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ABSTRACT

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How the provision of unemployment benefits affects employment and unemployment is a debated issue. In this paper, we aim at complementing theoretical and empirical contributions to this debate with a laboratory experiment: We simulate a job market with search effort and labor force participation decisions while varying the maximum length of unemployment benefit eligibility. Our results reveal two separable, opposing effects: Individuals within the labor force search with lower effort when unemployment benefits are extended. However, individuals are more likely to participate in the labor force and to actively search for a job. Concerning employment, the second effect dominates so that unemployment benefits raise employment.

Keywords: Job Search, Employment, Labor Force Participation, Unemployment Insurance, Economic Recession, Laboratory, Experiment

JEL classification: E70, J21, J65

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1 Introduction

If and how strongly the generosity of unemployment benefits affects unemployment and employment is regularly the subject of heated policy debates, especially but not only during recessions and economic crises. During recessions it is harder for unemployed workers to find a job, unemployment spells get longer and therefore, some argue, the eligibility of unemployment benefits should be (temporarily) extended. Others fear that this reduces the search effort of unemployed workers and thus makes the problem of high unemployment even worse. This debate has sparked many empirical studies, with, however, very mixed and inconclusive results. We contribute to this debate by providing new evidence based on a laboratory experiment. We find that the generosity of unemployment benefits reduces search effort but also makes workers more willing to search actively for a job. In our experiment the second effect dominates the first one so that unemployment benefits raise the employment rate.

During the Great Recession eligibility for unemployment benefits was extended in many US-states and subsequently rolled back during the recovery. This has led to a surge in empirical studies using the extension in eligibility and/or its roll-back as quasi-natural experiment. However, the results in these studies are very mixed and inconclusive. Whereas Hagedorn et al. (2015a,b), and Johnston and Mas (2018) found large and significant positive effects of unemployment benefit eligibility on unemployment, Boone et al. (2018), Chodorow-Reich and Karabarbounis (2018), Coglianese (2015), Farber and Valetta (2013), Rothstein (2012) and Farber et al. (2015) found either small, insignificant or even negative effects. This inconclusiveness of the empirical literature motivates our new perspective on this issue, using evidence from a laboratory experiment in a fictional labor market meant to mimic the main channels through which unemployment insurance generosity affects employment. The main advantage of the laboratory approach is that we can study the effect of interest (here: The impact of unemployment benefit generosity on job search, labor force participation, and employment) in a controlled environment (Cox and Oaxaca, 2008; Falk and Heckman, 2009; Falk and Fehr, 2003).

There are two direct channels via which the generosity of unemployment benefits (or unemployment insurance) affects employment.[1] On the one hand, a more generous unemployment benefit system (be it via a higher replacement rate or longer periods of eligibility) makes unemployment less painful and thus reduces the search effort of unemployed workers. On the other hand, a more generous unemployment benefit system makes participation in the labor force more attractive because receipt of unemployment benefits is typically conditional on active search for a new job (non-employed workers that do not search

[1] There are other indirect channels via which the unemployment benefit system can affect employment. Unemployment benefits might increase wages and thereby reduce the vacancy-posting of firms. They might stabilize the income of workers and thereby aggregate demand which in turn would raise vacancy-posting by firms. Covering these additional channels would require a much more complex experimental design and we therefore abstract from these channels in the present study but leave this for future research.

for a job are considered to be out of the labor force). The first effect reduces employment because it lowers the exit rate from unemployment. The second effect raises employment because it expands the labor force and thus the number of searching workers.[2]

The aim of our analysis is to test the two channels discussed above, the effect on search effort and the effect on labor force participation, in a laboratory experiment. An advantage of this approach is that it is not prone to data-quality and endogeneity issues, potential explanations for the inconclusiveness of the empirical studies cited above. In the laboratory, we are able to directly control the economic environment including the eligibility of unemployed workers for unemployment benefits. Furthermore, and in contrast to empirical studies cited above, we directly observe the behavior of interest (job search effort and labor force participation) under incentive-compatible conditions.

Before we run the experiment, we develop a simple model that is meant to capture our main variables of interest and that we use to derive hypotheses about labor market behavior that will be tested in the laboratory. Since our interest is the behavior of workers without a job, we assume that a job lasts for only one period, i.e., at the beginning of a period each worker is unemployed. She then has the choice to actively search for a job or enjoy an exogenous income of 'home production' that is drawn each period from a random distribution but known at the time of the decision. If the worker decides for home production, she is considered out of the labor force, loses any eligibility to receive unemployment benefits, and does not have a chance to find a job.[3] If the worker decides to search for a job, she has to choose her search effort. Higher search effort implies better chances to find a job, but the cost of search effort is increasing exponentially (which implies interior solutions). In case of successful search the worker receives an exogenously given wage. In the case of unsuccessful search the worker can receive unemployment benefits but only for a limited number of periods (whenever the worker finds a job eligibility is reset to its maximum).

In this simple model we derive several hypotheses about how the generosity of the unemployment benefit system and the state of the business cycle affect the labor force participation decision and the search effort of searching workers: during a recession labor force participation and search effort go down; longer eligibility to receive unemployment benefits reduces search effort but raises labor force participation; regimes with longer benefit eligibility and reforms that raise benefit eligibility likewise lower search effort but increase labor force participation.

Our experimental design mimics this model and tests the hypotheses via four different treatments. In all treatments the subjects of the experiment play

[2]The unemployment rate, which is defined as the share of unemployed workers in the labor forces, ignores the second effect is thus only an insufficient statistic for evaluating the effects of unemployment insurance. And indeed Farber and Valetta (2013) and Rothstein (2012) find that the small increase in unemployment they obtain in their analyses is primarily due to the fact that more workers are looking for a job and not due to a lower job-finding rate.

[3]In the data there is some movement between workers out of the labor force and employment but for the purpose of out study this is irrelevant.

a repeated game (for a total of 70 periods) in which they first observe their value of home production for the given period, then have to decided whether they want to search for a job and if they do with how much effort they want to search. All treatments start out with a 'normal' state of the labor market, go through a 'recession' with reduced job-finding rates, and then go back to 'normal' times. The treatments differ in the extent of benefit eligibility. Two treatments start out with high eligibility (6 periods) and two start out with low eligibility (3 periods). Furthermore, treatments differ in how they react to the recession-period. In one treatment eligibility is reduced from 6 to 3, in one treatment it is increased from 3 to 6 and in the two remaining treatments eligibility stays fixed.

Using this experimental design we are able to test how recessions affect search behavior, how the remaining benefit eligibility and how maximum benefit eligibility affect search behavior and how temporary adjustments during crises affect search behavior. Most of our hypotheses are confirmed. Remaining benefit eligibility raises labor force participation but lowers search effort. Thus our experiment confirms that unemployment benefits have counteracting effects on employment. However, we find that the first effect dominates the second effect one so that unemployment benefits raise employment. Likewise, maximum benefit eligibility raises labor force participation and lowers search effort but this effect is relatively weak. Concerning the effects of changes in benefit eligibility during crisis we find an interesting asymmetry: while reducing benefit eligibility makes unemployed workers search harder, extending eligibility does not have detrimental effects on search effort. One result of the experiment is clearly counter to our hypothesis from the experiment: in the laboratory the search effort of active searchers goes up during a recession and not down as our theory would predict. Note, however, that this resembles previous results in the literature like the one in the study of Camerer et al. (1997) who showed that taxi drivers increase their working hours on bad days.

Apart from the empirical literature on the effects of unemployment benefits on unemployment and employment mentioned above, our paper is related to the experimental literature that studied behavior in the context of labor markets, primarily related to investigations of job search models and the fair-wage hypothesis.

Several experimental investigations of job search models exist where subjects have either to accept a job with an exogenously determined wage, or stay unemployed and wait for the next offer (Braunstein and Schotter, 1982; Schotter and Braunstein, 1981; Cox and Oaxaca, 1989, 1990; Boone et al., 2009). The main conclusion drawn from these studies is that the observed behavior and reactions toward changes in the environment are close to the theoretical predictions of optimal search.[4] Our approach differs in important aspects: In the literature, job search is typically a series of binary decisions (acceptance or rejection of a job) and thus subjects only play a passive role in the act of job

[4]This literature has been reviewed and discussed in Camerer (1995), Cox and Oaxaca (2008) and Duffy et al. (2008).

search. In contrast, our experiment is motivated by the matching model of Diamond, Mortensen and Pissarides (see, e.g., Pissarides (2000)) and subjects need to make a continuous effort decision which influences their job finding probability. Thus while existing studies focus on the choice of workers who already have a job-offer, our study focuses on the decisions of workers that lead to such offers. Furthermore, subjects in our experiment have the choice to not participate in the labor market and stay out of the labor force. As outlined above, out of the labor force is an important labor force state and needs to be taken into account for evaluations of labor market institutions. There is also empirical evidence by Flinn and Heckman (1983) indicating that unemployment and out of the labor force are behaviorally distinct labor force states and it appears crucial to study them separately in the context of job search. To the best of our knowledge, we are the first considering endogenous search effort and the state of being out of the labor force in an experimental investigation of labor market models.

The fair wage-effort hypothesis as developed by Akerlof and Yellen (1990) suggests that workers compare their actual wage to a fair-wage-reference point. If their actual wage falls short of this reference point, workers show a reciprocal performance response by reducing their work effort. Experimental evidence in favor of the fair-wage-hypothesis has been provided by Cohn et al. (2015) as well as by Gächter and Thöni (2010). While in our experimental set-up the wage is fixed across treatments, we manipulate the generosity of the unemployment benefit system and thereby might exogenously change the workers' fair-wage-reference point. When the generosity of the unemployment benefit system increases, the fair-wage-reference point might be shifted upward and workers consequently may reduce their effort (in our case search effort) if the given wage falls short to this reference point. Hence, the fair-wage-effort hypothesis is in line with our finding that an increase in the generosity of the unemployment benefit system decreases search effort within the labor force.

The rest of the paper is structured as follows. In section 2 we introduce the theoretical model and derive the hypotheses to be tested in the laboratory. In section 3 we describe the experiment. In section 4 we discuss the results of the experiment, while section 5 concludes.

2 Model

This section describes the model that forms the basis of the laboratory experiment and derives theoretical hypotheses that will later be tested. The model resembles the search and matching model with endogenous search effort and a labor force participation decision (Pissarides, 2000), but since we are interested in the search behavior of unemployed workers, we do not model the firm-side, i.e., we do not model the vacancy-posting decision of firms and we do not model the wage negotiation process, treating wages as exogenous and constant.

Workers are assumed to be risk-neutral. At the beginning of each period a worker faces the decision of whether she wants to participate in the labor market or not. If she does not participate in the labor market, the worker receives a

randomly distributed payoff from home production. If she participates in the labor market, she has to choose a level of costly search effort e. Higher search effort implies a higher probability to find a job, but is also more costly. If job search is successful the worker earns an exogenously given wage w. Otherwise the worker is entitled to receive unemployment benefits $b < w$ for a limited number of periods. Note that only workers who have actively searched for work are eligible to receive unemployment benefits. We solve the model backwards, i.e., we describe first the search effort decision of a worker who is active in the labor force and then describe the labor force participation decision.

2.1 Choice of search effort

Workers can at most receive T periods of uninterrupted unemployed benefits, i.e., if the worker does not find a job within T periods, she is no longer eligible to receive unemployed benefits. Finding a job implies eligibility for another T periods of unemployment benefits. Due to limited eligibility, the value of an unemployed worker depends on the remaining periods she can still get unemployment benefits. Let us define the value of a worker who is still eligible for $t > 0$ periods of unemployment benefits and actively searches for a job as V_t^s. This value is described by the following value function

$$V_t^s(a;e) = (1 - p\,(a,e))\,(b + \beta V_{t-1}) + p\,(a,e)\,(w + \beta V_T) - c(e) \qquad (1)$$

where $p(a,e)$ is the probability to find a job (depending on search effort e and a business cycle shifter a),[5] $c(e)$ with is the cost of providing search effort, and β is a discount factor. With probability $1-p$ the worker is not successful in finding a job. In this case she receives unemployment benefits, but the number of periods for which she is still eligible to receive unemployment benefits is reduced by 1. Therefore, the workers gets the discounted future value V_{t-1}. With probability p the worker is successful in finding a job. In this case she receives the wage w and is eligible for unemployment benefits for another full T periods. Therefore, the worker gets the discounted future value V_T. In any case the worker has to pay search effort. Note that the value functions on the right-hand side of the equation are distinct from the value function on the left-hand side of the equation (they do not contain the superscript s) because they denote the value of the worker prior to the decision to participate in the labor force that will be described further below.

For the functional form of p we assume $\partial p/\partial e > 0$, $\partial p/\partial a > 0$, and $\partial^2 p/(\partial e \partial a) < 0$). The probability to find a job is increasing in search effort and is larger in a boom (and thus smaller in a recession), and search effort pays off more in a boom. For the functional form of c we assume $\partial c/\partial e > 0$, and $\partial^2 c/\partial e^2 > 0$, i.e., the cost of search effort is increasing at an increasing rate.

For a worker that is no longer eligible to receive unemployment benefits, i.e.,

[5] Typically during a boom wages also go up, we abstract from this channel to keep the model simple.

$t = 0$, the value function becomes

$$V_0^s(a;e) = (1 - p(e))\,\beta V_0 + p(e)\,(w + \beta V_T) - c(e) \tag{2}$$

The worker will no longer receive any unemployment benefits until she is successful in finding a job and thus can reinstate benefit-eligibility.

Obviously the value of a worker who is no longer eligible for unemployment benefits given in equation 2 is smaller than the value of a worker who still is eligible given in equation 1, since the latter earns income during unemployment and the former not. Similarly, the value of a worker who is eligible to receive unemployment benefits increases with the number of periods of eligibility. This is immediately intuitive since longer eligibility implies a higher potential for receiving unemployment benefit payments, but to see this more formally take the difference of value functions of two workers with periods of eligibility $t_1 = 2$ and $t_2 = 1$ but identical search effort:

$$V_2^s(e) - V_1^s(e) = (1 - p(e))\,\beta\,(V_1 - V_0)$$

which is positive since we already established $V_1^s > V_0^s$. By further iteration it is clear that:

Lemma 1 *The value of a worker is larger, the longer the remaining eligibility to receive unemployment benefits.*

Naturally, the value of a worker is also higher during a boom, in times of high a, because this improves the chances to get a job

$$\frac{\partial V_t^s}{\partial a} = \frac{\partial p}{\partial a}\,(w - b + \beta V_T - \beta V_{t-1})$$

which is positive since $w > b$ and $V_T > V_{t-1}$. This result is summarized in Lemma 2

Lemma 2 *The value of a worker is larger, the higher a i.e., the better the state of the business cycle.*

Depending on whether the worker is still eligible to receive unemployment benefits the optimal search effort of a worker who is active in the labor force is determined by one of these two first order conditions:

$$\frac{\partial c}{\partial e} = \frac{\partial p}{\partial e}\,(w - b) + \frac{\partial p}{\partial e}\beta\,(V_T - V_{t-1}) \tag{3}$$

$$\frac{\partial c}{\partial e} = \frac{\partial p}{\partial e} w + \frac{\partial p}{\partial e}\beta\,(V_T - V_0) \tag{4}$$

The marginal cost of providing more search effort has to equal the marginal benefit. The benefit of providing more search effort is the higher probability to find a job where the benefit of a job is not only the higher income (since $w > b$)

but also the implication that eligibility for future unemployment benefits is increased (the gain in the value function signified by the last term).

Comparing equations 3 and 4 it is immediately clear that workers that are no longer eligible to receive unemployment benefits have stronger incentives to provide search effort. First, the direct payoff of work is larger because their income in the case of unemployment is zero (their opportunity cost is lower). Second, the gain in the future value is at least as large, i.e., $V_{t-1} \leq V_0$, with strict inequality for $t > 1$. Similarly, the incentives to provide search effort are stronger, the closer a worker is to exhausting its eligibility, since by Lemma 1 the gain in future value is higher. This is summarized in our first hypothesis that is to be tested in the laboratory:

Hypothesis 1 ***Search effort and benefit eligibility****. Search effort is a decreasing function of the number of periods that the worker is still eligible to receive unemployment benefits.*

Basically a worker that can still receive unemployment benefits for quite some time is more relaxed about being unemployed than a worker whose eligibility is close to expiring.[6] Note, however, that this relationship is not linear. The effect is expected to diminish as the number of periods left increases. As an extreme example, for a worker whose eligibility is still 100 a drop by one period does not make much of a difference, but for a worker who has only two periods left a further drop is much more important. Hypothesis 1 directly implies two related but distinct hypotheses that we will also test in the laboratory:

Hypothesis 2 ***Search effort and benefit regime****. An unemployment benefit regime that allows for longer eligibility implies lower average search effort.*

Workers who become newly unemployed are automatically eligible to receive the maximum number of periods of unemployment benefits. If this number is higher, according to hypothesis 1 these workers have lower incentives to search for a job and thus average search effort will also be lower.

Hypothesis 3 ***Search effort and benefit reform****. A reform to the unemployment benefit system that extends the eligibility to receive unemployment benefits lowers search effort.*

It is precisely this channel that critics of eligibility-extensions have in mind. By reducing the pressure on unemployed workers, they reduce the incentives to search for work and thus raise unemployment. In the laboratory experiment we will test the first hypothesis by comparing workers with different benefit eligibility, the second hypothesis by comparing two regimes with different maximum numbers of eligibility and the third hypothesis by changing the maximum number of eligibility.

[6] In practice workers might still be eager to find a new job because they fear loss of human capital or stigma, but these effects are not captured by our model.

Optimal search effort also depends on the state of the business cycle. By assumption search effort pays off more during a boom so that optimal search effort is higher during a boom

$$\begin{aligned}\frac{\partial^2 c}{\partial e \partial a} &= \frac{\partial^2 p}{\partial e \partial a}(w-b) + \frac{\partial^2 p}{\partial e \partial a}\beta\left(V_T - V_{t-1}\right) > 0 \\ \frac{\partial^2 c}{\partial e \partial a} &= \frac{\partial^2 p}{\partial e \partial a} w + \frac{\partial^2 p}{\partial e \partial a}\beta\left(V_T - V_0\right) > 0\end{aligned}$$

This result is summarized in our fourth hypothesis

Hypothesis 4 ***Search effort and the business cycle****. Search effort is higher during a business cycle boom and lower during a recession.*

Having discussed the decision to provide search effort for workers that are active in the labor force we will now proceed to the labor force participation decision.

2.2 Labor force participation decision

At the beginning of each period workers have to decide whether they want to participate in the labor force and search for a job or whether they want to stay out of the labor force and receive home production χ instead. The value of home production is drawn each period from a random distribution with continuous probability density function $f(\chi)$ with infinite support and cumulative density function $F(\chi)$. The value of home production is known at the time the labor force participation decision is taken.[7] If a worker decides to not be active in the labor force she loses any claims on unemployment benefit payments (but can still can regain them later by taking up a job).

The assumption of a continuous randomly distributed value of home production implies that workers above a certain threshold value will choose to be out of the labor force - for them home production is so profitable that it does not pay off to search for a job. To the contrary, workers below that threshold will choose to be active in the labor force. Let us denote this threshold by $\widetilde{\chi}_t$. Because the value of being active in the labor force depends on the eligibility for unemployment benefits t, the threshold will also depend on eligibility. Given this threshold the value of being out of the labor force is defined by the following value function (the superscript i stands for inactive):

$$V^i(\chi) = \chi + \beta \int_{\widetilde{\chi}_0}^{\infty} V^i(\chi)\, dF(\chi) + \beta F\left(\widetilde{\chi}_0\right) V_0^s \tag{5}$$

A worker who is currently out of the labor force earns home production χ. Her future value depends on the realization of χ in the next period. If the value

[7] The assumption of individually heterogeneous home production implies an interior solution for the number of workers in the labor force. Otherwise, all workers would either be in or out of the labor force.

of χ next period is below the threshold $\widetilde{\chi}_0$ (which happens with probability $F(\widetilde{\chi}_0)$), she will participate in the labor force and get the value V_0^s. Both the threshold and the value of labor force participation are conditional on $t = 0$, because being out of the labor force in the current period implies that the worker is not eligible to receive unemployment benefits in the following period. If the value of χ next period is above the threshold $\widetilde{\chi}_0$, the worker will again stay out of the labor force. In that case the value of the worker depends on the (yet unknown) realization of χ next period and thus we have to take the integral over the distribution of χ.

Having defined the value of a worker who is out of the labor force, we can now consider a worker's labor force participation decision. A worker who is still eligible to receive unemployment benefits for t periods will choose to be active in the labor force whenever the value of doing so is larger than the value of being outside of the labor force, i.e., whenever

$$V_t^s > V^i(\chi_t)$$

while at the threshold value the worker is indifferent between being in or out of the labor force

$$V_t^s = V^i(\widetilde{\chi}_t) \tag{6}$$

implying that the probability to participate in the labor force is

$$lfp_t = F(\widetilde{\chi}_t) \tag{7}$$

Note that the future value of being out of the labor force in equation 5 does not depend on a worker's current eligibility for unemployment benefits. The reason is that the eligibility is lost when exiting the labor force. Therefore, it is only the value of being in the labor force that makes the threshold $\widetilde{\chi}_t$ depend on t. In Lemma 1 we have shown that the value of a worker increases in eligibility t. This immediately implies that the threshold $\widetilde{\chi}_t$ and the probability to participate in the labor force also increase in t. Intuitively, a worker who is eligible for unemployment benefits longer has more to lose from exiting the labor force and therefore is more reluctant to do so.

Hypothesis 5 ***Labor force participation and benefit eligibility****. The probability to participate in the labor force is an increasing function of the number of periods that a worker is still eligible to receive unemployment benefits.*

and by implication:

Hypothesis 6 ***Labor force participation and benefit regime****. An unemployment benefit regime that allows for longer eligibility implies higher labor force participation.*

Hypothesis 7 ***Labor force participation and benefit reform****. A reform to the unemployment benefit system that extends the eligibility to receive unemployment benefits raises labor force participation.*

From this discussion it is clear that the effect of unemployment benefits on employment is ambiguous in our model. On the one hand, unemployment benefits induce workers to actively search for a job because they can only receive this government transfer if they are active. This effect clearly tends to increase the employment rate. On the other hand, unemployment benefits reduce the effort with which workers search for a new job. Standard models because often ignore the labor force participation decision and thus are restricted to the second effect.

Finally, we turn to effect of business cycles on labor force participation. By Lemma 2 we have seen that the value of workers in the labor force increases with the state of the business cycle a, because it becomes more likely that a worker finds a job for given search effort. This leads us to a final hypothesis:

Hypothesis 8 ***Labor force participation and the business cycle****. The labor force participation rate is higher during business cycle booms and lower during recessions*

3 Experiment

3.1 Experimental Design

The experiment resembles the above described theoretical model. In each period, the participant has to decide about participating in the labor force and – conditional on participating in the labor force – her search effort. When making these decisions the participants know the the value of home production, they know the job-finding rate that a certain level of search effort implies and they know how costly their chosen search effort is.

We consider variations in unemployment benefits both among different groups of participants as well as within one participant by temporarily reforming the unemployment benefit regime during the experiment. This feature allows direct comparisons across different unemployment benefit systems as well as path dependent analyses: How do subjects respond to a reform of the unemployment benefit system? How do subjects' previous experiences shape their behavioral response to a reform? In reality these are relevant questions from a policy perspective when an unemployment benefits system is already in place.

In our experiment, the eligibility for unemployment benefits is either high (H, max periods of benefits = 6) or low (L, max periods of benefits= 3). After 25 periods a recession hits the economy lowering the job finding rate. At this stage, we introduce four treatments: In the treatments LL and HH, the max periods of unemployment benefits is unchanged during the economic recession. In the treatments HL and LH, the eligibility for unemployment benefits is changed temporarily as a response to the recession. In the treatment LH the duration

of unemployment benefits is extended; in the treatment *HL*, the duration to receive unemployment benefits is reduced. These treatments are supposed to mimic economic policy reactions to recessions which are either an extension or a contraction of public services. After 20 periods of economic recession, the economy returns to its original state for 25 periods including the job finding probability and the unemployment benefit system. Please note that our experiment consists in total of 70 periods. In our analysis, however, we include only 60 periods by removing the first and last five rounds. This was done to remove any potential bias in our data due to learning and testing at the beginning of the experiment, and any bias due to last-round-effects which are often reported in experimental work. We chose this procedure ex ante and therefore included only 20 periods of economic recession to have a balanced structure.

Participants collected points in the experiment which were summed up (earnings from wages and home production as well as the cost of search effort were expressed in points). At the end of the experiment, these points were converted into euro with the following exchange rate: 200 points = 1 euro.

3.2 Calibration

This section describes how we parameterize the model described in section 2 to be able to use it in the laboratory experiments. For the experiment we assume that effort is an integer in the interval $[1, 10]$. This assumption provides the subjects of the experiment enough choice to allow for diversity without overburdening them with too much detail. The benefit of home production is also an integer to be described further below.

The parameter β is irrelevant for the experiment, but it matters for the calibration of the model and for determining optimal search in the model. We choose the standard value 0.99. The absolute level of the wage is also irrelevant, what matters is its level relative to other parameters in the model that are calibrated. We are therefore free to choose the wage and pick $w = 50$. The replacement rate of unemployment benefits is set to 0.65, the standard value for European countries, so that $b = 32.5$.

The functional forms that we choose for the job finding rate p and the cost of effort c are the following:

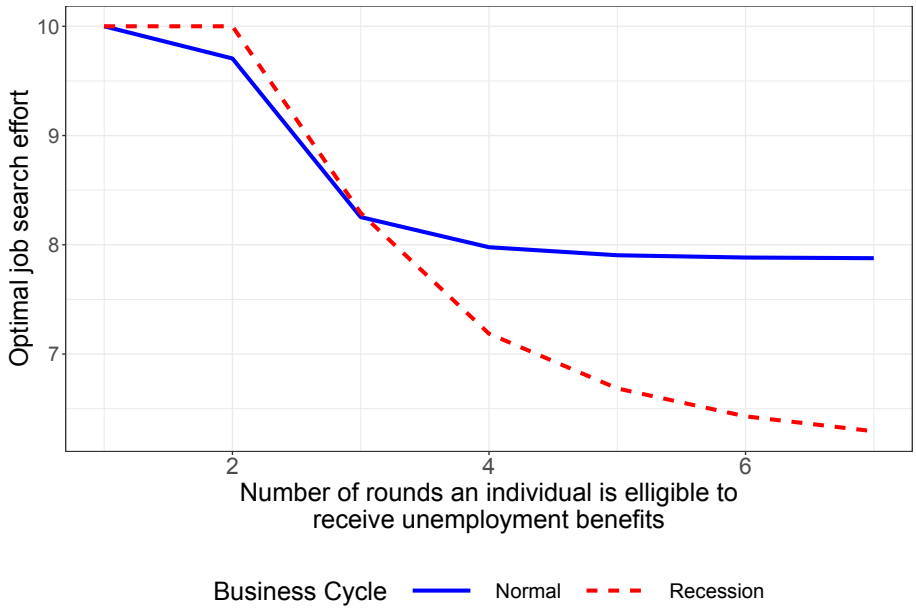
$$\begin{aligned} p(e) &= ae \\ c(e) &= \psi e^2 \end{aligned}$$

satisfying our assumptions above that the cost of search effort is rising at an increasing rate and that the job finding rate depends positively on both effort and the business cycle with both being complements. The parameter $\psi = 0.1$ is chosen such that the optimal search effort of newly unemployed workers is 8, a sufficiently high but interior number. The parameter a represents the state of the business cycle and can take on two values, a_H in normal times and a_L during recession. We choose a_H such that it implies that the job finding rate for newly unemployed workers with optimal search effort is close to 70%. We target

this relatively high rate because jobs in our experiment last for only one period and thus substantially lower rates might be too discouraging. We thus choose $a_H = 0.09$ implying a job finding rate of 0.72 for optimal search effort and of 0.9 for maximum search effort. Thus a worker with maximum search effort has a high chance of finding a job but is still not certain to do so. Finally, we choose $a_L = 0.07$ such that the job finding rate during the recession is substantially reduced.

Given this parameterization we can calculate optimal search effort for different levels of benefit eligibility. Figure 1 illustrates the results for both normal times and recession times (allowing effort to take non-integer values not larger than 10). The figure makes clear that eligibility does not matter much for higher levels of eligibility, especially during normal times: the line is flat with optimal search effort staying close to $e = 8$. Only when eligibility is close to expiring it begins to matter so that workers search with more effort. The graph also illustrates that optimal search effort is substantially lower during the recession but only for workers with relatively high benefit eligibility left.

Figure 1:
Optimal search effort in the model in dependence of benefit eligibility.



With these numbers we can also calculate the corresponding value of unemployed workers. Based on these results we assume that the payoff from home production is drawn from a uniform distribution on the interval $[29, 48]$. This choice implies that the value of a subject that is permanently out of the labor force is close to but below the value of a worker that is in the labor force. It

also allows for a wide range of home production payoffs to expect sufficient variation in the choice of labor force participation. The results of our experiments validate our choices.

3.3 Experimental Sessions

We recruited a total of 223 participants from the student population of the Kiel University (Mean age= 25 years, SD = 4.6). The participants were randomly assigned to the four different treatments (see Table 1). Recruitment was organized via hroot, a software platform for organizing and managing experiments (Bock et al., 2014). Data was collected between 7th of February 2019 and 13th of February 2019 in six sessions. Each session lasted about 1 hour and the average compensation for participation was 12 euro. The experimental task was programmed in oTree, a Python based software framework for experiments in economics (Chen et al., 2016).

Table 1: Participants per treatment

Treatment	N
HH	65
HL	48
LH	48
LL	62

3.4 Analysis

To account for the panel structure of our data and the resulting dependencies in observations, we use cluster-robust standard errors, adjusted for clustering at the participant level, as suggested by Moffatt (2015).[8]

4 Results

4.1 Verification of the incentive structure

Before testing our main hypotheses, we first verify that some basic incentives within our experiment worked into the predicted directions. We consider the variables *economic recession* and *home production* to be fundamental drivers of behavior in our experiment. During the economic recession, the job finding probability for a given search effort drops which should have a negative impact on job search effort and labor force participation across treatments (see hypotheses 4 and 8). Likewise, a higher current level of home production makes participation in the labor force less attractive and thus should reduce the labor force participation rate (see equations 5, 6 and 7). Our model does not imply

[8] Cluster-robust standard errors were calculated with the STATA command *vce(cluster clastervar)*.

an effect of current home production on the search effort of active searchers, because draws from the random distribution of home production f are independent over time, but if subjects interpret current home production as a signal for future home production they are expected to reduce search effort if home production is higher (because not having a job is less painful).

Check 1 *A higher value of home production reduces search effort and labor force participation*

Participants respond to the value of home production in the predicted way: When the value of home production is higher, individuals are less likely to participate in the labor force ($\beta = -0.110,\ SE = 0.005,\ p < 0.001$, see Model 1 in Table A.1).[9] The average marginal effect[10] is -0.03, i.e., if the value of home production increases by one unit, the probability of an individual being active in the labor force decreases roughly by three percentage points. The predicted probabilities of participating in the labor force against the value of home production from the probit model are plotted in Figure 2. From the figure we can see that the prediction explains the actual data very well. The mean value of home production is 38.5 points. At this level, the predicted probability of participating in the labor force is 69%. For the min (max) value of home production of 29 (48) points the predicted probability of participating in the labor force is 94% (30%). Thus, as expected, the effect of home production on labor force participation is quite strong.

Furthermore, individuals within the labor force provide significantly less search effort when the value of home production increases ($\beta = -0.078,\ SE = 0.011,\ p < 0.001$, see Model 1 in Table A.2). The mean value of job search effort is 6.3 and thus an increase in the value of home production by one unit decreases search effort within the labor force by roughly 1.2 percent. Note, however, that this effect is very small, which is to be expected because, as discussed above, there is at best an indirect effect of home production on search effort. Thus, we identify two, separable effects working into the same direction: Individuals are less likely to participate in the labor force when home production is more attractive and individuals within the labor force provide less search effort.

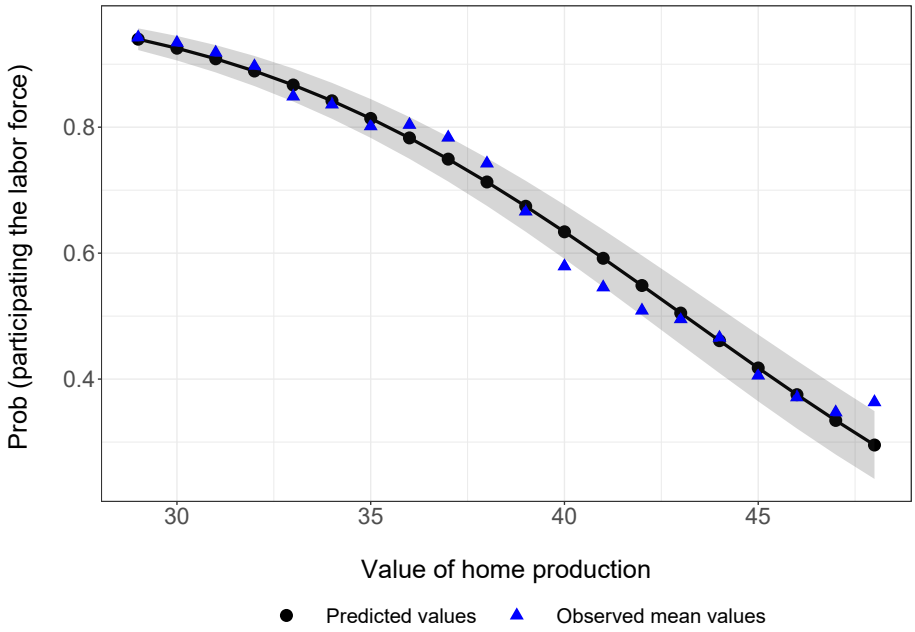
Check 2 *An economic recession negatively affects search effort and labor force participation*

Turning to the effects of economic recession we find that participants only partly react in the predicted way: Individuals are less likely to participate in the labor force during an economic recession ($\beta = -0.226, SE = 0.029,\ p < 0.001$, see Model 2 in Table A.1). This finding is in line with hypothesis 8. The predicted probability of participating in the labor force in the absence of the economic recession is roughly 69%. This probability drops during the

[9] The decision to be in the labor force is a binary variable, therefore we use a probit model.

[10] Predicted probabilities and marginal effects after the probit models were estimated with the STATA command *margins*.

Figure 2:
Predicted probabilities of participating in the labor force against the value of home production from the probit model. Shaded area indicates the 95% confidence interval.



economic recession to 61%, i.e., the economic recession reduces the probability of an individual participating in the labor force by roughly twelve percent.

However, participants that are actively looking for a job increase their efforts during the economic recession ($\beta = 0.482,\ SE = 0.101,\ p < 0.001$, see Model 2 in Table A.2). This is in contrast to our hypothesis 4 according to which search effort should decrease during a recession because job search is less productive, i.e., is successful at a lower rate for given search effort. This could be explained by a strong desire of some subjects to hold a job (maybe to avoid stigma) even during bad times so that they increase their search effort to counteract the drop in job prospects that comes from the recession. Note that this resembles previous results in the literature like the one in the study of Camerer et al. (1997) who showed that taxi drivers increase their working hours on bad days.

These behavioral adjustments strengthen the drop in employment that occurs during the recession. To quantify this effect note that average observed labor force participation and search effort are 70% and 6.3 respectively during normal times. This amounts to an average employment rate of 40%.[11] Without behavioral response (i.e., holding search effort and labor force participation

[11]The average employment rate during normal times (recession) is given by the average labor force participation rate × average search effort × 0.09 (0.07).

constant) the recession would lower the employment rate to 31%. If only labor force participation adjusted in response to the recession, then the employment rate would drop to 27%, by approximately 10% more. The increase in search effort, however, serves to push up the employment rate to 28%. Thus while the behavioral response of the subjects strengthens the drop in employment, the fact that both responses counteract each other dampens the total effect.

Our analysis so far shows that both the level of home production and the economic recession are fundamental drivers of behavior within our experiment. Therefore, we include these variables as controls in all subsequent analyses.

Note that the regression models show a negative time trend in almost all specifications (Rec_perdio is significantly > 0). This means that both search effort and labor force participation are trending down over the course of the experiment, suggesting that participants across treatments move to a new long-term equilibrium where search effort and labor force participation are lower. Adaption of behavior over the course of an experiment is often observed in experimental work and one explanation is learning (Moffatt, 2015). To avoid a potential confound due to learning, we employ a full factorial design, i.e., all possible combinations of the factors of interest (the unemployment benefit regime). Additionally we include a time variable (Rec_period) into our regression models to account for these temporal dynamics.

4.2 Main results

Having established that basic incentives within our experiment worked into expected directions, we now draw our attention to the main hypotheses formulated in section 2. In doing so we use a slightly different structure than in that section, first discussing the relevance of benefit eligibility for both search effort and labor force participation, then the relevance of the regime, and then the effects of policy changes.

4.2.1 Benefit eligibility

Our first hypothesis was related to the relationship between search effort and the eligibility to receive unemployment benefits:

Hypothesis 1 ***Search effort and benefit eligibility****. Search effort is a decreasing function of the number of periods that the worker is still eligible to receive unemployment benefits.*

We test this hypothesis by regressing search effort on the remaining number of periods that a worker is still eligible to receive unemployment benefits, controlling for the state of the business cycle and the value of home production (see Table A.3).

Table A.3 shows that individuals within the labor force provide less search effort when more rounds of unemployment benefits are available ($\beta = -0.182,\ SE = 0.037,\ p < 0.001$, see Model 1 in Table A.3). The coefficient has the expected

sign and is statistically and economically significant. The size of the coefficient suggests that for an individual within the labor force an additional period of unemployment benefit eligibility decreases search effort by about three percent. Note that this effect is much larger than the effect of home production ($\beta = -0.078$), but not too much smaller than the effect of recession ($\beta = -0.482$). The effect of three additional periods of benefit eligibility, which resembles our treatment variation, is stronger than the effect of recession. Given that a recession in our experiment has a very strong effect on the job-finding rate (reducing it by 23%), the effect of benefit eligibility appears actually quite strong. Please note that we can robustly replicate this effect in a sample restricted to the first 20 periods, i.e., without any experience of an alternative benefit regime ($\beta = -0.193,\ SE = 0.044,\ p < 0.001$, see Model 1 in Table A.4).

In Figure 3 we plot the predicted job search effort against the number of periods that an individual is still eligible to receive unemployment benefits. This figure is complemented by the observed data from the treatments *HH* and *LL*.[12] In both treatments, we see that search effort is a decreasing function of the number of rounds the worker is still eligible to receive unemployment benefits, although search effort increases for high unemployment benefit eligibility on average. The latter effect is partly explained by a selection effect (individuals with high search effort do find a job and drop out of the sample for lower periods of eligibility). Note that this observed behavior is also in line with the discussion after hypothesis 1 and the illustration in section 3.2 that benefit eligibility primarily matters for search effort when it is already very low. In the appendix, we replicate the negative effect of the remaining unemployment benefit eligibility on search effort for various specifications, such as for those individuals who unsuccessfully search (see Figure 5) or the whole sample in the first 20 periods (see Figure 6).

We next turn to hypothesis 5 that deals with the effect of benefit eligibility of labor force participation:

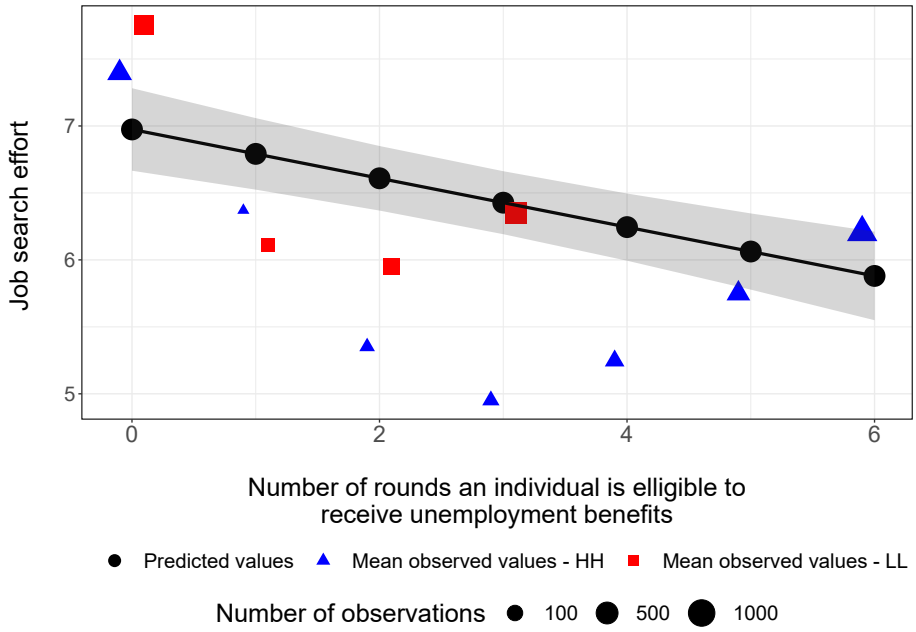
Hypothesis 5 ***Labor force participation and benefit eligibility***. *The probability to participate in the labor force is an increasing function of the number of periods that a worker is still eligible to receive unemployment benefits.*

We find that the probability to participate in the labor force is an increasing function of the number of periods that a worker is still eligible to receive unemployment benefits ($\beta = 0.258,\ SE = 0.016,\ p < 0.001$, see Model 1 in Table A.5).[13] The average marginal effect is 0.07, i.e., one additional round of unemployment benefits increases the likelihood of staying in the labor force by seven percentage points. The predicted probabilities of participating in the labor force against the number of rounds an individual is still eligible to receive unemployment benefits are plotted in Figure 4. The predicted probabilities of

[12] We focus on these two treatments because they do not experience changes in the benefit regime.

[13] Note that we measure remaining eligibility before the labor force participation decision takes place, because a decision to be inactive implies ineligibility.

Figure 3:
Predicted and actual job search effort against the number of rounds an individual is eligible to receive unemployment benefits. Shaded area indicates the 95% confidence interval.



participating in the labor force range between 94% and 50% for the max and min number of periods respectively.

When we compare the predicted probabilities with the observed data from the treatments HH and LL, we observe that the above described effect is mainly driven by a lower labor force participation rate for individuals who are ineligible to receive unemployment benefits. For positive values of eligibility the curve in Figure 4 is rather flat while labor force participation sharply drops for individuals that are no longer eligible to receive unemployment benefits. It seems for the decision to participate in the labor force it primarily matters whether benefits are available or not. As an alternative we therefore model this decision with a dummy variable where 1 indicates that the worker is eligible to receive unemployment benefits and zero indicates that the worker is ineligible to receive unemployment benefits ($\beta = 1.387,\ SE = 0.069, p < 0.001$, see Model 2 in Table A.5). The coefficient is statistically significant and large indicating that the labor force participation rate is 37 percentage points higher if a workers is eligible to receive unemployment benefits. This illustrates that it is not an innocuous assumption to ignore the labor force participation decision.

The importance of benefit eligibility for labor force participation is confirmed by looking at the actually observed and averaged data from our experiment in

table 2. The table compares the labor force participation rate (share of searching workers in the total population), the employment rate (share of employed workers in the total population) and the unemployment rate (share of unemployed workers in the labor force) for workers that are eligible to receive unemployment benefits and for those that are not. The table demonstrates very well the two counteracting forces of unemployment benefits. On the one hand, unemployment benefits reduce search effort and thus lead to a substantially higher unemployment rate. On the other hand, unemployment benefits motivate workers to actively search for a job leading to a much larger labor force participation rate. What matters for economic output is the employment rate and here the second effect clearly dominates so that the employment rate is higher for workers eligible to receive unemployment benefits. The positive effect of benefit eligibility on employment is statistically confirmed both when treating benefit eligibility as a continuous variable ($\beta = 0.074,\ SE = 0.009, p < 0.001$, marginal effect is $= 0.03$, see Model 1 in Table A.7) as well as when treating it as a dummy variable ($\beta = 0.421\ SE = 0.049, p < 0.001$, marginal effect $= 0.14$, see Model 2 in Table A.7). The effects of benefit eligibility on labor force participation and employment are replicated using a sample restricted to the first 20 periods in Tables A.6 and A.8

Table 2: Labor force participation and employment rate by unemployment benefit eligibility

Eligibility	Labor force participation	Employment rate	Unemployment rate
Yes	82%	42%	48%
No	44%	28%	37%

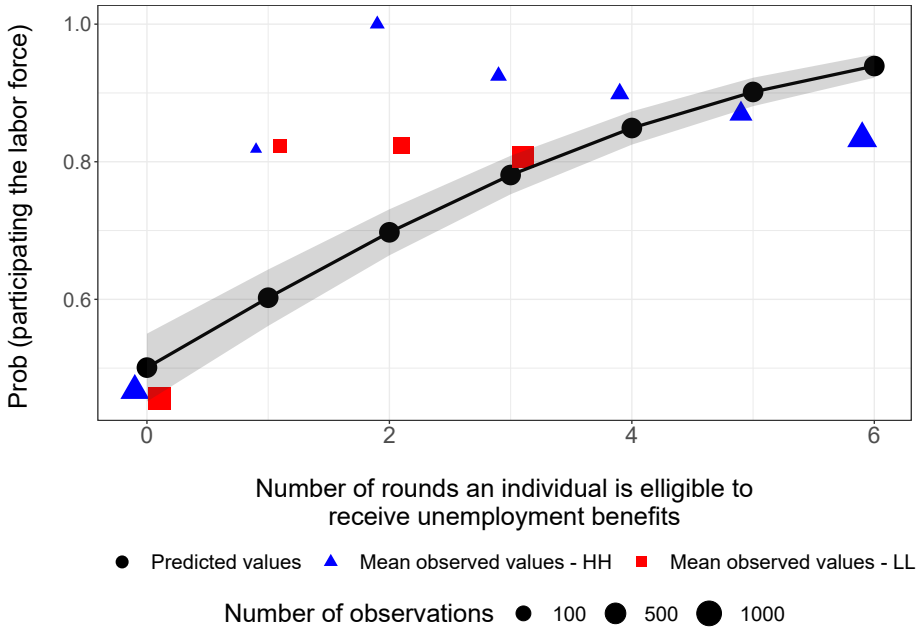
4.2.2 Benefit regime

In our experiment we used various treatments that differ with respect to the maximum length of benefit eligibility. This variation we will now use to test our hypotheses 2 and 6, starting with search effort:

Hypothesis 2 ***Search effort and benefit regime****. An unemployment benefit regime that allows for longer eligibility implies lower average search effort.*

In line with our previous results, an unemployment benefit regime with longer unemployment benefits duration, on average, lowers search effort within the labor force ($\beta = -0.395,\ SE = 0.191,\ p = 0.040$, see Model 2 in Table A.3). We can exploit features of our experimental design to verify the robustness of this effect: We observe a similar trend that conditional job search effort is significantly lower when the eligibility to receive unemployment benefits is larger in the first 20 periods of our experiment (i.e., without any experience of an alternative unemployment benefits regime, $\beta = -0.366,\ SE = 0.240,\ p = 0.129$, see Model 2 in Table A.4). Please note that in this specification we use less data

Figure 4:
Predicted probability of participating in the labor force against the number of rounds an individual is eligible to receive unemployment benefits from the probit model. Shaded area indicates the 95% confidence interval.



points and neglect any variation due to reforms of the unemployment benefits system.

Our second hypothesis concerning the unemployment benefit system focuses on labor force participation:

Hypothesis 6 ***Labor force participation and benefit regime.*** *An unemployment benefit regime that allows for longer eligibility implies higher labor force participation.*

We find a statistically significant and positive effect of maximum benefit eligibility on labor force participation ($\beta = 0.182,\ SE = 0.090, p = 0.043$, see Model 3 in Table A.5). The average marginal effect of an extension of unemployment benefits is about 5.4 percentage points. We can also replicate this effect in the first 20 periods of our experiment (i.e, without any experience of an alternative unemployment benefits regime; $\beta = 0.261,\ SE = 0.120, p = 0.040$, see Model 3 in Table A.6, marginal effect is 7.2 percentage points).

The observed data is reported in Table 3. Qualitatively the results are in line with table 2, high benefit eligibility leads to higher unemployment but also to higher labor force participation and higher employment, but table 3 also confirms the observation that the maximum length of benefit eligibility is

less important quantitatively. In fact, the difference in employment rates is not statistically significant as reported in Table A.7, Model 3. Thus, in our experiment it matters more whether unemployment benefits are available at all, and not so much what the maximum length of benefit eligibility is.

Table 3: Labor force participation and employment rate by unemployment benefit eligibility

Eligibility	Labor force participation	Employment rate	Unemployment rate
Low	64%	36%	43%
High	69%	37%	47%

4.2.3 Benefit reform

Having discussed the role of remaining benefit eligibility and the benefit regime, we now turn to the question how (temporary) changes in the unemployment insurance system affect search effort and labor force participation (hypotheses 3 and 7), again starting with the discussion of search effort.

Hypothesis 3 ***Search effort and benefit reform****. A reform to the unemployment benefit system that extends the eligibility to receive unemployment benefits lowers search effort.*

In our experiment, we included two treatments (HL and LH) in which the maximum eligibility of unemployment benefits is changed in response to the recession.[14] We do so because it is typically during times of economic stress that changes in unemployment benefits are contemplated. As discussed above eligibility to receive unemployment benefits is often increased in severe recessions in the US. To test for the effects of policy changes we use one of the treatments that did not experience a change in policy as the baseline (HH in Models 1 and 3 Table A.9 and LL in Models 2 and 4) and test the effects of changes in policy via interaction terms.[15] Our main coefficients of interest are the ones on HL×Recession in the regressions where HH is the baseline and on LH×Recession in the regressions where LL is the baseline. These regression coefficients illustrate by how much the change in search effort during the recession differs between treatments HH and HL or between LL and LH, resp. Thus these coefficients illustrate the effect of the change in policy.

Confirming the results above, the recession increases search effort within the labor force (Models 1 and 2 in Table A.9). Also in line with our previous findings, we find that a reduction of unemployment benefit eligibility during the recession (treatment HL vs. HH) significantly increases job search effort within the labor

[14] Remember that in treatment HL maximum eligibility is 6 in normal times and reduced to 3 during the recession, while in treatment LH it is 3 in normal times and 6 during the recession.

[15] The advantage of this approach is that we can directly identify the effect of a reform in response to the recession.

force as indicated by the significant positive interaction term of the treatment HL and the recession dummy ($\beta = 0.715,\ SE = 0.255,\ p = 0.006$, see Model 1 in Table A.9). An extension of unemployment benefits (treatment LH vs. LL), by contrast, decreases search effort ($\beta = -0.304,\ SE = 0.282,\ p = 0.518$, see Model 2 in Table A.9). This effect, however, is much smaller and not statistically significant.[16] In our experiment there is thus a clear asymmetry between policy changes that make the unemployment system more restrictive and those that make it more generous: Reducing unemployment benefits during a recession makes workers search harder, but extending periods of eligibility does not make them more idle. Thus at least according to our experimental results the fears stated in the introduction that more generous benefit payments cause higher unemployment appear overblown.

Finally, we study how a temporary change in the unemployment benefit regime impacts the labor force participation decision during the recession.

Hypothesis 7 ***Labor force participation and benefit reform****. A reform to the unemployment benefit system that extends the eligibility to receive unemployment benefits raises labor force participation.*

Analogous to our analysis of search effort we use treatments HH and LL and baselines and study the impact of policy changes via interaction terms. We find that a reduction of unemployment benefit eligibility during the recession (treatment HL vs. HH) decreases labor force participation, although not statistically significant ($\beta = -0.069,\ SE = 0.109, p = 0.527$, see Model 1 in Table A.10). Thus the effect points in the predicted direction but is too small to be statistically significant. However, contrary to our previous findings and our hypotheses, we find that an expansion of unemployment benefits during the recession (treatment LH vs. LL) leads to an additional decline in labor force participation $\beta = -0.100,\ SE = 0.096, p = .105$, see Model 2 in Table A.10). Thus an extension in unemployment benefits has detrimental effects in our experiment, but from an entirely unexpected side - it does not reduce search effort but it does reduce labor force participation.

Again we compactly illustrate the results of our experiment in a table showing the labor force participation rate, the employment rate and the unemployment rate, this time for our four different treatments during the recession (Table 4). Cutting unemployment benefits (HH vs. HL) leads to lower unemployment but higher employment. Extending unemployment benefits (LL vs. LH) leads to higher unemployment and lower employment. These results have to be taken with a grain of salt, because partly the effects are insignificant (as discussed above and shown in Tables A.9 and A.10). The results illustrate, however, that temporary changes during a recession might have very different effects than permanent changes (i.e., different regimes).

[16] Please note that we include fewer observations in the treatment comparisons and hence have a lower statistical power to detect differences.

Table 4: Labor force participation and employment rate by benfit reform

Reform	Labor force participation	Employment rate	Unemployment rate
Baseline Reduction: *HH*	66%	29%	56%
Reduction: *HL*	59%	31%	47%
Baseline Expansion: *LL*	62%	32%	48%
Expansion: *LH*	52%	23%	56%

5 Conclusion

The main contribution of this paper is that it provides an experimental analysis of how the generosity of the unemployment benefit system impacts labor force participation and job search, and thereby employment and unemployment. Using an experimental approach, we are able to identify two separable, opposing effects of an extension of unemployment benefits: On the one hand, individuals within the labor force provide less search effort when unemployment benefits are extended. On the other hand, individuals are motivated to participate in the labor force and take up active job-search. In our experiment the second effect dominates the first one so that unemployment benefits raise the employment rate.

The motivation for using an experimental approach is that it is not prone to data-quality and endogeneity issues to the extent that existing empirical studies on this topic are. Furthermore, in the controlled environment we can directly put our theoretical model to test which is not possible with the naturally occurring data because of the indirect channels between unemployment benefits and wages that may exist. By doing this, we are able to identify domains where our model makes correct predictions (such as how the generosity of the unemployment benefit system impacts labor force participation and search effort), but we also observe domains where the experimental evidence is clearly counter to the hypotheses from our model (such as the increase in search effort during a recession). It appears crucial to further adjust our model and thereby to improve its predictive power.

It is important to highlight, however, that the experimental approach has limitations as well: We create an artificial job market and model only the supply side. For the sake of our research question, we also assume that employment lasts for only one period and we neglect any effort a worker might invest to keep a job. A common objection to the experimental approach is therefore that it is unclear to which extent behavior in this environment resembles real life behavior (no external validity). The underlying criticism involves various facets such as that the subject pool is typically not representative and is less experienced in the labor market. The relatively low stakes in experimental work are also often a point of critique. Moreover, results may be dependent on the exact calibration of the experiment. These criticisms apply to labor market experiments more generally and we refer the reader to Levitt and List (2007), Falk and Heckman (2009) and Charness and Kuhn (2011) for more detailed discussions. We would

also like to highlight that the calibration of our experiment was not chosen arbitrarily, but it was inspired by empirically observed data, e.g., the relation between the size of wages and the size of unemployment benefits.

Another aspect of our experimental design needs some further attention: Job search effort in our experiment is not implemented as real effort but as stated effort (participants choose a number). It is debated among experimental economists whether the first approach has a higher external validity as it may better capture psychological aspect related to exerting effort such as getting bored after a while or time-inconsistent choices (Charness et al., 2018). On the other hand, a real effort task may carry intrinsic motivation for some participants, when they enjoy the task (Carpenter and Huet-Vaughn, 2019). We decided to use stated effort to measure job search effort because our experiment consisted of several rounds and it would have been too time consuming to include a real effort task in each period. Furthermore, there would have been the risk that participants could become too tired after a certain number of periods. Another important concern relates to the 'scalability' of (labor market) experiments, i.e., that (treatment) effects could diminish in size when they are applied on a lager scale (Al-Ubaydli et al., 2017). While we think that the experimental approach has several advantages in our setting, we acknowledge its limitations and do no take it as a panacea but rather as a complementary source of information to existing empirical and theoretical contributions.

As outlined above, both the empirical as well as the experimental approach in the laboratory have weaknesses and therefore alternatives should be discussed: Field experiments offer one way that may solve both the data-quality and the endogeneity problem of empirical studies and at the same time provide a controlled environment (List and Rasul, 2011). A field experiment just involving real workers as suggested by Horton et al. (2011), appears not suitable in our context because a governmental intervention which manipulates the unemployment benefit system is necessary. Hence, any field experiment related to our research question requires a large intervention and therefore should be motivated by a strong scientific foundation to which we contribute.

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A Appendix

Table A.1: Impact of home production and economic recession on labor force participation

	(1)	(2)
Dep. var.: Labor force participation		
Home production	-0.110***	
	(0.005)	
Recession		-0.226***
		(0.029)
Rec_period	2.715***	1.233**
	(0.474)	(0.378)
Constant	4.631***	0.451***
	(0.209)	(0.051)
Observations	13380	13380
Subjects (clusters)	223	223
Wald Chi^2	420.41	68.76

Probit regression with cluster-robust standard errors
Robust standard errors, adjusted for clustering at the participant level, are in parentheses
Home production is the value of home production
Recession is a dummy variable which is 1 during the recession
Rec_period is the reciprocal of the perdiod number
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.2: Impact of the value of home production and economic recession on job search effort

	(1)	(2)
Dep. var.: Job search effort		
Home production	-0.078***	
	(0.011)	
Recession		0.482***
		(0.101)
Rec_period	1.847	3.165**
	(1.198)	(1.207)
Constant	9.228***	6.162***
	(0.420)	(0.136)
Observations	8884	8884
Subjects (clusters)	220	220
R^2	0.023	0.006

Linear regression with cluster-robust standard errors
Robust standard errors, adjusted for clustering at the participant level, are in parentheses
Home production is the value of home production
Recession is a dummy variable which is 1 during the recession
Rec_period is the reciprocal of the perdiod number
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.3: Impact of unemployment benefit eligibility on job search effort

	(1)	(2)
Dep. var.: Job search effort		
Ben_round	-0.182***	
	(0.037)	
Ben_max		-0.395*
		(0.191)
Home production	-0.066***	-0.077***
	(0.011)	(0.011)
Recession	0.436***	0.469***
	(0.098)	(0.098)
Rec_period	3.852**	3.547**
	(1.215)	(1.202)
Constant	9.087***	9.176***
	(0.420)	(0.428)
Observations	8884	8884
Subjects (clusters)	220	220
R^2	0.050	0.034

Linear regression with cluster-robust standard error
Robust standard errors, adjusted for clustering at the participant level, are in parentheses
Ben_round is the current eligibility
Ben_max indictates the benefit regime
Home production is the value of home production
Recession is a dummy variable which is 1 during the recession
Rec_period is the reciprocal of the perdiod number
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.4: Impact of unemployment benefit regime on job search effort in the first 20 periods

	(1)	(2)
Dep. var.: Effort		
Ben_round	-0.193***	
	(0.044)	
Ben_max		-0.366
		(0.240)
Home production	-0.079***	-0.090***
	(0.012)	(0.012)
Rec_period	2.379^{+}	2.220
	(1.394)	(1.393)
Constant	9.747***	9.783***
	(0.467)	(0.488)
Observations	3185	3185
Subjects (clusters)	220	220
R^2	0.060	0.039

Linear regression with cluster-robust standard errors
Robust standard errors, adjusted for clustering at the participant level, are in parentheses
Ben_round is the current eligibility
Ben_max indictates the benefit regime
Home production is the value of home production
Rec_period is the reciprocal of the perdiod number
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.5: Impact of unemployment benefit elegibility and regime on labor force participation

	(1)	(2)	(3)
Dep. var.: Labor force participation			
Ben_round	0.258***		
	(0.016)		
Ben_round_dum		1.387***	
		(0.069)	
Ben_max			0.182*
			(0.090)
Home production	-0.132***	-0.141***	-0.112***
	(0.005)	(0.005)	(0.005)
Recession	-0.210***	-0.212***	-0.300***
	(0.036)	(0.031)	(0.035)
Rec_period	0.806^{+}	0.765^{+}	1.522***
	(0.428)	(0.405)	(0.453)
Constant	5.100***	5.257***	4.773***
	(0.220)	(0.220)	(0.222)
Observations	13380	13380	13380
Subjects (clusters)	223	223	223
Wald Chi^2	1075.07	1376.53	441.65

Probit regression with cluster-robust standard errors
Robust standard errors, adjusted for clustering at the participant level, are in parentheses
Ben_round is the current eligibility
Ben_round_dum is is a dummy variable with 1 when unemployment benefits are available
Ben_max indictates the benefit regime
Home production is the value of home production
Recession is a dummy variable with 1 during the recession
Rec_period is the reciprocal of the perdiod number
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.6: Impact of unemployment benefit elegibility and regime on labor force participation in the first 20 periods

	(1)	(2)	(3)
Dep. var.: Labor force participation			
Ben_round	0.223***		
	(0.020)		
Ben_round_dum		1.235***	
		(0.087)	
Ben_max			0.261*
			(0.120)
Home production	-0.138***	-0.145***	-0.120***
	(0.007)	(0.007)	(0.007)
Rec_period	-0.202	-0.110	0.198
	(0.622)	(0.601)	(0.657)
Constant	5.538***	5.626***	5.185***
	(0.276)	(0.274)	(0.280)
Observations	4460	4460	4460
Subjects (clusters)	223	223	223
Wald Chi^2	561.24	717.47	331.24

Probit regression with cluster-robust standard errors
Robust standard errors, adjusted for clustering at the participant level, are in parentheses
Ben_round is the current eligibility
Ben_round_dum is is a dummy variable with 1 when unemployment benefits are available
Ben_max indictates the benefit regime
Home production is the value of home production
Rec_period is the reciprocal of the perdiod number
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.7: Impact of unemployment benefit elegibility and regime on employment

	(1)	(2)	(3)
Dep. var.: Employment			
Ben_round	0.074***		
	(0.009)		
Ben_round_dum		0.421***	
		(0.049)	
Ben_max			0.019
			(0.054)
Home production	-0.066***	-0.067***	-0.065***
	(0.004)	(0.004)	(0.004)
Recession	-0.267***	-0.269***	-0.297***
	(0.030)	(0.028)	(0.030)
Rec_period	1.213***	1.173**	1.412***
	(0.355)	(0.360)	(0.380)
Constant	2.023***	1.976***	2.138***
	(0.168)	(0.172)	(0.163)
Observations	13380	13380	13380
Subjects (clusters)	223	223	223
Wald Chi^2	356.04	411.90	247.25

Probit regression with cluster-robust standard errors
Robust standard errors, adjusted for clustering at the participant level, are in parentheses
Ben_round is the current eligibility
Ben_round_dum is is a dummy variable with 1 when unemployment benefits are available
Ben_max indictates the benefit regime
Home production is the value of home production
Recession is a dummy variable with 1 during the recession
Rec_period is the reciprocal of the perdiod number
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.8: Impact of unemployment benefit elegibility and regime on employment in the first 20 periods

	(1)	(2)	(3)
Dep. var.: Employment			
Ben_round	0.054***		
	(0.012)		
Ben_round_dum		0.288***	
		(0.064)	
Ben_max			0.098
			(0.071)
Home production	-0.068***	-0.068***	-0.066***
	(0.005)	(0.005)	(0.005)
Rec_period	0.557	0.558	0.629
	(0.496)	(0.500)	(0.522)
Constant	2.200***	2.166***	2.244***
	(0.192)	(0.195)	(0.190)
Observations	4460	4460	4460
Subjects (clusters)	223	223	223
Wald Chi^2	197.98	214.15	177.32

Probit regression with cluster-robust standard errors
Robust standard errors, adjusted for clustering at the participant level, are in parentheses
Ben_round is the current eligibility
Ben_round_dum is is a dummy variable with 1 when unemployment benefits are available
Ben_max indictates the benefit regime
Home production is the value of home production
Rec_period is the reciprocal of the perdiod number
$^+$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.9: Impact of a change in the unemployment benefit regime on job search effort

	(1)	(2)
Dep. var.: Job search effort		
HL	-0.034	-0.403
	(0.342)	(0.352)
LH	0.231	-0.138
	(0.315)	(0.326)
LL	0.369	
	(0.296)	
HH		-0.369
		(0.296)
Recession	0.331^{+}	0.444*
	(0.183)	(0.190)
HL × Recession	0.715**	0.602*
	(0.255)	(0.263)
LH × Recession	-0.191	-0.304
	(0.275)	(0.282)
LL × Recession	0.113	
	(0.262)	
HH × Recession		-0.113
		(0.262)
Home production	-0.077***	-0.077***
	(0.011)	(0.011)
Rec_period	3.572**	3.572**
	(1.197)	(1.197)
Constant	8.834***	9.203***
	(0.465)	(0.453)
Observations	8884	8884
Subjects (clusters)	220	220
R^2	0.034	0.034

Linear regression with cluster-robust standard errors
Robust standard errors, adjusted for clustering at the participant level, are in parentheses
Home production is the value of home production
Recession is a dummy variable with 1 during the recession
Rec_period is the reciprocal of the perdiod number
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.10: Impact of a change in the unemployment benefit regime on labor force participation

	(1)	(2)
Dep. var.: Labor force participation		
HL	-0.206	0.071
	(0.156)	(0.153)
LH	-0.501**	-0.224
	(0.168)	(0.165)
LL	-0.277+	
	(0.151)	
HH		0.277+
		(0.151)
Recession	-0.339***	-0.191**
	(0.067)	(0.061)
HL × Recession	-0.069	-0.217*
	(0.109)	(0.107)
LH × Recession	0.048	-0.100
	(0.098)	(0.096)
LL × Recession	0.148	
	(0.091)	
HH × Recession		-0.148
		(0.091)
Home production	-0.113***	-0.113***
	(0.006)	(0.006)
Rec_period	1.551***	1.551***
	(0.458)	(0.458)
Constant	5.153***	4.876***
	(0.241)	(0.235)
Observations	13380	13380
Subjects (clusters)	223	223
Wald Chi^2	448.08	448.08

Panel regression with cluster-robust standard errors
Robust standard errors, adjusted for clustering at the participant level, are in parentheses
Home production is the value of home production
Rec_period is the reciprocal of the perdiod number
+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 5:
Predicted and actual job search effort against the number of rounds an individual is eligible to receive unemployment benefits for individuals who unsuccessfully search. Shaded area indicates the 95% confidence interval.

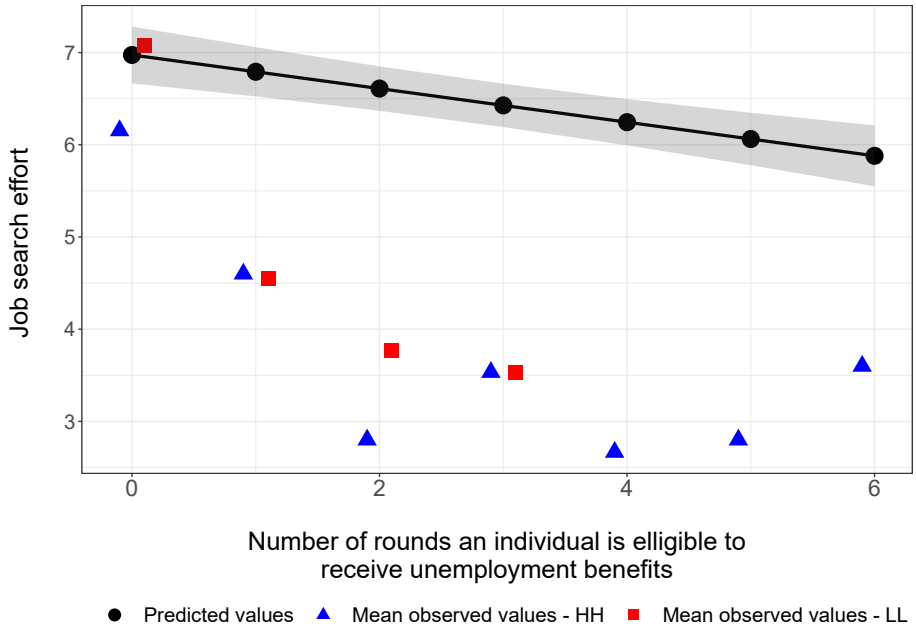

Figure 6:
Predicted and actual job search effort against the number of rounds an individual is eligible to receive unemployment benefits in the first 20 periods. Shaded area indicates the 95% confidence interval.