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Abstract

We analyze to what extent work meaning – the significance of a job for others or for society – increases the willingness of employed and unemployed individuals to accept a job. To this end, we elicit reservation wages for a one-hour job and randomly vary its description as having either "high" or "low" meaning. Our subjects participate in the "Panel Study of Labour Market and Social Security" (PASS), which comprises a random draw from the German population and a random draw of unemployed individuals from the unemployment register. We can thus link subjects' experimental behavior to rich survey data and control for selection into the experiment. For subjects who consider work meaning as very important (around one third of PASS respondents), high-meaning reduces the reservation wage by around 18 percent. By contrast, among unemployed individuals, work meaning increases the reservation wage by around 14 percent. We discuss how work meaning can have both positive and negative effects on labor supply when it interacts with fairness concerns or work norms.

Keywords: Work Meaning, Labor Supply, Unemployment
JEL Classification: C83, C90, M52

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1 Introduction

> *"Meaning is cheap [...], but ignoring the dimension of meaning may be quite expensive, for employers and for society."* – Dan Ariely, Emir Kamenica, Dražen Prelec (2008)

A growing literature argues that workers do not only care about their wage, but also about whether their job is "meaningful", in the sense that it creates benefits for others or for society (see Cassar and Meier 2019 for a recent overview). If work meaning were an important driver of behavior, this would have important consequences for public policy. As long as labor supply only depends on the trade-off between leisure and consumption, social welfare and unemployment insurance create an incentive problem and may induce individuals not to work or to retire from the job market too early (Mirrlees 1971, Saez 2002). If individuals were motivated to supply labor when the job is important for society, this would relax the incentive problem and allow for more generous social security and higher welfare. For instance, advocates of a universal basic income argue that many individuals would accept jobs with low pay but high amenities such as work meaning as long as a certain fixed income is guaranteed (e.g., Van Parijs and Vanderborght 2017).

Before we can take into account work meaning for policy recommendations, we need to obtain a broader understanding of how work meaning affects labor supply in a general population. The evidence on this is mixed and depends on the sample analyzed. Experimental studies such as Ariely et al. (2008) often find strong positive effects of work meaning on labor supply, but typically rely on selected samples. Maestas et al. (2018) analyze the willingness to pay (WTP) for non-wage attributes based on a representative sample of the US population. Respondents are willing to trade-off wage against work meaning, but the WTP for work meaning is rather small, in particular when compared to many other job attributes. Indeed, in several occupations with high benefits for society but low wages – such as nurses in hospitals or old-age homes – there is a shortage of workers, and many countries struggle to find sufficient personnel for these occupations.[1] In addition, attitudes towards society may differ between individuals. In their survey of active labor market policies Crépon and van den Berg (2016, pg. 524) note that "many non-employed individuals are effectively at a great distance from the labor market, in that they have accommodated to a life without regular work and they experience very long spells of joblessness. [...] These individuals may feel rejected by society and subsequently reject society in turn." Thus, it is not clear how individuals in general trade-off wages and benefits for society.

[1] For example, in Germany in 2011, the vacancy duration for general and elderly care nurses were 105 and 110 days, respectively, compared with 67 days for all professions (Kovacheva and Grewe 2015), and demand for care workers is predicted to exceed supply in the next years (Afentakis and Maier 2013).

In this paper, we investigate the impact of work meaning on labor supply and the underlying heterogeneity. Our study design combines the benefits from an experimental variation of work meaning and from using a representative subject pool. All our subjects are participants in the "Panel Study of Labour Market and Social Security" (henceforth PASS). A unique feature of PASS is that it consists of two sub-samples: first, a random draw from the German population, and second, a random draw of unemployed individuals from the unemployment register. This allows us to investigate whether the positive effects of work meaning on labor supply occur in a representative sample, and to analyze the extent of heterogeneity in how individuals react to work meaning. We can link rich survey data on our subjects with their experimental behavior, and we can control for selection into the experiment. Overall, we elicit preferences using a survey question from about 5,300 individuals (about 4,200 employed and 1,100 unemployed individuals) and experimental reservation wages from 711 individuals (591 employed and 120 unemployed individuals).

In the experiment, we offer an actual one-hour job that is about digitalizing research documents. It can easily be completed from home within seven days after accepting it. To elicit subjects' reservation wages for this job, we apply the Becker-DeGroot-Marschak mechanism, a standard tool in experimental economics to elicit reservation values. We vary the meaning of the job through differential descriptions of its content. In the "high-meaning treatment", we explain subjects that research documents of the medical faculty at Ludwig-Maximilians University in Munich must be digitalized for potential later use and that subjects would thus contribute to medical research by working in this job. In the "low-meaning treatment", we state that the documents are from a public institution, and that they are unlikely to be used again after digitalization. These descriptions are similar to those in Kosfeld et al. (2017), who found in a sample of students that output in the high-meaning treatment increases by 15.5 percent relative to that in the low-meaning treatment. By comparing the average reservation wages in our two treatments, we can test to what extent work meaning affects labor supply.

The results from the PASS survey and our experiment are informative about the behavioral effects of work meaning and about the heterogeneity in the impact of work meaning on labor supply. First, in the survey we find that a majority of individuals evaluate work meaning as a "somewhat important" or "very important" aspect of their job. However, unemployed individuals value work meaning significantly less than employed individuals. Consistent with Maestas et al. (2018), we also find that for both employed and unemployed individuals work meaning is only the seventh most important job attribute out of nine. In particular, it is on average significantly less important than job security and fair wages, the two most appreciated job attributes for both employed and unemployed individuals.

Second, we find that overall work meaning has no significant effect on labor supply in our

experiment. This contrasts sharply with the results found in the previous literature. However, the average effect masks substantial heterogeneity in our subject population. If we only focus on subjects who indicate in the PASS survey that work meaning is a very important aspect of their job (31.6 percent of PASS respondents), we find that reservation wages are about 17.7 percent lower in the high-meaning treatment than in the low-meaning treatment. This number is roughly comparable with what studies with convenience pools find (Burbano 2016, Bäcker and Mechtel 2018). By contrast, the treatment effect is insignificant for all subjects for whom work meaning is not "very important."

Third, we find that work meaning has a negative effect on the labor supply of unemployed individuals. In this group the average reservation wage is 14.0 percent higher in the high-meaning than in the low-meaning treatment. This effect is mostly driven by male subjects. For the same population we also observe that their effort in the job significantly increases in work meaning, even after controlling for wages. In the high-meaning treatment unemployed individuals are 55.2 percent more productive than in the low-meaning treatment (by contrast, for employed individuals we do not observe a significant effect of work meaning on productivity).

We discuss several behavioral motivations that could explain our results, in particular the negative effect of work meaning on the labor supply of unemployed individuals. Our preferred explanation is that work meaning may evoke fairness concerns and/or work norms. If individuals are concerned with fairness, they may feel entitled to receive a share of the benefits they create through their job. Hence, they may derive positive utility from a meaningful work only if they are sufficiently compensated for their efforts. Alternatively, if a job is described as meaningful, workers may infer from this that a high level of effort is required to do the job properly. Both behavioral motivations can be captured conveniently in a simple utility framework that formalizes concerns for work meaning, such as in Cassar and Meier (2019). We show that differential reactions to work meaning emerge in such a framework. If the population exhibits heterogeneity in their valuation of work meaning, work meaning has a positive effect on labor supply for high types and a negative effect for low types.

Our most important conclusion is that it is not innocuous to leverage work meaning in order to increase labor supply. Making benefits for society more salient may raise demands for compensation, as is the case with our unemployed subjects. Therefore, work meaning may not be "cheap" as the initial quote suggests. However, we also find that work meaning significantly increases the productivity of unemployed subjects, which may encourage employers to offer appropriate wages.

The rest of the paper is organized as follows. In Section 2 we provide an overview of the related literature. In Section 3 we describe the PASS survey and the experiment. In Section 4 we show the main survey results on the valuation of work meaning and other job attributes. In

Section 5 we present the main results from the experiment, and we examine selection into the experiment. In Section 6, we discuss several explanations for our results, and present a simple model that rationalizes our findings from the experiment. Section 7 concludes. The appendix contains additional robustness checks as well as the experimental instructions.

2 Literature

In this section, we provide a brief overview of the literature that analyzes the impact of work meaning on labor supply. In general, work meaning can have many different dimensions, see Rosso et al. (2010) and Cassar and Meier (2019). In our study, we focus on work meaning defined as "the significance of a job for others or for society", and we will therefore ignore contributions to the literature that analyze the effects of other non-monetary benefits (such as recognition). Overall, we distinguish between experimental studies that use specific subject pools and studies that use census data or labor market surveys with representative samples.

Experimental studies on work meaning. The studies that are most closely related to ours experimentally vary the meaning of a job. This is usually by done by changing the description of the job before subjects make a choice, or by changing the job content (in a way that keeps the difficulty of the task constant). Several studies find positive effects of work meaning on workplace productivity; see Grant (2008), Chandler and Kapelner (2013), Carpenter and Gong (2016), Chadi et al. (2017), and Kosfeld et al. (2017). Using a sample of online workers on mTurk, Chandler and Kapelner (2013) also examine reservation wages, but they do not find a significant effect of work meaning on reservation wages. Ariely et al. (2008) vary work meaning by destroying output immediately in one treatment, while keeping it intact in another treatment. They derive a "quasi-reservation wage" from a subject's output by lowering the piece rate at each produced unit. This quasi-reservation wage is between 28 and 48 percent lower in the high-meaning treatment than in the low-meaning treatment. In a replication of this experiment, Bäker and Mechtel (2018) find that work meaning reduces the quasi-reservation wage by 14 percent. Both studies use student subjects.

Experimental studies on social incentives. A related literature analyzes experimentally how social incentives affect performance and labor supply. When the employer provides social incentives, there is a donation to charity or the workers' output generates donations. Several studies show that social incentives can have positive effects on workplace performance; see, for instance, Tonin and Vlassopoulos (2010, 2015), Imas (2014), Fehrler and Kosfeld (2014), Gerhards (2016), Charness et al. (2016), DellaVigna and Pope (2018), and Cassar (2019). The study most closely related to ours in this literature is Burbano (2016). By eliciting reservation

wages of online workers, she shows that providing information about the employer's corporate social responsibility activities significantly reduces reservation wages; the effect size is between 12 and 44 percent.

Evidence from field data. A few studies use field data to examine workers' willingness to sacrifice pay in order to do more meaningful work. By analyzing data on job offers to postdoctoral researchers, Stern (2004) shows that "scientists pay to be scientist." Leete (2001) uses US census data to estimate non-profit/for-profit-wage differences. While she does not find an economy-wide pay differential, her study reveals considerable heterogeneities across industries and occupations with both positive and negative wage differentials. Jones (2015) argues that a positive gap between for-profit and non-profit-wages only occurs if labor demand is low enough so that non-profit organizations can meet demand by only hiring motivated workers.

Non-wage job attributes. There is a renewed interest in labor economics about how non-wage attributes – such as work meaning – influence wages and wage inequality. In his *Wealth of Nations* Adam Smith argued that non-wage attributes can explain differences in wages. Rosen (1986) formalized compensating wage differentials. A common approach to analyze whether compensating wage differentials exist is the stated preference approach. It uses hypothetical choice experiments in order to estimate the WTP for certain non-wage attributes. Differences in WTP between different groups of the population are then used to show whether non-wage attributes augment or diminish existing wage-inequalities.

Most of the recent literature on non-wage attributes focuses on some version of schedule flexibility. One exception is Maestas et al. (2018), who also elicit WTP for a version of work meaning, namely "opportunities to contribute to society." They find that WTP for non-wage attributes is sizable. Moving from the worst to the best job in terms of non-wage attributes is equivalent to a 56 percent wage increase. Respondents indicate that they would be willing to trade-off 3.9 percent of their wages in order to change from occasional to frequent opportunities to contribute to society. While this estimate is significantly different from zero, it is the lowest estimate among all elicited dimensions of non-wage attributes.[2]

3 PASS Survey and Experimental Design

3.1 The PASS Survey

Our survey data originate from the "Panel Study Labor Market and Social Security", PASS (DOI: 10.5164/ IAB.FDZD.1806.en.v1). PASS provides a database to study the demographics

[2]These are schedule flexibility, telecommuting, physical job demands (sitting and relaxed), pace of work, autonomy, paid time off (10 and 20 days), working in teams, job training, and meaningful work.

and labor market behavior of a representative sample of the German population with an over-representation of long-term unemployed (Trappmann et al. 2019). It is conducted annually since 2005 to scientifically assist the introduction of "unemployment benefit II" through the Hartz reforms, the largest social reform project in the history of Germany.[3] The survey is managed by the Institute for Labor Market Research (henceforth IAB), the research institute of the German Federal Employment Agency. PASS consists of two distinct samples. One sample is representative for the German population, the other one is a random draw from the unemployment (type II) register of the Federal Employment statistics.

We partnered with the IAB to include additional questions in the PASS survey, and to conduct an experiment with PASS participants. In wave 10 of this survey we added a question about which aspects of a job are important for the individual. Item (A) in the survey question below is work meaning; item (B) refers to an appropriate wage. The exact wording of the question is as follows (translated from German):

> [Job Attributes] *How important are the following aspects of your job for you?*[4]
> *Please, indicate in each case whether the aspect is not important at all/less important/somewhat important/very important.*
> *How important is it for you that...*
>
> *A) ...through your work you make a contribution to society?*
> *B) ...you get paid properly for your work?*
> *C) ...you have a secure, permanent job?*
> *D) ...you receive recognition from colleagues and superiors?*
> *E) ...you are not under time-pressure?*
> *F) ...you have career opportunities?*
> *G) ...you have discretion over the content of your work?*
> *H) ...you can freely choose your working hours?*
> *I) ...you have an opportunity to learn new qualifications?*

Overall, about 4,200 employed and 1,100 unemployed individuals provided valid answers to the first two items. With this question we examine how important work meaning is for employed and unemployed individuals, and we can investigate how important it is for these subgroups relative to other job aspects.

[3] Thus, long-term unemployed in our study are recipients of Unemployment Benefits II; see Lohse (2005) and Fitzenberger (2008) for a description of these reforms.

[4] For unemployed individuals, the pre-text to this question was as follows: *Suppose that you get offered a job. You now have to decide whether you accept the job offer or not.*

3.2 Experimental Design and Procedures

We offered PASS subjects a job that takes one hour to complete. Their task in the job is to digitize scanned PDF documents from the medical faculty of the Ludwig-Maximilians University (LMU) in Munich, Germany. Subjects could work from home using their own computer. No particular skills or equipment were required to complete the job. Subjects got paid under the condition that they work on the job for one hour.

The job offer was part of an experiment. In the experiment we elicited subject's reservation wage for the job. To do this, we applied the Becker-DeGroot-Marschak mechanism, which is a standard tool in experimental economics to elicit reservation values (e.g., Bohm et al. 1997). After describing the job, subjects were asked at which wage between 9 and 35 Euros they are willing to work for one hour.[5] The computer then randomly drew a number x between 9 and 35. If this number x was (weakly) above the respondent's reservation wage, the respondent was admitted to the job and was paid a wage of x after its completion. Otherwise, the experiment ended. This procedure ensures that each subject has an incentive to indicate the true reservation wage. Individuals could also chose the option that they do not to accept the job even if the wage is above 35 Euros.

When describing the Becker-DeGroot-Marschak mechanism to our subjects, we used intuitive explanations. In particular, we showed the following illustration (translated from German): "Please, keep in mind: The higher the hourly payment is that you request, the lower is the probability that you can participate in the study. If you want to make sure you can work in the study, indicate 9 Euros as a requested hourly payment. If you only want to work in the study if the hourly payment is bigger than (for example) 16 Euros, then indicate 16 Euro as a requested hourly wage."

Our goal is to analyze how reservation wages vary in the meaning of the job. We therefore assigned subjects to two treatments that vary in the job description, the "high-meaning treatment" and the "low-meaning treatment." In the high-meaning treatment, we informed subjects that the research documents they digitalize would be relevant for future research at the medical faculty. In contrast, in the low-meaning treatment, we told subjects that the documents they digitalize would be stored, but most likely would not be used in the future. The two descriptions read as follows (translated from German):

> [High-meaning job description] *The texts feature results of research conducted by prospective medical doctors at the Ludwig-Maximilians University Munich. They have to be digitalized to make them accessible for future medical research. So, with your efforts you can contribute to medical research.*

[5] We chose 9 Euros as an lower bound in order to comply with the minimum wage.

> [Low-meaning job description] *The texts are data that have to be digitalized for a public institution. They have been stored in an archive for quite some while. In the future, the texts are supposed to be stored digitally. After this, the documents are unlikely to be used again.*

Importantly, both descriptions were correct. They only highlighted different aspects of the worker's effort in the job. For the high-meaning treatment the description highlighted the potential benefit for research. By contrast, the description for the low-meaning treatment highlighted that the use of the documents is unlikely. We created this job in collaboration with the medical faculty at Ludwig-Maximilians University Munich, so that we could be sure that both descriptions were appropriate.

The experiment was conducted over the internet and administered by CentERdata at Tilburg University.[6] In the invitation letter we announced that participants could earn between 9 and 35 Euros, and that all participants would take part in a lottery for 50 Amazon-vouchers of value 25 Euros each. Upon clicking on the link to our study, subjects first participated in a survey on perseverance and risk preferences. We then explained the job and elicited the reservation wage. Subjects were randomly assigned to one of the two treatments, and they were admitted to the job if and only if the offered wage was weakly above their reservation wage. In this case, subjects could complete the job immediately or within the next seven days. The invitation letter to the experiment is displayed in Appendix A, and the most important instruction screens are displayed in Appendix B.

Wave 10 of PASS took place between February 2016 and September 2016. Our experimental study took place from July to August 2017. Hence, our experimental subjects indicated a reservation wage many months after answering the survey question on the job attributes. To create the experimental sample we used 4,598 PASS respondents who participated in wave 10 and had at least one employment or unemployment spell, whose survey language is German, and who agreed to being contacted for research. From this sample, the IAB has drawn a 75 percent random sample or 3,442 respondents which we invited to participate in the experiment.[7] In total, we recruited 711 PASS subjects (20.7 percent response rate); 160 subjects indicated that they do not want to do the job even if the wage is 35 Euros, 551 subjects reported a reservation wage between 9 and 35 Euros; for 364 of them the randomly drawn wage weakly exceeded the reservation wage. Of the 711 subjects, 364 were assigned to the high-meaning treatment, 347 to the low-meaning treatment. The average earnings in our study were

[6] CentERdata has more than a decade of experience running internet surveys and experiments. Among other studies, CentERdata maintains the Dutch Household Survey (DHS) and the LISS Internet Panel. For more information, see http://centerdata.nl/en.

[7] The remaining 25 percent of respondents serve the IAB as control group for internal PASS quality research. We excluded 703 PASS respondents who we contacted before to participate in a pre-test.

25.43 Euros for subjects who completed the job and 4 Euros for those who could not do the job as their reservation wage was above the random number draw (we did not communicate the payment of the 4 Euros beforehand). All payments were made after the completion of the experiment.

4 Survey Results

We first analyze the importance of work meaning overall and compared to other non-wage attributes using the PASS survey data. Overall, 31.6 percent consider work meaning very important, 42.6 percent somewhat important, 20.3 percent less important, and 5.5 percent not important at all. Hence, a majority of 74.2 percent consider it as somewhat or very important to make a contribution to society. This number is very close to the 77 percent of workers who provide the same answers in the "International Social Survey Program, Work Orientation Waves" with 100,000 workers from 47 countries (Dur and van Lent 2019).

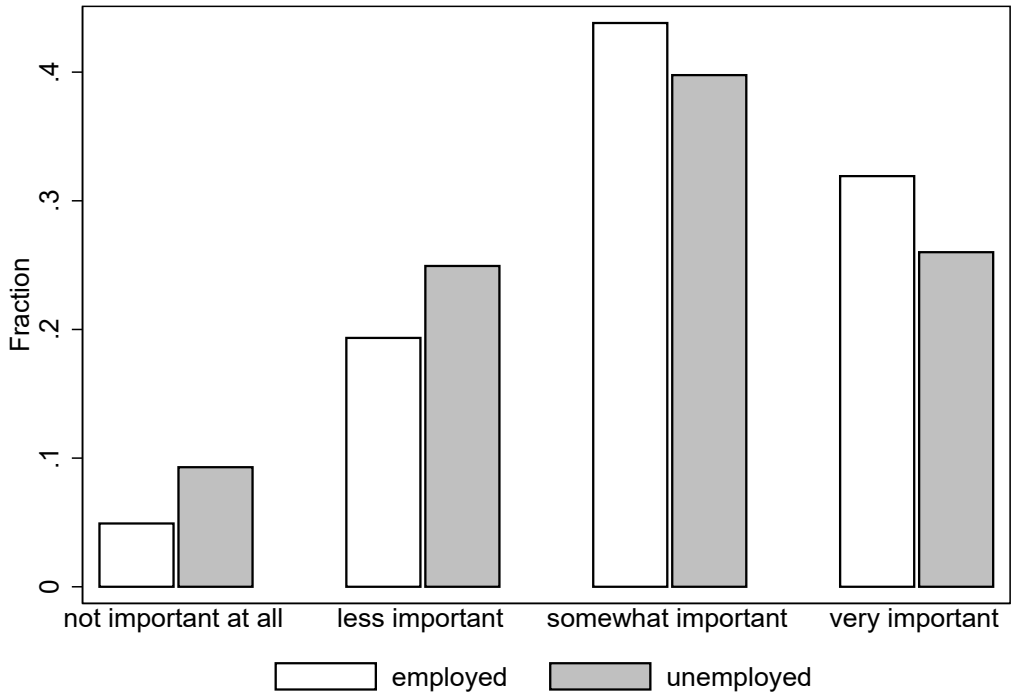


Figure 1: Importance of work meaning, by employment status

Next, we compare the responses to the work meaning question between employed and unemployed individuals separately. Figure 1 shows the distribution over responses for the two sub-samples. For unemployed individuals work meaning is significantly less important than for employed individuals. In the sample of employed individuals 31.9 percent state that

work meaning is very important, and 43.8 percent indicate that it is somewhat important. For unemployed individuals the corresponding numbers are 26.0 percent and 39.8 percent, respectively. The difference in distributions of employed and unemployed individuals is statistically significant (two sample Mann-Whitney test, z-statistic = 6.48, p-value < 0.000).

[Insert Table 1 about here]

We analyze the association between employment status and valuation of work meaning in a simple regression framework. The dependent variable is a dummy that equals 1 if a subject considers work meaning as very important. The estimated coefficient for being unemployed in Column (1) of Table 1 is significantly different from zero, indicating that unemployed individuals are 18.81 percent less likely to consider work meaning as very important compared to employed individuals. This number increases slightly to 22.47 percent at the baseline when we control for a number of individual characteristics, see Column (2) of Table 1. Moreover, we find that males, married individuals, and individuals with a high school degree are significantly less likely to consider work meaning very important, while age is positively associated with the probability of considering work meaning as very important.

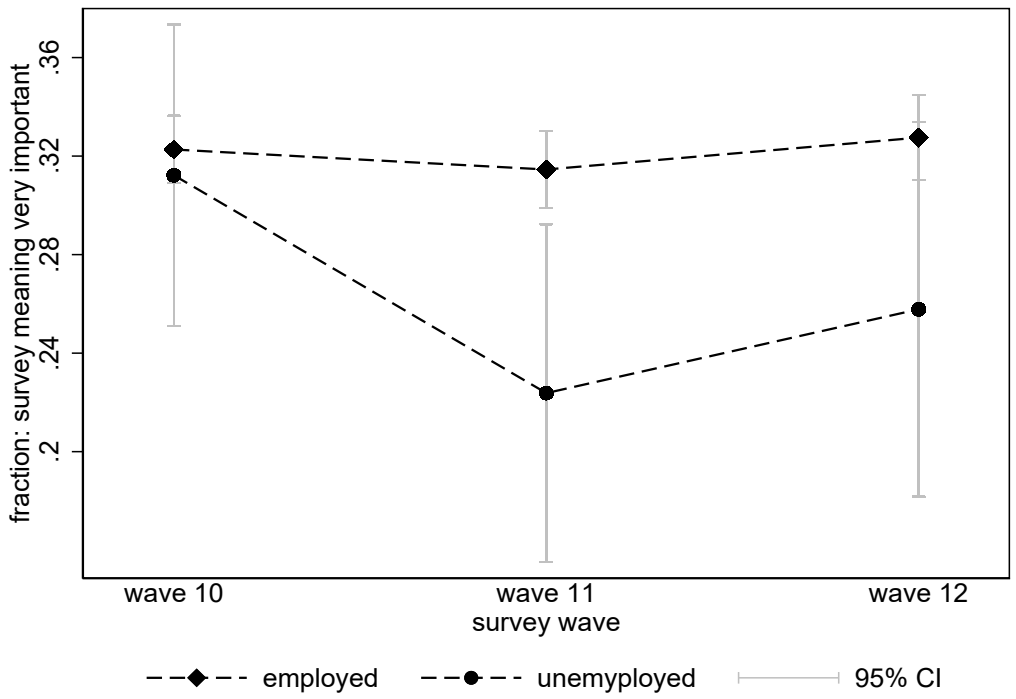


Figure 2: Valuation of work meaning by future employment status

The panel structure of the PASS survey allows us to investigate whether individuals with weaker preferences for work meaning have a higher probability to become unemployed, or

whether becoming unemployed weakens preferences for work meaning. To do this, we use all individuals who are employed in wave 10 as our sample. We then compare the valuation of work meaning in wave 10 between individuals who remain employed in all waves and individuals who become unemployed in either of the two following waves. We find that it is almost identical in both groups. The share of respondents who state that work meaning is very important is equal to 31.2 percent for those who become unemployed and 32.2 percent for those who do not. We cannot reject the null hypothesis that the difference between both groups is zero (p-value = 0.372). Thus, future unemployment is not predicted by valuation of work meaning. Figure 2 additionally displays the share of respondents who state that work meaning is very important, separately for those who remain employed and those who do not. While the valuation of work meaning remains stable for those who remain employed, it drops significantly for those who experience unemployment. Thus, our results suggest that the direction of causality runs from the experience of unemployment to lower valuation of work meaning and not the other way around.

[Insert Table 2 about here]

Finally, we investigate the importance of work meaning for our subjects relative to all other job characteristics. To allow for a comparison, we calculate for each job characteristic the average survey response, and assign value 1 to the answer "not important at all", value 2 to the answer "less important", value 3 to the answer "somewhat important", and value 4 to the answer "very important." Table 2 shows the average valuation of all job characteristics for the full sample as well as for employed and unemployed individuals separately. The ranking of job attributes is similar in both samples. The two most highly ranked attributes are "secure job" with a mean of 3.73 and "appropriate salary" with a mean of 3.59.[8] Work meaning only ranks seventh on the list of nine job attributes with a mean of 2.98. The difference in means between "appropriate salary" and work meaning is statistically significant (p-value < 0.001).

When comparing the mean value for work meaning between employed and unemployed individuals, we find that employed individuals have significantly lower preference for work meaning than employed individuals (3.30 and 2.83, p-value < 0.001). By contrast, having a job with an appropriate salary is significantly more important for unemployed individuals than for employed individuals (3.58 and 3.63, p-value = 0.006). All other job attributes seem to be less important for unemployed individuals compared to employed individuals; the differences are statistically significant except for "no time pressure" and "promotion prospects." We conclude that unemployed individuals value work meaning less than employed individuals, and that both groups have a similar valuation of work meaning relative to other job attributes.

[8]For unemployed individuals, the attributes "recognition" and "no time pressure" as well as "flexible working hours" and "promotion prospects" switch order.

5 Experimental Results

Before we present the experimental results, we investigate whether our sample is balanced between the two meaning treatments and across employed and unemployed individuals. The differences in demographic and socio-economic controls between treatment and control group tend to be small and insignificant, see Table 3. The only exception is the difference in the probability of being married for unemployed subjects, which is significant at the 10 percent level.

[Insert Table 3 about here]

5.1 Labor Supply

We examine how work meaning affects labor supply in our experiment. Subjects on average ask for a reservation wage of 17.89 Euros (sd = 7.28). The average reservation wage is 17.85 Euros (sd = 7.33) in the low-meaning treatment, and 17.93 Euros (sd = 7.24) in the high-meaning treatment (the difference is not statistically significant). Thus, in our setting work meaning does not reduce the reservation wage to the same extent as found in previous studies.

Next, we differentiate these results by employment status. Employed subjects request on average a reservation wage of 18.46 Euros (sd = 7.25); their average reservation wage is 18.75 Euros (sd = 7.42) in the low-meaning treatment and 18.19 Euros (sd = 7.09) in the high-meaning treatment. Unemployed individuals on average request a reservation wage of 15.55 Euros (sd = 6.97); their average reservation wage is 14.61 Euros (sd = 6.01) in the low-meaning treatment and 16.66 Euros (sd = 7.88) in the high-meaning treatment. For unemployed individuals the differences between the two treatments is statistically significant at the 10 percent level (t-statistic = -1.53, p-value = 0.07). Thus, for unemployed subjects the high-meaning treatment has a significantly negative effect on labor supply.

We further investigate the treatment effect of work meaning on labor supply in a simple linear model. Our first specification is

$$RW_i = \beta_0 + \beta_1 HM_i + \beta_2 UE_i + \varepsilon_i, \tag{1}$$

where RW_i is the reservation wage subject i states in the experiment, HM_i is a dummy variable taking value 1 if subject i was assigned to the high-meaning treatment, UE_i is a dummy variable taking value 1 if subject i is unemployed, and ε_i is random noise. In our second specification, we additionally include the interaction term $HM_i \times UE_i$ in equation (1) to investigate the heterogeneity in the treatment effect by employment status. For subjects who state that they would not accept the job even for 35 Euros we do not know the reservation wage. To take

into account that our dependent variable is censored, we estimate both specifications using Ordinary Least Squares (OLS) and a Tobit estimator.

Table 4 shows the results from estimating our two specifications. In Columns (1) and (2), we include only the effects of our two main controls, high-meaning treatment and employment status. The effect of meaning in this specification is close to zero and insignificant. If subjects trade-off meaning and reservation wages, we would expect a negative and significant coefficient. The point estimate is slightly more negative in the Tobit estimation, but remains insignificant.

Overall, the reservation wages of unemployed individuals are significantly lower than those of employed individuals. OLS estimates a difference of 2.91 Euros, while Tobit estimates a difference of even 7.16 Euros. This higher difference reflects the fact that the share of subjects who indicate a reservation wage below 35 Euros is higher among unemployed individuals than among employed individuals (89.2 and 75.1 percent, respectively).

Our survey results suggest that unemployed individuals are less concerned with work meaning than employed individuals. In Columns (3) and (4) of Table 4, we therefore investigate whether unemployed individuals react differently to the meaning variation in our experiment. Indeed, we find that this is the case. Among unemployed individuals, those in the high-meaning treatment have a 14.0 percent higher reservation wage than those in the low-meaning treatment. The effect is even larger, albeit statistically insignificant in the Tobit regression.

[Insert Tables 4 and 5 about here]

We next investigate whether there are gender differences in how our subjects respond to work meaning. To do this, we include a gender dummy as well as interaction terms between meaning treatment, unemployment, and gender into our two specifications. Table 5 shows that males have significantly higher reservation wages than females. When we allow for interaction between unemployment and gender, we find that employed males ask for significantly higher reservation wages than employed females, while unemployed males on average ask for almost the same wages than unemployed females. Importantly, the negative effect of work meaning on labor supply of unemployed individuals (i.e., the positive effect on the reservation wage) is mainly driven by male subjects. On average, their reservation wage is 4.80 Euros (33.6 percent) higher in the high-meaning treatment.[9]

[Insert Table 6 about here]

[9]Our results on gender differences have to be taken with some care since some of our subgroups (unemployed males and females) only comprise between 20 and 30 observations.

Using the PASS survey, we investigate whether subjects' valuation of work meaning matters for how they react to work meaning in the experiment. For this, we consider the sample split of subjects along the importance of work meaning reported in the survey. In our experimental sample, work meaning is "very important" for 181 subjects, and it is "not important at all", "less important" or "somewhat important" for 393 subjects. For 82 subjects in the experimental sample, this value is missing in the survey. For a complementary analysis, we stratify the sample along the importance of getting paid an appropriate wage in the same way.

Table 6 shows the results from a Tobit model. The high-meaning treatment significantly reduces the reservation wage for subjects who indicate in the survey that work meaning is very important to them. For these subjects, the average effect is -3.90 Euros (or -17.7 percent) at the baseline, which is comparable to the effect size from previous studies. For subjects who consider work meaning as less important, there is no significant effect, and the point estimate is even slightly positive. Importantly, no such result emerges if we split the sample with respect to the preferences for receiving an appropriate wage. Thus, the heterogeneity in preferences with respect to work meaning drives the small average effect of work meaning on reservation wages in Table 4.

5.2 Productivity

Next, we investigate the effect of work meaning on subjects' productivity. We measure productivity as the sum of correctly typed characters. Since this variable is highly skewed to the right, we take the log sum of correctly typed character as outcome variable in our empirical analysis. Subjects who start working in the job produce on average 8.46 (sd = 0.77) log correctly typed characters. The number of log correctly typed characters is 8.50 (sd = 0.63) in the high-meaning treatment and 8.41 (sd = 0.90) in the low-meaning treatment. Thus, productivity is slightly higher in the high-meaning treatment, but the difference is not statistically significant.

We further differentiate these results by employment status. Employed individuals who start working the job (208 subjects) produce on average 8.52 (sd = 0.66) log correctly typed characters in the high-meaning treatment, and 8.55 (sd = 0.70) in the low-meaning treatment. Unemployed individuals (51 subjects) produce on average 8.38 (sd = 0.43) log correctly typed characters in the high-meaning treatment, and 7.94 (sd = 1.29) in the low-meaning treatment. For unemployed individuals, the difference between high- and low-meaning treatment is statistically significant on the 5 percent level (t-statistic = 1.72, p-value = 0.048).

In total, 334 subjects were eligible to work in the job; 74 subjects did not start working,

thus we have 260 subjects who actually start doing the job.[10] We therefore expect that subjects for which we observe productivity outcomes are a non-random selection of the sample of eligible subjects. Note that individuals who report a lower reservation wage are more likely to receive a wage offer that is higher than their stated reservation wage. Thus, individuals who start working are likely to be negatively selected on their reservation wage.

To account for non-random sample selection, we estimate a two-stage Heckman selection model in addition to OLS. The first stage of the Heckman model estimates the probability of working in the job. As exclusion restriction we use the difference between the reservation wage and the randomly drawn wage. The second stage then estimates productivity taking potential sample selection into account.

[Insert Table 7 about here]

Table 7 shows the productivity effects of our main controls and their interaction, both for OLS regressions and the Heckman model. Columns (1) and (2) display the estimated coefficients for employment status and meaning treatment. The impact of the high-meaning treatment on productivity is positive, ranging between a 5.7 and 5.6 percent increase, but statistically insignificant. Unemployed individuals are significantly less productive than employed individuals. They produce between 38.7 and 39.7 percent fewer correctly typed characters. The lower panel of Table 7 provides the results from estimating the job participation probabilities in the Heckman model. Being unemployed significantly reduces the probability of working in the job. However, belonging to the high-meaning treatment group does not predict a higher job participation in a significant way. The inverse Mill's ratio is very small and does not suggest any significant selection.[11]

Columns (3) and (4) of Table 7 provide the estimated coefficients for our specification with interaction terms. As already indicated by the raw means of productivity, unemployed individuals are significantly less productive than employed individuals in the low-meaning treatment (between -61.2 and -60.5 percent). However, this negative effect almost vanishes in the high-meaning treatment, see Column (3). The coefficients estimated by OLS and by the Heckman model are very similar. The notion that selection does not play a large role is supported by a Mill's ratio that is close to zero and insignificant.

We now provide a more detailed interpretation of the productivity coefficients in Column (3). To get an idea on how the estimated coefficients translate into the actual number of correctly typed characters, we apply a simple procedure that re-transforms log predicted values

[10] One subject did not type properly. Therefore, our actual number of subjects for the productivity analysis reduces to 259.

[11] As a robustness check, we also use the total number of characters typed as a measure of productivity. The results for this measure are roughly the same, see Table C.2 in Appendix C.

into levels (Duan 1983). The transformed level predictions can be found in Table C.3 in Appendix C. In the low-meaning treatment, employed individuals produce on average 6,234 correctly typed characters, whereas unemployed individuals produce significantly fewer, namely 3,381 correctly typed characters. In the high-meaning treatment, employed individuals type 6,014 correct characters, which is similar to the number produced in the low-meaning treatment. By contrast, unemployed individuals are significantly more productive: Compared to the low-meaning treatment, their productivity significantly increases by about 55.2 percent from 3,381 to 5,247 correctly typed characters. Thus, in the high-meaning treatment, unemployed individuals produce about 87 percent of what is produced by employed individuals which is not significantly different. Hence, in the high-meaning treatment, unemployed individuals are almost as productive as employed individuals.

5.3 Selection into the Experiment

An important concern for the generalizability of experimental results is the extent to which we can draw inference about the population from an experiment with a selected sample of participants (e.g., Harrison et al. 2002, von Gaudecker et al. 2011). The PASS survey is conducted with a representative sample of employed and unemployed individuals. Therefore, we can use extensive data on participants and non-participants to examine whether selection is a concern for our main results.

Our sampling procedure induces potential selection between the sample of invited subjects and experimental subjects. To account for potential non-random selection into the experiment, we first re-estimate equation (1) with the interaction term using a Heckman selection model. The first stage estimates the decision to participate in the experiment; the second stage estimates the reservation wage equation taking potential sample selection into account.[12]

[Insert Table 8 about here]

Table 8 shows the results for our main specification with and without additional controls. The lower panel of Table 8 displays the estimated coefficients for the selection equation. Women and married individuals are significantly less likely to participate in the experiment. Individuals who hold a high school degree have a significantly higher probability of participating in the experiment.

The upper panel of Table 8 displays the estimated coefficients from our reservation wage equation. The estimated coefficients are almost identical to the estimated OLS coefficients in

[12] As exclusion restriction we use the availability of a subject's e-mail address in addition to their postal address. We assume that having an email address only affects the stated reservation wage through the participation decision, and does not have any other effect on the reservation wage.

Column (3) in Table 4. Regarding the control variables, we find that males and individuals with high school degree ask for significantly higher wages.[13] For specifications without controls, the inverse Mills ratio is negative; for specifications with controls, the respective coefficient is positive. Besides, the Mills ratio is not significantly different from zero across all specification. Thus, sample selection does not significantly bias our OLS estimates.

A disadvantage of the Heckman model is that it relies on strong parametric assumptions, which makes it prone to misspecification. We thus apply inverse probability weighting (IPW) as an alternative method to adjust for potential selection. The IPW approach consists of two steps. In a first step, we estimate the individual probability of being selected into the experiment, using employment status and all control variables as predictors. We then weight each individual by the inverse of these probabilities, and estimate the outcome equation for the selected sample, using the same specification with controls as in Column (2) in Table 8.

The results of the IPW analysis can be found in Table C.4 in Appendix C. The estimated coefficients of our main and interaction effects as well as of our controls are very similar in magnitude and significance to those in Table 8. Taken together, this suggests not only that our results are insensitive to different sample selection methods, but also that our main results in Table 4 are robust to sample selection.

Finally, we investigate whether endogenous sample selection plays a role for the productivity effects shown in Columns (1) and (3) of Table 7. As for reservation wages, we estimate our main specification without and with controls using a Heckman model. Table C.5 in Appendix C reports the results. Again, the estimated coefficients of our main and interaction terms for unemployment and high-meaning treatment are very similar to those in Table 7.

These findings show that our main results on reservation wages and productivity are robust to sample selection in the invited sample. This suggest that they can be generalized to the full PASS sample. Since the PASS comprises a random sample of the general population and the unemployment register, our study may allow to draw inference about the general population.

6 Discussion

Our results show that for a subsample of subjects the high-meaning treatment increases the reservation wage for accepting the job. In this section, we discuss potential explanations for this finding. In Subsection 6.1, we outline several mechanisms, and we formalize the two most promising candidates in a unifying framework in Subsection 6.2.

[13] Importantly, controlling for education does not result in lower coefficients for the employment indicator. Thus, education does not seem to absorb variation in the employment coefficient. Note though that only a very low share of unemployed individuals in our sample hold the highest school degree. Any interpretation therefore should be considered cautiously.

6.1 The negative effect of work meaning on labor supply

One candidate explanation for the negative effect of work meaning on labor supply of unemployed individuals is that these individuals evaluate the job in the high-meaning treatment as less meaningful than the job in the low-meaning treatment. To avoid this concern, some studies on social incentives (e.g., Fehrler and Kosfeld 2014, Cassar 2019) allow subjects to choose which organization shall benefit from their effort.[14] However, adopting this approach would have lowered statistical power of our analysis significantly. Therefore, we chose a setting where most individuals would find contributing to research meaningful and beneficial for society.

An important argument against the reversal in meaning is that the subgroup for which we saw a significant negative effect of work meaning on reservation wages also exerts significantly more effort in the high-meaning treatment than in the low-meaning treatment. As discussed in Subsection 5.2, this finding cannot be explained through selection on wages. Thus, other mechanisms generate the negative effect of work meaning on labor supply.

We now outline two mechanisms that are in line with our observations and that can be formalized using standard arguments from the behavioral economics literature. First, a job that generates benefits for society implies that somebody else will benefit from the worker's effort. This may create fairness concerns in the sense that the worker would like to receive a share of these benefits. Her reservation wage then increases in work meaning. This motivation could be particularly strong among individuals who are (or perceive themselves as) less well-off relative to the average individual.

Second, if a job appears as important for society, workers may infer that a high level of effort is required to do the job properly. Akerlof and Kranton (2000, 2005) formalize this idea as a "norm" to which workers of a certain social identity have to comply. When effort is costly, workers need to be compensated for these additional costs, so that their reservation wage increases in work meaning. Unemployed individuals indeed exert more effort in the high- than in the low-meaning treatment. Hence, the higher reservation wage may just reflect higher costs of effort.

Note that both mechanisms – fairness concerns and work norms – imply that work meaning is not "cheap" in the sense that it increases labor supply and effort without additional costs. Instead, it may depend on the social context and workers' information about the job whether work meaning influences labor supply and performance positively or negatively.

[14] Cassar (2019) does not find any difference in performance when subjects can choose the mission of their employer relative to a treatment where the mission is exogeneously given.

6.2 Work meaning, fairness concerns, and work norms

We analyze a simple labor supply model that captures preferences for work meaning as well as the behavioral motivations discussed above. For preferences that include only work meaning we use the utility function from Cassar and Meier (2019). This utility function equals

$$U(w, e, \theta, x) = Y(w, e) + M(\theta, x, e) - c(e), \tag{2}$$

where w is the worker's fixed wage, $e \in [0, \infty)$ the effort the worker exerts in a job, $\theta \in [0, \bar{\theta}]$ her preference type, $x \in [0, \bar{x}]$ the work meaning that the job carries, and $c(e)$ the worker's convex effort cost function with $c'(0) = 0$ and $\lim_{e \to \infty} c'(e) = \infty$. Cassar and Meier (2019) allow for multidimensional types θ and work meaning x to capture different aspects of work meaning. Without loss of generality we only use a one-dimensional version of their model.

The term $Y(w, e)$ is the worker's income. In our case, she only gets a fixed wage so that we set $Y(w, e) = w$. The term $M(\theta, x, e)$ is the worker's utility from doing meaningful work. The agent's type θ denotes how important work meaning is for the worker: $\theta = 0$ means that the worker does not derive any utility from work meaning, while a value θ close to the upper bound $\bar{\theta}$ captures that work meaning is very important for her. For convenience, we assume that we can write $M(\theta, x, e) = \theta m(x, e)$; the function $m(x, e)$ then denotes how much work meaning is generated depending on the job's characteristics x and the agent's effort e. Thus, in the following, we use the utility function

$$U(w, e, \theta, x) = w + \theta m(x, e) - c(e). \tag{3}$$

We consider the following interaction. An employer offers the job at wage w to the worker. The worker then accepts or rejects the offer. If she rejects it, the worker earns her outside option value $\bar{U}$. If she accepts it, she chooses effort e. Denote by $e^*(w, \theta, x)$ the agent's optimal effort if she accepted the a job at wage w, her own type is θ, and job meaning equals x. The worker accepts the job if and only if w is large enough so that $U(w, e^*(w, \theta, x), \theta, x) \geq \bar{U}$. We derive for any given wage w, type θ, and job meaning x the worker's optimal effort $e^*(w, \theta, x)$, and then characterize the reservation wage $w^*(\theta, x)$ that makes the agent indifferent between accepting or rejecting the job. We first consider the case without fairness concerns, and then update the utility function to take fairness concerns and work norms into account.

Analysis of the basic model. Suppose the worker's utility function is given by (3). How effort and reservation wage respond to changes in job meaning then depends on the shape of $m(x, e)$. We assume that work meaning increases both in job meaning x and in the agent's effort e, $m_e(x, e) > 0$ and $m_x(x, e) > 0$ at all x, e, and that the cross-derivative $m_{ex}(x, e)$ is also strictly

positive. To ensure existence of a unique optimal level of effort, we assume that $m(e, x)$ is concave in both arguments, $m_{ee}(x, e) < 0$ and $m_{xx}(x, e) < 0$ at all x, e. The agent's effort $e^*(w, \theta, x)$ is then implicitly defined by the first-order condition $m_e(x, e) - c'(e) = 0$, and we get

$$\frac{de^*}{dx} = \frac{\theta m_{ex}(x, e)}{\theta \mid m_{ee}(x, e) \mid - c''(e)} \tag{4}$$

at $e = e^*(w, \theta, x)$. Note that the term on the right of (4) is strictly positive. Hence, if the worker cares about work meaning, $\theta > 0$, her effort strictly increases in the meaning that the job carries. Next, the worker's reservation wage is implicitly defined by the indifference condition

$$w + \theta m(x, e^*(w, \theta, x)) - c(e^*(w, \theta, x)) = \bar{U}. \tag{5}$$

Using implicit differentiation, we obtain the relationship between reservation wage $w^*(\theta, x)$ and job meaning:

$$\frac{dw^*}{dx} = -\theta m_x(x, e) \tag{6}$$

at $e = e^*(w, \theta, x)$. Thus, as long as the agent cares about work meaning, her reservation wage strictly decreases in the meaning that the job carries. If the worker does not care at all about work meaning so that $\theta = 0$, both her effort and her reservation wage are unaffected by changes in job meaning x. Taken together, this implies that in a heterogeneous population an increase in job meaning must have a positive effect on labor supply. Hence, this simple model cannot account for our experimental results. In a next step, we therefore add fairness concerns to the framework.

The model with fairness concerns. To include fairness concerns, we first define the employer's – or society's – benefit $\pi(x, e)$ from the worker's effort. It strictly increases in both job meaning and the worker's effort, $\pi_x(x, e) > 0$ and $\pi_e(x, e) > 0$, and it is linear in effort. Moreover, we assume that $\pi(x, 0) > 0$ for all $x \in [0, \bar{x}]$; thus, $e = 0$ can be interpreted as an effort level that is contractually enforceable, and that produces positive benefits for the employer.

If the agent is concerned with fairness, she compares her fixed wage w to the benefit she feels entitled to; we denote this value by $\xi\pi(x, e)$ for some constant $\xi \in (0, 1)$. If $w \geq \xi\pi(x, e)$, the worker feels treated fairly, and her utility function is given by (3). However, if $w < \xi\pi(x, e)$, the worker feels underpaid, which creates disutility of $\alpha(\xi\pi(x, e) - w)$ for some constant $\alpha \in (0, 1)$.[15] The worker's utility function is now given by

$$U(w, e, \theta, x) = w + \theta m(x, e) - \alpha \max\{0, \xi\pi(x, e) - w\} - c(e). \tag{7}$$

[15]This may also capture fairness concerns that are motivated by aversion to disadvantageous inequality (Levine 1998, Fehr and Schmidt 1999).

Note that, all else equal, an increase in job meaning x now can have two countervailing effects on the worker's utility: It generates positive utility when the agent values work meaning, but it may also create costs for the agent if she is feeling underpaid given the importance of her job for society. The worker can partly offset unfair pay by reducing her effort. When the wage is smaller than the fair share of benefits, $w < \xi\pi(x, e)$, the worker's effort strictly decreases in job meaning x if her type θ is small enough relative to her fairness concerns α. Our assumptions ensure that, for any wage w, there is a unique optimal level of effort $e^*(w, \theta, x)$. If it is positive, this effort is implicitly defined by the first-order condition

$$\theta m_e(x, e) - \alpha\xi\pi_e(x, e) - c'(e) = 0 \quad \text{if } w < \pi_e(x, e), \tag{8}$$

$$\theta m_e(x, e) - c'(e) = 0 \quad \text{if } w \geq \pi_e(x, e). \tag{9}$$

We further can show that, at a given wage w, effort $e^*(w, \theta, x)$ increases in the worker's type θ. The worker's reservation wage is defined by the indifference condition

$$w + \theta m(x, e^*(w, \theta, x)) - \alpha \max\{0, \xi\pi(x, e^*(w, \theta, x)) - w\} - c(e^*(w, \theta, x)) = \bar{U}. \tag{10}$$

With this, we get the following result.

Proposition 1. *Consider an increase in job meaning, from x to x'. If $\bar{\theta}$ is large enough, there exists a critical type $\theta^* > 0$ with the property that (i) the reservation wage increases for all types below θ^*, $w^*(\theta, x') > w^*(\theta, x)$ for all $\theta \in [0, \theta^*)$, and (ii) the reservation wage decreases for all types above θ^*, $w^*(\theta, x') < w^*(\theta, x)$ for all $\theta \in (\theta^*, \bar{\theta}]$.*

This result is intuitive. It shows that the effect of an increase in job meaning can have differential effects on labor supply. For low types θ work meaning is not very important, and fairness concerns dominate the behavioral reaction to an increase in job meaning. For these workers, an increase in work meaning implies that the job generates more benefits for the employer or for society, and therefore they feel entitled to a higher wage. Hence, their reservation wage increases. In contrast, for high types θ work meaning is very important, and fairness concerns play only a secondary role in the behavioral reaction. As in the simple model, an increase in job meaning lowers their reservation wage. Note that for types around θ^* concerns for work meaning and fairness roughly cancel out each other. At a given increase in job meaning, their reservation wage remains more or less the same. In experimental data, fairness concerns therefore may conceal valuation of work meaning.

Proof of Proposition 1. We first show that $w^*(\theta, x)$ strictly decreases in θ for all $x \in [0, \bar{x}]$.

Using implicit differentiation on the indifference condition in (10), we get that

$$\frac{dw^*}{d\theta} = -\frac{1}{1+\alpha} m(x, e^*(w, \theta, x)) \quad \text{if } w^*(\theta, x) < \pi_e(x, e^*(w, \theta, x)) \tag{11}$$

$$\frac{dw^*}{d\theta} = -m(x, e^*(w, \theta, x)) \quad \text{if } w^*(\theta, x) > \pi_e(x, e^*(w, \theta, x)), \tag{12}$$

which by continuity of $w^*(\theta, x)$ yields the desired result. Next, observe that at $\theta = 0$, we have $e^*(w, 0, x) = 0$ for all w, x. Since $\pi(x', 0) > \pi(x, 0) > 0$, we therefore must have $w^*(0, x') > w^*(0, x)$. In contrast, if $\bar{\theta}$ is large enough, then from (10) it follows that $w^*(\bar{\theta}, x') < w^*(\bar{\theta}, x)$. Hence, there must be a value θ^* such that $w^*(\theta^*, x') = w^*(\theta^*, x)$. It remains to show that there is only one such value. For this, we show that $\frac{dw^*}{dx}$ strictly decreases in θ. Suppose w.l.o.g. that θ is such that $w^*(\theta, x) < \pi_e(x, e^*(w, \theta, x))$. From the indifference condition in (10) we then get

$$\frac{dw^*}{dx} = -\frac{1}{1+\alpha}\left[\theta m_x(x, e) - \alpha\xi\pi_x(x, e)\right] \tag{13}$$

at $e = e^*(w^*, \theta, x)$. We can calculate

$$\begin{aligned}
&\frac{\partial}{\partial\theta}\left[\theta m_x(x, e) - \alpha\xi\pi_x(x, e)\right] = \\
&= m_x(x, e) + \left[\theta m_{xe} m(x, e)\frac{\partial e}{\partial\theta} - \alpha\xi\pi_{xe}(x, e)\frac{\partial e}{\partial\theta}\right] \\
&= m_x(x, e) + \frac{\partial}{\partial x}\left[\theta m_e(x, e)\frac{\partial e}{\partial\theta} - \alpha\xi\pi_e(x, e)\frac{\partial e}{\partial\theta}\right] - \frac{\partial}{\partial e}\left[\theta m_e(x, e)\frac{\partial e}{\partial\theta} - \alpha\xi\pi_e(x, e)\frac{\partial e}{\partial\theta}\right]\frac{\partial e}{\partial x} \\
&= m_x(x, e) + \frac{\partial}{\partial x}\left[\theta m_e(x, e) - \alpha\xi\pi_e(x, e) - c'(e)\right]\frac{\partial e}{\partial\theta} - \frac{\partial}{\partial e}\left[\theta m_e(x, e) - \alpha\xi\pi_e(x, e) - c'(e)\right]\frac{\partial e}{\partial\theta}\frac{\partial e}{\partial x} \\
&= m_x(x, e)
\end{aligned}$$

at $e = e^*(w^*, \theta, x)$. Since $m_x(x, e)$ is strictly positive, we have

$$\frac{\partial}{\partial\theta}\left[\frac{dw^*}{dx}\right] = -\frac{1}{1+\alpha} m_x(x, e) < 0, \tag{14}$$

which shows the result. □

The model with work norms. We also obtain differential reactions to job meaning as in Proposition 1 if we assume that the worker's behavior is governed by work norms instead of fairness concerns. Suppose that $\bar{e}(x)$ is the work norm related to job meaning x, and that it is strictly positive and increasing in x. The worker suffers from not complying to the work norm so that her utility function now equals

$$U(w, e, \theta, x) = w + \theta m(x, e) - \alpha \max\{0, \bar{e}(x) - e\} - c(e). \tag{15}$$

The constant $\alpha > 0$ indicates how much disutility the worker incurs if her effort falls short of the work norm. For given x, the benefits form effort are concave, while the costs are convex. Hence, there is again a unique optimal level of effort $e^*(w, \theta, x)$, and it increases in θ.

We demonstrate that we get the same result as in Proposition 1. Consider first type $\theta = 0$. This type chooses either effort $\bar{e}(x)$ to avoid the penalty, or some effort level below $\bar{e}(x)$ that solves the the first-order condition $c'(e) = \alpha$. If the work norm increases due to a rise in job meaning x, this type either increases effort (to avoid the penalty) or keeps her effort constant. In both cases, her disutility from doing the job increases. Thus, her reservation wage increases in job meaning x. Next, consider a high type θ whose valuation of job meaning is large enough so that her effort $e^*(w, \theta, x)$ strictly exceeds the work norm $\bar{e}(x)$. Increasing job meaning x then only increases her payoff from the job, so that her reservation wage decreases in x. Thus, we again obtain differential effects of job meaning on labor supply.

7 Conclusion

We examined to what extent individuals are willing to sacrifice wage for work meaning. Making a job meaningful – in the sense that it creates benefits for others or for society – has been shown to increase performance and labor supply in a number of studies. However, so far it is not clear to what extent this holds for a general population, and unemployed individuals in particular. To this end, we analyze a representative sample from a German labor market survey (PASS). This survey is conducted with a representative sample of the general population, and a representative sample of unemployed individuals. We invited both groups to participate in an experiment in which we elicit reservation wages for a one-hour job, and vary work meaning through differential descriptions of the job. By combining experimental and survey data, we analyzed the extent of heterogeneity in how individuals react to work meaning, and controlled for selection into the experiment.

A majority of PASS respondents indicated that work meaning is somewhat or very important to them. However, for unemployed individuals it is less important than for employed in individuals. For both employed and unemployed individuals work meaning is significantly less important than receiving an appropriate wage or having a secure job. These survey results are reflected in the experimental behavior of our subjects. The work meaning variation had on average no significant influence on subjects' reservation wage. For subjects who in the survey consider work meaning to be very important, work meaning decreased the reservation wage by 17.7 percent. In contrast, for unemployed individuals, work meaning increased reservation wages by roughly the same extent.

Our interpretation of these results is that, depending on the individual, work meaning may

trigger different behavioral motivations that can have opposing effects on labor supply. High work meaning can signal benefits for others, which may create demands for more compensation if subjects are concerned with fairness. Alternatively, they may imply norms of high effort provision, which similarly lead to higher reservation wages. Thus, making jobs meaningful is not necessarily an inexpensive way to increase one's willingness to accept a job.

Tables

Table 1: Importance of survey work meaning and individual characteristics

	(1)	(2)
unemployed	-0.060***	-0.071***
	[0.016]	[0.016]
male		-0.075***
		[0.013]
high school degree		-0.007**
		[0.002]
age		0.002***
		[0.001]
number children		0.006
		[0.006]
married		-0.039***
		[0.013]
constant	0.319***	0.277***
	[0.007]	[0.026]
observations	5,178	5,178
R-squared	0.003	0.014

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. OLS regressions of high importance of work meaning on individual characteristics. The binary dependent variable takes the value one if a respondent considers work meaning to be very important, and is zero otherwise.

Table 2: Mean differences in the importance of wage and non-wage components of a job by employment status

How important is...	employment status	mean	N	diff	*t*-statistic	*p*-value
contribution to society	all	2.984	5286			
	employed	3.027	4167	0.203	6.997	0.000
	unemployed	2.825	1119			
appropriate salary	all	3.591	5318			
	employed	3.580	4187	-0.051	-2.728	0.006
	unemployed	3.630	1131			
secure job	all	3.732	2632			
	employed	3.747	2062	0.143	4.186	0.000
	unemployed	3.684	570			
recognition	all	3.144	5318			
	employed	3.175	4183	0.064	3.530	0.000
	unemployed	3.032	1135			
no time pressure	all	3.115	2694			
	employed	3.121	2130	0.029	0.743	0.457
	unemployed	3.092	564			
promotion prospects	all	2.719	2704			
	employed	2.732	2124	0.060	1.461	0.144
	unemployed	2.672	580			
discretion over work content	all	3.063	2621			
	employed	3.105	2044	0.190	5.208	0.000
	unemployed	2.915	577			
flexible working hours	all	2.789	2638			
	employed	2.855	2076	0.311	7.735	0.000
	unemployed	2.544	562			
on the job training	all	3.194	2617			
	employed	3.211	2079	0.085	2.296	0.022
	unemployed	3.126	538			

Numbers are based on the full PASS sample. For mean comparison *t*-tests were used.

Table 3: Balancing of selected covariates by work meaning and employment status

	unemployed		employed	
	diff.	*p*-value	diff.	*p*-value
male	0.039	[0.678]	-0.027	[0.526]
high school degree	-0.067	[0.415]	-0.037	[0.397]
age	1.246	[0.578]	-0.389	[0.690]
number children	-0.290	[0.205]	-0.124	[0.210]
married	-0.131*	[0.099]	0.058	[0.175]
unemployment duration	-1.563	[0.874]		
net income (Euros)			-36.171	[0.722]
observations	113		543	

p-value in brackets. *** p<0.01, ** p<0.05, * p<0.1. Mean comparison using *t*-tests and assuming unequal variances.

Table 4: Impact of work meaning and employment status on reservation wage

	OLS (1)	Tobit (2)	OLS (3)	Tobit (4)
unemployed	-2.907***	-7.162***	-4.140***	-8.577***
	[0.763]	[1.342]	[0.939]	[1.873]
high-meaning	-0.057	-0.178	-0.563	-0.691
	[0.619]	[1.056]	[0.692]	[1.172]
unemployed × high-meaning			2.614*	3.027
			[1.532]	[2.670]
constant	18.485***	24.413***	18.753***	24.682***
	[0.485]	[0.845]	[0.514]	[0.891]
observations	551	711	551	711
R-squared	0.025		0.030	

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1; OLS regressions of individual reservation wages on work meaning, employment status and interactions.

Table 5: Impact of work meaning and employment status on reservation wage, by gender

	OLS (1)	Tobit (2)	OLS (3)	Tobit (4)
unemployed	-3.418***	-7.949***	-2.802*	-7.799**
	[0.775]	[1.446]	[1.607]	[3.022]
high-meaning	-0.078	-0.385	-0.456	-0.531
	[0.636]	[1.089]	[0.954]	[1.616]
male	2.844***	4.351***	3.221***	5.111***
	[0.637]	[1.096]	[1.088]	[1.747]
unemployed × high-meaning			-0.600	0.656
			[2.197]	[4.272]
unemployed × male			-3.706*	-3.592
			[2.011]	[4.065]
high-meaning × male			-0.441	-1.126
			[1.455]	[2.404]
unemployed × high-meaning × male			6.296**	5.624
			[3.041]	[5.782]
constant	17.424***	22.779***	17.563***	22.782***
	[0.567]	[0.959]	[0.679]	[1.152]
observations	507	656	507	656
R-squared	0.065		0.079	

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. OLS regressions of individual reservation wages on work meaning, employment status, gender and interactions. Since gender information is only available in the survey data, our analytic sample reduces by 44 observations.

Table 6: Impact of work meaning and employment status on reservation wage, by survey measure

	sample split, by survey meaning			*sample split, by survey salary*		
	very important	less important	missing	very important	less important	missing
unemployed	-4.789	-6.886***	-12.823***	-6.228***	-7.039***	-12.998***
	[2.968]	[1.891]	[2.434]	[2.101]	[2.362]	[2.419]
high-meaning	-3.899*	1.532	-1.081	-1.196	0.976	-0.710
	[2.017]	[1.525]	[2.496]	[1.682]	[1.729]	[2.491]
constant	26.203***	23.755***	26.342***	24.913***	24.020***	26.376***
	[1.653]	[1.196]	[2.082]	[1.372]	[1.341]	[2.076]
observations	181	393	82	339	236	81

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Tobit regressions of individual reservation wages on work meaning and employment status.

Table 7: Impact of work meaning and employment status on output quality – OLS and Heckman regressions

	OLS (1)	Heckman (2)	OLS (3)	Heckman (4)
outcome equation: log nr correctly typed characters				
unemployed	-0.397***	-0.387***	-0.612**	-0.605***
	[0.147]	[0.120]	[0.248]	[0.159]
high-meaning	0.057	0.056	-0.036	-0.040
	[0.091]	[0.094]	[0.095]	[0.104]
unemployed × high-meaning			0.475*	0.492*
			[0.271]	[0.237]
constant	8.503***	8.534***	8.554***	8.599***
	[0.070]	[0.104]	[0.071]	[0.109]
selection equation: conducting the job				
unemployed		-0.334**		-0.286
		[0.163]		[0.229]
high-meaning		-0.020		0.001
		[0.132]		[0.149]
unemployed × high-meaning				-0.094
				[0.320]
constant		-0.346***		-0.356***
		[0.107]		[0.112]
observations	259	506	259	506
R-squared	0.045		0.053	
inverse Mill's ratio		-0.062		-0.091
		[0.154]		[0.154]

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. OLS regressions estimate robust standard errors. Heckman regression models are estimated using two-step procedure. Exclusion restriction for Heckman model: Difference between stated reservation wage and randomly drawn wage. The selection equation estimates the probability of participation in the one hour job conditionally on work meaning, employment status and interactions (Column (4)). The outcome equation estimates the impact of work meaning, employment status and interactions on the log number of correctly typed characters.

Table 8: Impact of work meaning and employment status on reservation wage – Heckman regressions to account for non-random selection into the experiment

	(1)	(2)
outcome equation: reservation wage		
unemployed	-4.360***	-4.230***
	[1.162]	[1.166]
high-meaning	-0.552	-0.790
	[0.717]	[0.704]
unemployed × high-meaning	2.691*	2.799*
	[1.612]	[1.587]
male		2.721***
		[0.660]
high school degree		2.433**
		[0.999]
age		0.025
		[0.030]
number children		-0.275
		[0.311]
married		-0.122
		[0.751]
constant	19.578***	15.401***
	[2.627]	[3.180]
selection equation: participating in the experiment		
unemployed	-0.076	-0.021
	[0.067]	[0.071]
male		-0.130**
		[0.057]
high school degree		0.497***
		[0.060]
age		0.002
		[0.003]
number children		-0.041
		[0.025]
married		-0.169***
		[0.064]
constant	-1.456***	-1.483***
	[0.062]	[0.131]
observations	3,245	3,148
inverse Mill's ratio	-0.453	0.366
	[1.776]	[1.896]

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. Heckman regression models are estimated using two-step procedure. Exclusion restriction for Heckman model: respondent was invited via e-mail or not. The selection equation estimates the probability of participating in the experiment on employment status and individual characteristics. The outcome equation estimates the impact of work meaning, employment status and interactions, and individual characteristics on reservation wage.

Appendix

A Invitation Letter (English Translation)

Dear [name],

Thank you very much for participating once more in the study "Life quality and social security" this year. You have contributed to the success of the study, which since 10 years has provided scientists and politicians with important information about the life circumstances of the German population.

Since life in Germany is changing, we too want to pursue new paths in research. In cooperation with the universities of Mannheim and Leuven, we implement the internet-based study "Personality and employment", in addition to "Life quality and social security." The study consists of a short survey, after which we ask the participants to take part in a small case study. In the case study, it is possible to earn some money.

From the participants in the study "Life quality and social security" we randomly selected candidates for participation in the additional case study – you are among them. We kindly invite you to participate. Of course, participation in this additional study is voluntarily, and there will not be any negative consequences if you decline to participate. It is, however, crucial for the validity of the study that possibly all selected individuals participate. Among those who participate both in the survey and the case study, we raffle 50 amazon vouchers with a value of 25 Euros each (for at most 1000 participants). In addition, you have the possibility to earn something in the case study (between 9 and 35 Euros). Participating in the study is for technical reasons only possible until August 20, 2017. Unfortunately, since the study has limited financial means, only the first 1000 individuals that register can participate. You can participate in the study using the following link:

www.pass-arbeitswelt.de

Your personal access code is: [code]

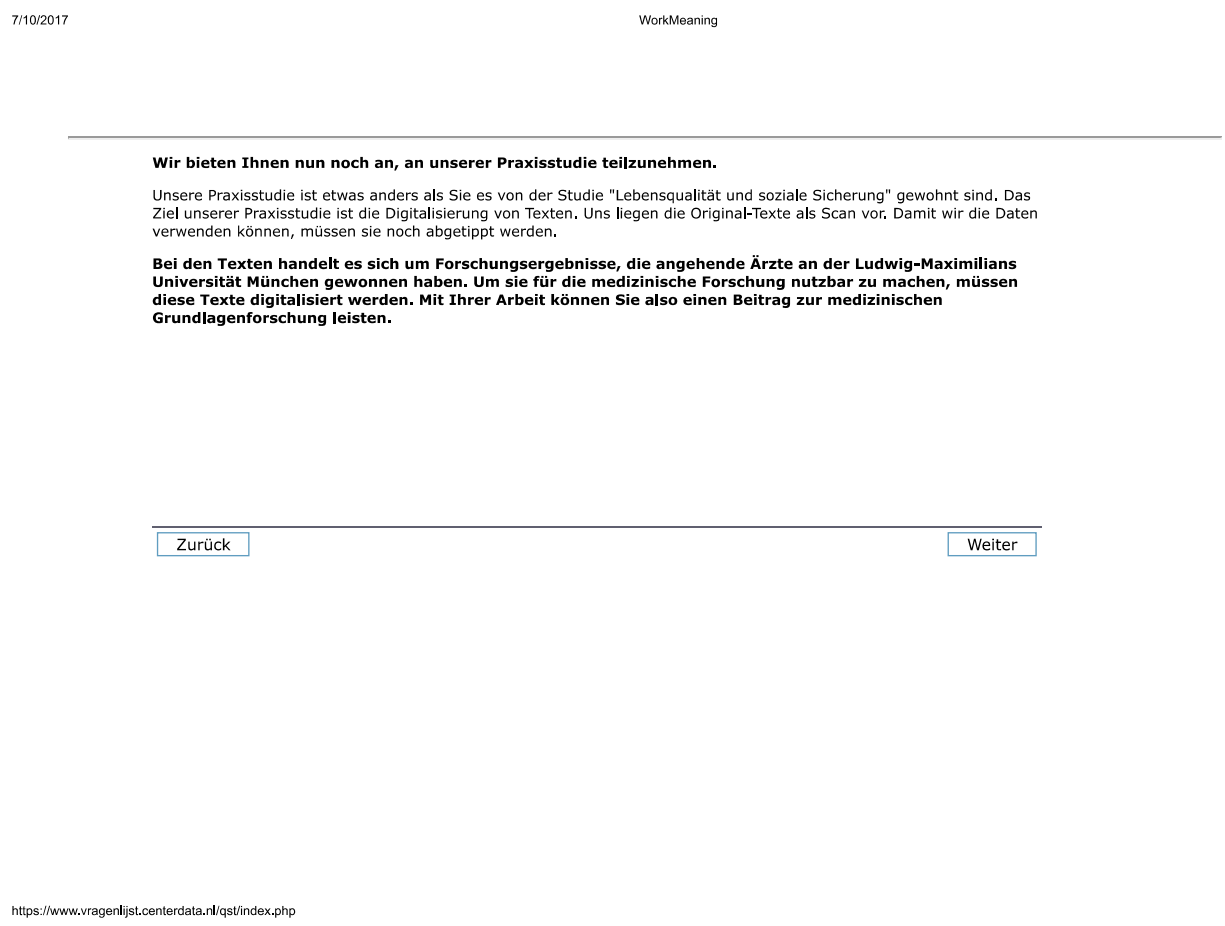
This code ensures that only those invited can participate in the study. Your data are saved anonymously. The collected data are stored separately from your name and email address. To evaluate the data from the additional study "Personality and employment" together with the survey "Life quality and social security" we merge the data using a unique respondent number. By participating in the survey you agree to the data being merged. You may revoke your consent at any time. All information can be found in the data protection statement.

Independently of your participation, we will ask you again the coming year to participate as usual in the survey "Life quality and social security."

We are looking forward to your participation. Thank you very much and kind regards,

B Experimental Instructions

The following screenshots show the instructions for the experiment with English translation.



We now offer you the opportunity to take part in our case study.

Our study is somewhat different from what you are used to in the study “Life quality and social security.” The goal of our study is to digitalize texts. We have scans of the original texts. In order to use these texts, they have to be type-written.

The texts feature results of research conducted by prospective medical doctors at the Ludwig-Maximilians University in Munich. They have to be digitalized to make them accessible to future medical research. Hence, with your efforts, you can contribute to medical research.

Wir bieten Ihnen an, für **eine Stunde** an unserer Praxisstudie mitzuarbeiten – also kurze Texte abzutippen. Diese Arbeit können Sie zu Hause an Ihrem Computer erledigen. Sie können frei wählen, wann innerhalb der nächsten 7 Tage Sie arbeiten wollen.

Die von Ihnen geleistete Arbeit wird natürlich vergütet. Die Bezahlung beträgt zwischen 9,00 Euro und 35,00 Euro pro Stunde. Den Lohn erhalten Sie im September 2017 ausbezahlt, wenn Sie eine Stunde gearbeitet haben.

Zurück Weiter

We offer you to work – that means to type short texts – for our study for **one hour**. You can do this at home on your computer. You can choose freely when you would like to work during the next 7 days.

Of course, you will be reimbursed for your efforts. The hourly wage is between 9,00 and 35,00 Euros. You will receive the payment in September 2017 if you have worked for an hour.

Auf der nächsten Seite können Sie auswählen, zu welchem Stundenlohn Sie die Arbeit annehmen möchten. Sie können jeden Lohn zwischen 9,00 Euro und 35,00 Euro wählen.

Der Computer lost Ihnen dann zufällig eine Zahl zwischen 9,00 und 35,00 Euro als Lohn zu.

Wenn diese Zahl **größer** ist als der von Ihnen geforderte Stundenlohn, so erhalten Sie die geloste Zahl als Stundenlohn.

Wenn diese Zahl **kleiner** ist als der von Ihnen geforderte Stundenlohn, so können Sie nicht an der Praxisstudie mitarbeiten.

Sie können auch angeben, dass Sie an der Praxisstudie auf keinen Fall teilnehmen möchten.

Zurück Weiter

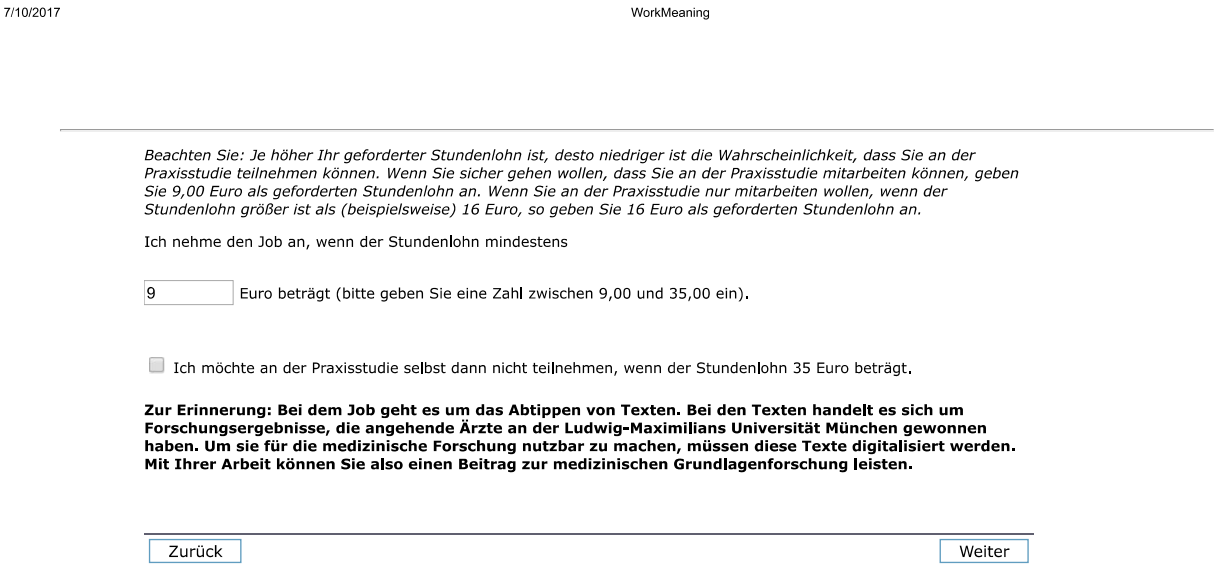
On the next page, you can choose the hourly wage at which you would be willing to accept the job. You can choose a wage between 9 and 35 Euros.

The computer then randomly chooses a number between 9 and 35 as your wage.

If this number is **higher** than the hourly wage you asked for, you will receive the number as your hourly wage.

If this number is **lower** than the hourly wage you asked for, you cannot take part in our study.

You can also state that you do not want to take part in our study at all.



7/10/2017 WorkMeaning

Beachten Sie: Je höher Ihr geforderter Stundenlohn ist, desto niedriger ist die Wahrscheinlichkeit, dass Sie an der Praxisstudie teilnehmen können. Wenn Sie sicher gehen wollen, dass Sie an der Praxisstudie mitarbeiten können, geben Sie 9,00 Euro als geforderten Stundenlohn an. Wenn Sie an der Praxisstudie nur mitarbeiten wollen, wenn der Stundenlohn größer ist als (beispielsweise) 16 Euro, so geben Sie 16 Euro als geforderten Stundenlohn an.

Ich nehme den Job an, wenn der Stundenlohn mindestens

9 Euro beträgt (bitte geben Sie eine Zahl zwischen 9,00 und 35,00 ein).

Ich möchte an der Praxisstudie selbst dann nicht teilnehmen, wenn der Stundenlohn 35 Euro beträgt.

Zur Erinnerung: Bei dem Job geht es um das Abtippen von Texten. Bei den Texten handelt es sich um Forschungsergebnisse, die angehende Ärzte an der Ludwig-Maximilians Universität München gewonnen haben. Um sie für die medizinische Forschung nutzbar zu machen, müssen diese Texte digitalisiert werden. Mit Ihrer Arbeit können Sie also einen Beitrag zur medizinischen Grundlagenforschung leisten.

Zurück Weiter

https://www.vragenlijst.centerdata.nl/qst/index.php 1/1

Please, keep in mind: The higher the hourly payment is that you request, the lower is the probability that you can participate in the study. If you want to make sure you can work in the study, indicate 9 Euros as a requested hourly payment. If you only want to work in the study if the hourly payment is bigger than (for example) 16 Euros, then indicate 16 Euro as a requested hourly wage.

I will accept the job if the hourly payment is at least

X Euros (please enter a number between 9,000 and 35,00).

I do not want to participate in the study, even if the hourly payment is 35,00 Euros.

Reminder: This job is about the typing of texts. The texts are research results gained by prospective physicians at the University of Munich. In order to make them usable for medical research, they have to be digitalized. With your work you can contribute to fundamental medical research.

C Additional Results

Table C.1: Importance of receiving an appropriate wage and individual characteristics

	all respondents	unemployed	
	(1)	(2)	(3)
unemployed	0.047***		
	[0.017]		
unemployment duration		0.000	0.000
		[0.000]	[0.000]
male	-0.014		-0.025
	[0.014]		[0.034]
high school degree	0.009***		-0.008
	[0.003]		[0.007]
age	-0.001		-0.001
	[0.001]		[0.001]
number children	0.015**		
	[0.006]		[0.012]
married	-0.022		-0.026
	[0.014]		[0.028]
constant	0.612***	0.650***	0.715***
	[0.027]	[0.027]	[0.068]
observations	5,209	869	869
R-squared	0.005	0.000	0.004

robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1; OLS regressions of high importance of salary on individual characteristics. The binary dependent variable takes the value one if a respondent considers the salary to be very important, and is zero otherwise.

Table C.2: Impact of work meaning and employment status on an alternative measure for output quality – OLS and Heckman regressions

	OLS (1)	Heckman (2)	OLS (3)	Heckman (4)
outcome equation: log nr typed characters				
unemployed	-0.323***	-0.300***	-0.473***	-0.460***
	[0.106]	[0.106]	[0.168]	[0.140]
high-meaning	0.035	0.034	-0.029	-0.037
	[0.082]	[0.083]	[0.092]	[0.092]
unemployed × high-meaning			0.331*	0.361*
			[0.199]	[0.209]
constant	8.547***	8.619***	8.581***	8.667***
	[0.066]	[0.092]	[0.070]	[0.096]
selection equation: conducting the job				
unemployed		-0.334**		-0.286
		[0.163]		[0.229]
high-meaning		-0.020		0.000
		[0.132]		[0.149]
unemployed × high-meaning				-0.094
				[0.320]
constant		-0.345***		-0.356***
		[0.107]		[0.112]
observations	259	506	259	506
R-squared	0.038		0.048	
inverse Mill's ratio		-0.150		-0.169
		[0.135]		[0.135]

standard errors; *** p<0.01, ** p<0.05, * p<0.1; OLS regressions estimate robust standard errors; Heckman regression models are estimated using two-step procedure. Exclusion restriction for Heckman model: Difference between stated reservation wage and randomly drawn wage. The selection equation estimates the probability of participation in the one hour job conditionally on work meaning, employment status and interactions (Column (4)). The outcome equation estimates the impact of work meaning, employment status and interactions on the log number of typed characters.

Table C.3: Transformation of coefficients from Table 7, Column (3)

group	coeffcients	number of correctly typed characters	difference in number of correctly typed characters [p-value]
employed, low-meaning	$\hat{\beta}_0$	6234	
employed, high-meaning	$\hat{\beta}_0 + \hat{\beta}_2$	6014	220 [0.704]
unemployed, low-meaning	$\hat{\beta}_0 + \hat{\beta}_1$	3381	
unemployed, high-meaning	$\hat{\beta}_0+\hat{\beta}_1+\hat{\beta}_2+\hat{\beta}_3$	5247	1866 [0.045]

All coefficients are taken from Column (3) in Table 7. To transform the log-coefficients into actual numbers of correctly typed characters we make use of the Smearing factor (Duan 1983): $\exp(\hat{\beta}_i) \times \frac{1}{N} \sum_{i=1}^{N} \exp(\hat{\epsilon}_i)$

Table C.4: Impact of work meaning and employment status on reservation wage – Inverse Probability weighting (IPW) to account for non-random selection into the experiment

	(1)
unemployed	-4.145***
	[1.065]
high-meaning	-0.833
	[0.775]
unemployed × high-meaning	3.035*
	[1.643]
male	2.480***
	[0.680]
high school degree	2.316***
	[0.668]
age	0.022
	[0.033]
number children	-0.259
	[0.292]
married	-0.172
	[0.773]
constant	16.200***
	[1.445]
observations	498
R-squared	0.086

standard errors; *** p<0.01, ** p<0.05, * p<0.1; Regression using inverse probability weighting. Weights are obtained from a probit regression of participating in the experiment on employment status and individual characteristics. The final stage estimates a weighted OLS regression of the impact of work meaning, employment status and interactions, and individual characteristics on reservation wage.

Table C.5: Impact of work meaning and employment status on output quality – Heckman regressions to account for non-random selection into the experiment

Variables	(1)	(2)
outcome equation: log number correctly typed characters		
unemployed	-0.559***	-0.469***
	[0.169]	[0.172]
high-meaning	-0.035	-0.002
	[0.104]	[0.102]
unemployed × high-meaning	0.442*	0.405*
	[0.237]	[0.236]
male		-0.238**
		[0.105]
high school degree		-0.020
		[0.167]
age		-0.007
		[0.004]
number children		-0.093*
		[0.048]
married		0.197*
		[0.114]
constant	9.064***	9.549***
	[0.560]	[0.691]
selection equation: participating in the experiment		
unemployed	-0.090	-0.063
	[0.081]	[0.087]
male		-0.168**
		[0.069]
high school degree		0.463***
		[0.073]
age		0.002
		[0.003]
number children		-0.039
		[0.031]
married		-0.157**
		[0.078]
constant	-1.680***	-1.711***
	[0.074]	[0.157]
observations	2,998	2,903
inverse Mills ratio	-0.291	-0.343
	[0.316]	[0.356]

standard errors; *** p<0.01, ** p<0.05, * p<0.1; Heckman regression models are estimated using two-step procedure. Exclusion restriction for Heckman model: respondent was invited via Email or not. The selection equation estimates the probability of participating in the experiment on employment status and individual characteristics. The outcome equation estimates the impact of work meaning, employment status and interactions, and individual characteristics on the log number of correctly typed characters.

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