# Why Do I Even Bother? The Nonlinear Impact of Debt on Wage Selectivity

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**Abstract**

Prior to entering the workforce many individuals have accumulated large sums of debt that require repayment in the near future (e.g., student loans, credit cards, mortgages, etc). When these debt service payments are large, they may significantly impact an individual's labor market behavior. In this paper we utilize an online experiment to test the impact of debt on individuals' willingness to accept wage offers. We observe a significant nonlinear effect of debt on wage selectivity when workers are required to repay their entire debt before earning a payout. However, when we consider an income-based repayment scheme, similar to that adopted for student loans, this nonlinear relationship vanishes. Therefore, we conclude that income based repayment plans have the ability to smooth nonlinearities in wage acceptance arising due to differences in debt levels.

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# 1 Introduction

Approximately 80% percent of Americans have some form of large debt or financial obligation (Pew Charitable Trust, 2015). Often this debt must be repaid within a specific time frame, and these debt burdens differ significantly across individuals. In this paper, we investigate the extent to which differences in debt lead to differential labor market outcomes. Specifically, we use an online experiment to determine the impact of debt on individuals' wage selectivity. We find that debt exerts a nonlinear effect on wage selectivity, with low-debt and high-debt individuals being more selective than individuals with moderate levels of debt. However, policy interventions, such as an income-based repayment plan, are shown to eliminate this nonlinear response.

We motivate our experimental work using a modified version of the standard reservation wage model proposed by McCall (1970). Our model demonstrates a plausible reason as to why agents with very low *or* very high levels of debt will be more selective than agents with a moderate debt level. This theoretical result can be explained as follows: when debt= 0, an agent behaves just as they would in the standard theory where debt is absent. As debt levels rise from 0, agents will become less selective in terms of their wage. This occurs because at low to moderate debt levels, an agent is comparing his known payoff today with his expected payoff next period. While rejecting the current wage provides the agent with the opportunity to draw a new wage next period, this also reduces the amount of time (number of periods) the agent has to pay off their debt and earn a positive payout. Therefore, while increasing debt reduces both the agent's payout today and their expected payout tomorrow, the reduction of tomorrow's expected payout is amplified by the loss of work-time associated with waiting. This process continues as debt rises up to a point. Once an agent's debt is sufficiently large, their expected return from waiting will become negative and they will simply select any wage that offers a net return of at least 0 today.[1] Under this condition, further increases in debt will drive up the agent's reservation wage as the agent will require a higher wage in order to service their debt and break even. This basic finding suggests that existing research on wealth and job/wage selectivity (to be surveyed below) continues in the debt domain *but only up to a certain level of debt.* After this level of debt, the negative relationship between debt and wage selectivity reverses.

While our theoretical finding indicates that a nonlinear relationship between debt and wage selectivity may exist, we are interested in determining whether this relationship is actually present in an experimental setting. We are not testing the accuracy of the model per se but rather whether or not the canonical wealth - wage selectivity relationship may reverse under a sufficient level of debt (i.e., negative wealth). To test this, we use an online experiment where we randomly assign subjects a debt level and then present them with exogenously generated wage offers under a fixed time constraint. We observe a statistically significant nonlinear relationship between subjects' debt level and the number of wage offers they choose to observe. Both low-debt and high-debt subjects are found to be more selective than their medium-debt counterparts. This nonlinear effect is qualitatively consistent with our theoretical finding. Therefore, both our theory and our experimental evidence

[1] We assume throughout that agents always have the outside option of "non-participation." In this case, the agent never accepts a wage and defaults on their debt. In the following sections we provide details for why this is reasonable, given our questions of interest.

indicates the presence of a nonlinear relationship between an individual's debt level and their willingness to accept a given wage.

The results described above indicate two issues that policy makers may be interested in addressing. First, debt may increase both wage and income inequality. Specifically, since low-debt agents are more selective than their mid-debt counterparts, the realized wage and associated income of these agents may differ. Second, as agents who face very high debt levels have an incentive to hold out for a "home-run" wage (or a sufficiently high wage), they will likely face high levels of unemployment. As a consequence, policy makers may seek to implement policies that break this nonlinear relationship. We consider one such policy: a standard income based repayment plan. Under our income based repayment plan, subjects are guaranteed 70% of their wage, with the remaining 30% going to service their debt. If they should happen to pay off their debt, they will receive their entire wage in the remaining periods. Under our income-based repayment plan we find little variation in both our agents' probability of acceptance (model) and the number of wage offers observed by our subjects (experiment). Therefore, both our theoretical and experimental results provide evidence that income-based repayment plans are sufficient to break the nonlinear relationship between debt and wage selectivity.

## 2 Background

The connection between an individual's financial condition and their labor market outcomes has been well studied in the literature. For instance, there is a rich line of research exploring the effects of wealth on job acceptance and labor market transitions. The general consensus within this literature is that an individual's wealth is positively related to job selectivity. That is, as wealth decreases (increases), workers become less (more) selective in terms of wages. For instance, under standard assumptions Danforth (1979) demonstrates a positive correlation between asset holdings and accepted wages, while Blundell et al. (1997) show an inverse relationship between employment and initial wealth (savings).[2]

The empirical literature on the effects of wealth on labor market outcomes echo the theoretical findings. While significance is susceptible to the specification, Bloemen (2002) finds evidence in support of an inverse relationship between savings and the likelihood of accepting a job. However Bloemen (2002), suggest that estimating relationships between wealth and job acceptance through labor market transitions will be difficult. This is due to the possibility that the likelihood of transition is a function of individual preferences/characteristics as well as factors from the demand side. In particular, individual borrowing constraints may have a significant effect on transitions in the labor market. Indeed, Rendon (2012) demonstrates this using a dynamic model and data from the National Longitudinal Survey. Results from the model, however, do suggest that initial wealth influences job search outcomes. This is because individuals with more wealth can be more selective. Thus, while

[2]There is a large literature on the presence of debt aversion, or the tendency of individuals to make choices in order to avoid the accumulation of debt. Debt aversion has been demonstrated to influence an individual's likelihood to attend college, their career choice upon graduation (Field, 2009) and even lead to sub-optimal consumption (Meissner, 2014). The primary difference between our work and this strand of literature is that we treat debt as exogenous in order to isolate the effect of variations in debt on wage selectivity.

these individuals have a higher probability of being unemployed, they also have a higher probability of earning higher wages. Bloemen and Stancanelli (2001) find similar results, showing that wealth has both a positive affect on an individual's reservation wage and a negative (albeit small) affect on employment.

Given the conventional interpretation of debt as negative wealth, our paper contributes to the previously discussed literature by demonstrating that the positive relationship between wealth and wage selectivity remains, even for moderately negative wealth levels.[3] However, the nonlinear effect introduced earlier and detailed shortly indicates that once debt becomes sufficiently large, this relationship may break down and the effect of wealth on wage selectivity becomes negative. Such a relationship is consistent with housing literature which reports a positive relationship between homeownership and increased wage selectivity (Oswald, 1996; Blanchflower and Oswald, 2013)[4]. While issues regarding housing and labor market decisions necessarily introduces further questions regarding endogeneity, we simply present this as an empirical example of our mechanism. Furthermore, our experimental design provides us with control and allows us to avoid the potential endogeneity issues mentioned in the empirical literature.

Therefore, our paper contributes to several strands of literature that investigate the effects of wealth, savings, and financial security on individuals' labor supply decisions. We focus on an often overlooked question, the impact of debt on wage selectivity, and offer an explanation that is testable with our experimental design. We propose that there is a nonlinear relationship between debt and wage selectivity. Consistent with previous work, we show that for low to moderate debt levels, an increase in debt reduces workers' wage selectivity. However, at some point the debt becomes so large that unless the worker lands a high paying job, the debt will go unpaid. Thus at some level of debt, the worker keeps searching for a "home run" job when workers with less debt would have already accepted employment. Lastly, we demonstrate that a simple income based repayment plan is sufficient to smooth the nonlinearities in wage selectivity induced by debt.

## 3 Theory

To provide motivation for our experimental work, we demonstrate that a nonlinear relationship between debt and wage selectivity may exist using a two-period model in the spirt of McCall (1970). Specifically, we modify the standard model to allow for a finite time horizon

[3]While the interpretation of debt as negative wealth is reasonable, it potentially ignores the severe limitations high debt balances place on individuals with limited means. It is well-known that individuals with limited means and experience, such as new labor market entrants, experience higher rates of job turn over than their more seasoned counterparts (e.g., Topel and Ward, 1992; Neal, 1999). Furthermore, individuals who experience repeated job losses often move into positions that offer lower wages (Farber, 1999; Böheim and Taylor, 2002). Browning and Crossley (2009) explore this regularity and find evidence that workers are, in a way, using these low wage positions (which are plentiful) as a substitute for credit. In other words, workers who lack sufficient savings (or who have accumulated debt) accept low wage positions to finance consumption and service debt obligations in the short-run, which is consistent with our findings.

[4]As an intuitive example, consider an individual who has locked into a mortgage with a large monthly payment. Accepting a low paying job will not be sufficient to cover expenses and as such, the individual has an incentive to holdout for a higher wage because taking a low wage will not affect the final outcome and cost effort.

and agents who differ in terms of their debt levels. Once an agent's debt is known, she receives a wage offer drawn from $U(0,1)$. If she accepts this offer, she will earn this wage and face a flow effort cost, $e$, in both periods.[5] If she rejects the offer, she will receive a new wage offer next period that may either be accepted or rejected. We assume that the two time periods are in short proximity of each other, and as such, we ignore the presence of time discounting. We consider this model under two debt repayment regimes; Regime 1, where agents must repay their entire debt before earning a payout, and Regime 2, where agents are afforded an income-based repayment plan. The next two subsections detail these two regimes.

### 3.1 Regime 1

Under Regime 1, an agent must repay her debt before she can pay her effort cost and earn a payout. This serves as our benchmark case, where agents receive no debt forgiveness while working. However, we assume that agents always have the outside option of never accepting a wage and earning nothing.[6] To solve this problem we start in the final period, $t = 2$. If the agent accepts a wage offer, $w$, in time $t = 2$, she will receive a payout, $\pi$, given by:

$$\pi = w - e - D \tag{1}$$

As the agent could always reject this wage offer and earn 0, any accepted wage offer must payout at least 0. Therefore, the reservation wage in time $t = 2$, $\bar{w}_{Res1,2}$, is given by:

$$\bar{w}_{Res1,2} = e + D \tag{2}$$

where the first subscript denotes the debt repayment regime and the second subscript denotes the time period.

With the reservation wage in time $t = 2$ in hand, we can move on to computing the reservation wage in time $t = 1$. At time $t = 1$, accepting a wage of $w$ would result in a payout of:

$$\pi = 2(w - e) - D \tag{3}$$

If the agent rejects $w$, she will receive another wage offer at time $t = 2$. If this wage is less than $\bar{w}_{Res1,2}$, the agent will reject it as well and will earn a 0 payout (outside option). Let $\tilde{w}_{Res1,1}$ denote the threshold wage that would make an agent indifferent between earning $\pi$ (from equation 3) and earning 0:

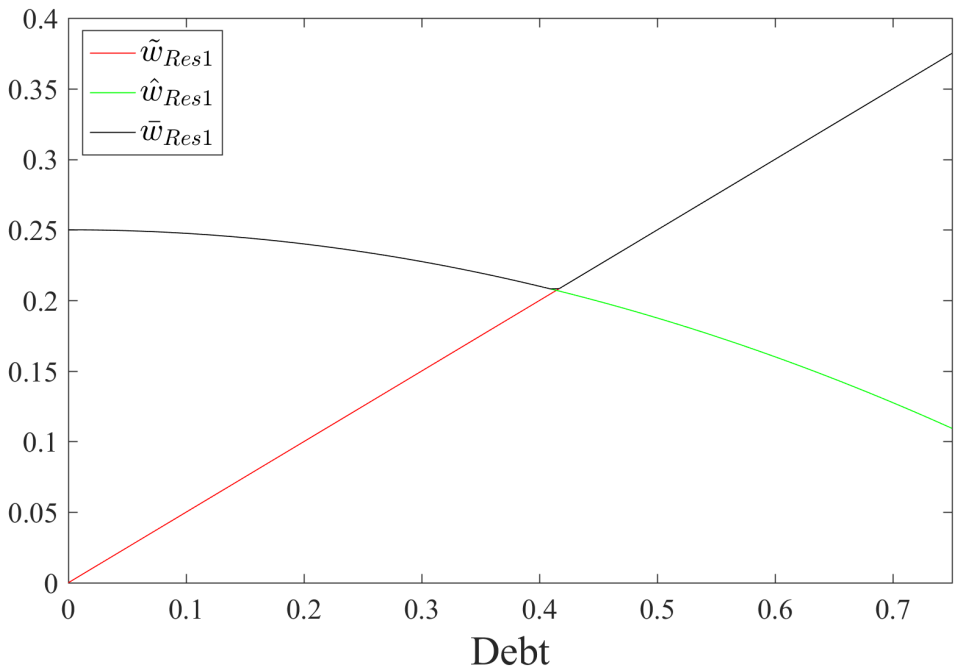
$$\tilde{w}_{Res1,1} = e + \frac{D}{2} \tag{4}$$

It is also possible that the agent will accept the wage drawn in time $t = 2$. In this case, the agent must compare the payout she would earn by accepting $w$ today with her expected payout from waiting. To compute the agent's expected payout, we must first compute her

[5] The flow effort cost can be interpreted as the cognitive cost of paying attention or performing the task.

[6] This assumption is reasonable as employed individuals have verifiable income that can be garnished while unemployed individuals do not.

Figure 1: Regime 1 Reservation Wage




expected wage conditional on the wage offer being "acceptable", $E\{w'|w' \geq \bar{w}_{Res1,2}\}$:

$$E\{w'|w' \geq \bar{w}_{Res1,2}\} = (1-F(\bar{w}_{Res1,2})) \int_{\bar{w}_{Res1,2}}^{1} wf(w)dw = (1-\bar{w}_{Res1,2}) \left(\frac{1+\bar{w}_{Res1,2}}{2}\right) \quad (5)$$

Given this expected wage, the agent's expected payout from waiting, $E\{\pi\}$, is given by:

$$E\{\pi\} = (1-\bar{w}_{Res1,2}) \left(\frac{1+\bar{w}_{Res1,2}}{2}\right) - e - D \quad (6)$$

Let $\hat{w}_{Res1,1}$ denote the threshold wage that would make an agent indifferent between earning $\pi$ (from equation 3) and and earning $E\{\pi\}$ (from equation 6):

$$\hat{w}_{Res1,1} = \frac{1}{2}\left[(1-\bar{w}_{Res1,2}) \left(\frac{1+\bar{w}_{Res1,2}}{2}\right) - e\right] + e \quad (7)$$

Figure 1 presents plots of both $\tilde{w}_{Res1,1}$ and $\hat{w}_{Res1,1}$, assuming $e = 0$.[7] For the agent to accept $w$ in time $t = 1$, it must be the case that it exceeds both of these conditions. Therefore, the reservation wage in time $t = 1$ under Regime 1, $\bar{w}_{Reg1,1}$, is given by the black line in Figure 1. Given our distributional assumptions, the probability that an agent accepts a wage offer is simply $1 - \bar{w}_{Reg1,1}$. Thus, the clear nonlinear relationship between an agent's debt level and their reservation wage is passed through directly to their wage

[7] We have considered alternative specifications, and our main results hold for moderate values of $e$.

selectivity, with low-debt and high-debt agents being more selective than their mid-debt counterparts. This nonlinear relationship exists because at low levels of debt, the agent's current payoff and their expected payoff are both positive. However, as the agent's debt level rises, it becomes less and less likely that the agent will be able to pay their debt and recoup their effort costs in the remaining period. As such, for higher debt levels it is the comparison with 0 (the outside option) that binds.

### 3.2 Regime 2

Regime 2 is modeled after an income based repayment system, like those used to help individuals service student loans. We assume that agents keep 70% of their wages until their debt is paid off, after which, they keep their full wage.[8] We are interested in how this policy effects the relationship between debt and wage selectivity observed earlier.

Again, we start in time $t = 2$, but unlike under Regime 1, agents now have access to two potential payoff functions, given by:

$$\hat{\pi} = 0.7w - e \tag{8}$$

$$\tilde{\pi} = w - e - D \tag{9}$$

Equation (8) is consistent with the income based repayment option, and (9) is the same as the payment under Regime 1. For a given wage, an agent will receive the larger of the two payoffs. Therefore, the reservation wage in time $t = 2$, $\bar{w}_{Res2,2}$ is given by:

$$\bar{w}_{Res2,2} = \min\{D + e, \frac{e}{0.7}\} \tag{10}$$

In time $t = 1$, accepting a wage, $w$ will result in a payout that follows the basic structure presented for $t = 2$. Assume that the agent is paid based on the first payoff function, then her payout from accepting $w$ today will be:

$$\tilde{\pi} = 2[0.7w - e] \tag{11}$$

When determining if they should accept $w$, the agent must compare this payout with the following alternatives:

$$\pi_a = (1 - \bar{w}_{Res2,2})\left(\frac{1 + \bar{w}_{Res2,2}}{2}\right) - e - D \tag{12}$$

$$\pi_b = 0.7(1 - \bar{w}_{Res2,2})\left(\frac{1 + \bar{w}_{Res2,2}}{2}\right) - e \tag{13}$$

[8] We have also considered cases where agents keep 50% and 90% of their wages and our main results carry over.

Given these possible future returns, the agent solves for two separate threshold wages:[9]

$$\bar{w}_{Res2,a} = \frac{\frac{1}{2}\left[(1-\bar{w}_{Res2,2})\left(\frac{1+\bar{w}_{Res2,2}}{2}\right) - e - D\right] + e}{0.7} \tag{14}$$

$$\bar{w}_{Res2,b} = \frac{\frac{1}{2}\left[0.7(1-\bar{w}_{Res2,2})\left(\frac{1+\bar{w}_{Res2,2}}{2}\right) - e\right] + e}{0.7} \tag{15}$$

The first panel of Figure 2 presents plots of these threshold wages. A sufficient (but not necessary) condition for a wage to be accepted is that it satisfies both of these thresholds. This condition, $\tilde{w}_{Res2,1}$ is given by the dotted black line in the first panel of Figure 2.

It is also possible that the agent will be paid according to the second payoff function. In this case, his current payout will be:

$$\hat{\pi} = 2[w - e] - D \tag{16}$$

Comparing this payout with the expected payouts ($\pi_a$ and $\pi_b$) given above yields:

$$\bar{w}_{Res2,c} = \frac{1}{2}\left[(1-\bar{w}_{Res2,2})\left(\frac{1+\bar{w}_{Res2,2}}{2}\right) - e\right] + e \tag{17}$$

$$\bar{w}_{Res2,d} = \frac{1}{2}\left[0.7(1-\bar{w}_{Res2,2})\left(\frac{1+\bar{w}_{Res2,2}}{2}\right) - e + D\right] + e \tag{18}$$

These two thresholds are presented in the second panel of Figure 2. As before, a sufficient (but not necessary) condition for a wage to be accepted is that it satisfies both of these threshold. We denote this condition as $\hat{w}_{Res2,1}$ and present it in dashed black in the second panel of Figure 2.

To determine an agent's reservation wage in time $t = 1$, we must consider $\tilde{w}_{Res2,1}$ and $\hat{w}_{Res2,1}$ simultaneously. Both of these conditions are presented in the third panel of Figure 2. Any wage that satisfies at least one of these conditions will be accept. Therefore, the reservation wage at time $t = 1$, $\bar{w}_{Res2,1}$, is given by the minimum of these two conditions and is presented as the solid black line in Figure 2. Interestingly, while the reservation wage under Regime 1 displays a clear "V" shape, indicating a differential impact of debt on wage selectivity, this effect is not present under Regime 2.

Figure 3 plots the reservation wage under both regimes. Inspection of Figure 3 indicate that when debt equals 0, agents' reservation wages will coincide between the two regimes. However, as debt increases, the reservation wage will fall under Regime 1, but remain constant under Regime 2. Eventually, debt will become sufficiently large and agents will require higher wages to break even under Regime 1. Thus, while there is a clear nonlinear relationship between debt and wage selectivity under Regime 1, no such relationship exists under Regime 2.

[9] For completeness, we should also include the case comparing the current payout to 0. However, under our calibration, this is never needed as one of the payoff functions will always yield a positive payout.

Figure 2: Regime 2 Reservation Wage

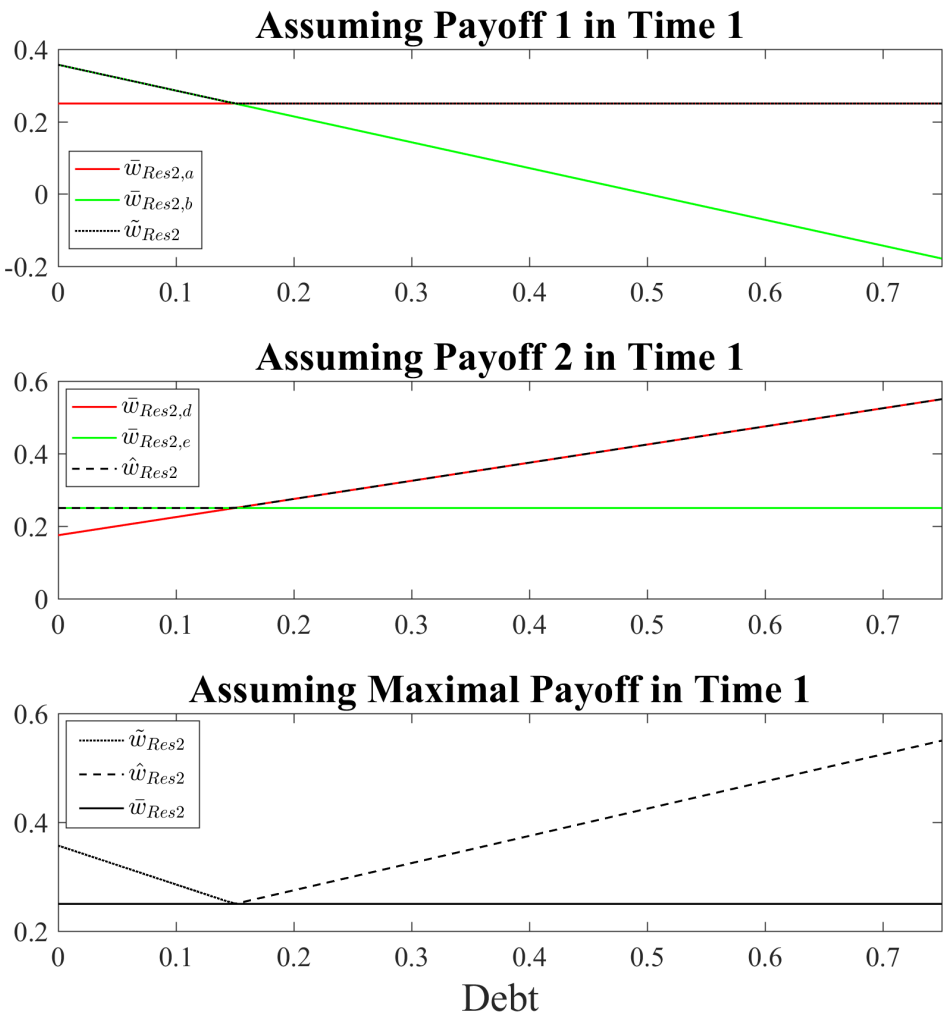
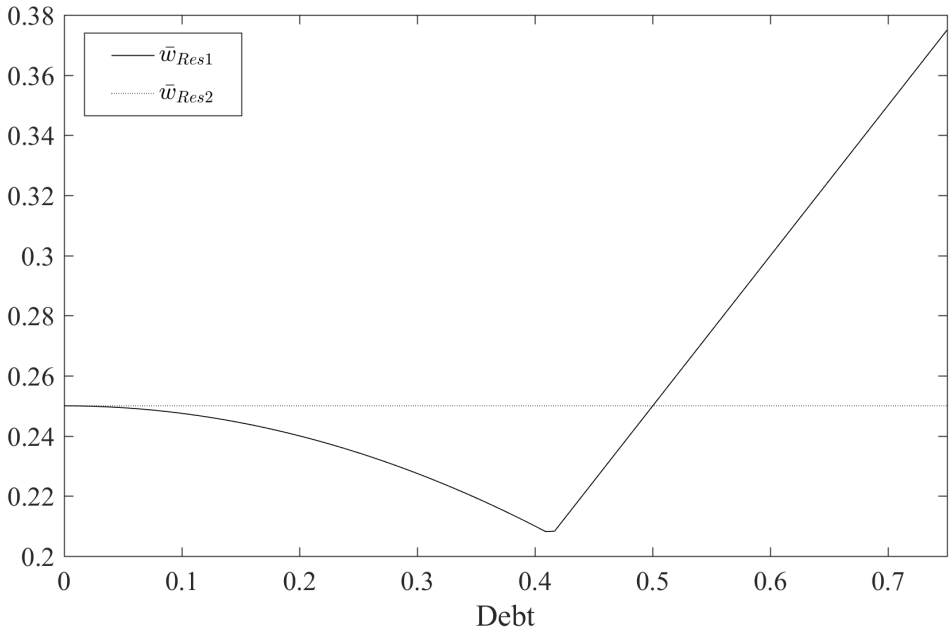


Figure 3: Compare Reservation Wages Between Regimes




# 4 Experimental Design and Hypotheses

To determine if the nonlinear relationship between debt and wage selectivity found using our two period model exists in a more realistic setting, we conduct an online experiment using Amazon Mechanical Turk (AMT, going forward). AMT is an online labor market made up of workers (subjects in our experiment) and requesters (in this case the authors). Workers complete short tasks (HITs) for money and requesters post the HITs. Workers are anonymous and are paid through paypal, which is linked to a randomly generated worker ID. Workers are paid a flat participation fee (25 cents in our experiment) and have the opportunity to earn a bonus payout depending on their performance within the experiment. These payments are made about one day following the experiment - typical for AMT.

The experiment's procedures are as follows. After accepting the HIT and indicating their consent, subjects complete a short survey to record their gender and risk preferences. Specifically, subjects are asked the following question:

> *How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?*

Subjects answer this question on an 11 point scale ranging from 0 to 10 - with 0 corresponding to "I avoid risk" and 10 corresponding to "Fully prepared to take risks."[10] After completing the survey, subjects are given the full experimental instructions and then start the experiment. Not including the survey or instructions, the experiment is timed and lasts

[10]This risk question has been shown to reliably predict risky behavior (See Dohmen et al. (2011)).

for 2 minutes.[11] Following the experiment, subjects are instructed to submit their HIT and their earnings are paid about a day after their completion via their Paypal account. Subjects participate once and this is verified by a unique AMT worker ID number.

In the experiment, subjects play the role of workers and complete codes for money.[12] In all treatments, subjects are given a randomly generated debt ($D_i$) that is distributed $U(0, 30)$. After being assigned their debt, a vector of 40 wages is generated for each subject. Each element in this vector is drawn independently from $U(0, 10)$ and the values are hidden from the subject. The software is written such that the experimenters have a record of all of the possible wages a subject could observe. However, subjects will not observe all wages, only the first $k+1$ wages where $k$ is the number wages the subject rejected. At the same time subjects are shown their debt, subjects are presented with their first wage offer (i.e., the first element in their wage vector), which may be accepted or rejected. If the subject rejects the wage, the computer waits 3 seconds and offers the subject the next wage in the vector. Subjects know that if they reject a wage they will have to wait 3 seconds before another wage will be offered. Subjects only start coding words once a wage is accepted.[13] Subjects have 2 minutes to both accept a wage *and* code words. Regardless of the treatment (to be discussed shortly) if a subject does not accept a wage within 2 minutes of being offered her initial wage, she earns only her 25 cents participation fee.

There are two treatments (which correspond to the "regimes" introduced in the previous section). Regime 1 is our control. Under Regime 1, to earn a bonus, subjects must earn an amount greater than their debt. In this case, their earnings would be their wage times the number of codes they completed minus their debt. If a subject's revenue is not greater than their debt, they earn only their participate fee. Under Regime 2, subjects earn 70% of their wage for each code they complete, with the remaining 30% going to settle their debt. Once their debt is repaid, the subject earns her full wage going forward. Regime 2 was calibrated using a pilot of Regime 1. Average revenue in these pilots was roughly 45 cents with an average debt of about 15 cents, which corresponds to subjects keeping roughly 70 percent of their endowment. To keep the two regimes comparable, we set the income-based repayment plan to a 30 - 70 split. In sum, each subject is assigned one debt, a single regime, and a vector of possible of wages.

This design is chosen specifically because we want to explore whether or not an individual's debt impacts their wage selectivity, and if income-based repayment plans alter this relationship. Therefore the goal of this paper is not to illustrate an optimal repayment plan but rather show how these types of plans can affect labor market decisions. The random

[11] In other words, the worker can spend as much time as she wants on the survey and instructions. But, once the actual experiment starts, she only has 2 minutes.

[12] Subjects know that they are in an experiment. The coding task operates as follows: subjects are given a chart that assigns each letter of the alphabet a number. Below the chart, the computer randomly generates a four letter code. In an input box below, subjects input the corresponding number to each letter and click the "submit" button. After clicking the submit button, the computer randomly generates a new code. The task is real effort and similar to what is used in Ku and Salmon (2012).

[13] While there are advantages to using a BeckerDeGrootMarschak method (BDM) or strategy method to elicit reservation wages, we felt it was more natural to have the computer to make "take it or leave it" offers because it is more typical of what happens in actual labor markets - particularly entry level positions. Additionally, strategy methods are more difficult to explain than the "take it or leave it" offers. Given the realism of the "take it or leave it" offer and the fact that we could not respond to subjects' questions quickly (as in the lab), we thought it best to use our chosen design.

assignment of debt removes endogenity from the environment. Additionally, the employer in our experiment is the computer who offers wages that are randomly generated and subjects are not told about the earnings/debt/wages of other players. Thus, subjects' decisions will not be motivated due to a preference for fairness in terms of payoffs relating to another player (c.f., Vant Wout et al., 2006).

The random generation of wages and debts has benefits and costs. The primary cost of this design is that identifying a treatment effect will be difficult as there is a large degree of randomness. However, with enough observations, we will be able to identify a treatment effect. The primary benefit of this strategy is that the observed effects will not be due to a specific string of debts or wage draws. Additionally, given the issues described above, we have effectively biased ourselves away from observing a treatment effect. Therefore, if we do observe a significant treatment effect in our environment, it is likely to exist in the world outside of our experiment.

The predictions derived from our model and experimental design suggest 3 primary hypotheses. For narrative purposes hypotheses are stated in terms of the alternative.

**Hypothesis 1** *Subjects will respond to financial incentives.*

Hypothesis 1 essentially states that subjects will consider monetary incentives when deciding whether or not to accept a wage. This suggests two outcomes. First, ceteris paribus, subjects offered higher initial wages will take fewer draws. Second, while we offer no theoretical basis as to why, we expect that debt should matter in terms of selection into the experiment. While we cannot directly observe this effect, we may infer selection effects by examining average debt held by subjects in the experiment. Because debt is drawn from $U(0, 30)$ in the experiment if there is no selection we would expect to observe an average debt level of 15 cents in both regimes. Additionally, given the large sample size, we would also expect there to be no significant difference in the average debt held by subjects across the two regimes.

**Hypothesis 2** *Subjects in Regime 1 will have a nonlinear response to debt. Subjects in Regime 1 with either very low levels of debt or very high levels of debt will be comparatively more selective than those with moderate levels of debt.*

Hypothesis 2 states that subjects will respond to incentives in a manner consistent with theoretical predications. That is, at low to moderate levels of debt, the relationship between debt and wage selectivity will be consistent with existing literature. Comparatively wealthier subjects (i.e., low debt holders) will be more selective than poorer subjects. At some point however, this relationship will break down and poorer subjects will become more selective. Throughout our experiment, the number of wage draws a subject chooses to observe will be used as our measure of wage selectivity.

**Hypothesis 3** *Regime 2 will break the nonlinear relationship between debt and wage selectivity.*

Our final Hypothesis tests whether or not responses to debt are malleable to policy interventions. Our theoretical prediction is that under a standard income-based repayment

plan, agents' debt does not impact wage selectivity. This can be tested in two ways using our experimental results. First, under Regime 2, we should observe subjects being equally selective at all levels of debt. Second, given the calibration of our experimental parameters, we expect agents with moderate debt levels to take more wage draws under Regime 2 than under Regime 1. Also, this effect should switch directions at higher levels of debt and we should observe no significant difference for low levels of debt where subjects should be equally selective across both regimes.

# 5 Results

Our primary variable of analysis is the number of wage draws a subject chooses to observe, which we interpret as a measure of the subject's wage selectivity. The logic behind this interpretation is that ceteris paribus, a less selective worker will take fewer wage draws. In the next two subsections, we detail the results of our experiment, highlighting the impact of debt on wage draws.

## 5.1 Summary Statistics

Before we present the main results of our experiment, we first note that we omit 29 outliers. These outliers took more wage draws than 95% of all other subjects in the experiment (roughly 3 times the average). The number of outliers are nearly identical across the two treatments (14 and 15 in Regime 1 and 2 respectively)[14] After omitting outliers, 615 subjects participate in the experiment. 305 in Regime 1 and 310 in Regime 2. The overall average earnings (not including the participation fee) is 33.39 cents. Subjects in Regime 1 earn 31.89 cents on average while those in Regime 2 earn 34.85 cents.

On average subjects report a subjective level of risk aversion equal to 5.477 - corresponding to risk neutrality. Subjects in Regime 1 indicate a subjective level of risk aversion of 5.379 while those in Regime 2 indicate a subjective risk preference of 5.577. The difference is not significant (T-test: $p = 0.386$). The gender breakdown is roughly equivalent across treatments. 51.3 percent of subjects in Regime 1 and 51.4 percent in Regime 2 indicate that they are male. This difference is not significant (T-test: $p = 0.9635$).

Subjects have similar ability. Subjects in both regimes code about .06 words per second. In Regime 1, subjects spend .058 words per second while subjects in Regime 2 spend .06 words per second. This difference is not significant (T-test: $p < 0.4053$). Additionally, the level of debt has no effect on the rate at which subjects complete codes (OLS *coef* = *-.0001*: $p = 0.316$). Similar results are observed in Regime 1 (OLS *coef* = *-.0003*: $p = 0.148$) and Regime 2 (OLS *coef* < *-.0001*: $p = 0.969$) when the effect of debt on the rate of completion is estimated on each treatment separately. Thus we can be relatively certain that any treatment effects are not driven by differences in risk preferences or ability.

Recall that subjects' debt and wage offers are randomly generated. As such, before discussing treatment effects, we first check to see if there are significant differences in these randomly generated variables across the two treatments. This is because significant differences in these parameters may imply selection. Selection effects are inferred through the

[14] The reported results are robust to winsorization/trunctation. Standard errors increase moderately due to extreme outliers (some over 30).

mechanics of AMT. After accepting a HIT, workers may return the HIT at any time if they no longer wish to participate. A returned HIT is reopened and a different worker may then complete it. Since debt and wages are randomly generated in our experiment, this new worker would have a different debt level and wage vector than the original worker who returned the HIT.

We first examine our subjects' randomly drawn wage vectors. Table 1 presents the average of the first five elements (i.e., the first five wage offers) in the wage vector across the two treatments, the overall average, and the resulting p-value of a T-test testing for a significant difference across the two regimes.[15] As can be seen in Table 1 there are no significant differences to report in terms of the first 5 elements in the wage vector. As the vast majority of subjects select one of the first 5 wages they are offered (roughly 95%), this suggests that subjects are not selecting into the experiment based off of an early wage draw.

Table 1: First 5 Average Wage Draws by Regime

| | Wage 1 | Wage 2 | Wage 3 | Wage 4 | Wage 5 |
|---|---|---|---|---|---|
| Regime 1 | 4.6957 | 4.979 | 4.922 | 5.0515 | 5.0656 |
| Regime 2 | 4.9029 | 4.9268 | 4.8594 | 4.8913 | 4.96 |
| Overall | 4.8002 | 4.9527 | 0.7875 | 4.9707 | 0.6574 |
| p-value | 0.3703 | 0.82 | 0.7875 | 0.4946 | 0.6574 |

**Notes**: Bottom row presents p-values of t-tests for each of the first 5 wages across the two regimes.

**Result 1** *Subjects respond to incentives. The average debt in Regime 1 is significantly less than the average debt in Regime 2.*

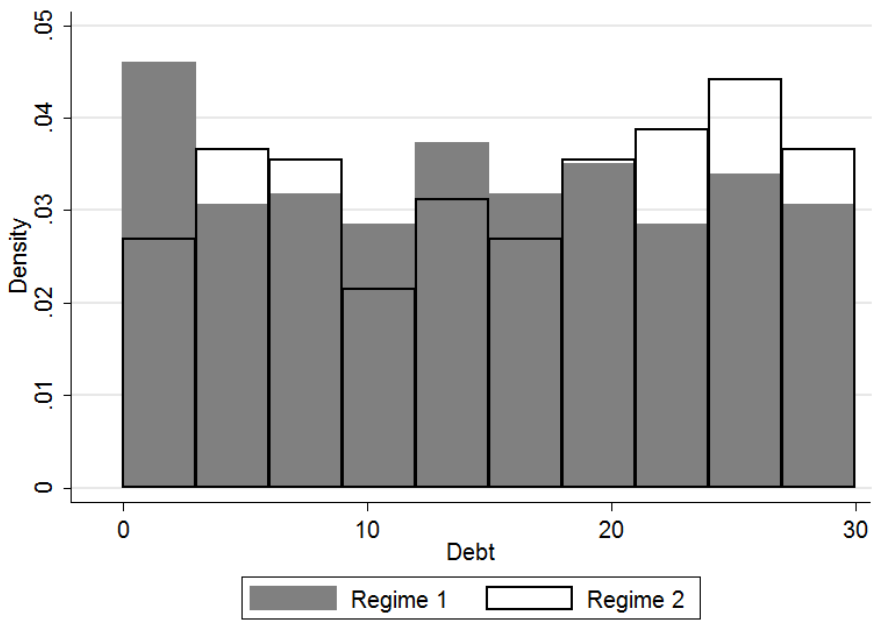
Overall, the average level of debt in our experiments is 14.8 cents, which is not significantly different than 15 cents (T-test: p=0.5426). However, we do find a significant difference between the average debt levels of our two regimes. Specifically, average debt in Regime 1 is 13.89 cents, while it is 15.36 cents in Regime 2. This difference is significant (T-test: p=0.041). Furthermore, the the average debt in Regime 1 is significantly different from 15 cents (T-test: p=0.0304), while this is not the case under Regime 2 (T-test: p=0.4706). These results provide evidence in support of Hypothesis 1, with Debt influencing selection into the experiment under Regime 1. The observed difference in average debt across the two regimes suggests that subjects in Regime 1 who were assigned large debt levels were more likely to return the HIT than their counterparts in Regime 2. This non-random selection into the experiment would therefore put downward pressure on the average debt in Regime 1.[16] We are fairly certain that debt is the only source of selection as we observe no significant differences in the demographics of subjects or their randomly generated wages across treatments.

[15] Averages for all 40 elements in the wage vector are available upon request.

[16] Ideally we would keep track of the number of subjects who returned the HIT, as well as their associated debt levels. Regrettably, AMT does not allow this.

This observation implies two findings: i) income based repayment plans weaken the burden of debt *in general* thus encouraging participation in the experiment (regardless of debt) and ii) subjects respond to debt levels. Thus, even though stakes are low, subjects are responding in meaningful ways that are consistent with standard economic theory. Additionally Result 1 also means that in Regime 1, we will have a slight over sample of subjects with low debt and a slight under sample of subjects with high debt. Graphically, this can be seen in Figure 4.

Figure 4: Debt by Treatment




**Notes**: Histogram of Debt by Regime. Bin size is 3.

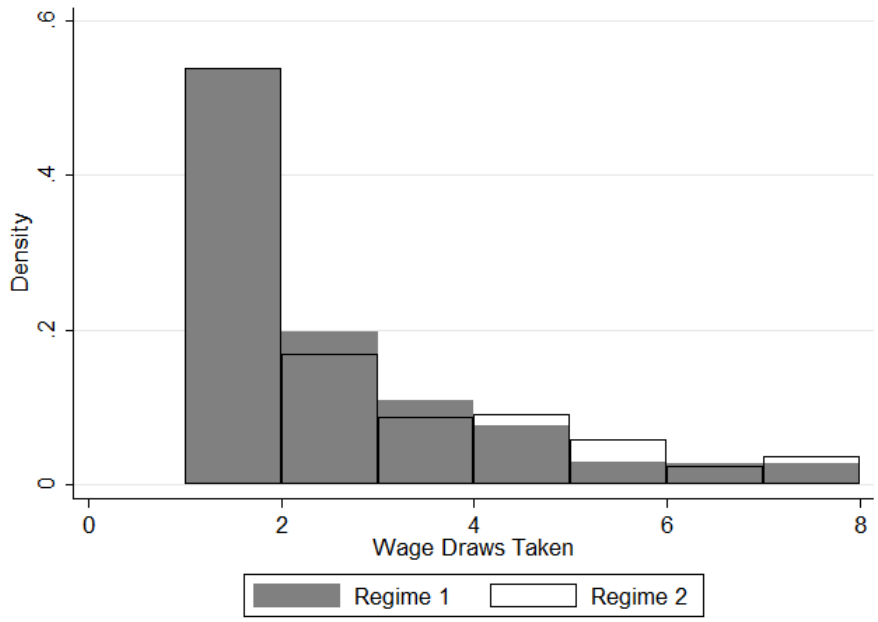
Further evidence in support of Hypothesis 1 is found when estimating the probability a subject accepts their first wage offer as a function of their first wage (in cents) using a probit with robust standard errors. The marginal effect of the initial wage offer is positive and highly significant (Probit marginal effect *coef =.0965*; $p < 0.001$). Qualitatively identical results (available upon request) are observed using the same specification and only Regime 1 or 2 data. Thus, subjects who observe a higher initial wage are significantly more likely to accept the first wage they are offered.

## 5.2 Wages Drawn

Most subjects (331) select their first wage offer. This behavior does not vary across treatments, with approximately 54 percent of subjects accepting their first wage offer in both Regimes. The average number of wage draws is 2.127 and there is no significant difference in this number across the two regimes (T-test: $p = 0.3605$). Figure 5 presents the distribution

of wage draws by regime, and as one would expect, distributional tests are consistent with the previously discussed means test (Mann-Whitney Ranksum: $p = 0.6735$).

Figure 5: Wages Drawn by Treatment




**Notes**: Histogram of wage draws by Regime. Bin size is 2.

**Result 2** *For low levels of debt, subjects in both regimes are roughly equally selective. As debt increases however subjects in Regime 1 gradually become less selective and then more selective.*

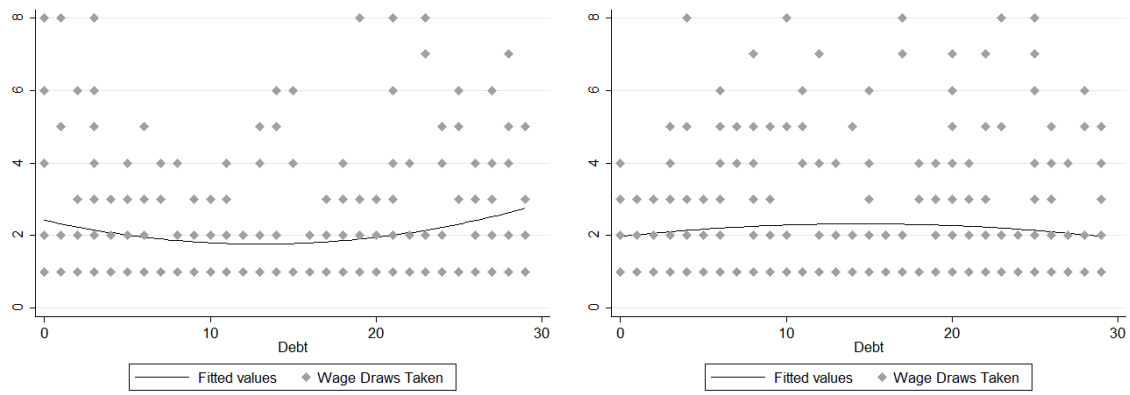
**Result 3** *Income-based repayment plans break the nonlinear relationship between debt and wage selectivity.*

We find evidence in support of Hypotheses 2 and 3. The left-hand panel of Figure 6 presents a scatter plot of wage draws against debt for Regime 1. Inspection of this plot indicates a clear nonlinear relationship between debt and wage selectivity. Specifically, under Regime 1, agents with moderate levels of debt (debt in the range of 10 - 20 cents) observe fewer wage offers than subjects outside of this range. The right-hand panel of Figure 6 show that this nonlinear effect is no longer present under Regime 2.

To gain further insight into the results, we divide debt into three broad regions: 1) LOW, 2) MEDIUM, and 3) HIGH. Subjects with debt less than 10 are classified as LOW debt holder, while subjects with debt greater than 20 are classified as HIGH debt holders. The remaining subjects, with debt between 10 and 20, are classified as MEDIUM debt holders. As predicted, there is little difference in the selectivity of LOW debt holders across the two regimes. On average subjects in this group take about 2.16 wage draws. Regime 1 LOW

debt holders take 2.08 ($n = 106$) wage draws while their counterparts in Regime 2 take 2.23 ($n = 99$) wage draws. This difference is not significant (t-test: $p = 0.4886$). Subjects with MEDIUM debt also behave in a way that is consistent with theory. On average, subjects with MEDIUM debt take 1.99 wage draws. Under Regime 1, subjects with MEDIUM debt take 1.78 ($n = 112$) wage draws on average, while their counterparts in Regime 2 take 2.23 draws ($n = 100$). This difference is significant (t-test: $p = 0.0381$). In our first departure from theory, we find subjects with HIGH debt in Regime 1 take 2.45 ($n = 85$) wage draws and those with HIGH debt in Regime 2 take 2.11 ($n = 111$) draws. While this difference is in the direction of theoretical predictions, the difference in the average number of draws is not significant (T-test: $p = 0.173$).

Figure 6: Wage Draws and Debt by Regime




**Notes**: Minimum earnings requirement and wage draws by regime. Left hand side corresponds to Regime 1. Right hand side corresponds to Regime 2.

While the experimental results under our simple debt classification system are roughly consistent with our theoretical findings, we are interested in the sensitivity of this finding to a more general treatment of debt. Table 2 presents results from estimating the number of wage draws a subject takes as a function of their debt and other individual level variables. Models 1 through 3 estimate the number of wage draws a subject in Regime 1 takes as a function of their initial wage draw, subjective risk preferences, and debt. Models 4 through 6 do the same but for subjects in Regime 2. Variable descriptions are as follows: DEBT is the subject's debt, FIRST WAGE is the initial wage that was offered to the subject, and RISK is the subject's reported level of risk aversion. Finally, to account for the nonlinear relationship of debt and wage draws we include $\text{DEBT}^2$ which we expect to be positive and significant in Regime 1.

Models 1,2, 4 and 5 are Tobit Models censored at 1 (the minimum number of wage draws), Models 3 and 6 are Poisson estimators. All models use robust standard errors. Results are robust to other specifications. Models 1 and 4 are basic models that provide evidence that the discussed difference in regimes are not due to the inclusion of variables. Models 2 and 5 demonstrate that results are robust when we include other independent variables and Models 3 and 6 demonstrate the results are robust to alternative estimators. First, note that in all models where it is included, FIRST WAGE is significant and negative

- meaning that a high first wage tends to lower the number of draws a subject takes. This result is intuitive as a very high initial wage offer will likely exceed a subject's reservation wage for all levels of debt across the two regimes. Thus if a subject gets lucky and gets offered a sufficient high wage it makes sense that she would take it and start coding words. This result is consistent with Result 1.

Next note that there is a significant nonlinearity present in Regime 1 but not Regime 2. Specifically, at a debt level below approximately 12.5, increases in debt are associated with less selectivity in Regime 1. Subjects tend to become more selective as debt further increases. As predicted this effect is not present in Regime 2.

Table 2: Wage Draws Taken

| | Regime 1 | | | Regime 2 | | |
|---|---|---|---|---|---|---|
| | M1 | M2 | M3 | M4 | M5 | M6 |
| DEBT | -0.215*** | -0.225*** | -0.049*** | 0.053 | 0.092 | 0.029* |
| | (0.078) | (0.078) | (0.018) | (0.087) | (0.083) | (0.017) |
| $DEBT^2$ | 0.008*** | 0.008*** | 0.002*** | -0.002 | -0.003 | -0.001 |
| | (0.003) | (0.003) | (0.001) | (0.003) | (0.003) | (0.001) |
| FIRST WAGE | | -0.428*** | -0.058*** | | -0.489*** | -0.071*** |
| | | (0.065) | (0.017) | | (0.067) | (0.013) |
| RISK | | -0.092 | -0.015 | | 0.001 | 0.003 |
| | | (0.065) | (0.015) | | (0.068) | (0.015) |
| CONSTANT | 1.549*** | 4.042*** | 1.241*** | 0.52 | 2.398*** | 0.911*** |
| | (0.472) | (0.652) | (0.158) | (0.563) | (0.633) | (0.127) |
| $R^2$ | 0.0113 | 0.0601 | 0.0281 | 0.0003 | 0.0534 | 0.0265 |
| LL(UL) | 164(141) | 161(140) | | 167(143) | 164(134) | |
| Model | Tobit | Tobit | Poisson | Tobit | Tobit | Poisson |

**Notes**: Dependent variable is the number of wage draws taken. Models 1,2, and 3 analyze Regime 1. Regime 2 data is analyzed in Models 4, 5, and 6. LL indicates the number of observations at the lower limit. UL corresponds to upper limit. Robust standard errors in parentheses. ***: $p < .01$, **: $p < .05$, and *: $p < .10$.

In Table 3 we present analysis similar to that presented in Table 2. However, in Table 3 we estimate treatment effects and debt effects using data from both regimes. The results presented in Table 3 echo that found in Table 2. This is true regardless of the estimator being used or independent variables that are included. As before, subjects who observe a higher starting wage are significantly more likely to accept an earlier wage. Additionally, we also find that as predicted, subjects with very low levels of debt in both regimes take a similar number of wage draws. However, as debt increases, the behavioral response to debt diverge as predicted.

Theory predicted that as debt increased, subjects in Regime 1 would become less selective and then become more selective as debt increased beyond a certain point. Subjects in Regime 2 would not respond as strongly and be equally selective across all levels of debt. In other words, the marginal effect of debt on the number of draws taken will be negative

Table 3: Wage Draws Taken (Part 2)

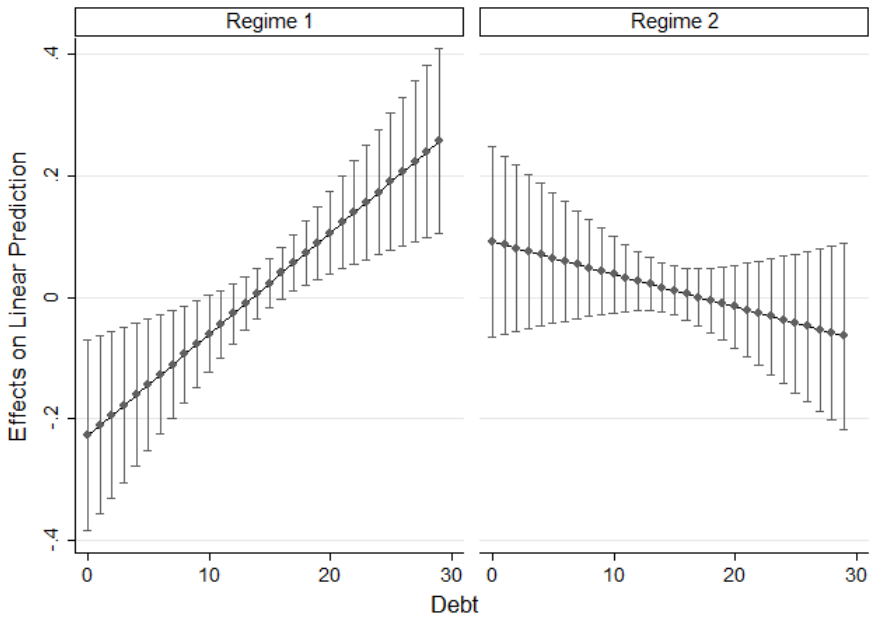
| | Model 7 | Model 8 | Model 9 |
|---|---|---|---|
| DEBT | 0.054 | 0.091 | 0.028* |
| | (0.085) | (0.08) | (0.017) |
| $DEBT^2$ | -0.002 | -0.003 | -0.001 |
| | (0.003) | (0.003) | (0.001) |
| REGIME 1 | 0.887 | 1.264* | 0.281* |
| | (0.71) | (0.704) | (0.156) |
| REGIME 1*DEBT | -0.276** | -0.319*** | -0.076*** |
| | (0.116) | (0.114) | (0.025) |
| REGIME 1*$DEBT^2$ | 0.01*** | 0.011*** | 0.003*** |
| | (0.004) | (0.004) | (0.001) |
| FIRST WAGE | | -0.456*** | -0.064*** |
| | | (0.046) | (0.011) |
| RISK | | -0.047 | -0.006 |
| | | (0.047) | (0.011) |
| CONSTANT | 0.601 | 2.599*** | 0.937*** |
| | (0.533) | (0.57) | (0.118) |
| $R^2$ | 0.0057 | 0.0561 | 0.0268 |
| LL(UL) | 331(284) | 325(274) | |
| Model | Tobit | Tobit | Poisson |

**Notes**: Dependent variable is the number of wage draws taken. LL indicates the number of observations at the lower limit. UL corresponds to upper limit. Robust standard errors in parentheses. ***: $p < .01$, **: $p < .05$, and *: $p < .10$.

and subsequently become positive in Regime 1. In Regime 2, the marginal effect will be 0. We find this.

Figure 7 presents the marginal effect of debt by regime from Model 8. Similar results are observed in all specifications (available upon request). Marginal effects are consistent with what is visually seen in Figure 6 and theoretical predications. Under Regime 2, the marginal effect of subjects' debt is not statistically different from zero at all levels of debt - meaning subjects' debt has no impact on the number of wages drawn. This is different from what we observe under Regime 1. Prior to a debt of around 10 cents, larger debts decrease the number of wage draws a subject takes. At a debt of approximately 15, further increases in debt increases the number of wage draws subjects take. Moreover the marginal effect of debt only overlap at moderate levels of debt.

Figure 7: Marginal Effect of Debt on Number of Wage Draws Taken




**Notes**: Marginal effect of debt on wages drawn. Left hand side corresponds to Regime 1. Right hand side corresponds to Regime 2. Error bars are 95% confidence intervals with robust standard errors.

In sum, while there is a statistically significant nonlinear relationship between subjects' debt and wage draws under Regime 1, no such effect is present under Regime 2. Thus income based repayment plans weaken the nonlinear effect of debt on individuals' wage selectivity.[17] The fact that income-based repayment plans can smooth nonlinearities in

[17]In Figure 8 of the appendix, we also present the marginal effect of debt on accepted wages by treatment. The model used to generate this figure uses the same set of explanatory variables as Models 8 and 9 in Table 3 and uses OLS. As can be seen in Figure 8, the direction of the marginal effect of debt corresponds to theoretical predictions and wage draw analysis, albeit insignificantly so. This is not unexpected as the wages offered each subject are individually pulled from the uniform distribution. Thus there is significant variation which muddy the identification of secondary treatment effects.

wage selectivity induced by variations in debt levels suggests a clear benefit of adopting such policies. However, we have yet to discuss the costs associated with income-based repayment plans. As an attempt to provide a measure of such costs, we perform a simple "back-of-the-envelop" calculation to compare the average debt repaid under both regimes. Under Regime 1, subjects repay approximately 83% of outstanding debt. This number falls to approximately 62% under Regime 2. Therefore, switching from Regime 1 to the income-based repayment plan under Regime 2 results in a 19 percentage point reduction in debt repayment. Further research is needed to determine how sensitive this cost is to the structure of the income-based repayment plan. Perhaps it is possible to smooth nonlinearities in wage selectivity without causing such a drastic reduction in debt repayment.

# 6 Conclusions

In this paper we demonstrate, using both theory and experiments, that the positive relationship between wealth and wage selectivity reported in existing literature carries over to the debt domain. However, this is true only for modest levels of debt. At higher levels of debt the relationship reverses and we find that deeply indebted subjects become more selective than their less-indebted counterparts. Thus, we find evidence of a nonlinear effect of debt on individuals' wage selectivity.

Having established a nonlinear relationship between debt and wage selectivity, we investigate the robustness of this relationship to the adoption of an income-based repayment plan. The results from both our theoretical model and our experiment indicate that income-based repayment plans are sufficient to smooth the nonlinearities in wage selectivity observed earlier. Thus, our results make the case for why governments who are concerned with inequality effects may consider adopting such policies. In future work we plan to focus on the development of optimal or efficient repayment plans as well as the importance of interaction among firms and workers in the wage determination process.

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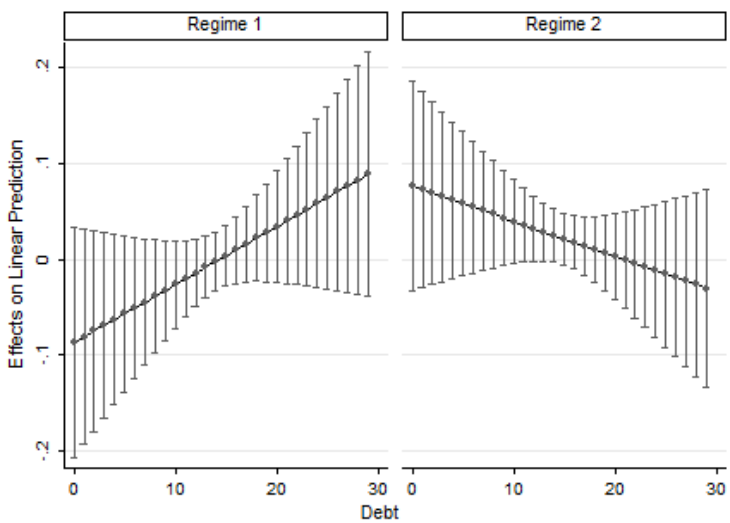
# A Supplementary Analysis

Below in Figure 8 are the marginal effects of debt on accepted wages using OLS specified below in the Equation below. The marginal effects on accepted wages are consistent with the effect of debt on wage search. Yet, as can be seen in Figure 8, the marginal effects are not significantly different from each other or zero. This is not surprising considering the randomly generated wages.

$$\hat{wage} = \beta_0 + \beta_1 Debt + \beta_2 Debt^2 + \beta_3 Regime1 + \beta_4 Regime1^* Debt + \beta_5 Regime1^* Debt^2 + \beta_6 FirstWage + \beta_7 Risk \quad (19)$$

Figure 8: Marginal Effect of Debt on Accepted Wages




**Notes**: Marginal effect of debt on accepted wages. Left hand side corresponds to Regime 1. Right hand side corresponds to Regime 2. Error bars are 95% confidence intervals with robust standard errors.

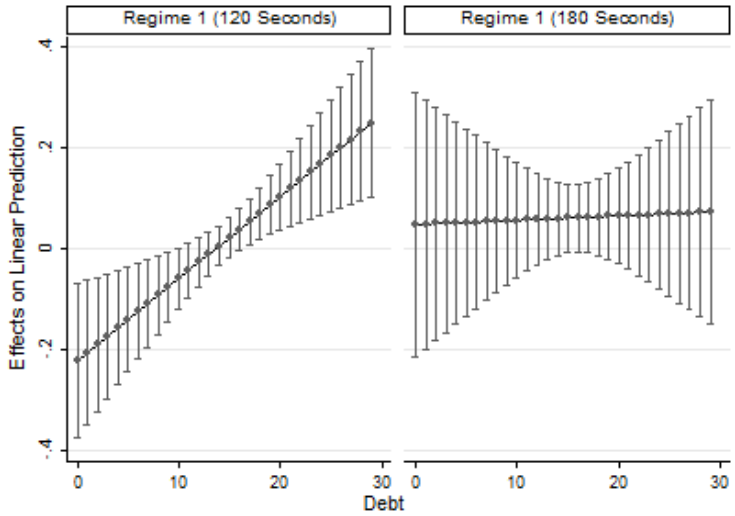
We now examine the effect of the time constraint on the number of wage draws taken. Subjects are given 180 seconds instead of 120. Everything else is identical to Regime 1 discussed in the text. 98 subjects participate in this treatment. The average number of wage draws taken by subjects is 2.244. This difference is not significantly different from the Regime 1 discussed in the text (T-test: $p = 0.3369$).

Figure 9 plots the marginal of effect of debt on the number of wage draws taken in Regime 1 with 120 seconds and Regime 1 with 180 seconds. The specification used to generate the marginal effects is presented in the equation below.

$$\hat{wage} = \beta_0 + \beta_1 Debt + \beta_2 Debt^2 + \beta_3 Regime1_{180} + \beta_4 Regime1^*_{180} Debt + \beta_5 Regime1^*_{180} Debt^2 + \beta_6 FirstWage + \beta_7 Risk \quad (20)$$

As expected the marginal effect of Regime 1 with 120 seconds in negative and then positive. This effect is not present in Regime 1 with 180 seconds.

Figure 9: Marginal Effect of Debt on Wage Draws Taken (120 vs 180 Seconds of Wage Search)




**Notes**: Marginal effect of debt on the number of wage draws taken. Left hand side corresponds to Regime 1 with 120 seconds. Right hand side corresponds to Regime 2 but with 180 seconds of wage search. Error bars are 95% confidence intervals with robust standard errors.

# B Instructions

Informed Consent

This research is being conducted by Dr. David Johnson and Dr. John Gibson who are professors at the University of Central Missouri and Georgia State University, respectively.

I chose to voluntarily participate in this research study. I have been recruited for this study through Amazon Mechanical Turk. Only persons 18 years of age or older may participate. I affirm that I am 18 years of age or older. Only individuals who read and write English may participate. I affirm that I can read and write in English. This study has been approved by the University of Central Missouri Research Ethics Board.

This study involves completing a demographic survey in the first stage and an optional effort task in the second stage. The survey will take less than 5 minutes. The effort task will take exactly 2 minutes in addition to the time it takes you to read the instructions. I will be paid 25 cents for completing the survey and a bonus that depends on my decisions and performance in the effort task. The amount of my bonus will be based on my decisions and performance.

I am free to withdraw from the study at any time without incurring the ill will of the researchers. If I withdraw, my data will not be used and will be deleted by the researchers as early as possible. If I wish to withdraw, I must do so within 20 days of completing the study. There are no known risks or benefits from this study beyond those from any typical activity I might do in an online environment.This study will benefit society by helping researchers better understand how individuals respond to incentives in labor markets. The confidentiality of any personal information will be protected to the extent allowed by law.

My name or AMT account number will not be reported with any results related to this research. I can obtain further information from Dr. David Johnson (djohnson@ucmo.edu). If I have any questions about this study, I can contact Dr. Johnson at djohnson@ucmo.edu. If I have any questions about my rights as a participant, I should contact the Human Subjects Protection Program at (660) 543-4624. I may ask questions at any time via email (djohnson@ucmo.edu).

Should new information become available during the course of this study, about risks or benefits that might affect my willingness to continue in this research project, it will be given to me as soon as possible.

By clicking on the start button below, I am indicating my consent to participate in this study.

If you do not wish to participate, please return the HIT.

## B.1 Survey

Please complete the survey below. For doing so you will earn your 25 cents participation fee in addition to your bonus that will be determined by your decisions in the second stage.

What is your gender?

How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means: "risk averse" and the value 10 means: "fully prepared to take risks". You can use the values in between to make your estimate.

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and click on the appropriate circle on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly.

I plan tasks carefully.
I do things without thinking.
I make-up my mind quickly.
I am happy-go-lucky.
I don't "pay attention."
I have "racing" thoughts.
I plan trips well ahead of time.
I am self controlled.
I concentrate easily.
I save regularly.
I "squirm" at plays or lectures.
I am a careful thinker.
I plan for job security.
I say things without thinking.
I like to think about complex problems.
I change jobs.
I act "on impulse".
I get easily bored when solving thought problems.
I act on the spur of the moment.
I am a steady thinker.
I change residences.
I buy things on impulse.
I can only think about one thing at a time.
I change hobbies.
I spend or charge more than I earn.
I often have extraneous thoughts when thinking.
I am more interested in the present than the future.
I am restless at the theatre or lectures.

I like puzzles.
I am future oriented.

## B.2 Stage 2:

Welcome to the second stage of the experiment. This stage will take 2 minutes and you must complete the full 2 minutes to be paid your bonus. We will first walk you through the experiment while providing instructions. The instructions are simple, and if you follow them carefully, you can earn a considerable amount of money. All the money you earn is yours to keep, and will be paid to you, by bonus, after the experiment ends. The bonus (based off of your performance on the task) will be paid to you using the AMT bonus mechanism.

Please click the "Next" button to continue.

Table 4: Add caption

| a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | q | r | s | t | u | v | w | x | y | z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 7 | 25 | 8 | 26 | 12 | 4 | 23 | 18 | 9 | 14 | 5 | 17 | 19 | 6 | 22 | 21 | 2 | 11 | 3 | 10 | 1 | 20 | 13 | 24 | 15 |
| | | | | | | | | | | | a | b | c | d | | | | | | | | | | | |

The task will involve encoding sequences of letters into a numerical code. There will be a table at the top of the screen (like the one shown above) with all the letters in the alphabet and a number below each one. This table will represent a code. Below the table you will find a four letter word which is a randomly generated set of four letters and underneath this word four number input boxes. You will be asked to enter the corresponding number below each letter in the word and then press OK to submit and move on to the next word. There are many words.

So for example (see above) if you are given the word "ABCD", you will get credit for coding the word correctly if you put "16" in the first box, "7" in the second box, "25" in the third box, and "8" in the fourth box.

Please click the "Next" button to continue.

Stage 2 (continued):

**REGIME 1**

Prior to starting the coding task, the computer will offer you a piece rate wage that will pay you some number of cents (or fraction of a cent) for each code you correctly complete. If you do not like the wage, you can reject it. If you reject a wage, the computer will wait 3 seconds and then offer you another wage that you will also have the option of accepting or rejecting. There are many wages. The wages have been randomly generated and are pulled from the range 0 cents to 10 cents. You will be given 2 minutes to accept your wage AND code words. Once you accept a wage, you will begin coding words. If you do not accept a

wage within the 2 minute time limit, you will earn a bonus of zero cents.

In addition, no matter what your accepted wage is, you will have a minimum earnings requirement that is randomly assigned. This minimum earnings requirement has the potential to reduce the total bonus you earn from participating in the second part of the experiment. 30% of your wage will be withheld for each code you successfully complete until you have paid off your minimum earnings requirement. Once you have paid off your minimum earnings requirement, you will keep your full wage for each additional word that you code correctly. So, for example, if you have a minimum earnings requirement of 10 cents and you accept a wage of 1 cent and code 10 words, you will earn a bonus of 0.7*1*10 = 7 cents and you will pay 3 cents of your minimum earnings requirement. The remaining 7 cents will be forgiven. On the other hand, if you have a minimum earnings requirement of 10 cents and you accept a wage of 1 cent and code 40 words, you will earn a bonus of 1*40-10 = 30 cents and you will pay the full 10 cents of your minimum earnings requirement.

**REGIME 2**

Prior to starting the coding task, the computer will offer you a piece rate wage that will pay you some number of cents (or fraction of a cent) for each code you correctly complete. If you do not like the wage, you can reject it. If you reject a wage, the computer will wait 3 seconds and then offer you another wage that you will also have the option of accepting or rejecting. There are many wages. The wages have been randomly generated and are pulled from the range 0 cents to 10 cents. You will be given 2 minutes to accept your wage AND code words. Once you accept a wage, you will begin coding words. If you do not accept a wage within the 2 minute time limit, you will earn a bonus of zero cents.

In addition, no matter what your accepted wage is, you will have a minimum earnings requirement that is randomly assigned. If you do not reach this minimum earnings requirement, you will earn only your participation fee (e.g., 25 cents). However, once you reach your minimum earnings requirement, you will be paid a bonus that is equal to your wage times the number of codes you complete minus your minimum earnings requirement. So, for example, if you have a minimum earnings requirement of 10 cents and you accept a wage rate of 1 cent and you code 20 words, you will earn a bonus of 10 cents (i.e., 20*.01- .10). More generally, in this example, you would have to code at least 10 words in order to meet your minimum earnings requirement.

Before you begin please answer the following questions:

(True or False) Your bonus will be your wage rate times the number of codes you complete.
(True or False) You have 5 minutes to code as many words as possible.