Labor Supply and the Value of Nonwork Time: Experimental Estimates from the Field

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Objective

- Estimate the flow value of non work time relative to a worker's labor market wage (*z)*
- Crucial parameter in many macro models
  - Explaining wage dispersion require a very low value of *z* (Hornstein, Krusell and Violante, 2011)
  - Explaining business cycle volatility of unemployment and vacancies requires very high value of *z* (Hagedorn and Manovskii, 2008,…)
  - Pension claiming/retirement behavior (Lalive et al. 2018)
- Useful for Cost-benefit analysis for public policies that affect work hours

Objective

- This parameter is typically calibrated and assumed values vary widely
  - Pre-Hagedorn and Manovskii assumed values were in the range of 0.45-0.5
  - Post Hagedorn and Manovskii range is 0.73-0.92.
- Calibrated values tend to be sensitive to assumptions

Objective

- There is very little direct evidence on the value of *z*
- Closest we have are estimates of reservations wages (eg. Krueger and Mueller, Manning and Petrongolo) which is a related but different parameter
  - Differs if unemployed workers take into account the continuation value of unemployment (Mortensen, 1987)

What we do

- Recruit for real telephone interviewer and data entry positions
- During the application process applicants are asked to choose between two positions
  - Positions are identical except for (randomized) wage and hours
  - e.g., 25 vs. 30 hours/week
- Use worker choices to estimate Marginal value of time (MVT) for each 5-hour block

What we do

- Given a wage rate, optimizing workers will select labor supply to equate the wage and the MVT => collection of MVT values is an estimate of the labor supply curve for the *unemployed* jobseekers in our sample
- The integral of this divided by their market wage is *z*

What we do

- Contributes to the literature on estimation of the labor supply function
- Estimate its shape, and elasticities as a function of hours worked
- Contributes to the literature on using field studies to estimate labor supply
  - Eg. Fehr and Goette (2007), Farber

Design

- Similar to Mas and Pallais (2016), “Valuing Alternative Work Arrangements”
- Experiment took place in 2017 during the hiring process to fill telephone interviewer and data entry positions.
- We posted advertisements for these real positions on a national U.S. job search platform in 80 large metro areas.

Job Ads

- Ads provided no information about the hours of work or the wage.
- Stated explicitly that the job was temporary and was expected to last one month
- Stated that the job was work from home.
- All of these statements accurately described the real job.

Choice experiment

- Show two positions that differed only in the hours of work and the hourly wage, which were randomly assigned to applicants.
  - Show only two options to minimize cognitive load on the part of the applicants.
- Individuals were asked to choose between a job that was [*h*] hours and a job that was [*h*+5] hours per week, where *h* varies from 5 to 35 in 5-hour increments.
- Choices were 5 vs. 10, 10 vs. 15, 15 vs. 20, 20 vs. 25, 25 vs. 30, 30 vs. 35, and 35 vs. 40 hours per week.

Position Descriptions

The position is a one-month work-from-home [type] position.

The position is [h] hours per week.

This position pays [Y] dollars per hour.

The position is a one-month work-from-home [type] position.

The position is [h+5] hours per week.

This position pays [Z] dollars per hour.

Effective wage

- Each comparison can be summarized by the "effective" wage applicant *i* receives for working the 5 additional hours in the longer position

$$e_{ih} = \frac{h_i \times w_{ih} - (h_i - 5) \times w_{ih-5}}{5}$$

- Randomly select $e_{\_ih} \in \{0,4,8,12,16,18,20,24\}$.
- For the three lowest hours choices (5 vs. 10, 10 vs. 15, and 15 vs. 20 hours), we let $e_{\_ih}$ also take values of {2,6,10}.

Effective wage

- The higher hourly wage job always paid $18.
- This was sometimes the shorter position and sometimes the longer position, depending on whether the effective wage was above or below $18.

Other details

- We told applicants that the type of work in both jobs was the same
- Asked them which job they would choose if both were available.
- Assured applicants that we would not look at their choices before making hiring decisions

Above 40 hours

- Difficulty in analyzing >40 hours this is that hourly workers would have to get an overtime premium => unclear unclear how to interpret choices
- Implement a second set of treatments where we offered the choice of either (1) a 40 versus 45 hour position or (2) a 45 or 50 hour position.
- Here, we randomly vary the overtime premium for hours over 40.

>40 hour descriptions

The position is a one-month work-from-home [type] position.

The position is 40 hours per week.

This position pays 18.00 dollars per hour.

*

The position is a one-month work-from-home [type] position.

The position is 45 hours per week.

This position pays 18.00 dollars per hour for the first 40 hours and [EW] dollars per hour for the remaining 5 hours.

Conceptual Framework

$\{h_i - 5, w_{ih-5}\}$ $\{h_i, w_{ih}\}$

$\overline{MVT_h}$

$U((h_i w_{ih}, h_i) > U((h_i - 5) w_{ih-5}, h_i - 5)$

$MVT_{ih} < e_{ih}$

$Pr(1[h_i] = 1 | e_{ih}) = Pr(MVT_{ih} < e_{ih} | e_{ih})$

$Pr(\frac{MVT_{ih} - \mu}{s} < \frac{1}{s} e_{ih} - \frac{\mu}{s}) = \Lambda\left(\frac{1}{s} e_{ih} - \frac{\mu}{s}\right) = \Lambda(\beta_1 e + \beta_0)$

Sample Composition for Main Treatments

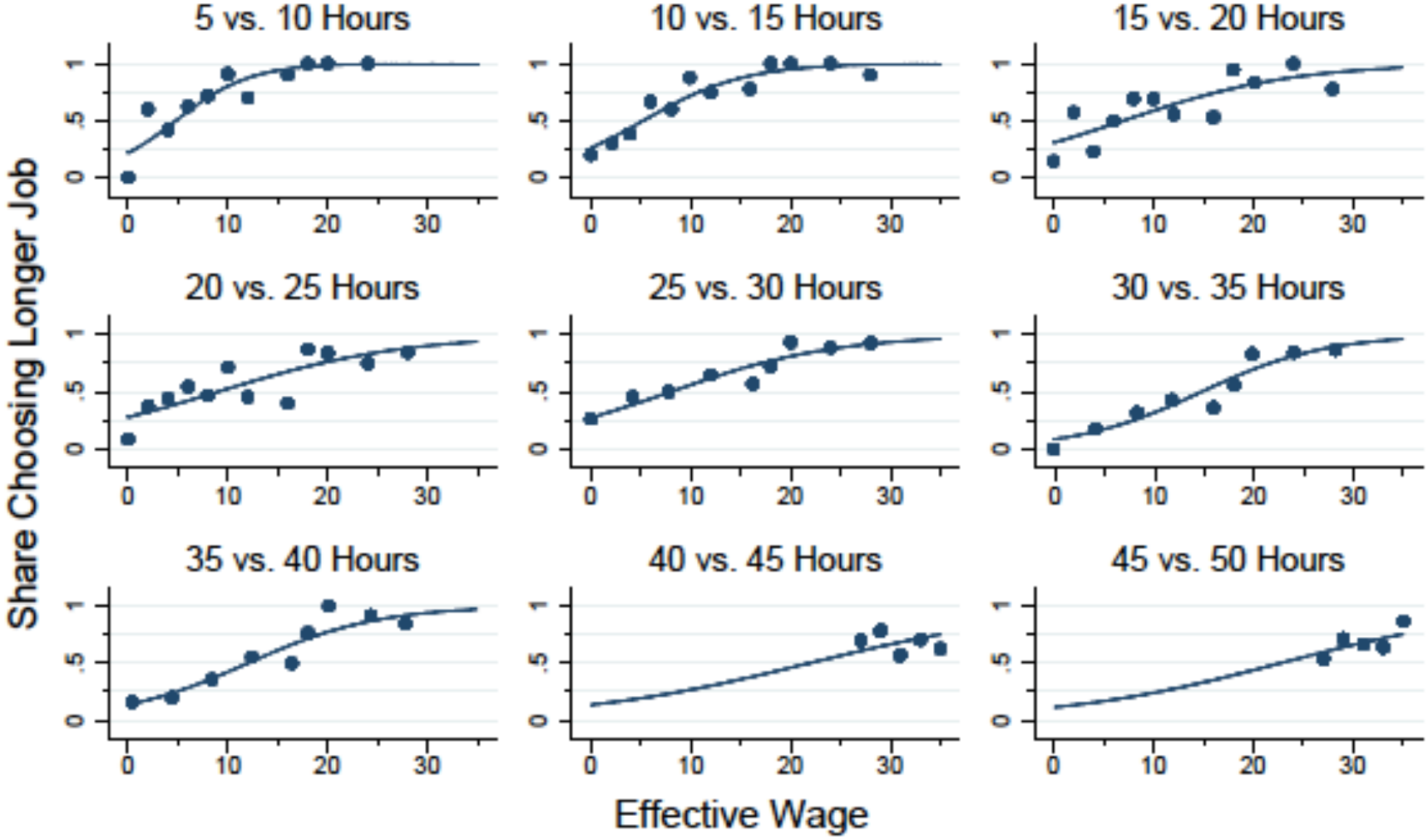
	All	Unemployed Applicants
Female	83%	83%
Currently Employed	41%	0%
Full-time	14%	0%
Part-time	28%	0%
Unemployed	59%	100%
Unemployed for < 3 Months	37%	64%
Unemployed for 3-6 Months	7%	13%
Unemployed for > 6 Months	14%	23%
Age		
Average Age	33.6	32.7
< 30 years old	46%	49%
30-40 years old	30%	30%
> 40 years old	24%	21%
Education		
Less than High School	2%	2%
High School	27%	30%
Some College	44%	44%
College Degree	24%	21%
Advanced Degree	4%	2%
Race		
White	45%	44%
Black	34%	34%
Hispanic	11%	12%
Other	9%	10%
Observations	2,658	1,152

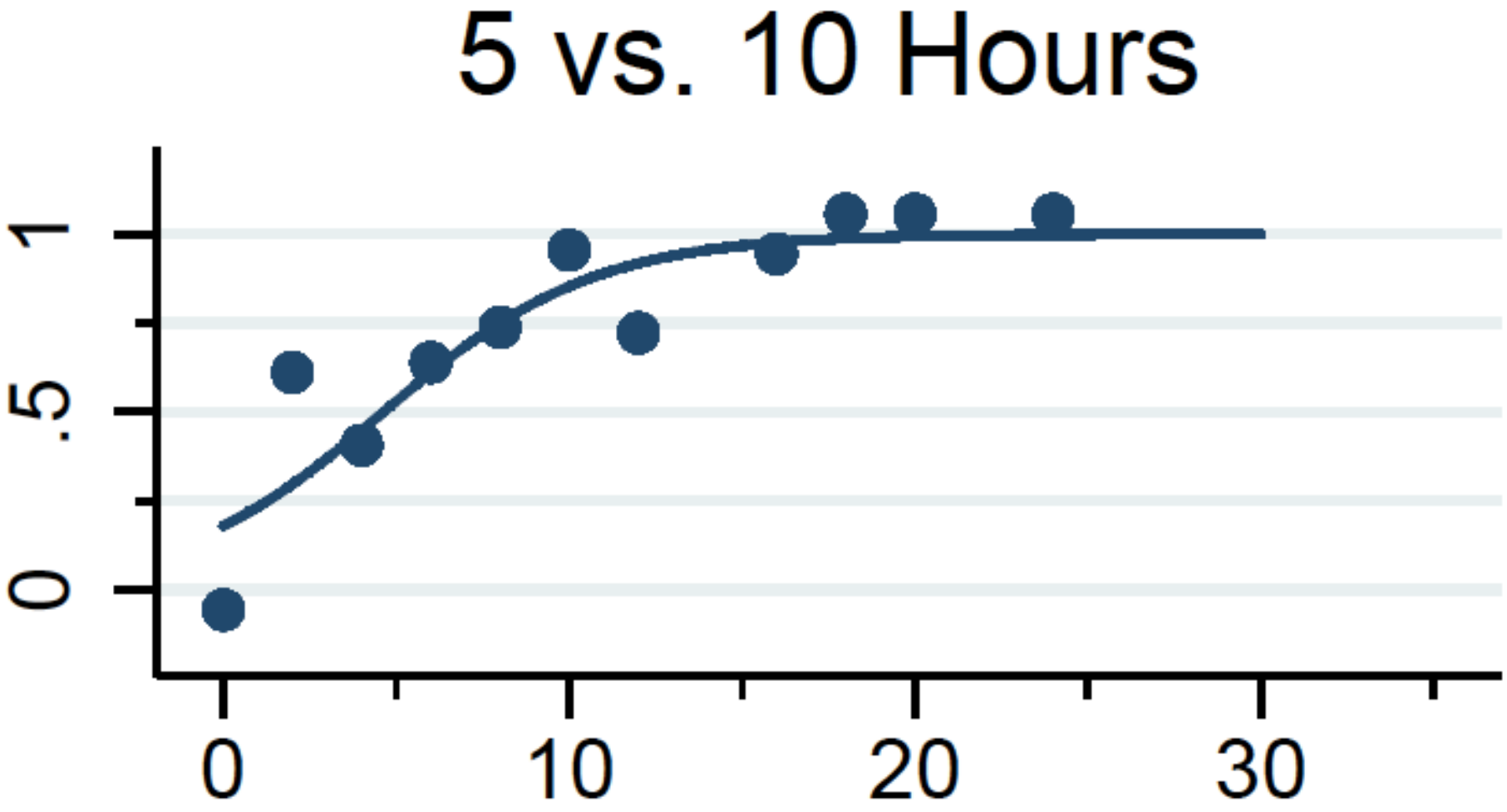
Randomization

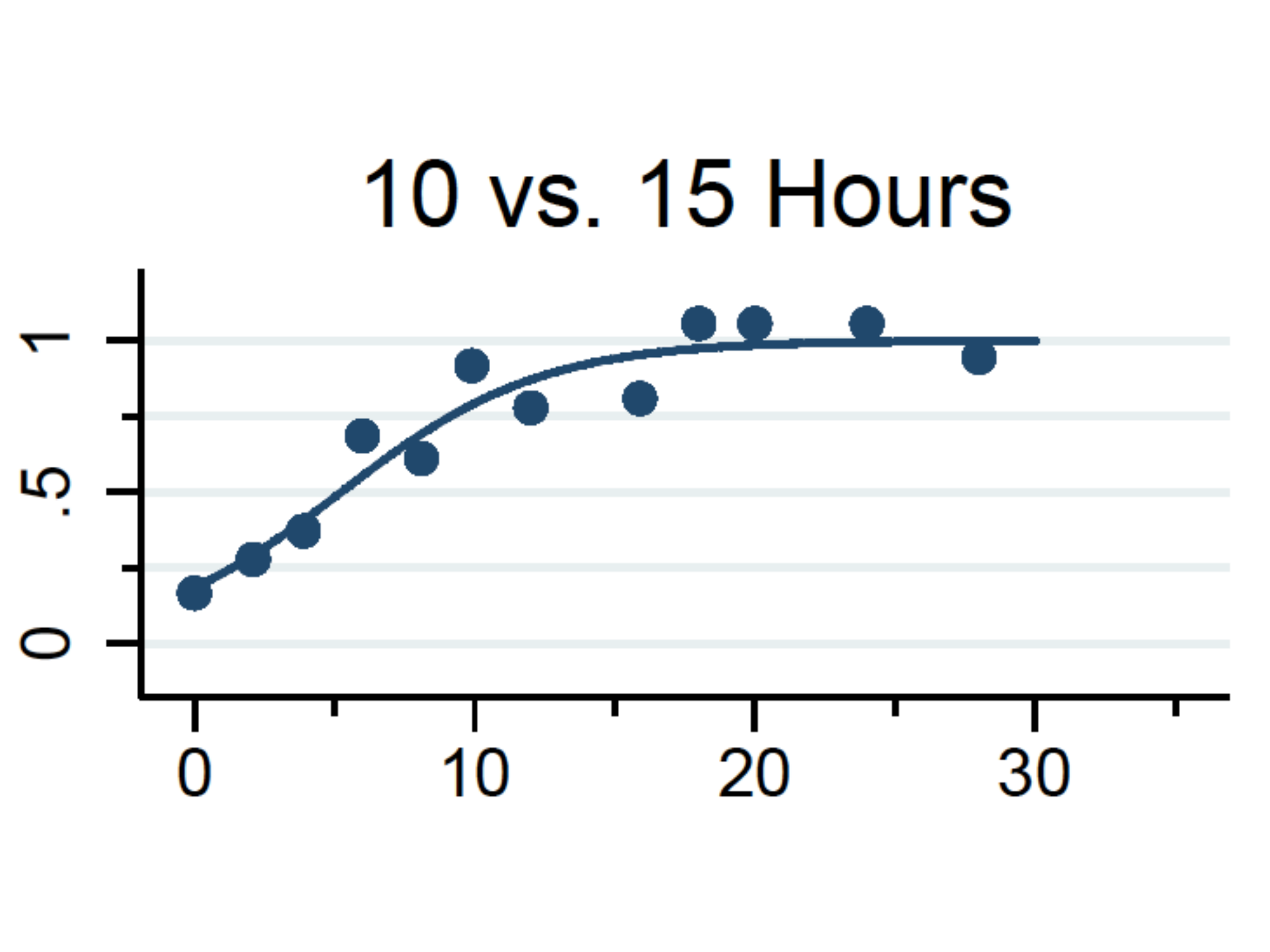
	5 vs 10	10 vs 15	15 vs 20	20 vs 25	25 vs 30	30 vs 35	35 vs 40	40 vs 45	45 vs 50
Age	0.58	0.87	0.94	0.67	0.59	0.62	0.36	0.68	0.74
Female	0.78	0.17	0.26	0.86	0.66	0.10	0.42	0.74	0.96
White	0.34	0.86	0.89	0.66	0.90	0.33	0.85	0.07	0.96
Black	0.55	0.88	0.76	0.72	0.19	0.04	0.08	0.46	0.80
Hispanic	0.05	0.84	0.28	0.87	0.01	0.82	0.14	0.60	0.28
Other Race	0.37	0.23	0.65	0.05	0.98	0.19	0.18	0.02	0.69
Applicants in Treatment	464	425	420	373	396	401	351	360	344

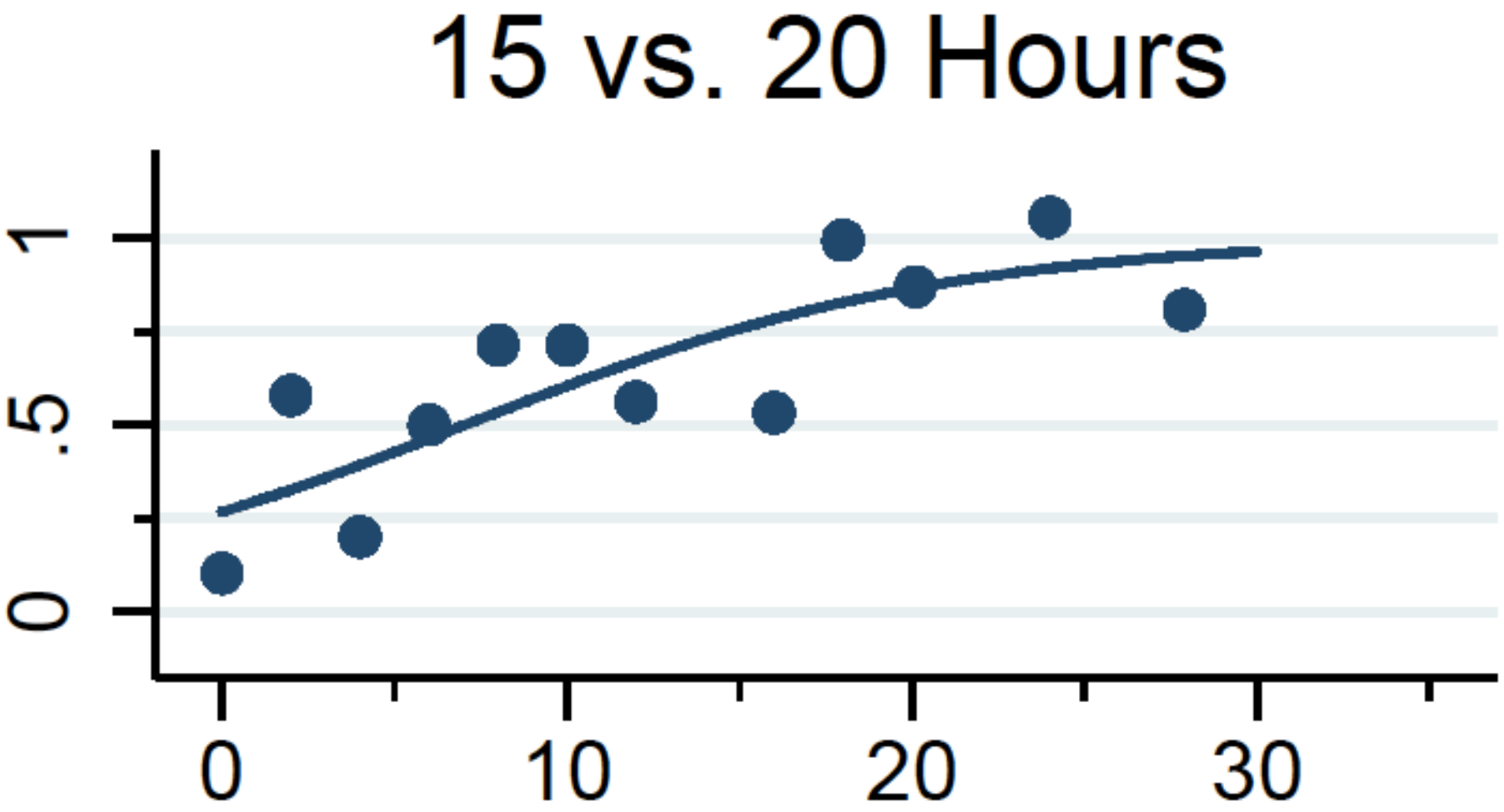
Figure 1. Marginal Value of Time

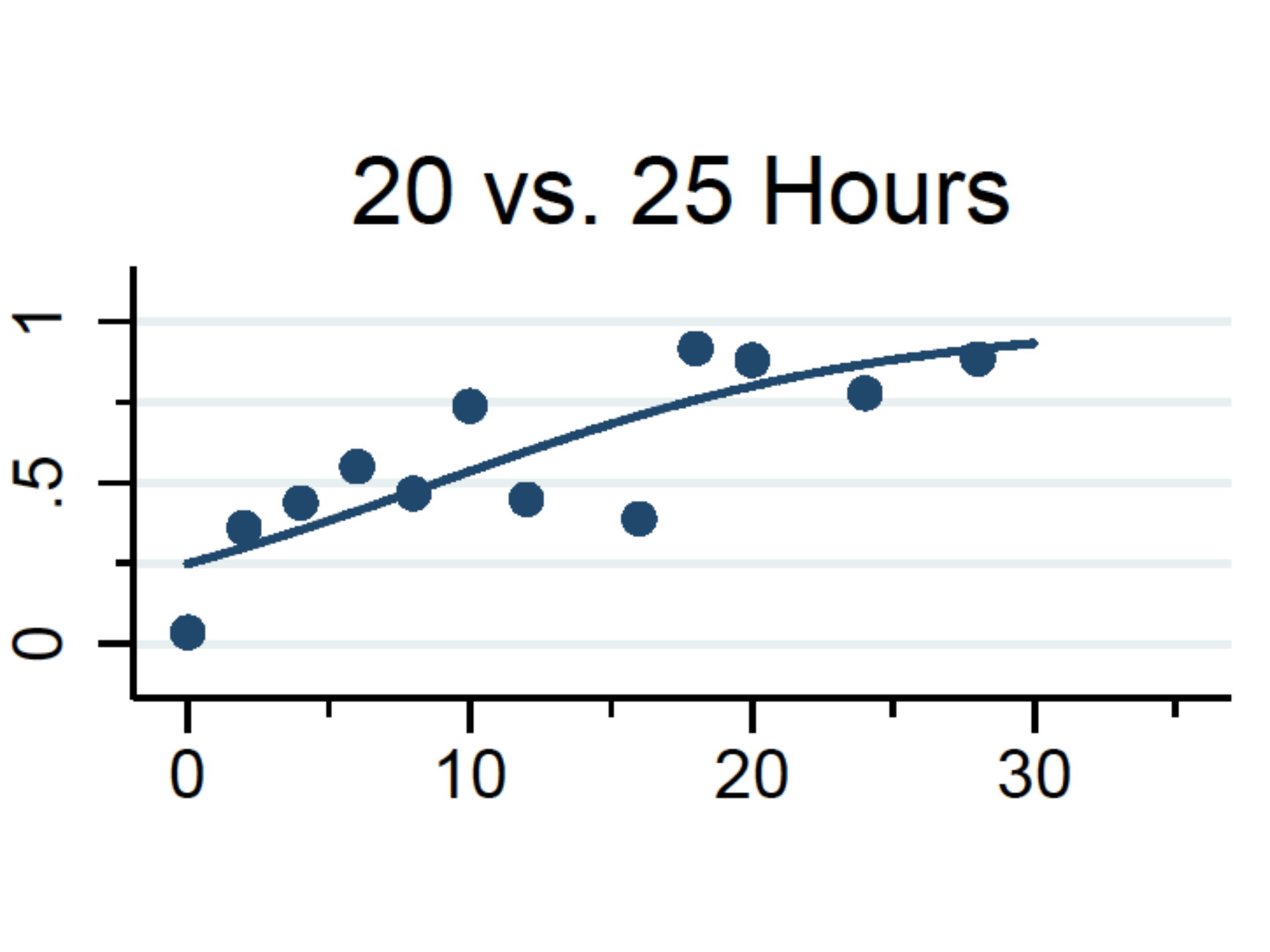
Unemployed Applicants

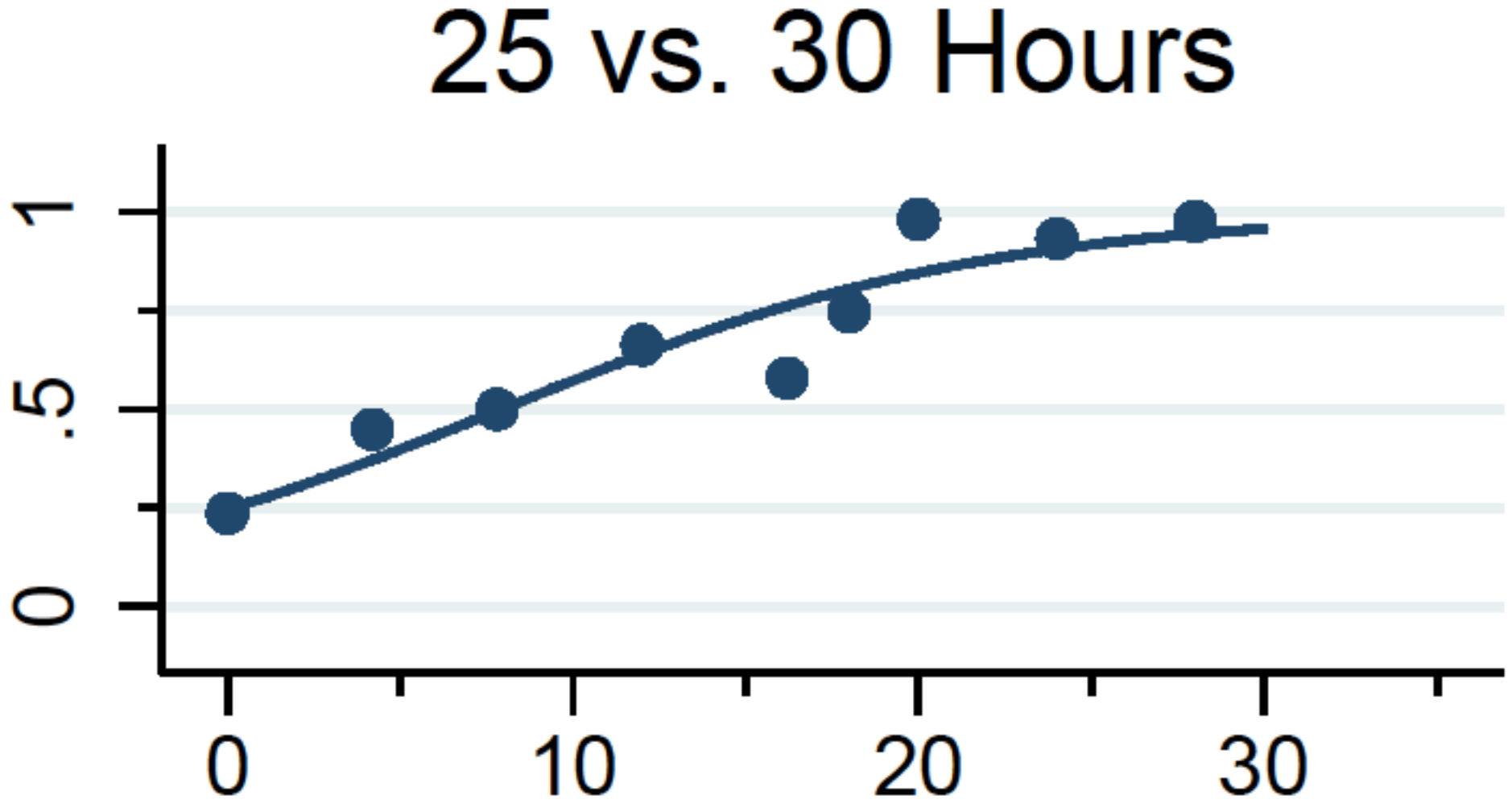


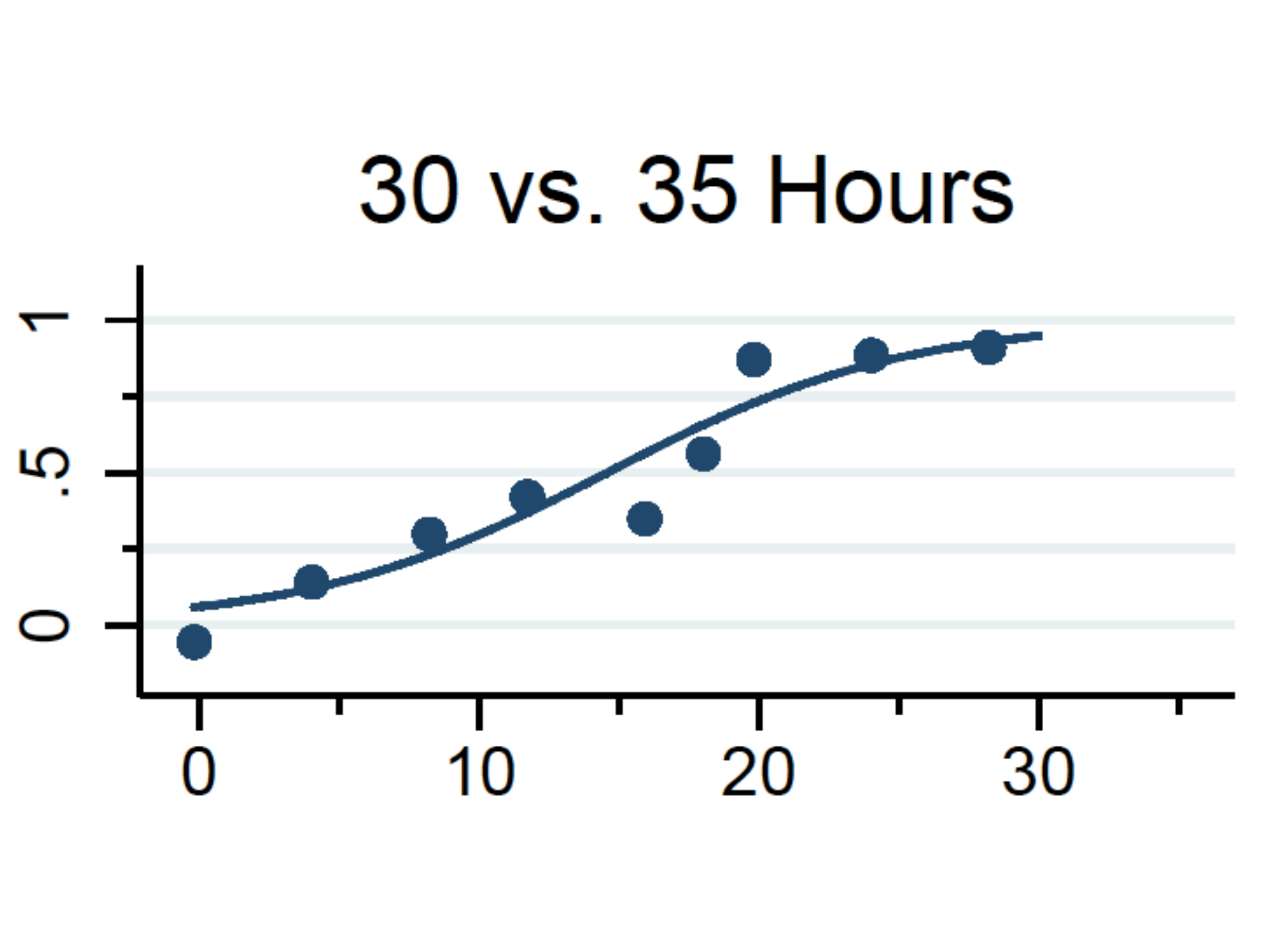

5 vs. 10 Hours
0
.5
1
0
10
20
30

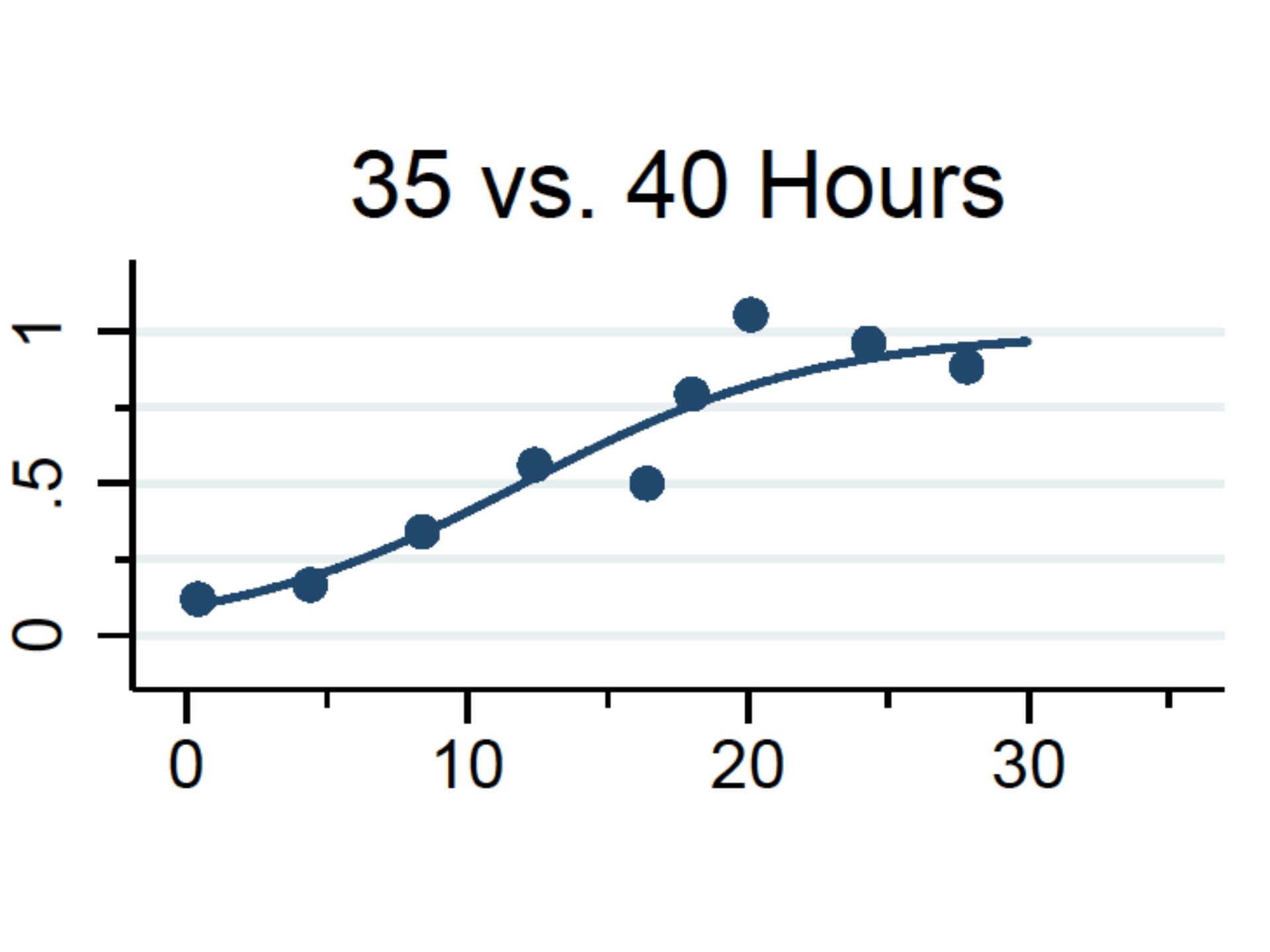

10 vs. 15 Hours
0
.5
1
0
10
20
30

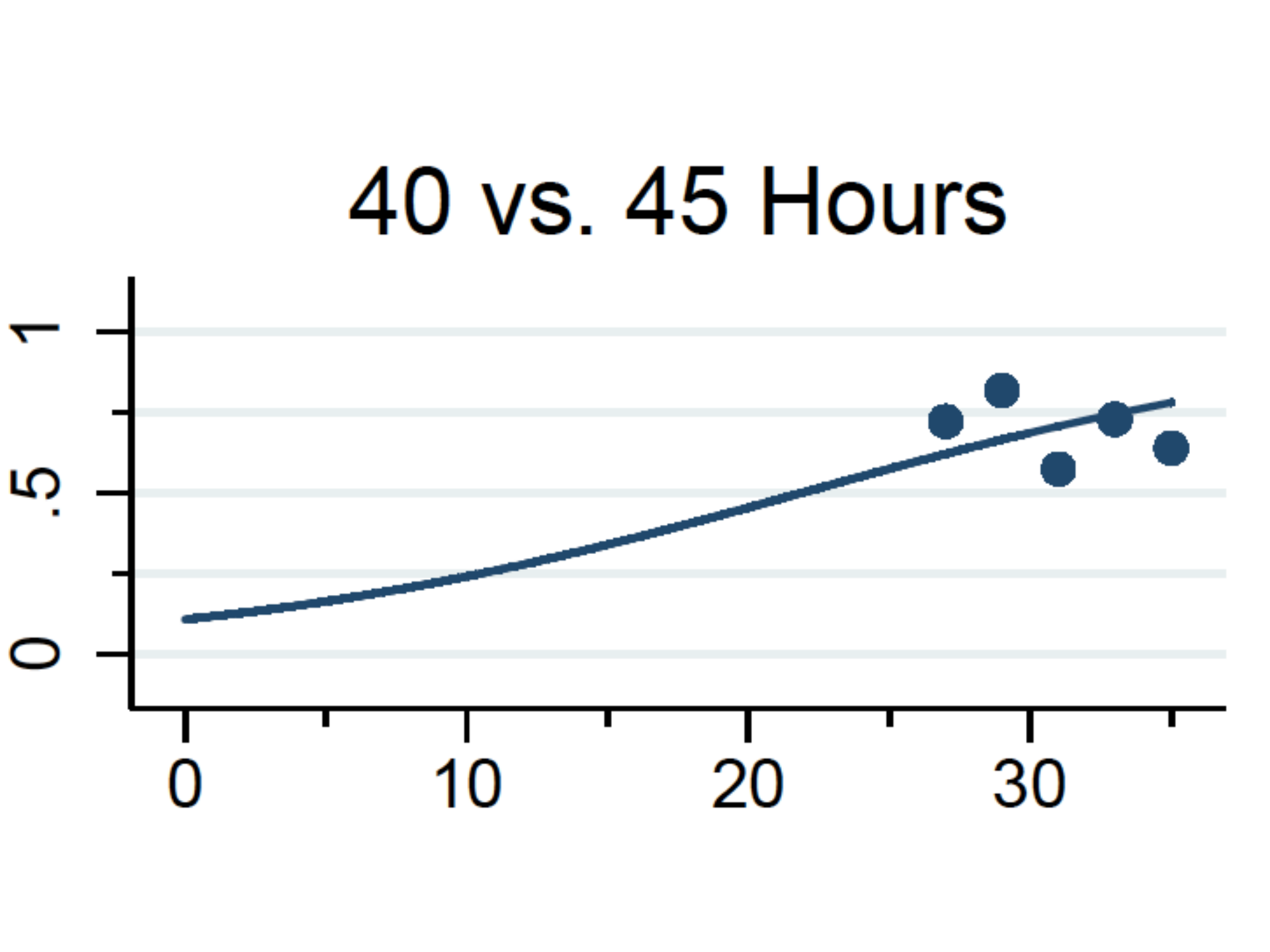

15 vs. 20 Hours
0
.5
1
0
10
20
30

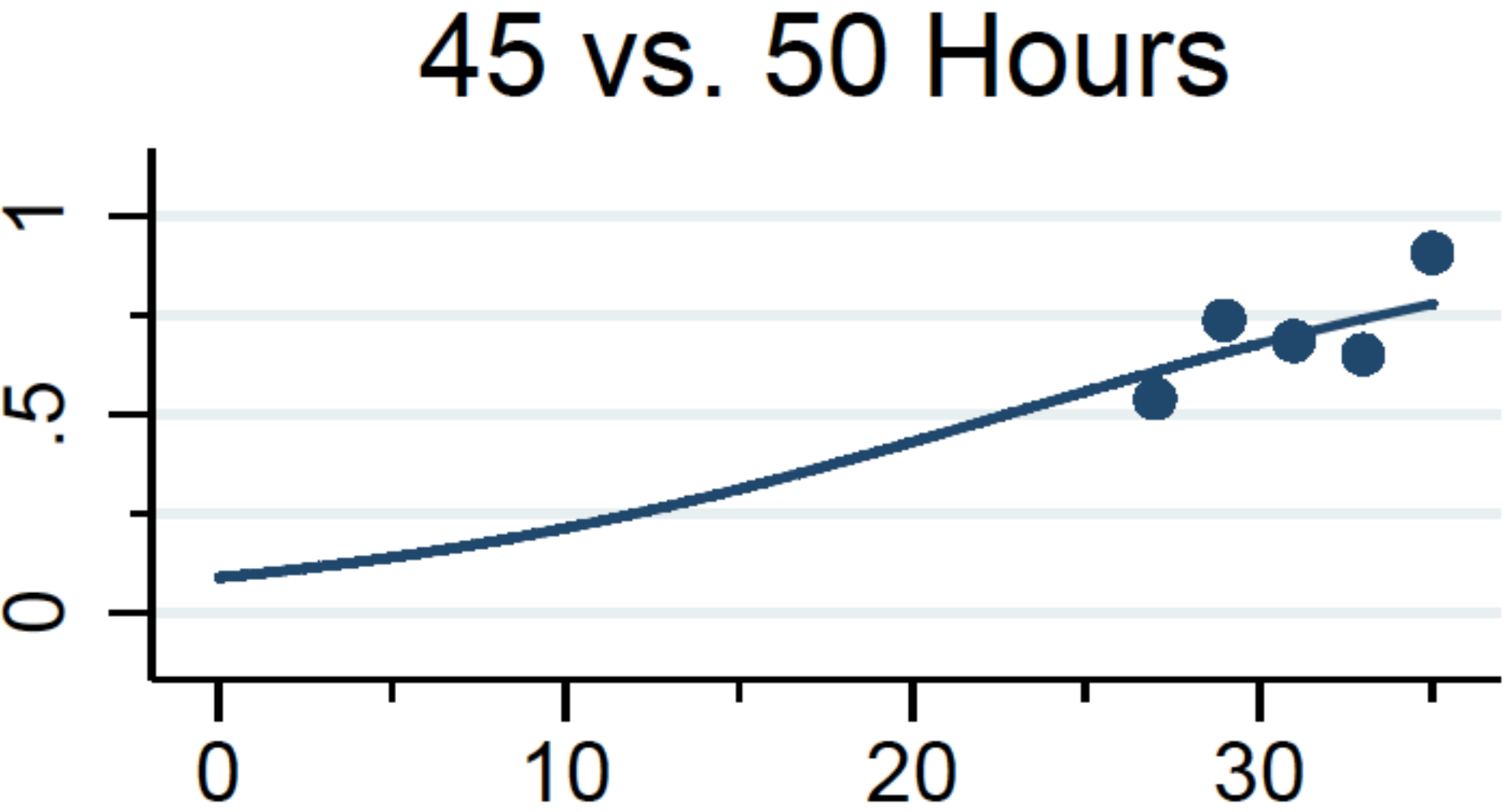

20 vs. 25 Hours
0
.5
1
0
10
20
30

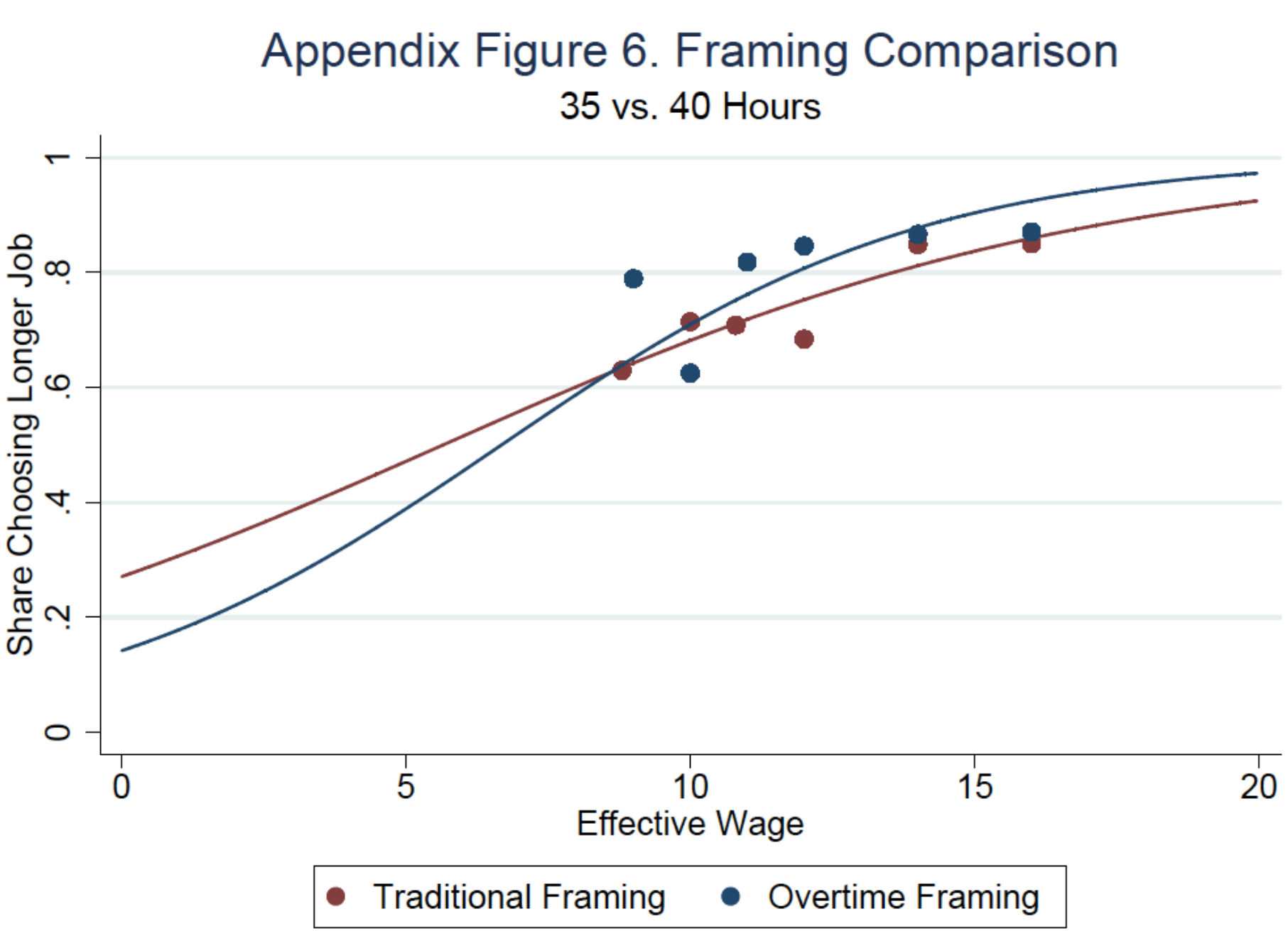

25 vs. 30 Hours
0
.5
1
0
10
20
30


30 vs. 35 Hours
0
.5
1
0
10
20
30


35 vs. 40 Hours
0
.5
1
0
10
20
30


40 vs. 45 Hours
0
.5
1
0
10
20
30


45 vs. 50 Hours
0
.5
1
0
10
20
30


Appendix Figure 6. Framing Comparison
35 vs. 40 Hours
Share Choosing Longer Job
0
.2
.4
.6
.8
1
0
5
10
15
20
Effective Wage
Traditional Framing
Overtime Framing

Mean Marginal Value of Time (Unemployed)

5 vs. 10	10 vs. 15	15 vs. 20	20 vs. 25	25 vs. 30	30 vs. 35	35 vs. 40
$4.80	$5.27	$7.00	$8.95	$7.97	$14.68	$12.00
(0.96)	(1.22)	(1.91)	(1.74)	(1.84)	(1.34)	(1.50)
117	124	128	153	135	133	112

40 vs. 45	45 vs. 50
$21.89	$22.69
(1.70)	(1.54)
121	129

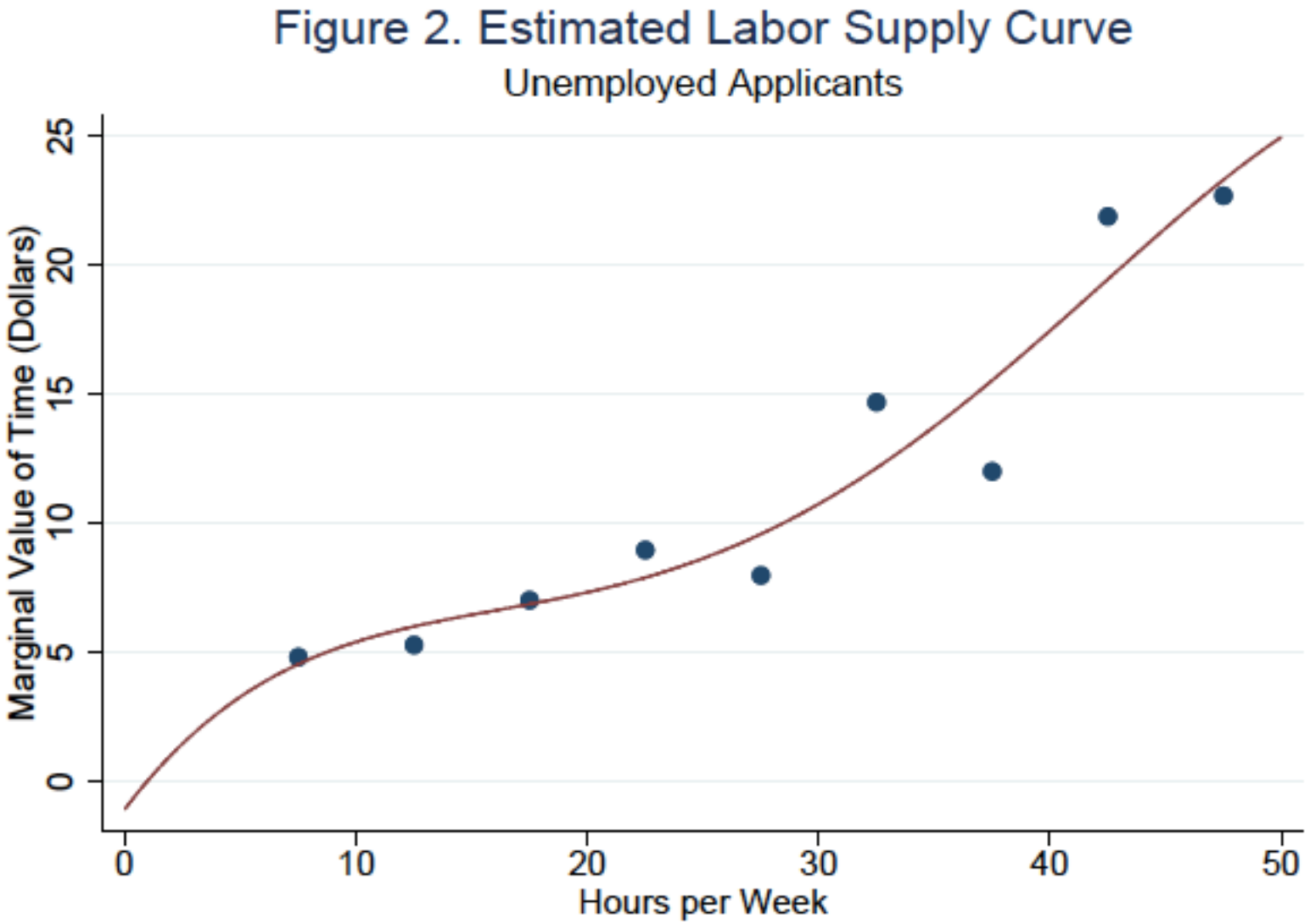


Figure 2. Estimated Labor Supply Curve
Unemployed Applicants
Marginal Value of Time (Dollars)
0
5
10
15
20
25
0
10
20
30
40
50
Hours per Week

Table 2. Labor Supply Elasticities
Unemployed Applicants

	Raw Points	Quartic Fit
10 Hours	5.36	1.80
15 Hours	1.18	2.47
20 Hours	1.02	1.79
25 Hours	-1.72	1.03
30 Hours	0.28	0.71
35 Hours	-0.71	0.58
40 Hours	0.21	0.56
45 Hours	3.07	0.62

Calculating *z*

$$\hat{z} = \frac{1}{\hat{w}} \left[\frac{5(\overline{MVT_5} + \overline{MVT_{10}} + \ldots + \overline{MVT_{40}})}{40} \right]$$

Note that because of linearity of the expectations operator, the average of the values of time can be used to calculate the average value of *z.*

Calculating the predicted market wage

- Use applicant characteristics to predict wage in the CPS
- Use gender, race, and education, and 5-year age bin
- Discount by 6% (matching average wage discount in CPS DWS for recently unemployed workers)
- Average market wage is $14 per hour

Flow Value of Nonwork Time

	Unweighted	Weighted
Implied *z*	0.58	0.57
	(0.04)	(0.07)

Comparison to Understanding America Study

- We use the Understanding America Survey (UAS) to explore the external validity of our results.
- The UAS is a nationally-representative survey in which a panel of randomly-selected individuals respond to web-based surveys.

Comparison to Understanding America Study

- We asked hourly workers:

  Imagine that you are applying for a new job in the same line of work as your [main, last] job and you have been offered two positions. Both positions are the same as your [main, last] job and to each other in all ways including benefits, other than the work schedule and how much they pay. Assume you can take no other jobs.

  Please read the descriptions of the positions below.

  Position 1) This position is X+10 hours per week and has a fixed Monday-Friday daytime schedule. The position pays $Y per hour.

  Position 2) This position is X hours per week and has a fixed Monday-Friday daytime schedule. The position pays $Z per hour.

  Which position would you choose?

Comparison to Understanding America Study

- Here, “X” is 10, 20, or 30 hours per week
- “Y” – the hourly wage in the longer job – is a worker's current hourly wage.
- The hourly wage in the shorter job, “Z”, is a random multiple of the worker's current hourly wage. The multiple was one of [65%, 80%, 90%, 95%, 98%, 100%, 102%, 105%, 110%, 120%, 135%] for employed workers.
- Use these wages to calculate effective wages.
- The shorter job could pay more or less per hour than the longer job. [Main, last] is “main” for employed workers and “last” for unemployed workers.

Comparison to Understanding America Study

- Experiment *z*: 0.58 (0.04)
- UAS *z*: 0.61 (0.03)

Discussion

- z=0.6 is in the intermediate to upper end of the calibration literature
- Fixed-costs?
- Marginal product vs. wage?
- Taxes?

Discussion

- Marginal product versus wages
  - Using MP for denominator => smaller *z* if wage < MP
  - Inverse of the elasticity of LS to the firm is the "Rate of Exploitation"
  - Elasticity=4 => *z* is 20% smaller
  - Diamond-Mortenson-Pissarides model implies smaller wedge between wage and MP (~2%)
- Taxes
  - After-tax wage => *z* is 20% larger

Fixed costs

- Commuting time
  - Average worker spends 1 hour a day commuting
  - Value commute time at half the wage (Small 2012) => add 0.06 to *z*
- UI
  - Replacement rate is approximately 0.4, but take-up rate is low, and benefits are temporary
  - Chodorow-Reich and Karabarounis (2016) estimate the opportunity cost of lost benefits as 0.06.

Child care

- Pattern of *z* by age suggests that jobseekers do not intend to pay for childcare
- Average child care costs are low
    - Among women with full-time jobs, only 35% pay anything for childcare
    - Average childcare expenditure is $148 per week conditional on having any expenditures, and $51 overall
- Adds 0.023 to Z

Heterogeneity in *z*

Table 3. Estimates of $\tilde{z}$

	UI Eligibility		Childcare Responsibility			UAS
	Potentially Eligible for Benefits	Ineligible for Benefits	Age 25 or Younger (13.5%)	Age 26-39 (51.9%)	Age 40 or Older (21.7%)	Hourly Workers
Estimate of $\tilde{z}$	0.57	0.61	0.74	0.53	0.53	0.61
	(0.05)	(0.10)	(0.13)	(0.06)	(0.10)	(0.03)
Observations	644	251	279	419	188	2,354

Discussion

- Estimates of *z* are 0.58 for leisure+home production and 0.72 after accounting for these fixed costs (0.87 assuming no wedge between wage and marginal product)
- This is in the upper part of the range from calibrations (but less than 0.95!)
- Unsubsidized childcare or benefit take-up can push this above 1

Discussion

- Highly elastic ls at low hours of work is not incompatible with the labor literature
- Sample is primarily female, who tend to have higher labor supply elasticities.
- The less elastic part of the labor supply relationship corresponds to the range of hours where most people work.

Discussion

- The shape of the labor supply function we estimate can rationalize the distribution of workers hours in the economy.
- In the U.S. labor market there are many full-time workers, many individuals who are out of the labor force entirely, and relatively fewer who choose part-time work.
- This distribution can be easily explained by the labor supply relationship we estimate, the key feature being that it goes from more elastic to more inelastic.