Using Time Outside the Labor Market

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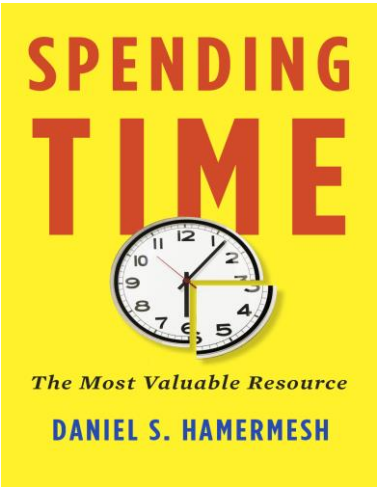
- **BASED ON:**

SPENDING TIME: THE MOST VALUABLE RESOURCE

Oxford University Press, 2019



"TAKING TIME USE SERIOUSLY: INCOME, WAGES AND PRICE DISCRIMINATION"

Daniel Hamermesh and Jeff Biddle, NBER Working Paper No. 25308

"A GIFT OF TIME"

Daiji Kawaguchi, Jungmin Lee and Daniel Hamermesh

Labour Economics, 2013.

"UNEMPLOYMENT AND EFFORT AT WORK"

Michael Burda, Katie Genadek and Daniel Hamermesh,

Economica 2019

"RACIAL/ETHNIC DIFFERENCES IN NON-WORK AT WORK"

Daniel Hamermesh, Katie Genadek and Michael Burda

NBER Working Paper No. 23096 Revised

I. The Central Questions

A. Is the dichotomy labor-leisure correct?

B. If not, why does its failure matter?

C. How does the mix of non-market time use respond to economic incentives?

D. How do these affect what we feel?

II. Time Use Data—Three Data Sets

A. The American Time Use Survey (ATUS), 2003-17

1. One person/household, 1 day only.

2. Diary filled out next morning, 2-5 months after final CPS interview. Thus have all CPS variables. Day runs 4:00AM-3:59AM.

3. No specified time intervals. >400 coded categories (coding by BLS based on verbal responses in diary). Not

4. 1800/month in 2003, about 1000/month since.

B. *Enquête Emploi du Temps*, 2009-10

1. All persons in household ages 11+, 2 days each.

2. ~28,000 diaries, filled out next morning. Day runs Midnight-11:59PM.

3. 10-minute time intervals. ~140 coded categories (coding based on verbal responses in diary).

4. The fourth, basically decennial such survey.

C. German *Zeitverwendungserhebung*, 2012-13

1. All persons in household ages 10+, 3 days each.

2. Nearly 25,000 diaries, filled out next morning. Day runs Midnight-11:59PM.

3. 10-minute time intervals. ~160 coded categories (coding based on verbal responses in diary).

4. The third, basically decennial such survey.

III. How is Non-market Time Spent? Definitions/accounting

A. Paid work—usual labor economics concept
B. Home production—non-paid activities that you can contract out.
C. Personal activities—mostly sleep. Things we all must do and can't contract out.
D. Leisure, include TV-watching. Things we do not have to do and can't contract out.
E. Illustrations:

IV. Descriptive Statistics

A. Distinguish non-workers from workers.

B. Table 1—the 6 basic categories of time use.

C. Present for non-workers, workers on days with work.

D. Stats make sense:

1. More work, TV in US

2. Income comparisons about in line with other sources.

3. Workers sleeping less.

Table 1. Descriptive Statistics, Time Use in the U.S., 2003-15; France, 2009-10; Germany, 2012-13

	Work	Home Production	Sleep	Other Personal	TV-watching	Other Leisure
ATUS:						
Non-workers	-----	249	557	124	236	274
(N = 51,997)		(0.90)	(0.62)	(0.44)	(0.89)	(0.95)
Family Income:	$49,383 (210)					
Workers	497	124	473	115	104	127
(N = 52,383)	(0.85)	(0.56)	(0.48)	(0.28)	(0.45)	(0.60)
Family Income:	$61,434					
Enquête:						
Non-workers	------	257	532	210	167	274
(N = 5,854)		(2.26)	(1.50)	(1.39)	(1.73)	(2.26)
Family Income:	€28,005 (259)					
Workers	499	119	458	170	86	109
(N = 4,287)	(2.58)	(1.72)	(1.45)	(1.19)	(1.24)	(1.70)
Family Income:	€39,972					
Zeitverwendungserhebung:						
Non-workers	------	265	526	183	164	302
(N = 1,993)		(3.51)	(2.00)	(1.68)	(2.65)	(3.85)
Family Income:	€28,683 (397)					
Workers	476	127	455	130	94	158
(N = 8,173)	(2.06)	(1.31)	(1.06)	(0.62)	(0.92)	(1.51)
Family Income:	€41,892					

*Standard errors of means in parentheses.

V. Estimates for Non-workers

A. Non-worker if no earnings, no work on diary day(s), no usual hours of work reported.

B. Table 2—show effects of 10,000-unit increase in income on each of 5 categories. All available demographics held constant. Note: Cluster s.e.'s for F, D.

Table 2. Income Effects on Time Use (Minutes/Day in Response to +10,000 ($ or €) Annual Income): Non-workers U.S., 2003-15; France, 2009-10; Germany, 2012-13*

	Home Production	Sleep	Other Personal	TV-watching	Other Leisure
ATUS:**					
(N = 51,997)	2.19	-2.05	1.10	-2.95	1.71
	(0.18)	(0.14)	(0.10)	(0.20)	(0.22)
Adj. R^2	0.260	0.078	0.035	0.121	0.065
Enquête:**					
(N = 5,439)	-0.63	-3.00	3.19	-7.07	7.52
	(1.74)	(1.22)	(1.53)	(1.49)	(2.03)
Adj. R^2	0.324	0.122	0.068	0.101	0.208
Zeitverwendungserhebung:**					
(N = 1,993)	0.82	-3.35	-4.10	-5.68	12.31
	(2.18)	(1.49)	(1.19)	(1.81)	(2.70)
Adj. R^2	0.221	0.068	0.053	0.080	0.102

*Standard errors in parentheses below the parameter estimates. Those in the French and German equations are clustered on the individuals.

**The equations also include a quadratic in age; indicators and numbers of children in several age groups; gender, marital status and their interaction; a vector of indicators of educational attainment; and vectors of indicators of state of residence, metropolitan status, year, month and diary day.

***The equations also include a quadratic in age; a vector of indicators of educational attainment; indicators and numbers of children in several age groups; gender, coupled status and their interaction; and vectors of indicators of the month, diary day and region.

****The equations also include a quadratic in age; indicators of number of children under age 10; gender, marital status and their interaction; and, vectors of indicators of quarter, diary day, educational attainment and East Germany.

C. Clear effects of ↑ non-earnings (other household income):

1. Sleep, TV inferior similarly in all 3 economies.
2. TV more inferior than sleep—makes sense.
3. Effects of 1 SE ↑ are 2-4% on sleep, 12-17% on TV.
4. Other leisure uniformly superior.
5. Rest mixed.

VI. Estimates for Workers—U.S.

A. Worker if reported + usual hours AND worked on the diary day. Intensive margin only. Hourly wage, other household income (partner's wages, unearned income, etc.).

B. Table 3—sleep, TV, M, F separately

C. Mostly clear negative effects of ↑ earnings, as with other income among non-workers

D. Pure income effects negative.

Table 3. Parameter Estimates, Sleep and TV-watching (Minutes/Day in Response to +$10 Hourly Earnings, +$10,000 Other Annual Income): Married Workers, ATUS 2003-15*

	Sleep		TV-watching	
Ind. Var.:	**Male**	**Female**	**Male**	**Female**
Annual Other Income	0.061 (0.220)	-0.205 (0.162)	-0.229 (0.263)	-0743 (0.183)
Hourly Earnings	-1.153 (0.558)	-0.711 (0.651)	-2.212 (0.668)	-3.305 (0.687)
Adj. R^2	0.122	0.117	0.113	0.073
N =	18,122	19,526	18,122	19,526

*All equations also include a quadratic in age; indicators and numbers of children in several age groups; a vector of indicators of educational attainment; and vectors of indicators of state of residence, metropolitan status, year, month and diary day.

VII. Estimates for Workers--FR

A. Worker if reported + usual hours AND worked on the diary day. Intensive margin only.

B. Table 4—only the two time-intensive commodities, M, F separately

C. ↑ earnings–not much there.

D. Assuming inelastic LS, same holding work time constant.

E. Pure income effects negative, as with non-workers.

Table 4. Parameter Estimates, Sleep and TV-watching (Minutes/Day in Response to +€10 Hourly Earnings, +€10,000 Other Annual Income: Partnered Workers, *Enquête Emploi du Temps,* 2009-10*

	Sleep (minutes/day)		TV-watching (minutes/day)	
	Male	**Female**	**Male**	**Female**
Ind. Var.:				
Annual Other Income	-0.07 (0.202)	-0.08 (0.17)	-0.38 (0.15)	-0.32 (0.10)
Hourly Earnings	2.08 (3.00)	1.32 (5.60)	-3.44 (2.35)	7.65 (5.87)
Adj. R^2	0.111	0.156	0.090	0.098
N =	2,775	2,635	2,775	2,635

*Standard errors below the parameter estimates, clustered on individuals. The regressions also include a quadratic in age; a vector of indicators of educational attainment; indicators and numbers of children in several age groups and vectors of indicators of the month, diary day and region.

VIII. Rationalizing the Findings

A. Commodities $Z_1 \ldots Z_M$; Utility $U = \sum (Z_i/\gamma)^{\gamma}$, $\gamma < 1$.

B. $Z_i = [\delta_i X_i^{\rho(i)} + (1-\delta_i)T_i^{\rho(i)}]^{1/\rho(i)}$, where $\sigma_i = 1/(1-\rho_i)$. Not Leontief

C. What can we say from this?

1. Even with the genlztns, elast. of time to I is identical for all non-work time for workers.
2. Need more assumptions: If $\sigma_u <$ all $\sigma_i \equiv \sigma$ (harder subst between than within). This gives for lower σ_u , more goods-intensive as w↑, for lower σ more time-intensive as w↑.
3. Implies more + inc. elast. if 1 relatively goods-intensive, relatively easier subst. of goods in production.

D. Crucial point: Becker (1965) model requires modification to goods-time substitutability to explain real-world responses to Δ income, wages.

E. Clearly, econ. incentives alter mix of non-market activities—not only the labor-leisure choice.

IX. Other Issues

Examine some probably goods-intensive activities.

A. Choose eating away from home; museums,events, etc.

B. Problem: Unlike sleep and TV, incidence on any day is not high. Special problem in F sports/arts.

C. Table 5—show effects of 10,000-unit increase in income on each of Eating Out, Sports/Arts, for non-workers.

1. Clear + effects of ↑ non-earnings:
    a. But: On incidence—why?
    b. But effects on intensity vary.
2. Similar results for workers, etc.

Table 5. Income Effects on Time Use (Minutes/Day in Response to +10,000 ($ or €) Other Annual Income): Non-workers U.S., 2003-15; France, 2009-10*

	U.S.**				France***	
	Eating Out		Sports/Arts		Eating Out	
Determinants of:	**Prob.**	**Cond. Mean**	**Prob.**	**Cond. Mean**	**Prob.**	**Cond. Mean**
	0.028	0.462	0.028	-0.556	0.058	-16.71
	(0.002)	(0.091)	(0 .002)	(0.423)	(0.017)	(18.78)
Pseudo-R^2 or Adj. R^2	0.037	0.026	0.071	0.026	0.094	0.168
N =	51,997	8,834	51,997	2,408	5,407	1,154

*Standard errors in parentheses below the parameter estimates. Those in the French equations are clustered on the individuals.

**The equations also include a quadratic in age; indicators and numbers of children in several age groups; gender, marital status and their interaction; a vector of indicators of educational attainment; and vectors of indicators of state of residence, metropolitan status, year, month and diary day.

***The equations also include a quadratic in age; a vector of indicators of educational attainment; indicators and numbers of children in several age groups; gender, coupled status and their interaction; and vectors of indicators of the month, diary day and region.

X. An Extension

A. What if goods prices differ across people, so for some Group d, some goods i, $p_i[1+d] > p_i$ for others? *Cet. p*ar. Group d will consume/produce relatively time-intensive commodities.

B. Minorities in the U.S.—certain goods prices are higher.

C. Immigrants—some evidence for France, Greece.

D. Examine sleep, TV in ATUS for African-Americans, sleep only for white Hispanics. Sleep for French immigrants (Not TV bec. of language issues.)

E. Throughout same controls as before. Present for all (results qualitatively same for non-workers, workers separately).

F. Table 6

1. For all Groups d, more time spent in these time-intensive activities.

2. Effect on TV bigger than on sleep for African-Americans—consistent with the difference in income effects.

G. Are these estimates reasonable—can all the difference result from product-market discrimination?

1. Take Table 2 estimates of income effects; make extreme assumption that discrimination reduces real income by 25%.

2. African-Americans: Explain 1/7 to 1/3 of extra sleep, about 1/3 of extra TV. Hispanics: Can explain about ¼ of extra sleep.

3. French immigrants: Explain about 1/6 to ½ of extra sleep.

Table 6. Effect of Minority Status on Minutes of Sleep and TV-watching (Minutes/Day): U.S. Minorities/Immigrants, 2003-15; French Immigrants, 2009-10*

	Sleep		TV-watching	
	U.S.			
Ind. Var.:	**Male**	**Female**	**Male**	**Female**
African-American	7.22	14.88	37.56	25.21
	(1.72)	(1.42)	(2.23)	(1.68)
White Hispanic	10.69	11.54	------	------
	(1.67)	(1.48)		
.				
Adj. R^2	0.099	0.091	0.154	0.126
N	64,766	83,229	55,640	72,112
	France			
Immigrant	12.23	4.78		
	(6.17)	(6.53)		
Adj. R^2	0.141	0.110		
N	10,517	12,169		

*Each equation includes the variables listed and all the variables included for each country in the estimates presented in Tables 3 and 4. The French estimates are clustered on the individual respondents.

XI. What Happens When People Get More Time?

A. Short-term, but surprisingly and temporary—as in a recession?

1. RBC mythos—true output doesn't decrease because of substitution of non-market for market output.

2. Facts—Figure 12.1 Even for men, <1/3 of freed-up time is used for home production.

B. What about a permanent exogenous cut in work time—a partial answer to Keynes (1930)?

1. Background—Japan early 1990s, Korea early 2000s, reduced standard hours beyond which overtime penalty applies.
2. Work hours did drop in both countries. Even Δ^2 on those most likely to have been affected were negative.
3. Very little was re-allocated to household production—Tables 1.

Table 1J
Reduced-form estimates of changes in time use on the treatment propensity score, Japan, 1986–96.

	All days (per day)		Weekdays		Saturdays		Sundays	
	(N = 447)	R^2	(N = 447)	R^2	(N = 481)	R^2	(N = 484)	R^2
ΔM	−40.46	0.014	30.06	0.006	−366.34	0.334	−47.19	0.021
	(15.47)		(18.62)		(23.64)		(14.64)	
ΔH	−34.21	0.012	−50.59	0.022	34.88	0.011	−21.79	0.004
	(14.08)		(15.45)		(15.34)		(15.76)	
ΔP	5.07	0.001	−14.35	0.004	82.76	0.088	20.14	0.006
	(9.14)		(11.16)		(12.18)		(11.43)	
ΔL	69.61	0.049	34.87	0.009	248.70	0.280	48.84	0.018
	(13.85)		(16.82)		(18.22)		(16.28)	
Mean propensity	0.110		0.113		0.112		0.111	
	(0.089)		(0.089)		(0.089)		(0.090)	
SD propensity [10th, 90th]	[0.003, 0.239]		[0.004, 0.242]		[0.003, 0.239]		[0.003, 0.239]	

Notes: Estimated by weighted least squares, with weights equal to the average population sizes of the cells across the two years, here and in Table 1K. Standard errors in (parentheses) under parameter estimates here and in subsequent tables.

Table 1K
Reduced-form estimates of changes in time use on the treatment propensity score, Korea, 1999–2009.

	All days (per day)		Weekdays		Saturdays		Sundays	
	(N = 1048)	R^2	(N = 994)	R^2	(N = 783)	R^2	(N = 756)	R^2
ΔM	−245.12	0.042	−157.06	0.013	−593.39	0.134	−172.89	0.014
	(36.12)		(42.74)		(53.98)		(53.58)	
ΔH	176.22	0.065	156.68	0.040	259.43	0.084	161.84	0.041
	(20.59)		(24.23)		(30.59)		(28.03)	
ΔP	35.97	0.005	5.89	<0.001	93.08	0.017	70.49	0.007
	(15.20)		(17.41)		(25.66)		(30.00)	
ΔL	32.93	0.001	−5.52	<0.001	240.88	0.033	−59.44	0.002
	(27.80)		(32.98)		(46.83)		(47.66)	
Mean propensity	0.062		0.062		0.069		0.071	
	(0.080)		(0.080)		(0.086)		(0.086)	
SD propensity [10th, 90th]	[0.002, 0.171]		[0.002, 0.170]		[0.003, 0.185]		[0.003, 0.196]	

XII. Feelings about Non-market Time

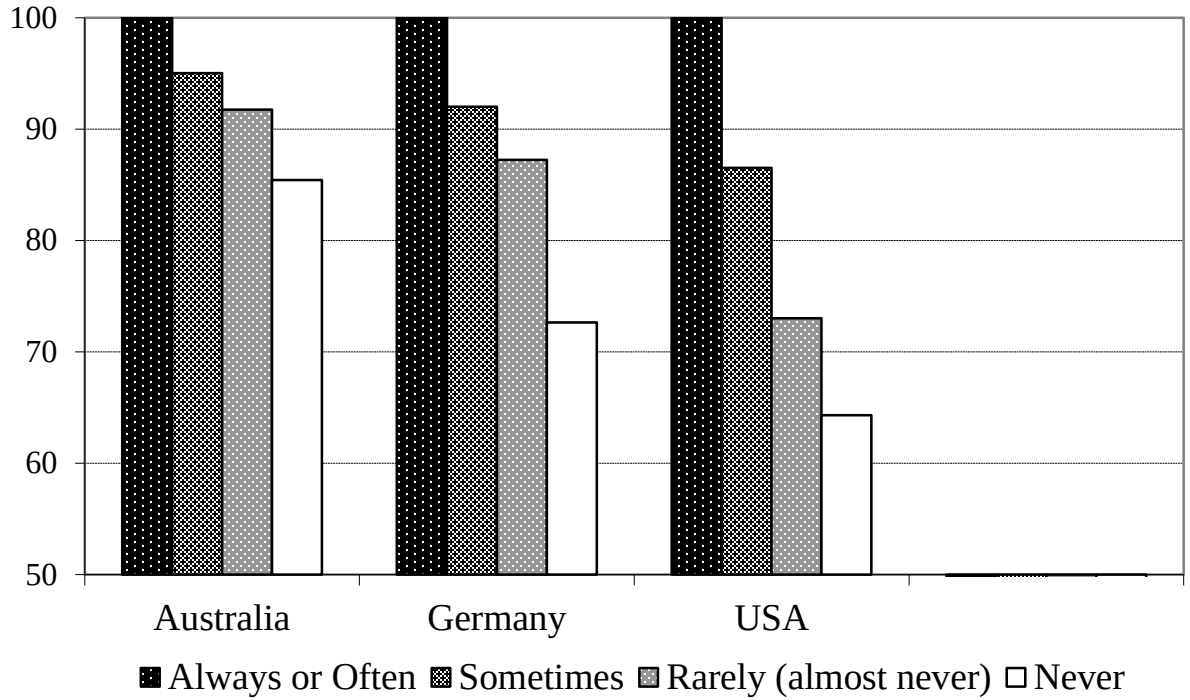
A. Why the responses—what can we learn about underlying preferences for various non-market activities?

B. Which ones bother us more/less?

C. Figure on France, Germany, UK

D. Who is bothered by the shortage of time?

1. Think of goods-time model, with Lagrange multipliers as indicators of the stress that the limits on goods, time create.
2. Then high-wage/income people should be more stressed for time, less for income than others.
3. So if inquire about time-stress, will rise with wage, rise for non-workers with household incomes.
4. Evidence:



Earnings by Level of Time Stress
(100 = Average Earnings if Always or Often Stressed for Time)

XIII. Not All Time on the Job is Work

A. We don't work all the time at work—measured hours are not actual effort. (Indeed, what is work?)

B. Conflicting theories

1. Labor hoarding—let workers loaf to avoid incurring additional hiring/training costs after downturn. Implies loafing ↑ with unemployment--countercyclical.

2. Shirking—higher unemployment gives employers an advantage—more risk if caught shirking. Implies loafing ↓ with unemployment—procyclical.

C. These are opposite predictions. Which is correct—or are both?

C. Is nonwork at work economically important?

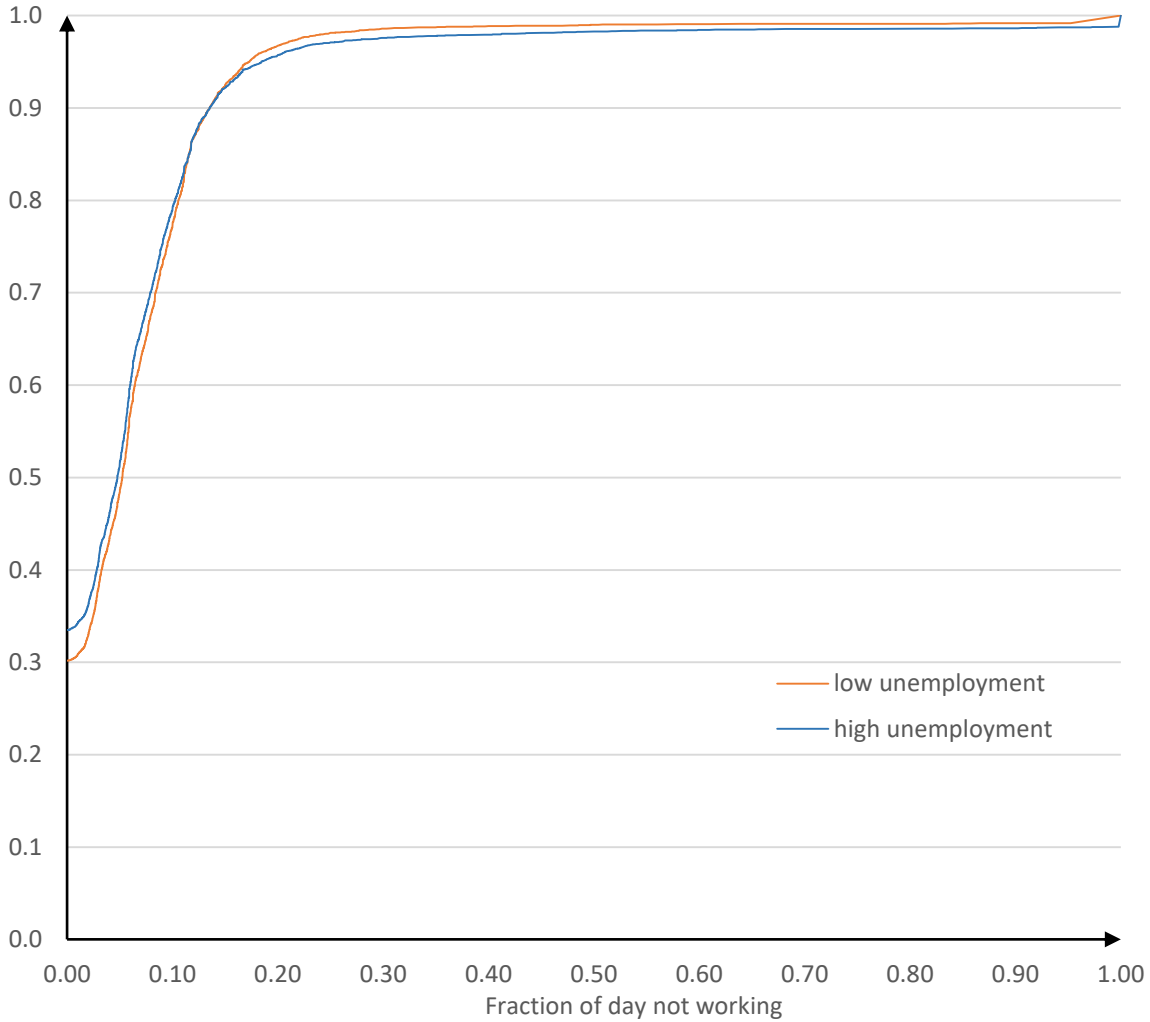
YES!

1. Increase in fraction of time not working of 0.013 (mean of 0.068) over range of variation in state unemployment rates 2003-12.

2. Decrease in fraction with some non-work of 0.061 on mean of 0.663

3. Increase in fraction of time not working by those who do loaf of 0.020 on mean of 0.100

Figure 1: Empirical cumulative distribution functions of time not working at work during low and high unemployment (2005-7 and 2009-11)



Source: American Use Time Survey, authors' calculations.

D. There are interesting demographic differences.

Focus on race/ethnicity—four minorities, non-Hispanic White majority.

(There are no gender differences.)

E. Results Table 2

1. Note huge numbers of covariates.
2. Separate samples by education; by health status; by public/private; by hourly/salaried; by union/non-union. Essentially same demographic differences.
3. Why? Rule out lots of stories, but can't rule out pure discrimination because of differences in prospects.

Table 2. Parameter Estimates, Racial/Ethnic Effects on the Fraction of Worktime Not Working, ATUS Employees, 2003-12 (Base Group Is Non-Hispanic Whites)*

Equation	African-American	Non-black Hispanic	Asian-American	Other races
		MEN		
Raw differential	0.0148	0.0203	0.0034	0.0056
	(0.0036)	(0.0031)	(0.0036)	(0.0059)
Add hours, demographic and geographic indicators**	0.0123	0.0198	0.0094	0.0080
	(0.0036)	(0.0034)	(0.0039)	(0.0062)
Add very detailed industry, occupation and union indicator***	0.0081	0.0155	0.0088	0.0030
	(0.0038)	(0.0034)	(0.0040)	(0.0061)
		WOMEN		
Raw differential	0.0112	0.0132	0.0078	0.0025
	(0.0027)	(0.0034)	(0.0057)	(0.0063)
Add hours, demographic and geographic indicators**	0.0112	0.0904	0.0091	-0.0034
	(0.0030)	(0.0038)	(0.0062)	(0.0066)
Add very detailed industry, occupation and union indicator***	0.0083	0.0063	0.0059	-0.0041
	(0.0031)	(0.0039)	(0.0066)	(0.0070)

*Standard errors of parameter estimates in parentheses.
**Quadratics in daily work time, usual weekly hours, and potential experience; vectors of education indicators, of age of youngest child, of states, months, and days of the week; indicators of marital and metro status.
***Adds indicators for 513 occupations, 259 industries, and union membership.

XIV. Conclusions and Implications

A. Clear differences in income elasticities of time in commodities—requires going beyond standard household production assumptions.

B. Time-intensive activities are clearly inferior—perhaps best demonstration of goods-time substitution in household production.

C. Implications for thinking about tax policy:

1. **Income taxes** alter what we do with non-work time, even if total work time is unchanged (because of differential goods intensities).
2. **Sales taxes** do this directly—but alter purchases of untaxed goods unless the taxed good produces an average goods-intensity commodity.
3. **Differential tariffs/quotas** do the same thing.
4. **None of these is neutral**—because of non-separability of non-market time use.

D. Implications for stress—don't listen to complaints about how busy someone is.

E. Implications for measuring productivity: Over the cycle, across industries, people.

F. Implications for demographic wage differentials.