Supplemental Material (not copyedited or formatted) for: Mark Aguiar, Mark Bils, Kerwin Kofi Charles, Erik Hurst. 2021. "Leisure Luxuries and the Labor Supply of Young Men." Journal of Political Economy 129(2). DOI: https://doi.org/10.1086/711916.

Online Appendix for "Leisure Luxuries and the Labor Supply of Young Men"

A1 Data Appendix

Our analysis primarily uses the American Time Use Survey. Here, we further detail our use of that data – including sample restrictions – as well as for the Current Population Survey, which we employ for supplemental statistics. We also use BLS Price data. The main text discusses its use.

A1.1 American Time Use Survey (ATUS)

The bulk of our analysis is based on the 2004 to 2017 waves of the American Time Use Survey (ATUS). The ATUS is conducted by the U.S. Bureau of Labor Statistics (BLS), with individuals drawn from the exiting sample of the CPS. We download the ATUS data directly from the BLS website. Individuals are sampled approximately 3 months after completion of their final CPS survey. At the time of the ATUS, the BLS updates the respondent's employment and demographic information. The time-use data reflect a 24-hour diary where respondents report activities from the previous day broken by 15 minute intervals. Survey personnel then classify each activity to one of over 400 detailed categories. We omit a few minor time categories from our classification in Section 3 of the main text, such as own health and a catch-all "uncategorized" activity.

The time diaries are designed to measure an individual's primary task. It measures secondary tasks less well. For example, consider someone who commutes for a half hour on the subway, reading a book during their commute. The survey will prompt the individual to only report the primary activity, which would likely be commuting. However, if the individual lists multiple activities as their primary activity, those activities get allocated an equal portion of that time interval. Continuing the example, if someone reported both commuting and reading were primary activities, 15 minutes would get allocated to commuting and 15 minutes to reading. This preserves that each individual's total reported time is 24 hours. So it is likely that the less primary of multi-tasking activities are underreported. This may be relevant to some recreational computer activities, like engaging in social media.

Time spent at market work in the ATUS differs from that reported in the CPS March supplements. The time diary includes commuting time. It also reflects time worked during one 24-hour period, rather than a recall estimate of hours worked in a "usual" week.

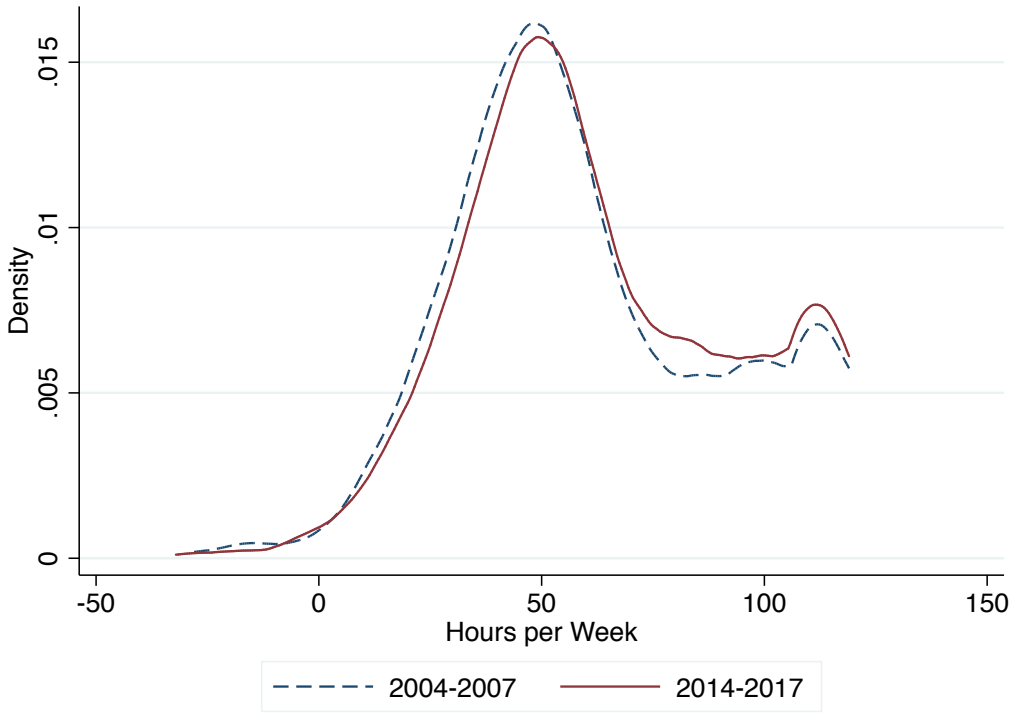
We restrict the sample to those ages 21 to 55. We exclude individuals in the military and full-time students ages 24 and under. Status as a full-time student is only consistently asked in the March Supplement for those ages 24 and under.

A1.2 Current Population Survey (CPS)

We downloaded the 1977-2018 March Annual Social and Economic Supplements to the CPS directly from the IPUMS CPS website (https://cps.ipums.org/cps/index.shtml). We restrict

Supplemental Material (not copyedited or formatted) for: Mark Aguiar, Mark Bils, Kerwin Kofi Charles, Erik Hurst. 2021. "Leisure Luxuries and the Labor Supply of Young Men." Journal of Political Economy 129(2). DOI: https://doi.org/10.1086/711916.

Figure A1: Distribution of Leisure Time for Young Men



Note: Figure shows kernel density of leisure time for younger men.

the sample to ages 21 to 55, again excluding individuals in the military and full-time students ages 24 and under. Status as a full-time student is only consistently asked in the March Supplement for those 24 and under.

Our CPS series focus on hours and employment. We define those who are employed as anyone who reports working last week (empstat = 10) and anyone who has a job but did not work last week (empstat = 12). Employment status is measured as of the survey. For example, respondents in the 2018 March Supplement report information about whether they were working in March of 2018. Hours worked are reported retrospectively. Survey respondents in year t report (1) how many weeks worked during the prior calendar year and (2) the hours per week they usually worked during the prior year. We construct annual hours worked by multiplying weeks worked during the prior year by the usual weekly hours worked during the prior year. We also document the extent to which individuals did not work during the prior year. We define not working during the prior year as survey respondents who report working zero weeks during the prior year.

A2 Additional Tables and Figures

In this section we report several tables and figures referenced in Section 3 of the text.

Supplemental Material (not copyedited or formatted) for: Mark Aguiar, Mark Bils, Kerwin Kofi Charles, Erik Hurst. 2021. "Leisure Luxuries and the Labor Supply of Young Men." Journal of Political Economy 129(2). DOI: https://doi.org/10.1086/711916.

Table A1: Broad Time Allocation During the 2000s: Unadjusted ATUS Weights

(a) Men, Age 21-55

	Age 21-30			Age 31-55		
Activity	2004-2007	2014-2017	Change	2004-2007	2014-2017	Change
Market Work	38.5	36.7	-1.7 (1.0)	40.9	40.5	-0.4 (0.5)
Job Search	0.3	0.8	0.5 (0.1)	0.3	0.4	0.11 (0.05)
Home Production	12.1	11.6	-0.4 (0.5)	14.8	14.0	-0.7 (0.2)
Child Care	2.8	2.1	-0.7 (0.2)	3.6	4.1	0.5 (0.1)
Education	2.5	2.9	0.4 (0.4)	0.6	0.6	-0.01 (0.08)
Leisure	61.0	63.3	2.3 (0.9)	57.0	57.5	0.5 (0.4)

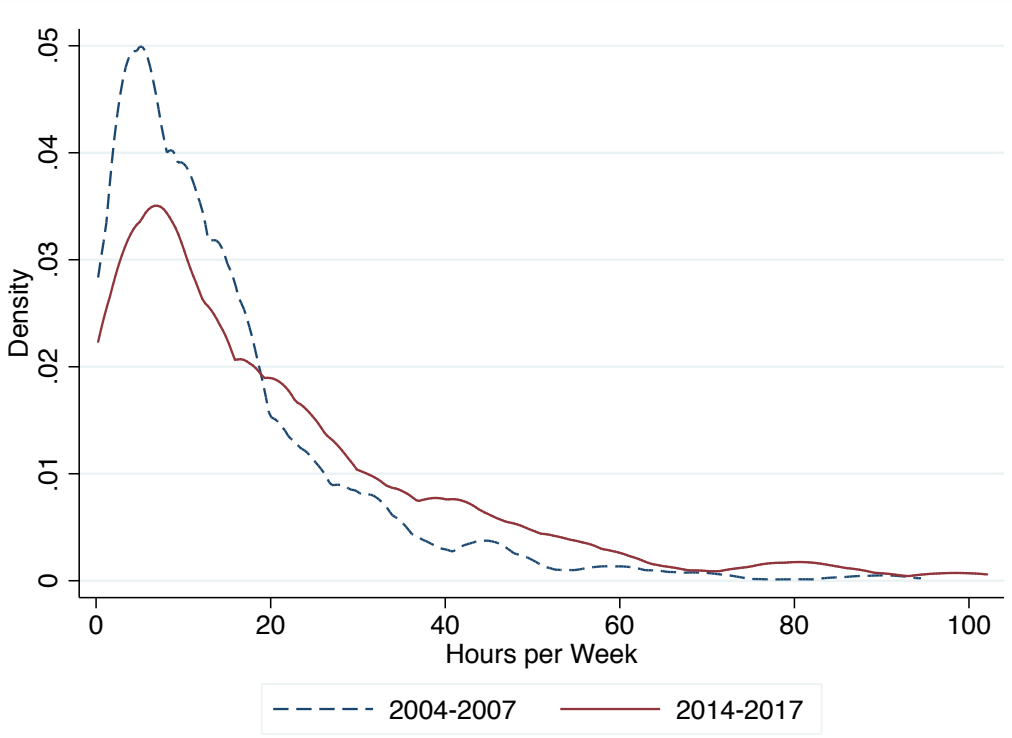
(b) Women, Age 21-55

	Age 21-30			Age 31-55		
Activity	2004-2007	2014-2017	Change	2004-2007	2014-2017	Change
Market Work ”	27.4	27.3	-0.1 (0.8)	27.4	27.4	0.0 (0.4)
Job Search	0.2	0.3	0.1 (0.1)	0.2	0.2	0.03 (0.03)
Home Production	19.0	17.6	-1.4 (0.4)	24.2	22.4	-1.8 (0.3)
Child Care	9.9	8.3	-1.7 (0.4)	7.4	7.8	0.5 (0.2)
Education	2.3	3.2	0.9 (0.3)	1.1	0.9	-0.2 (0.1)
Leisure	58.5	59.9	1.4 (0.7)	56.1	57.4	1.3 (0.3)

Note: This table replicates Table 1 using the raw ATUS weights rather than those adjusted for educational attainment differences between the ATUS and CPS.

Supplemental Material (not copyedited or formatted) for: Mark Aguiar, Mark Bils, Kerwin Kofi Charles, Erik Hurst. 2021. "Leisure Luxuries and the Labor Supply of Young Men." Journal of Political Economy 129(2). DOI: https://doi.org/10.1086/711916.

Figure A2: Distribution of Recreational Computing Time for Young Men



Note: Figure shows kernel density of recreational computing time for younger men conditional on strictly positive time. The share of younger men with strictly positive computing time is 0.23 for the 2004-07 ATUS sample and 0.30 for the 2014-17 ATUS sample.

Supplemental Material (not copyedited or formatted) for: Mark Aguiar, Mark Bils, Kerwin Kofi Charles, Erik Hurst. 2021. "Leisure Luxuries and the Labor Supply of Young Men." Journal of Political Economy 129(2). DOI: https://doi.org/10.1086/711916.

Table A2: Leisure Activities for Men 21-30: Unadjusted ATUS Weights

Activity	2004-2007	2014-2017	Change
Total Leisure	61.0	63.3	2.3 (0.9)
Recreational Computer	3.3	5.9	2.6 (0.4)
Video Game	2.0	3.8	1.8 (0.3)
ESP	24.3	25.9	1.6 (0.6)
TV/Movies/Netflix	17.3	15.6	-1.7 (0.5)
Socializing	7.8	7.7	-0.1 (0.4)
Other Leisure	8.3	8.2	-0.1 (0.4)

Note: This table replicates Table 2 using the raw ATUS weights rather than those adjusted for educational attainment differences between the ATUS and CPS.

Table A3: Leisure Activities for Employed Men 21-30 (Hours per Week)

Activity	2004-2007	2014-2017	Change
Total Leisure	57.6	59.8	2.2 (0.9)
Recreational Computer	3.0	4.9	1.9 (0.3)
Video Games	1.8	3.1	1.2 (0.3)
ESP	23.6	24.7	1.1 (0.6)
TV/Movies/Netflix	15.9	14.5	-1.5 (0.5)
Socializing	7.4	7.8	0.4 (0.4)
Other Leisure	7.7	8.0	0.3 (0.4)

Note: This table replicates Table 3 using the raw ATUS weights rather than those adjusted for educational attainment differences between the ATUS and CPS.

A3 Alternative Engel Curve Specifications

In this appendix, we report estimates from two alternative Engel curve specifications; namely, a log-log specification and a specification that includes a quadratic in log leisure.

The log-log specification is:

$$\ln h_{ikt} = \delta_{it} + \sum_n \alpha_{n,t} D_{k,n} + \beta_i \ln H_{kt} + \varepsilon_{ikt}. \tag{35}$$

This is identical to the benchmark AIDS specification (31), but with the log of time spent on an activity $\ln h_{ikt}$ replacing the share s_{ikt}. The results are reported in Table A5, which

Supplemental Material (not copyedited or formatted) for: Mark Aguiar, Mark Bils, Kerwin Kofi Charles, Erik Hurst. 2021. "Leisure Luxuries and the Labor Supply of Young Men." Journal of Political Economy 129(2). DOI: https://doi.org/10.1086/711916.

Table A4: Computer Leisure and Video Game By Age-Sex Groups

	2004-2007	2014-2017	Change
		Men 21-30	
Total Leisure	61.0	63.3	2.3 (0.9)
Recreational Computer	3.3	5.9	2.6 (0.4)
Video Games	2.0	3.8	1.8 (0.3)
		Men 31-55	
Total Leisure	57.0	57.5	0.5 (0.4)
Recreational Computer	2.1	2.1	-0.03 (0.10)
Video Games	0.9	0.9	0.03 (0.07)
		Women 21-30	
Total Leisure	58.5	59.9	1.4 (0.7)
Recreational Computer	1.5	2.6	1.1 (0.2)
Video Games	0.8	1.3	0.5 (0.1)
		Women 31-55	
Total Leisure	56.1	57.4	1.3 (0.3)
Recreational Computer	1.6	2.0	0.3 (0.1)
Video Games	0.6	0.7	0.13 (0.05)

Note: This table replicates Table 4 using the raw ATUS weights rather than those adjusted for educational attainment.

Supplemental Material (not copyedited or formatted) for: Mark Aguiar, Mark Bils, Kerwin Kofi Charles, Erik Hurst. 2021. "Leisure Luxuries and the Labor Supply of Young Men." Journal of Political Economy 129(2). DOI: https://doi.org/10.1086/711916.

has the same structure as Table 5. Comparing the two tables reveals that the alternative specifications yield nearly identical elasticities.

Table A5: Leisure Engel Curves of Younger Men: Log-Log Specification

	(1)	(2)	(3)	(4)
Recreational Computer	2.42	2.40	2.44	1.42
	(0.35)	(0.35)	(0.39)	(0.43)
Video Games	2.95	2.85	2.74	1.94
	(0.50)	(0.50)	(0.55)	(0.57)
TV/Movies/Netflix	1.21	1.10	1.13	1.18
	(0.13)	(0.12)	(0.13)	(0.17)
Socializing	0.49	0.52	0.44	0.77
	(0.27)	(0.27)	(0.30)	(0.31)
ESP	0.76	0.77	0.76	0.88
	(0.13)	(0.13)	(0.14)	(0.18)
Other Leisure	1.01	1.13	1.21	1.12
	(0.23)	(0.22)	(0.21)	(0.26)
Fixed Effects:				
Time Period	✓	✓	✓	✓
Education		✓	✓	✓
Geographic			✓	✓
Industry				✓

Note: Estimated $\hat{\beta}_i$ using the log-log specification (35). Otherwise, the specification is the same as the benchmark AIDS specification (31). An observation is a time-gender-age-education-industry-state group cell. Bootstrapped standard errors are in parentheses.

Table A6 replicates the estimates of Table 6 for the other three demographic groups with the log-log specification. Again, the two alternative specifications track each other closely.

We now explore a specification that includes higher-order terms. Specifically, we estimate the following:

$$\ln h_{ikt} = \delta_{it} + \sum_n \alpha_{n,t} D_{k,n} + \beta_{1i} \ln H_{kt} + (\ln H_{kt} - \mu)^2 + \varepsilon_{ikt}, \tag{36}$$

where $\mu = \frac{1}{KT} \sum_k \sum_t \ln H_{kt}$ is the sample average of log leisure for the respective demographic group. The coefficient β_{1i} captures the linear effect of log leisure on log time spent in activity i. The coefficient β_{2i} captures non-linearities of a cell's log leisure, where the non-linear term includes both changes over time and across cells.

Table A7 reports the estimates of $\{\beta_{1i}, \beta_{2i}\}$ for younger men's time spent on computer and ESP. The specification includes a time fixed effect, and thus corresponds to Column (1)

Supplemental Material (not copyedited or formatted) for: Mark Aguiar, Mark Bils, Kerwin Kofi Charles, Erik Hurst. 2021. "Leisure Luxuries and the Labor Supply of Young Men." Journal of Political Economy 129(2). DOI: https://doi.org/10.1086/711916.

Table A6: Engel Curve Estimates by Demographic Group: Log-Log Specification

	Men 31-55	Women 21-30	Women 31-55
Recreational Computer	1.39	1.57	1.53
	(0.17)	(0.39)	(0.15)
ESP	0.59	0.65	0.64
	(0.04)	(0.09)	(0.04)

Note: Specification is that of Table A5 Column 1. Bootstrapped standard errors are in parentheses.

of the linear specifications in Tables 5 and A5.

The linear term is again very close to both the benchmark AIDS elasticity as well as the elasticity from the log-log specification. The quadratic terms imply that time spent on computing is (locally) convex in log leisure, while that on ESP is concave. However, the standard errors are large relative to the size of the coefficients.

Table A7: Leisure Engel Curves of Younger Men: Quadratic Specification

	Linear Term (β_{1i})	Quadratic Term (β_{1i})
Recreational Computer	2.39	1.01
	(0.34)	(1.55)
ESP	0.78	-0.83
	(0.12)	(0.73)

Note: Estimated β_{1i} and β_{2i} using the quadratic specification of (36) with time fixed effects. An observation is a time-gender-age-education-industry-state group cell. Bootstrapped standard errors are in parentheses.

To address whether the non-linear terms affect our estimate of technological improvement, we consider the following. Express log of time spent at activity i, up to a second-order approximation, as:

$$\ln h_{it} = (\eta_i - 1)\ln\theta_{it} + \beta_{1i}\ln H_t + \beta_{2i}\ln(H_t - \mu)^2 + \varepsilon_{it}.$$

Letting I represent the activity of interest (computing) and j the reference activity (ESP), the same "double-differencing" procedure used in the benchmark analysis (and assuming

$\Delta \ln \theta_j = 0$) yields:

$$(\eta_I - 1)\Delta \ln \theta_{It} = \left(\Delta \ln h_{It} - \frac{\beta_{1I}}{\beta_{1j}} \Delta \ln h_{jt}\right) - \left(\beta_{2I} - \frac{\beta_{1I}}{\beta_{1j}}\beta_{2j}\right) \Delta \ln(H_t - \mu)^2.$$

The first (linear) term takes the same form as the benchmark (33). The second term captures the role of non-linearities that potentially were mis-attributed to technology in the benchmark specification due to specification error. The non-linear calculation potentially differs from the benchmark if the estimated linear elasticities (β_{1i}) differ once we include higher-order terms, or if the non-linear terms are non-zero. However, as shown above, the linear terms are nearly identical to the benchmark. In particular, the linear effect is 0.393, compared to the benchmark's 0.383. The term $\Delta \ln(H_t - \mu)^2 = 0.003$ and $\frac{\beta_{1I}}{\beta_{1j}}\beta_{2j} = 3.55$. Thus, the non-linear term reduces the implied technological growth by 0.012. The total implied change is 0.380, with a standard error of 0.16, almost identical to the benchmark estimate. Thus, non-linearities in the leisure Engel curve do not seem to affect the measured change in leisure technology for younger men.