



# Towards a Framework for Time Use, Welfare and Household-centric Economic Measurement

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# Why We need a New Measure



- Rapid changes in consumer behavior as measured in time use
  - Is not seen in GDP or PCE growth
- Consumers face zero marginal prices for many Internet products
  - Because their marginal cost of reproduction has fallen to zero
- With two-way mass communication, boundary between paid work and household work has become porous
- Widely viewed disconnect between welfare and GDP

# Can Studying Time Use Place a Money Metric on Welfare?



- If GDP doesn't measure welfare, what can economists and national statisticians do?
- Can we measure true economic progress with a *money metric*?
  - Can we answer quantitatively: is an economy performing well for its participants?
- We argue that perhaps we can only answer this by incorporating time use
- Time is:
  - Fundamental to all human experience
  - A required input to all consumption activity
  - The costly input when consumption goods have zero marginal price
  - Divided into paid work, household production, and leisure



What shall I buy  
today?

What shall I do  
today?



“The real price of every thing, what every thing really costs to the man who wants to acquire it, is the toil and trouble of acquiring it.” Adam Smith

# Time

vs

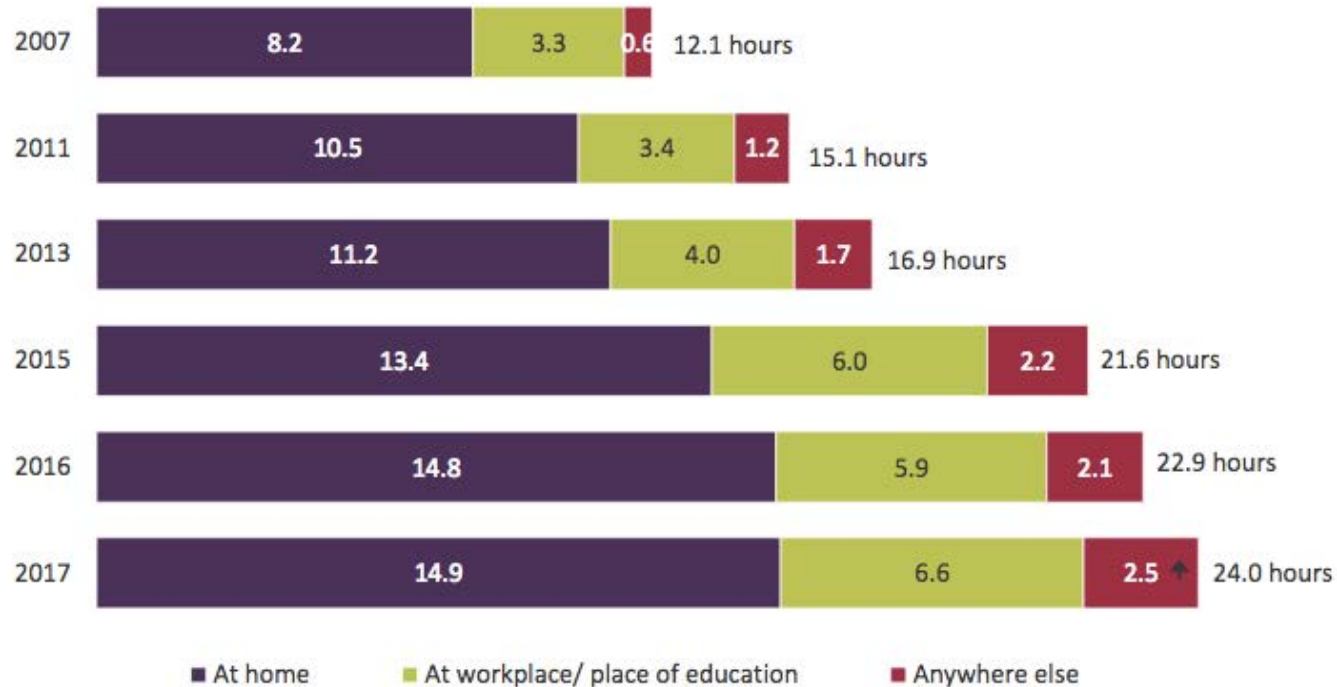
# Money



- All face same budget constraint
- Save more, more to spend
- Unequal budget constraints
- Save more, less to spend

But they are inter-related: spend time to earn more money, spend money to gain more time

# The Internet ate my home work: Adult hours online in UK



Source: Ofcom Adults' Media Literacy Tracker 2017

IN5A-C. How many hours in a typical week would you say you spend online at home /at your workplace or place of education/ anywhere else? (unprompted responses, single coded)

Base: All adults aged 16+ who go online (1553 in 2016, 1570 in 2017)

Arrows show significant changes (95% level) between 2016 and 2017

# Activities move across boundaries



	Paid Work	Home Production	Leisure
Routine	Teller	Driving	Jogging
Non-routine	Travel Agent	Caring Cooking	Creativity: taking photos and videos

The diagram illustrates the movement of activities across four boundaries: Routine vs. Non-routine, Paid Work vs. Home Production, and Home Production vs. Leisure. Orange arrows indicate movement from Routine to Non-routine, and from Paid Work to Home Production. Blue arrows indicate movement from Home Production to Paid Work, and from Home Production to Leisure.

# Life cycle issues: time can be scarcest commodity



- Young educated households
  - Work long hours developing their careers
  - Spend quality time with kids
  - Scrimp to afford a house in a good school district
  - Commute long hours
  - Don't sleep much
  - Often report unhappiness
- Shows the limits to intertemporal time trade



# GDP ignores unpaid time inputs



- The welfare benefit under GDP is basically personal consumption expenditures as seen in transactions
  - Conceived as  $U(C)$ , where  $C$  is a long vector of purchased goods and services
  - Home production mainly outside the boundary of GDP
  - While this takes place in time, time is usually not incorporated as an input
  - Nor does GDP ask how consumers feel while they consume or work

# Expanding consumption to utility



- Work on time use has taken broadly two directions:
  - Household economics, with a shadow value of time, as proposed initially by Becker
  - Well-being studies based on self-reports
    - For example, time use surveys that ask how participants feel in given activities
- In household production (Becker, 1967)
  - Count unpaid household work as labor
  - Leisure time is consumption time
  - Opportunity cost is the wage (in simplest version)
  - If all time is measured by the wage, full income is  $wT$ 
    - Where  $T$  is time at paid work+ unpaid work + leisure

# Survey measures of well-being and value



- More recently, economists have been looking to surveys to understand well-being
- Time use surveys increasingly include feelings while engaged in activities (stated feelings)
  - Direct reports of well-being
- Economists are also asking how feelings or activities can be placed on a money metric (stated preferences)

# Lots of recent studies on time use and/or broader wellbeing measures



- Diewert & Fox 2018
- Alpman et al 2018
- Cassar & Meier, and Kaplan & Schulhofer-Wohl, JEcPerspectives 2018
- Hulten & Nakamura 2018
- Jones & Klenow, AER 2016
- Dotsey et al, Int Economic Review 2014
- Gershuny & Fisher 2014
- Benjamin et al, AER, 2012, 2014
- Deaton, 2018
- Bridgman, 2016
- Maestas et al, 2018
- Aguiar and Hurst, Handbook of Macro, 2016
- +
- Goolsbee & Klenow, AER 2009
- Krueger et al, 2009
- Brynjolfsson et al 2018a, b
- Coyle, Economica 2018
- Coyle & Rogers in progress

# Shadow value of time



- First approximation: wage rate
- But work may be pleasant or unpleasant
  - Enjoyment means there is a consumption value to work, which raises the shadow value of time relative to the wage
- And work may involve learning
  - Learning by doing further raises the shadow value of time
- And work may be meaningful
  - Studies show that people will accept lower wages to do work they consider meaningful
- Can we find the shadow value of time by asking people?
  - E.g., what wage would you have to be paid to shelve books at a library?
  - Or, what would you pay to have a shorter commute?

# Three ways to estimate shadow value of time



- “Revealed” preference: how much will someone spend to save time?
  - Trade-off between commute and rent may be captured in measured rent gradients
- “Stated” preference: how much would you pay to have a shorter commute?
- “Stated Feelings” : how do you feel as you commute (direct report on welfare)
  - Miserable commute raises the shadow cost of commute relative to value of time



# Many, many questions

- Can we reconcile the answers we get from these different approaches?
  - Can econometric encompassing techniques help us out?
- How will these money-metric utility measures align with real consumption measures?
- We need time use data with stated feelings (discontinued in US)
- We need more surveys—both private and official.

# Summary



- Without a credible measure of aggregate welfare, economists' ability to make macro policy recommendations will be increasingly attenuated.
- To recapture welfare in the age of digitalization, we need shadow prices, particularly of time.
- We are a long ways from a complete new picture, but a tremendous amount of research has been launched.
- Coordinating this research, and maintaining it statistically over time so that we can make time series, is the big task ahead.



# Thanks!



- This is very much work in progress
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