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

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*The views expressed today are my own and not necessarily those of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.*
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

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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

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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 | • Unequal budget constraints |
| • Save more, more to spend | • 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       | Creativity: taking photos and videos |
|         |            |                 |                  |

- Teller
- Driving
- Jogging
- Cooking
- Taking photos and videos
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 an 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?

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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
• Email us with comments
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