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February 7th, 2025

Using people's feelings to value time

People hate wasting time commuting. But translating that into a monetary value to help government policy isn't that straightforward. Christian Krekel, George MacKerron and Iven Stead present a new method to put a value on people's time by sampling people's feelings throughout the day.

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The average road user loses about 115 hours per year to congestion in the **UK**, and about 100 hours in the **US**. This suggests a huge potential for investments in time-saving transport infrastructure such as high-speed rail, highways, or digital services to optimise scheduling. But how should government analysts value time and potential time savings, key inputs into the cost-benefit analysis of such investments?



Today, most studies either directly ask people how much they would be willing to pay for, say, a reduction in travel time due to a new road, or they infer people's willingness-to-pay from observing their behaviour.



Time is money

The question of how to value time is a cornerstone of economics and goes back a long way, to seminal work by **Gary Becker**, who argued that leisure – including commuting outside of working hours – should be valued at the wage rate, which is its opportunity cost. Today, most studies either directly ask people how much they would be willing to pay for, say, a reduction in travel time due to a new road (so-called *stated preferences*, or they infer people's willingness-to-pay from observing their behaviour (so-called *revealed preferences*).

In the UK, the Department for Transport (DfT) bases its value of time on a large stated-preference *survey* of over 11,000 individuals and businesses carried out in 2014. This elicited willingness-to-pay for travel time savings using a discrete choice experiment, covering a range of modes and journey purposes. Alongside this, a revealed-preference analysis of choice of train operators was carried out, which corroborated the results of the stated-preference analysis.



Revealed preferences assume that people act fully rationally and with perfect foresight, for example when taking a faster road and paying a toll, though evidence suggests otherwise .



But these approaches are not without problems. Stated preference studies often present people with purely hypothetical choices. For example how much they would be willing to pay for a ten-minute reduction in commuting time due to a hypothetical new road near their home, and the framing of options may influence valuations. Revealed preferences assume that people act fully rationally and with perfect foresight, for example when taking a faster road and paying a toll, though *evidence* suggests otherwise . Importantly, what constitutes a particular use of someone's time is entirely subjective, and context is key. For example, time spent commuting with a loved one may be experienced differently than time spent commuting alone, or it may not be perceived as commuting at all.

A new method to value time

In a new paper, Christian Krekel and George MacKerron propose a *new method to value time*. It is based on an app ("Mappiness") that samples people's feelings in real-time as they go about their daily lives. In particular, we asked a panel of 30,928 residents UK-wide during the years 2010 to

2016 (about 2,234,753 observations) at random moments (i) how happy they felt, (ii) where they were, (iii) whom they were with, and (vi) what they had just been doing.



When commuting, and even more so when subject to congestion or delays, women and low-income households suffer more.



We use these panel data to estimate the value of time (VOT) during commuting. Our method has three steps:

1. We estimate the effect of reporting the activity “commuting” on respondents’ happiness.
2. We calculate the marginal rate of substitution between that activity and income, to obtain the income equivalent of commuting – that is, how big a reduction in income would be needed to reduce happiness by the same amount as commuting does standardising the duration to one hour.
3. We calculate the (time-use) weighted average income equivalent of all the other activities people can report, as a counterfactual. We then obtain the VOT for commuting by subtracting from the income equivalent of commuting this counterfactual.

Table 1 shows our results.

Notes: The VOT for ‘commuting’ is the monetary value (in GBP) of spending one hour commuting as opposed to doing something else. Sources: Mappiness data, 2010 to 2016, own calculations.

We arrive at a VOT of about 12 GBP per hour of commuting, and as much as 24 GBP per hour of commuting when stuck in traffic. The negative sign suggests that commuting is a disbenefit to people. In other words, there is an opportunity cost to commuting and individuals would be better off doing something else. These values can now inform government transport appraisals.

For example: imagine adding another lane to a short stretch of motorway costs GBP 1,000,000. If adding that lane saves 1,000 people 15 minutes of congestion every working day, the net benefits in the first year are $(1,000 \text{ people} * 250 \text{ days} * 0.25 \text{ hours} * 24 \text{ GBP}) - 1,000,000 \text{ GBP} = 500,000 \text{ GBP}$.

As Table 1 shows, there is substantial heterogeneity, in particular by gender and household income. When commuting, and even more so when subject to congestion or delays, women and low-income households suffer more. When it comes to time of day or day of week, there are more disbenefits from commuting and from congestion on evenings and on weekends.



Our method is particularly suited to the monetary valuation of public goods and services for which no market prices exist, or which are too granular to be captured by overall life satisfaction data



Our values are fairly close to those found in official DfT appraisal guidance: the UK values commuting time at -15.3 GBP, compared to -9.6 GBP in the **Netherlands** and between -9.3 GBP and -15.5 GBP in **Sweden**. Using our new method, we arrive at a value of commuting of, on average, -11.8 GBP (and -24.2 GBP when congested).

Our method is particularly suited to the monetary valuation of public goods and services for which no market prices exist, or which are too granular to be captured by overall life satisfaction data (or **WELLBYS**, as adopted by HM Treasury in the UK), such as infrequent time spent in various activities (e.g. sports or cultural activities, informal care, or volunteering) or places (e.g. cultural or historical sites, or nature), but that are nevertheless of policy interest. It will enable statistical agencies such as the Office for National Statistics (ONS) in the UK to paint a more complete picture of social value in national accounts. Importantly, it is relatively easy to implement, allowing for a uniform methodology to calculate the VOT for most activities, reflecting the richness of people's lives.

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Iven Stead is an economist at the UK Department for Transport (DfT), working on the development of the Department's appraisal guidance and external and academic engagement, with a focus on transport, the economy and wellbeing. He has worked at the DfT for ten years in total; before that he worked at the Department of Energy and Climate Change and the UK Office for National Statistics. He has also worked for Jacobs."



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