ESCoE Programmes of Research (Part 2)
15:20 – 16:30

4. Subnational Statistics

5. Productivity, Innovation and Business Dynamics

6. Labour Markets and Households

7. Time-Use Survey

Subnational Statistics

Nowcasting sub-national income distributions

- **Research context:**
  - Despite significant progress in measuring regional output at a higher frequency, and on a timelier basis, our insights on regional incomes are significantly less timely;
  - Sub-national policymakers, including those tasked with statutory duties to forecast sub-national incomes, are reliant upon less timely data on regional incomes;
    - Where more timely estimates are available these are often only partial income, and only 'point estimates' of the income distribution such as the average.
  - Policymakers wishing to answer questions about how incomes are evolving in their area (e.g., during sudden shocks like the *pandemic* or the *financial crisis*) or about the policy impacts on *inequality* (e.g. as part of policy agendas around *regional inequality*, or to determine which percentiles of the earnings distribution will be most affected by a policy intervention) do not currently have timely data.

Nowcasting sub-national income distributions

- **Research question:**
  - Can we use econometric modelling methods to produce more timely estimates of incomes and the income distribution for the UK, its regions and nations?

- **Methods:**
  - In nowcasting sub-national output growth in the UK we made use of mixed-frequency vector autoregression (*MF-VAR*) models, in this work we will extend these to functional *MF-VARs* to enable us to incorporate information from microdata on the income distribution alongside aggregate economic indicators;
    - These models need a long-time series of data, which informs data choice.
  - We will utilise more timely macroeconomic data alongside detailed microdata (Family Expenditure Survey (1969 to 2001); Expenditure and Food Survey (2001 – 2008), and Living Costs and Food Survey (2008 to present)).

Nowcasting sub-national income distributions

- **Outputs:**
  - Our focus is developing a model (which will be shared with ONS) to produce more timely estimates of the income distribution;
    - We'll start with a model for the UK as a whole, before moving to develop a model at a sub-national level.
  - We will also produce a time series of data on sub-national income distributions back to the start of our sample which will be made available to others (researchers, policymakers etc);
  - Significant scope to use these data to answer key policy questions.
- **Key timelines:**
  - Apr 2023 – Dec 2023: Development of UK model, estimation and testing of the model;
  - Jan 2024 – Sept 24: Extension to incorporate regional income distributions, estimation and testing;
  - Oct 2024 – Mar 2025: developing code packages and resources to support ONS colleagues to adopt the regional model.

Further Activity

- **Significant subnational elements to other projects – and more will be explored**
  - Nowcasting
  - Small area work
  - Third Sector

- **Through other funding, work from ESCoE 1.0 is continuing to be developed and is having an impact:**
  - Sub-national indicators – Economic Data Innovation Fund
  - Regional Trade – Centre for Inclusive Trade Policy

Since Bloom and Van Reenen (2007) we know **better managed firms excel**, have been **more agile** and **more resilient** in Covid-19 (ONS, 2018; 2021), Brynjolfsson et al (2021) and Bai et al (2021), and also are **superior forecasters** (Bloom et al. 2021).

Use Covid-19 experience to learn about productivity and supply chains, remote working and use of potential and intangible capitals.

Exploit new data sources from ONS and other sources to explore effects of management and uses of new forms of labour and capital e.g. MES, BICS, BERD, E-commerce survey, APS, UKIS, ASHE, Decision Maker Panel, SWAA-UK

Improve measurement of TFP and its relationship to the definition of intangibles and potential capital, entry and exit of firms.

Important Issues

- **Productivity** has stagnated since the Financial Crisis, but not uniformly.
  - How might management practices have exacerbated productivity differences during and after Covid-19?

- **Innovation** is increasingly driven by intangible investment.
  - How do we measure intangible investment? How is it linked to technology innovation?

- **Business dynamism** is declining and market power is rising.
  - How can we measure and what are the drivers? What are the implications for policy?

First Steps and Deliverables – next 2 years

Productivity

- Performance-management relationship and 'super-forecasting' ability; methodological innovations in TFP estimation using this data.
- Explore firms' use of remote labour and potential capital.
- Resilience and response to shocks: supply-chain and demand uncertainty.
- Measure intangible capital to improve TFP measurement.
- Persistence of COVID changes e.g. remote work, use of potential capital.

Applications

- Inform 'Help To Grow (HtG): Management' interventions.
- ONS development of capital assets data. Bank of England understand productivity trends. HMG model congestion and net zero effects.

First Steps and Deliverables – next 2 years

Innovation

- Evaluate the possibility for proxying investment in intangibles and firm capabilities using novel open data sources.
- Sectoral concentration measures using a new methodology based on a bottom-up industrial taxonomy.
- Indices of technology adoption and related intangibles capabilities at the sectoral and geographical levels to characterise the competitive strengths of local economies.

Applications

- Metrics to inform BEIS, Cabinet Office, DLUHC in the development of growth and levelling up policy.

First Steps and Deliverables – next 2 years

Business Dynamism
- Document the state of business dynamism in the UK.
- Combine Companies House, FAME, Insolvency Service and Annual Business Survey data to link business dynamism and productivity.

Applications
- New business data sets. Shared code.
- Documented look up tables for wider use.
- Contributions to international comparisons work.
- New understanding of relationships between entry, exit and productivity.

Further Ideas

What other things would we like to do?

- Productivity
  - Work more closely with "Help to Grow: Management".
  - Use insights to improve ONS capital and regional data provision.

- Innovation
  - Explore with GitHub how we might measure the economic value of open-source software development (using construction cost models of software) in the UK.

- Business Dynamism
  - Using business dynamism measures to inform competition policy.
  - Develop models to evaluate industrial/growth policy and productivity implications.

Q&A

Labour Markets and Households

- Objectives: To address gaps in the provision of Labour Market Information (LMI) in the UK using admin, survey and web-based data

- Strand 1: Labour Accounts

- Strand 2: Career Pathways

- Strand 3: Measuring Employer Power

- Potential beneficiaries: ONS, DfE, DLUHC, BEIS, Cabinet Office and GEO.

1. Labour Accounts

- SNA guidance: four quadrants – jobs, people, volumes, payments
- Challenges include the measurement of hours and self-employed income
- Time Use Survey providing new information on the intensity of labour input

- Led by Mary O'Mahony (KCL) and a PhD student

- D1.1 Paper: A survey of concepts, measurement and available data.
- D1.2 Paper: The operation of labour markets in the UK: evidence from labour accounts.
- D1.3 Paper: Work intensity: evidence from the Time Use Survey.

2. Career Pathways

- No easily accessible information on job/occupational transitions

- Aim to use longitudinal data (e.g. ASHE) and commercial data (e.g. job adverts) to map transitions (actual and feasible)

- Opportunities to track structural changes and identify barriers to progression

- Led by Cath Sleeman and colleagues (NESTA)

- D2.1 Paper covering methodology and mapping theoretical and realised career pathways.

- D2.2 Data visualisation

3. Measuring Employer Power (monopsony)

- Existing studies using different measures and data sources; different trajectories
- Review different approaches to measurement, and develop measures of employer power by industry, occupation, local area (using ASHE, BSD, APS, RTI)
- Can contribute to policy on levelling up, low pay and fair treatment

- Led by John Forth (City), Alex Bryson (UCL) and Hedvig Horvath (UCL)

- D3.1 Paper: Methodological paper on concepts and measures of monopsony power.
- D3.2 Paper: Research paper on the role of monopsony power in explaining wage inequality and wage changes.

Timetable

	Year 1				Year 2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Labour accounts								
D1.1 Survey of concepts & measurement			▓	▓	▓	▓		
D1.2 Paper: Operation of labour markets				▓	▓	▓	▓	
D1.3 Paper: Work intensity					▓	▓		▓
Career pathways								
D2.1 Paper: Methodology and mapping	▓	▓	▓	▓	▓			
D2.2 Data visualisation					▓	▓		▓
Employer concentration								
D3.1 Methods paper			▓	▓	▓			
D3.2 Research paper					▓	▓	▓	▓

Beyond the first two years (tentative)

- Transitions out of work due to age/caring responsibilities using survey data

- Inclusivity of labour demand using data on job adverts

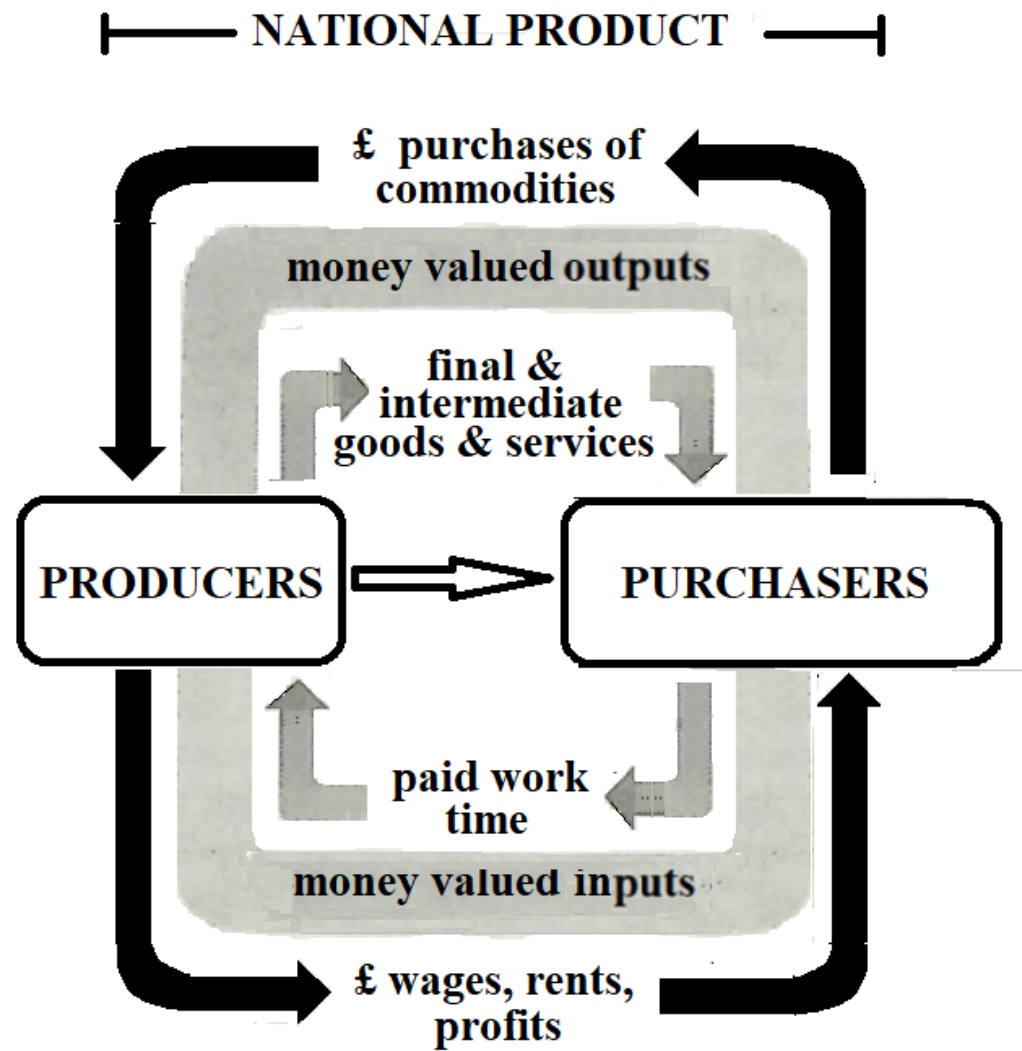- New measures of job quality using employee reviews

The ESCoE time-use programme:

Time-use survey requirements for National Income accounting

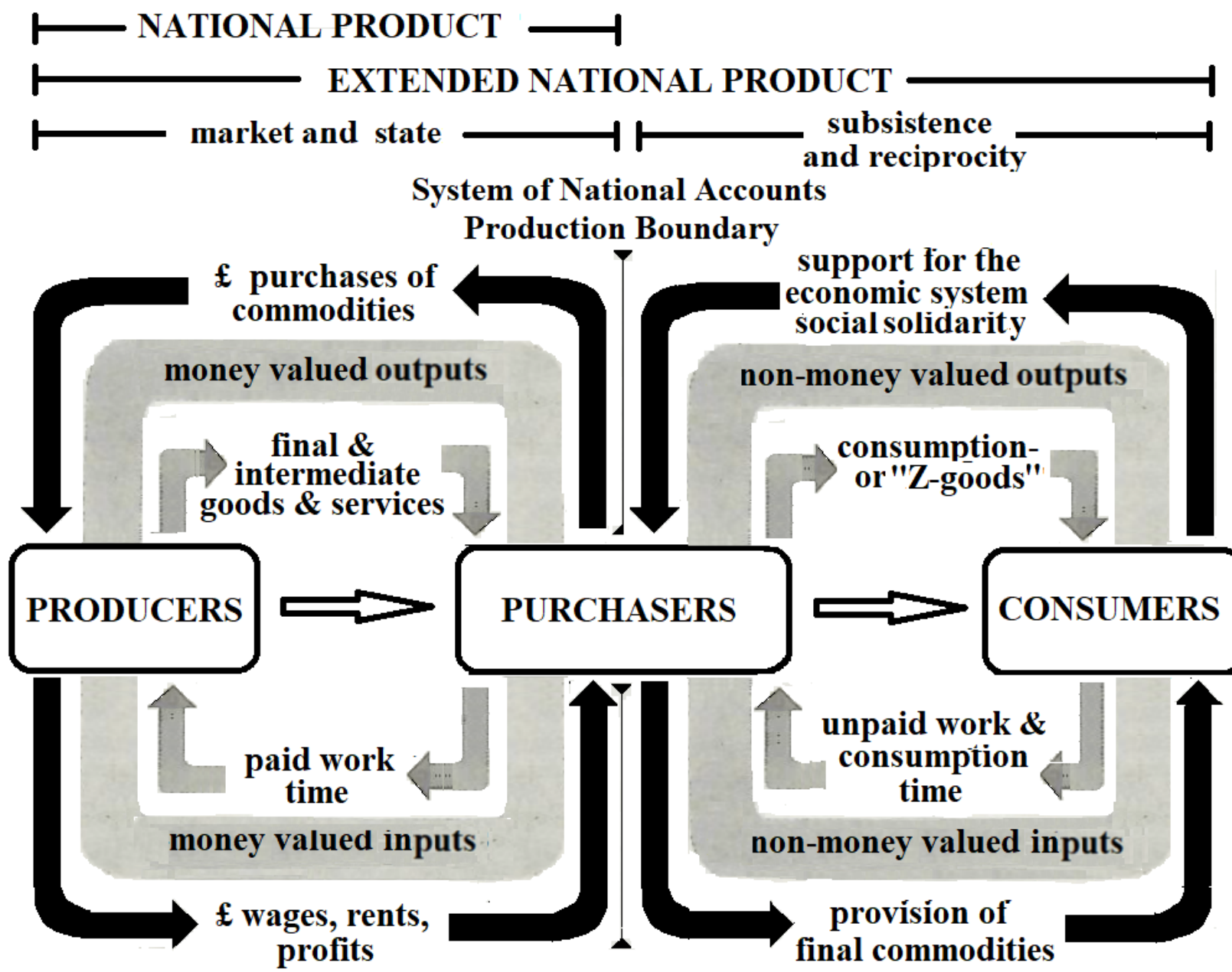## Jonathan Gershuny and Oriel Sullivan

December 2022

inputs and outputs: the circular flow of income

(Compare with Samuelson and Nordhaus 2010, p. 522)

Inputs and outputs: *two* circular flows

Time-use diaries for National Accounting: — Inputs, Outputs *and Outcomes*

General design requirements for time-use diaries

- **Continuous registration** of activities through the diary day
- **Multiple recording fields** (primary, secondary, location, co-presence)
- **Independent timings** for each field

Specific requirements for double entry "eNP" estimations

- "**input** data": from unpaid work time, valued by "shadow wages".
- "**output** data": from consumption episodes, valued by "shadow prices"

Specific requirements for single entry "outcome" valuations

"outcomes": consequences of economic activity *without market equivalents*

- Additional diary fields (eg **instantaneous utility**: Kahneman *et al* 2004).
- Indicators of **health outcomes**: (METs, participation in risky activities).
- **"Footprints"** of daily activity: environmental & resource depletion effects.

Reviewing online time use survey methods

Online diary instruments
- ONS-developed online instrument OTUS
- CTUR-developed online instrument CaDDI
- Other instruments (MOTUS, telephone-only ATUS)

Assessing parallel implementation of OTUS & new CaDDI by NatCen

Comparison of performance
- Response rates, representativeness and accessibility biases
- Costs per diary day
- Response quality (N of episodes, extent of missing data etc.)
- Application-related criteria (national accounting requirements)

Design (and fund) new continuous UK time-use survey programme.
- NOTE: Probable need to combine multiple instruments

A Click-and Drag Diary Instrument (CaDDI)
--main activity field, part-completed.

The (original) CaDDI Instrument-completed (Sullivan et al 2021)
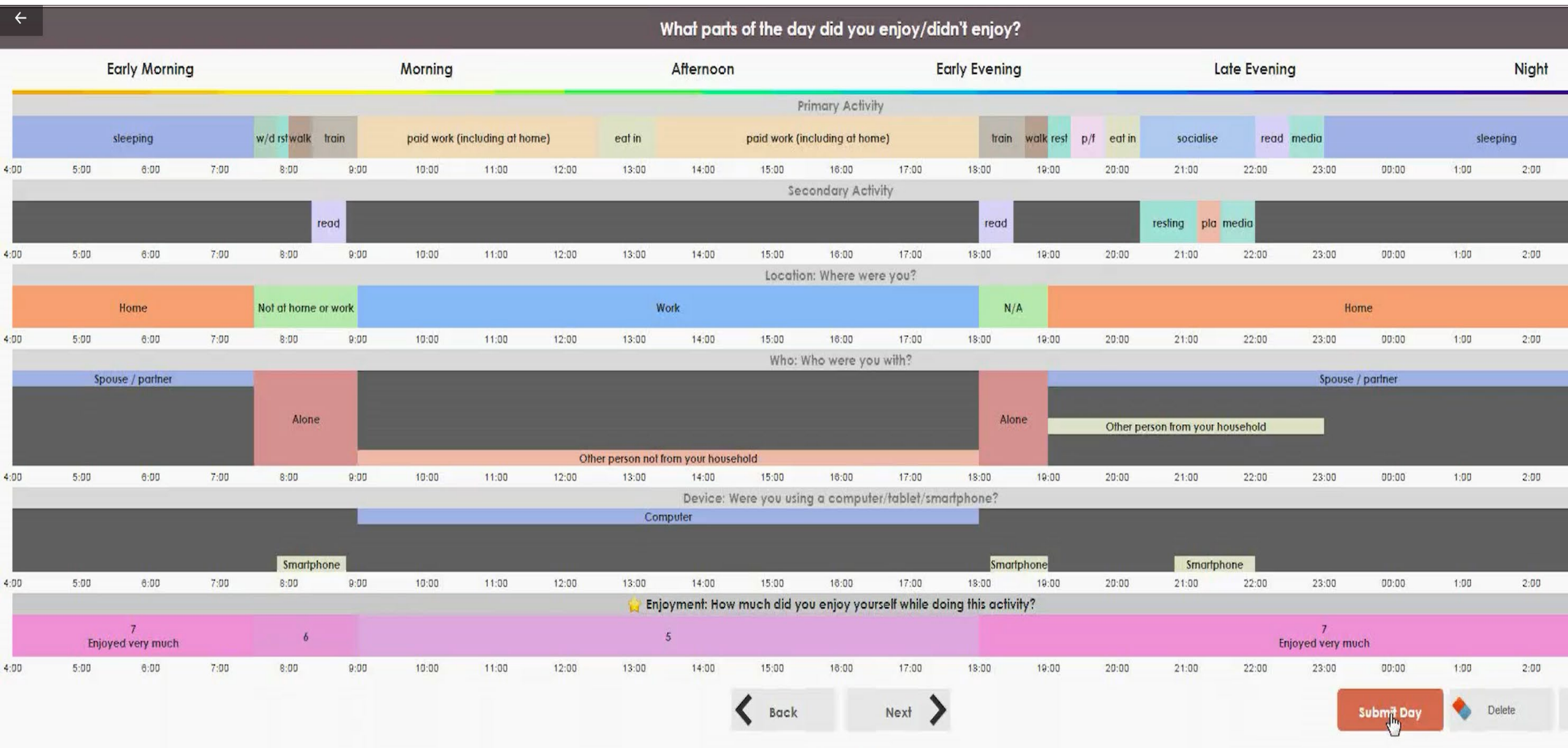
Using time-use surveys to estimate extended Inputs and Outputs

First steps to construct the basic National Accounting time budget:

- **divide all the activities of the population's day across 2 dimensions:**
  - first by the **economic status of the activity** (columns)
    - **paid work** time
    - **unpaid work** time
    - **consumption** time

  - second, by the **category of final consumption** *(rows)*
    - The sort of human *"***want***" or "***function***"* to which the activity contributes.

A time budget for national accounts, organised by activity type and service function (CaDDI surveys, UK adults, 6 waves, 2016-21)

Minutes per day Service functions	paid work time	unpaid work & travel time	consumption time	all UK time	Imported work time
household services (sleep. shelter)		37	614		
eating and drinking in private		73	78		
child care		22			
voluntary & personal care services		20	1		
leisure activities private spaces		33	317		
physical exercise in public spaces			33		
leisure out (eating, cinema etc)			10		
High-end services (educn., medicine)			16		
Govt. services (law, roads, sewers)					
exported work time					
totals	185	193	1062	1440	

Assigning UK household weekly expenditure (HES 2018) and Government final weekly expenditure per household

£ per week per household Service functions	consumed as purchased	input to further production	Total weekly spending	% of UK final spending
household services (sleep. shelter)	£6	£29	£35	5%
eating and drinking in private	£6	£102	£108	16%
child care	£6	£29	£35	5%
voluntary & personal care services	£6	£29	£35	5%
leisure activities private spaces	£16	£37	£53	8%
physical exercise in public spaces	£26	£42	£68	10%
leisure out (eating, cinema etc)	£66	£52	£118	17%
High-end services (educn., medicine)	£45	£16	£61	9%
Govt. services (law, roads, sewers)	£38	£32	£70	10%
exported work time			(£103)	(15%)
totals	£215	£368	£686	100%
	37%	63%		

A time budget for national accounts, organised by activity type and service function *(CaDDI surveys, UK adults, 6 waves, 2016-21)*

Minutes per day Service functions	paid work time	unpaid work & travel time	consumption time	all UK time	Imported work time
household services (sleep. shelter)		37	614		
eating and drinking in private		73	78		
child care		22			
voluntary & personal care services		20	1		
leisure activities private spaces		33	317		
physical exercise in public spaces			33		
leisure out (eating, cinema etc)			10		
High-end services (educn., medicine)			16		
Govt. services (law, roads, sewers)					
exported work time					
totals	**185**	**193**	**1062**	**1440**	

A time budget for national accounts, organised by activity type and service function (CaDDI surveys UK adults, 6 waves, 2016-21)

(Paid work time distributed to service functions by % of money expenditure)

Minutes per day Service functions	paid work time	unpaid work & travel time	consumption time	all UK time	Imported work time
household services (sleep. shelter)	9	37	614	**660**	19
eating and drinking in private	29	73	78	**179**	5
child care	9	22		**31**	1
voluntary & personal care services	9	20	1	**30**	1
leisure activities private spaces	14	33	317	**365**	10
physical exercise in public spaces	18		33	**51**	2
leisure out (eating, cinema etc)	32		10	**42**	1
High-end services (educn., medicine)	17		16	**33**	1
Govt. services (law, roads, sewers)	19			**19**	1
exported work time	27			**29**	1
totals	**185**	**193**	**1062**	**1440**	**41**

Double-entry extended National Accounts valuation

- **INPUT** method

  eNP(i) = sum (all paid labour time*wage rates)
            PLUS (all unpaid labour time*shadow wage rates)
            MINUS value of intermediate products

- **OUTPUT** method

  eNP(o) = sum (all paid consumption episodes*prices)
            PLUS (all unpaid consumption episodes*shadow prices)

- **Dual entry accounting identity:**

  $$\textbf{eNP(i)} \equiv \textbf{eNP(o)}$$

(Holloway et al., 2002).

Examples of single-entry "outcome" accounts

- **Instantaneous utility:**

  outcome value = sum of **durations** in each diary episode

  * **simultaneous diary enjoyment scores**

  (Kahneman et al 2004 suggest summing above- vs below-median scores)

- **Individual metabolic load (exercise status)**

  outcome value = sum of **durations** in each diary activity

  * **MET value** for activity

  (METs scores from "Ainsworth Compendium", Ainsworth et al 2004)

- **Environmental footprint**

  outcome value = sum of **durations** in each diary activity
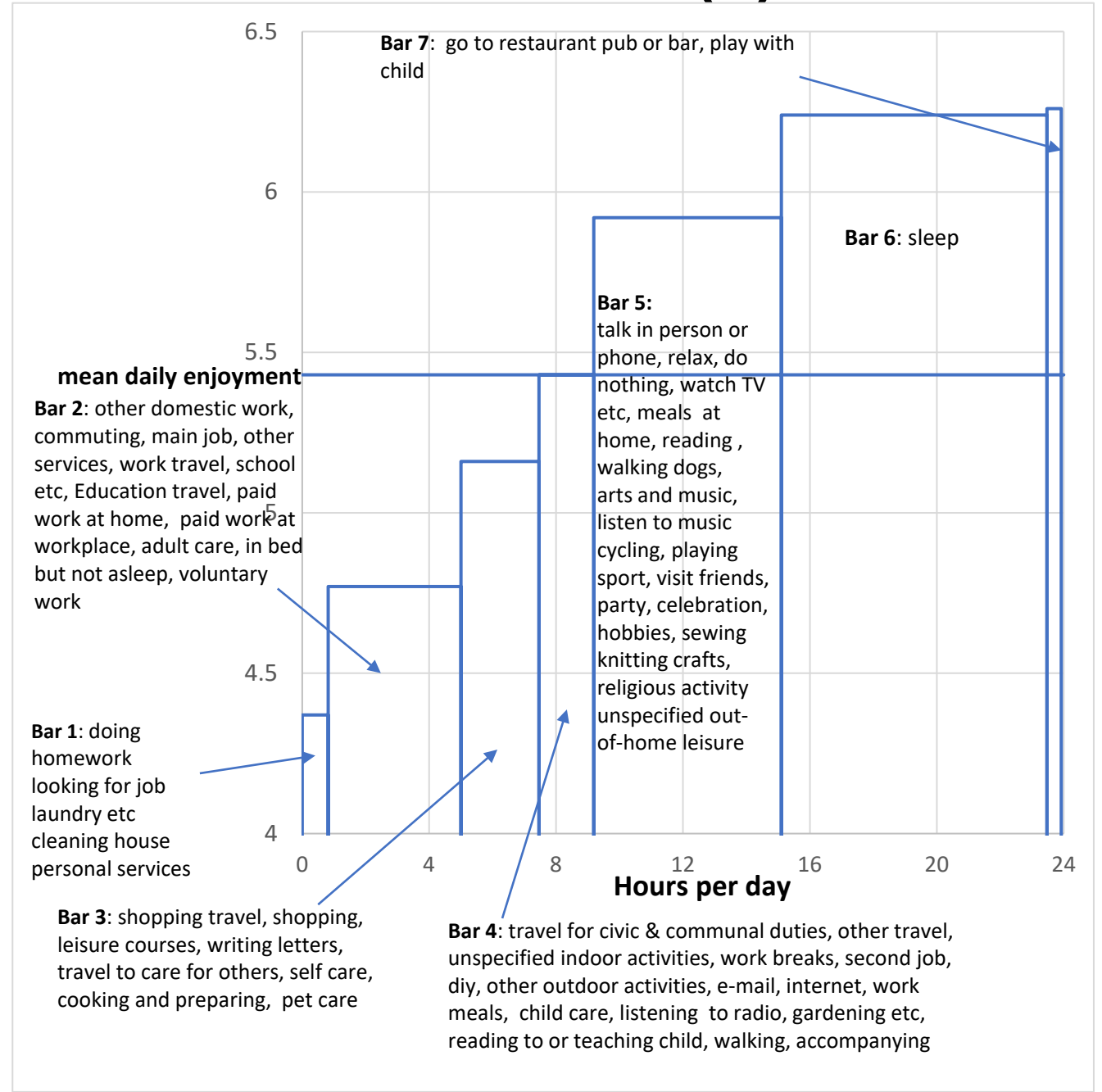
  * **impact value** per minute

Note: no direct market or other money basis for valuing these effects.

Example of single entry "outcome" accounts (1)
(from UK HETUS 2014-15)

Mean Instantaneous Utility
(after Kahneman 2004)

- Sum (duration of each episode
  * diary enjoyment score)
  / 1440

Bar 7: go to restaurant pub or bar, play with child

Bar 6: sleep

Bar 5: talk in person or phone, relax, do nothing, watch TV etc, meals at home, reading , walking dogs, arts and music, listen to music cycling, playing sport, visit friends, party, celebration, hobbies, sewing knitting crafts, religious activity unspecified out-of-home leisure

mean daily enjoyment

Bar 2: other domestic work, commuting, main job, other services, work travel, school etc, Education travel, paid work at home, paid work at workplace, adult care, in bed but not asleep, voluntary work

Bar 1: doing homework looking for job laundry etc cleaning house personal services

Bar 3: shopping travel, shopping, leisure courses, writing letters, travel to care for others, self care, cooking and preparing, pet care

Bar 4: travel for civic & communal duties, other travel, unspecified indoor activities, work breaks, second job, diy, other outdoor activities, e-mail, internet, work meals, child care, listening to radio, gardening etc, reading to or teaching child, walking, accompanying
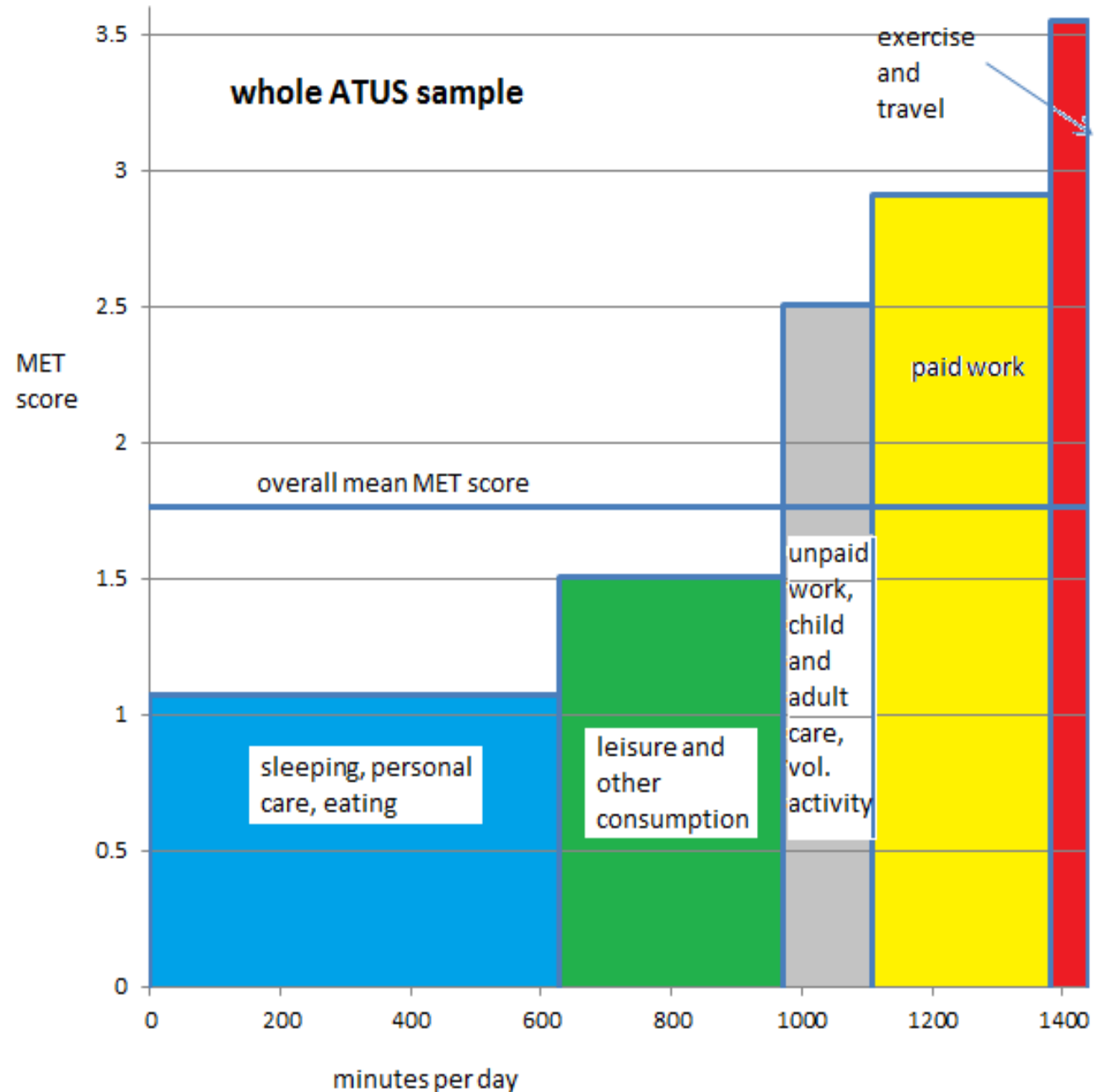
Hours per day

Example of single entry "outcome" accounts (2)
(from American Time Use Study 2015)

Mean **Metabolic Expenditure**
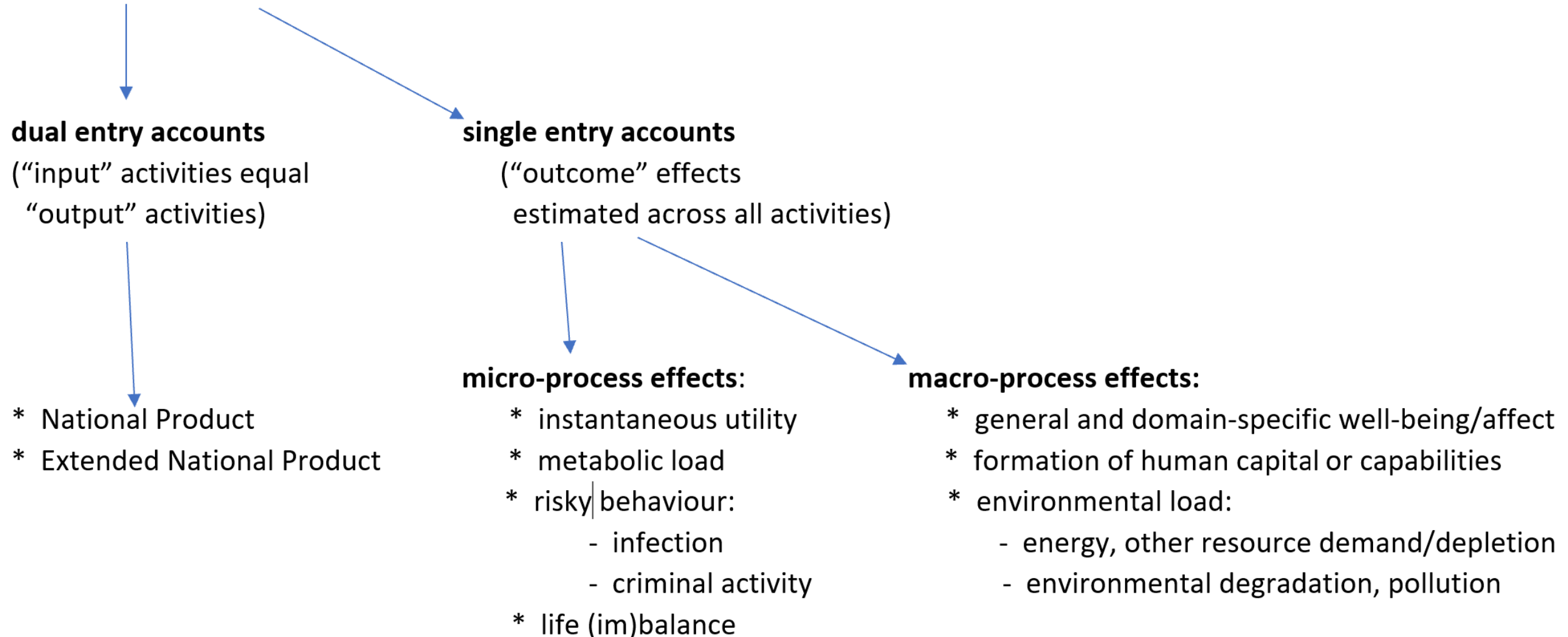
(after Ainsworth 2003)

- Sum (duration all episodes
    * MET score for activity)
      /1440

The Stiglitz-Bean dashboard: multiple social indicators with a common (time-use) baseline

Time-use diary survey evidence

dual entry accounts
("input" activities equal
   "output" activities)

single entry accounts
   ("outcome" effects
   estimated across all activities)

* National Product
* Extended National Product

micro-process effects:
   * instantaneous utility
   * metabolic load
   * risky behaviour:
         - infection
         - criminal activity
   * life (im)balance

macro-process effects:
   * general and domain-specific well-being/affect
   * formation of human capital or capabilities
   * environmental load:
         - energy, other resource demand/depletion
         - environmental degradation, pollution

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