Manifesting the Invisible Economy.

from "MIE: Time Wealth and Wellbeing"

J Gershuny (forthcoming 2025)

"*Economics is the study of how societies use scarce resources to produce valuable goods and services and distribute them among different individuals".*

(Samuelson and Nordhaus (20th ed. p.4)

A large part of all economic activity—I suggest in what follows, more than half—is invisible and unrecognised within conventional economic statistics. Economists mostly deal with wages for labour and the use of capital assets, and the prices of the resulting commodities. But most of the work is not paid labour, domestic capital in private households provides no monetary returns, and much, perhaps most of all final output is consumed without being directly paid for. Wages and prices can be tracked and measured by money payments—but the other half-or-more of economic activity is invisible in monetary terms. Ignoring the invisible product, impairs our understanding of how goods and services are distributed across societies.

However, both sots of production are readily observable in terms of populations' time-use. Both paid-for and unpaid labour can be seen clearly, and ***measured*** using the time-diary method, while all acts of consumption—whether of purchased services or home products—show up in the same diaries. And as a bonus, since paid work ***plus*** unpaid work ***plus*** consumption literally exhaust every daily record of time use, statistics based on time potentially provide ***complete economic accounts***.

In brief…

…there are two fundamentally different sorts of National Accounts:

1. "Dual entry" accounts document how the different sorts of work (production) across the society balance the different sorts of consumption. They are described as "dual" because of the identity fundamental to their constitution: ***the value of production is identical to the value of consumption***.
2. "Single-entry" accounts concern the ways that each of the various things that members of the society do—both ***work and consumption—have*** **consequences, *individual*** (for health, subjective wellbeing and life satisfactions) and ***collective*** (justice and fairness, sustainability of styles of life, environmental protection, respect for other species).

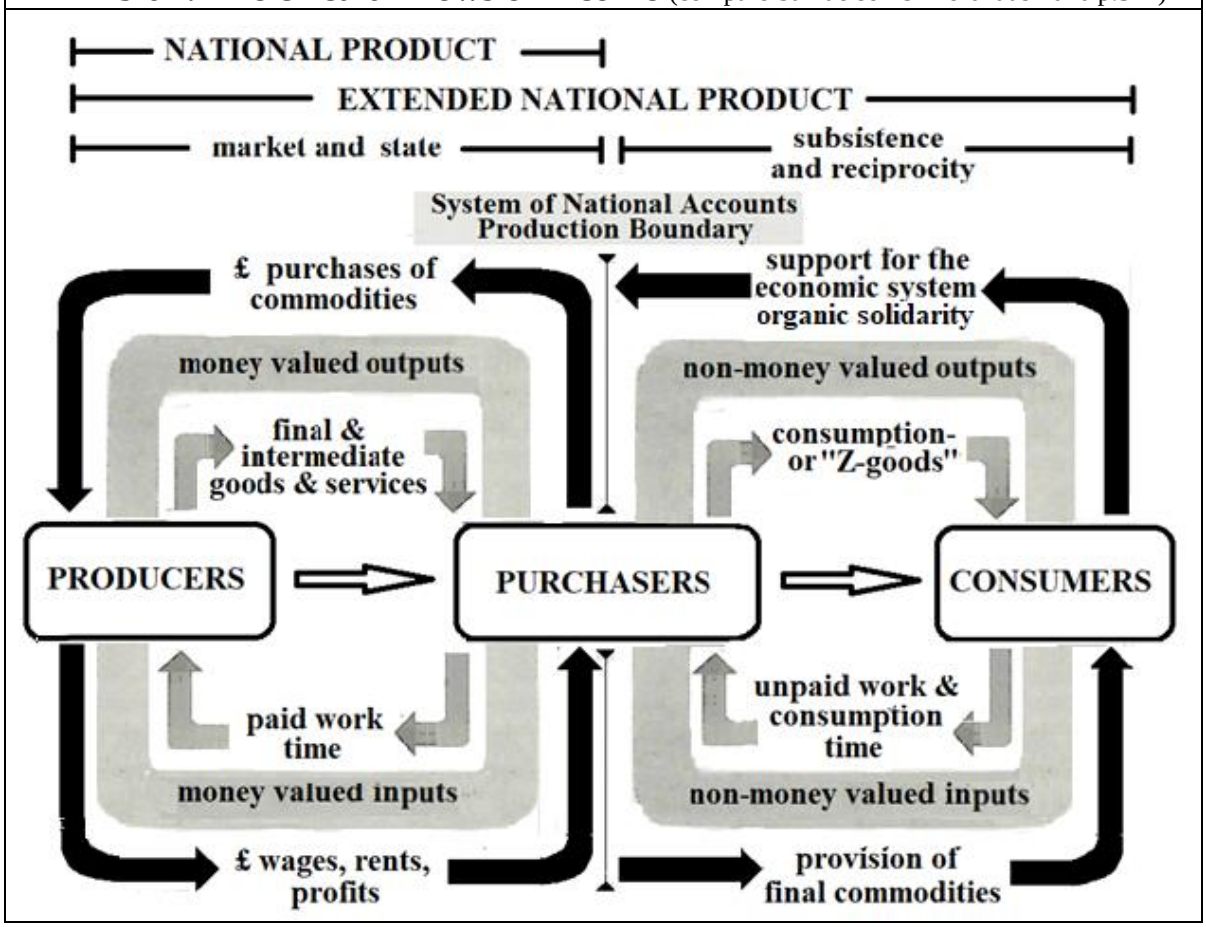
Both can be constituted from the same single source of evidence, which includes the totality of human action and behaviour: comprehensive, nationally representative, ***records of populations' time-use***. These must be combined with wage rate and price data to estimate value, and with expenditure data as a means of associating particular work inputs with specific consumption outputs. But an essential component of both forms of account is the time-use record, which provides an exhaustive summary of everything done in the society.

Dual-entry accounts are traditionally interpreted as *opposing work by leisure*. This is understood (depending on political perspective) either because of the generally negative characteristics of labour's experience of paid work in the economy, or as a systematic binary conflict between a dominant class of owners of capital, attempting to enforce excessive levels of work—more than is needed for the reproduction of the labour force—on a dominated class of workers ("exploitation"). "Progress", depending on which perspective is adopted, involves either increasing or reducing the "labour share" in National Product, or equivalently, reducing or increasing the rate of exploitation. Work is, from both perspectives, solely a means to enable consumption.

Single entry accounts strongly qualify this opposition. Work, in some form and volume, may itself be *wanted*, or even *needed,* by many or most people, irrespective of their wealth, to maintain specific aspects of their own well-being (providing social purpose and status, temporal structure, a framework for sociability, opportunity for physical exercise). Included in work, in this discussion, is the unpaid labour not included in money-denominated production, which also contributes to the satisfaction of both individual and collective wants.

1 Economics 101: *Two* circular flows of National Income.

Exhibit 1. The circular flows of income (compare Samuelson & Nordhaus 2010 p.512)



The left-hand circuit of Exhibit 1 is a description of the economist's general view of economic activity (adapted from a leading English-language economics textbook). Broadly, the money

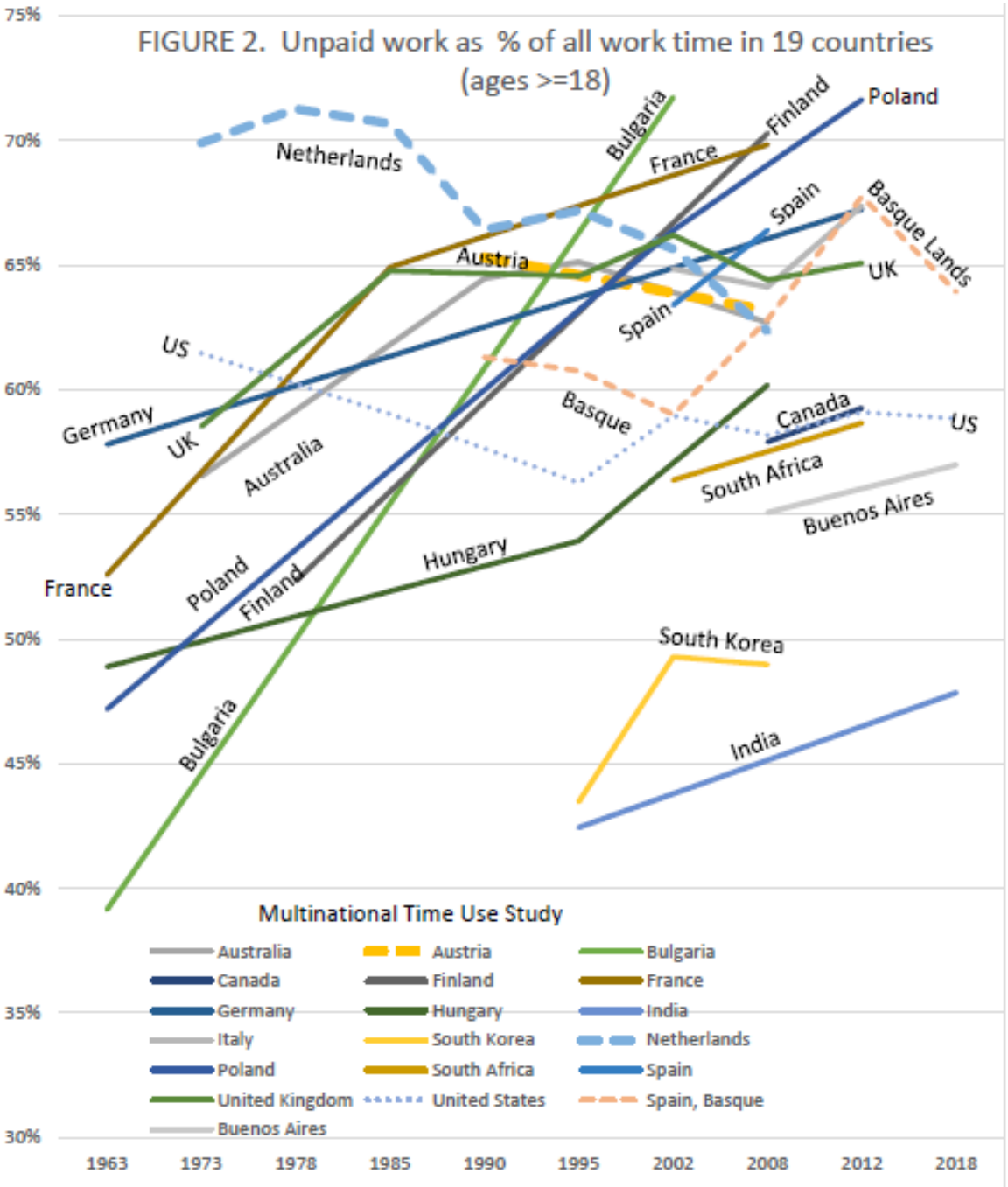
value of the total of purchases of goods and services in an economy ("outputs"), is the same as the money value of earnings—wages, rents and profits or "inputs". Outputs and inputs together constitute the "dual entry" accounts for a national economy. Money circulates between producers and (here, carefully named, for a reason that will soon emerge) "purchasers". And, opposing the circular flow of money values, is a corresponding flow of real commodities, goods and services, whose value is exactly reflected by that of the labour time, either contributed directly to produce those commodities, or embodied in the capital goods, infrastructures, and materials used in the money economy. But—the central contention of what follows—estimates based on this perspective cover an insufficient range of economic activity to support Samuelson's "produce valuable goods" view of the task of economics as expressed in the quotation that heads this chapter.

The problem is that this system of accounts in no way exhausts the full range of productive activity. Conventional GNP does include a small allowance for unpaid "household services" (DeRock 2021); but nevertheless the circuit on the left-hand side of Exhibit 1 excludes a large part of all labour time. Economists customarily dismiss this issue as "the housekeeper problem": marrying a paid domestic worker who continues to do the same work but unpaid, diminishes the national product. The example, however, belittles the problem. In fact, a wide range of innovations lead to shifts of work out of the money economy—"self-servicing". Buy a domestic washing machine instead of laundry services, substitute private cars for public transport, or an internet travel website for a travel agent—these all require various sorts of domestic capital investment, purchase of materials and intermediate services, use of public infrastructures, often combined with unpaid labour, moving substantial elements of the provision of some final services decisively outside the limits of the money economy described in the left-hand circuit.

The use of the housekeeper's marriage to exemplify the externalization of economic activity beyond the measured economy, might suggest that missing unpaid work is a minor omission. But far from it: the total of unpaid work time, in most developed countries, considerably exceeds the paid. The standard economists' definition of "work" comes from the "Third Party Criterion" (Reid 1934): work is any activity that you ***could*** pay some other person to do for you, without losing the opportunity for consumption that results from it, ***irrespective of whether or not you do actually pay for it***. This definition serves to divide all the activities of daily life into just three categories: paid work time, unpaid work time and non-work time. Or to put it another way, into, respectively, (1) work that contributes to the National Product as defined by the System of National Accounts (SNA) Production Boundary in Exhibit 1, (2) work that does not so contribute, and (3) to time devoted to consumption (compare with Aas 1979 four-category classification).

Exhibit 2 shows the ratio of unpaid labour time to the total of paid and unpaid work time in a broad range of countries at various points in recent history. These are calculated from a collection of large-scale, nationally representative time-diary surveys, brought together as the Multinational Time Use Study (MTUS: Lamotte et al 2023). Seventeen of the nineteen countries represented in Exhibit 2 have more than 50% of all their work time (paid plus unpaid) located outside the System of National Accounts Production Boundary (SNAPB)—and most of these countries exhibit a long-term historical trend of quite substantial growth in this proportion. Of the three exceptions shown with interrupted lines in Exhibit 2, the USA and Austria already had higher-than-average levels of unpaid work at the start of the MTUS'

historical data coverage, and the Netherlands previously had absolutely the highest proportions of unpaid work in any of the countries—reflecting an exceptionally low level of paid employment among Dutch married women in the 1950s and '60s.



So a focus on the money economy alone, may lead us to misperceive the full extent of both economic activity, and (as we shall see in a moment) of the implications of technological change. Purchase of commodities does not itself constitute consumption. Only a subset of what is produced in the money economy—"final services"—is directly consumed. Most is in effect ***used***, as capital, or infrastructure, or materials or software, in further processes of provision, located outside the measured economy, perhaps (but not necessarily) involving

unpaid work as well as consumption time—evidence for this can be found in households' money expenditure alongside time expenditure data. Money accounts provide no direct evidence of the deployment of unpaid work and purchased intermediate commodities beyond the money nexus or of their consequences for consumption. Just as enterprises generate ***profits*** from their activities by combining the various factors of production (capital, materials, paid labour), so households (and other informal entities not primarily motivated by money earnings) generate similar operational benefits, economic gains—"***household surpluses***"—through their deployment of the factors of provision including unpaid as well as paid labour and consumption time.

The growth in the self-servicing modes of provision represent in the broadest sense ***technological innovations*** that run contrary to the normal Baumol "cost disease" expectation that technology-related productivity growth in the services lags behind manufacturing. In fact it is technical innovation in the production of small-scale machinery cheap enough to install in private households and sufficiently automated for relatively untrained labour to operate, that enables these changes. And the very same paradigm of service-sector innovation, with consumer capital plus infrastructure (cars, cookers, and TVs, plus road, sewage and electricity supply networks, as well as broadcast programme materials) that drove economic growth from the 1950s to the 1980s, now, with household IT equipment, broadband network infrastructure and downloadable software and other entertainment and factual content, continues to provide an ever- expanding range of domestically produced services. Conventional money accounts provide either ***no***, or at best only ***very indirect and partial***, reflections of the extent, value and distribution of these activities, even though these new modes of service provision have as fundamental a bearing on human wellbeing as do those final services purchased directly from the money economy.

We can however see the ghostly traces of this extra-economic economic activity when we look carefully at the detail of household expenditures. Exhibit 3 assigns UK households' spending in 2018—measured by the Household Expenditure Survey (HES) and using the standard System of National Accounts expenditure classifications (COICOP)—together with outputs from public expenditure provided free at the point of consumption, to various purposes, or "final service functions" (such as sleep, shelter, home entertainment, education). These are divided according to whether they are ***consumed directly*** or ***input to further processes of household production*** (some more detail of this classification is given in Exhibit 5 below). Nearly two thirds of all commodities fall into the latter class—of intermediate commodities input to further production outside the money economy, but within the second circuit in Exhibit 1.

In the conventional national accounts—the left-hand panel of Exhibit 1—are reciprocal flows of money from purchasers to producers and corresponding material flows, of goods and services from the producers to the purchasers. Some but not all of the purchases are directly consumed. In the second circuit (the right-hand panel) there is a circulation constituted by flows of unpaid work and consumption time combined with the other, unconsumed goods and intermediate services from the money economy, to produce those final services—following Becker (1965) we can call these "Z-goods". They are the ultimate objects of consumption. Once we add the non-money circuit, the System of National Accounts production boundary must be reconstituted. All final purchases contribute to the conventional national product measure. But when we think of consumption from Becker's (1965) Z-goods perspective, it

emerges that the original System of National Accounts Production Boundary includes commodities that are better understood to be intermediates—part-processed goods, materials, investment items, some services, which are all used in final production (or "**provision"), outside the money economy.**

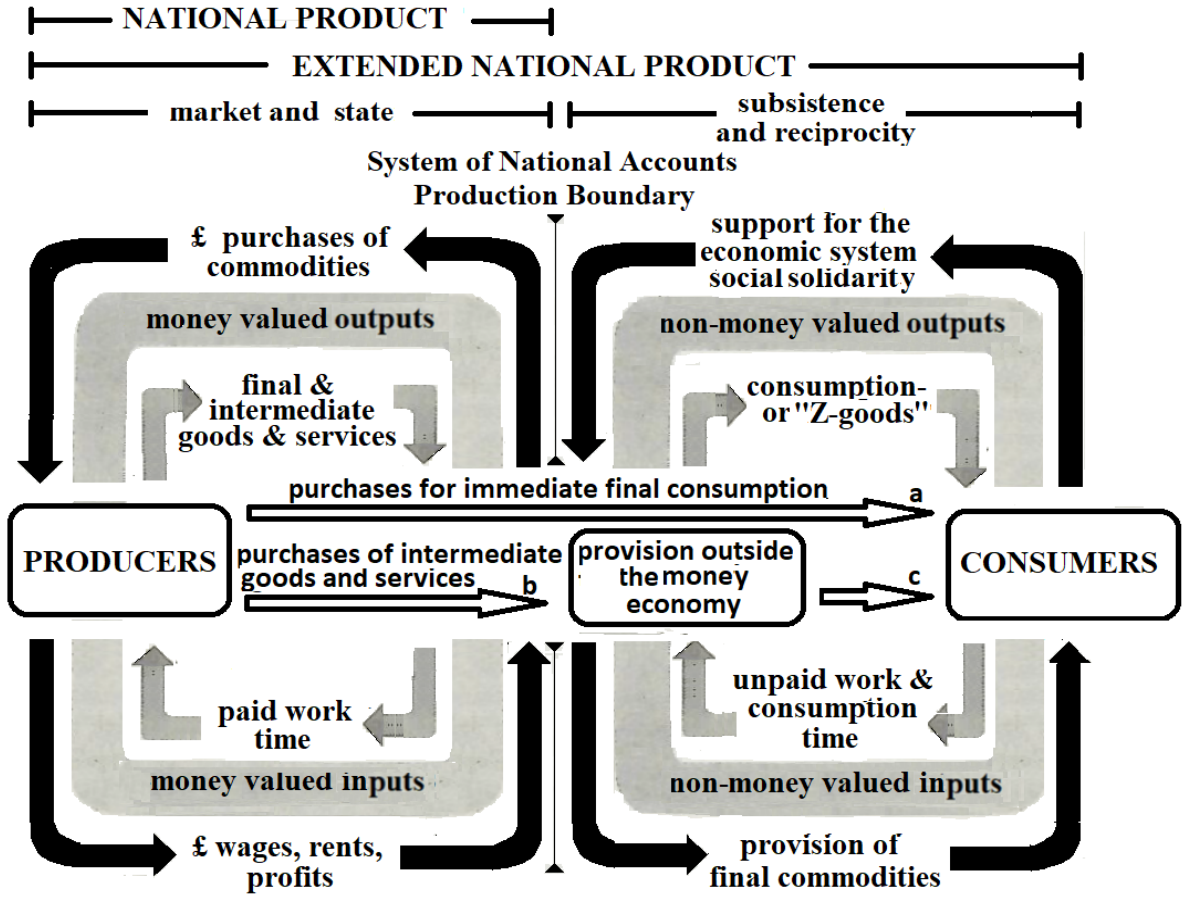
Exhibit 3 Assigning UK household weekly expenditure (HES 2018)
and Government weekly final expenditure per household

£ per week per household Service functions	**consumed as purchased**	**input to further HH 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 (education, medicine)	£45	£16	£61	9%
Government. services (roads, sewers etc)	£38	£32	£70	10%
exported work time			(£103)	(15%)
Totals	£215	£368	£686	100%
	37%	63%		

From a macroeconomic perspective, the money economy, often characterised as "the market", consists of two distinct but interrelated modes of economic activity: ***exchange*** (consisting of pairwise agreements to transfer ownership of commodities—labour, goods or services—from one party to another in consideration of a money transfer in the opposite direction) and also ***direction*** by the nation state (tax and benefit systems to redistribute the outcome of market activity (also infrastructure and other collective provisions—Adam Smith's "Fleets and Magistracy"). The second set of circuits, located outside the money nexus, has three modes of operation: ***reciprocity*** (non-binary exchange: Mauss 1923), ***barter***, and ***subsistence*** production. In the past these non-money-based "customary" modes of economic activity have sometimes been treated as archaic survivals (eg Polanyi 1944). But the evidence of the substantial size, and the relatively recent proportional growth, of unpaid work provided by Exhibit 2, tells us otherwise. All five economic modes lead in the end to similar sorts of provisions to meet human wants. Different sorts of people may be expected to purchase final services for consumption directly from the money economy, and to provide them outside the money nexus. So if we fail to include the "shadow earnings" and household surpluses from the right-hand

side of the diagram alongside the wages and profits of the left, ***we miss the economists' core objective of representing the distribution of the benefits of economic activity across different individuals***. This is the ultimate reason for efforts to include the value of the output of the three non-money modes of provision in estimates of economic wellbeing.

Exhibit 4. The dual circuits of time and money—with no double counting



When we do so, however, we must beware of double counting. Both sorts of final service provision (those purchased directly from the market and those provided by households) may relate to the same, or at least to similar, sorts of consumption—taxi trips and private car rides, restaurant and home-cooked meals, theatre performances and downloaded films at home, nights at hotels and nights' sleep at home, and so on. In the left-hand circuits of Exhibits 1 and 4, national product is the sum of final sales of commodities to consumers, not counting "intermediate" purchases of capital and semi-finished products by enterprises from other enterprises. In exactly the same way, when we put values on the final commodities produced by private households, we need to include only the value of the final services consumed, and not add-in the value of the intermediate commodities purchased by households from the money economy. In Exhibit 4 the Extended National Product (the total of national provisions within a "General Production Boundary") is the sum of flows a and c, and excludes b.

Estimating National Accounting extensions

The conventional National Product is a familiar and widely-used statistic, simply expressed as so many billions of national currency, or thousands per head of population. Can we similarly estimate the size of the Extended National Product? The first step is estimating the value of various sorts of unpaid work. There are in fact two different methods, corresponding, respectively to the input and to the output concepts used to estimate conventional GNP.

Let us identify our objective as ***providing estimates of the scale and distribution of extra provision for final consumers that emerges from the non-money circuit***, using valuations similar to, and derived more or less directly from, the money economy.

Since the National Product is the sum of all money value-added—of all wages and profits and analogous incomes—so the extended National Product must add-in a valuation of the unwaged labour but consider flow b in Exhibit 4, the costs of the domestic capital equipment, and of intermediate commodities) that go into household and similar production. In an inversion of the paradox discussed in previous paragraphs, the simplest implementation of this procedure is to add the value of "**shadow *wages***" by multiplying all unpaid work time by a ***standard wage rate for a housekeeper***.

As we have already seen there is a great deal more to the extended economy than just housework, so a perhaps-preferable approach multiplies time in each separate category of unpaid work by an appropriate ***specific occupational wage*** (or fractional wage to represent diseconomies of scale and generally lower skills in informal production): cooks' wages for cooking, teachers' for childcare, taxi drivers' for trips for domestic or leisure purposes, accountants' for work on household bills, and so on. (I return to consider a third method, "opportunity cost", preferred by some economists, in a moment).

These methods for valuing non-money activity in the right-hand sphere of Exhibit 4 correspond to the input methods depicted in the left side of the diagram. The use of shadow wages to assign a money value to unpaid work had been the preferred methodology from Bernadette Kneeland (1929) to Oli Hawrylyshn (1974) to choose just two from many through the 20th century, and subsequently (eg Webber *et al* 2016). But a radical alternative to this approach emerged from Luisella Goldschmidt-Clermont and her colleagues at the ILO during the 1980s and '90s—making use of the dual accounting identity between the values of inputs and of outputs, by proposing entirely independent estimates of the value of outputs from "shadow prices" for the purposes of comparison. Just as the time diary data tells us about unpaid work time, they also allow us to estimate the extent of—or count each instance of—all consumption for the same population. So just as we multiply each minute of unpaid labour by a ***shadow wage*** for a particular class of provision—say, food or transport or laundry work to "extend" our valuation of all inputs—so similarly, for an independent "extended" valuation of outputs, we can multiply each instance of non-market consumption, of say, a meal or a trip or a period watching television at home, by (some fraction of) the price that would be charged for it if a similar final service were purchased directly from the money economy: the "***shadow price***".

The combination of an inputs-based approach with this alternative outputs-based approach was first implemented by Holloway *et al* (2002), for seven specific activities (housing, transport, nutrition, clothing and laundry, childcare and adult care, and other voluntary activity) in the UK. Holloway's group (from the Office of National Statistics) used a variety of market

research and official sample survey data to make independent estimates of unpaid work inputs and consumption of outputs (there was at that time no current UK time-use diary survey evidence available).

One advantage of the Goldschmidt-Clermont/Holloway approach is that it provides a ***reality check***—since the benefit from an unwaged provision of a service can be assumed to be of a similar scale to the level of benefit implied by the price of a market-based alternative. So—to use a Holloway example—we would expect the value of a school-delivery trip in a parental car to be of the same order as that of a taxi-ride of the same distance (remembering of course to subtract appropriate fractions of capital costs, petrol, road tax, garage services and so on for the private car travel). The same reality check will also militate against the use of any opportunity-cost valuation of the unpaid service—since, for example, the cake baked by a brain surgeon will not provide the same margin of benefit above that baked by a pastry-chef, as might be implied by the difference in their expected marginal earnings (reader, please consider ***whose cake you might prefer to eat***).

There is an important second advantage to output measures. The output approach provides estimates of the extent of consumption activities that are invisible to the conventional money-based statistics derived from expenditure data—estimating ***how consumer capital is used*** in extra-economic final service production. Much of the recent innovation in modes of final service provision within the home has been concentrated in areas that involve virtually no unpaid work but nevertheless provide a genuine household surplus above the cost of capital and other input materials. Consider for example, screening video materials; presumably the benefit of a film viewed at home might be assessed as some, perhaps small, but nevertheless non-negligible, fraction of the price of a cinema visit—and also to vary in value in proportion to the quality of the screen and the domestic furnishing and housing, just as the price charged for a cinema ticket will vary *inter alia* by the quality of the seating and other equipment, and the location of the cinema. We may suspect that part of the reason for the relative neglect of non-market-based consumption in economics is simply the absence from money-expenditure data sources, of the sort of evidence of acts of consumption that are provided straightforwardly by time-expenditure data.

Every item of consumption not directly purchased for money, should nevertheless and without exception be considered to provide some benefit to the consumer. For National Accounting purposes the money value of the purchased services can be estimated directly, by the price paid by the consumer. But for services produced and consumed at home the benefit will not be adequately reflected by the costs of the purchased material inputs alone; there is in addition some surplus of value generated by the combination of these inputs and the consumer's consumption time. The household is in effect an enterprise producing services—just like restaurants, schools, hotels, cinemas—and hence produces ***household surpluses*** of satisfaction through meals, educative or custodial childcare, nights sleep, video sessions, over and above the value of intermediate inputs, just as commercial enterprises produce ***profits***. And these can in principle be allocated monetary values, either by assumption, or from direct survey evidence of the benefit received by the consumer. Consider an analogy with the service sector in the money economy: much of volume and value of its production is estimated by assumption and not directly measured (Atkinson 2005). Similar methods can be used for estimations of the value of household production of services.

The three sorts of time use—paid work, unpaid work and consumption—identified by the Third Person Criterion and estimated by time-use diary surveys, sum to the 1440 minutes of the day. And for randomly selected, nationally representative sample surveys of diarists such as those deployed in Exhibit 2, activities in the three spheres together represent the entire 1440 minutes of the society's Great Day—***exhausting all production and all consumption.***

3. Calculating Extended National Product: eNP

This section outlines principles that might underline calculations of extended National Product (eNP)— generalising from National Product extension for particular items of household service production, of childcare, meals and so on, as considered in the previous section, to an exhaustive, or comprehensive, implementation, including all of a society's activity in a set of full economic accounts.

The most fundamental requirement is for an appropriate classification of consumption. The arguments surrounding Exhibit 4 established clearly that we need to distinguish between expenditures on services which are ***consumed directly*** ("at the instant of production" in the economists' phrasing), and on the other hand intermediate commodities, **goods or services *used in further processes of provision***. Also the observation that some final services provided directly by the money economy are at least partially substitutes for, or capable of being substituted by, non-money-based household provisions, means that we need a separate classification, of ***categories of want***, or distinct ***final service functions*** relating to different sorts of provision such as sleep and shelter, food and drink, leisure services, education and medicine.

The discussion so far implies the need for a complex classification of household money expenditure, crossing the directly- *versus* indirectly-consumed dimension (intermediate commodities vs final services), with the service functional classification. This same service-functional classification can also be crossed with time-expenditure data, and used to organise evidence on unpaid work and consumption (which are respectively, unmeasured and only-partly-measured in the money expenditure data). Combined, the money- and the time-expenditure materials provide a complete coverage of all economic activity.

Exhibit 5 provides an example of such a classification. It identifies eight final service functions, chosen for expositional convenience (travel expenditures are discussed in the next paragraph), though a much longer list may be needed for a full implementation of these concepts. The cell-entries involve dividing some of the money expenditure categories between functions, (since for example some of the same expenditure categories span both the shelter and the food-provision expenditure categories).

Exhibit 5. Spending time and money by Final Service Functions: examples of assignment categories					
	money expenditure categories			time expenditure categories	
Final service functions (Z-goods)	**Materials, inter-mediate services.**	**Capital items**	**Final services**	**Work time**	**Consumption**
(1) basic services sleep. shelter	fuel, clothes, soap, repair services	Housing, furniture, clothes, domestic equipment	Cooks, housekeepers, hotel stays, laundry	Unpaid clean, tidy, laundry, mend-ing, maintaining, diy, IT, shopping	sleep, rest, personal toilet
(2) eating and drinking in private spaces	Food, drink, power supplies	domestic equipment, "white goods"	Au-pairs, gardeners, cooks, cleaners	Unpaid prepare & cook, clean, tidy, laundry, mending, IT, shopping	eating at home or other private spaces
(3) childcare	nappies	Prams, toys	Paid care provisions for young	Unpaid care for own & other children	(children's consumption time)
(4) other personal care services			Paid care provisions for old, differently abled	voluntary work, unpaid care for coresident & non-coresident elderly	Adults consuming personal care services
(5) leisure activities in private spaces		Tv, radios, computers, tablets, books, games		unpaid clean, tidy, clothes wash, mend, maintenance, diy, IT	Tv, video, reading, computer games, chats, hobbies
(6) physical exercise in public and private spaces		Specialised sports clothing and kit	Purchased training services, gym access etc.		playing sport, walking (including walking dog etc)
(7) leisure activities in public spaces	Leisure consumables games, fireworks, toys, books	Leisure equipment, boats, caravans, skis etc	Cinemas, theatres, concerts, sports events, restaurants, hotels		Eat and drink out, cinema, theatre, concert, sport event, museums, libraries
(8) High-end services, edu-cation, medicine, religion	Education materials,soft-ware, pharmaceuticals	medical kit (eg wheel-chairs, IT equipment).	Purchased medical and educational services		medicine, education, religious practices,
transport	Purchase of fuel, driver educ., garage services	Purchases & hire of cars, vans m/cycles	Purchase tickets for bus, train ,taxi, air transport	Driving vehicles unpaid	leisure trips
paid work				Paid work	

In the time-use survey materials, trips (with one single exception) are assigned by their purposes to one of the eight functions. In this approach to extended National Accounts, travel is treated, not as a final service function in itself, but as an intermediate service, a means to some end—which allows us, *inter alia*, to examine directly the trade-offs between travel and the use of IT in remote service prevision. (The single exception is time devoted to leisure trips, identifiable as travel episodes both starting and ending at home, which are classified as out-of-home leisure activity.) Paid work time should properly be traced back from the final expenditure data via input/output evidence, to time denominated labour inputs in the originating industries; but for the expositional purposes of the discussions here, this is also distributed between the service functions in proportion to the total of unpaid work and consumption time devoted to each (an alternative would be to use the money expenditure proportions derived from Exhibit 4. (The use of the input/output tables for this purpose will also allow us to estimate population time proportions associated with investment activities as well as imports and exports.)

The time-use survey evidence of the substantial size of economic activity outside "the economy", combined with a more careful distinction between intermediate and final expenditures, yields a genuinely new perspective on macro-economic change.

The presence of time measures in both sides of Exhibit 4, provides an opportunity to replace the empirical estimates provided by the narrower conventional money-based economic accounting, by more comprehensive empirical evidence including the full range of human activities, both paid and unpaid work, and non-work consumption. There is a substantial body of evidence, in the Multinational Time Use Survey, comprising detailed and comprehensive, nationally representative time use surveys, with more than 2 million detailed diaries of continuous 24-hour periods, representing the daily activities of most of the countries of the developed world, and extending back two-thirds of a century to the 1960s. But for the moment, consider just the UK.

Exhibit 6, a UK time budget, is constructed on the basis of these sorts of assumptions, amalgamating functional (Z-good) categories, and deploying the UK time use survey for 2015, and UK household money expenditure survey data (using standard COICOP categories). This table involves a certain amount of… imaginative reconstruction of the input-output flows, but nevertheless, the most important aspect of this evidence, in the green-shaded cells of the table covering unpaid work and consumption, consists of information that can be read directly out of the time use survey materials, without any interpretation beyond the category assignments of the sort set out in Exhibit 5.

Tables of this sort allow us to estimate double-entry National Accounts comprehensively and exhaustively. We multiply each element of paid and unpaid value added by an appropriate wage or shadow wage, to produce the input-value half of the dual entry system. And we multiply each episode of consumption by appropriate prices or shadow prices to estimate output values. And then finally we adjust the input and output values for each category of provision against each other until we arrive at an identity. Remembering that the total of the paid and unpaid work time plus the consumption time is the 1440 minutes of the society's Great Day, we can conclude that, unlike the System of National Accounts, even with piecemeal extensions added-in, this time budget provides, for the first time, a demonstrably complete economic account of the society's activity.

There are of course no ***ultimately correct*** shadow prices or shadow wages—any more than we can claim that the money-valued estimates of those parts of the money economy's service sector valued by the wages of paid producers are genuinely reflect the value of outputs. These allocations are—to the extent that different sorts of people access market and non-market services to differing extents—***essentially*** political constructs—since alternative values assigned to various products may privilege different social groups. To explore these issues we can conduct sensitivity analysis to establish the consequences of making particular decisions about the relative values—of, for example, films viewed at home versus films seen in the cinema—for the overall eNP estimates. Undeniably, comprehensive estimates of Extended National Product of this sort must always be even more problematical than those of conventional national product. But they do at least provide some recognition of substantial provisions, which may vary importantly among different social and economic groups, and change over historical time because of technological change.

Exhibit 6: UK National Accounting Time Budget 2015: paid, unpaid and consumption time associated with categories of want

(UK 2015: minutes per adult aged 18+)

	UK time				Non UK
Wants	Consumption time	Unpaid work time	Paid work time	Total UK time	Imported work time
Sleep	511			**511**	
Shelter, nutrition	143	135	51	**329**	17
Home leisure	258	24	13	**295**	2
Leisure out, shopping	65	80	21	**166**	3
Medicine & education	18	11	53	**82**	2
Background services			26	**26**	1
Exported work time			33	**33**	8
TOTAL	994	250	196	**1440**	34

We should remind ourselves, however, that it is only the *money* valuation of the work and the consumption time that is problematical. The *time* allocations to these are directly observable from the survey evidence (as the green-background cells) as presented in Exhibit 6. If proper techniques for time use measurement are applied (Harvey 1993, Eurostat 2019) they provide, with a reasonable degree of objectivity, ***complete*** measures of the extent of work and consumption in a society. And where we have an appropriate historical record, we can consider

changes in the balances between the paid and unpaid work categories, which constitute, in effect, proxies for technological change in the provision of services.

Exhibit 7. Estimated growth of economic activity outside the money nexus UK 1973-2015.

GNP time = paid work time for each final service function **eGNP time** = paid + unpaid work time for each	GNP *time* as % of extended GNP time	
	1973	2015
Shelter, nutrition	36%	27%
Leisure at home	68%	35%
Out of home leisure, shopping	50%	21%
Medicine & education	100%	83%
TOTAL	58%	44%

Exhibit 7 is constructed by comparing the Exhibit 6 (the UK national time budget for 2015), with an equivalent table for the UK in 1973 (Exhibit A1 in the Appendix). It illustrates the equivalent to the shifts in the locations of work shown in Exhibit 6, showing changes in the balance of paid and unpaid work for the UK, over a 40-year period, broken down by categories of final service function. The biggest historical changes we see are in paid work contributing to leisure and shopping out of the home, where the paid labour proportion in 2015 is two fifths of the 1973 level—a change we may presume relates to transport changes (cars vs public transport), and perhaps the replacement of local shopping by supermarkets (though the time implications are unclear), and the spread of fast-food outlets, with reduced paid labour as well as shorter meal times. Similar considerations apply to work related to home leisure consumption: the 2015 paid proportion is hardly more than half that in 1973 (presumably reflecting changes in IT infrastructure and households' IT equipment—of the sort that we can expect to become even more prevalent over coming decades). Overall, through this more than 40-year period, paid work in the UK declined from 58% of all work time in 1973, to 44% in 2015.

This sort of major shift in time use, which constitutes perhaps the most general and important consequence of technological change in its broadest sense, can ***only*** be observed through time-use evidence. There is a little more to follow on the specifics of the need for time use-evidence for the construction of single-entry accounts. But before turning away from the discussion of double-entry accounting, consider one further macro-sociological observation.

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In the right-hand circuits of Exhibits 1 and 4 is a flow of material provisions, balanced by unpaid work and consumption time, but with no money payments, and hence no direct equivalent to the "money purchases balancing wage, rents and transfers" of the left-hand side of the Exhibit. In its stead I introduce an additional half loop, in which provision of the final

consumption commodities (Becker's Z-goods) may be said to be balanced or rewarded, by what Durkheim in his **Division of Labour**, called "organic solidarity" (or Lockwood called "system integration")—the general acceptance of the legitimacy of the current structures of prices and wages, without which the economy soon becomes disorganised by strikes, inflationary wage-price spirals and the like, The flow and particularly ***the distribution*** of material provisions, as estimated in the extended National Product, may be compared or correlated with survey estimates of satisfaction with the operation of the national economy.

4. Time use and single-entry national accounts

Extended dual entry accounts provide *exhaustive* national accounting, with, in principle at least, money values attached to all elements of time use. Or to put this another way, the total value of a society's time viewed through the dual-entry lens, is ***precisely*** double the eNP: the sum of the value of time devoted to work and the value of time devoted to consumption. This strange result is achieved by the trick of definition inherent in the Third Person Criterion: dual-entry accounts set the ***intrinsic*** value of all sorts of work to zero.

Yet, paradoxically, it is likely that many of those at this moment reading this text will view their current activity as contributing to their own work, and yet ***also*** obtain some affective response, whether enjoyment or irritation, directly from these words. So the assumption—central to dual-entry accounting—that work is entirely instrumental and without intrinsic satisfactions or dissatisfactions, should nevertheless really be evidently incorrect to exactly the sorts of people who assert it!

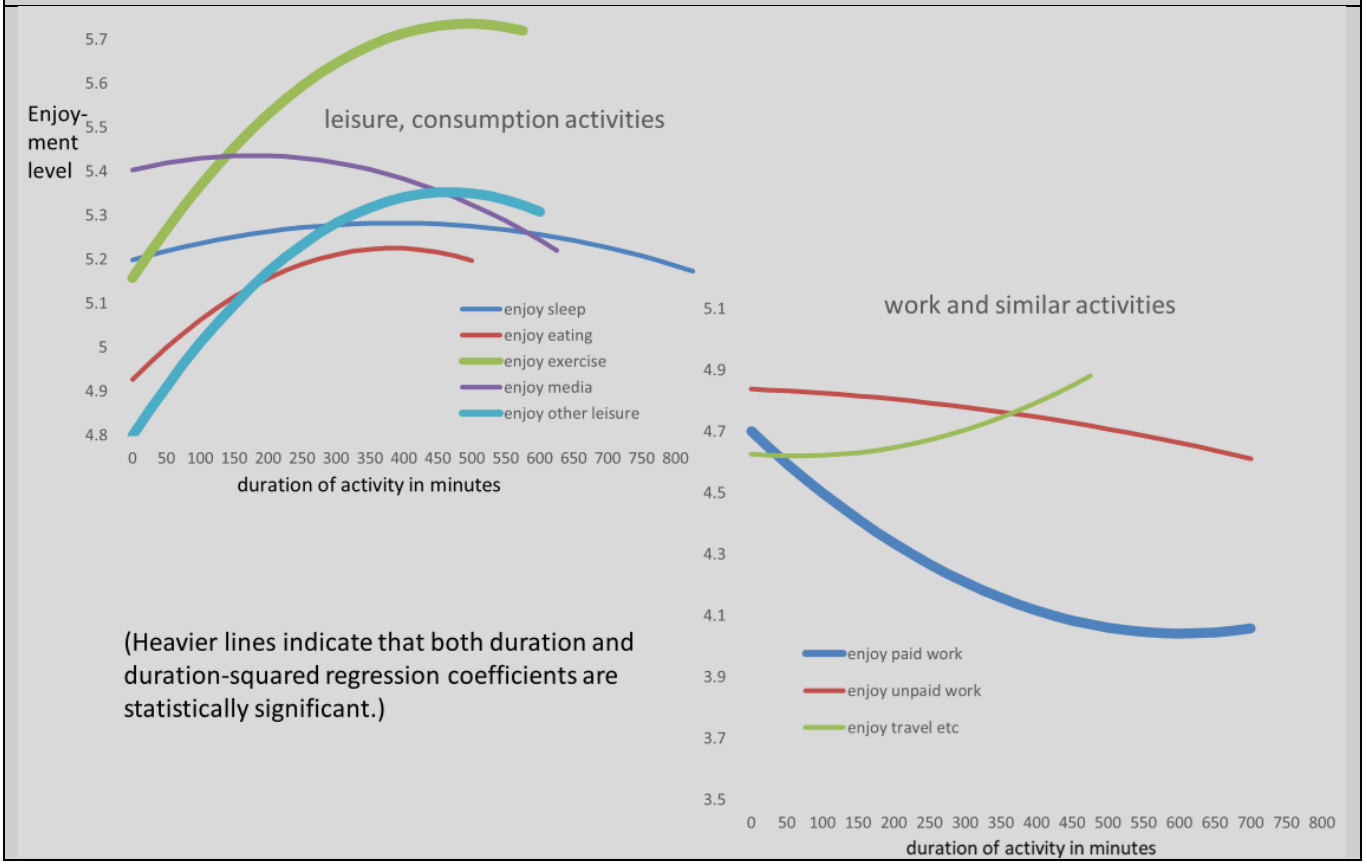
Of course, the assumption is made in an "as if", ***ceteris paribus*** manner. We may sometimes simplify the world, by making arbitrary-seeming assumptions, to understand it better. But then we also have a responsibility to subsequently ***recomplicate*** the world, by varying them. We know perfectly well that, in reality, work may be pleasant or unpleasant, relaxing or exhausting. It may provide us with exercise, a time structure, a source of social contact, a sense of purpose and of making a social contribution—precisely the "latent functions of work" first identified by Jahoda and colleagues in the 1930s, and confirmed by Jahoda et al (1971), Warr (1987) and by numerous subsequent researchers (Kapuvari 2011). Would we really be content to promote economic growth in a way that generates net ill-health or unhappiness, as we well might do if we were to formulate our economic policy entirely with a view to maximising productivity in the market economy irrespective of the consequences of the intrinsic experience of work? It follows that, to supplement the dual-entry accounts, we also need single-entry accounts, considering the affective and other consequences of ***all*** activities, both leisure ***and*** work, to accompany the double-entry ones.

These consequences of work time are essentially the same categories of subjective experience and physiological states that we routinely associate with consumption activities. In place of the "value of work ≡ value of consumption" dual-entry assumption, for the "single entry" accounts we calculate instead the specific "value" of the consequences of ***both*** work time ***and*** consumption for each dimension of life-experience, health or wellbeing, using coefficients relating the duration of the activity to some objective or subjective ***outcome***. Just as for the dual-entry accounts, we multiply durations in each activity by specific coefficients—but for

the single-entry accounts these coefficients convert time, not into money values, but into more specific measures of wellbeing, happiness or health.

Two examples. The first follows Kahneman's (1999) and Krueger et al (2009) discussion of instantaneous utility. This can be measured within the time diary instrument itself, as a continuously recorded diary field in which the diarist reports how much she is enjoying the current activity (Kahneman et al 2004). In fact the "day reconstruction" method that Kahneman describes is a standard time diary approach, and its application to utility estimation originates two decades earlier, with Juster and Stafford's (1985) notion of "process benefits". Initially this involved multiplying durations in each activity by coefficients derived from a questionnaire battery in which respondents rank their expected enjoyment score for specific activities. It was subsequently developed by John Robinson using continuous diary-based measures in a 1985 US national survey. Modern researchers (Krekel and McKerron 2024) trace its ultimate origins to a 19th century thought experiment by the English economist Frances Edgeworth, involving an imaginary "hedonimeter" which continuously registers individuals' affective states through the day on a horizontally revolving drum (like that of a barograph).

Exhibit 8. Mean Daily Utilities, broad activity categories by daily durations
UK CaDDI surveys 2016-2022, women aged 35, time-varying enjoyment levels

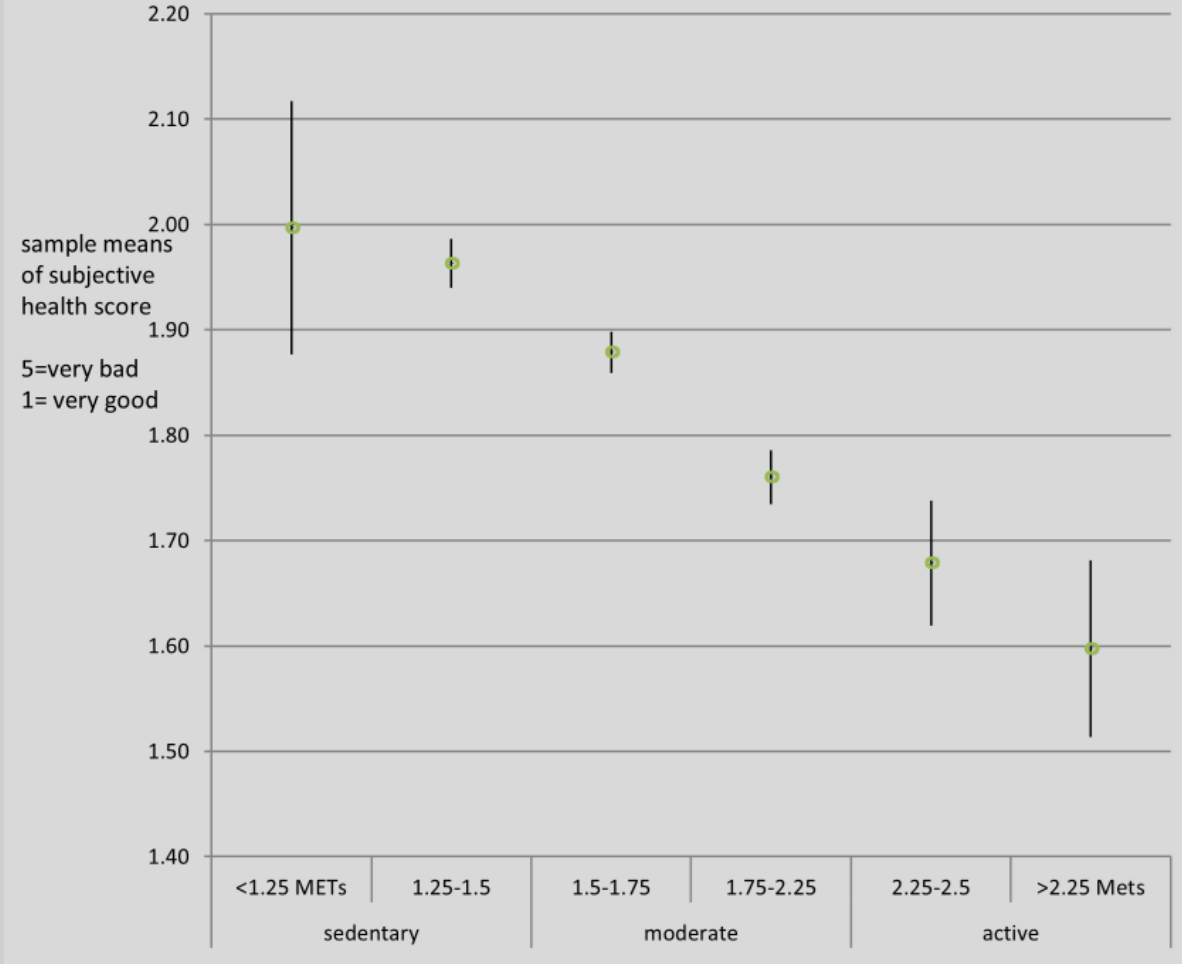


The modern time-use survey implementation of this takes advantage of standard time-diary design, with multiple 24-hour fields, (recording respectively primary and secondary, activities, presence of others, location etc., each calibrated to 5-, 10- or 15-minute intervals), adding a final 24-hour field which invites diarists to register their current level of enjoyment on a scale

of 1 to 7 or 1 to 9). Perhaps a third of all diarists record constant levels throughout the day (it is not yet clear whether this is a non-response or an indicator of an even temperament) but in general this instrument works properly, to produce, for example, not merely plausible estimates of variation in the mean utility across activities, but also rather elegant ***marginal*** utility estimates, showing the expected (mostly statistically significant) Diminishing Marginal Utility results for consumption and unpaid work activities, but not for paid work or travel (Exhibit 8). (Appendix Exhibit A2 shows the distribution of enjoyment totals across the population's day.)

The second example uses Metabolic Expenditure scores (METs). There is a well-established connection between activity as recorded in time use diaries and levels of metabolic load. METs provide estimates of the extent of physical exercise associated with different sorts of activity—from nights' sleep via sedentary desk-based work to physical labour, sports and gym-based exercise (Aynsworth et al 2011, Tudor Locke et al 2009). Exhibit 9 illustrates the clear and statistically significant associations between METs levels as estimated from diary records of daily activity patterns, and diarists' self-rated (negative-scored) global health status. (Appendix Exhibit A3 uses these techniques to illustrate the origins of US populations' physical activity.)

Exhibit 9. UK 2015 Subjective health scores by whole day exercise levels
(Adults daily METs means and 95% confidence intervals)



These two simple examples of "outcome" states predicted from short-term evidence of daily activity patterns serve to illustrate the potential of connections between the time-use diaries and questionnaire-based life satisfaction data. Clearly, evidence of a single day—or indeed of two days, one weekday and one weekend from each respondent which is now the standard requirement for time-diary surveys—is not sufficient to describe the full range of variation in individuals' days. Nevertheless there are methods for combination of diary materials with other evidence of respondents' longer-term participation rates, to provide improved estimates of the association between daily activities and life-outcomes (Gershuny 2012).

Paralleling these individual-level outcome measures are potential applications to major collective-level social indicators. Each of the daily activities have metaphorical "footprints" on the global environment. Associated with any given mix of modes of provision for human wants, across a society, are impact on the environment, ranging from depletion of natural resources to the generation of the various sorts of pollution. So the time use evidence provides a potential empirical basis for modelling alternative policies' impact on environmental conditions.

The dual-entry methods for estimating the value of particular categories of unpaid work as ***National Income extensions*** are not in any way new. But these extensions are, exactly as described: add-ons to the national accounts. The contribution made here is something rather more radical. It proposes an ***Extended National Accounts***, with substantial parts of what is now considered as final output, reclassified as intermediate products, but with a comprehensive estimation of the value of all consumption (as defined by exclusion by the Third Person Criterion)—rather than estimation of specific add-ons with convenient-to-identify unpaid labour—and with an adequate estimation of the "household surpluses" generated by home production. The extended accounts are not incompatible with the conventional SNA; simply, some categories are reallocated, from the National Accounts Production boundary to within the General Production Boundary. And the GPB is extended to include "household surpluses" to parallel the profits of commercial enterprises.

The sorts of single-entry accounts discussed here again contain no innovations. Including these alongside eNP. follows the recommendations of, amongst others the 2009 Stiglitz, Sen and Fitoussi Report. The innovative contribution is simply the demonstration that the sorts of social indicators identified as requirements—by that report and others—are ultimately constructed out of evidence of exactly the same set of activities as are deployed for the dual-entry accounts.

And the conclusion: properly constructed time-use surveys, collected regularly on a national scale, are a necessary element for adequate economic measurement.

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APPENDICES

Exhibit A1: UK National Accounting Time Budget 1973: paid, unpaid and consumption time associated with categories of want

(UK 2015: minutes per adult aged 18+)

	UK time				Non UK
Wants	Consumption time	Unpaid work time	Paid work time	Total UK time	Imported work time
Sleep	502			**502**	
Shelter, nutrition	149	157	88	**394**	24
Home leisure	261	8	17	**286**	7
Leisure out, shopping	57	28	28	**113**	6
Medicine & education	9	0	46	**55**	4
Background services			32	**32**	4
Exported work time			57	**57**	8
TOTAL	978	193	269	**1440**	54

Exhibit A2 Mean enjoyment of time, UK 2015 (after Kahneman) men and women aged 15 and older (Gershuny and Sullivan 2019)

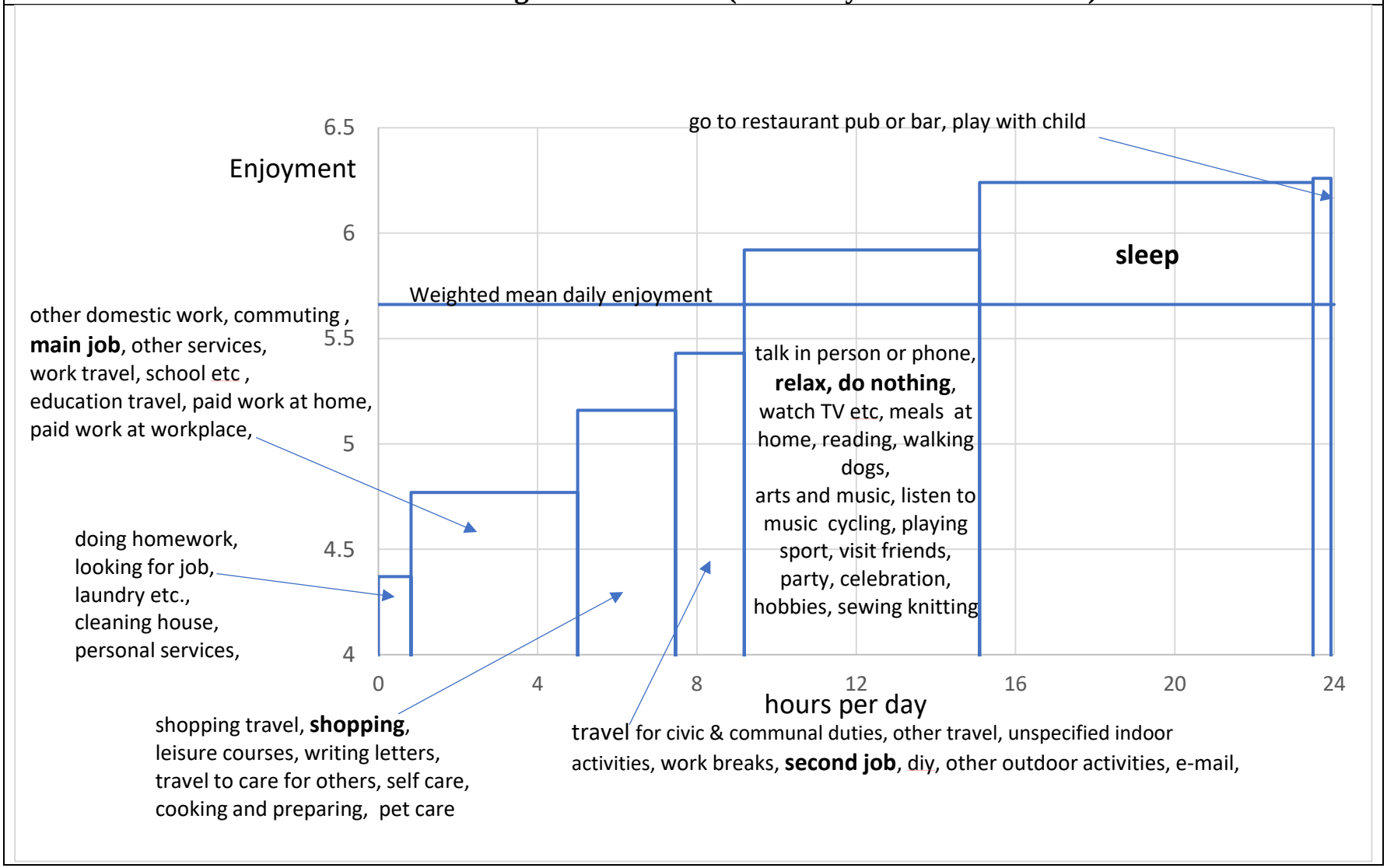

Exhibit A3 metabolic expenditure across the day (after Ainsworth)
(Harms et el 2019; data from American Time Use Study 2003-2012)