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Time Allocation and the Comprehensive Accounting of Economic Activity

Jonathan Gershuny

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Number 2005-8

Institute for Social and Economic Research

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ABSTRACT

This paper discusses the construction of an exhaustive account of a society's time, organised so as to show the economic means through which its members' wants are met. Its starting point is a pair of empirical papers in the area of national accounting, together with the 2005 Report of an Expert Panel of the US Academy of Sciences, convened to consider National Accounts extensions. It argues that the approach of linking consumers' time and money expenditures, common to both papers and central to the Panel's recommendations, can be usefully extended by (1) including state final provision of services, and (2) using input/output and connected techniques to convert the private and state money expenditures into their labour time equivalents. The result is a comprehensive accounting of economic activity entirely in terms of time; it is argued that this approach involves fewer arbitrary assumptions than equivalent money-based accounts, though it can be used for much the same purposes. An estimation of such an accounting system is undertaken for the UK in 1961 1983/4 and 2001/2, and various conclusions are drawn, concerning its use for the interpretation of the impact of technical change on employment and leisure patterns, and for the formulation of public economic policy.

NON-TECHNICAL SUMMARY

There is more to economic activity than is found in "the economy". Productive activity is located also within private households and communal groups. Welfare and wellbeing is promoted by this extra-economic economic activity, just as it is by the economic. The distributional consequences of the extra-economic activity may be different from the economic—and there are certainly historical changes, shifting elements of production variously into and out of "the economy" as a result of technological and organisational change in production processes. For these reasons, both academic social scientists and public agencies are interested in National Accounts "extensions" which take due account of extra-economic production. The conventional approach to this involves placing money values on either the time spent in unpaid production, or uses the time spent in consumption as the basis for estimates of the value of this production.

Reported here is an alternative time-based accounting system, that attempts, not to translate extra-economic production or consumption time to money values, but instead, economic production money values to their time equivalents. Time, unlike money, is strictly finite and constant, so accounts of this sort show us directly the historical changes in the distribution of the society's time between work and leisure, between basic and luxury production, and between high and low skilled occupations.

These accounts are constructed through the following three steps:

1. Associating each individual's leisure and unpaid work time to corresponding categories of final household expenditure and public service (ie all purchases plus all goods and services provided free by governments or similar agencies).
2. Use standard input-output and occupation-industry employment tables to calculate the ultimate occupational labour-time content of each category of final output and substitute these time values for the money values for each category..
3. Adding an extra row representing the paid work time embodied in exports (ie the time devoted by members of this society to satisfying the wants of members of other societies), and an extra column representing other societies' work time embodied in imports.

Time Allocation and the Comprehensive Accounting of Economic Activity

1. TIME AND NATIONAL ACCOUNTS

A well conducted time budget survey, constructed from a sample of day- or week-long diaries covering all 24 hours, for the whole of a national population across a whole year, constitutes one sort of comprehensive account of the population's activities. Yet it does not tell us all we want to know, as economists or sociologists, about how a society meets its members' wants. It leaves out various associations between time and money, which are essential to an understanding of much of social and economic activity. Time is exchanged for money in paid work, and time is combined with money in unpaid work and consumption. For an exhaustive account, we need to find ways of bringing time-use accounts together with the money accounts conventionally used for this purpose.

Two recent pieces of economic literature (one indeed as yet only informally published) which converge from opposite ends of the economic spectrum (economic theory and national accounting practice), to contribute to one of the fundamental building-blocks of economic sociology. Gronau and Hamermesh (2002), building on a line of argument from Becker (1965) and more broadly if less rigorously Linder (1970), investigate the time and goods intensities of various final consumption commodities. Holloway et al (2002) representing a working party from the UK Office of National Statistics (hence the "ONS"), are contributing to the literature concerning the extension of national accounts by counting the market value of the services produced within and consumed by private households[1]. The scope of the

[1] There are in principle three distinct methods for valuing household production: (1) valuing unpaid labour inputs from the opportunity cost of the domestic producer's time (ie the "shadow wage"); (2) valuing labour inputs from the market wage of specialist paid workers providing equivalent services—or alternatively from the wage of a general purpose housekeeper; and (3) by valuing household output by comparison with the market prices of equivalent commodities. Hawrylyshyn (1976) reviews a range of "labour input" approaches. Schettkat (1985) while using both opportunity cost and market alternative methods in his study, states that "without doubt, the best way to account for household production would be to measure the output itself directly." (p310). Fitzgerald and Wicks (1990) respond directly to this assertion in their output study. Goldschmidt-Clermont (1993) similarly argues strongly against the input labour value approach.

2005 report from the US National Academy of Sciences Expert panel on National Accounts extensions (Abraham and Mackie 2005) is somewhat broader, but its summary recommendations in fact cover the same ground as the 2002 papers.

The central insight provided by the two papers and the relevant chapters of the National Academy report is in essence the same single, simple, table. They first construct lists of what Becker (1965) termed "Z-goods"—final satisfaction-producing activities—let us call these "final service functions".[2] They associate each element of the list, with estimates of the money expenditure on the goods and services related to it (taken from consumer expenditure surveys) and with the related time expenditures (unpaid work and consumption time, from time diary surveys), so as to produce a time-and-consumer-expenditure (TCE) table. The time may then be taken as corresponding to the labour, and the purchased commodities, to the capital, materials and intermediate products, used as factors in the production—or perhaps to avoid confusion we might refer to this as the provision—of the final service functions.

In what follows, I argue that much of interest to both sociologists and economists may be achieved by taking the matching of time and money a little further still. The TCE table, though important in itself, is just the starting point for a rather more thoroughgoing and comprehensive extension to the System of National Accounts. I propose two additional accounting steps.

The TCE table provides no sign of the final services provided by the state. Neither those background "fleets and magistracy"-type services considered by Adam Smith to be non-economic, nor the "free" services produced by government agencies and non-governmental organisations, and distributed without direct payment at the point of consumption, appear in it. Yet much of the time of particular sub-populations (eg students, the sick) may be spent consuming the latter, while the former are the background to the greater part of everything done by everyone. The TCE can

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[2] Their lists differ, but for pure accounting purposes at least this hardly matters. Gronau and Hamermesh's "commodities" are sleep, lodging, appearance, eating, childcare, leisure, health, travel and miscellaneous (constituting an exhaustive list of final expenditures), where the ONS have housing and associated services, transport, nutrition, clothing maintenance and laundry, childcare and adult care (ie including only activities involving some unpaid work).

therefore usefully be extended to include the state-provided final services, in what becomes a time-and-final-consumption (TFC) matrix. My construction of the TFC matrix includes all items of final consumption.

The time accounts also provide, in addition to consumption time, information on the paid work time contributed by people in different occupations and industries. The goods and services, denominated in money terms in the TFC, can also be thought of as constituted by the labour time of people in various jobs. I propose a second table to complement the TFC matrix, showing the labour-time content of each of the categories of final goods and services[3]. There are economic activities in other countries, imported as goods and services, which go to satisfy wants or needs of the members of the domestic population, and corresponding work activities which are exported to meet the needs of other populations. Fortunately the standard input-output matrices contain information that allows us to include these in the labour-time content (LTC) matrix.

The TFC matrix shows, separately for each element in the list of final service functions, how consumption and unpaid work time is combined with the various money-valued final outputs of the economy. The LTC matrix shows in turn how the various money-valued final outputs are constituted in terms of labour time. Combine them, and we get a matrix that shows the amounts of consumption time, unpaid work time and embodied paid work time that are associated with each final service function. These three sorts of time exhaust the time budget. So the product of the TFC and the LTC shows the whole of the "great day" of the society, the 1440 minutes of the whole population, broken down to exhibit how the various human wants or needs—the "final service functions"—are each provided for, through different combinations of various sorts of time.

This way of thinking about the economy, though generally consistent with accepted national accounting practices, has quite fundamental implications, not just for the

[3] This involves a non-trivial, but nevertheless straightforward process, adjusting standard input-output matrices to include capital flows as intermediate outputs, and combining them with an industry/occupation labour-time matrix.

detail of accounting categorisations, but also for the general vocabulary which we use in the discussion of economic activity.

I should stress that nothing in what follows implies any commitment to any particular sort of labour theory of value. Where value is added by particular categories of labour, that value can as well be represented by hours of work at given market wage rates, as by dollars of earned income. The product of the TFC and the LTC matrices simply show the amounts of the different sorts of paid and unpaid labour and consumption time associated with each category of human want. The choice of appropriate multipliers for valuing the various sorts of labour time is a distinct task. National product as defined by the UN System of National Accounts (SNA), or extended national product including household outputs, may be straightforwardly read-off from the relevant labour elements in the TFC*LTC matrix, by combining them with suitable output or productivity estimators.

2. THE COMPONENTS OF TIME-BASED ACCOUNTS

Using the TCE matrix

Gronau and Hamermesh's argument (and much of what follows here) is based on Becker's conceptualisation of household production as the combination of specific goods or services with particular amounts of time. They are concerned with empirical estimation of the Becker/Linder[4] concept of goods intensity for the US in 1985 and Israel in 1991—the (relative) rate of dollar or shekel expenditure per unit of time in each class of Z-good. In the most general terms, the time-and-money patterns in the two countries are rather similar. They find that "lodging" "appearance" and "eating" all have a relatively high level of expenditure on goods and services relative to time, and "health" has the highest of all. They show differences in goods intensities by educational level, finding, among other results that, quite contrary to the expectations from the economic literature, childcare time increases in step with childcare expenditure, with the highest human capital parents spending the most time and the

[4] The brief macro-economic discussion of time intensity in the conclusion to their paper suggest that they may also find Linder's (1970) hilariously vigorous onslaught on busyness-fetishism helpful.

most money[5]. They find a generally inverted-U shaped relationship between age and goods-intensity—unsurprising given the similarly shaped relationship between age and earnings.

They turn finally to a central concept from the Becker's (1965) paper, the "full time" comprised by the individual's total of leisure and unpaid work time, plus the time equivalent of her or his total expenditure. It emerges that "necessities" (shelter, food, sleep, and clothing) take up about 60% of full time, and that this proportion remains roughly constant throughout the life-course.

Table 1. The generic time and consumer expenditure (TCE) matrix

	Consumption time	**unpaid work time**	**household expenditure on goods and services**
service functions	**1**	**2**	**3**
1			
2			
..			

The generic similarities and the specific differences between these calculations and those of the ONS can be illustrated through the specification of the TCE table itself (Table 1). Column 1 includes all of those unpaid activities associated with each of the final service functions that would correspond to the "third person criterion" (ie activities that could be carried out by someone else without losing the direct utility derived from it: ref 193x; Hawrylyshn 1976). Column 2 includes all other associated non-work time uses, and column 3 shows the shares of household expenditure (unequivalised) on goods and services associated with each function.

Gronau and Hamermesh's calculations are entirely straightforward. They simply sum the entries for columns 1 and 2 in each row, and set these against the entries for column 3. The ONS group is concerned with the narrower task of valuing household production and estimating the productivity of domestic work, and their procedures are therefore more complex. Their column 2 estimates are totals of unpaid work time from time diary surveys, just as are Gronau and Hamermesh's. However they estimate a variant of the column 1 entries, derived also from diary studies, but

[5] This finding is consistent with the sociological literature showing the same relationship both in cross-section and longitudinally, women's childcare time increasing alongside growth in their labour force

calculating not the total time spent in the activity, but the number of separate occasions or instances that respondents engage in the activity. They count how many meals or snacks at home, clothes-washes, school-delivery trips, and so on, occur over the observation period. They then place a money value on each category of output by finding a near-equivalent market product. Thus, restaurant services of a quality related to the duration of the meal and the size of the household budget, are used to value meals and snacks at home, simple commercial laundry services to value the domestic clothes wash, a cab ride for a school delivery trip, a basic hotel night for a night's sleep at home, and so on. Then they multiply these values by the number of occurrences to get the total value-added in domestic output. And they finally subtract the contents of the relevant column 3 cell, which are in effect the intermediate costs of production, to get the net value added from the different sorts of domestic production activities.

They arrive at what we might at first consider to be depressingly low estimates of productivity for some areas of domestic output. UK nutrition-related activities in 2000 are valued at just £2.59 per hour (as compared to a statutory adult minimum wage of £4 at that time) and childcare at £3.56, though laundry and other clothes-related activities produce a respectable £7.19 per hour of net value added. But on more careful consideration we might remember that both cooking and childcare also yield other direct utilities, of the sort that economists have called "process benefits" (Juster and Stafford 1985) and sociologists think of as affective outcomes (Berk 1985, Bittman and Pixley 1997), and are now with increasing frequency carried out by relatively unpractised (and hence inefficient) men as well as by women, while home laundry provides fewer non-economic returns and is carried out chiefly by women.

What is important for the moment however, is not the difference in the two groups' research activities, but the similarities between them. Starting from two very different points, one quite abstract and theoretical, the other close to the centre of public management of economic policy, they call on the same evidence, and the same types of classification, to deal in an innovative manner with two closely connected and problematic national accounting issues.

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participation: Gershuny 1998, see also Bianchi 2000.

Final production, final service functions, and Z-goods

This convergence of theory and policy here, concerns the sometimes incomplete correspondence between what we think of narrowly as "the economy"—defined by, for example, the UN SNA—and what we might consider more generally to be "economic". My contention is that a reconciliation of these two notions turns on a more careful consideration of what is meant by the term "service consumption".

Services are intangible products, often said to be "consumed as they are produced"[6] Services within the SNA production boundary (SNAPB) include "intermediate" services (eg engineering or industrial waste management) which are purchased by enterprises, only to be used in further production processes. The SNA also includes services considered to be "final" insofar as they are sold to private individuals or households, cross the SNAPB and appear no more in the conventional national accounts. Some of these "final" services are indeed items of final consumption in the sense that they are literally "consumed as they are produced". We go to the restaurant, we consume our meal. We go to the theatre, the actors act, we consume the play (and associated services such as our interval drinks) and there is no tangible economically salient residue.[7] The play may resonate in our minds and even influence our future behaviour but such consequences are not usefully considered to be "economic".

But, from the discussions in the previous section, we see that certain of these "final" services that cross the SNAPB, are not consumed in this sense, but are used in further processes that are recognisably "economic" even though they lie entirely outside "the economy". For example, we pay garages to have our motorcars "serviced", just as we

[6] Again following the ancient example of Adam Smith: in this case from his description of the work of domestic servants.

[7] This statement, as much else in this paper, reflects no more than a pragmatic appreciation of the current socio-technical organisation prevailing in OECD societies, just as Adam Smith's quite different accounting conventions reflect those of Europe in the 1780s. Thus, under different circumstances, we might find the waste heat from the massed audience in the theatre generating electricity, which is used ultimately to grow tomatoes. In this case the theatre would be jointly producing intermediate and final outputs.

pay for petrol to fuel them—and indeed we buy the cars themselves, and none of these three commodities are consumed in any sense (other than the conventions of the SNA) as a result of the purchase. Rather, we use them, to produce a genuinely final transport service, which is for many purposes functionally equivalent to the sort of services we might alternatively have purchased from a taxi or railway company or an airline. Beyond the SNAPB, is the more general production boundary (the GPB) which includes outputs from private households such as these transport services, as well as the activities of voluntary organisations using unpaid labour to produce commodities distributed without charge to their final consumers.

Plainly "consumption", as used here, is equivalent to Gronau and Hamermeshesh's "household production", and means something quite distinct from what is intended in the conventional SNA equation of final output with investment and consumption commodities. It may be helpful here to think of Becker's (1965) Z-goods, which are combinations of given quantities of goods and services purchased from "the economy", with given quantities of individuals' time. Becker himself, in this most useful of articles, makes no distinction between unpaid work and consumption time. For present purposes, however, we must notice that there are potentially two distinct steps to the ultimate Z-products:

Household production of final service functional equivalents, using commodities purchased from the economy in combination with unpaid work time—activities outside the SNAPB but within the GPB.

Assimilation by the ultimate consumer, either of purchased final services, or of equivalent final service functions provided by the household, in real time—activities lying wholly outside the GPB.

Services produced in the economy or provided by the household are the only substances subject to final consumption in this sense—they are what cross the "boundaries of the self" from the outside to the inside. What we eat is the meal (ie a nutritional service), not its ingredients, nor, plainly, the time of its cook. And for many purposes (though admittedly not all the possible sociological purposes) the

meal is a meal, whether produced in a restaurant, or provided at home. Services, in this sense, are the unique ends of economic activity, the ultimate economic outputs, which are literally "incorporated" by private individuals for their own private purposes.

In this conceptualisation there are three sorts of economic activity: paid work, unpaid work, and consumption. Often all three are involved in the satisfaction of wants, though some instances of consumption may largely miss out one of the other two: the restaurant meal, the theatre trip involve no direct unpaid work (though the special clothes we may wear may have been cleaned at home); and the forest meal of wild mushrooms involves no purchased materials directly (though we bought the pot we cooked it in). In some cases the consumption time coincides with time in one of the other two stages: we drive ourselves and we arrive at the destination, the time spent is unpaid work from one point of view, consumption from another.[8]

The two accounting examples discussed in the previous section represent respectively the second of these sorts of activity alone, and the second and third together. The ONS group seek to add the value of household production to that of production in the economy. Gronau and Hamermesh by contrast bring together household production and consumption in the time accounts, and SNAPB outputs, initially at least, in money terms. Unlike either of these, the approach set out in the following pages attempts to account for each of the three stages separately

Final service functions

Any particular act of final consumption involves a specific sequence of prior activities, which at its longest might include some primary industry, some manufacturing, some intermediate and some final service production within the SNA, and then some unpaid work in a private household, and then finally some

[8] And most difficult of all, are those particular hours we spend doing what we are paid to do by our employer, not because we are paid for them, but because that's what we enjoy doing. Thoreau might at first claim that the pure appreciation of nature claims nothing beyond leisure time—but even he wears shoes, howsoever light, to walk in the woods.

consumption time. Let us call this entire sequence, the ""chain of provision" for a particular want. The specifics of the chain—precisely how much of each component is required to satisfy the want—depends on the technology employed. Technical change alters the coefficients, and really radical innovations can fundamentally alter its composition (as for example where the private car-owner driving himself to work replaced the tram car attendant). At any point in time, several different "modes of provision" might persist in parallel, some people, to continue the example, commuting to work by car, others by metro. The ratio between these transport media is what geographers call the "modal split"; the same term might be applied more generally to the balance between theatre and television, home meals and restaurants, professional and parental childcare, internet shopping and trips to the supermarket, and so on.

The full set of such modes of provision relating to each general category of human want—each complete set of functional near-equivalents such the car/metro, cinema/theatre/television examples—constitutes what I've called a "final service function". And we can draw up exhaustive lists of such functions, like that used by Gronau and Hamermesh, such that the full spectrum of human wants, and hence all economic activities, are included somewhere in the accounts that deploy them.

In this paper I use one such list, comprising sleep, shelter, nutrition, home-based services, travel and shopping services, out-of-home leisure, medical and educational services, together with background service usage and (as explained later) exports[9]. I must say immediately that I have no more empirical evidence than do Gronau and Hamermesh that these are the things that people actually want. In fact, were the guiding principle underlying it simply the nature of human wants in a developed society, I would immediately agree that the Gronau and Hamermesh list in footnote 1 may be a marginally better one. My own list certainly suffers from the problem, discussed explicitly by Gronau and Hamermesh, that some elements of the list might from certain points of view be considered as means for the achievement of other elements (as transport is clearly the means for getting to the out-of-home leisure, for

[9] These nine categories are in fact themselves an aggregation of a more detailed list of 21 final service functions, which was used in the original statistical work for this paper, first set out in Gershuny 1989.

example). But, followed to its conclusion, all of the wants might then be seen as ancillary to one grand and absolutely abstract want, such as the desire for "utility"—and then the discriminatory power of the accounting system would be entirely lost.

In fact the list is chosen only partly in relation to judgements about the nature of human wants, but also with an eye to various concerns which imply needs for different sorts of categorical discrimination. There is a need to provide the basis for various sorts of national accounting extension activity (which explains why it is in some respects closer to the ONS list set out in footnote 2). There are also distinct accounting requirements concerning (i) the publicly provided background service consumption category, which has no specific consumption time or unpaid work time (except perhaps that of prisoners, court witnesses, juries and so on, which is generally missing from time diary surveys), and (ii) similarly time embodied in exports which goes to meet wants in other societies, and is required to pay for imports from those societies[10]. Neither of these last two examples represent wants in themselves, but both are of substantial interest, and I judged this approach to be on balance preferable to the alternative of adding them into other functions on a pro-rata basis. In addition, there are also pragmatic considerations, such as that sleep, which would otherwise fit most sensibly together with the "shelter" category, is such a large category in itself (8 to 9 hours per day) that it is more helpful to register it separately.

[10] The "export" category has no consumption or unpaid work time, expenditure or public provision attached to it. The total value of exports is nevertheless placed in column 4 of the table where it is needed for the next stage of the calculation.

Table 2. The time and final consumption (TFC) matrix (illustrative examples)

	time values		**money values**	
	Consumption time	**Unpaid work time**	**household expenditure on goods and services**	**services provided free at point of consumption**
final service functions:	1	2	3	4
sleeping	asleep			
shelter, clothing	relaxing	Cleaning, laundry, diy, gardening	house purchase/rent, white goods, clothes, materials, maintenance	public housing, sewerage
nutrition	eating	Cooking, washing up	cooking equipment, food and other materials	
other home-based services, childcare	playing reading watch tv etc	home care of children, sick	entertainment equipment, cable etc	public and commercial[11] radio and television
travel and shopping (not travel to work)	shopping, other travel	Driving own car	car purchase etc,, transport services	publicly provided transport infrastructure
out-of-home leisure	leisure services participation		Cinema, concert etc tickets, restaurants	
medical, educational services	educ and med. participation		school fees, medical insurance	public medical and educational services
background services				national defence, courts, prisons and policing,
exports				all exports

My proposal is, in effect, to add an extra column—a second money column—to Gronau and Hamermesh's table, representing the public provision of final services (Table 2). This has, as previously noted, two components. There are the "background" services which might alternatively perhaps have had their value divided pro rata across the other functions, but which are allocated instead to the one specialised function with no associated consumption time. And there are the more "specific" public services whose consumption may be associated with particular service functions. (The relevance of the "export" row will emerge shortly.)

Clearly, each of the calculations carried out by Gronau and Hamermesh, and by the ONS group, on variants of the TCE table, might as well or better be carried out using versions of TFC table, adding in where appropriate those elements of SNA final consumption that are not included in consumer expenditure. But rather than re-covering this ground, I press onwards, to replace the money values in the TFC table with their paid labour time equivalents.

[11] Commercial television and radio broadcasts, supported from advertising and sponsorship revenue, are treated as joint outputs, part of intermediate costs of firms paying for the advertising, and also final services provided free at the point of consumption.

The labour-time content of SNAPB commodities.

The objective here is to use a version of the standard input/output tables in combination with information on hours of work by industry and occupation from labour force surveys—or preferably, from the original time diary survey materials—to substitute for columns 3 and 4 of Table 2. First we must find the industrial (and import) composition of the column 3 and 4 entries. Table 3 indicates the form of the input/output table used for this purpose. (The actual table used in the calculations in the following section in fact considered 11 distinct sectoral origins and destinations, each destination in turn adding value to one or more of the cells in these two columns).

Table 3. Ultimate industrial origins of value added in final output.

	Destinations			
	primary	**secondary**	**tertiary**	**exports**
	1	**2**	**3**	**4**
origins	**(Column %)**			
1. imports				
2. primary				
3. secondary				
4. tertiary				
	100	100	100	100
5. capital and stocks	£ value	£ value	£ value	£ value
6. final consumption	£ value	£ value	£ value	£ value

Table 3, intended to represent the relevant input/output relationships in money-value terms, presents us with an immediate problem. The total output of an economy, in any one year, is conventionally considered in the SNA as being the sum of all final consumption plus the formation of capital and the accumulation of stocks of unused commodities. But if we are to conceptualise the end points of economic activity as the extent of satisfaction of final service functions, then processes of formation of capital goods and stocks are more appropriately to be considered, not as final, but as intermediate outputs, alongside semi-finished products in the conventional accounts.

In short, we need to endogenise investment activities within the input/output framework. Consider, for a moment, how we might view economic activity, not from an annual perspective, but summarised or averaged over a decade or an even longer period. Capital and stocks are, in effect, both stored future final consumption. Of

course, if we treat them as such, we might lose track of the potential choices through which some current consumption might be postponed in order to enlarge future consumption possibilities. But though, in what follows, we endogenise capital flows within the input/output matrix, they are nevertheless still registered, and they may still be used in models of macro-economic growth.

Obviously different industries have different levels of investment registered in the national accounts. But for present purposes I have simply distributed the total investment output from each industrial sector, to each sector in proportion to its final output of final consumption commodities, assuming the industrial origin of value added in investment output is in the same proportions as that of consumption commodities (Sraffa 1963).

Table 4 Paid work time by industrial sector and occupational group

	Industrial sector		
	primary	**secondary**	**tertiary**
From diary data (mins/day):			
consumer service professions			
Managers, scientists, etc			
other service workers			
manual workers			
N of workers in each category			
Consumer service	N	N	N
..			
£ value added (from input/output tables)	£ value	£ value	£ value

The outcome of this procedure is a new table with a similar structure to that of Table 3, but now without the equivalent its row 5, showing straightforwardly, the proportion of the money value of each category of final consumption output that was added by each industrial sector.

The next step is to find the work time (and numbers) of the various sorts of workers in each industry. Table 4 represents the form of the occupation/industry breakdown of work time. Finally we need also to transform the value of imports into their work-time equivalents (in the calculations that follow I have simply used the UK average productivity rates for this purpose).

Tables 3 and 4 provide the information required for the LTC matrix. We can now turn back to the Table 2 TCE matrix, and associate each separate item in columns 3 and 4, with the labour time content from this source, and we obtain as a result a form of economic accounts which shows in a complete way how a society's time is used to meet its wants.

3. AN ESTIMATION

Data sources and the Great Day.

The UK provides just about sufficient surviving data to allow us, with a certain amount of license, to go back 40 years or so in the construction of the time accounts. The earliest surviving UK national time diary study dates from 1961 (with 2500 7-day diaries; BBC 1964), and there are, among others, approximately comparable studies from 1974/5 (BBC 1978), 1983/4 with 1400 7-day diaries), 1987 (including only adults aged 20-59), a 1995 study with 2,000 single-day "light" diaries, and a substantial diary study from 2000/01 with over 20,000 single-day diaries [12]. Table 5 is based on the adult time use evidence from the 1961 1983/4 and 2000/1 diary studies. The UK Family Expenditure Survey was carried out annually from 1956 to 2000 (when it was replaced by the Family Resources Survey); the present exercise uses the 1965 and 1985 input/output tabulations from the Central Statistical Office. Industry by occupation employment distributions were drawn from the relevant Population Censuses.

From these sources, and using the procedures set out above, we arrive at Table 5, which represents the overall allocation of UK adults' time to the satisfaction of the various final service functions, at two different point in history (the beginning of the 1960s and 200s)[13]. Every individual has 1440 minutes in their day. Table 5 shows the 1440 minutes of the Great Day of the society.

[12] Detailed descriptions of these studies and others may be found on www.iser.essex.ac.uk/mtus

[13] Table 5 provides an aggregated view of the society as a whole, but it might alternatively be broken down to show the circulation of time among the occupational groups (and the non-employed), a sort of

Table 5 The "Great Day" of UK adults, 1961 1983/4 and 2000/1 (mins per UK adult aged 18+)[14]

	UK time							Non-UK time
	leisure time	unpaid work time	UK paid work time				TOTAL UK time	
			Consumer service professions	managers, scientists, etc	other service workers	manual workers		Foreign work from imports
1961								
sleep, shelter, clothes	564	94	1	10	20	43	732	14
nutrition	94	65	0	6	12	29	206	10
other domestic	213	12	1	2	5	12	245	4
travel, shopping		25	0	1	5	8	39	1
out-of-home leisure	87		0	1	8	4	100	2
medical, educational	5		12	2	10	8	37	2
background services			1	5	13	17	36	1
exports			0	5	11	30	45	6
ALL	963	196	15	32	83	150	1440	40
1983/4								
sleep, shelter, clothes	550	83	2	8	14	20	677	16
nutrition	82	72	0	3	5	8	169	6
other domestic	268	20	1	2	4	5	299	3
travel, shopping		47	0	1	3	4	55	2
out-of-home leisure	121		0	1	8	2	132	2
medical, educational	11		14	3	12	5	46	3
background services			1	5	11	7	23	1
exports			1	7	11	20	39	10
ALL	1033	222	19	29	68	70	1440	43
2001/2								
sleep, shelter, clothes	558	88	*3*	*13*	*13*	*18*	693	*16*
nutrition	65	59	*0*	*5*	*4*	*7*	141	*6*
other domestic	244	24	*2*	*3*	*4*	*4*	281	*3*
travel, shopping		52	*0*	*2*	*3*	*3*	60	*2*
out-of-home leisure	136		*0*	*2*	*7*	*2*	146	*2*
medical, educational	8		*25*	*5*	*11*	*4*	53	*3*
background services			*2*	*8*	*10*	*6*	25	*1*
exports			*2*	*11*	*11*	*18*	41	*10*
ALL	1011	224	34	47	62	62	1440	*43*

complement to Quesnay's (1798) [1894] "physiocratic" *Tableau Economique*, in which money circulates among the Estates of France.

[14] The 2001/2 panel was constructed without access to an appropriate contemporary input-output matrix; the relevant section of the table, marked by the use of *italics*, is therefore estimated on the basis of the equivalent 1985 characteristics, adjusted to give the correct 2001/2 overall distribution of paid work time by occupation.

Historical Change in the Great Day

Though Table 5 is denominated in minutes, it is based on, and hence entirely consistent with, the money values in the relevant annual National Accounts, so it can sensibly be used as a base for calculations of "extended" national accounts of the type produced by the ONS group. Many of the essential features of national accounts appear here quite simply and in miniature. Notice, for example, that even Britain's enduring problem on its visible trade balance emerges here, as a small current account deficit (of 2 minutes) on international trade in time use!

Various features of economic development emerge with clarity as a result of comparison of the 1961, 1983/4 and 2000/1 panels.

One of the more important of these is the reduction overall of time in paid work. The total of 281 minutes per day in 1961, falls to 205 minutes in 2001. We might note—particularly since this includes travel to work time—that the later total is much smaller than the 264 and 248 minutes respectively for the US and Israel found by Gronau and Hamermesh at approximately the same point in time. It is indeed quite likely that the UK had shorter work-hours than either of these countries, but the difference more probably stems from the fact the Gronau and Hamermesh use only couples' data[15], so the UK includes more young people before they enter the labour-market, and many more older single retirees who have survived previous partners.

Within this total we see (Table 6[16]) a clear indication of increase in the skill level of the workforce. The consumer service professions—teachers, doctors, nurses and similar workers—nearly treble their proportion of the total of UK time in employment, scientific and technical workers more than double their proportion, while other service worker remain unchanged and manual work reduces by more than a third.

[15] This choice reflects the fact that Israel's only appropriate household expenditure survey was a sample of couples.

[16] Table 6, and each of the following tables, derives from calculations based on the relevant sections of Table 5.

Table 6 Occupational structure of work time

All UK paid work time	Minutes/day			% paid work time		
	1961	1984	2001	1961	1984	2001
Consumer professionals	15	19	34	**6%**	**10%**	**16%**
Engineers, scientists	32	29	47	11%	15%	23%
Other service workers	83	68	62	30%	37%	30%
Other manual workers	150	70	62	**53%**	**38%**	**30%**
Total minutes	281	186	205			

The proportion of the day required to satisfy "basic" needs (Table 7) does indeed fall over this period, while that devoted to luxuries ("going out") grows substantially, just as we would expect during a period of relatively rapid economic development. We should note that the time-based accounts demonstrate this essential characteristic of economic growth with great clarity and simplicity. The largest part of this effect comes from the reduction in manual work, whose volume is halved in absolute terms over this period. There was considerable productivity growth over this period in agriculture and construction. Indeed, the 40% reduction in paid work coupled with the small absolute increase in the level of professional and technical employment, in the chains of provision for shelter and nutrition, suggest that the productivity growth relates to an increase in their technical sophistication. We see also (comparing the cells in Table 5) very little change overall in sleep time. We should also notice, in the "nutrition" rows of Table 5, a dramatic reduction in time spent eating at home. This effect seems to have been maintained pretty continuous from the 1930s to the present day, and is found also in many other countries; it seems to relate partly to changes in diet, partly to a growth of casual "grazing" (taking snacks simultaneously with other activities and hence less likely to be registered in the "primary activity" section of the diary instrument) and partly to growth in sociable eating away from home.

Table 7 Time related to basic needs (sleep, food and shelter)

UK basic/luxury balance	**Minutes/day**			**Proportion of day**		
	1961	**1984**	**2001**	**1961**	**1984**	**2001**
sleep	564	550	558	39%	38%	39%
shelter, nutrition, home	619	595	556	**43%**	**41%**	**39%**
going out, shopping	176	232	259	**12%**	**16%**	**18%**
background servs,xprts	81	62	66	6%	4%	5%
	1440	1440	1440			

Obviously, the overall reduction in paid work is related in part to an increase in technical efficiency in a narrow sense. But notice that the fall in unpaid work is smaller both absolutely and in relative terms than that of paid: this is evidence that there is some proportional externalisation of costs going along with increasing technical efficiency. While part of the change took the general form of, for example, increasing mechanisation of farm labour, another part took the form of—an entirely characteristic phenomenon of the period—purchase and use of a domestic washing machine substituting for the purchase of final laundry services. This is of particularly importance in relation to Becker's, and subsequently Gronau and Hamermesh's interest in goods intensity. To some degree calculations of this phenomenon which do not take account of the distinction between unpaid work time and pure consumption time may be distorted (ie goods intensity understated). People must now spend more time providing themselves with what was previously acquired as part of purchased commodities.

Technical change and modes of service provision

The tracking of the full range of effects of technical change, both inside and outside "the economy", is indeed one of the main motivations behind the development of this accounting system. The "creative destruction" of jobs through technical change forms a constant thread throughout economic history, but cannot be properly understood by considering jobs alone, as the next example, of shopping and related travel, makes absolutely plain.

Table 8 Shopping and related transport

	Mins per day		
	unpaid work time	paid work time	total
1961	25	14	39
1983/4	47	8	55
2001/2	52	8	60
2001/2 index (1961=100)	208	57	154

The period from the beginning of the 1960s to the mid-1980s saw, in the UK, a rapid change in the organisation of retail distributive services. At the beginning of the

period, the characteristic British retail outlet was the fully serviced "corner store" with shop assistants taking orders across the counters which divided them from their customers, perhaps also arranging for home deliveries. In the clearest of contrasts, the equivalent British norm by the mid-1980s was the self-serviced "supermarket". Relatively little change in the overall balance of time is visible duriong the second half of the 4 decade period. The consequence of the change in the mode of provision of retail services was in part experienced within the retail premises, with shoppers carrying out (literally) some of the selection activity previously done by shop assistants. And it took place partly outside those premises: precisely because the supermarket was many times the size of the small stores they replaced, the average trip length to the shops (and the time spent parking and in other related queuing activities) is correspondingly increased. In effect the consumer's own time is substituted for various transport (from wholesale warehouse to retail stores) and shop assistant activities previously included within the money costs of retail purchases. This, again, is manifestly externalisation, imposing costs which fall outside the conventional national accounts: jobs are lost from "the economy", and correspondingly, work is increased outside it.

Self-servicing examples of this sort abound over this period. We might particularly note analogies with current information technology. There are competing "modes of provision" for particular final service functions. In the case of musical services, for example, the traditional modes of professional provision through public concert halls, compete with high fidelity recordings reproduced on domestic equipment in private homes. For entertainment more generally at this time, cinemas and theatres were competing, unsuccessfully, with television. To put it in what are not entirely anachronistic terms, new modes of service provision consisting of innovative combination of domestic equipment, software (records, broadcast programmes), and public infrastructure, enabled high quality final service production in private spaces by their ultimate consumers, rather than in public spaces by paid service workers.

The impact of technical change is nevertheless potentially "creative" as well as "destructive" of jobs. The shopping example as discussed so far involves externalisation and a net loss of jobs. But this should in no way suggest that the

movement of work activities is always and necessarily out of "the economy". Consider the extent of shopping time in Table 8. Presumably some part of this might be considered recreational as well as work-like—but a large part of it was simply necessity; there being no effective alternative mode of retail service consumption, we all had perforce to go to the supermarket. But now, with the slow emergence of web based internet grocery and similar shopping, with relatively cheap home delivery services included, producing in turn new jobs, both at the high-skill end in software development, and at the low-skill end in delivery services, perhaps resulting in reduction of the 30 current minutes per day or so of shopping time.

Leisure activities

Which brings us immediately to leisure, or at least to activities which are chosen, rather than forced on us in the short term by our established long-term circumstances. First: leisure (or discretionary) activities at home. Consumption time in this area was increasing, over the 1961-1983/4 period. Here we need to consider a more detailed activity categorisation than that provided by Table 5. Television viewing as a primary activity grew slightly, over this period, but compensating for it, in the UK, was a decline in radio-listening as a first activity, so the primary activity total of television plus radio was approximately constant (Gershuny and Fisher 1999 pp xxx). The general increase in at-home leisure time that we see in Table 5, reflects mostly growth in entertaining non-household members at home. In this case the doubled total of "unpaid work" time from 12 to 24 minutes per day reflects, not substitution for paid work, but an absolute growth in childcare as a primary activity, even though the number of children per household was declining substantially over this period.

Finally, in this quick tour of time-use change, we arrive at what is the inevitable reflection of the reduced total of time devoted to satisfaction of basic service functions. The length of the great day is fixed. So a necessary consequence of meeting basic wants more efficiently in time-terms, is the growth of time devoted to luxuries. We see in Table 9 a greater than 50% growth in time devoted to luxury consumption, And here, alongside the growth in consumption time, we find also an

absolute increase in the amount of paid work overall (even though the less skilled paid work time categories still reduce dramatically).

Table 9
Time related to luxury functions (out-of-home entertainment, education, health and infrastructure)

	Mins per day					
	Consumption time	**Consumer service professions**	**Managers, scientists, etc**	**Other service workers**	**Manual workers**	**total**
1961	92	13	8	31	29	173
1983/4	133	16	9	31	14	203
2001/2	144	27	15	28	12	232
2001/2 index (1961=100)	157	208	188	90	41	134

It is worth repeating that the central feature of this accounting system is the absolutely fixed length of the Great Day. If time is saved somewhere, it must go somewhere else. The usefulness of this approach for thinking about technical change, and about the implications of economic growth more generally, goes beyond its ability to look at its correlates external to "the economy" itself. It also leads us to consider the population's marginal propensities for new forms of consumption, that is, time- (as opposed to money-) related elasticities of demand for final service functions.

4 DISCUSSION

Social structure and the interdependence of work and leisure

The approach to time allocation developed here has a macro-economic implication, distinct from but nevertheless directly implied by, Becker's micro-economic association between items of money expenditure and the consumer's own consumption time. The introduction of the TFC matrix asserts the parallel association between the consumer's consumption (and unpaid work) time and other people's paid work time. In short, Becker's 1965 model can be shown to imply the

direct interdependence of consumption patterns and occupational employment patterns[17].

This is the real reason why the occupational content of the labour embodied in the final purchased goods and services is so important. In modern societies, individual differences in occupational specialisation (closely related to differences in individuals' own human capital) are increasingly important as the basis for social differentiation—for establishing advantageous or disadvantageous positions in societies. Different patterns of consumption imply different patterns of occupational employment, and hence different sorts of social structure.

Modern states have substantial influence over time use, not just directly through work-hours regulations and holiday rights, but also indirectly through the whole panoply of state interventions in the economy. Maternity or parental leave entitlements, worker safety regulations, child-care provisions, retirement rights, shop and other service facility opening-time regulations and so on, all have direct effects on individuals' time allocation. The consequence of this, is that time-use regulation is now emerging as a major new economic policy lever, with effects, not just on the level of economic activity, but also on the shape of social structure.

We might note parenthetically the importance of a new field of research, providing an empirical understanding of the dynamics of time use. There is an as yet hardly-asked question: can we in fact use cross-sectional differences observed in time diary studies to infer time elasticities of demand for final service functions, or must we turn to those rarest of instruments, time-use panel studies?

Set out in the foregoing is a simple empirical demonstration of how the economic activity covered by the System of National Accounts is nested inside the more comprehensive set of economic activities within the General Production Boundary, which is in turn nested within the society's overall pattern of time allocation. It

[17] A simple theorem deriving directly from Becker's 1965 assumptions shows that, given n social classes, each with a particular occupational skill and a given pattern of consumption, the consumption patterns of n-1 classes determine both the consumption and the work time of the nth class (Gershuny 2000 Chapter 8).

provides a complete and exhaustive account of the society's time, organised so as to show the forms of economic organisation through which its members' wants are met. As all accounting systems do, it involves a considerable investment in assumptions—in this case concerning not just issues such as the homogeneity of input-output relationships within the economy, but also about the ultimate purposes of final expenditures (ie the sorts of human wants that they are intended to satisfy). However, as compared with the sorts of extensions of accounting procedures to include extra-System of National Accounts (SNA) product proposed by the US National Academy Panel, by Holloway et al and Gronow and Hamermesh, it involves one, most important, category of reduction in the number of required assumptions.

Output inside the General Production Boundary but outside the SNA is by definition not in a market. So there are clearly no market prices that can be attached to the commodities produced in this region. Of course, we may make assumptions about the equivalence of these products to products which are produced for markets, as indeed the National Academy Report proposes. But these assumptions will always be more problematical than the assumptions we normally build into national accounts, for two reasons. First, the quality of these products will definitely differ from products from within the SNA, since they are produced by differently skilled (generally less skilled) workers, without formal qualification or certification for their work, and using quite different equipment and infrastructure. Second, and more important, if these extra SNA activities were somehow introduced into real markets, they would without doubt radically change the prevailing prices in these markets.

By contrast, the time-based accounting system proposed here requires no such assumptions. We observe simply that amounts of time are devoted to unpaid work and consumption activities related to particular categories of want, and we juxtapose these with the amounts of different sorts of paid labour time embodied in commodities also associated with these wants. Readers should be warned against the mistaken view that anything proposed here involves any form of "labour theory of value". On the contrary, the distinct occupational categories forming columns in the foregoing tables are intended as proxies for different levels of human capital, reflecting in turn the market wages of different categories of workers. Evidence

compiled in this general form can be used in a range of different ways—which include making either shadow wage- or producer-wage-equivalent estimates of the money value of extra-SNP production in just the ways proposed by the National Academy panel. But doing so does lose perhaps the single most important characteristic of national time accounts: the quantification of various different activities in a single measure which sums to the constant total of the 1440 minutes of the Great Day.

This total allows us to ask—and answer—a number of questions that sometimes are more appropriately answered in terms of time than of money. Amongst these are:

What is the overall balance of effort between the satisfaction of basic needs and luxury wants? We have seen (in Table 7) that the UK has shifted its time quite decisively from the former to the latter category. This shift would seem to be a reasonably unambiguous indicator of economic progress (at least to the extent that the luxury output is not composed merely of defensive consumption promoted by economic growth itself).

What is the effect of technical change on the balance among different sorts of paid employment? Tables 6 and 9 show respectively the overall shift away from unskilled employment, and the particular concentration of high skill employment related to the growing category of luxury consumption.

What is the change in the balance between paid and unpaid work? Table 8 provides us with an example which can be interpreted in part as the externalisation of labour costs, by the substitution of unpaid labour from consumers. And overall, table 5 tells us the reduction of the total of paid work in the UK by rather more than one Great Hour, has been partially compensated for by an increase of just about 30 Great Minutes of unpaid work.

All of the foregoing discussion is of the UK economy in aggregate. But the system set out here is designed to be used in a more disaggregated form, so as to show the distributional consequences of socioeconomic change. And it does so in a form that

shows the basic macro-social interrelationship between forms of consumption and differentiated social groups: it is, after all, just those "fractions of human capital" represented by the different occupational groups involved in the production of marketed commodities, that constitute the distinct groups whose life-chances either converge or diverge through historical time.

Time-use Keynesianism?

What is presented here is no more than an accounting device—but it is a device with various potential applications. I conclude with an example of one such application.

The increasing technical efficiency of production in modern economies means, inter alia, that "time constraints become more binding" as Gronau and Hamermesh have it[18]. We see, in writings such as Schor (1993), and not entirely inconsistently Robinson and Godbey (1997), the emergence, in the USA, of Linder's "harried leisure class" of well paid employees, working hours that would not have been considered excessive in the 19th or early 20th century, but nevertheless still with insufficient free time in which to spend their money.

This "money rich, time poor" phenomenon has straightforward Keynesian implications. In the earlier part of the 20th century we managed our economies by providing those with the highest marginal propensities to consume—the money poor—with spending subsidies. Now the appropriate target of such policies may be, not the poor, but the consumption-time-constrained rich. Instead of reducing income taxes, suppose we reduce paid work time without proportional pay cuts (which is of course a disguised tax on output)? The long-term consequences are not yet entirely clear, but we might nevertheless draw a lesson from the many countries in continental

[18] "Macro models using notions of household production have not considered how the interaction between time allocation and goods production might be altered as economies develop and the changing price of time alters the mix of goods produced. For example, as time constraints become relatively more binding, the macroeconomic importance of cycles in spending on consumer durable goods will be altered to the extent that these are used to produce relatively more or less time-intensive commodities". (Gronau and Hamermesh p.2)

Europe that have pursued precisely this line of policy since the late 1980s, with positive social consequences (as compared for example with the USA) and without much real evidence of concomitant damage to the international competitivity of their industrial production.

References.

Abraham K and C Mackie (eds) **Beyond the Market: Designing non-market Accountas for the United States**. Panel to Study the Design of Non-Market Accounts, Committee on National Statistics, Division of Behavioural and Social Science and Education, Washington DC: National Academies Press 2005.

BBC **The People's Activities** London: BBC Audience Research Department 1964

BBC **The People's Activities and the Use of Time** London: BBC Audience Research Department 1978

Berk SF The **Gender Factory: The Apportionment of Work in American Households** New York: Plenum 1985

Becker G. "A Theory of the Allocation of Time" **Economic Journal** 75, 493 – 517 1965

Bittman M and Pixley J **The Double Life of the Household: Myth, Hope and Experience** St Leonards NSW: Allen and Unwin 1997

Fitzgerald, J. & John Wicks. Measuring the Value of Household Output: a Comparison of Direct and Indirect Approaches. **Review of Income and Wealth.** Series 36, No. 2. June 1990 pp. 129-141

Gershuny J "Technical Change and the Work/Leisure Balance: A New System of Socioeconomic Accounts", **Technology and Economic Progress**, ed. Aubrey Silberston, London: Macmillan 1989.

Gershuny J and Fisher K "Leisure" in **Twentieth Century Social Trends** eds AH Halsey and J Webb London: Macmillan 2000.

Goldschmidt-Clermont, L., "Monetary Valuation of Non-Market Productive Time: Methodological Considerations" **Review of Income and Wealth**. Series 39, No. 4, December 1993 pp. 419-433

Gronau R and Hamermesh D "Time Versus Goods: The Value of Measuring Household Production Technologies www.eco.utexas.edu/faculty/Hamermesh/HPSeriously.prn.pdf 2002

Hawrylyshn "The Value of Household Services: A Survey of Empirical Estimates" **Review of Income and Wealth** 23 (1) pp 79-96, 1976

Holloway S, S Shor and S Tamplin **Household Satellite Account (Experimental) Methodology** London: ONS 2002

Juster T and F Stafford, “Process Benefits and The Problem of Joint Production”, in **Time, Goods and Well-Being** T Juster and F Stafford (eds) Ann Arbor Michigan: ISR 1985.

Linder S **The Harried Leisure Class** New York: Columbia University Press 1970

Quesnay F **Tableau Economomique** London: Royal Economic Society, British Economic Association [1894]

Read M, **Economics of Household Production** New York: John Wiley and Sons 1934

Robinson J and Godbey G **Time for Life: The Surprising Ways Americans Use Their Time** University Park: Pennsylvania State Press 1997

Schettkat, R The Size of Household Production: Methodological Problems and Estimates for the Federal Republic of Germany in the Period 1964 to 1980. **Review of Income and Wealth**, Series 31 (1885) pp. 309-321

Schor J The **Overworked Amewrican: The Unexpected Decline of Leisure** New York: Basic Books 1993

Smith A **An Inquiry into the Nature and Causes of the Wealth of Nations** London: JM Dent and Sons [1910]

Sraffa P **Production of Commodities by means of Commodities: prelude to a critique of Economic Theory** Cambridge: Cambridge University Press 1963