The Neglected Economy

The Unfinished Business of Measuring and Understanding Household Production, the Hidden Half of our Economic System

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Foreword

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The following manuscript contains many inventive, even profound ideas but unfortunately it is incomplete. It takes the form of an intermediate draft. In our view this version is the most recent recoverable version. Regrettably, we were unable to cross-check that the manuscript was indeed the most up-to-date version against files on Duncan Ironmonger's personal computer or the back-up drive on the University of Melbourne server. Any existing files had been deleted by the University's IT staff, during the period when Duncan Ironmonger was admitted to residential care. These circumstances will leave the reader with two obvious questions – (1) why was the manuscript never completed and more importantly (2) why would an incomplete draft be worth preserving and publishing.

Like many creative thinkers, Duncan Ironmonger's inventiveness came in uncontrollable flashes of insight. This meant while in the process of committing a wonderful idea to paper, it would provoke a fresh insight. Perhaps out of fear that he would lose the train of thought behind this new idea, he would neglect the documentation of the first idea and vigorously pursue the new thought. So, the chain of digressions would leave a trail of partially completed documents. The ancient Greek philosopher Heraclitus said, "no man ever steps in the same river twice", since the flow of water in the stream means it is always a new set of water into which the feet are treading. And so it was with Duncan Ironmonger's thinking, it was a Trotsky-like process of perpetual supersession and a restless flux striving for better ideas. The consequence is that apart from a handful of documents that reveal developmental milestones, the complete access to his overarching vision is in the form of partially completed intermediate draft. We have drawn inspiration from the famous archival material in the Marx-Engels Gesamtausgabe and think the manuscript should be preserved, imitating Fredrich Engels practice of noting, in square brackets "here the manuscript trails off" We believe that despite, its incompleteness much can be learnt from these documents.

So, to the most important thing: why should anybody bother reading this incomplete document? The answer is that Duncan Ironmonger thought he had discovered that the economy was, as he said a beast "standing on two legs". The problem was that, somehow, one leg was hidden in plain sight! He thought he had stumbled upon a way of documenting the contribution of the (unseen) second leg, which he called 'Gross Household Production' and it contributed equally (or maybe was the dominant., standing leg) of economic well-being.

Duncan Ironmonger believed that the national accounts , developed by Simon Kuznets and Colin Clark, had a sound perception of one leg, which he called the 'Gross Market Product' because it followed stocks and flows of money. Indeed Duncan Ironmonger was an enthusiastic advocate of macroeconomics and the idea of national accounts. While in the interwar years many economists had decried the attempt to measure the whole economy, using the biblical metaphor of it being like trying to 'make bricks without straw' due to data limitations. It continues to be true that the

available data is not perfect but in the construction of national accounts, economic statisticians have refused to allow "the perfect to be the enemy of the good" as the saying goes. In the construction of these accounts an approximate estimate is superior to no estimate. So one might say instead: "don't let the approximate be the enemy of usefulness". In the Post World War II news environment, the social endorsement of macroeconomic measures is so secure and mostly reported without any investigation of the procedures behind its assembly. These hallowed national account are estimates based on whatever data is available and often imputed estimates. For example, households dwelling in owner-occupied housing, may or may not be paying off a mortgage, so the national accounts attributes to these households an imputed rent. Nevertheless, the advantages of these somewhat approximate estimates for monitoring the market economy have been substantial.

Duncan Ironmonger was born in 1931. His early childhood environment was the Great Depression, when it seemed like the whole nation was one endless breadline, with many desperate for even the barest essentials. Duncan Ironmonger's first job was in the emergent national capital of Canberra, then a collection of hostel (dormitories) with communal mess hall serving a population that had increased from a prewar total of 13,000 to a postwar total of 130,000. He was employed at the Australian Bureau of Statistics and was studying at night school for a Bachelor of Commerce as a part-time student at Canberra University College, an affiliate of the University of Melbourne. Through winning a scholarship he completed his final year at the University of Melbourne. The Keynesian revolution was in full swing and the postwar economy was booming and it seemed that macroeconomics had tamed the spectre of awful depressions. Ultimately, he gained his PhD (1962) from Cambridge, writing a path-breaking treatise on demand analysis which was later published as *New Commodities and Consumer Behaviour*, 1972). From 1963 to 1966, he returned to Australia and became a Division Director at the Australian Bureau of Statistics, working on the production of national accounts. This gave him a uniquely thorough comprehension of how the measurement of Gross Domestic Product was assembled. In 1966 he left the Bureau to join Ronald Henderson at the University of Melbourne as Senior Research Fellow in the Institute of Applied Economic and Social Research. Despite becoming the Deputy Director of the Institute in 1972 and running it for five years as Acting Director, after Henderson retired in 1979, he sustained his interest in national accounts. Also, he maintained his contact with all the key figures who had codified the national accounts and universalised their collection via the United Nations.

In the latter half of the 1980s, the University of Melbourne decided to appoint a new Director of the Institute and key staff responded by leaving the University and setting themselves up as a private entity doing economic modelling and forecasting. So for five years, from 1986 to 1991, Duncan was Director of the Centre for Applied Research on the Future, a small unit in the Faculty of Architecture and Planning. In 1991 he was welcomed back to what he considered his natural intellectual home in the Department of Economics. He renamed his unit the Households Research Unit and was its Director until 2018.

By 1986, his major research focus had become household economics. He had discovered a rather odd Australian survey conducted on behalf of the Cities Commission in 1974 that followed procedures standardised by the Szalai's landmark collection of multinational data documenting the ways people used their time. Up to that point the standard economic approach was to consider households as purely a unit of consumption, but Duncan Ironmonger, a pioneer of studying consumption, now became interested in what households *produced*. He hit upon the idea of using Leontief's input-output

analysis and, to begin with, noted that time use data approximated the magnitude of labour inputs into the household production of goods and services. He was impressed by the sheer volume of production this implied. His earliest analysis documented the staggering number of meals produced nationally by households. He claimed that the household production of meals was Australia's largest industry , even though it was absent from the conventional national accounts. Later, when superior data became available, he revised this claim showing that the labour input devoted to rearing children (counting the constraints of supervisory care) dwarfed the amount of time spent producing meals.

This manuscript charts key milestones in Duncan Ironmonger's brilliant conception of what he called Gross Economic Product (GEP), a revolutionary revision of national accounts that acknowledged the role of both market and non-market production in creating economic welfare. He named the two component Gross Market Production (GMP defined as gross domestic production minus imputed rent) and the non-market component Gross Household Production (GHP – the total value of the goods and services produced by households without pay).

The first notable innovation was his bold advocacy of policy-relevant economic science. Duncan Ironmonger's imagination had been ignited by the postwar ambition that macroeconomic policy could and should tame damaging economic fluctuations, eliminating events like the Great Depression. The post-World War II era saw a huge burgeoning of social sciences based on the philosophically naive idea that science is value-free. However, some aspects of the Keynesian revolution advanced the Enlightenment era idea that human rational intellect (science) could free humans from constraints. Economic science is not value free but should guide policy to increase human welfare.

The realization of the need for Satellite National Accounts of the non-market economy

Influenced by their newly post-colonial membership, the United Nations undertook a major revision of their advice on the construction of National Accounts in 1993. They decided to preserve the existing series of Gross Domestic Product, but to recognise that much economic production occurs without a measurable cash transaction. Most blatantly obvious is the proportion of the planet's population that survives by subsistence agriculture. Moreover, much productive employment in the Global South falls outside the market economy. In addition to subsistence agriculture and other forms of women's unpaid work (especially family care) there was an obvious need also to capture 'informal employment'. The conventional measure of involvement in the labour force (one hour or more per week of paid employment) produces a wildly underestimated measure in the Global South because in many cases the majority of employment consists of unregulated activities– agricultural day labourers, sub-contracted industrial workers (e.g. in garment industries), the self-employed, workers in family businesses, domestic workers, street vendors, auto-rickshaw drivers, waste pickers, etc. In 2019 the Organisation for Economic Co-operation and Development (OECD), in conjunction with the International Labour Organisation (ILO), estimated the scale of 'informal employment' in a large sample of countries at varying stages of development (119 developed countries and 27 emerging and developing countries). Their report found that, globally, 81% of all enterprises were informal. Furthermore, 'informal' employment represents 70% of all employment in developing and emerging economies, compared with about 18% in developed countries (OECD., 2019[i]). Duncan Ironmonger was keenly interested in the economic contribution of household production in the Global South and

his work was greatly admired in India and Africa, where he got a 'rock star' reception as I personally witness on many occasions.

The 1993 United Nations' revision of the System of National Accounts (SNA) expanded the production boundary to include "goods" produced by households. As noted previously, this change was aimed at the substantial sub-populations across the globe whose livelihood depended on subsistence agriculture. Consequently, revised SNA deemed the growing of rice and chickens for use within the household as production of goods to be included in the SNA estimate of GDP even though these goods were not for sale.

However, this meant that most household production that took the form of "services," such as the cooking of rice and chickens for use within the household, was excluded from the revised measure of GDP. Instead, it was to be relegated to the new category of 'Satellite National Accounts'. The United Nations Statistical Division advocated that national statistical organizations calculate Satellite National Accounts, which would summarize the national value of all the household productive activities. Unfortunately, only a limited number of the 193 countries that are members of the United Nations have ever produced satellite accounts of unpaid household production (Australia, Canada, UK, New Zealand, Mexico. South Korea, Hungary and Georgia).The rare examples that exist have just attempted to value the labour inputs, few have a consistent series and these have had no obvious influence on policy formulation.

Duncan ironmonger was among the first to respond with ideas about how these satellite accounts should be calculated. So this unfinished manuscript by Duncan Ironmonger is a pioneering explanation of how to value the outputs of unpaid household production.

This led to a curious situation: demand for Duncan Ironmonger's ideas around the globe but little influence over his colleagues in the economics department. He was as Kat Legge says, writing in the *Weekend Australian,* something of the "international guru with statisticians … who tracked him down at his humble headquarters… the Household Research Unit close to the University of Melbourne". Statisticians in Ottawa, Canada; Helsinki, Finland, Oslo, Norway, Ahmedabad, India; UNESCAP (Bangkok, Thailand), and UNECA (Addis Ababa, Ethiopia) all sought his advice.

Valuing outputs

From the beginning Duncan Ironmonger insisted the key to satellite national accounts was to value the outputs of what he called 'household production', the primary component of non-market production. The monetary value of these goods and services can be estimated by finding prices of similar or the same goods and/or services provided by the market.

The third person criterion

He adopted Margaret Reid's 'third person criterion', which excluded any activities that could not, in principle, be provided by someone else. For example, you can't pay someone else to sleep for you and it makes no sense to pay someone else to enjoy an entertainment on your behalf as you are not directly entertained. This is an important principle because neoclassical economists typically define "work" as an activity that delivers no subjective benefits, building on Adam Smith's idea that paid work is all "toil and trouble". It follows that any activity that offers any intrinsic rewards doesn't qualify as "work". Some respected economists like Robert A. Pollak and Michael Wachter, point to the contradiction: childcare is a mixture of both production and leisure [ii]

> In the household production function model as well as in the traditional demand theory approach, the household is maximizing utility rather than output. In applying production theory to the household, the household production function literature has not attempted to draw the line indicating where production processes stop and utility begins. In empirical work, where direct measures of the relevant variables are not available, the two are easily confused.(274).

A similar conclusion might be applied to the subjective experience of paid employment. As Thomas Juster and Frank Stafford have pointed out, employees often derive enjoyment from paid work.[iii] This does not disqualify it as work. So Reid is correct in proposing that the definition of work should not depend on whether the activity is enjoyable, but on whether it could, in principle, be provided by someone else.

Why comparing the value of unpaid labour to GDP is misguided

The other key insight is that non-market outputs, just like market outputs, involve factors of production other than labour, most importantly including household capital. So when comparing Satellite National Accounts to GDP, factors other than labour must be counted. Since well-conducted time use surveys provide the basis for accurate estimates of national non-market labour times valuing labour time is a relatively straight forward process. Furthermore, comparing this estimate to GDP is a dramatic way of illustrating the economic significance of this labour. In many ways this says more about the social acceptance of GDP, than it does about the significance of non-market production. Strangely, there has been a vigorous debate a about which wage-rate to use. The alternatives are (1) a general housekeeper wage, even though such servants were plentiful in the past but are rather scarce in the present day; (2) market specialist wages for separate outputs, chef for cooking, professional cleaners, for cleaning, plumbers and carpenters for handyman jobs, etc.), and (3) opportunity cost, which assumes foregone wage rates and makes ironing a shirt by a neurosurgeon highly expensive even though they may be inexperience at ironing, take longer and more likely to damage the garment. But all this is avoided if you simply value outputs, which is the logic behind the measure of GDP. Valuing non-market production along the same lines means, as the colloquial saying goes, 'comparing apples with apples.'

Of course, separating out all the inputs into household production, apart from the labour time, is not straightforward and, theoretically one must acknowledge the problems of joint production and differences in the economies of scale between industries and households. All of this requires intellectual inventiveness and data not available in time use surveys. As Ruth Schwarz-Cowanastutely notes;

> Several million American women cook supper each night in several million separate homes over several million separate stoves - a specter which should be sufficient to drive any rational technocrat into the loony bin ...Out there in the land of household work there are small industrial plants which sit idle for the better part of every working day; there are expensive pieces of highly mechanised equipment which only get used once or twice a month; there are consumption units which weekly trundle out to their markets to buy 8 ounces of this nonperishable product and 12 ounces of that one...(1979: 59)[iv].

The fading of the 'separate spheres' model of gender roles and the mass entry of women into the paid labour force, together with the evidence of a 'motherhood penalty' in women's earnings has led to an interest in increasing participation in parenting by fathers. While time use data shows a

secular increase in fathers time with children, much of this time is spent in joint parenting with the child's mother. So, the extent to which this, apparently parental time, absolves mothers of their responsibility for parenting is less clear[v].

How Duncan Ironmonger navigates around these potential obstacles to produce a valuation based on outputs is explained in this manuscript.

The advantages of Leontief's framework

Duncan Ironmonger's choice of Leontief's framework for studying 'household production' is crucial because it recognises the non-labour inputs needed for the non-market production of goods and services. In advanced economies, raw ingredients are turned into meals, with the aid of cook tops, ovens, toasters, kettles, blenders, food processors air fryers, coffee machines, not to mention the drawer full of kitchen utensils, knives, graters, sieves, peelers, etc. Meals are served at tables set, perhaps, with tablecloths, cutlery, drinking vessels and napkins. Eaters sit on dining chairs; consuming food served on crockery and drinkware. Clothes, and other textiles are laundered using machines that wash, rinse and spin dry items, while detergents and enzymes remove dirt and stains. Floors are vacuumed, mopped clean and surfaces wiped with appropriate implements.

Private automobiles ferry household members to important locations, often to places of paid, employment, education and leisure venues. Indeed, According to the 2021 Census, on average, an Australian household owns 1.8 motor vehicles; 91% of households reported having at least one vehicle, with over half (55.1%) owning two or more. Most probably in Australia, the number of trips undertaken in private vehicles is overwhelmingly larger than those relying on public transport.

Then there is the human need for shelter. Households purchase or lease private dwellings to provide household members not only with hygienic shelter but bed linen, furniture and audio and visual devices to entertain them. Frequently shelter is the most significant single capital investment the household will make.

In addition, there is the business of providing the care necessary to raise children, attend to the needs of illness, even disability or elder care. This often requires equipment (cots, prams, specialised car seats and restraints, nappies, books, toys, mobility aids, medications, etc.) but care is very labour-intensive. The so-called 'market substitutes' for household care are most often not actually outright replacements for household care but supplements that enable carers to coordinate schedules to facilitate key activities, such as paid employment.[vi] Moreover, the time constraints of raising children in the advanced economies has grown steadily over the 100 or so years for which data is available.[vii] This expansion of the labour of parenting continues apace despite the dramatic reduction in the birthrate over this period. As you will see, when including the constraints of supervisory care, the time parents devote to childcare is greater than any other market or non-market industry. Furthermore it is barely reduced even by long day-care, non-parental childcare services[viii]

It is worth noting in this context that a peculiar characteristic of humans is that, in a sense, the infants are born prematurely compared to other species. A foal walks, a little awkwardly, following a comparatively short interval after birth but the human infant is born hugely dependent – mobility comes more slowly and the ability to communicate effectively generally takes more than 2 years. This process is perhaps the most miraculous stage in human development since it requires aural acuity, fine muscle control for speech and the harnessing of huge cortical connection to memorise

combinations of phonemes and proper word order. When the child is between 2-6 years of age, linguists talk about something called a “vocabulary spurt” where the number of words recognised by the child multiplies at an astonishingly rapid rate. Linguists have done experiments putting infants in front of televisions and discover that they acquire no extra vocabulary but have a parent in the room at the same time and the child’s vocabulary increases! Try to acquire a second language beyond your teens and speak it with the correct accent and this might give you some appreciation the profundity of this achievement during infancy.

Research on student’s school performance shows that this depends a great deal on the home environment of the student. Clearly, as the example of language acquisition shows, the parental contribution to the development of the infants human capital is crucial.

Thanks to the advocacy of Nobel laureate economist James Heckman we now have a better understanding of the immense significance of investing in high quality early childhood education (birth-to-five years). Early childhood education is vital because it fosters crucial brain development during a child's formative years. Heckman argues this stage yields the highest rate of return on the labour time invested in the development of human capital. This investment fosters crucial cognitive and social-emotional skills, leading to improved education, health, and employment outcomes, while also reducing costs associated with crime and healthcare. Moreover, formal education relies on the fact the pupils already possess the essential communication, empathy, and self-regulation skills. Without these skills there could be no effective pedagogical interactions with teachers. While, typically, economists have assumed human capital is adequately captured by years of education plus years of job experience, this overlooks the key insight Duncan Ironmonger shared with Heckman, namely: that the pre-school years investment in human capital was foundation for lifelong success, making early childhood education a wise economic and social strategy. Furthermore, the fact that most of this investment took place in private homes meant that a key form of investment was unseen and unmeasured, therefore, reinforcing the need to have an account that measured the value of the unpaid household economy.

Ironmonger’s insight in applying Leontief approach was to realise that what conventional economics regarded as the process of (final) ‘consumption’ were instead raw materials, intermediate and capital goods in a further (non-market) production process. Although there is neo-classical theorizing about household production, the view that the economic function of household is consumption somehow still prevails. However, Ironmonger comprehended that household production process turned purchases into meals, clean houses into furnished accommodation, respectable apparel and infants into sociable, citizens and employees, among other things. The market sector provided inputs into non-market production.

The non-market sector produced services that underpinned the provision of human needs, a phenomenon the economist struggled with when mis-specifying the ‘standard of living’. Duncan Ironmonger often reminded me, that where people lived in huts with a dirt floor the household economy would be small and, therefore, the ‘standard of living’ would be lower than in a three-bedroom dwelling with wall-to wall carpets, crisp bed linen, comfortable furnishings and electronically enabled lighting, appliances and entertainment.

Much of the information about the raw materials and capital goods used in household production is available through household expenditure surveys, though it is difficult to ascertain which

expenditures should be deemed inputs and which, final consumption. Future research could use this data as a means of valuing these classes of inputs. Being aware that market might undervalue caring activities, the difference between the cost of the inputs and the value of the outputs can allow for calculation of the *'value added'* by the labour of household production. Value-added is perhaps, the *most significant indicator of the economic contribution of household production,* which was, indeed, the hidden leg/pillar of the economy[ix].

Perhaps one of the most exciting extensions in Ironmonger's thinking about the outputs of unpaid household labour came in August 1996 when he heard Andrew Harvey and Arnab Mukhopadhyay presentation "The role of time-use studies in measuring household outputs" at the conference of the International Association for Research on Income and Wealth, Lillehammer, Norway[x]. This paper convinced him that hidden in time use data was vital information that facilitated the identification of the seven major outputs of the household economy and the ancillary services that supported them. He was thrilled by this 'discovery' and it seemed to him to have all the characteristics philosophers praise using the term "Occam's razor" to praise is elegant reduction of complexity.

The seven final outputs are: accommodation, meals, clean clothes, childcare, transport, volunteering, and education. In addition, Ironmonger noted, some 'ancillary' services are not regarded as final outputs include shopping and gardening. This conceptual scaffold allowed Ironmonger to seek out the prices of similar outputs available on the market. This step, from information about units of time to prices, has inhibited many analyst who believe a valuation of unpaid work by outputs would be ideal but can't imagine how you make the step from activity to prices. This makes Ironmonger's Chapter 5 "Filling In the Boxes : A New Framework for National Accounts of Household Production" the first in-depth explanation of how to move from the data in time use survey on the seven categories of household production to value these goods and services. That is what he meant by the expression 'filling in boxes'. This step made Ironmonger the equivalent of Simon Kuznets or Colin Clark to estimate the annual value of unpaid household production.

Of course, just as with GDP, we are dealing with defensible, approximate estimates. A properly conducted time use survey gives us a snapshot of the number of **meals and snacks** eaten by adults during an average week. It even gives us information on where these meals where eaten, the times of day when eating takes place and how long each episode of food consumption lasted. So that is a start, but one that on the composition, and hence the quantity and quality, of the foods and liquids consumed. There is a large range in the price of meals provided by the market. Fast food chains compete to offer low priced bundles, while at the opposite pole in Michelin three-star restaurants a meal might cost the equivalent of a week's wages.[xi] Ironmonger followed the lead of Harvey and Mukhopadhyay (1996): "Combining these estimates of adult's meals with demographic data and data from the family expenditure survey they estimated the number of children's meals… Market surveys of Canadian food establishments then provided the *average price of a meal bought in restaurants and other food establishments*." He commented on the assumption that market price "reflects the same mix of types of meals and snacks as the mix of types of meals provided by households", noting that "there would be a higher proportion of meals for babies and children in home production than in the market". Ironmonger suggests that ideally the market price might be "re-weighted to reflect the composition of household meals".

Incidentally, Ironmonger suspected that the 24-hour recall typical of most time use survey designs suffered from respondents not being able to recall all the meals and snacks they ate. “The number of meals *and snacks* eaten at home” he says, “ are most probably far too low. In time use diaries people are likely to significantly under-report the number of episodes of eating snacks and possibly also the number of meals”. Nutritionist have long noted that food diaries tend to underestimate eating occasions and the error increases in proportion to increases in body mass index (BMI), which is worrying, from a public health viewpoint. Recently, an experiment had respondents fitted with a wearable camera (taking an image every 30 seconds), while also completing a time diary for this same day. This experiment showed that whereas the time diary record was broadly consistent with the camera images, eating that accompanied another main activity (eating at a work desk or watching a screen) was the most frequently overlooked activity.[xii] It seems amazing that Ironmonger anticipated, and tried to compensate for, this level of ‘mindless’ eating.

Ironmonger was convinced that private dwellings were a capital input which unpaid household production turned into the service of **accommodation**. Adult bed nights, 99.2% at home (2006), are captured in the time diary and children’s bed nights can be imputed from the information gathered in the ‘company present’ column in the diary. Accommodation also provides more than just shelter “but indoor and outdoor space and facilities for a full range of household production and consumption activities including recreation, leisure and social interaction”, he says. As previously noted, having a significant impact on the standard of living. Consequently, he removed the ‘imputed rent’ part of GDP from the aggregate account of Gross Market Production (GMP) and transferred this quantity to Gross Household Production (GHP) and called the sum of GMP and GHP, the two-legged beast, Gross Economic Product (GEP). Private dwellings in Australia, like elsewhere in advanced economies, vary widely in the amenities they offer for owner occupied or rental properties. While the accommodation alternatives available on the market are unlikely to exactly provide the equivalent amenities of private accommodation, they also vary widely in price. So once again Ironmonger uses the average price of licensed hotels, motel and guest houses and serviced apartments to estimate the cost of accommodation per bed night produced by the unpaid household economy.

In discussing the household production of laundered items, ironmonger assumed a distinction between **clean clothing** (women’s. men’s and children’s) garments and items used by every member of the household such as sheets, towels, etc. These latter items, in a sense are public goods available to everyone in the household. Ironmonger has assumed that these items (bed linen and towels) would be included in the market equivalent the service category ‘accommodation’. He is struggling hard to avoid ‘double counting’ this part of the service of laundry performed in household without any payment.

When it comes to personal garments, he notes that “commercial laundries and hotels that offer to launder clothing do so at different market prices depending on the type of garment”. They charge a higher price for trousers, skirts and dresses than for shirts, blouses, tops and shorts and a still lower price for underclothes, socks and handkerchiefs. Thus, he believed that to estimate the gross market value of household laundry we need to count the numbers of each type of garment that is laundered by households and value these quantities at the market laundry prices for each type. His solution was to conduct a small survey in 2005 to collect information about the number of clean clothes

produced by households (differentiating by garment types for women, men and children). However, in the surviving text there is no table estimating the market price equivalent of the households loads of laundry. Personally, I am not convinced that this level of refinement, separate prices for each garment is necessary. Since laundromats offer a fixed price 'bag wash' a service that covers washing and folding but no ironing or putting away of clothes, I believe you could value each load of laundry recorded in the time diary at the price of a laundromat bag wash and argue that the double counting of the public items was offset by the omission of labour time of ironing clothes returning these items to cupboards and drawers. As with many national accounting measures this valuation might be 'good enough'.

Ironmonger reminds us that "the output of **childcare** should be measured in child hours of care, not the input hours of parents or other unpaid carers". As mentioned before, on average the time households devote to childcare is greater than the labour input allocated any of the other six branches of production. However, capturing childcare is not straightforward because much of it occurs in the context of simultaneous activity and it can often look like leisure (.e.g. watching Sesame Street with your child might get coded to the activity "watching television'). In addition, there are issues of joint production, both parents doing an activity with the child, care of multiple children at the same time, and episodes of food preparation that produces meals for both the adult and the children in the household. The crucial activities that promote language and socio-emotional development are subtle and often indistinguishable from play. And, most importantly, the is something that is often called 'supervisory care'. This is the constraint of parental responsibility, being available to step in if siblings fight or a child is distressed. Nancy Folbre uses the metaphor of parents being like fireman, constantly on-call, ready to respond instantly to the child's needs, even while the parents are sleeping[xiii]. These activities are required by the laws governing child neglect. Since being 'on call; is a state and not an activity, time-diaries, which ask to list the activities over the course of the day don't register this very real constraint of parenthood. However there is a column in the standard time use survey design that asks respondents about who was present while they were performing an episode of an activity which gives some access to this responsibility (i.e. a non-activity)[xiv]. By the time of writing the manuscript presented here, Ironmonger showed his awareness of this issue.

Many time use surveys also collect data on the presence of children during an adult activity episode. Thus, we can calculate the time adults had a child (or children) present during all activities, including sleeping. The presence of a child (or children) during adult activities in the household can be an estimate of the time a child is cared for by the household, that is the "child hours" of care. The time adults spend in the presence of a child (or children) is really the total time spent in childcare (indirect and direct care) that adult household members provide to children. This is a more accurate estimate of all the direct and indirect childcare households provide.

Direct childcare covers physical and emotional care, teaching/helping/reprimanding children, playing/reading/talking with child, minding child, accompanying child to school or extra-curricular activities, feeding and food preparation for children, travel associated with childcare activities and other childcare activities.

Physical and emotional care is composed of activities like bathing, dressing, toileting, changing nappies, brushing teeth. It also covers putting children to bed, waking children up, settling babies

and getting children ready for school, or outings. Time-use coding conventions dictate that where the preparation of children's food (including preparing bottles for babies) is jointly produced with the preparation of food for adults this activity assigned to the service of "meals"[xv]. Only where the respondent indicates the making the meals was exclusively for child (e.g. feeding baby, expressing breast milk, preparing bottles or making a meal) is this activity coded to childcare.

When parents report helping with homework, schoolwork, helping with other studies, reading, helping children do things, showing them how or giving directions about household chores this is coded to 'teaching/helping/reprimanding child'. The issue here is whether these activities should be allocated to the direct childcare or to household production of education. Many analyst might use the child's age to determine this allocation. Of course, this allocation issue is less important than capturing the value of this output in either category.

Parental activities are coded to 'playing/reading/talking with child' if they include activities such as playing with child, reading to child, talking to child, watching TV or movies with children. As noted earlier, this direct production of childcare is a vital aspect of language acquisition, emotional regulation and the development of social skill which enable formal education. Once again there is an overlap between a childcare output and an educational output. And, once again the main thing is that it is valued somewhere.

Occasionally, respondents report 'minding children' directly, indicating supervisory care, but there is no further information about the activity, such as babysitting, minding child, looking after child. However, as noted earlier the constraints of indirect care only appear via the co-presence of children information. Indirect care is a substantial constraint. Nighttime care for sleeping children illustrates that market services are not a perfect substitute for parental care. Ironmonger proposed this solution:

> An alternative and somewhat more direct and simple starting point is to use the demographic data on the numbers of children to give estimates of the total hours for which children require care. The hours of care provided by the market (in childcare centres and schools) can then be obtained by surveys of these establishments and deducted from the total to give an estimate of the residual care provided at home. This method has been used by the Office for National Statistics (Holloway et. al., 2002)[xvi] to give estimates of childcare in the UK and by the present author to give estimates for Australia (Ironmonger and Soupourmas, 2002).

In practice, to capture the indirect (supervisory) care of children, Ironmonger's estimates for Australia followed Holloway and Short's UK estimates used the price for a live-in nanny, assuming each nanny minded two children working for a 46-hour week and deducting hours provided by market care and formal education[xvii].

As every suburban 'soccer mum' can attest, parents spend a lot of time accompanying children to school or extra-curricular activities, such as children's sport or other extra-curricular classes. Indeed, there is even an academic literature on whether contemporary children are being overwhelmed by 'overscheduling' of extra-curricular activities and psychologist have developed a scale to measure this.[xviii] This draws our attention to the topic of travel associated with childcare activities**, i**ncluding taking children to or picking them up from school, daycare, other classes and the time waiting for children when picking them up. Most frequently the means of transport are private vehicles as capital inputs into producing the transport that underpins these activities.

Of course there are some other childcare activities**,** that have not yet been mentioned**,** such as talking to childcare providers or where there was no other applicable code for a childcare-related activity.

The fifth economic service produced by household is **transport** without the payment of fares. Ironmonger argues, household use their own private vehicles to drive themselves and/or their families to specific destinations. He says, "they are essentially providing their own taxis without charging themselves the fare". In addition to the driver's labour input, taxi fares cover the capital (the vehicle) and the other inputs – fuel, maintenance and repairs. A similar logic applies to share riding services, such as Uber.

Taxi fares vary by the distance travelled, combined with a hiring charge (called 'flag fall' in Australia) and sometimes a surcharge for unsociable or busy times of the day. Time use surveys provide information on the number of trips and the duration of trips at specific times of day. This information, especially when supplemented by other transport surveys, provides the basis for valuing the outputs of the household production of transport. Ducan Ironmonger comments:

> The distance travelled in kilometres can then be estimated based on the duration of the trip multiplied by average speed obtained via travel surveys. In Australia there are also annual official surveys of samples of both domestic and commercial vehicles to determine, for public transport policy purposes, the annual average number of vehicle kilometres travelled by vehicle type. These surveys provide estimates of household transport vehicle kilometres.

Around the turn of the Millennium, Robert Putnam[xix] drew attention to a phenomenon he called 'social capital', the power of voluntary associations in creating the conditions that promote civic engagement and social welfare. This work built on a tradition generally attributed to Alexis de Tocqueville[xx], followed by Almond and Verba [xxi] and further extended by Mark Granovetter's idea of 'the strength of weak ties'[xxii]. The promise that citizens' civic engagement would increase the communities welfare , without any extra, significant fiscal expenditure by the state, amplified the interest in the value of '**volunteering**'. This resulted in a slew of commissions for Duncan Ironmonger to produce a monetary valuation for the activities of non-profit organizations in the federal States of Australia[xxiii].

Incidentally, the strength of associative ties was also a concern of state socialist societies before the fall of the Berlin wall. They hoped to monitor the transition from what they called a 'socialist society' to a genuinely 'communist society' characterised by a mode of production not constrained by capitalist accumulation but based instead on the 'free association' of workers[xxiv]. This interest, when combined with the 'Marxian labour-theory-of-value', which argued the true price of commodities reflects the (socially necessary) time embodies in the products, explains why these societies were well-disposed to collecting time use surveys. This concern culminated in the landmark, UNESCO-sponsored, twelve-nations study led by Alexander Szalai, the origin of standardised time use survey methodology. [xxv]

Ironmonger distinguished between formal volunteering and informal volunteering. He called formal volunteering 'indirect volunteering' because it is mediated through an organisation. Formal volunteers offer unpaid help in the form of time, service or skills

donated to an organisation. In contrast, he calls informal volunteering 'direct volunteering' because "occurs within the personal networks of family, friends, neighbours and acquaintances".

Sometimes formal volunteers are reimbursed for expenses incurred but Ironmonger did not regard this as the payment of salary. He went on to note that "Informal or unorganised volunteering"is *direct* as it is not mediated through an organisation… It includes regular, spontaneous and sporadic help that takes place between friends and neighbours such as giving advice, looking after other people's children or helping an elderly neighbour".

Ironmonger believed that it would not be feasible to measure the specific outputs of volunteer activities, such as the provision of meals, care and other favours, provided both indirectly and directly. "Consequently', he argued "the estimates are relegated back to measuring the input time and valuing that at an appropriate market rate".

Ironmonger argued that the output of 'education", does not comply with the third person criteria, because 'education is not a task you could usefully pay someone to do for you as the benefit would not accrue to you". Formal education is a personal (and unpaid household) investment and benefits are delayed appearing only later in life as "in the form of higher income over many years". He followed the conventional process of valuing the investment in term of the income foregone for adults (15+ in Australia) pursuing years of formal education (an opportunity-cost valuation).

So, to summarize the process of estimating gross household production Ironmonger drew upon five sources of data

1. An estimate of the total quantity of household production (usually the average number of daily occurrences of this output found in the time diary);
2. The total quantity of labour time input used in household production of a particular service (hours per day derived from the time diary);
3. The market price for a unit of a particular service (dollars per unit, often taken from consumer expenditure surveys);
4. The total value of intermediate inputs in household production of a particular service (dollars, often found in expenditure surveys);
5. Since capital goods generally have lengthy lifetimes, the rental value of the capital inputs into household production of services (prices found in expenditure surveys or from appliance or car rental businesses)

From this input/output information one can calculate many significant measures. Multiplying (1) the daily quantity of household production of a particular service, by the unit price in the market (3) yields a dollar estimate for the *daily gross value of the production of this service*. Subtracting the value of intermediate inputs (4) from gross value gives a daily estimate of the *value added* in the production of this service. With this value-added estimate one can calculate the total value of the labour input by deducting the rental value of capital used (5). By dividing this total value of labour involved by the quantity of time it took (2) one can derive an *hourly wage-rate for the unpaid production of that particular service*.

Summing the production of all seven services generates four more useful estimates: the gross dollar value of all unpaid household production, the total dollar value of all intermediate inputs into unpaid

household production, the total rental value of capital inputs to unpaid household production, and the labour input across all services in hours.

Of course, this calculation provides only *daily estimates* derived from a representative *sample survey*. Macroeconomics series are about national populations and reported either quarterly or annually. Aggregating sample estimates is a regular practice of national statistical organizations as such estimates guide the delivery of government services. So the appropriate multipliers (called statistical weights) are available and are usually supplied with any official survey. These statistical weights, together with the survey design, can ensure that all days of the week are proportionately represented. Standard tables of daily time use represent an average of each of the five weekdays and Saturday and Sunday. While this an artificial day, different from any particular day, it makes conversion of daily data to weekly, monthly, quarterly, and annual estimates straight forward. The value of unpaid household production can be expressed in terms comparable to standard macroeconomic measures such as GDP.

Arguing for the advantages of using his output approach to valuing unpaid household labour over, the more conventional debate about the appropriate wage-rate[xxvi] to adopt Ironmonger made the following comments.

> This method simply solves the much-debated dilemma of which market wage rate to use – opportunity cost wage, specialist wage or general housekeeper wage… For example, if a man takes 60 minutes to prepare, serve and clean up after a meal for four people, say valued at $40 at restaurant prices, and the costs of the ingredients, energy for cooking and washing up, together with the use of the kitchen, kitchen equipment, dining room, furniture and utensils are $25, then the wage rate for the man's unpaid labour is $15 per hour. If a woman can prepare the same meal in 30 minutes, her labour would be worth $30 per hour… The use of an output valuation method on household production also goes a long way towards solving the issue of the joint production of services through simultaneous or parallel uses of time. The joint products -- meals prepared and children minded -- of the labour and capital used in preparing and minding is counted and valued at market prices. The value of the labour used simultaneously is found indirectly by deducting the materials and capital costs from the market value of the joint outputs.

Working with the most current time use survey available during his lifetime Duncan Ironmonger produced annual estimates of the Household Economy in Australia 2006 and comparable data for the Market Economy in Australia 2006. He estimated that households provided $50,380 billion's worth of bed nights' accommodation, adjusted for the under-sampling of holidays. Households produced $36.381 billion's worth of meals and $8.84 billiondollars' worth of clean clothes. Unpaid care of children accounted for another $30.179 billion. Household vehicles provided $320.496 billion's worth of transport. Household contributed a further $4,705.6 million's worth of volunteering and another $4.440 million invested by unpaid adult household member's in advancing their educational attainment.

Taken together, the total of household production of goods and services summed to $155.426 billion in Australia in 2006. In the same year, the estimated Market Economy (i .e. GDP minus imputed rent) was $114.177 billion. This is a factual demonstration that the Australian economy, properly considered, is indeed a two-legged beast, with a slightly dominant non-market leg!

What is slightly more puzzling is how conventional economists have somehow managed to avoid colliding with the hard reality of the magnitude of unpaid household production. After all, most

economists live in private dwellings, eat most meals at home, wear clothes kept clean by their washing machines, raise children, mostly travel in their private vehicles, may sometimes volunteer and encourage household member to seek the highest level of educational attainment they can. One of the unsolved sociological mysteries is how often really significant everyday things are somehow hidden in broad daylight.

In Chapter 6, Ironmonger followed the same procedure to calculate the magnitude of Gross Household Product (GHP) in the United States for the years 2003 to 2009. Furthermore, he compared this magnitude to his estimates of Gross Market Product (GMP), Gross Economic Product (GEP) and the published conventional estimates Gross Domestic Product (GDP) for the same years. His detailed analysis of American Time Use Survey (ATUS) data, supplemented by his knowledge of surveys in Europe and Japan), convinced him that in *most developed countries, the volume of time devoted to unpaid work in the household economy is greater than the volume of paid work in the market economy***.** Household expenditure statistics (and some other sources) show that the value of the physical capital used in the household economy is less than the value of capital used in the market. In terms of value he argued that in these countries *Gross Household Product (GHP) was slightly larger than Gross Market Product (GMP).* Ironmonger estimated that over the years 2003 to 2009 in the United States GHP was between 21 to 34 per cent greater than GMP and "that *Gross Economic Product (GEP) is more than twice GDP*. Most probably because the effects of his aging were inhibiting, the prose in this chapter is sparse but the key data is all there in constant 2005 dollars.

Other countries conduct official time use surveys at period intervals but only the U.S. Bureau of Labor Statistics collects annual data. While Australian (and many European) time use surveys gather data on main activities and at least one simultaneous activity for all adults in the household, ATUS gathers data on only one adult in the household and does not collect simultaneous activities, except for one question regarding children under 13 "in your care." Moreover, ATUS has a highly restricted capture of co-presence, limiting simultaneous care of children by asking respondents if someone under 12 years of age was in the same room. This means that supervisory care of children playing in another room or in the yard is lost. However, these characteristics of ATUS data are no barrier to Duncan ironmonger, because of the way he calculates the value of childcare (see above). The use of this lower quality time use collection has broad significance because so much time use data both historical data (reaching back to 1920s and beyond) and geographically (outside of Australia and Europe since the 1990s) is of similar quality, i.e. one respondent per household and only a record of single 'main' activity. Ironmonger's work on ATUS *demonstrates*, among other things, the *generalisability of his methods of calculating Satellite National Accounts* for most time use surveys.

As noted earlier, Ironmonger's input-output approach facilitates the calculation of the value added by labour. This allows Ironmonger to investigate what the average hour spent in producing each of the seven house productive services yields. The result is hourly valuation of the time spent producing that service, i.e. an *hourly wage rate* so often found in economic analysis. "The more rigorous method used in my analysis", he says, avoids the controversies about whether to use 'replacement', 'specialist' or 'opportunity cost' wage rates, "and is directly related to the scale, technology and organization of household production".

> The main point to note from these estimates is that the highest wage rate (approaching $40 per hour) is in transport, the driving of cars and other vehicles for up

to 418 miles per household per week. This is the *only* category of household production for which household members have to pass tests and qualify for a license!

Duncan Ironmonger was animated by the historical events when he realized the ATUS was available for the period of, what in the United States, was called the 'Great Recession'. One often repeated criticism of economics is that, while the discipline copes easily with 'comparative statics' (comparing two static snapshots), it is much less adept at handling 'dynamics' (modeling the path and process of change over time). This issue emerges when there are crises, severe economic down-turns, not anticipated by neoclassical economists but felt directly by the lay population. Why didn't the professionals who specialize in studying the market warn the public? Shouldn't they have devised a method of avoiding these cycles? Duncan Ironmonger thought dynamics and policies that moderated/avoided economic catastrophes was, indeed, something economists should strive to achieve. He was a public commentator who attracted attention because he made predictions about how the market economy was performing. He embraced economic modelling and *regarded forecasting as the ultimate goal of economic statistics*. His ambition was to build a microsimulation model that allowed economist to study the economic contribution of the unpaid labour of households and combine this with the already existing models of the market to gain a *truly full vision of the total economy and its future***.** This incomplete manuscript goes a long way towards laying the foundations for this endeavor and it is up to us as his successor to build upon them.

Planned table of content and map of surviving chapters (text in mock handwriting are comment by Duncan ironmonger and Faye Soupourmas-Dodich, his editor, notes to themselves about possible further revisions)

SURVIVING TABLE OF CONTENTS	**MOST RECENT SURVIVING MANUSCRIPT**
Foreword	Never solicited or completed
Preface	Reproduced here
Introduction	Reproduced here
.1 A BRIEF OUTLINE OF SYSTEMS AND SYSTEM RESEARCH Dynamic processes Data systems Economic systems, data, research and policy The interaction between social science research and policy Macroeconomic research – the interplay between theory and measurement Defining a system	Reproduced here

Defining the variables Measuring the variables Estimating the parameters Ideas to improve macroeconomics Limitations of the current framework	
.2 THE ROLE OF HOUSEHOLD PRODUCTION Economic production Household production Inputs of labour in household production Inputs of physical capital in household production Inputs of intermediate commodities in household production (*Expand*?) Household production outputs Production and maintenance of human capital Health as an Investment (*Perhaps in last chapter ?)* Household production income (*2 versions?*) Stock variables in household production Reasons for quantifying household production Intermediate inputs and contributions of capital (*Some extra thoughts Faye Soupourmas-Dodich & Duncan Ironmonger*) Summary	Reproduced here

.3 OUR TOTAL ECONOMIC SYSTEM Purpose and structure of this book Enlarging the scope of economics Changes in economic thinking The time frame of macroeconomics Microeconomic problems and policies The role of public investment The role of private investment A Brief Outline of a New Framework A brief summary of macroeconomic concepts and variables Input flows Output flows Stocks at end of period Three aims of the book	Reproduced here
.4 NATIONAL TIME ACCOUNTS Revealing the hidden reality of our economic universe Time use data: time use – what is it? A brief history of time use measurement Availability of time use data National time accounts framework – production, consumption, investment What national time accounts show – revealing the hidden household economy Some early estimates for Australia Simultaneous time Estimates from the Szalai surveys of 1965-66 Estimates published by UN in 1995	Reproduced here

Estimates published by OECD in 2011 Change in time use Melbourne time accounts American time accounts – ATUS Time accounts for India 1999 and Australia 1997 Summary (*Possible other topics in this chapter)*	
5 EARLY NATIONAL ACCOUNTS OF HOUSEHOLD PRODUCTION Early estimates of the value of the household economy Norway United States United Kingdom Other countries *(National accounts of household production)* Input-output tables of household production Input-output coefficients of household production More input-output tables of household production (Needs Work) New estimates of Australian household production	No surviving version (perhaps absorbed into other chapters and abandoned as a separate chapter)

.6 A NEW FRAMEWORK for NATIONAL ACCOUNTS OF HOUSEHOLD PRODUCTION A brief outline of a new framework for household economy accounts Categories of household outputs Goods, services and consumption Accommodation varieties	Has become **Chapter 5. Filling in The Boxes : A New Framework for National Accounts of Household Production** and analyses Australia data.

Meal varieties Clean clothes varieties Child care varieties Transport varieties Volunteering varieties Education varieties Source data Calculated data Aggregate data Advantages over other methods New estimates for the Australian total economy 2006 Gross Market Product and Gross Economic Product	
7 UNITED STATES NATIONAL ACCOUNTS OF HOUSEHOLD PRODUCTION Estimates for the United States total economy 2003-2009 Introduction Data sources and methods (*Move from Appendix*) The magnitude of GHP in the USA The components of GHP Imputed wage rates (*Not an addendum*) United States household production and the great financial crisis Some results and some questions Some answers Some more answers The effects of GFC on the components of GHP Accommodation	Has become **Chapter 6 United States National Accounts of Household Production,** which clearly unfinished and jumbled between manuscript and appendix (of key tables).

Transport and clean clothes Care, meals and snacks Hypothesis disproved Tentative conclusions	
8 THE CHALLENGE TO UNDERSTAND THE ROLE OF HOUSEHOLD PRODUCTION New frontiers for economics and policy A program of research on the role of household production in the total economy The behaviour of the economic system Household economic behaviour Household spending of time Household spending of money Using household capital goods Household decisions Groups of household decisions Short-term decisions Medium-term decisions Long-term decisions A macroeconomics of the life-course Innovation, new commodities and Schumpeter The business cycle, macroeconomics and Keynes A challenge to Economists, Statisticians and Policy Makers Summary and Conclusion	Never completed.
Bibliography and References	Incomplete
Acknowledgements	Reproduced here
Index	Never completed

PREFACE

Economics is the social science discipline that seeks to understand the ways in which economic systems operate to produce and distribute economic goods and services to meet the needs and wants of people.

There are two systems of production – the Market Economy and the Household Economy. Progressively, and now almost universally, economists, economic statisticians and policy makers have focused on the Market Economy as measured by Gross Domestic Product (GDP) in the United Nations System of National Accounts, the national income, production and expenditure accounts.

This is a book about the outrageously neglected household production system – the Household Economy – the production and distribution of services within and between households without payment – the Non-Market Economy. Further it seeks to measure the value in monetary terms the value added by this production – Gross Household Product (GHP). As a consequence we can obtain a monetary value of the total economic system – Gross Economic Product GEP). The book also indicates how the household economy and the market economy interact, how they are mutually supportive and interdependent.

The measurement of household production is an exciting new field for empirical economic research and analysis. The monetary value of the total economic system has now been measured in a number of countries. Done correctly, the measurements show that in many developed countries the Household Economy and the Market Economy are of comparable magnitudes. This is a big surprise for many, who following earlier, inadequate estimates, have thought that household production was only one third the size of market production.

There is growing interest in research on the macro-economic importance of the value added by households using their own unpaid labor and their own capital. Governments in many countries (e.g. Australia, Canada, Finland, Germany, Italy, New Zealand and Norway) have been providing millions of dollars for their national statistical offices to collect regular data on household time use. These data then help provide estimates of GHP, the value created by unpaid labor and household capital (Duncan Ironmonger 1996a, 2001).

The remainder of this Preface is a chronological outline of my journey in this new field.

My Early Views on the Role of Households

Those who taught me economics in the early 1950s brought me up to regard the role of households as the place where the commodities produced by and bought from the market were consumed. The idea of households producing commodities was, and probably still is, rarely mentioned. A major part of this role was to choose which commodities and what quantities to buy and consume given the commodity prices and the money available to buy them. This part of economics is known as 'consumer behaviour' or 'consumer demand'.

From the age of 17, whilst working in the Australian Bureau of Statistics[1] in Canberra, I studied economics and statistics through the Canberra University College and the University of Melbourne. This included completing in 1957 a thesis for the degree of Master of Commerce,

[1] Then named the 'Commonwealth Bureau of Census and Statistics'.

Consumer Expenditure in Australia, 1947-48 to 1954-55. This research provided a detailed extension to **204** *commodity items* for the eight year period of the just **12** *commodity groups* of consumer expenditure published in the Bureau's National Income and Expenditure accounts. These extended detailed estimates were planned to form the basis of a larger statistical analysis of consumer demand in Australia.

In the late 1950s I had a chance to go to Cambridge in England to continue this analysis. However, I soon became more interested in the theory and measurement of the role of *new commodities* in consumer behaviour. So my PhD was on "New Commodities, Quality Changes and Consumer Behaviour". For the empirical part of this work I had available a much greater volume of data for the United Kingdom than I had brought from Australia. Some of the British data I used covered years as early as 1800 and as late as 1958. My most detailed econometric analysis used the data for 220 commodities published by Richard Stone and Deryck Rowe for the years 1920 to 1938.

In 1960 I returned to the Bureau in Canberra and subsequently advanced to become Director of the Bureau's secondary industry division responsible for producing the monthly, quarterly and annual statistics of manufacturing production and building.

In 1966 I moved from producing statistics to using them. I accepted an invitation to a research post as a senior research fellow at the new Institute of Applied Economic Research[2] at the University of Melbourne with Ronald Henderson as Director. My main work was to start macroeconomic modelling and forecasting of the Australian economy and to be the foundation editor of the *Australian Economic Review*. Subsequently I found that other researchers were starting to quote my PhD thesis in their publications; this led to my arranging for it to be published in 1972 by Cambridge University Press as the Department of Applied Economics Monograph 20: *New Commodities and Consumer Behaviour*.

During my first 34 years of work in economics and economic statistics I continued in the mould of thinking about the role of the household in the same way as I had been taught – *the household consumed, it did not produce.*

Data on Time Use and the First Input-Output Table of Household Production

While the ideas surrounding the household economy were being formulated it seemed that there was no way to make the ideas effective. This all changed in 1984 when I discovered there were data on how people spent their time, not just in paid work but for every minute of the 24 hour day and the 168 hour week. These data were from the first comprehensive survey of time use in Australia[3]. Clearly, adults were spending as much, if not more, time in unpaid work in household production than they were spending in paid work!

The Australian survey had been inspired by the publication in 1972 of the volume *The Uses of Time* edited by Alexander Szalai which contained the results of the co-ordinated multi-national survey of time use in twelve countries in 1965-66.

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[2] Subsequently named the 'Melbourne Institute of Applied Economic and Social Research'.

[3] The survey in May 1974 by the Australian Cities Commission of time use by representative people aged 18-69 years– 717 in Melbourne and 776 in Albury-Wodonga.

In 1986 I was able to set up the Centre for Applied Research on the Future within the Department of Architecture and Building in the University of Melbourne. The purpose of the Centre was to conduct research on the future of small social systems – households, informal groups and small businesses. It was established partly with the foundation sponsorship of the Australian government's Commission for the Future. Support also came from several business and government organisations including from the Australian Department of Science, Australian Research Grant Project No. A786-15397: 'The Input-Output Structure of Household Productive Activities'.

This grant enabled us to prepare the first ever input-output table of household production which showed the detailed use of labour, capital and intermediate inputs to each of the 12 outputs. Essentially it amalgamated the results from the 1974 Australian time use survey and the 1975-76 Australian household expenditure survey. I prepared this table with Evelyn Sonius and it was first published as *Household Productive Activities*, the second Research Discussion Paper of the Centre for Applied Research on the Future.

In 1987 we invited many Australian scholars working on the roles of women and of families to come together to present their research in conjunction with ours at the University of Melbourne in a workshop on "The Future of the Household Economy and the Role of Women". Nearly all of these papers and the contributions of the commentators were published in 1989 in the book "Households Work".

Contributors to the book were:

> *Chapter Authors:* Helen Brownlee, Bettina Cass, Mary Draper, Kathleen Funder, Jacqueline Goodnow, Duncan Ironmonger, Adam Jamrozik, Dianne Rudd, Evelyn Sonius, Jenny Trethewey, Peter Whiteford
>
> *Commentators:* Dorothy Broom, Meredith Edwards, Margo Huxley, Frank Maas, Elizabeth Ozanne, Peter Saunders, Merle Thornton, Ross Williams, Maryanne Wulff.

The contributors represented a broad cross-section of both the academic and the policy department research being conducted at that time on household productive activities, women in the household and income support for households. They came from the Brotherhood of St. Laurence, the Women's Policy Co-ordination Unit, the Department of Social Security, the Social Justice Strategy Unit, the Australian Institute of Family Studies (3), the Australian National University, the University New England, Macquarie University, Flinders University, Swinburne Institute of Technology, the Social Welfare Research Centre (University of NSW) (3) and the University of Melbourne (5).

The Value of Family Transfers

Looking back over my research I see that in 1982 I had my first realisation that the role of the household was far greater than just (a) buying and consuming commodities from the market and (b) supplying the market with labour. I was invited to write a paper on the topic "Income Security and the Future" for a workshop at the Australian National University in Canberra. This paper showed that the value of transfers *within households* was almost twice as great as the transfers *to households* from governments via the public tax and benefits system.

> "Family transfers are twice as important as community transfers. Estimates for 1975-76 show cash benefits to persons from governments (community transfers) provided about 12.8 per cent of personal disposable income

whilst cash and kind benefits from other individuals (family transfers) provided about 24.0 per cent of personal disposable income." (Ironmonger (1982) p 21)

In retrospect, my estimate of family transfers (mainly from parents to children) was grossly underestimated because I valued the transfers only at the cost of the purchased inputs from the market. The estimate did not include a value for the unpaid time and for the household capital used in the production of meals, care, etc. within the household. It took another four or five years for me to realise the full value of these transfers. Even so this led me to realise that the methods of describing the economy as expressed by governments were grossly inadequate. They dealt with only a limited part and in some situations a very modest part of the real economic activity of the community.

Household Production Input-Output Tables for Other Countries

In 1986, at the time we were preparing the first estimates for the input-output table of household production, we unearthed a number of published estimates of the value of household production for countries such as the United States, Canada, Britain and Australia. These are mentioned in my 1987 paper[4].

It took a few years for the idea of preparing a household production input-output table to be adopted for any other country. However, in April 1993, Statistics Canada held an international conference in Ottawa on the measurement and valuation of unpaid work. One of the workshops of the meeting was devoted to "The design of input-output accounts for the non-market economy". Michael Thoen of Statistics Canada presented Canadian household input-output tables[5] which were an extension of the existing input-output tables of the Canadian market economy. These were the next set of household input-output tables published for another country.

The Ottawa meeting had 150 participants and represented a variety of statistical agencies, universities, associations and interest groups. They came from Australia, Belgium, Brazil, Canada, Denmark, Finland, France, Germany, Hungary, Luxembourg, Japan, New Zealand, Spain, Sweden, the United Nations, and the United States.

It was attended by many of the world's experts on time use and household production. These included:

Jens Bonke (Denmark),Keith Bryant (USA), Ann Chadeau (France), Robin Douthitt (USA), Maria-Angleles Duran (Spain), Robert Eisner(USA), Barbara Fraumeni (USA), Luisella Goldschmidt-Clermont (France), Andrew Harvey (Canada), Klas Rydenstam (Sweden) and Dieter Schafer (Germany) *plus* Judith Frederick, Chris Jackson, Katherine Marshall, Doug Norris, Michael Thoen and Leroy Stone from Statistics Canada.

In my paper to the conference (Why measure and value unpaid work?) I said

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[4] *Research on the Household Economy*, *Research Discussion Paper No 1*, Centre for Applied Research on the Future, Melbourne: University of Melbourne. Republished as "Households and the household economy", Chapter 1 In *Households Work* (1989)

[5] *The Value of Household Production in Canada, 1981 and 1986, National Accounts and Environment Division discussion paper*, Ottawa: Statistics Canada.

> "We should all realise that what we are talking about at this conference is not just a marginal addition to our knowledge, a marginal addition to our national statistical systems. We are talking about a major change in our view of the world and a major change in what needs to be measured.
>
> "We need to measure and value unpaid work; that much is agreed. What we are talking about at this meeting is making visible, in the most useful way possible, about one half of all valuable economic activity. We are talking about how we can put in place the most efficient systems that can open up the other eye of the "statistical binoculars" with which we view *the economy*. Unfortunately, one lens of the binoculars has been closed so we can't see what is going on inside the household.
>
> "Our present economic accounts and other economic statistics on such concepts as *work* or *employment*, purposely, incorrectly and dangerously, make unpaid work invisible and of no "value". We have come very close to saying that unless goods and services are paid for by cash or credit card, they are of no value and hence unworthy of consideration. We say to the world, every time we issue the national accounts, "Ignore the non-market economy, it is of no consequence."

It seems that the economics profession has systematically subverted the system of accounts for its own convenience and purposes.

Nevertheless, in my view the conference gave a boost to the slow process of including measurements of household production in the national accounts and I hoped it could "mark a turning point in the world's view of economics".

Following the Ottawa conference I visited Norway, Sweden and Finland. In Oslo I was the guest of Statistics Norway (Iulia Aslaksen), in Stockholm the guest of Statistics Sweden (Klas Rydenstam) and in Helsinki the guest of Statistics Finland (Iiris Niemi).

As a result of these visits household production input-output tables were prepared for these three countries[6]. In effect these were the earliest estimates of Gross Household Product (GHP) for these countries which included the contribution of physical capital not just human capital (labour).

Further Progress towards Estimating GHP

Three more milestones were (1) the Fourth World Conference on Women in Beijing in 1995 that called for governments to measure and value women's unpaid work, (2) the Eurostat initiative to organise the harmonised European time use studies and the contract to Statistics Finland to produce a blueprint on how satellite accounts of household production could be prepared (including my insight about final outputs and ancillary activities) and (3) the advance by the United Kingdom Office of National Statistics to produce output based estimates of GHP for the United Kingdom – Sue Holloway, Sandra Short and Sarah Tamplin (2002).

In 1996 I contributed an invited paper to the special issue of *Feminist Economics* in honour of Margaret Reid entitled "Counting Outputs, Capital Inputs and Caring Labor: Estimating Gross

[6] Norway (Aslaksen and Gravningsmyhr, 1995), Sweden (Rydenstam and Wadeskog, 1995) and Finland (Viahavainen, 1995).

Household Product". This has become my most cited paper. Some quotations from it are appropriate in this Preface.

> "Society now has to grapple not just with the everyday usage of words such as "economic", "value", "work" and "leisure" so that we can communicate with each other in sensible ways, but it also has to deal with the capacity we now possess to measure and quantify such words in terms of regular statistics which monitor how much each of these activities is taking place or how much value our economic and social systems are producing. …….
>
> "The economic statistics of work and production are used extensively in framing public policy and in business decisions. Thus it matters a very great deal what activities we understand, define, and measure as "work" and "leisure" not only because this shapes everyday discourse but also because the reporting on the measured "variables" actually affects our lives through practical government and business decisions." (Ironmonger, 1996, p. 38)

This 1996 paper also repeated some of my 1993 Ottawa paper's thoughts with a bit more force. In conclusion I wrote:

> "The way in which we have allowed market measures of work and value to dominate our view of the world is potentially dangerous. We accept these figures without question and hence have come close to saying unless goods and services are paid for by cash or credit card they are of no value and hence unworthy of consideration. Every time a statistical bureau issues the national accounts or the employment statistics it says to the world – "ignore the household economy, it is of no consequence".
>
> "We need a major change in our view of reality, a major change in what needs to be measured, and a major change in our thinking about the way in which families and households participate in economic activity. Households provide as much care, nurture and maintenance directly, and without recompense, to the members of their own and other households as the whole output of the market economy. The reality of the huge unpaid contribution of households to economic value needs to be accepted; adopted as a benchmark fact, it would change nearly all of our deliberations about economic and social policy." (Ironmonger, 1996, p. 60)

In the late 1990s a number of meetings were held in Washington DC that led to the development of the United States American Time Use Survey (ATUS) by the Bureau of Labor Statistics. This is a continuous survey of representative samples of United States adults from 1 January 2003 which has now enabled a continuous series of quarterly and annual estimates of time use, household production and of Gross Household Product for the United States.

In the 21st century economists now have the measurement tools they need to explore the total economic production system of both market and household and consequently to engage with policy makers in government and business to help create a more equitable and efficient total economic system.

D. S. IRONMONGER

Department of Economics, University of Melbourne, September 2017

INTRODUCTION

This book is intended to be simple enough to be read and comprehended by the 'ordinary reader' but still to be complex enough to engage the experts – economists, economic statisticians and policy makers.

This Introduction summarizes some of the big ideas that have emerged from my research on the total economic system of production which consists of two interconnected systems – the market AND the household. As I often say "The economy needs two legs to stand, walk and run." Here "the economy" is being identified as the integrated sum of these two intimately interwoven elements. This is a fundamental shift in economic thinking.

Consequently, both legs of the economy need to be measured separately and continuously as parts of the single system of national accounts of economic production and consumption, expenditure and income. In every country of the world these more comprehensive accounts would provide the major new set of measurements for macroeconomic research and policy to replace the existing incomplete set of accounts.

Economics has been defined as the science of production, distribution and consumption. Adam Smith's main contributions to the science of economics were to lay the conceptual foundations for measuring a nation's wealth not by its gold or silver reserves but by its levels of production and also to champion free market capitalism as the most effective economic system. Levels of production are now measured by what is known as Gross National Product.

Although Adam Smith was emphatic in specifying that the purpose of economic production was consumption by humans, I doubt he had any idea that such a high proportion of this production occurred within households using their own unpaid labour and household capital.

Adam Smith states "It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from the regard for their own interest."[7] Their own interest is obviously the monetary profits they make from the sale of these commodities. He makes no reference to the role that the members of households play in collecting, assembling, preparing, cooking and serving the meat, beer and bread as dinners for consumption by all household members.

Household members do this for their own collective interest. But there is a difference: no money is placed on the table to pay for the dinners before or after they are consumed. Money of course has to be found to buy the ingredients, to pay for the heat and light involved and for all the cooking utensils, crockery, cutlery and furniture and furnishing of the dining room. But wages are **not** paid for the work the household members do in

[7] Wealth of Nations, Book I, Chapter II.

cooking, serving and washing up afterwards. This unpaid labour and the rental value of the household physical capital are missing from the current versions of the national accounts.

As we shall see, this was not always the case. Early statistical attempts were made to include these important parts of the complete economic system of production. This basic concept that the true economy is a combination of the Market and the Household has virtually disappeared from economics. This is particularly since WW2 and the dominance over the last half century of the United Nations System of National Accounts as the basis of measurement of the economic system.

I contend that the very deficient measurements provided by the current estimates of GDP and GNP are highly likely to give a distorted view of the complete economic system and thus a distorted basis for economic policy.

Despite some efforts there is still much unfinished business to complete in measuring the magnitude and movement through time of the household economy in every country of the World. As this is done I suggest there will be a much sounder basis for economics, economic research and economic policy.

Some dozen or more ideas about this measuring process are outlined during the course of the book. These are summarised as follows:

1. We need separate estimates of **Gross Household Product (GHP)** for the Household Economy, not just 'adjustments' to Gross Domestic Product that is frequently the approach of statisticians in the United States. Each of the two legs of the economy should be visible not just the market leg nor a single, fatter, total leg.
2. The final outputs of household production are **services** which fall into just seven **principal functions** –

   Accommodation – number of person-days at home
   Meals and snacks – number of meals and snacks at home
   Clean clothes – number items cleaned
   Child and adult care – number of hours of child and adult care
   Transport – distance travelled person-kilometres
   Volunteering – number of hours volunteered
   Education – number of hours in education.

3. Other activities such as house cleaning, shopping and gardening are regarded as 'ancillary' or 'auxiliary' activities that contribute to the final service outputs. This idea of principal functions and ancillary activities was conceived whilst I was in Helsinki at Statistics Finland in 1997 providing some input into their report for Eurostat on how to prepare a satellite account of household production. The output of an automobile factory is the number of vehicles produced. The purchasing and cleaning activities that also take place for an automobile factory are covered by the sale prices of the vehicles sold.

4. Estimates of the **Gross Value of Household Production (GVHP)** should be based on estimates of the quantities of the *outputs of household services valued at the prices for equivalent services available from the market*. This is the method used at present throughout the System of National Accounts (SNA). The SNA also uses this method to impute a rental value of owner-occupied dwellings which are not part of the market economy. Episode data from time use surveys can provide estimates for many of the output quantities – e.g. meals, accommodation nights and travel trips.
5. The estimates of the total input of unpaid labour to GHP should include the unpaid work that is done as **simultaneous (parallel or secondary) time input** to household production. This is especially important in measuring the time spent in caring for children where some two-thirds or more of the caring time is simultaneous.
6. The full costs of the **physical capital (dwellings, vehicles and equipment)** used in household production needs to be included in the estimates of the value added in household production, not just estimates of the depreciation of the physical capital items used during the accounting period. The full costs can be estimated by the sum of the rental values of the stock of the various items of household physical capital.
7. The existing national accounts data provide estimates of the **Intermediate Inputs to Household Production** (the materials, energy and services purchased from the market) that can then be deducted from GVHP to give estimates of the combined total value added by labour and capital in household production (GHP).
8. The **total value of labour input to household production** is calculated by deducting from GHP the estimates of the value added by physical capital input.
9. The **average labour wage per hour in household production** can be calculated by dividing the total value of labour input by the total hours of unpaid labour used in each accounting period. If the capital and intermediate inputs are estimated for each of the seven categories of household production services, the average wage per hour for each service may be calculated.
10. We need more useful estimates of **Gross Market Product (GMP)** for the Market Economy which ***excludes*** *from Gross Domestic Product (GDP) the imputed values for the housing services provided by owner-occupied dwellings*. These services are part of Gross Household Product (GHP). [When the United Nations Statistical Commission was preparing the 1993 revision of the System of National Accounts (SNA), I understand some market economists argued for the exclusion of these imputed values from the GDP estimates since they were not part of market production.] Adding GHP and GMP gives estimates of **Gross Economic Product (GEP)**, not 'Extended GDP'.

11. Although the Public Sector of the economy (General Government) is strictly not part of the Market Sector because its outputs, such as defence, police, parliamentary government and the judiciary are not sold, in this book the **Public Sector is regarded to be part of the Market**. Government Enterprises, which do charge for their services, are of course part of the Market. US data from the BEA suggest that the public sector contributes about 10 per cent of GMP which on my estimate would be about 5 per cent of GEP.
12. Evidence from both developed and developing countries does not support the view that household production is more prevalent in developing countries. The evidence is that **as countries develop, household production increases faster than market production.** The United Nations System of National Accounts (SNA) includes subsistence farming and fishing as part of the SNA definition of Gross Domestic Product (GDP) because these activities produce "goods" which though not sold, could be sold. The labour input to subsistence production is also, technically, part of labour used in market production, not household production. In addition, in developed countries households use much more physical capital than in developing ones, thus giving a higher GHP.

1. ECONOMIC SYSTEMS, DATA SYSTEMS, RESEARCH AND POLICY

> *"The task is, not so much to see what no one has seen yet; but to think what nobody has thought yet, about that which everyone sees…* " (Arthur Schopenhauer)

> *"The crises we face are systemic in nature. To overcome those crises we need to understand how systems work. To arrive at such an understanding we need to think systemically… There appears to exist a general systems laws which apply to any system of a certain type, irrespective of the particular properties of the system and of the elements involved*." (Ludwig Von Bertalanffy, General System Theory: Foundations, Development, Applications)

In the *Preface*[8] I stated, "Economics is the social science discipline that seeks to understand the ways in which economic systems operate to produce and distribute economic goods and services to meet the needs and wants of people." Consequently, it would be constructive to start with a chapter that outlined what I mean by economic systems, data systems, research and policy.

Dynamic Processes

The world can be viewed as comprising a large number of dynamic systems. However, real world dynamic processes can be examined at a great variety of levels. These levels form a hierarchy of increasing levels of aggregation.

First, they can be viewed as individual systems such as 'a school', ' a steel company', 'a field of growing wheat', 'a man driving a car', ' a woman enjoying a concert', or 'a growing child'. Then these systems can be considered at the higher levels of 'the school system', 'the metal industry', 'the farm', 'the car traffic system', 'the concert audience' or 'all children'. But they may be considered at higher levels again – 'the education system', 'all manufacturing industry', 'the crop growing industry', 'the transport system', 'all entertainment audiences', or 'all people'.

Data Systems

At every level, each system, potentially, should have a corresponding data system could be used to track, research, forecast or control it.

Although at the individual or micro-level there are very large numbers of real world systems and corresponding data systems, at higher levels of aggregation there is only a limited, and more manageable, number of systems and macro-level data systems.

Data systems are created to provide regular data about a dynamic process or system. Data can be used for (1) monitoring past performance, (2) understanding relationships,

[8] No copy of the this preface has survied

(3) predicting future performance, and (4) adjusting future outcomes. These uses can be called (1) tracking, (2) researching, (3) forecasting, and (4) controlling and they can be applied to almost any dynamic process whatever its nature – social, economic, biological, electronic, mechanical, psychological or physiological.

Mackay (2013) writes about "understanding, predicting, controlling and designing" the complex systems that are around us or of which we are part. Thus my 'tracking and researching' is his 'understanding'; my 'forecasting' is his 'predicting '; and my 'controlling' could be regarded as also covering 'designing'.

According to my framework, tracking the system is observing and monitoring past performance. *Researching* the system is establishing connections and understanding relationships both inside and outside the system. *Forecasting* the system is predicting future performance of the system under given or simulated future conditions. *Controlling* the system is changing future outcomes through policy alterations and movements of control instruments within the existing system.

Integral to the effective operation and continuing existence of *any* dynamic system are these four activities which require data. However, the data requirements of real-world dynamic systems vary. Consider the differences in the data systems required for walking, cycling, driving a car or flying an aeroplane. As a transport system increases in complexity, so do the data system requirements. Progressing from the transport system to the entire economic and social system we see the order of magnitude increase in complexity. However, the same principles of tracking, researching, forecasting and controlling similarly apply.

For any country, developed or developing, the economic system is an aggregation of the activity and behaviour of millions of individuals and households, thousands of business organisations and hundreds of public departments from local, state and national governments.

The macroeconomic system, the economy, of every country is a dynamic system that is measured by economic statisticians and studied by macroeconomists. The theoretical frameworks for these measurements and studies are **theoretical constructs** that evolve as ideas and data develop and interact. An economy is just one level of viewing the world.

To help track, research, forecast and control this vast macroeconomic system national statistical organisations have been established and financed to collect data and organise dozens of data systems. These provide the raw materials for the tracking, researching, forecasting and control functions. The central role of the national statistical organisation in research and policy is shown in Chart 1.

Chart 1.1. The Central Role of the National Statistical Organisation in Research and Policy

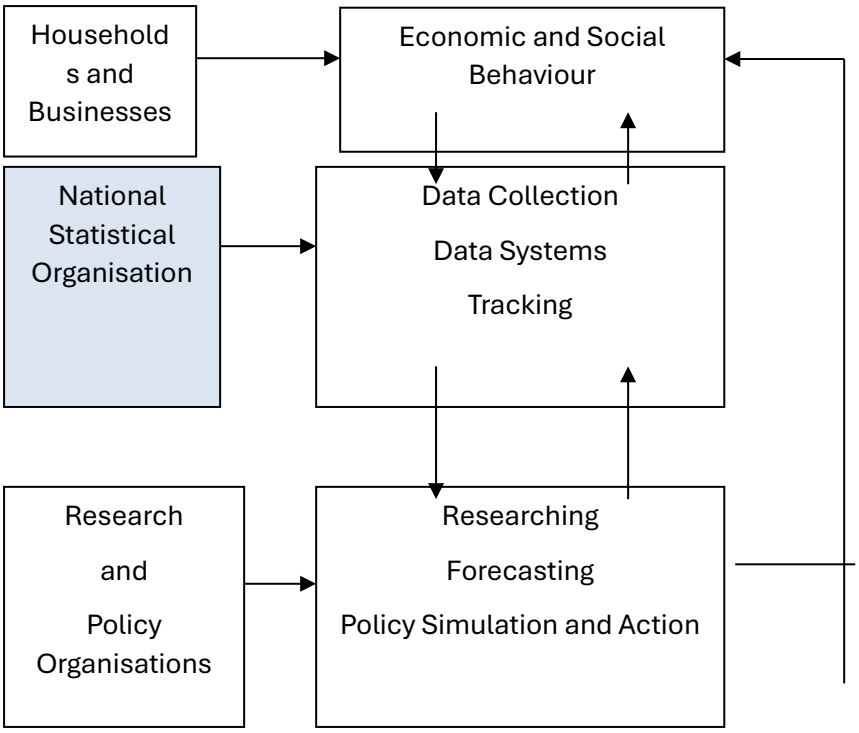
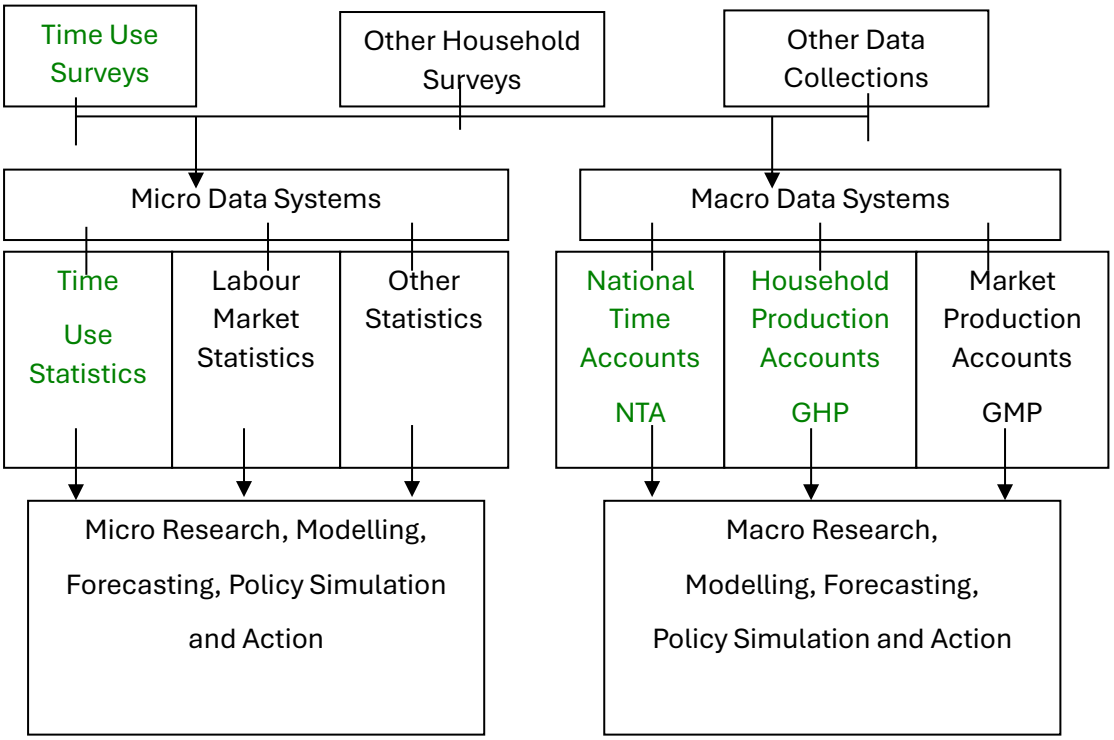


Chart 2 shows some details about the organisation of national surveys and data systems in relation to economics research and policy. The various micro and macro data systems – especially the new *time use statistics, national time accounts and household production accounts* - are shown in relation to the existing data systems. The chart shows how these data systems fit into research, modelling, forecasting and policy action.

Chart 1.2. The Organisation of Surveys, Data Systems, Research and Policy



As social scientists studying the economic and social system, or parts of it, economists, sociologists and psychologists *create and define* the endogenous and exogenous variables and the various parameters and boundaries of the system. Chapter 2 discusses these ideas in more detail.

In conjunction with statisticians and policy advisers, social scientists choose what variables are measured and the operational methodologies for obtaining these measurements. As experience generates knowledge, and as policies are implemented, some variables are discarded or re-defined and others are added.

The next section begins with a brief discussion about the crucial interaction between social science and policy.

Economic Systems, Data, Research and Policy

The Interaction between Social Science Research and Policy

Martin Rein (1980) challenges the view that there is a dichotomy between social science and social policy. He examines the assumptions that lie behind many studies of the utilization or under-utilization of social science research. These studies accept, in varying degrees, a dichotomy between knowing and acting and take as a premise that there is a one-way flow between knowledge and action. Rein takes on a different perspective, namely that concepts, ideas and knowledge have no meaning independent of their use. Hence, he asserts, "the task of research is to uncover the uses and interests that are served by knowledge"(Rein: 1980: 366).

We often talk, rather loosely and generally, about the economic and social system. It is the job of economic and social scientists to study this system. Sometimes we study parts of it, its sectors or sub-systems. Sometimes we attempt to study or model the whole. What is often overlooked is that the system for the determination and implementation of policy is part of the economic and social system; often the most critical part of the system. Thus what emerges from this discussion is that the research system itself – which is co-extensive with the policy process – is also a critical part of the economic and social system.

Specifically, the research sector is concerned with expanding our knowledge about the economic and social system. Hence in that sector, and in the model[9] of it, there are all the systems for modelling the complete system, obtaining data, testing the theory of how the system works and specifying concepts and definitions in relation to policy objectives.

Gunnar Myrdal is perhaps the most articulate spokesman for this approach to research. In his detailed review of the concept of the utilization of labour, Myrdal demonstrates the close connection between ideas and their practical application. He argues in his book *Asian Drama* (1968: 2060), that one cannot study the facts of underemployment without having a clear understanding of the policy implications to which the concept leads. Thus, there are no facts about underemployment and unemployment that are independent of the policy considerations that inform them.

Thus, following the Myrdal-Rein world view, it is seriously misleading to see the gathering of research knowledge about the functioning of the economic and social system flowing one way into the design of policies. A more complete and more satisfactory view of the

[9] To be a complete system, all sectors of the economic and social system, including the policy and research sectors need to have appropriate sectoral models.

interaction between research and policy is to regard research and policy as mutually influencing each other; policies and potential policies shaping the research agenda as much as research results informing the design of policies.

Macroeconomic Research – The Interplay between Theory and Measurement

The science of economic research is part of the broader science of research on social systems. To scientifically investigate and understand any system – to engage in research – it is necessary to define and measure the system. This means setting the limits of what is studied, the scope of the enquiry - the landscape or the terrain. This can be applied to all types of 'systems' – an ecological system, a river drainage system, a weather system, a political system and so on. The main function of theory is to set up a model that will lead to explanation, prediction and control of phenomena. Models mirror only certain limited aspects or facets of reality.

Macroeconomics is essentially an empirical science where the economic system is examined and the regularities are observed. It involves an ordering of facts and an elaboration of generalities. The difficulties are not only the complexity of phenomena but in the definition of the entities under consideration.

Undertaking research on an economic system involves a number of steps. These involve defining the system, its entities and variables; and then measuring the variables that change through time and estimating the system's parameters (the coefficients which remain constant).

Defining a System

First, an economic system (an economy) needs a geographical boundary (a region, a country or the whole world). Much of macroeconomics is concerned with the study of individual countries but with connections through trade and finance to other countries of the world.

This book is confined to analysing the structure and issues of a closed economy (without international trade). However, looking at the medium-term issues listed above, this does not mean that insights will not be drawn from comparisons across countries. For example, the different diffusion rates of new technology across countries provide an invaluable set of information about the different circumstances and impacts of these technologies. So measurements of the household economy, including time use, across countries can provide insights beyond those obtained from just a single country through time. Different country policies can also be brought into the analysis. To this extent a world-wide view is part of the discussion in this book.

The ideas developed in General Systems Theory by thinkers such as Ludwig von Bertalanffy (1968) are worth noting when defining a system. In *General System Theory (1968)*, he writes that "the main objective of the biological sciences is the discovery of the principles of organization at its various levels". System theory advocates the formulation and articulation of scientific theory and the measurement and interpretation of a phenomenon where previously there were none.

Another thinker in this area is economist Kenneth Boulding who with Ludwig von Bertalanffy and others founded the Society for General Systems Research[10] at the 1954 annual meeting of the American Association for the Advancement of Science.

System theory talks about "open" systems. What exactly is an open system? Every living organism is essentially an open system. It maintains itself in a continuous inflow and outflow, a building up and a breaking down of components, never being in a state of equilibrium. Through time, households are forming, changing, breaking up, ceasing. Into each part of the economic system there is a flow of new ideas which have influences on the behaviour (choices) of the units in the system.

Economics research is a grand quest for an understanding of reality – how the economic system functions and works. The world itself is too complex to model literally in all its details. It is the task of the researcher to select entities, variables and measurements that provide a model which, although incomplete, is nevertheless useful for understanding, forecasting and controlling relevant aspects of the economic system.

Defining the Variables

Second, the elements or entities of the system – households, firms – and the variables of the system – consumption, production, investment, saving, inputs, outputs – must be defined.

A time frame for behaviour – the time horizon – short, medium, long (not infinite) – needs to be specified.

The frequency or period of measurement requires consideration. Are measurements made by seconds, minutes, hours, days, weeks, months, quarters, years or decades? This will determine the reaction time periods of any functional relations between variables.

Measuring the Variables

*Third***,** measure the variables of the system.

[10] In 1988 it was renamed the International Society for the Systems Sciences.

This essentially involves deciding what can be measured, what cannot be measured, what methods of measurement are available and how precise these measurements are. Great discoveries in scientific enquiry have depended on the capacity to measure (observe) a phenomenon. For example, developments in astronomical knowledge are dependant on the precision of the measurement tools. The first optical telescopes measured only visible light but with the development of radio telescopes other frequencies of celestial radiation could be detected.

Scientific discoveries also depend of defining the components of a system in an organised way. In the physical sciences the periodic table of the elements is used to organise our knowledge of chemistry and physics. Similarly in macroeconomics there is a need to be clear in defining the components of the economic system and to obtain appropriate measuring procedures to observe economic behaviour.

Estimating the Parameters

Fourth, specify the functions or relationships between the variables – the behaviour of the system. This requires estimating the constants or parameters of the system.

My aim is to uncover any "hidden" assumptions of the present theory. Have economists got it right in the way they have defined and specified the macroeconomic system? My answer is that they have made a start but there is still a long way to go, particularly in scope and time horizon.

The end process of macroeconomic research is for research results to interact with economic policy makers. In the framework espoused by Martin Rein, the research should inform the policy and the policy issues should inform the research.

The process should not be a one-way flow of ideas where research results inform policy. There should be a reciprocal interaction between researchers and policy makers in the attempt to understand the effectiveness of policies as they are implemented or not implemented. Successful policies lead to better 'control' of the economic system and the moderation of the effects of external 'shocks'.

Ideas to Improve Macroeconomics

The next Chapter will summarise the main elements of the current macroeconomic theory – what is currently defined and measured. I will propose an improved macroeconomic framework, re-defined and measured, so there is a better chance of discovering what is really going on.

This re-defined system should –

(1) Include household production – the missing part of the total economic system. This involves enlarging the concept of investment to correctly allocate items which are at present incorrectly allocated to consumption and to also include investment in human capital as part of total economic investment; and

(2) Lengthen the time horizon beyond the short-term business cycle. This involves including changes in the technology of production and consumption through the diffusion of new commodities and including changes in household demographic structures through changes in fertility, longevity and household size.

Admittedly, these are great alterations to the scope and concepts of most of the current theory of macroeconomics. However, they are necessary if we want to appropriately meet the currents demands on public policy. My aspiration/hope is that these ideas will find acceptance among my fellow economists and economic statisticians and also will be understood by our policy makers and the general community.

Limitations of the current framework

Unfortunately, the current macroeconomics framework is limited in terms of both scope and time horizon.

The *scope* is because economic production is conventionally defined to exclude household production. The current macroeconomic system of production is narrowly limited to production that is (1) produced and sold by businesses or (2) produced by governments and not sold but financed by taxation. The production of services by households for their own use (or for the use by other households) that are not sold is excluded (with one major exception, the rental value of accommodation services provided by owner-occupied dwellings). Households are seen as providing labour for the market economy and as consumers of goods and services purchased from the market. Households are not considered to be producers or to be investors in capital goods to be used in household production.

The investment by households in dwellings for their own occupation is regarded as part of investment by the market economy. On the other hand the investment by households in vehicles, household furniture, equipment and other durables for their own use in production is classified as consumption. It would be more logical to treat both of these types of expenditure as investment in household capital for household production.[11]

[11] In the case of parents, who are investing increasing amounts of time spent in childcare, one of the outcomes of household production is the human capital embodied in the grown children (more about this investment in subsequent chapters).

Every economist is living, acting and experiencing their part of household production within their own household but the economist's thoughts, theories and measurements are almost entirely about market investment and production.

Economists give great importance to theories and measurements of households buying goods and services from the market (the economics of consumer behaviour) and theories and measurements about households selling their time to the market (labour economics). The theories and measurements about household investment and production get very little airplay in comparison with the theories and measurements about market investment and production.

The *time horizon* of macroeconomics research is frequently limited because the theory generally focuses on the short-term horizon of the business cycle of four to five years. The present macroeconomic framework assumes the technology of production and the broad structure of the system are more or less constant. Medium term changes in technology and demography which have structural effects on production and consumption are usually ignored.

Occasionally the longer-term effects of demographic change are considered, particularly the effects of the ageing of the population on the proportion of the population able to supply labour for market production. However, as the household economy is ignored, changes in the technology and the broad structure of the system of household production are also ignored. Some of these changes have had substantial impacts and may take place quite rapidly.

The fundamental problem is that current macroeconomic models ignore the household economy as a producer and investor longer term issues. Although there are instances of longer-term analysis, macroeconomics is predominately focussed on the short to medium term. For example the diffusion and innovation of new household productive capital is seldom taken into account. Also, investing in human capital can only really be measured over the long term.

Consequently, within this restricted framework the range of macroeconomic policies that could be considered for implementation by governments is limited both in scope and temporal horizon. Opening up the scope of economic production to include household production and to encompass a longer time horizon will provide a better framework for macroeconomic theory. In turn, this enlarged theory should provide a better framework for considering major problems that can only be tackled by the collective action of governments.

Removing the limitations on scope will require the measurement of a wider range of macroeconomic variables, the re-definition and re-estimation of some of the existing

variables and the estimation of a wider range of behaviour functions connecting the exogenous and endogenous variables of the total economic system.

Lengthening the time horizon to include longer term effects of changes in production and consumption technology in *both parts* of the system will require the additional identification and measurement of relevant variables and behavioural functions such as the speed of diffusion of new commodities and effects of movements of households through the stages of the life course.

In summary, it seems that the present vision of the macroeconomic system has been poorly specified and defined. It is akin to defining and researching the plants of an ecosystem in a land environment but omitting to study the effects of the animals, birds and insects.

From another perspective, the *problems* that the present macroeconomics is designed to deal with are limited. This may be a consequence of the limitations of the scope and time horizon. Macroeconomics has had some success with improved policies for moderating short-term fluctuations and war and post-war disruptions to the system. These controls are not yet perfect. Perhaps a wider approach to understanding the total economic system could lead to improvements in the policies already in use.

Beyond that, there are a number of other major longer-term problems such as poverty, inequality and the use of environmental resources for which insights and policies could emerge from a wider definition of the economic system and the time horizon of its operation.

2. THE ROLE OF HOUSEHOLD PRODUCTION

"What has made this nation great? Not its heroes but its households." (Sarah Orne Jewett, American writer, 1849-1909).

Economic Production

Some 250 years ago, in his lectures in jurisprudence at Glasgow University, Adam Smith outlined the purpose of economic production. Specifically Smith contended that "The business of commerce and industry is to produce the greatest quantity of the necessities of life for the consumption of the nation."(Meek, Raphael and Stein, 1978: 390) He also summarised this maxim somewhat more succinctly and simply as "Consumption is the sole end and purpose of all production" in his great book *An Enquiry into the Nature and Causes of the Wealth of Nations*[12],

In short, the objective of the economic system[13] is to satisfy human material needs and wants through the provision of goods and services that satisfy these needs. Ultimately the production of goods and services is for the satisfaction of human needs and wants.

Essentially, the end purpose of economic production is the *final* consumption, or the use of these commodities, by the members of households. Final consumption is defined by the United Nations system of national accounts as "the use of the goods and services *emanating from production*[14] for the satisfaction of the individual and collective needs and wants of households and the community"(United Nations, 1992: 3)

There are a large number of human needs and wants that are satisfied by consumption. People of different age, gender and ethnicity, would have different priorities among the various wants; different commodities[15] would have different capacities to meet specific wants. Some wants such as water, food and shelter are basic necessities for existence. Others such as travel, companionship and entertainment are higher up the hierarchy of wants.

In this book, individual human needs and wants are examined under just seven broad but exhaustive categories of services. These essential services for the maintenance of human life include:

- Accommodation, including entertainment
- Meals, including snacks and drinks

[12] Smith, 1776 Vol. II, Book IV, Ch. VIII[12], p. 179 – Chicago University Press Republished, 1976

[13] Defining the boundary of an economic system is discussed in Chapter 1.

[14] Emphasis added. I assume this means that goods and services emanating from the environment, such as air and sunshine, are not coming into use by means of economic production.

[15] In my terminology, I use the term 'commodity' to mean both goods and services. The distinction between 'goods' and 'services' is discussed in Chapter 6 on page 114.

- Clean clothes
- Care and development of children and care of ill, disabled or elderly adult household members
- Transport
- Volunteering, i.e. services to other households either directly or through volunteer organisations
- Education

These services are provided both by households (without remuneration) and by business and government organisations (with remuneration).

In addition, the collective needs of the community, such as defence, law and order, and public roads are provided to both households and businesses as public services by general government organisations financed through taxation and borrowing.

The seven categories have been selected partly on the basis of what is feasible to be **measured with currently available data systems** in many countries[16]. Health services, which are provided by households, by business organisations and by governments, are another category that possibly could be measured in many countries.

The economic system has the purpose of satisfying human *material* needs and wants by providing services that satisfy these needs. Humans have many other *non-material* needs and wants (such as affection, understanding, participation and identity). The full range of needs and wants have been extensively categorised and discussed by others like Maslow (1943) and Max-Neef et al (1991).

Non-material wants/needs may sometimes be met as joint products from the consumption of economic services used to satisfy material needs and wants. However, it is challenging to assign an economic value to non-material wants/needs as they are notoriously problematic and difficult to count and measure.

In summary, the economic system maintains itself and human society by the economic production of services that satisfy human needs and wants!

Household Production

In 1977, the American writer Scott Burns painted a picture of the relative roles of the household and the market in providing for human services. He wrote:

> "Individuals increasingly find it more beneficial to invest in the household economy than in the market economy." (Burns, 1977:55).

Moreover, Burns noted that:

> "In primitive societies, as we have already noted, there is virtually no market economy. Much of the work is done collectively and co-operatively (fishing, preparing for crops, taking in crops, hunting, etc.). How the economic product is distributed is a matter decided by the social order." (Burns, 1977:78)

[16] The role of data systems in economics is discussed in more detail in Chapter 1

In advanced economies Burns observed that:

> "While the marketplace makes dramatic assaults on home production in some areas (such as food preparation) and continues to lure workers into the labour market, households are making somewhat less dramatic inroads on the usual preserves of the marketplace, particularly in the areas of services." [No page number given, Eds.]

Burns also commented on the role of the government in providing "collective" services.

> "The market and the household have now reached an unhappy standoff, marked by the growth of consumerism. The household is now beginning to regain lost ground. Meanwhile the collective economy has also enjoyed very rapid growth, usually at the expense of the marketplace but sometimes at the expense of the household." (Burns, 1977, Page 80)

Household activities and market activities (the household economy and the market economy) work together and are integral to each other. This is a symbiotic relationship. The two parts of the total economic system have a mutually beneficial relationship. It is one of both cooperation and competition. The two parts also coevolve as technologies change and populations change demographically.

Some particular activities are complementary, such as driving to and from market work and the market work itself. The driving to work supports the paid work and the paid work provides the money income to pay for the costs of running the car. One activity completes the other.

However other activities, such as meals at home and meals away from home, compete with each other. In measuring the quantity and valuing these competitive services allowance needs to be made for potential quality differences between the two sources. Research on the quality of United States meals is discussed below in greater detail.

To highlight the significance of household production to our everyday lives, readers are invited to make their own estimates for a few key questions about the relative importance and quality of their *own household production of services in comparison with their use of these services from the market*.

These questions include:

> (1) How many meals and snacks per week do you and your family prepare at home rather than have prepared in restaurants or fast-food outlets? How healthy are these snacks compared to meals purchased in the market?
>
> (2) How many nights per year do you and your family spend at home rather than in hotels or motels?
>
> (3) How many journeys per week do you and your family make in your own vehicles rather than by taxis or public transport? and
>
> (4) How many hours per month of care of children, disabled and elderly members of your household are provided by your own household rather than by market based carers?

All these household produced services are provided without payment. Of course, households purchase from the market the 'intermediate inputs' and sometimes households hire servants to provide meals and child care in their own homes. The paid labour time involved in these services is part of market production, not household production.

In most cases the answers to these questions would surely lead to the conclusion that your household provides the vast majority of the services – the market just a small fraction! Perhaps you can briefly talk about the quality of the services provided by households on average compared to the services provided by the market – for example household provide superior meals, quality childcare, accommodation and transport. Although it is difficult to objectively quantify the quality of household services, the quality of services is a very important issue. The household plays a crucial role in providing services to individual household members and the quality of these services contributes significantly to the standard of living. How nutritious and healthy was the home cooked meal, how comfortable the accommodation, taking care of your own elderly parent or child… a home cooked meal and sleeping in your own bed cannot be easily or cheaply replicated by the market!

The importance of household production in satisfying various human needs and wants can be seen through the prism of data from national statistical office. For example the United States Bureau of Economic Analysis, the Bureau of Labor Statistics and other sources have compared the production and supply of *final consumption services* to individuals by households with the production and supply of *final consumption services* by market businesses and public organisations. Comparisons between market and household production include the numbers of bed nights in households versus the number of paid nights of accommodation; the number of meals provided at home versus in cafes and restaurants; the distances or number of travel journeys provided by households' own vehicles and drivers compared with those provided by taxis, trains, buses and aeroplanes.

Although some broad indications of the relative magnitudes of the two avenues of production are given below, more detailed data will be presented in subsequent chapters.

For example, the United States Department of Agriculture Economic Research Service has made estimates of the shares of the US food sources provided at home and away from home for the population aged two years and older. (Lin and Guthrie, 2012) This research has shown a large increase in the away from home source over the years from 1977-78 to 2005-08. The report also assessed changes in the nutritional quality of food away from home (FAFH) versus food prepared at home (FAH). Although there was an increase in meals prepared away from home, there was a decrease in the nutritional quality of these meals. Disturbingly, the share of calories from away from home food rose from 17.7 per cent to 30.6 per cent; the fast-food share rose from 3.1 per cent to 13.2 percent and the restaurant share from 3.3 per cent to 6.7 per cent.

The authors conclude that:

> “In the past three decades, FAH has changed more in response to dietary guidance, becoming significantly lower in fat content and richer in calcium, whereas FAFH did not. In 2005-08, FAFH was also higher in saturated fat, sodium, and cholesterol and lower in dietary fibre than FAH.” (Lin and Guthrie, 2012 p. i)

They also report that

> “Given the current epidemic of obesity among Americans, the higher caloric intake associated with FAFH has drawn particular policy attention … More research on the effects of regular, long-term consumption of FAFH on caloric intake, diet quality, and weight status is needed, but our results suggest that its association with higher caloric intake and lower diet quality deserves public health attention.” (Lin and Guthrie, 2012 p. 13)

The above example reinforces the old adage that there is nothing better than a home cooked meal and emphasises the stark discrepancy between the quality of services provided by the household compared to the market. The household is vitally important in maintaining the well-being of its members.

Inputs of Labour in Household Production

Another way to truly appreciate the significance of household production in our everyday lives is for you to consider how much time per week your partners and other household members actually spend in unpaid household production activities as against the time you all spend in paid market production activities.

Some members spend more time in paid work than unpaid; but others spend more in unpaid work than paid. There are now excellent national statistics for many countries which show that for most developed countries the unpaid is greater than the paid *if the volume of unpaid care work is counted correctly.* (See Ironmonger, 2004, p 93-100)

Chapter 4 presents and discusses some detailed statistics of the labour time used in both household production and market production for a number of countries and recently for the United States.

Inputs of Physical Capital in Household Production

By including household production in our models of the economy there needs to be a fundamental change in perceptive regarding the use of household physical capital - housing, vehicles and equipment . To use these types of capital requires either their ownership or their renting. A small proportion of households have access to these types of capital free of charge – for example by a relative or friend. If provided by a business to an employee or by government (such as for military personnel) it may appear to be free of charge but probably means a lower salary.

The production of household services involves capital as well as labour. In most countries, there has been a great enlargement of the stock of capital equipment used in household production and increase in the intensity of the capital involved in household production.

In his book *The Household Economy,* Scott Burns has many suggestions for making strong points about the rise of capital in household production. Burns (Figure 5 page 33) gives US data for December 1971 for saturation indexes of 22 key items of household equipment ranging from Black-and-white televisions (99.8%) down to dishwashers(29.6%) and food waste disposers (28.4%). This table doesn't show automobiles, telephones or computers. The table is from M*erchandising Week* February 28, 1972(put in footnote) Burns also quotes annual sales of items (e.g. eight million vacuum cleaners) and shows in $billion the value of household assets for non-farm home ownership and consumer durables.

The United States Bureau of Economic Analysis (BEA) publishes data for the net stock of consumer durables covering everything from automobiles, light trucks, furniture and household appliances down to books, computers, computer software, bicycles and photographic equipment.

The following table shows estimates by the BEA of the various groups of consumer durables held by US households at the end of the year 2015. In total, they amounted to $5,236.8 billion or $39,270 on average for each of the more than 133 million housing

units. These estimates do not include clothing which also can be regarded as a consumer durable.

Table 2.1. United States, Consumer Durables, Current Cost Net Stock, 31 December 2015

Asset	Total Billions of Dollars	Dollars per Housing Unit (a)
Autos	570.1	4,275
Light trucks	929.6	6,871
Motor vehicle parts & accessories	14.8	111
Furniture	653.2	4,898
Clocks, lamps. Lighting fixtures	145.8	1,093
Carpets and other floor coverings	111.7	838
Window coverings	64.3	482
Household appliances	240.1	1,801
Glassware, tableware & household items	230.9	1,731
Tools & equipment for house and garden	107.7	808
Video & audio equipment	354.0	2,655
Photographic equipment	17.5	131
Personal computers and peripheral equip	105.6	792
Computer software and accessories	62.8	471
Calculators. typewriters & other equip	5.8	43
Sporting equip, supplies, guns & ammo	288.1	2,160
Motorcycles	63.7	477
Bicycles & accessories	25.0	188
Pleasure boats	73.6	552
Pleasure aircraft	8.3	62
Other recreational vehicles	54.6	410
Recreational books	149.6	1,122
Musical instruments	25.6	192
Jewellery & watches	420.5	3,221
Therapeutic appliances & equip	194.4	1,458
Educational books	71.9	539
Luggage & similar personal items	183.5	1,376
Telephones & facsimile equipment	56.1	413
Of which Vehicles	**I,719.7**	**12,886**
Equipment	**3,517.1**	**26,384**
TOTAL Consumer Durables	**5,236.8**	**39,270**

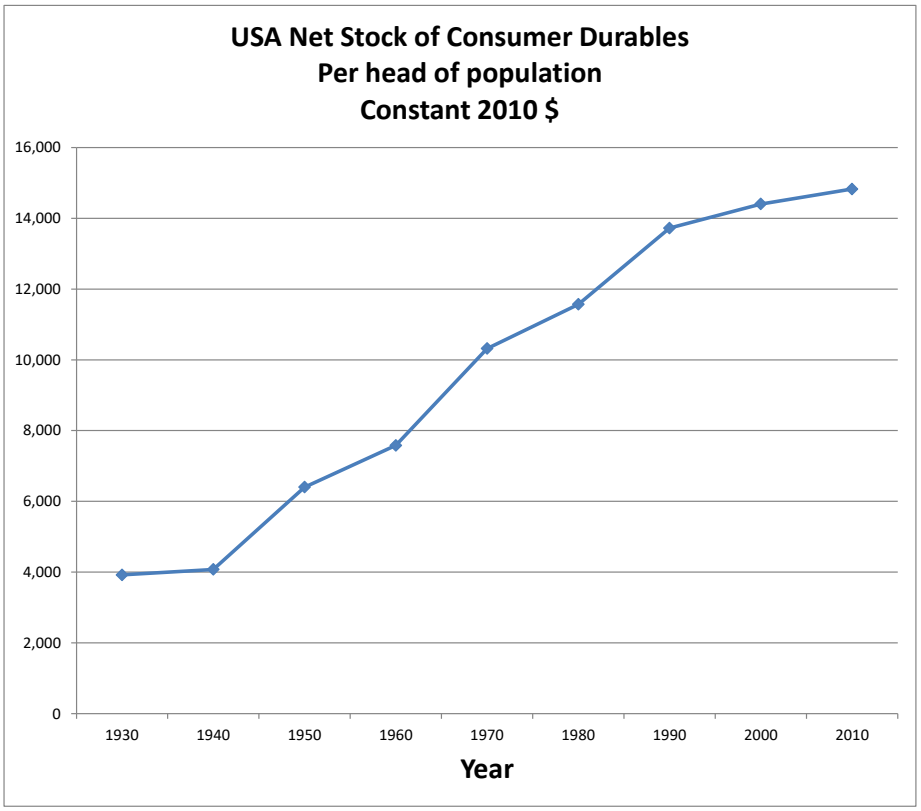
(a) 133,351,840 units. Source: US Census Bureau, American Community Survey

Table Source: United States Bureau of Economic Analysis

The following chart shows the aggregate value of consumer durables in the United States over ten-year intervals from 1930 to 2010. The current dollar values published by the BEA have been converted to constant 2010 dollars by using an index of consumer prices and then put a per capita basis by using the US Bureau of the Census estimates of the resident population.

The chart clearly shows that over the 80-year period the real stock of consumer durables has increased from around $4,000 per head in 1930 and 1940 to over $14,000 in 2010, an increase of over 250 per cent.

Chart 2.1



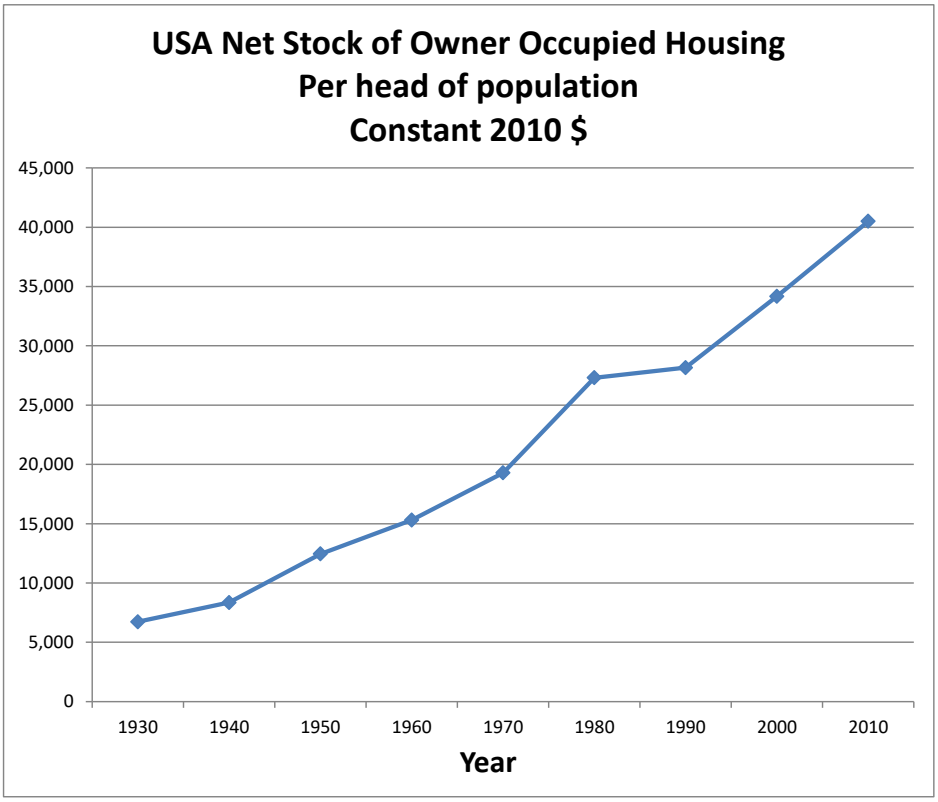
In addition to consumer durables households also use their owner-occupied dwellings in the process of household production.

The United States Bureau of Economic Analysis publishes data for the net stock of owner occupied and tenant occupied housing in the United States.

The following chart shows the aggregate value of owner occupied housing in the United States over ten year intervals from 1930 to 2010. The current dollar values published by the BEA have been converted to constant 2010 dollars by using an index of consumer prices and then put a per capita basis by using the US Bureau of the Census estimates of the resident population.

The chart clearly shows that over the eight-decade period from 1930 to 2010 the real stock of owner-occupied housing has increased from around $6,700 per head in 1930 to over $40,000 in 2010 - an increase of 500 per cent.

Chart 2.2



The next table shows the relative magnitude of these dwellings in comparison with the other items of physical capital used throughout the economic system of production.

The United States Bureau of Economic Analysis National Income and Product Accounts show data for the $billion value of total household capital for years up to 2012. The following table shows the values of household fixed capital and consumer durables in comparison with the rest of the economic system for the years 2003 and 2012. In 2012 the household economy used just one third of the total, a decline from 37 per cent in 2003. The decline in the household proportion was balanced by a rise in proportion of government fixed assets.

Table 2.2. Net stock of fixed assets and durable goods: United States 2003 & 2012

	$ billion		Per cent	
	2003	**2012**	**2003**	**2012**
Households -				
Owner occupied housing	9,573.7	13,010.0	26.6	24.3
Motor vehicles and durable goods	3,679.2	4,847.9	10.2	9.0
Total Households	**13,252.9**	**17,857.9**	**36.8**	**33.3**
Non-households -				
Non-government	15,640.2	23,205.7	43.4	43.3
Government	7,154.8	12,508.0	19.8	23.3
Total Non-households	**22,795.0**	**35,713.7**	**63.2**	**66.7**
TOTAL	**36,047.9**	**53,571.6**	100.0	100.0

Source: Bureau of Economic Analysis (2013) *Survey of Current Business*, October 2013, pages 10-24

The household – market relationships will differ between countries which have different regimes or are different stages in the adoption of innovations in household production or are at different stages of the demographic transition.

Particular countries will have different structures and stages of development of the two parts – household and market. Thus, although there will be some similarities, for example the level of the use of cars or other household equipment, each economy (country) will have its own trajectory. At a particular point in time, say the year 2010, situations will be different in regard to the observed interactions between household and market production. Countries will also differ greatly in public infrastructure, public/private provision of services such as health and education and legal systems governing competition and consumer protection.

Another difference between countries will be in the proportion of the population living in non-private dwellings.

At any point in time a proportion of every country's population is living in institutions such as hospitals, nursing homes, prisons, schools, hotels, motels, boarding houses, etc. These people are counted in censuses of population and housing as living in *non-private dwellings* and hence are outside the definition of residing in a household. We can call them the *non-household population*.

Some of these would be just temporary residents, for example a brief spell in hospital, others would be residents for longer periods, such as residing in a boarding school for a term and others, such as prisoners serving a long jail sentence, could be in an institution for years. All of these members of the population are considered not to be engaged in household productive activities and whilst they living in non-private dwellings are not counted as members the household population.

In Australia in 2011 approximately two per cent of the resident population were not residing in a household on Census night. (Australian Bureau of Statistics, cat no 3231.0, Household and family Projections, 2006 to 2031)

The production of accommodation, meals and other final services by the organisations running non-private dwellings should be included as market production.

Inputs of Intermediate Commodities in Household Production

In addition to Labour and Capital, production in both households and market organisations require inputs of energy, materials and other goods and services which are transformed in the production process. These inputs are called 'intermediate' commodities.

These inputs include the purchases from utilities of electricity, gas and water and the purchases from supermarkets and other retailers of food, groceries and household supplies that are brought home for transformation to final services for household consumption.

Intermediate commodities are also required in government provision of collective services.

Household Production Outputs

As already noted, the outputs of services from household production are discussed under seven broad categories – accommodation, meals, clean clothes, care, transport, etc.

However, there is still the question "Are these outputs or are they inputs?" Perhaps they best considered as both outputs from one process and then inputs into another.

Thus, *education* is a service *output* from the household production process and then an *input* into the production of additional human capital. It is both an output and an input. Of course, the production of additional human capital is a long-term process that also involves inputs from the non-household sectors of the economy.

Similarly, *care* (childcare and adult care) is a service *output*, but is also a major *input* into the formation (and maintenance) of human capital.

These are quite complex issues that need a great deal of deep thought. Any resolution of these complexities must also be tempered by what can be achieved by way of measurement.

Production and Maintenance of Human Capital

The economic literature on the returns to education sometimes analyse the effects of the different levels of formal education – preschool (kindergarten, primary, secondary and tertiary (college/university). There are also studies of the effects of on-the-job training. All of these overlook the role of households in the years before formal education occurs and the role of different household environments through the formal education years.

In the discussion of household contribution to human capital formation, people underestimate the importance of the pre-school years. The most striking example is language acquisition. Language is generally acquired at home (through interaction with parents). Formal schooling depends on this linguistic capacity, which is extended at school through learning to read and write.

It worth noting in this context that a peculiar characteristic of humans is that in a sense the infants are born prematurely compared to other species. A foal walks, a little awkwardly, following a comparatively short interval after birth but the human infant is born hugely dependent – mobility comes more slowly and the ability to communicate effectively generally takes more than 2 years. This process is perhaps the miraculous stage in human development since it requires aural acuity, fine muscle control for speech and the harnessing of huge cortical connection to memorise combinations of phonemes and proper word order. Between 2-6 years of age linguists talk about something called a "vocabulary spurt" where the number of words recognised by the child multiplies at an astonishingly rapid rate. Linguists have done experiments putting infants in front of televisions and discover that they acquire no extra vocabulary but have a parent in the room at the same time and the child's vocabulary increases! Try to acquire a second a second language beyond your teens and speak it with the correct accent and this might give you some appreciation the profundity of the this achievement during infancy.[17]

Research on schools and students shows that the performance of students depends a great deal on the home environment of the student not just on the level of competence of the school teachers. Obviously, the development of skills and capabilities in a young person depends not only on what happens at school but what happens at home. What happens at home is not just the amount of 'homework' but also the attitudes of the other members of the household to study and learning and the encouragement or otherwise of the scholars. For example, the research by Hoover-Dempsey and colleagues, (2005), reveals why parents become involved in their children's school education and the positive effects of this involvement.

And Gary Becker in the forward to Schultz (1972) writes that:

> "Recent developments in the theory of the allocation of time and household production functions provide the tools for a rigorous analysis of the effects of human capital in the nonmarket sector. Before this decade is over we will have, I venture to guess, reliable and valuable estimates of the effects of human capital on nonmarket rates of return and productivity, and of the variety of changes in household decisions and expenditures of time and goods that are induced by a change in human capital."
> (Gary S. Becker (1972) "Foreword" p. xvii in *Human Resources* New York: NBER[18])

Becker's 'nonmarket sector' is the same as my term the 'household economy'. But then we also have to consider the role of the household economy in producing, growing and maintaining human capital.

Some more quotes from Schultz illustrate some of the issues:

> "The main reason for the failure to get at the returns on women's schooling has been the long neglect of any accounting of the economic value of the nonmarket activities that centre on the household … Most of the benefits from the education of women are realized at the micro

[17] These observations were provided by Michael Bittman (Personal communication February 2017)

[18] Gary Becker's predictions do not seem to have yet been achieved.

level of the household as a consequence of the increases in the effectiveness and efficiency associated with the rise in the education of women." (Schulz, 1972:38-39)

Moreover, Schulz goes on to observe:

> "...there are strong reasons for believing that preschool investment ranks high, even higher than that pertaining to elementary schooling, both in terms of rates of return and of equity. It is obvious that there are no earnings foregone from the value of the time of the children at the preschool level. The required investment must be made in large part by motivating the mothers of the children who are reared in homes beset with disadvantages, and by enhancing the ability of these mothers to give their children a better start than they are now capable of doing. Thus, it becomes a dual investment, for it is a means of increasing the skills and knowledge of mothers with low levels of schooling and, at the same time, through them, those of their children ...The new economic approach to fertility, children, and population has been made possible by the extensions of economic theory.... The foundation of this approach is provided by the development of the concept of human capital and the extension of the theory to deal with the allocation of time. In large measure, it has been the conceptualization of the allocation of time that has led to a wide array of empirical studies concentrating on the nonmarket activities of the household in acquiring market commodities, in processing them, and in consuming them, including the allocation of time and of commodities and services in bearing and rearing children." (Schulz, 1972 pp 46-7 and 54 respectively.)

Investing in human capital (mostly) involves the time input of both a teacher and a pupil. For example, a child learning to stand, walk, run, talk, read or write needs to input a lot of time to the learning tasks. And usually other members of the household need to input time as teachers to help the child to learn. Both types of time inputs should be categorised as 'work'.

In our present economic models, we only value the care, nurture and education of children when we outsource these activities to the market.

My aim is to point out that this activity of households (educating and training children and young people) is a *productive* activity and hence part of the output of household production and that it is an *investment* activity not a consumption activity.

Health as an Investment

Schultz (1972) has a section (pages 49-51) on health as an investment, writing "Many of the acquired attributes of health have durability, and, to the extent they do, their acquisition represents an investment in human beings."

Perhaps health should be seen as "repairs and maintenance" of human capital rather than as "investment" in the sense of maintaining the existing human capital rather than creating *additional* human capital.

Perhaps the analysis of "health" should be done as a combination of household production activities and market production activities. Some health promoting activities, such as exercise and swimming may be done at home but can also be done through joining a gym or paying to go to a swimming pool. Again, although medications are purchased from the pharmacy following a visit to the doctor, they need to be

administered at home according to medical directions. Again, many minor ailments, particularly with young children, are treated by staying at home and being cared for by a parent.

There are many home and market related consumption activities, such as smoking and junk-food, which are regarded as "unhealthy" and hence must be considered as reducing human capital. Perhaps the analysis should be about healthy and unhealthy home meals and eating. What role does the household play in providing healthy meals to its members? What is the role of the household in preventing future health problems?

Another topic to consider would be the difference between mental health and physical health. It seems "health" is a complex area for analysis in terms of the different household and market combinations and interactions.

These are just cursory notes on these complex issues. The challenge for economists, statisticians and policy makers is to explore these complex issues related to human capital, health and household production. I revisit these research issues in more detail in the final chapter of this book. My ideas for the "total system" and its variables are set out in the following chapters.

Household Production Income

Another flow variable is the *imputed income* from household production - which is the sum of (a) the value added in the production of household consumption services and (b) the value added in the production of human capital through the education and training of household members, both adults and children. The value added through economic production is the sum of the imputed contributions to this production by the 'factors' of production – labour (*human* capital) and capital (*physical* capital).

The value added in a production activity is the gross value of the output from the activity **minus** the purchases of intermediate inputs used in this production.

The gross value of household produced **consumption services** is the sum of the quantities of the different types of services (meals, accommodation, transport, etc.) each multiplied by the market prices of equivalent outputs available in the market. Similarly, the gross value of household production of **human capital** is the sum of the quantities of the different types of human capital each multiplied by the market prices of obtaining equivalent human capital through education and training available from the market.

What seems to be a comparatively easy exercise in the case of consumption services now appears to be quite complex in the case of human capital development.

The main complexity is that the value (returns) from investing in human capital, especially children's capital, are expected to be in the long run many years ahead when, as an adult, the child starts earning money income. There is a large literature about the returns to education, I think couched mostly in terms of the years spent in formal education and college. The returns from investing in human capital should also be reflected in improved household production.

Households are primarily concerned with undertaking activities that ensure the well-being of their members on a physical and mental level. By ensuring the well-being of their members they play a fundamental role in influencing future real income and nurturing future workers and current workers – i.e. investing in human capital.

As there are both a *consumption* item and an *investment* item two macroeconomic questions arise: (a) what is the marginal propensity to consume out of household production income? And, (b) what are the incentives to invest in human capital?

Of course, as household production income is an imputed value it cannot be saved; it must be either consumed or invested in human capital. But what determines the allocation between these two? Questions about the marginal propensity to consume and the incentives to invest need to be explored.

Decisions by households to also invest in human capital not only involves spending time, it also usually involves spending money to pay for tuition, buy books and travel to educational institutions. These purchases from the market are intermediate inputs to the gross value of education production by households. The values of these intermediate inputs have *not* been used in the estimates in this book!

The education estimates in this book relate to people aged 15 years and over ('adults'). If we could find the data we count children's time at school or doing school homework. Robert Eisner did count (and value) children's time in education in his total income accounts for the USA. However, most surveys of time use do not include children.

Obviously returns from investing in human capital are expected to be in the long run some years ahead when earning a money income. There is a large literature about the returns to education, mostly in terms of the years of formal education in school and college.

There are obviously/hopefully *some* short run returns through happier and more helpful young members of the household. There are also returns from some young people being capable of being productive in the household by helping with chores, even preparing food and cooking meals.

But what is the market price of the output of education the student enjoys? Traditionally when we value education, we put a wage per hour on the input time! So for education (and volunteering) we use an input approach not an output one.

You could argue that households, in essence, maintain a physiological and psychological healthy stock of human capital by providing its members shelter, food, care and transport, education, and leisure, etc.

The true heroes are the households that sustain and invest in healthy and content people as American writer Sarah Orne Jewett suggested. It is time we recognised this in our economic accounting and thus in our economic research and policy formation. When household do not provide adequate services to its members in terms of shelter, food, care, and transport it can become problematic and costly for the entire community.

Reasons for Quantifying Household Production

It is nonsense to say that a meal produced and consumed in a restaurant has economic value but that meal produced and consumed at home has none! Or that child care provided by the market has economic value but child care provided by households is of no value! These considerations make a strong case for household production of services, though unpaid, to be included in the regular measurements of the total production of the economic system.

The reason why we should quantify household production in monetary terms is because of its central role in maintaining and investing in the well-being of household members. We need a complete picture of economic production – market and household. Currently we only seem to value goods and services produced by the market not the household even though the household plays a fundamental role in maintaining the well-being of its members. Much of the literature on education and health outcomes ignores the role of the household. For example, childcare is frequently discussed in economic policy only when it undertaken by the market. Tax incentives are given to transfer childcare from households to the market. Obviously, this is because no intrinsic monetary value is placed on childcare provided by households in terms of investing in human capital.

This is why it is so important to make household production part of everyday economic discourse. In addition, , the next chapter presents data that actually quantify *how large* household production is in relation to market production.

Is showing it is so large a sufficient reason why it needs to be included? No, the reason why household production should be included in economic discourse it that household production is *economic* production, and thus part of the economic system. Showing that it is so large (about equal to the magnitude of market production) just exposes the size of the error that follows from the unacceptable definition of the market being the total economy.

The importance for economic discourse about the economic interactions between gross market and gross household economies (the effects of one on the other) and opportunities for more refined economic policy that open up once household production is included in the research agenda are shown in Chapter 7[19].

Summation

This Chapter begins with Adam Smith's pronouncement that the purpose of economic production is to produce the greatest quantity of the necessities of life for the consumption of the nation. Echoing Smith's sentiments, the United Nations defined final consumption in the system of national accounts, as "the use of the goods and services emanating from production for the satisfaction of the individual and collective needs and wants of households and the community". In other words, the purpose of economic production is to satisfy human wants and needs.

[19] Fragments of this may be in Chapter 6 but a Chapter 7 was never completed

The main argument for the huge importance of the role of household production in satisfying human needs and wants lies in asking you the reader to think about how many meals, hours of care etc. are provided by your own household. The anecdotal evidence from your own life regarding the magnitude of household production was reinforced by some actual numbers from statistical surveys of the whole population with comparisons between household production and market production.

Specifically, comparisons between the household economy and the market economy of the total volumes of human labour time and the volumes of physical capital used in each domain, presented earlier, highlight the crucial role of the household in the provision of services.

Moreover, we must acknowledge the fundamental role that household production plays in nurturing human capital and the well-being of its members.

A structured discussion of the major variables that need to be specified and measured for researching the household economy. These include the input and output flow variables and the stock variables.

In summary, Chapter 2 strongly makes the case for household production of services, though unpaid, to be included in the accounts for the value of total economic system. It is nonsense to say that a meal produced and consumed in a restaurant has economic value but that meal produced and consumed at home has none! Or that a child taken care of by the household has less value than a child cared for by the market in a childcare centre!

The Household Economy is often referred to as the “hidden” economy or the “invisible” economy. Just as investigations of the nature and properties of the invisible dark matter and dark energy of the cosmos are the latest challenges to cosmologists and astrophysicists, so, investigations of the nature and functions of the almost invisible household economy are the latest challenge to economists, statisticians and policy makers. Indeed, the challenge is to go one step further: to reconceptualise our valuation of the creation and flow of goods and services that we define as “The Economy”.

It should be noted that as a child, each of us grows up and learns within both a household production and consumption environment and a market production and consumption environment. Nevertheless, I venture to suggest that we all experience and comprehend the activities of the household before we do those of the market.

Really what has happened is that, although as children we are all brought up to experience and understand much about the function and operation of the household economy, as we grow older the overwhelming discussion about “the economy” and “economics” is turned towards exclusively meaning the market economy.

Thus, the very important household economy in shaping our lives is *outrageously hidden and neglected*.

3. OUR TOTAL ECONOMIC SYSTEM

"The difficulty lies, not in the new ideas, but in escaping from the old ones, which ramify, for those brought up as most of us have been, into every corner of our minds". (Maynard Keynes, 1936, General Theory, Preface p. viii)

Where to now? Purpose and Structure of the coming chapters

The ultimate aim of this book is to ambitiously change the terrain of economics in two fundamental ways. First, is to expand the scope of economics – to bring it back to where it should be. As a productive sector, the household should be included in the total economic system. Secondly, to change the emphasis of the time-frame of macroeconomics and economic policy to cover a longer-term horizon. Unfortunately, currently, the short-term fluctuations of the business cycle seem to be the prime concern of macroeconomic policy.

In advanced developed countries the household economy does about half of all economic production of goods and services. The reality of our total system of economic production has been neglected in economics, economic statistics and economic policy. The unacceptable omission of the productive household economy from conventional policy formulation has significant consequences for our economic welfare.

Analysis of the contribution of caring nurturing unpaid labour to the process of human capital formation is of obvious importance in the policy debate. Unpaid childcare is one of the largest oversights of current economic measurement and national accounting. For example, a woman hires a nanny to continue in paid work. The work the nanny undertakes is included in GDP. Nonsensically, if the woman stays at home and takes care of her own child, it is considered a net loss for GDP. Economic analysis focuses solely on the provision of childcare by the market in terms of the rebates, GDP etc. The childcare provided by households is completely ignored in traditional discussions about economic value. The longer-term value of childcare provided by households has implications well into the future as childcare is a community concern rather than just a private, parental matter. The quality of childcare provided by households in comparison with the market may have implications in terms of human capital. Current models of the economy completely ignore the household sector in the provision of this essential service in the development of human capital.

Other policy implications –

Measuring and regularly monitoring unpaid household work will give economists and policy makers a better measure of the total goods and services in the economy. We will be able to better understand increases in goods and services - whether they are actual increases or just shifts in goods and services provided by the market and the household.

Measuring the household economy also opens up questions of compensation. Discussions about whether government and private sector initiatives would cover proposed payment and pension plans for unpaid household workers who miss out on superannuation benefits, etc. Data on the household economy could be used to expand childcare credits to allow parents to stay home if needed, foster a paid maternity leave program, reinforce corporate policies or offer tax breaks to sole market workers whose partners solely work in the household sector.

Economics examines how the production, distribution and consumption of goods and services functions and works. Macroeconomics studies the system in its totality; microeconomics studies specific parts of the economic system at lower levels of the hierarchy of systems within the total system. There is a continuum of levels that can be considered by microeconomics. At the very bottom are the decisions by individual people, households and businesses. At the top of the hierarchy are governments and international organisations setting the rules and the economic policies.

The foremost purpose of this book is to set out the overall framework for a program of research and investigation to put macroeconomics 'back-on-track' to cover the total economy – the total system of production both within the household and the market. Widening the scope of economics and economic analysis by including household production has consequences for our understanding of both short-run business cycle fluctuations and long-run economic growth changes. It also has consequences for the economic policies that could be applied to manage these phenomena.

The book begins with chapters outlining the role of household production and the total economic system; it continues with chapters that cover the national time use accounts and national money accounts. These accounts are needed for tracking and researching the ways in which the total system works. After two chapters that present a new framework for national accounts of household production (for Australia and the United States) .a final chapter[20] issues a challenge to economists, statisticians and policy makers to raise their eyes to the opportunities available in the wider, more complete, economic system.

Enlarging the Scope of Economics

The purpose of this book is to highlight the effect on macroeconomics of including *the household productive economy within the scope of economics*. This is a significant change in the general frame of reference for both macroeconomics and microeconomics.[21] Ironically the definition of economics comes from the ancient Greek *oikonomia*, "management of a household, administration" from *oikos*, "house" + *nomos*,

[20] Never completed- Eds.

[21] The revolutions brought about by Newton, Copernicus, Darwin and Einstein were due to their changes in general frames of reference.

"custom" or "law", hence "rules of the house(hold)" even though economics has come to narrowly refer to the market component of the economic system.

In his recent book *Understanding Keynes' General Theory,* Sheehan writes that "Keynes in essence departs from the classical school by asking different theoretical questions, applying a distinctive economic order on a complex reality, and addressing new policy issues." (2009, p 273). My approach is to add the missing household variables to both the micro and the macroeconomic models. This leads to innovative theoretical questions leading to fresh areas for economic theory, measurement and research with new policy issues to address and therefore new economic opportunities.

On new ideas, Stigler (1965) writes, "new ideas are harder to sell than new products". He also writes that the successful inventor of a new idea is "utterly persuaded of the significance and correctness of his ideas" and that "he is more a warrior against ignorance than a scholar among ideas". Although it may be difficult, we need to escape from the shackles of the old and unacceptable idea that economics is only about the market – those things that are paid for by cash or credit card or financed by taxation.

This book endeavours to express its guiding ideas in ordinary language as *verbal* models not only in terms of mathematical equations.

Enlarging the scope gives a wider range for macroeconomic research and opportunities for practical action. This change in scope changes the production, consumption and investment functions of the economy. They are doubled in number and re-defined and thus provide an impetus to a much more complete investigation of the effective operating macro-economy as a total system.

The enlargement of scope includes several additional industries to the economy. For example, the household meals and snacks industry provides many more meals than the restaurant, café and take-away food industry of the market. The household provides more accommodation, personal transport, care and clean clothes than does the market. The details of the inputs of labour, capital and intermediate commodities into each of these household industries need to be analysed.

Microeconomic research – the study of the behaviour of individual households and firms – is also expanded in scope by including households as productive units. So really this enlargement of scope changes the whole range of economics and economic research. It enables economics to explore an exciting new terrain – it is akin to opening up a new continent ripe for exploration.

Changes in Economic Thinking

The acceptance of the idea that households are economic producers, in addition to their roles as consumers and participants in the labour market, involves some fundamental changes in the usual views about the extent of household decisions.

Households need to decide how to use time and how to spend money - the two basic scarce resources at their disposal. They also need to decide how to use their capital equipment, a third set of resources at their disposal.

Economists usually consider that households use money only to buy consumer goods and services (consumer behaviour). This is an old idea from which we need to escape. However most of the spending shown in the national accounts as household consumption are actually purchases either of capital goods (investment) or of goods and services for use in household production (intermediate commodities). Direct spending on consumption from the market is only a small proportion of the total spending of money[22]. Hence, . we must accept that households not only have a role as producers of services by combining labour and capital but they also have a role as investors by maintaining and augmenting the capital used in economic production. In conventional economic thinking this role is usually reserved for business and government.

Economists usually consider that households use time to participate in the labour market by seeking and obtaining a paid job. The remaining time is conventionally regarded as leisure or "free" time. This is another deep-rooted and incorrect idea from which we need to escape. It is clear that a major use of household time is work in household production. This production not only includes services for direct, immediate consumption by members of their own and other households but also investment in human capital through education and care.

Once we acknowledge households not only consume but produce and invest, we can see the conventional 'household as units of consumption' approach to theory and measurement . is inadequate. Indeed, it is worse than inadequate it is misleading and encouraging us to neglect half (or more) of all economic productive activity.

The choices and decisions made by households are much more complex than the usual theory and measurement undertaken within economics. These choices and the factors that influence them are rightly studied as a section of *microeconomics*. However, the main focus in this book is on the enlargement of the domain of *macroeconomics*. This follows from the obvious fact that households not only consume but also produce.

The Time Frame of Macroeconomics

It is clear that the initial concern of 'macroeconomics', as it developed as a separate part of 'economics', was the short-run four-to-five-year fluctuations in national income and employment. The short-term business cycle was the main focus of Keynes' ideas and policy needs outlined in 1936 in *The General Theory*. In the short-term the technology of production was assumed to be virtually constant so structural changes in the system could be ignored.

[22] Some statistics to validate these statements are shown in chapter 5.

Although this may have been a reasonable assumption 80 years ago, evidence about the rate of technological change in recent years would suggest this is not a safe assumption for current economic analysis.

Moreover, macroeconomics has enlarged its scope in an attempt to understand the determinants of long-run economic growth. The question then arises, how does the inclusion of the household economy enlarge the analysis of longer-term growth? The time frame has moved to longer periods in which structural changes in the economic system due to technology and demography not only affect the growth trajectory of an economy but also can affect the short-term behavioural responses of the system. This is likely to involve different policy needs and opportunities.

This longer time horizon will bring in (1) *demographic* structural changes, (2) *technology* shifts and (3) the longer-term *public infrastructure* issues that can be given an added impetus by considering the connections (both competitive and complementary) between the two systems of production which both aim at satisfying human needs and wants.

Changes in household demographic structure and diffusion of new technology are two medium/long term issues that are discussed briefly in Chapter 8[23]

In Chapter 8, our research on household demography particularly changes in life course stages – younger aged households, middle-aged households with children and older aged households – is re-presented. (Ironmonger & Soupourmas, 2003) This is a useful focus for the book, not only because these types of households have very different relative involvement in the two productive systems but also because the macroeconomic policies needed to help each of these types of households differ. These are key bits of new information to incorporate in the new understanding of the total economy.

On technology diffusion some of our published material on the diffusion of technology within households of productive capital equipment (cars, washing machines, TVs etc.) and of intermediate inputs (electricity, foods etc.) but also on direct consumption (railway journeys, ice cream etc.). (Ironmonger, 1972; Ironmonger, Lloyd-Smith & Soupourmas, 2000)

These two topics (demographic change and technology diffusion) are germane to the overall message, focus and contribution of this book. They can be connected usefully as both are processes that operate in the medium and longer term.

Within this framework the focus here is on the macroeconomic rather than the microeconomic aspects. For example the gross and net diffusion effects of changes in

[23] Chapter 8 was never completed, Eds.

new and outmoded commodities in the inter-war period in the United Kingdom (Ironmonger, 1972, 160-165). With very fine detailed commodity information on household purchases available over a string of years it would be possible to calculate these gross and net diffusion effects for a subsequent period or for other economies such as the US. This idea is left for others to pursue.
The ideas of Schumpeter and other economists who have studied longer term economic issues could also be re-visited within the wider production framework. Why is this highlighted?

Macroeconomic Problems and Policies

This book is written with the intention of resolving some major macroeconomic problems that the world is currently facing.

I share the view of Martin Rein (1980) that policy and research should be a two-way interaction - research affecting the policies that can be implemented; and the policy problems affecting the research.

Keynes tackled “persistent unemployment”, how to “save capitalism” and how to “manage wartime disruption and post-war recovery”. These were the urgent macroeconomic policy issues of the 1930s and 1940s that inspired Keynes’ thinking; inspired new ways of analysing the complexities of the economy. Today the policy issues for macroeconomic management of the economy are sometimes seen as controlling just three variables – the rate of unemployment, the rate of inflation and the balance between current and future consumption. (McDonald, 1992, 3) The third of these is really the balance between consumption and investment. But it can also be seen as managing the balance of international payments.

Whilst these issues continue to engage the policy managers, what additional important macroeconomic problems exist today?

> Poverty? Of money? Of time?
> Inequality? Of income? Of opportunity? Of education? Of finance? For women?
> Access to and adoption of new technology? Inequalities in access to new things?

These problems seem to fall under the general heading of inequalities in the distribution between people and between households. Inequality is still a major problem in most countries of the world.

In 1936, in the opening paragraph of the final chapter of the General Theory, Maynard Keynes linked inequality and unemployment as the outstanding faults of the economic system. He wrote “The outstanding faults of the economic society in which we live are its failure to provide for full employment and its arbitrary and inequitable distribution of wealth and income”. (Keynes, 1936, p 372) More recently, Joseph Stiglitz (2012) shows that growing inequality endangers the future of today’s divided society, particularly in the United States. To continue with an attack on these problems there needs to be a refreshed attempt to further understand the economic system and how economic policy can intervene.

In policy research, it is necessary to be very clear about how things work. Which are the independent variables that can be manipulated by policy? Perhaps most, if not all, of these issues of poverty, inequality and new technology can be investigated through an analysis of the *'life course' stages* of the household economy and the different interactions with the market economy.

I suggest that the household economy can be divided into three life course stages – (1) *younger households* comprising one or more adults (aged 15 years, but with an average age of less than 45), (2) *households with children* and (3) *older households* (with average age of 45 years or more). These households have very different degrees of participation in both market and household production.

For example, households with children spend a lot of both money and time in the bringing up and development of their children – an investment in human capital. The adults living in younger households spend time and money in the development of their own human capital but very little, if any, on developing children's human capital in other households. The three types also are at very different stages for the requirement, the acquisition and use of physical capital – dwellings, vehicles and equipment.

The relative numbers of these three types of households also change through time as fertility decreases and the length of life increases. These demographic changes can have significant effects on the macroeconomic structure of the household economy with flow-on effects to the market economy. Chapter 6 will describe some of the research issues to be investigated relating to these changes. Chapter 7[24] will outline some of the medium-term policies that should be explored to better manage the effects of the demographic transition

This book is more a set of *ideas for investigation* by researchers to be undertaken in collaboration with potential policy makers in the true two-way (Martin Rein) interactive process between research and policy. All this needs measurement, monitoring of systems and hypothesis testing.

So, for each of the big policy issues that could be better understood by a total economy perspective, a theoretical structure needs to be constructed.

The Role of Public Investment

Keynes' demand management proposals in wartime conditions to constrain private consumption to free up resources for defence production could be relevant to the current imbalances in public infrastructure investment. Sheehan (2009, p 249-258) discussing Keynes' ideas on creating long-term stability, presents the Keynesian idea that public

[24] Never completed but Chapter seems to contain some of this information – Eds.

investment should be a large part of total investment (65 to 75 per cent) and that this should be planned.

Many governments aim to finance most capital expenditure on infrastructure out of taxation (current revenue) rather than going into debt by borrowing. In the business sector companies do not finance all their capital investment out of current revenue - they borrow and go into debt. They are creating capital assets which they expect to be profitable. Similarly, households borrow to acquire housing and other productive assets that will produce returns in terms of increased comfort and productivity. Both businesses and households need complementary investment in public assets such as roads so that goods and services can be delivered between the two parts of the private system. There is no reason that these public investments should be financed only by current revenue from taxation. To create the needed level of public infrastructure governments should also borrow so that the total system can function at an optimum level.

Although this topic could lead into an interesting discussion about what is the desirable extent of public ownership of various parts of the economy – banking and finance, security, communications, transport and so on, I do not propose to cover these issues in this book!

The Role of Private Investment

In the total economy, we have to facilitate two investment streams in addition to public investment – household investment and business investment. Long term stability probably requires separate management of both these streams, each probably requiring a different policy since they are governed by different incentives. The institutional mechanisms for financing the two investment streams are also quite different.

In relation to taxation, we need to note that taxation of the income and activity in the market economy gives a competitive advantage to household investment and production, which are not taxed directly. “The taxation of earned income is an inducement to seek income in the household economy rather than the marketplace.” (Scott Burns, 1975, p 161). It is said that any government that tried to tax household production and the imputed income from it would soon be voted out of office.

A brief outline of a new framework

Final consumption is classified as either private or public. Final private consumption, such as a meal, is where the benefits of the consumption are obtained by a single individual and this consumption excludes benefits to anyone else.

Final public consumption includes services derived from the provision of public roads, street lighting, police and defence forces, and weather forecasts and so on. A pure public good (commodity/service) was defined by Samuelson as follows “Each individual’s consumption of such a good leads to no subtraction from any individual’s consumption of that good”. (Samuelson, 1954, 387). At some times of the day public roads would not

be ‘pure’ since too many users at the same time cause traffic congestion. Congestion lengthens the journey times for all users and thus can be regarded, in Samuelson’s terminology, as ‘subtracting’ from the consumption of all road users.

Final consumption is essentially an activity that takes place in a specific period of time during which an individual uses or consumes a ‘service’. Ultimately goods (physical objects) end up as being used in the production of ‘services’.

For example, an apple (a physical good) provides the service of a snack or nutrition; a dwelling provides the service of accommodation or shelter; a television set provides the service of entertainment or information. At the end of the production process, goods all end up providing services to individual people – women, men and children.

What macroeconomic theory needs to take on board is that a very large proportion of the commodities consumed by households are produced within households by their own efforts and using their own capital equipment. The daily flow of accommodation, meals, laundry, care and transport are largely produced within the home. This final production of services of course relies on other inputs such as energy and materials purchased from the market. A subsequent chapter will show the relative magnitudes of these home-produced final consumption commodities in relation to market produced final consumption.

Two key features of conventional macroeconomic theory are the “propensity to consume” and the “inducement to invest”. The propensity to consume is a description of the behaviour of households to purchase consumption commodities provided by the market. The inducement to invest is a description of the behaviour of businesses to purchase capital goods to use in the process of market production.

In the total economy, we have *two types of propensity to consume* (a) the propensity to consume by purchasing services (such as meals in restaurants) directly from the market . and (b) the propensity to consume services provided by household production (such as meals prepared at home). These two propensities are obviously jointly determined, but need to bring in other factors beyond monetary income and wealth in the usual simplified market economy model currently used in macroeconomics.

These factors would include not only the preferences of households for home-produced services compared with market supplied services but also the capacity of the household to produce these services and the relative costs in time and money of the alternatives. This is a rather more complex set of decisions.

	Market Economy	Household Economy
Propensity to Consume	Goods and Services from the Market	Services from Household Production

Similarly, we have *two types of inducement to invest* (a) the inducement to invest in business capital by the business sector governed by the profit motive and (b) the inducement to invest in both physical capital (housing, vehicles and household equipment) and in human capital (education and development of children and other household members). Obviously, the household investment is induced by an expectation of "returns" but these are very different from the monetary profits expected from business investment.

	Market Economy	Household Economy
Inducement to Invest	For Profits	For Returns

Changing the scope of macroeconomics to include the household economy requires new theory and new measurements. This new model of the total economic system requires the *inclusion of new variables* relating to household production and the income generated in the process. It also requires *changes to the definitions and measurements of the traditional variables* of consumption and investment.

Essentially the propensity to consume should be viewed as two interconnected complex decisions – consumption directly from the market and consumption from household production; and the inducement to invest in household capital which has different motives than the profit motive behind market economy business investments.

A brief summary of macroeconomic concepts and variables

There are a number of concepts that are used in theory, measurement and estimation in macro-economics. The concepts, their selection and definitions are based on the idea that they will be measured and the functional relationships connecting these variables will be estimated from the actual macroeconomic data obtained from a sequence of time periods covering many quarters and years.

This approach to measuring and finding the relationships within the parts of the macroeconomic system is an *inductive* approach which relies mainly on the historical evidence rather than a *deductive* approach which relies mainly on the theory that we can invent. The approach is also based on the idea that we need to see how the results perform when used in an economic policy framework. Macroeconomic research is done in an environment where the interaction between research and policy application is of the highest priority. What works and what do not work is what we are trying to discover. "The proof of the pudding is in the eating."

Of course, a certain amount of intuition is needed to conceive the definitions of the macro variables such as production, consumption and investment: but there is also a long history of measurement and cogent research results to support the use of these basic concepts.

The first concept involves defining the production boundary. The current macroeconomic theory of just a single market economy production system defines the production boundary to exclude all household production of services, except the rental value of owner-occupied housing. This ensures that the national accounts exclude most production and consumption of household services.

The justification for this omission is that

> "certain household activities – such as housework, do-it-yourself projects and care of family members – are excluded because by nature these activities tend to be self-contained and have limited impact on the rest of the economy and because their inclusion would affect the usefulness of the accounts for long-standing purposes, such as business cycle analysis". (Bureau of Economic Analysis, 2009)

These arguments are made without any foundation of evidence. First the household activities are not self-contained. They all require purchases of capital equipment and intermediate inputs from market production. As household production has become more capital intensive, these purchases of capital goods have had profound effects on a number of market industries. Also, innovation in new consumer commodities has allowed the growth of many new market industries.

Business cycle analysis can still be conducted provided measurements of the separate activities of market and household production are maintained. Measuring household activities does not imply that these estimates would simply be aggregated with the market activity measurements and the longstanding estimates of the market would be lost. Indeed, the existing market estimates would be augmented by parallel estimates of the cyclical behaviour of the household economy. Greater understanding of relationship between these main parts of the total system can be obtained.

The definition of the production boundary also excludes the "free" production from natural processes in the environment. For example, the growth of trees in an uncultivated forest is not included, but the harvesting of the trees from that forest is included.

Next there are several distinctions between types of variables.

The first distinction required is one between "flows" and "stocks".

Flows are variables in the model which measure the magnitude of specific concepts (such as consumption or investment) as they occur *during a specific period of* time (such as the year 2006 or the first quarter of 2007). *Stocks* are variables in the model which measure the magnitude of specific concepts (such as capital equipment or inventories) which exist at specific points of time (such as at 31 December 2006 or 31 March 2007).

Most of the variables discussed in macroeconomics are flows; a number of categories are briefly listed in the following section.

The second distinction required is between "input flows" and "output flows" in to and out from the process of economic production. The inputs are the labour, capital, materials and energy used during the process of production. The outputs are the goods and services produced. These flows are measured as quantities and values occurring during a period of time, such as a month, a quarter or a year.

Input flows

Factors of Production

These are *input flows* into the production process. Usually these are just two – "labour" and "capital". Labour is the use of human capital (time) in the production process. Capital is the use of non-human (physical) capital in the production process. There are great variety of skills and attributes of the labour time used. Similarly, there are great variety and forms of equipment, vehicles buildings and land (physical capital) used in production of goods and services. The "rental values" of the variables in specific dated periods are needed. In the total economy model measures for four variables are required as shown below)

Factor of Production	Market Economy	Household Economy
Labour	**L**m	**L**h
Capital	**K**m	**K**h

Lm and **K**m are the same variables as measured in the current macro models; **L**h and **K**h are new, additional variables.

Intermediate Inputs to Production

These flows are the materials, energy and services purchased from other parts of the economic system and used up in producing goods and services. Within the market economy these include the gross value of the sales from one firm to another but exclude the "value added" in the production process which is attributed to the two factors of production – labour and capital. However, in household production intermediate inputs purchased from market firms are part of what is currently measured as "final" consumption by households, **C**. Clearly these purchases are not final at the time they are purchased. They are eventually included the cost of production of the services produced by and consumed in households at a later period. This variable can be designated as **M**h.

Intermediate Inputs	Market Economy	Household Economy
Symbol	**M**m (Net = 0)	**M**h (part of current model **C**)

Output flows

Gross Value of Services for Consumption

Services (e.g. Meals)	Market Economy	Household Economy
GVPS	**VPS**m	**VPS**h
Equals	**LS**m **+ KS**m + **MS**m	**LS**h **+ KS**h + **MS**h

Gross Value of Investment in Human Capital

Investment (e.g. Education)	Market Economy	Household Economy
GVPI	**VPI**m	**VPI**h
Equals	**LI**m **+ KI**m + **MI**m	**LI**h **+ KI**h + **MI**h

Gross Value of Production

This flow is the sum of the contribution by the factors of production (labour and capital) plus the value of the intermediate inputs purchased from other economic units.

Gross Value of Production	Market Economy	Household Economy
GVP	**VP**m	**VP**h
Equals	**L**m **+ K**m + **M**m	**L**h **+ K**h + **M**h

Gross Value Added by Production

This is the sum of the contributions by the factors of production.

Gross Value Added by Production	Market Economy	Household Economy
GVA	**VA**m (GMP)	**VA**h (GHP)
Equals	**L**m **+ K**m	**L**h + **K**h

Investment or Accumulation (Augmenting the Capital Stock)

The addition of physical capital can be considered as either in gross or net terms. Gross investment is the total of new capital goods produced in a specific period and hence added to the stock of capital during that period. Net investment is the result of deducting from the gross addition the amount of capital retired, scrapped or destroyed during the same period.

The Stocks of Fixed Capital and Inventories Held at end of periods

Usually few stock variables are included in macroeconomics modelling, even though the economic statisticians produce estimates of the stock variables. Moreover, business accounting requires not only income and expenditure flow accounts but also balance sheets of assets and liabilities at the conclusion of each accounting period.

The final distinction to be noted is one between variables measured in “current prices” or in “constant prices”. Most variables in the economic system are measured in two sets of prices.

Current price variables are measured at the prices of the current period whereas *constant price volume* variables are measured in the prices of some constant "base" period to eliminate the price change component of current price variables. For example, the variables for the years 2005 through to 2013 may be "re-valued" in the prices that existed in the year 2005. *Constant price* variables are also called 'volumes', 'physical volumes' 'deflated' or 'real' variables.

Three Key Tasks

In summary, three key tasks are required – (1) to argue for the incorporation of household production as part of the total economic system; (2) to show which new variables are needed and how they can be measured in the expanded system (and also what adjustments to the concepts and measurements of the present variables are needed); and (3) to suggest how investigation and research on the wider defined and measured system could proceed, hand-in-hand with economic policy possibilities._____

4. NATIONAL TIME ACCOUNTS

Those things which I am saying now may be obscure, yet they will be made clearer in their proper place **–(Nicolaus Copernicus)**

"All truths are easy to understand once they are discovered; the point is to discover them." (**Galileo Galilei)**

"Measure what can be measured and make measurable what cannot be measured." (Galileo Galilei)

Revealing the Hidden Reality of our Economic Universe

Accounts of time use expand our understanding of the economic universe by providing the evidence that shows the economy is a dual productive system.

There are certain similarities between the scientific quest to comprehend the physical universe and the quest to understand the economic universe. Time use data show that market-centric model of the economy is as mistaken as the geocentric model of the early astronomers that the earth as the orbital centre of the universe.

The Aristotelian/Ptolemaic system postulated a geocentric universe which assumed the earth was at the centre. The astronomical predictions of Ptolemy's geocentric model were used to prepare astrological charts for over a thousand years. The geocentric model was accepted as reality until the late 16th century when this view was gradually superseded by the heliocentric model of Copernicus, Galileo and Kepler.

Similarly, to date economics has had a very market-centric view of our economic universe. Observations from time use telescopes (time use surveys) and the construction of time accounts from this time use data have revealed the hidden reality of our economic universe. Our economic universe consists of both the market and household economic systems.

Time use data

Time Use - What is it?

Benjamin Franklin once said, "time is money!" But Franklin was wrong, time is not money - time and money are fundamentally different. Time can be used to obtain money, and money can be used to save time, but that does not make them interchangeable concepts.

Time is a finite, irreplaceable resource available to every man, woman and child in equal amounts of 168 hours per week over the course of a lifetime. Time use refers to the allocation by people of their time to alternative uses such as sleep, leisure or work.

Time is perhaps the most fundamental scarce resource. Unlike money income or wealth it is equally distributed and how well or wastefully it is used largely determines the progress, achievement and well-being of individuals, families, communities and societies.

One way to assess progress and well-being is to measure aggregate changes in the uses of time rather than, or in addition to, the usual monetary statistics showing changes in national income and expenditure. National time accounts are more comprehensive than money accounts as they simultaneously measure the productive time spent in both the market and the household, as well as the time spent in consumption of outputs from both.

The advent of radio astronomy in 1957, using a wider spectrum than that provided by the visible light frequencies, opened up new views of the astronomical universe. Similarly, official statistical organizations are beginning to provide new views of the economic and social universe by observing the world through a 'time frequency' rather than the more visible 'money frequency'.

A Brief History of Time Use Measurement

The accurate scientific measurement of how people use time began with independent surveys in a number of countries, particularly in the USSR and the United States in the 1920s.

A major advance was made in 1965-66 when Alexander Szalai directed the Multinational Comparative Time-budget Research Project[25] which oversaw 15 internationally comparable, diary-based surveys in 12 countries.

The countries included in this Multinational Comparative Time-budget Research Project were – Belgium, Bulgaria, Czechoslovakia, France, Germany – Federal Republic, Germany – Democratic Republic, Hungary, Peru, Poland, United States, USSR and Yugoslavia. The number of diary days of data obtained in the Szalai survey ranged from 778 in Jackson USA and 782 in Lima Peru to 2805 in France and 2891 in the USSR. The results of these surveys were published in 1972 in one volume of almost 900 pages, *The Use of Time*, edited by Alexander Szalai.

This publication led to the first Australian time use survey in 1974 with 1,492 diary days, 717 in Melbourne and 775 in Albury-Wodonga. Using the same methodology, this was a companion survey to the 1965-66 Szalai multi-national time-budget surveys. I was completely unaware of the existence of data on how people used time until whilst on study leave at Monash University in 1984, I discovered a copy of the report on the Australian Time Use Survey.

[25] Under the sponsorship of UNESCO and the International Social Science Council

This discovery enabled Evelyn Sonius and myself to produce the first input-output table of household production for Australia for the year 1975-76 but published in 1987 (Ironmonger and Sonius, 1987). In effect this was the first estimate of Gross Household Product (GHP).

Since 1965, official measurement of time use by national statistical organisations have included Norway (five surveys) at ten-year intervals from 1971, the Netherlands (eight surveys) at five-year intervals from 1975, Japan (eight surveys) at five-year intervals from 1976, Canada (six surveys) in 1981, 1986, 1992, 1998, 2005 and 2010 and Australia (four surveys) in 1987[26], 1992, 1997 and 2006.

Another impetus to measuring time use has come from Eurostat, the Statistical Organisation of the European Union. Eurostat encouraged all countries in the Union to participate in the Harmonised European Time Use Survey (HETUS). As a result, official time use surveys in the period 2000 to 2012 were conducted in 25 EU countries and also in seven other European countries.

Several developing countries – for example, India in 1998–9[27] and South Africa in 2001 – have recently conducted official time use surveys. In the first decade of the 21st century there has been a virtual explosion of time use surveys in Asia, Latin America, Africa and the Middle East.

One of the most important developments arose from a series of conferences and workshops sponsored by the Macarthur Foundation. Although the United States had been one of the "birth places" of time use measurement with the surveys of time use in farm households in the 1920s, and diary-based surveys that had been conducted by research centres at the Universities of Michigan and Maryland, there had never been an national,official survey conducted by any government statistical agency. It was not until the late 1990s that meetings at the Bureau of Labor Statistics (BLS) in Washington DC were held to evaluate the viability of a large-scale time use survey.

The administration conducted extensive research on methods and costs of collecting diary-based data and decided on yesterday-recall telephone diaries from a sub-sample of people who had just completed their eight-month term as a respondent in the monthly population survey. Moreover, the BLS decided to conduct the American Time Use Survey (ATUS) on a continuous basis as of the 1st of January 2003. This is the world's first (and still only) continuous diary-based official time use survey.

[26] This is a pilot survey of approximately 3,000 diary days conducted in the Sydney Statistical District only,

[27] This is a huge (90,000 diary days) pilot study in six India states selected to be representative of the whole country.

Availability of Time Use Data

The most readily available data on time use is usually obtained from tables from reports of the surveys published by the statistical organisations who conducted the surveys. These are now often available as down-loads from the organisation's web site rather than in hard copy printed reports.

Perhaps most important for researchers is not the availability of summary tables but the "unit record" files of the individual observations. These data files have been de-identified and are sometimes known as CURFS (confidentialised unit record files). These are usually available in two forms - *episode* files – which contain time of start and end of each activity during the day and *summary or aggregate* files – which contain the total time during the day of each activity, aggregating the total episode time for each type of activity, for example all the time spent eating in say four eating episodes during the day.

The Centre for Time Use Research at the University of Oxford[28] has made available to researchers a very large number of unit record aggregate files for more than 20 countries, with multiple years for some countries. These files have been developed as the Multinational Time Use Study (MTUS) and have been harmonised across countries and years to a common series of background variables and activity categories. The origin for MTUS was the unit record files from the 1965 Szalai Multinational Comparative Time-Budget Research Project covering 12 countries, the first study to produce time use data comparable across countries (Szalai, 1972).

The American Heritage Time Use Study (AHTUS) has prepared a harmonised set of unit record files for the United States time use data from university-based surveys for the years 1965-6, 1975-6, 1985 and 1992-4 so that comparisons can be made with the much larger data set for the first year (2003) of the American Time Use Survey (ATUS) conducted by the Bureau of Labor Statistics.

Another initiative to generate harmonised time use data has been the Harmonised European Time Use Survey (HETUS) which has been sponsored by Eurostat, the statistical agency of the European Commission. Since the late 1990s some 25 countries have now conducted time use surveys although some of these were just pilot surveys of a few hundred respondents. The major ones from at least 15 countries conducted over the period 1998 to 2005 have been absorbed into the HETUS database which enables comparative statistics to be extracted. Unfortunately, this database does not enable unit record files to be downloaded.

In contrast, the American Time Use Survey (ATUS) provides a facility to download unit record file data for all years of the survey 2003 to 2017. These are available either as

[28] CTUR has relocated to the University College London and has keep adding harmonized national time use survey to the Multinational Time Use Study so the number of surveys is now greater than mentioned in this manuscript.

episode or aggregate data files. With a few exceptions, the unit record file time use data for developing countries are not readily available to researchers.

National Time Accounts Framework – Production, consumption, investment

In addition to measuring the labour inputs to economic production in the market and household sectors of the economy, the National Time Accounts also provide data about time spent in consumption and investment. However, they do not measure the inputs of physical (non-human) capital to economic production nor do they measure the "intermediate" inputs of energy and materials necessary in these processes. The measurement of these inputs will be discussed in Chapter 6 which will present a new framework for national accounts of household production.

Although there are numerous classifications of time use activities – for example the system of 96 detailed and 37 reduced categories used by Szalai in the Multinational Comparative Time-Budget Research Project - the focus of this book is on using a *broad economic framework of production, consumption and investment time*.

The basic concepts of macroeconomics – production, consumption and investment – have been chosen to categorise the uses of time within the National Time Accounts. This is the same basic structure as the System of National (Money) Accounts (SNA).

Production activities include not only work in the market economy (paid work included in the usual employment statistics and within the SNA production boundary) but also unpaid work in the household economy excluded from the usual employment statistics.

The household economy provides economically valuable services (accommodation, meals, care, laundry and transport) to households without remuneration. This activity is outside the SNA production boundary but is within what is known as the "general production boundary". It is sometimes called "Non-SNA Economic Activity". It includes volunteer activities providing services to other households either directly or indirectly through organisations. In most advanced economies the household economy uses more labour time than the market.

Consumption activities include the time spent in eating and drinking, watching TV, sports, hobbies, recreation and social interaction.

Investment activities (time spent in the maintenance and development of human capital) include education, self-care and sleep. Sleep is the largest single use of time – an average of around 60 hours per week (hours per week) for adults and 70 hours per week for children.

The next two tables show the Szalai 37 activities[29] and their relationship to the framework of production, consumption and investment that is the focus of my work at the University of Melbourne on the total economic system.

Table 4.1. Multinational Comparative Time-Budget Research Project
Classification of Activities
(37 reduced categories in 9 groups)

1 Main job	14 Personal care	29 Social (home)
2 Second job	15 Eating	30 Social (away)
3 At work other	16 Sleep	31 Conversation
4 Travel to job	***Personal needs***	32 Active sports
Total paid/market work	17 Personal travel	33 Outdoors
5 Cooking	18 Leisure travel	34 Entertainment
6 Home chores	***Non-work travel***	35 Cultural events
7 Laundry	19 Study	36 Resting
8 Marketing	20 Religion	37 Other leisure
Total housework	21 Organizations	***Total leisure***
9 Care to garden/pets	***Study-Participation***	
10 Shopping	22 Radio	
11 Other household care	23 TV (home)	
Household care	24 TV (away)	
12 Basic child care	25 Read newspaper	
13 Other child care	26 Read magazine	
Total child care	27 Read books	
	28 Movies	
	Total mass media	

[29] These 37 categories were constructed from the detailed 96 two-digit categories coded in the underlying time use data. The details of these aggregations can be found in Szalai, 1972, pp 562-566.

Table 4.2 Economic Classification of Production, Consumption and Investment Time: Using Szalai 37 Classification of Activities

Production Time	Consumption Time	Investment Time
Market Production	15 Eating	19 Study
1 Main job		14 Personal care
2 Second job	17 Personal travel	16 Sleep
3 At work other	18 Leisure travel	
4 Travel to job		
	22 Radio	
Household Production	23 TV (home)	
5 Cooking	24 TV (away)	
6 Home chores	25 Read newspaper	
7 Laundry	26 Read magazine	
8 Marketing	27 Read books	
9 Care to garden/pets	28 Movies	
10 Shopping	29 Social (home)	
11 Other household care	30 Social (away)	
12 Basic child care*	31 Conversation	
13 Other child care*	32 Active sports	
	33 Outdoors	
20 Religion	34 Entertainment	
21 Organizations	35 Cultural events	
	36 Resting	
	37 Other leisure	

N.B. Child Care, both Basic (12) and Other (13), is classified as Household Production time since it involves adults (aged 15 years or more) producing a service of care (including training and education) for children (aged less than 15 years). It is not regarded as investment time. Similarly, within the category of Market Production time, the work of teachers in schools, colleges and universities is classified as production time, not as investment time. Investment time is reserved for the time individuals (both adults and children) spend in their own study, personal care and sleep.

The most important focus of my research has been on the time used in household production – the production of services undertaken by households with their own unpaid labour and their own capital for the use of members of households without payment. This is the household (non-market) economy.

Some early ideas about the draft framework for presenting national time accounts data were presented to conferences of the International Association for Time Use Research first at the meeting in Rome in 1992 and also in Brussels in 2003.

This early framework presented data for “household industries” alongside “market industries”. It also organised data for the household population separate from the population residing in non-private dwellings, for children’s time use and for adult time use, split between women and men.

The main difference between this framework and the Szalai activity categories is that market work is shown in a number of industries ranging from agriculture through mining, manufacturing and construction to various services industries.

This detail enables statements to be made about the relative sizes (in terms of labour input) of various household industries in comparison with various market industries. For example, for Australia in 1997 the household "restaurant and fast-food industry" (83 million hours per week (hours per week) in meal preparation) was almost twice as large as "manufacturing" (only 44 million hours per week). (Ironmonger, 2004, Figure 5.2, p 106)

	Household Population				Other Population		Total population	
	Children (<15 years)		Adults (15+ years)		All Ages		All Ages	
Activity	Girls	Boys	Women	Men	Females	Males	Females	Males

Further details of the relative sizes of household industries in Australia in 1997 are shown in two charts Household Industries and Market Industries in Table 4.3 [Some cells in Table 4.3 are empty, most ;likely because information about people who don't live in a private dwelling [those in prisons, hospitals and at sea, etc.] are unavailable, Eds.]

The version of the 1992 (and 2003) framework table shown below has been augmented by including some data for the city of Melbourne in the year 2000. The entries are shown as the average hours per person per week; they could also be shown in aggregates as millions of hours per week.

Table 4.3 National Time Accounts: Draft Structure: (Melbourne) (2000) Hours per person per week

MARKET WORK (SNA Economic Activities) (Market Industries)								
Agriculture								
(+ 7 other market industries)								
Other Industries								
Market work travel	0.0	0.0	1.7	3.3				
TOTAL MARKET	0.0	0.0	16.9	30.2				
HOUSEHOLD WORK (Non-SNA Economic Activities) (Household Industries)								
Meal Preparation								
(+ 6 other household industries)								
Voluntary Community								
Household work travel	0.5	0.5	3.3	2.7				
TOTAL HOUSEHOLD	3.6*	3.6*	29.5	18.4				
EDUCATION								
Pre School								
(+ 3 other levels)								
Continuing								
Education travel	1.0	1.0	0.6	0.4				
TOTAL EDUCATION	10.2*	10.2*	3.7	3.0				
LEISURE (Consumption)								
Eating & drinking								
(+4 other activities)								
Other passive leisure								
Leisure travel	3.6	3.6	2.4	2.3				
TOTAL LEISURE	75.2*	75.2*	68.0	66.7				
SLEEP & PERSONAL CARE								
Sleep								
Personal care								
Personal care travel								
TOTAL SLEEP & P CARE	79.1*	79.1*	68.0	66.7				
TOTAL TIME	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
Total Travel	5.1*	5.1*	7.8	8.7				
Total Population Melbourne ('000)	326	341	1,415	1.349				

(*)Girls and boys are assumed to be the same hours per week.

What the National Time Accounts Show – Revealing the Hidden Household Economy

The statistical efforts of the last 30 years have removed the uncertainty about the size and importance of the household economy. The national time accounts for many countries show that the labour time input required to run the household (non-market) part of the economic system is very large. When correctly measured, in most advanced economies the unpaid work time is larger than the paid work time. The need for time use data that Richard Stone noted in his 1975 UN progress report on developing a system of social and demographic statistics has now been satisfied.

> "Data on the allocation of time are needed to appreciate: the immense amount of economic activity that goes on in households, though it is not recorded in the national accounts; the extent to which shorter hours of work and labour saving devices in the home are in fact accompanied by greater leisure for family members; the ways in which leisure is used and the demand for goods and services that these uses imply; and much else beside." (United Nations Statistical Office 1975, p 5)

Although Stone recognised the need to appreciate the immense amount of economic activity that goes on in households, he did not see the need to quantify this economic activity in the national (money) accounts. In a later passage on the Household Economy in 1975 UN report he wrote –

> "In the national accounts, consumer goods and services are accounted for up to the point at which they reach households but the further transformations which they undergo at the hands of household members are not recorded. For the main purposes for which the national accounts are designed this convention is not only convenient but positively desirable since the addition of a large and very uncertain sum to the accounts would contribute little, if anything, to the study of the relationships between households, businesses and government. (United Nations Statistical Office 1975, p 151-2)

In direct opposition, the main contention of this book is that understanding the relationships between households, businesses and governments would be greatly improved, not only by national time accounts revealing the magnitude of the household economy but also by national money accounts of the household economy. This point will be elaborated on in detail in Chapters 5, 6 and 7).

Some early estimates for Australia

The first time use data that I encountered was for Australia, specifically the Cities Commission report for 1974 on time use in Melbourne and Albury-Wodonga. This survey first revealed that adults spent about 29 hours per week in *household work* compared with *32 hours per week for market work. The household was 47.4 per cent of the total economic production!*

These data were one of the sets of information used to make Australian estimates of total economic activity for 1976 in *Households Work* (Ironmonger 1989). This analysis showed that 217 million hours per week were spent in paid work in market industries and 220 million hours per week were spent in unpaid work in household Industries. In these estimates the *household accounted for 50.4 per cent of the total time spent in economic activity.* [30]

In summary, the early (1974-1976) Australian estimates show that, in terms of hours of labour input, the two parts of the economy are of approximately the "same magnitude". The household was either 47.4 per cent or 50.4 per cent of the total economy.

Simultaneous time

The main deficiency of these early estimates is the undercounting of time spent in caring for children – which is often classified as "secondary" or "simultaneous" time. The first Australian time use survey only counted "primary" or "main activity" time. Subsequently, official surveys showed that more than half of childcare was done simultaneously with other activities such as watching television or engaging in conversation.

Thus, these early data seriously underestimated the unpaid household work time in childcare because a very large proportion of which is done simultaneously as a 'secondary' activity with other 'primary' activities. To correctly estimate the total work time this secondary childcare time needs to be included as unpaid household work. There are also other corrections needed for these early estimates for Australia. For example, the 1974 time use survey only covered persons aged 18 to 69 years and omitted the time use of non-wage-earning men. The labour force surveys covered all persons aged 15 or more years.

A comprehensive discussion of the problems of simultaneous time was presented at the 25th IATUR Conference on Time Use Research in Brussels in September 2003 (Ironmonger, 2003). Under the title "There are only 24 Hours in a Day" the paper presented a new approach to simultaneous time use with an innovative two-dimensional measure of time use with a matrix table classifying primary time by secondary time. The matrix approach avoids the problem of double counting time use. Each minute of the day is recorded only once in the body of the table. Both the row totals and the column totals sum to a total of 1440 minutes per day or 168 hours per week.

The latest United Nations manual on the System of National Accounts (United Nations 2009) makes a fundamental error in assuming that the data from time use surveys are ambiguous because of the problem of secondary or simultaneous time. According to the report:

[30] There are some differences with the *Households Work* figures – mainly the paid work estimates are from the ABS *Labour Force* estimates for August 1976 for persons aged 15 years and over.

> "Time use surveys, however, are not unambiguous. There is the question of multitasking. For example, it is possible for somebody to prepare a meal, keep an eye on a small child and help another child with their homework all at the same time. Should the total amount of time be divided by three or should each activity count the whole amount of time spent?" (United Nations, 2009, page 542)

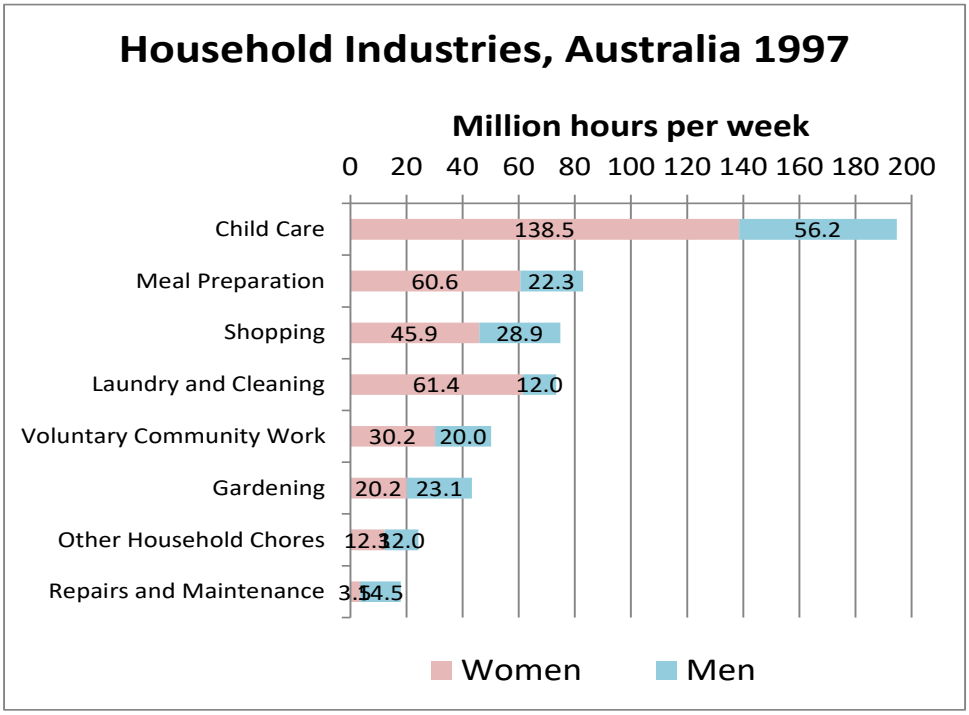
However, once we distinguish between the inputs and outputs in the example there is clearly no ambiguity. If the period concerned for these simultaneous activities was one hour, it is easy to see that the output from this one hour of labour input were two hours of child care and a meal. Subsequent episodes of the time use diaries of members of the household should record the eating of the meal.

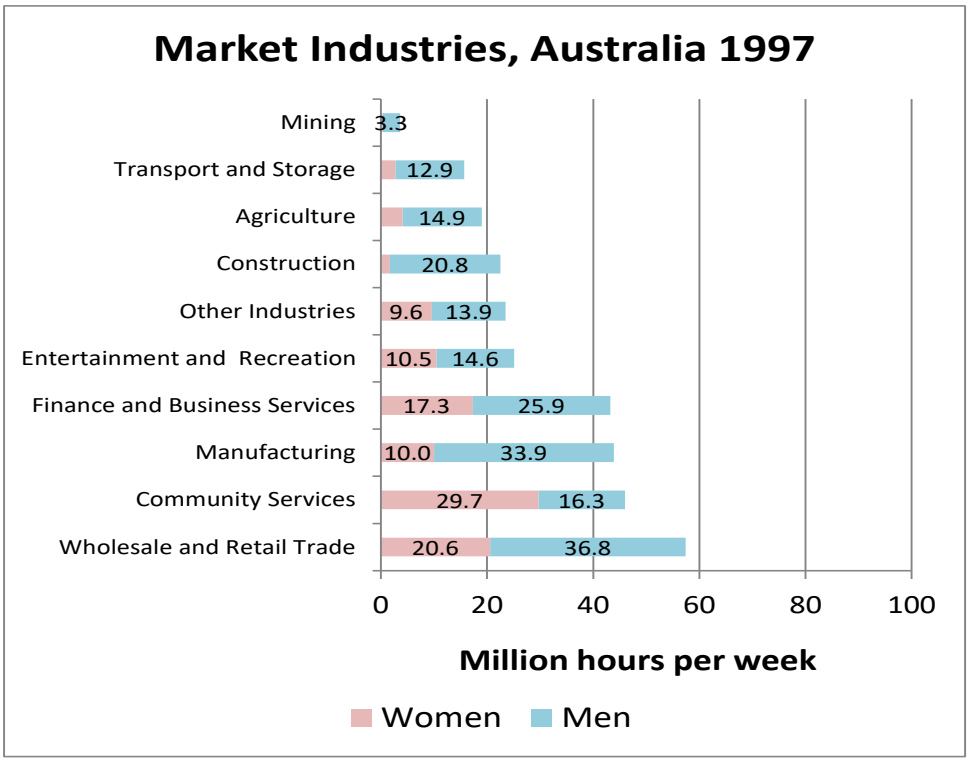
However, many diary-based time use surveys have great difficulty in recording episodes of simultaneous time use. Many surveys just ask respondents to recode their episodes of time use under the 'main' or "principal'' activity being undertaking. Very few surveys ask respondents to record what else they were doing. Moreover, in showing examples of how to record simultaneous or 'secondary' activities they rarely show caring for children as a 'main' activity. Only a few surveys, such as the Australian national time use survey of 1997, insist that every time episode should have an answer inserted for the 'what else' column. (*See* Ironmonger 2004, page 95)

Time Use in Australia in 1997

The following chart shows estimates for time use in Australia in 1997 that takes into account secondary time. These estimates were published in chapter 5, 'Bringing up Bobby and Betty: The inputs and outputs of childcare time' in *Family Time* (Folbre & Bittman, (Editors), 2004)

Chart 5


Household Industries, Australia 1997
Million hours per week
0 20 40 60 80 100 120 140 160 180 200
Child Care
Meal Preparation
Shopping
Laundry and Cleaning
Voluntary Community Work
Gardening
Other Household Chores
Repairs and Maintenance
138.5
56.2
60.6
22.3
45.9
28.9
61.4
12.0
30.2
20.0
20.2
23.1
12.3
32.0
3.1
54.5
Women
Men


Market Industries, Australia 1997
Mining
Transport and Storage
Agriculture
Construction
Other Industries
Entertainment and Recreation
Finance and Business Services
Manufacturing
Community Services
Wholesale and Retail Trade
3.3
12.9
14.9
20.8
9.6
13.9
10.5
14.6
17.3
25.9
10.0
33.9
29.7
16.3
20.6
36.8
0 20 40 60 80 100
Million hours per week
Women
Men

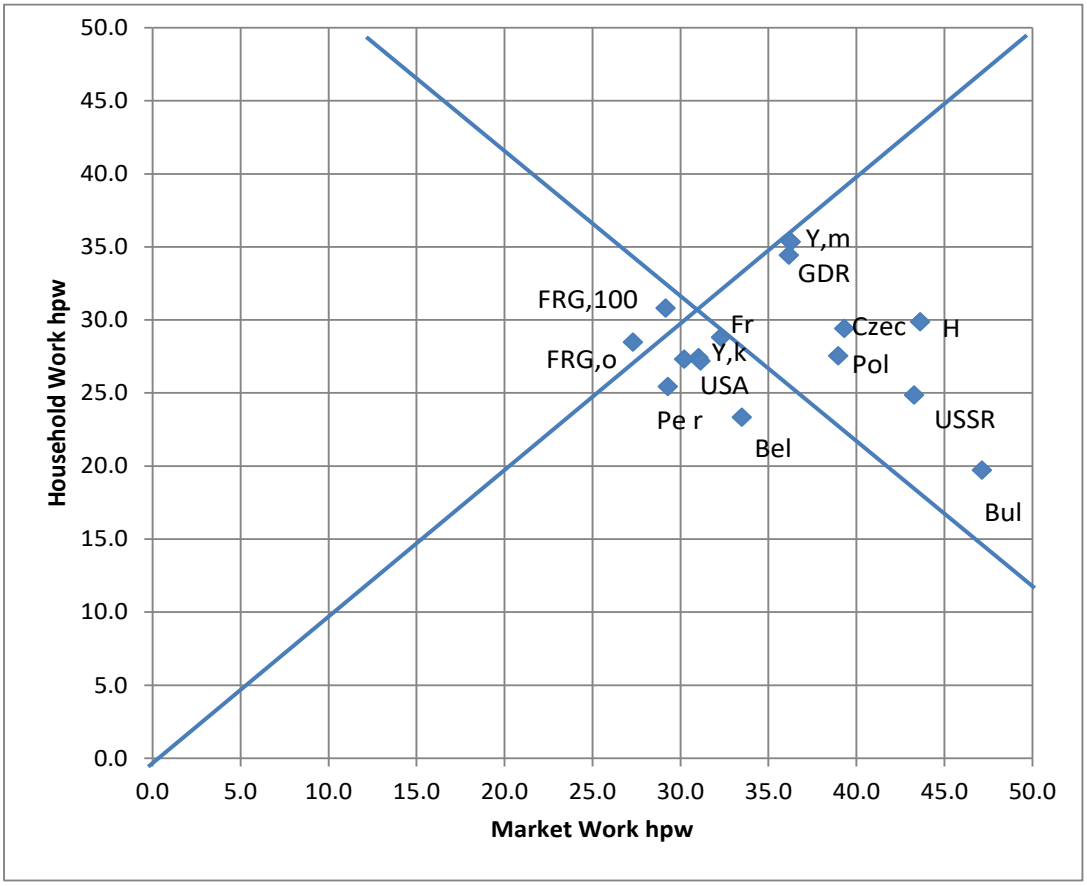
Estimates from the Szalai surveys of 1965-66

The following chart shows the average hours per person per week in household work and market work for each of the 15 survey sites in 12 countries of the Szalai surveys in 1965-1966.

It is important to note that these estimates are only for primary time; secondary (simultaneous) work time has not been included and hence total household work is to that extent undercounted.

There are two lines drawn across the chart. The first from the bottom left to the top right divides the area into two – that above and to the left (where household work is greater than market work) and the area below and to the right (where market work is greater than household work). All except the two FRG sites show market work to be greater than household work, the most extreme amounts of market work being in Bulgaria and the USSR.

Chart 6



Szalai surveys -

Bel – Belgium, **Bul** – Bulgaria, **C** - Czechoslovakia, **F** – France, **FRG,100** – Federal Republic of Germany, 100 electoral districts, **FRG,o** – Federal Republic of Germany, Osnabruck, **GDR** – German Democratic Republic, **H** – Hungary, **Per** – Peru, **Pol** - Poland, **Y,m** - Yugoslavia, Maribor, **Y,k** – Yugoslavia, Kragujevac, **USA** – United States, Jackson & 44 cities

The second line from the top left down to the bottom right divides the area between that above the line where the *total* work is greater than 62 hours per person per week and that below where the total is less than 62 hours per week. In all of the centrally planned economies (except one site in Yugoslavia) have total work of greater than 62 hour per week; all of the other countries show less the 62.

Again these measurements of household work hours do not include work done whilst simultaneously doing another, non-household work activity. The Szalai surveys did measure and publish data on the time spent in simultaneous, "secondary" activities. These are reported in section IV.4 of the report (1972: 673-710). The six most frequent secondary activities were childcare, eating, radio listening, television viewing, reading and conversation.

Estimates published by the United Nations in 1995

In 1995, the United Nations Human Development Office published a report titled *Measures of unrecorded economic activities in fourteen countries* prepared by Luisella Goldschmidt-Clermont and Elisabetta Pagnossin-Aligisakis. The countries and years of the data were - Australia 1992, Austria 1992, Bulgaria 1988, Canada 1992, Denmark 1987, Finland 1987-8, France 1985-6, Germany 1991-2, Great Britain 1983-7, Israel 1991-2, Italy 1988-9, Netherlands 1987, Norway 1990-1 and the United States 1985.

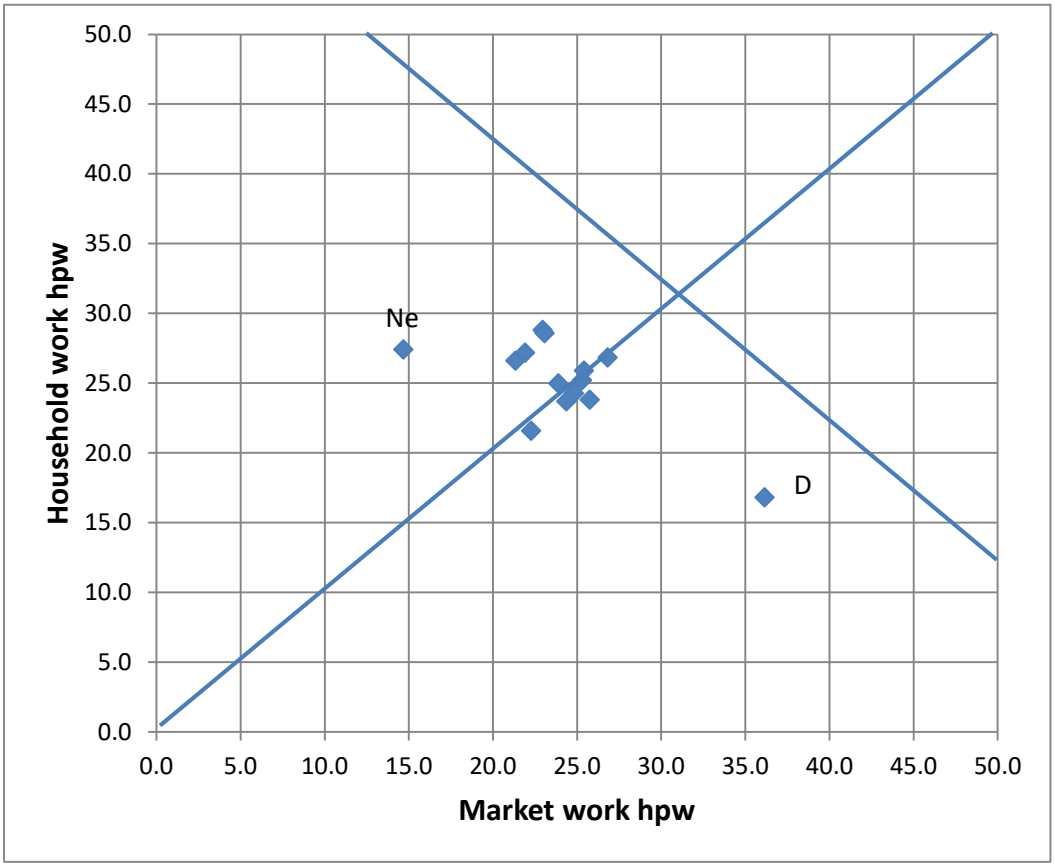
Once again, it must be pointed out that the total household work has been underestimated because the estimates are only for primary time and ignore the time spent multitasking.

This report summarised data on measurements of time use in the mid-1980s to the early 1990s in 14 countries. Under the sponsorship of the United Nations Human Development Report Office, this was the first to present data on work time as the distribution of *economic time* between *System of National Accounts* (*SNA) and non-SNA* activities. The SNA time is more or less synonymous with market economy time and the non-SNA time is synonymous with household economy time.

The distribution of the estimates of household economy work and market economy work for the 14 countries are shown in the following chart. As in the previous chart showing the 1965-66 Szalai data, two lines have been drawn dividing the area of the chart into segments where the household work is greater than market work and where total work is greater or less than 62 hours per person per week. The centre of gravity for the data is this time around the point where both household and market work are both approximately 25 hours per adult per week. There are two 'outliers' – Denmark (where market work was 36 hours per week and household work was only 17 hours per week) and the Netherlands (where market work was only 15 hours per week but household work was 27 hours per week). Part of the explanation for the lower market work in the Netherlands is that market work travel time was included as non-SNA (household) work.

These data for the 12 OECD countries were used in my influential paper in *Feminist Economics* in 1996.

Chart 7

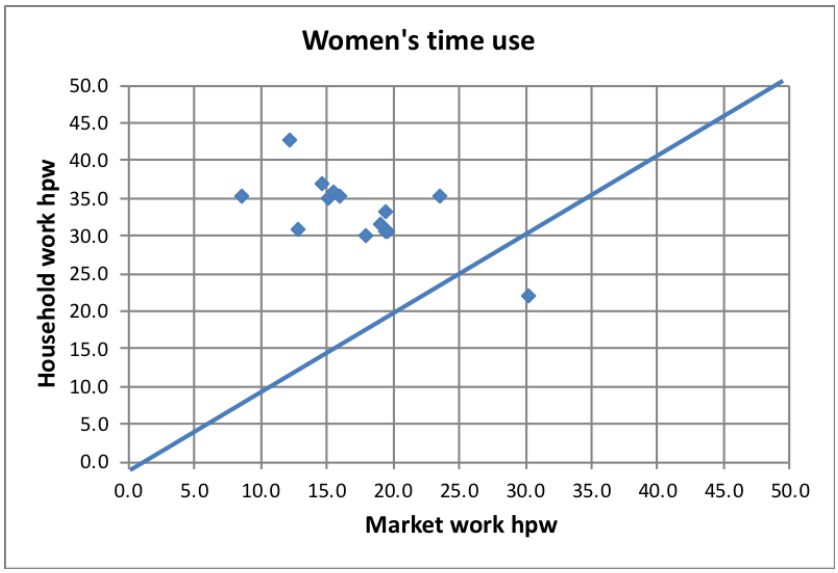


[Countries war not labelled in this diagram – Eds.]

These estimates *exclude time spent in education* and any simultaneous time in household work like childcare which are profound omissions when calculating total household work.

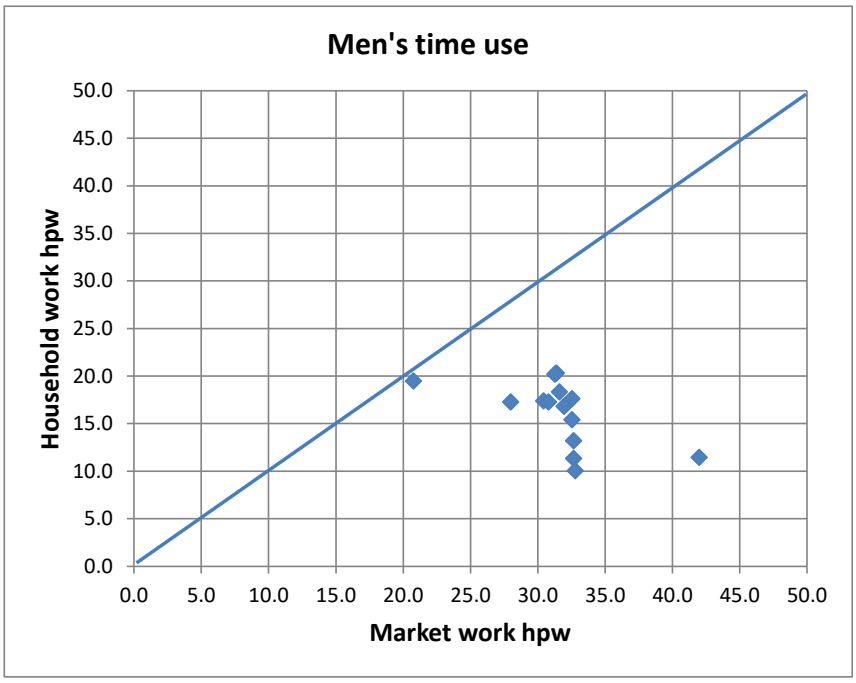
Nevertheless, the following chart shows the household work and market work for women and men for each of the 14 countries included in the 1995 report[31].

Chart 8



[Countries war not labelled in this diagram – Eds.]

Chart 9

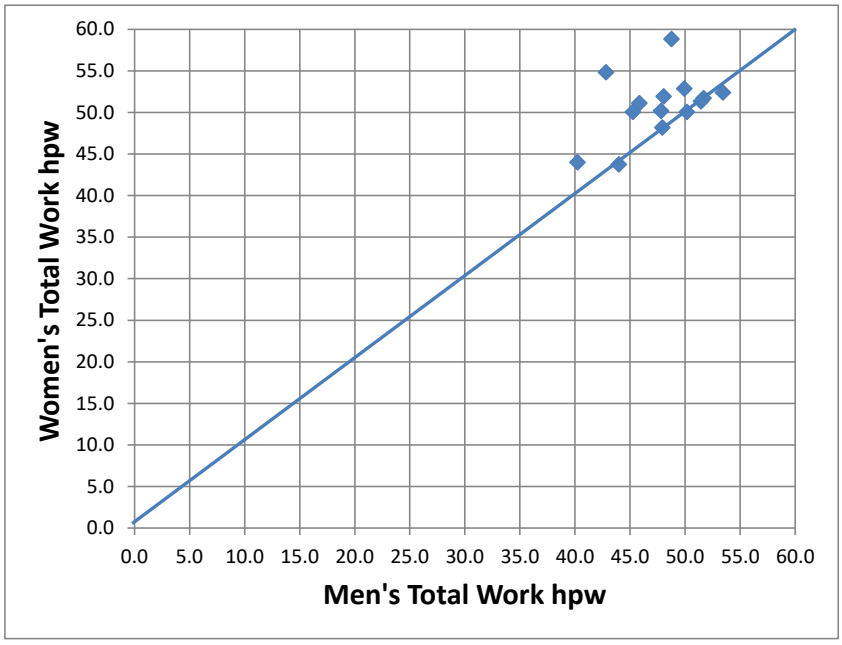


[Countries war not labelled in this diagram – Eds.]

[31] The Human Development Report Office report shows data according to gender.

With one exception (Denmark), women spend more hours in household economy work than in the market. Men spend more time in the market economy than in the household in every one of the 14 countries. Again Denmark is an outlier with average male market work of 42 hours per week. The Netherlands has men's lowest market work with average hours of just over 20 hours per week.

Chart 10



[Countries war not labelled in this diagram – Eds.]

Clearly the data show a large gender difference in the relative shares of time spent in the two systems of economic production – it could be called a large 'gender inequality' between work that is paid and work that is not.

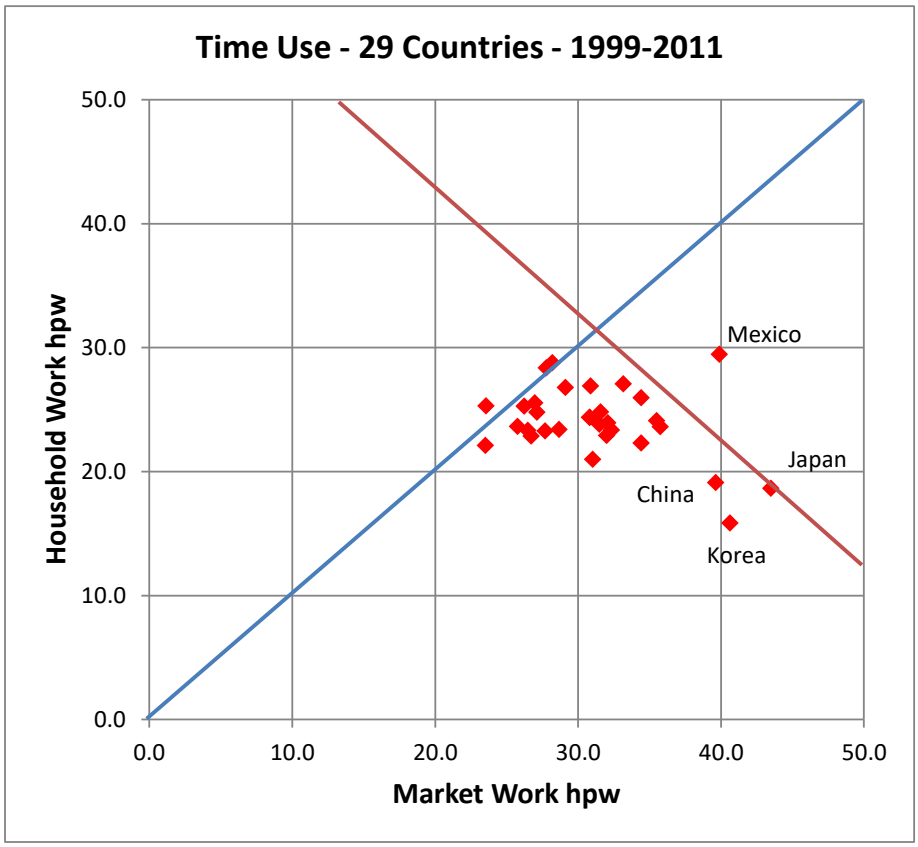
In addition, we find that women's total work exceeds that of men in ten countries, equals men's in one (Australia) and is less in only three countries (Denmark, Germany and Israel). These data are shown in Chart 10.

Estimates published by the OECD in 2011

The following chart shows the relative amounts of market work and household work for some 29 countries at the beginning of the 21st century. There are 26 OECD countries and China, India and South Africa. For the majority of countries, the data has been restricted to averages for those aged 15 to 64 years.

The OECD country mean shows a total workload of 55 hours per person per week – 31 hours of paid market work and 24 hours of unpaid household production.

Chart 11



[Not all countries were labelled in this diagram – Eds.]

There are four 'outlier' countries – Mexico with 40 hours of market and 30 hours of household work and China, Japan and Korea with 40 or more of market work and less than 20 hours of household work per week. The other 24 countries are grouped in a bunch around 30 hours of market work and 25 hours of household.

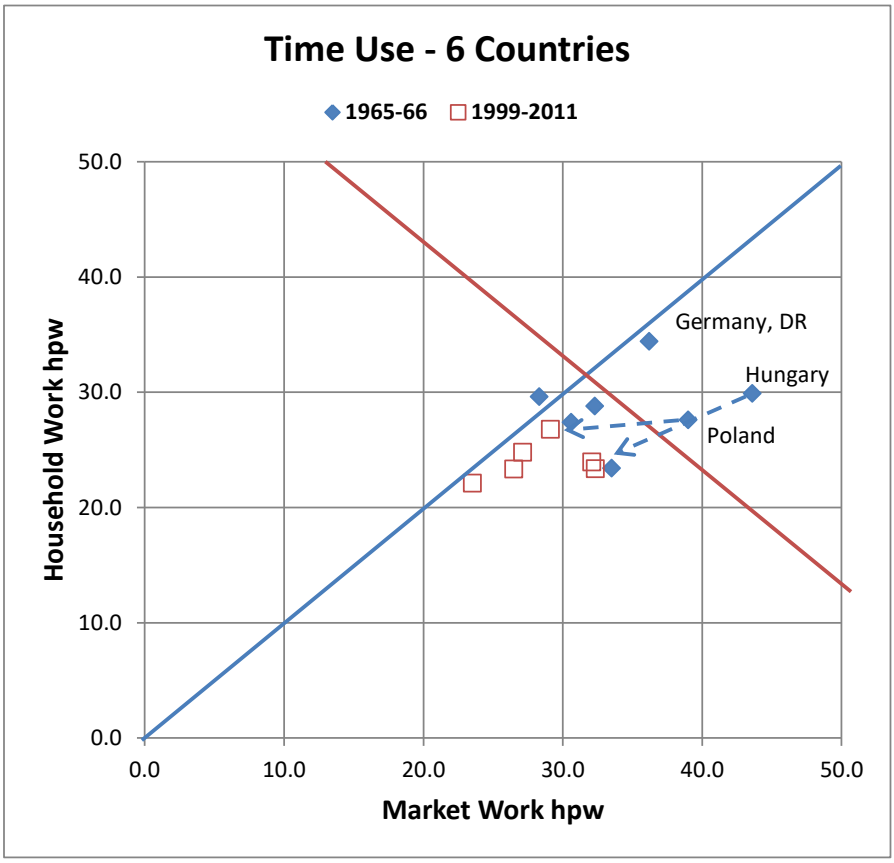
Change in Time Use – Six Countries – 40 years 1965-66 to 1999-2011

The following chart shows the change in household and market work for six countries that were included in both the Szalai surveys of 1965-66 and in a dataset collected by the OECD for the period 1999-2011. The countries are Belgium, France, Germany, Hungary, Poland and the United States.

Again, it is critical to remind readers that these estimates are only for primary time as secondary (simultaneous) work time has not been included and hence total household work is crucially undercounted.

Over approximately 40 years there has been a reduction in the average total work for the six countries which has moved from 64 hours per week (35 market and 29 household) to a total of 52 hours (28 market and 24 household). There were very large reductions of market work in Hungary and Poland.

Chart 12



[Not all countries were labelled in this diagram – Eds.]

Melbourne Time Accounts 1991-2006 published in 2008

Covering a period of 16 consecutive years, the Melbourne time accounts were designed to provide a framework for the detailed analysis of travel time by purpose of journey and mode of travel in Australia's second largest city. This is the first set of time accounts to use the production, consumption and investment categories of macroeconomics. Investment time is for two categories – education and personal care (which includes sleep). The accounts also include estimates for the time use of children and thus estimates of time use for the total population of all ages.

The Melbourne time accounts show the average market economy work (for all persons *including children*) grew from 17.6 hours per week in 1991 to 19.4 hours per week in 2006. These averages are lower than the data shown in the previous sections which exclude children. Over the same period the household economy work (including education) fell from 25.3 hours per week to 24.5 hours per week. In terms of the use of time, the household economy was 59.0 per cent of the total economy in Melbourne in 1991 and 55.8 per cent in 2006.

American Time Accounts – the American Time Use Survey (ATUS)

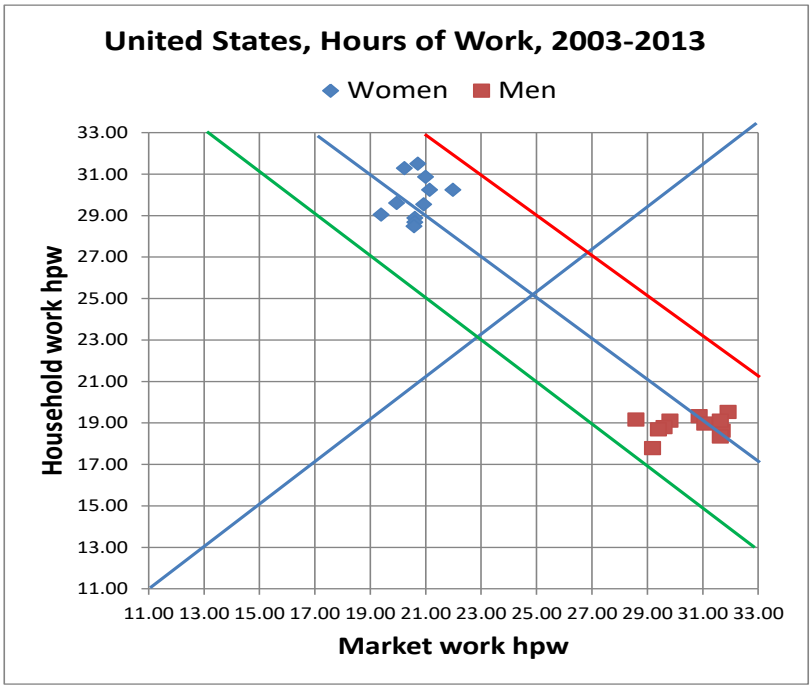
The American Time Use Survey began in January 2003 and has continued every month. The latest data available extends the accounts to December 2017. This amounts to 14 years of continuous data! These data have been assembled into National Time Accounts for the United States for this period and are set out in Appendix 1 to this chapter. They provide the basic information for the estimates of Gross Household Product and the national accounts of household economy for the United which are set out in an Appendix 1.

The following chart shows the household work and market work for both women and men in the United States over the years 2003 to 2013. In all years, women's household work (around 30 hours per week) was more than 50 per cent greater than that of men (less than 20 hours per week). Similarly men's hours of market work (around 30 hours per week) were about 50 per cent greater than that of women (just above 20 hours per week).

The diagonal lines going down from left to right show different levels of *total work time*. All observations lie within the band from 46 hours per week (green line) and 54 hours per week (red line). The blue line shows 50 hours per week; a greater number of the observations for women are above 50 hours and a greater number of the men's are less than 50 hours.

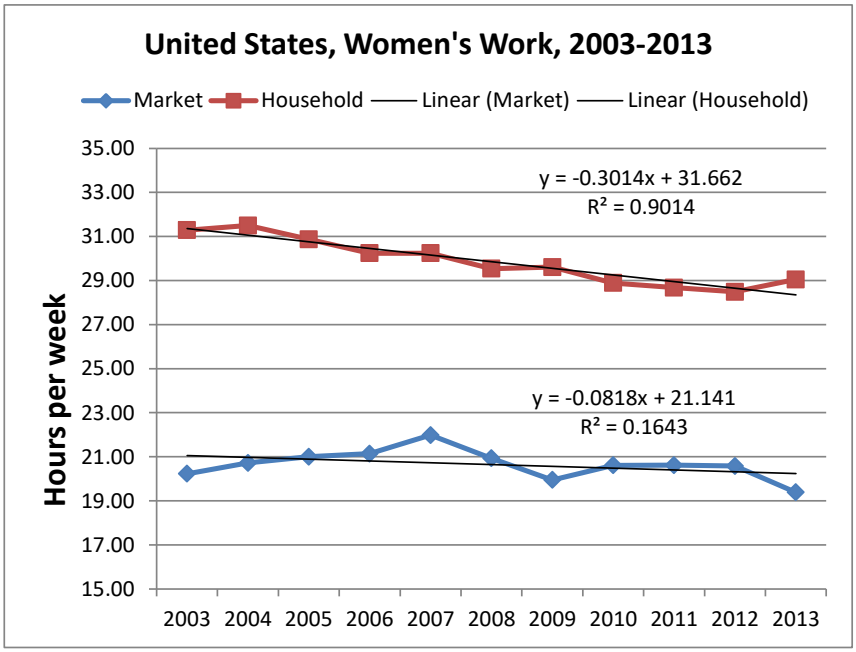
These household work totals *do not include care work time done simultaneously with other time* such as consumption, for example childcare time whilst also watching television. In addition, education time has been omitted from the household work hours, though arguably this time is also part of what can be called the household 'economy'.

Chart 13



The next charts show how these components of work have moved through time over the period.

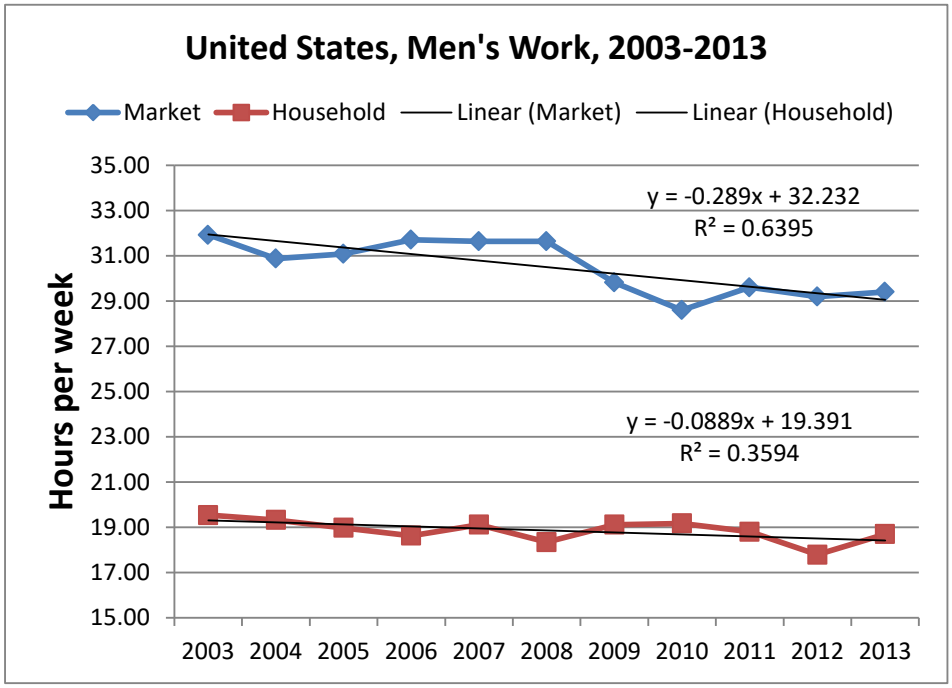
Chart 14



There was a strong downward trend in women's household work of more than 2 hours per week from over 31 hours in 2003 to less than 29 in 2023. Women's market work rose

during the years before the Global Financial Crisis (GFC) but has since declined – overall, a fairly flat trajectory.

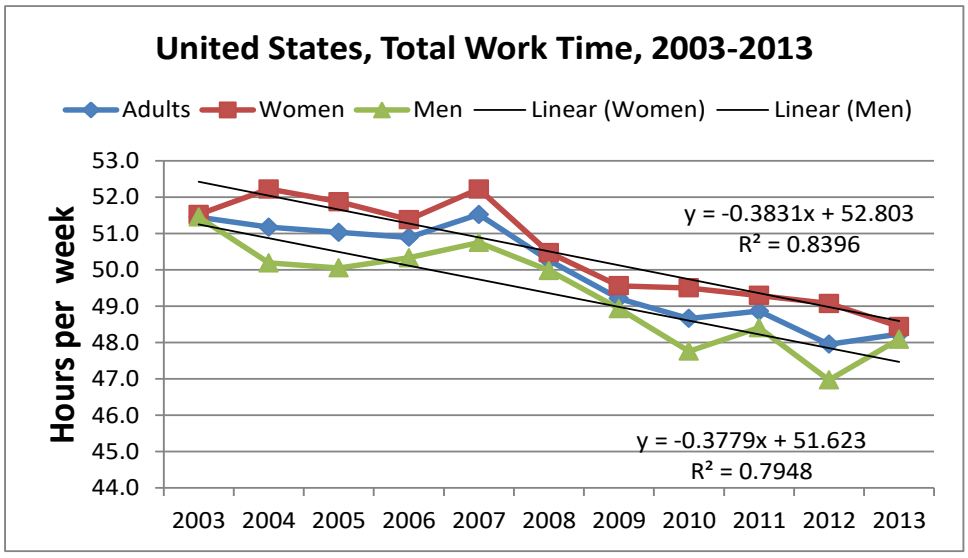
Chart 15



Men's market work was fairly constant at just over 31 hours per week from 2003 to 2008, but with the GFC it declined of just below 29 hours per week in 2010 and has remained around 29 hours per week since.

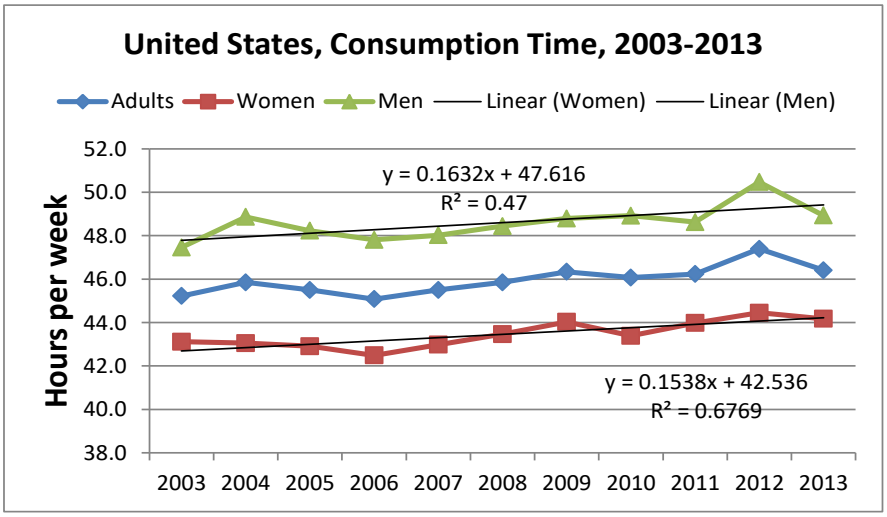
Further discussion of these movements in the components of work in the United States is contained in Part 3[32] on Research and Policy

Chart 16



[32] [what was intended for Part 3 is unclear and was never written – Eds]

Chart 17



Although the national time accounts are crucial for measuring the economic production of the household and market economies, because they cover all uses of time they enable measurement of other main human activities such as the time spent in consumption and sleep. The three charts shown here show how the decline in total work hours used in economic production of more than 7 per cent (3.8 hours per week) in the decade after 2003 for both women and men in the United States was absorbed in consumption and sleep.

Women and men both spent an extra one and a half hours per week in consumption (eating, drinking and other leisure activities). Over the decade, women also spent an extra one and a half hours per week sleeping; men just over one extra hour per week in sleep.

There was very little change in the time that Americans spent in personal care over the years from 2003 to 2013. However, women spend more than 6 hours per week in personal care; men just over four hours and a half.

Chart 18

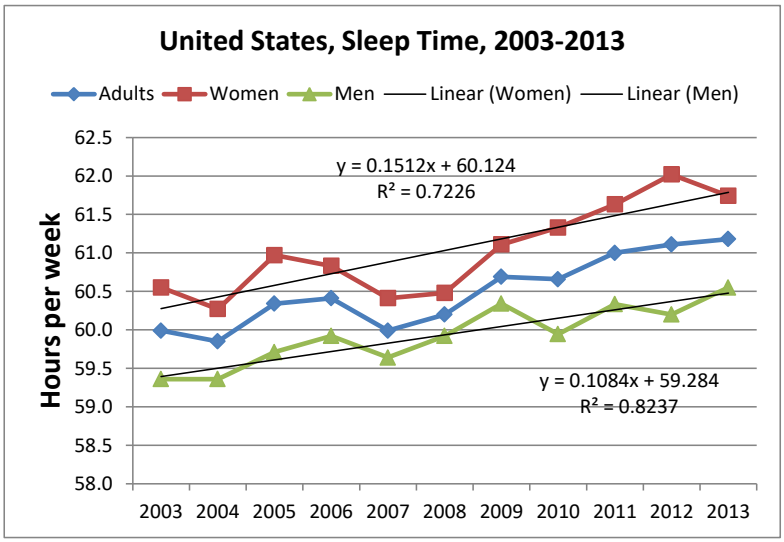
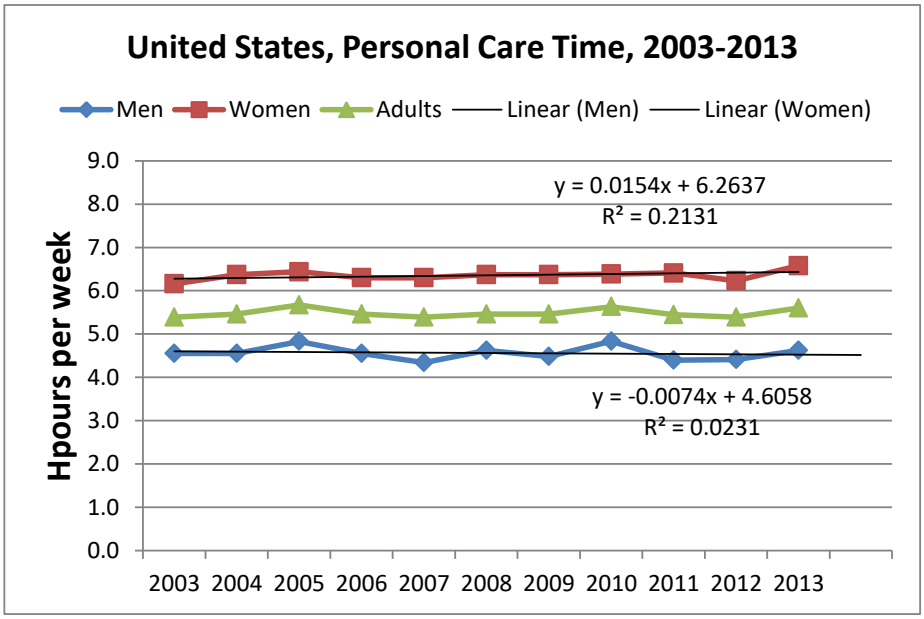


Chart 19



Time Accounts for India 1999 – compared with Australia 1997

The following table shows estimates of time use by people in both rural and urban areas of India from the first national time use survey conducted in 1999. The estimates show hours per person per week for those aged 6 years and over. Estimates for Australia in 1997 for persons aged 15 and over are shown in comparison.

Table 4.3 Time Accounts India 1999 and Australia 1997
Hours per person per week

Activity	**Rural India**		**Urban India**		**Australia**	
	Females	Males	Females	Males	Females	Males
Primary Industry	**19.5**	**31.0**	2.5	3.6	0.5	2.3
Secondary Industry	1.7	4.8	2.1	10.1	1.8	9.4
Tertiary Industry	1.3	6.5	4.6	27.3	13.1	19.2
Total Market Economy	22.5	42.3	9.2	41.1	15.4	30.9
Household Economy	33.9	**3.7**	36.4	**3.4**	36.1	20.2
Total Work	56.5	46.0	45.6	44.5	51.5	51.0
Education	6.4	9.1	9.5	10.6	3.3	2.8
Personal Care	7.6	8.6	7.6	8.3	6.8	5.7
Sleep	61.3	62.6	61.3	60.9	60.3	61.2
Consumption *	36.2	41.7	44.1	43.7	46.2*	47.3*
Total	**168.0**	**168.0**	**168.0**	**168.0**	**168.0**	**168.0**

(*) Consumption hours for Australia corrected to make total hours per week equal 168.

Source: Central Statistical Organisation, Government of India (2000) *Report of the Time Use Survey April 2000* Delhi
and Australian Bureau of Statistics (1999) *Time Use Survey, Australia 1997 Unit Record File* Canberra

One notable feature of the data is the very small amount of time that Indian males spend in household production – less than 4 hours per week in both rural and urban areas; this compares to 20 hours per week for Australian males.

The education time in India (more than 8 hours per person per week) includes children aged 6 to 14 years whereas the Australian estimates (3 hours per week) relate only to those aged 15 years and over. It is interesting to note that females in rural India have lower hours of education (6.4 hours per week) than rural males and urban dwellers (9.1 to 10.6 hours per week).

The table shows the very large amount of time used in rural India for food production in primary industry – 31 hours per week for males and 19 hours per week for females. In rural India total (market and household) work hours for females is greater than 56 per week; for males just 46 hours. Overall Australian total work (paid and unpaid) is 51 hours per week for both men and women. In India, females average hours of total work exceed 53 per week; for Indian males the average is only 46 hours.

It can be seen from these cross-country time use data that as a country moves from subsistence agriculture to a more developed, industrial and urban society the hours of market economy work (which includes the production of food) reduces. In 1999 rural Indians spent 32.7 hours per person per week in the market economy whereas urban Indians spent only 25.8 hours per week – 20 per cent less per person engaged. In Australia at about the same time (1997) the market used only 22.9 hours per person per week – 30 per cent less than in rural India.

It is evident from the table that Australia had a much greater use of labour in the household economy than India. Household work in Australia absorbed 28.1 hours per person per week; in India the volume of household work was only 18.7 hours per week – just two thirds of that in Australia.

Time will tell whether the growth of the household economy in India will follow the Australian trajectory and grow to more than 50 per cent of total work.

Table 4.4 Time Accounts India 1999 and Australia 1997
Hours per person per week

	India			Australia
	Total	**Rural**	**Urban**	**Total**
Market Economy Work	30.8	32.7	25.8	22.9
Household Economy Work	18.7	18.4	19.3	28.1
Total Economic Work	49.4	51.1	45.0	51.0
Proportion Household %	***37.8%***	***36.0%***	***42.9%***	***55.1%***

Summary of the National Time Accounts

Time use data provide extensive and un-refutable evidence that the productive economic system in every country consists of two parts – the market and the household. In developed countries each part of this dual system requires approximately the same amount of human time (labour) input. During the last 50 years the development of diary-based time use surveys has provided the tools to measure the use of one of the two factors of production – human capital (labour).

To reach the goal of measuring the monetary magnitude of the household economy, two questions remain to be answered.

Can reasonable measurements be made of monetary values of the labour quantities used in household production?

Can reasonable measurements be made of the value of use in the household economy of the other factor of production– physical capital – housing, vehicles and household equipment?

These questions will be addressed in Chapters 6 and 7 after a discussion of the history of the development of the national accounts of household production in Chapter 5.

Appendix 1

National Time Accounts, United States of America, 2003-2013

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
	Hours per person per week										
Women 15+											
Market work	20.2	20.7	21.0	21.1	22.0	20.9	20.0	20.6	20.6	20.6	19.4
Household work	31.3	31.5	30.9	30.2	30.2	29.5	29.6	28.9	28.7	28.5	29.1
Consumption	43.1	43.1	42.9	42.5	43.0	43.5	44.0	43.4	44.0	44.5	44.2
Investment - Education	3.4	3.4	2.9	3.7	3.1	3.6	3.5	3.4	3.2	3.3	3.4
Investment - Personal care	6.2	6.4	6.4	6.3	6.3	6.4	6.4	6.4	6.4	6.2	6.6
Investment - Sleep	60.6	60.3	61.0	60.8	60.4	60.5	61.1	61.3	61.6	62.0	61.7
Telephone and other	3.1	2.7	2.9	3.4	3.0	3.6	3.6	4.0	3.5	3.2	3.8
Total hours per week	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
Men 15+											
Market work	31.9	30.9	31.1	31.7	31.6	31.6	29.8	28.6	29.6	29.2	29.4
Household work	19.5	19.3	19.0	18.6	19.1	18.3	19.1	19.2	18.8	17.8	18.7
Consumption	47.5	48.9	48.2	47.8	48.0	48.4	48.8	48.9	48.6	50.5	48.9
Investment - Education	3.1	3.4	3.2	3.2	2.9	2.9	3.0	3.3	3.5	3.7	3.3
Investment - Personal care	4.6	4.6	4.8	4.6	4.3	4.6	4.5	4.8	4.4	4.4	4.6
Investment - Sleep	59.4	59.4	59.7	59.9	59.6	59.9	60.3	59.9	60.3	60.2	60.6
Telephone and other	2.2	1.8	2.0	2.2	2.3	2.2	2.6	3.3	2.8	2.4	2.6
Total hours per week	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0
Adults 15+											
Market work	25.8	25.6	25.9	26.3	26.7	26.1	24.7	24.5	25.0	24.7	24.2
Household work	25.6	25.6	25.1	24.6	24.9	24.2	24.5	24.2	23.9	23.2	24.0
Consumption	45.2	45.9	45.5	45.1	45.5	45.9	46.3	46.1	46.2	47.4	46.4
Investment - Education	3.3	3.4	3.0	3.4	3.0	3.3	3.2	3.3	3.3	3.5	3.4
Investment - Personal care	5.4	5.5	5.7	5.5	5.4	5.5	5.5	5.6	5.5	5.4	5.6
Investment - Sleep	60.0	59.9	60.3	60.4	60.0	60.2	60.7	60.7	61.0	61.1	61.2
Telephone and other	2.7	2.2	2.5	2.8	2.7	2.9	3.1	3.7	3.1	2.8	3.2
Total hours per week	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0	168.0

Notes: (1) The Household work totals in this table do not include care work time done simultaneously with other time such as consumption, for example child care time whilst also watching television.

(2) Household work includes care to children and other adults that can be counted as 'Investment' time.

5. FILLING IN THE BOXES : A NEW FRAMEWORK FOR NATIONAL ACCOUNTS OF HOUSEHOLD PRODUCTION

"The System of National Accounts (SNA) is the internationally agreed standard set of recommendations on how to compile measures of economic activity...expressed in terms of a set of concepts, definitions, classifications and accounting rules that comprise the internationally agreed standard for measuring such items as gross domestic product (GDP), the most frequently quoted indicator of economic performance." (United Nations 2009: 1)

A brief outline of a new framework for household economy accounts

In simple terms national accounting requires categories and variables to be clearly defined so that estimates can be filled in the "boxes" of the accounts. The national accounting statisticians then seek all possible available data to fill the boxes delineated by the established definitions. The accounts are in monetary terms and refer to specific dated periods of years or quarters such as calendar year 2006 or the quarter ended 30 June 2008. The values are thus "flows" of resources and production per year or quarter.

For household production satellite accounts (the national accounts of the household economy) the *variables* are defined in analogous ways to the same variables used in the national accounts of market economy.

National accounts distinguish between inputs and outputs of production and calculate the value added in this production as the contribution in value terms of both labour (human capital) and capital (physical capital). The remaining item is the value of the intermediate inputs used in production (materials and energy). Thus, the basic equations linking these variables are:

$$V = L + K + M \qquad (01)$$

$$GP = L + K \qquad (02)$$

where, over a specific period of time,

V = the gross value of production,
L = the value of the labour time used,
K = the rental value of the capital used,
M = the value of the other (intermediate) inputs of materials and energy used; and
GP = the gross value added in production.

It is often useful to consider the rental value of capital used in two further categories (i) dwellings, land and buildings and (ii) equipment, furniture and vehicles.

Thus

$$K = D + E \qquad (03)$$

Where

D = the rental value of dwellings, land and buildings used and

E = the rental value of equipment, furniture and vehicles used

The gross value of production and the inputs used can be disaggregated according to categories of commodities (goods or services) produced. In turn each of these categories and the components can be considered as comprising a price and a quantity.

Thus:

$$v_i = p_i \times q_i \qquad (04)$$

where, over a specific period of time

v_i = total value of production of commodity i (dollars)
q_i = total quantity of production of commodity i (quantity) and
p_i = market price for a unit of commodity i (dollars per unit of quantity).
The value of labour input in the production can also be decomposed into price (wage) and quantity (hours) components.

Thus for any commodity produced

$$l_i = w_i \times t_i \qquad (05)$$

where

l_i = total value of labour input to commodity i (dollars)
t_i = total quantity of labour time input to commodity i (hours) and
w_i = wage rate of labour used to produce commodity i (dollars per hour).

The relation in equation (05) also applies in aggregate across all production. So that

$$\sum_i l_i = \sum_i w_i t_i = \frac{\sum_i w_i t_i}{\sum_i t_i} \sum_i t_i = \frac{\sum_i w_i t_i}{\sum_i t_i} T$$

And hence

$$L = W \times T \qquad (06)$$

where

W = the weighted average wage rate across all production (dollars per hour) and
T = the total labour time used in all production (hours).

The variables used in defining equations (01) to (06) apply equally to both the market economy and the household economy.

However, the System of National Accounts (SNA) has narrowly defined the types of economic production which are to be included within the SNA boundary of production and what types should be excluded (Statistical Office of the United Nations, 1993). According to the SNA criteria, economic production emerging from the household should be included in “satellite” accounts, which closely mirror the standard accounts in structure. The major task for us is to fill in the boxes for the household accounts.

Time use surveys provided important data in helping to populate the cells in these "satellite" accounts. However, It is not widely recognised that diary-based surveys of time use contain data not only on 'input' time but also on 'output' time. The diaries record episodes of time use throughout the day showing activities that can be categorised not only as household production input time, such as preparing a meal, but also household output (or consumption) time such as eating a meal.

Harvey and Mukhopadhyay (1996) appear to have been the first to use the methodology of counting output episodes from time use surveys to estimate and value household production outputs. Using episode data from the 1992 Canadian time use survey, they counted the number of meals, the hours of childcare and the nights of accommodation. Using data from other surveys they also made estimates for the value of household clothes laundry, of voluntary or unpaid community-oriented activity and of personal development (education). The 1995 INSTRAW monograph, for which Andrew Harvey was the Consultant Project Coordinator, strongly recommended that education should be included in household production satellite accounts.

Estimates for the Australian total economy 2006

The following section of this chapter explores the application of this innovative methodology to the episode data from Australian time use surveys. The number of outputs is extended to include episodes of transport provided by households. This is in consensus with the Eurostat recommendation to include transport as a final output in the preparation of satellite accounts of household production. Initially household production of transport was classified as an ancillary activity like shopping or gardening (*see* Varjonen and Niemi, 2000).

A Framework for Household Production Satellite Accounts

Categories of Household Outputs

The household economy can be defined as the productive activities conducted by households using household capital and the unpaid labour of their own members to process goods and provide services for their own use (Ironmonger, 1994).

Household production includes the preparation of food and meals, laundry and house cleaning, childcare, shopping, household repairs and maintenance, gardening and other household tasks.

Goods, Services and Consumption

There is another issue mentioned in Kuznets' approach that is worth discussing. This is the distinction between *goods* and *services* and their roles in satisfying the wants and needs of the population of a country through *consumption*. Consumption of goods and services by consumers is assumed in economics to provide *utility*, the satisfaction of human needs and wants.

Broadly speaking, *goods* are tangible physical objects that can be seen and touched such as books and clothing. *Services* are the flows of experience and or satisfaction provided by other people such as dentists and barbers or the use of services provided by another organisation such as transport provided by a bus company or of accommodation provided by a motel. However, it is important to remember that in the national accounts for any specific period of time, we measure the *flows* through time then the consumption of any good is actually the *service* from *using* that good during that time period, not the mere *possession* of the good at any point in time.

Thus, all commodities, both goods and services, become useful in satisfying human needs and wants only when they are consumed (used) as *services*.

Accordingly, for national accounting to measure the services correctly, national accounts must move beyond the point of purchase of household goods to measure the use of these goods in providing services to the household members. Unfortunately, from Kuznets' time to this day, the United Nations guidelines for the compilation of official national accounts by the world's statistical organisations regard the purchase of household goods (even durables such as vehicles and household equipment) as consumption.

The SNA definitions confine household production to "services" and exclude the production of "goods". Thus, *growing* rice and chickens for use within the household is regarded as production of goods to be included in SNA production even if not for sale. *Cooking* rice and chickens for use within the household is regarded a production of meals and hence services not goods. This means the production of home-cooked meals is excluded from the SNA production boundary.

Amongst the services there are some which are now not regarded as final outputs but as "ancillary" services. These include shopping and gardening. As a result, there are just **seven** final categories of services now considered to be final outputs that should be included in the household production satellite accounts.

The seven final outputs are:

Accommodation,
Meals,
Clean Clothes,
Childcare,
Transport,
Volunteering; and
Education.

The complexity in counting and finding appropriate market prices for equivalent services provided by the market economy can be understood by considering the variety of types and qualities of the services within each category. In each case the actual range of variety of the services provided by households are compared with the actual procedures used by Harvey and Mukhopadhyay (1996).

A further complication is that some production can be made using market capital and household labour (such as a laundromat where households use their own labour time to produce clean clothes) and other production can be made using household capital and market labour (such as a hired worker using the household laundry equipment to produce clean clothes).

These types of "mixed modes" of production need to be accommodated within the satellite accounts. However, data to make estimates of these modes are hard to find and hence have not been included in the estimates for this chapter.

Accommodation Varieties – Size, Location, Tenure Type

The accommodation provided by households for their members is more than just shelter from the elements and is more than just a place to sleep. Accommodation also provides indoor and outdoor space and facilities for a full range of household production and consumption activities including recreation, leisure and social interaction.

Time use surveys provide data on the *quantity* of accommodation (bed nights) that households provide. Analysis of location and time of day data from diary-based time use surveys yields information on where adults and children spend their bed nights by the location of their morning and night sleep. Child bed nights can be imputed from the data by examining the presence of a child (or children) during adult sleep episodes. The 2006 Australian Time Use Survey showed about 99.2 per cent of bed nights are provided by households.

Time use surveys provide only limited information on the *quality* of household accommodation - often only basic information about the geographical location, dwelling structure, tenure type and the presence of major items of household technology.

Analysis of data from the census of population and housing shows a very wide range of accommodation from small one-bedroom apartments to large single-household, multi-storied dwellings with three and four bedrooms and large indoor and outdoor space for recreation and leisure in addition to facilities such as dining rooms, kitchens, bathrooms, laundries and garages. These dwellings can be owner occupied or rented and can be located close to and more distant from market and public facilities. Location is a large factor in the value of the accommodation. Dwellings can also vary greatly in their furnishings, furniture and equipment. Thus, the market prices for these varieties of accommodation will vary widely.

The measurement task involves estimating the number of days of accommodation for each accommodation variety and finding the market equivalent rental price for each variety.

Harvey and Mukhopadhyay (1996) counted the number of bed nights provided by households and valued these at the average price per person of a motel room shared by two people. Whilst this gives an estimate of the value of household accommodation, it seems likely to be an underestimate of the average quantity (in terms of space) and quality (in terms of equipment and facilities) of accommodation provided by households.

From the revenues from market accommodation for 2006 the following data are available.

Table 5.1 Market Accommodation, Australia, 2006

2006	Licensed hotels	Motels & guest houses	Serviced apartments	All types
Guest nights ('000)	33,702.2	34,529.8	25,897.5	94,129.5
$ per guest night	99.02	58.32	66.11	75.04

Source: ABS Quarterly Survey of Tourist Accommodation (Cat No 8635.0)

The average of $75.04 per guest night for all types of accommodation is used in the following estimates as the nearest market rate for equivalent quality household accommodation in Australia in 2006 but incorporates a discount of 20 per cent to reflect a lower cost for longer term stays.

Meal Varieties – Breakfast, Lunch, Dinner, Snacks, Drinks

Similarly, meals and snacks also vary greatly in their composition and hence in their cost. Although most meals are prepared and eaten at home, some (particularly lunches) are prepared at home and eaten at work or school, and others are eaten at canteens and restaurants. There are also take-away foods such as pizzas which may be collected from the pizza parlour or delivered to the household. The time use surveys provide a snapshot of the number of meals and snacks eaten by adults during an average week, the location, duration and time of day of the eating episodes. However, they do not provide any

information on the composition, and hence the quantity and quality, of the foods and liquids consumed. Ideally data are needed on the food ingredients of various types of home-produced meals and snacks produced in and consumed by households.

Some information is available from household expenditure surveys of the types and values of foods used for household production of meals.

Using time use survey data Harvey and Mukhopadhyay (1996) estimated the number meals eaten by adults aged 15+ years by time of day and location – home, work, school or restaurant. Combining these estimates of adult's meals with demographic data and data from the family expenditure survey they estimated the number of children's meals. Market surveys of Canadian food establishments then provided the average price of a meal bought in restaurants and other food establishments.

The accuracy of this procedure depends crucially on whether the market research average market price reflects the same mix of types of meals and snacks as the mix of types of meals provided by households. For example, there would be a higher proportion of meals for babies and children in home production than in the market. Likewise the data show that a high proportion of lunches are provided by the market. Thus, the market research average market meal price should be re-weighted to reflect the composition of household meals.

The accuracy of the final estimates also depends of how accurately people fully report all the meals (and particularly snacks) in the time use diaries. Time use surveys seem to underestimate the number of meals and snacks consumed at home. Harvey and Mukhopadhyay show a Canadian average of only 2.3 home eating episodes per adult per day in 1992. The Australian time use survey for 2006 shows only 2.2 adult home eating episodes per day. Both estimates of the number of meals *and snacks* eaten at home are most probably far too low. In time use diaries people are likely to significantly under-report the number of episodes of eating snacks and possibly also the number of meals.

Clean Clothes Varieties - Garment Types, Men's, Women's, Children's

Commercial laundries and hotels that offer to launder clothing do so at different market prices depending on the type of garment. Thus trousers, skirts and dresses are higher priced that shirts, blouses, tops and shorts which are higher priced than underclothes, socks and handkerchiefs. Thus, to estimate the gross market value of household laundry we need to count the numbers of each type of garment that is laundered by households and value these quantities at the market laundry prices for each type.

The most accurate output measure of clothing care is number of clean clothes of each different garment type (laundered and ironed/folded) produced by the household. Harvey

& Mukhopadhyay (1996) assumed the output measure of clothing care to be loads of laundry produced by households. As Harvey & Mukhopadhyay (1996) lamented, time use survey data as it is currently collected, provides "no clue" on either loads of laundry or number of clean clothes produced in households. Using loads of laundry as an output measure of clean clothes is further complicated by the fact that a load of laundry has both personal and household components.

Data on number of clean clothes produced by households can be obtained through other sources such as personal consumption surveys. The Households Research Unit conducted a small-scale Melbourne survey of housing, clothes, meals, trips and care in 2005. [33] This survey collected information about the number of clean clothes produced by households (differentiating by garment types for women, men and children).

One advantage of using this method is that the personal and household (sheets, towels, etc) components of loads of laundry do not need to be disentangled and allocated correctly to clothes care and accommodation. Thus, the number of clothing items laundered, including ironing can be obtained from personal consumption diaries such as those used in the "Daily Living in Australia Survey".

Child Care Varieties – Physical, Teaching, Reading, Minding, Multi-childcare, Multi-parent-care

The output of childcare is measured in child hours of care, not the input hours of parents or other unpaid carers. Rarely do time use surveys record the care received by children[34]. Time use surveys usually cover adults aged 15+ years and record the input hours of childcare provided by adult child carers. Some input hours would be providing care of more than one child; sometimes more than one person could record the care of the same child. It is also to be noted that the great proportion of input hours of childcare (particularly minding care) are recorded as a secondary activity whilst something else, such as watching television, which is recorded as the main activity (Ironmonger 1996a, 1996b, 2004).

Many time use surveys also collect data on the presence of children during an adult activity episode. Thus, we can calculate the time adults had a child (or children) present during all activities, including sleeping. The presence of a child (or children) during adult activities in the household can be an estimate of the time a child is cared for by the household, that is the "child hours" of care. The time adults spend in the presence of a child (or children) is really the total time spent in childcare (indirect and direct care) that

[33] Daily Living in Australia: A Survey of Housing, Clothes, Meals, Trips and Care, Households Research Unit

[34] An exception is the Longitudinal Study of Australian Children (LSAC) organised by the Australian Institute of Family Studies.

adult household members provide to children. This is a more accurate estimate of all the direct and indirect childcare households provide.

An alternative and somewhat more direct and simple starting point is to use the demographic data on the numbers of children to give estimates of the total hours for which children require care. The hours of care provided by the market (in childcare centres and schools) can then be obtained by surveys of these establishments and deducted from the total to give an estimate of the residual care provided at home. This method has been used by the Office for National Statistics (Holloway et. al., 2002) to give estimates of childcare in the UK and by the present author to give estimates for Australia (Ironmonger and Soupourmas, 2002).

Harvey and Mukhopadhyay (1996) use data from the Canadian time use survey on input hours combined with a statistical package and data from the family expenditure survey to estimate the number of output hours of childcare.

A comparison of the Canadian, Australian and United Kingdom data for some calendar years shows the following:

Table 5.2: Household Production: Output Hours of Child Care, 1992 and 1999

	Canada (1992)	Australia (1999)	United Kingdom (1999)
Million hours	11,984	29,332	87,786
Child population (0-14 yrs) ('000)	5,829	3,933	12,138
Average care per child -			
Per year	2,055.90	7,457.50	7,232.60
Per week	39.5	143.4	139
Per day	5.64	20.5	19.9

Thus, whilst the Australian and United Kingdom estimates are similar, an average of about 20 hours per day of childcare per child 0-14 years, the Canadian data show less than six hours per child per day.

The Canadian estimates used the market price for an hour of commercially available childcare from childcare centres for infants, pre-school and school aged children. The Australian and UK estimates used the price for a live-in nanny assuming each nanny minded two children working for a 46-hour week.

Transport Varieties – Distance, Purpose, Speed, Comfort

When households use public transport (trains, trams, buses and ferries) or take taxis they are purchasing a transport service from the market. Households pay fares for these services. When they use their own cars and other motorised vehicles to drive themselves

and their families they are essentially providing their own taxis without charging themselves the fare.

Household production of transport services involves the use of household capital equipment (vehicles) and the use of household labour (to drive the vehicles). Taxi fares cover the inputs of labour, capital and other inputs including fuel, maintenance and repairs.

The main way the market charges for taxi costs is by the distance travelled for each trip combined with a "flag-fall" or hiring charge per trip. Commonly there are also extra charges for different times of day, such as a surcharge for late night trips. To count the outputs of household transport services we need to count the number of trips, the distance covered and the time of day. The purpose of a trip does not affect the market price, so there is no need to differentiate between trip purposes. Taxis usually can take up to four passengers without extra charge.

Time use surveys are usually rich in the data needed for the calculations of the household production of transport services. Specifically, time use surveys provide comprehensive information on the number of trips and duration of trips undertaken by adults in motorised transport (car/truck/van/motorbike or scooter) provided by households at different times of the day. The distance travelled in kilometres can then be estimated based on the duration of trip multiplied by average speed obtained via travel surveys. In Australia there are also annual official surveys of samples of both domestic and commercial vehicles to determine, for public transport policy purposes, the annual average number of vehicle kilometres travelled by vehicle type. These surveys provide estimates of household transport vehicle kilometres.

Volunteering Varieties – Organised (Indirect) and Unorganised (Direct)

In its work on measuring and valuing volunteering, the Households Research Unit has distinguished between "organised" and "unorganised" volunteering. [35]

Organised volunteering is defined as unpaid help in the form of time, service or skills willingly given by an individual through an organisation or group. Formal or organised volunteering is *indirect* as it is mediated through an organisation. Reimbursement of expenses or small gifts is not regarded as payment of salary. Work reimbursed by payment in-kind is not regarded as volunteering.

Unorganised volunteering is defined as the informal unpaid help and care that occurs within the personal networks of family, friends, neighbours and acquaintances. Informal

[35] A more detailed discussion of the definitions of organised (formal) and unorganised (informal) volunteering can be found in Chapter 3 of the report *Giving Time*: *The economic and social value of volunteering in Victoria* (Soupourmas and Ironmonger, 2002).

or unorganised volunteering is *direct* as it is not mediated through an organisation. It includes regular, spontaneous and sporadic help that takes place between friends and neighbours such as giving advice, looking after other people's children or helping an elderly neighbour.

The estimates of volunteering in this chapter exclude looking after other people's children. This activity has been included on an output basis in the childcare category.

For the remaining volunteer activity, it is not feasible to measure the specific outputs of meals, care etc., provided both indirectly through volunteer organisations and directly in support of other adults. Consequently, the estimates are relegated back to measuring the input time and valuing that at an appropriate market rate. The rate is $24.09 per hour based on reports prepared by the Households Research Unit for the state governments of Queensland, Western Australia, and South Australia (Ironmonger, 2008, 2009, 2011).

Education Varieties – Pre-school, Primary, Secondary, Tertiary, Homework-study

The 1995 INSTRAW monograph *Measurement and valuation of unpaid contribution: Accounting through time and output* makes a persuasive argument that education represents personal, and, hence, household investment that yields a return over time. Although it does not technically comply with Margaret Reid's third person criterion for production, education is considered a productive activity. Education is not a task you could usefully pay someone to do for you as the benefit would not accrue to you. The output of education emerges over a long period of time after the input time and as shown by many studies accrues in the form of higher income over many years.

Robert Eisner and his team at North-western University in their ground breaking work on the extended national accounts for the United States included not only the education time of adults but also the education time of children in their estimates of Gross Household Product[36].

Harvey and Mukhopadhyay (1996) included estimates for the income foregone in the education process by Canadians aged 12 to 27 years. The education estimates in this chapter include estimates for Australians aged 15+ years.

Source Data

The data must be consistent for a particular year or quarter. For this paper the source data and the estimates are for Australia for the calendar year 2006.

Five types of data are used to make the estimates. These are:

Output and input data from time use surveys

q_i = total quantity of household production of service *i* (measured in appropriate units)
t_i = total quantity of labour time input used in household production of service *i* (hours)

[36] Eisner seems to have been the first to designate the valued added by household production as "Gross Household Product".

Input data from other surveys and sources

p_i = market price for a unit of service *i* (dollars per unit)
m_i = total value of intermediate inputs in household production of service *i* (dollars)
k_i = total rental value of capital input in household production of service *i* (dollars)

The total rental value of each capital input may be split into its components d_i and e_i where d_i = total rental value of dwelling space and land input in household production of service *i* (dollars) and e_i = total rental value of equipment, furniture and vehicles input in household production of service *i* (dollars).

Thus $d_i + e_i = k_i$.

Calculated Data

From the source data, calculated data are prepared for four more variables. These are:

$v_i = p_i \times q_i$ = gross value of household production of service *i* (dollars)
$ghp_i = v_i - m_i$ = value added (GHP) in household production of service *i* (dollars)
$l_i = ghp_i - k_i$ = total value of labour input in household production of service *i* (dollars)
$w_i = l_i \div t_i$ = imputed wage rate of labour input in household production of service *i* (dollars per hour)

Aggregate Data

Adding across all the various household production services gives four more variables *V, M, K* and *T*.

$V = \sum_{i=1,n} v_i$ = total gross value of household production (dollars)
$M = \sum_{i=1,n} m_i$ = total value of intermediate inputs in household production (dollars)
$K = \sum_{i=1,n} k_i$ = total rental value of capital inputs in household production (dollars)
$T = \sum_{i=1,n} t_i$ = total quantity of labour time inputs in household production (hours)

As shown before in equation (03) *K* may be split into two components, *D* and *E*.

From these estimates, three more aggregates can be calculated, *GHP*, *L* and *W*.

$GHP = V - M$ = total Gross Household Product (dollars)
$L = GHP - K$ = total value of labour time inputs in household production (dollars)
$W = L \div T$ = average imputed wage rate in household production (dollars per hour)

The basic identities linking these aggregate variables are

$V = GHP + M$
$GHP = K + L$ and
$L = W \times T$

Advantage of this new approach over other methods[37]

If we examine the way input-output principles are applied to valuation within the SNA we find there is one large sector where outputs are not sold -- the public sector. In this sector the value added by the provision of goods and services, for example police and defence, is estimated from the value of the purchased capital and labour used, not by the (non-existent) prices of the outputs. For the household, the problem of value-added estimation is somewhat different. Here, nearly all the goods and services produced, such as meals, laundry and child care, are also available from the market. So, unlike the public sector, we can count and value the household outputs at the market prices for which these goods and services can be purchased.

The accounting valuation and measurement possibilities for the business sector, the public sector and the household sector are set out in tabular form below.

Input-Output Valuation: Business, Public and Household Sectors

	Business	Public	Household
Inputs			
Labour time	Actual transactions	Actual transactions	,,, - (Residual)
Capital goods	Actual transactions	Actual transactions	Counted and priced at market
Intermediate	Actual transactions	Actual transactions	Actual transactions
Outputs			
	Actual transactions	,,, - (Residual)	Counted and priced at market

In the business sector the accounts can be based on actual transactions for both the inputs of labour, capital and intermediate commodities used in the production process and the outputs of goods and services flowing from this process. For the public sector, actual transactions can be used as the basis of the inputs but in most cases, there are no comparable commodities for which we can obtain prices to value the outputs of public goods.

For the household sector we can count the outputs and value them at market prices. The value of the labour inputs can then be calculated as the residual item from the deduction of the cost of the capital used and the cost of the intermediate inputs used in household production. *If we measure the hours of time involved, we can calculate as a residual the value per hour of that time.*

For example, if a man takes 60 minutes to prepare, serve and clean up after a meal for four people, say valued at $40 at restaurant prices, and the costs of the ingredients,

[37] The discussion in this section follows closely the arguments presented in Ironmonger (1996a).

energy for cooking and washing up, together with the use of the kitchen, kitchen equipment, dining room, furniture and utensils are $25, then the wage rate for the man's unpaid labour is $15 per hour. If a woman can prepare the same meal in 30 minutes, her labour would be worth $30 per hour[38].

Using this approach, the values of the labour used in the various types of household production are derived from the market values of the household production outputs less the cost of the capital and intermediate inputs which are also derived from market data. The average labour costs per hour are then simply derived by dividing these values by the time use survey estimates of the unpaid hours used in each type of household production.

This method simply solves the much-debated dilemma of which market wage rate to use – opportunity cost wage, specialist wage or general housekeeper wage. The imputed labour costs per hour from this new approach are thus based on the actual technology and productivity of household production not on wage rates determined by the technology and productivity of market production.

The use of an output valuation method on household production also goes a long way towards solving the issue of the joint production of services through simultaneous or parallel uses of time. The joint products -- meals prepared and children minded -- of the labour and capital used in preparing and minding is counted and valued at market prices. The value of the labour used simultaneously is found indirectly by deducting the materials and capital costs from the market value of the joint outputs.

New Estimates of Australian Household Production

The experimental estimates in this chapter are for the year 2006 using outputs from the Australian time use survey and other data from official and unofficial statistics.

The estimates cover the Australian household population of 19,891,200 (15,963,900 adults aged 15+ years and 3,927,300 children aged 0-14 years) in 7,954,800 households as recorded by the Australian Bureau of Statistics in the 2006 time use survey. The estimates therefore exclude people living in non-private dwellings such as hotels, motels, boarding houses and other institutions such as hospitals, schools and prisons.

[38] And, if her meals for four were of higher standard, say worth $44 at restaurant prices, her labour would be worth $38 per hour; $44 - $25 = $19 for 30 minutes work.

1. Accommodation [Number of days of accommodation]

Harvey and Mukhopadhyay (1996) called this "Housekeeping" and counted the number of bed nights

Table 5.1 Household Production of Accommodation, Australia 2006: Experimental Estimates (m = million)

Category	Item	Unit	Total All Households per year				
					Per year	*Per week*	*Per day*
Output	qi	days(a)	7,115.10	m	894	17.15	2.45
	pi	$/day(b)	60.03		60.03	60.03	60.03
	vi	$	427,119	m	53,693	1,030	147.1
Inputs	ti	hours(c)	6,895	m	866.8	16.62	2.37
	wi	$/hour	41.65		41.65	41.65	41.65
	li	$	287,185	m	36,102	692.37	98.91
	di	$	98,307	m	12,358	237.01	33.86
	ei	$	15,269	m	1,919	36.81	5.26
	ki	$	113,576	m	14,277	273.82	39.12
	mi	$	26,358	m	3,313	63.55	9.08
GHP	ghpi	$	400,761	m	50,380	966.19	138.03

Source: Households Research Unit, Department of Economics, University of Melbourne

Notes: (a) The TUS shows the number of accommodation days per year slept at own household or another household were 7,260.3 million. This is 99.06% of all days and implies that only 0.94% of all days (3.42 days per year) were slept in market provided accommodation. The TUS methodology of sampling in only four months of the year (avoiding the main holiday periods) most likely led to an undercounting of market accommodation days. Thus, the market days have been adjusted to 2.0% (7.3 days per person per year). This gives an estimate of 7,115.1 million household provided accommodation days.
(b) The market accommodation average of $75.04 per night in 2006 would mostly comprise casual accommodation for short-period stays. The market gives discounts on these casual rates for longer period stays. It is reasonable to make a 20% discount to the rate of $60.03 per day.
(c) Input hours comprise the following ABS time use categories –

	Minutes per day	Hours per person per year	Million hours per year
Other housework	22	133.8	2,136.50
Grounds, animal care	22	133.8	2,136.50
Home maintenance	9	54.8	874
Household management	9	54.8	874
Other domestic activities	4	24.3	388.5
Purchasing services	5	30.4	485.6
Total	***71***	***431.9***	***6,895.1***

2. Meals [Number of meals and snacks]

Harvey and Mukhopadhyay (1996) called this "Meal Preparation" and simply counted the number of meals.

Table 5.2: Household Production of Meals, Australia 2006: Experimental Estimates (m = million)

Category	Item	Unit	Total All Households per year		Per Household		
					Per year	Per week	Per day
Output	qi	meals(a)	34,341	m	4,317	82.79	11.83
	pi	$/meal(b)	10.39		10.39	10.39	10.39
	vi	$	356,764	m	44849.0	860.11	122.87
Inputs	***ti***	***hours(c)***	***6,992.20***	***m***	***879.0***	16.86	2.41
	wi	$/hour	40.52		40.52	40.52	40.52
	li	$	283,296	m	35,613	682.99	97.57
	di	$	0	m	0	0	0
	ei	$	6,107	m	767.7	14.72	2.1
	ki	$	6,107	m	767.7	14.72	2.1
	mi	$	67,361	m	8,468	162.4	23.2
GHP	ghpi	$	289,403	m	36,381	697.72	99.67

Source: Households Research Unit, Department of Economics, University of Melbourne

Notes: (a) Includes snacks. The time use survey episode data records only 2.24 eating episodes at home per adult per day. This is only 15.7 meals and snacks per adult per week. The time use diary methodology probably records only about half of all meals and snacks produced in the household. Thus the following numbers have been adopted for these experimental estimates.

		Adults	Children
At home	Number per person/week	32	36
	Number per person/year	1,669	1,877

(b) Estimates based on restaurant, cafe and fast food retail prices

		Adults	Children
Meals	$ per meal	20	7
Snacks	$ per snack	4	2
Meals & snacks	$ average	12.0	4.5

(c) Input hours comprise the following ABS time use categories –

	Minutes per person per day	Hours per person per year	Million hours per year
Meal preparation	49	298.1	4,758.80
Purchasing goods	23.0	139.9	2,233.40
Total	***72.0***	438	6,992.20

3. Clean Clothes [Number of clothing items laundered]

Harvey and Mukhopadhyay (1996) called this "Clothing Care" and estimated the number of laundry loads of clothes washing.

Table 5.3: Household Production of Clean Clothes, Australia 2006: Experimental Estimates (m = million)

Category	Item	Unit	Total All Households		Per household		
					Per year	Per week	Per day
Output	qi	items(a)	34,227	m	4,303	82.52	11.79
	pi	$/item(b)	2		2	2.18	2.18
	vi	$	74,566	m	9,374	179.77	25.68
Inputs	ti	hours(c)	1,651	m	207.54	3.98	0.57
	wi	$/hour	28		28.33	28.33	28.33
	li	$	46,775	m	5,880	112.77	16.11
	di	$	0	m	0	0	0
	ei	$ (d)	23,590	m	2,965	56.87	8.12
	ki	$	23,590	m	2,965.00	56.87	8.12
	mi	$	4,201	m	528.00	10.13	1.45
GHP	ghpi	$	70,365	m	8,846	169.64	24.23

Source: Households Research Unit, Department of Economics, University of Melbourne

Notes:(a) Number of clothing items laundered, including ironing - based on the personal consumption diaries from HRU survey of Living Conditions in Melbourne

		Persons
At home	Number per person/week	33
	Number per person/year	1,721
	Million per week	656.4
	Million per year	34,227

(b) The average price of $2.18 per clothing item laundered is calculated as follows.

	$/garment	No/week	$/week
Trousers, skirts, dresses, jumpers	*7*	*2*	14
Shirts, blouses, tops, t shirts, shorts	3	8	20
Underclothes, socks, handkerchiefs	2	18	27
All garments	**2.18**	**28**	**61**

(c) Input hours comprise the following ABS time use category –

	Minutes per person per day	Hours per person per year	Million hours per year
Laundry, clothes care	17	103.4	1,650.90

(d) Includes both laundry equipment and clothing.

4. Child Care [Number of child hours of care]

Table 5.4: Household Production of Child Care, Australia 2006: Experimental Estimates (m = million)

Category	Item	Unit	Total All Households per year		Per Household		
					Per year	Per week	Per day
Output	q_i	hours(a)	26,408	m	3,320	63.67	9.10
	p_i	$/hour(b)	9.25		9.25	9.25	9.25
	v_i	$	244,276	m	30,708	588.92	84.13
Inputs	t_i	hours (c)	10,973.9	m	1379.5	26.46	3.78
	w_i	$/hour	21.32		21.32	21.32	21.32
	l_i	$	233,957	m	29,411	564.04	80.58
	d_i	$	0	m	0	0	0
	e_i	$	6,107	m	768	14.72	2.10
	k_i	$	6,107	m	768	14.72	2.10
	m_i	$	4,212	m	529	10.15	1.45
GHP	ghp_i	$	240,064	m	30,179	578.77	82.68

Source: Households Research Unit, Department of Economics, University of Melbourne

Notes: (a) Number of child hours of care; includes care of other households' children.

(b) Hired nanny cost per hour of child care

(c) Input hours comprise the following ABS time use categories –

	Minutes per person per day	Hours per person per year	Million hours per year
Primary time, including travel	*41*	249.4	3,981.70
Secondary time	72	438	6,992.20
Total	**113**	**687.4**	**10,973.90**

5. Transport [Number of vehicle kilometres]

Harvey and Mukhopadhyay (1996) did not include this category.

Table 5.5: Household Production of Transport, Australia 2006: Experimental Estimates (m = million)

Category	Item	Unit	Total All Households per year		Per Household		
					Per year	Per week	Per day
Output	q_i	km(a)	114,158	m	14,351	275.22	39.32
	p_i	$/km(b)	1.80		1.80	1.80	1.80
	v_i	$	205,481	m	25,831	495.39	70.77
Inputs	t_i	Hours(c)	4,963.3	m	624	11.97	1.71
	w_i	$/hour	28.71		28.71	28.71	28.71
	l_i	$	142,515	m	17,916	343.59	49.08
	d_i	$	0	m	0	0	0
	e_i	$	20,523	m	2,580	49.48	7.07
	k_i	$	20,523	m	2,580	49.48	7.07
	m_i	$	42,443	m	5,336	102.33	14.62
GHP	ghp_i	$	163,038	m	20,496	393.06	56.15

Source: Households Research Unit, Department of Economics, University of Melbourne

Notes: (a) Household vehicle kilometres, estimated from the ABS TUS which shows for drivers of household vehicles 24.746 million trips per day with an average 33 minutes per trip. This is 4,963.3 m million hours per year. At an average speed of 23 kph (from travel survey data) this is 114,156 m km per year.

(b) Average taxi cost per kilometre, including flag fall, Melbourne

(c) Input hours comprise the following ABS time use categories –

	Minutes per person per day	Hours per person per year	Million hours per year
Car driver and other motorised transport	51	310.9	4,963.30

6. Volunteering [Number of hours of volunteer work]

Harvey and Mukhopadhyay (1996) called this "Volunteerism" and counted the number of hours of volunteer work.

Table 5.6: Household Production of Volunteering, Australia 2006: Experimental Estimates
(m = million)

Category	Item	Unit	Total All Households per year		Per Household		
					Per year	Per week	Per day
Output	q_i	hours(a)	1,553.8	m	195.3	3.75	0.535
	p_i	$/hour(b)	24.09		24.09	24.09	24.09
	v_i	$	37,432	m	4,705.6	90.24	12.89
Inputs	t_i	hours(c)	1,553.8	m	195.3	3.75	0.535
	w_i	$/hour	24.09		24.09	24.09	24.09
	l_i	$	37,432	m	4,705.6	90.24	12.89
	d_i	$	0	m	0	0	0
	e_i	$	0	m	0	0	0
	k_i	$	0	m	0	0	0
	m_i	$	0	m	0	0	0
GHP	ghp_i	$	37,432	m	4,705.6	90.24	12.89

Source: Households Research Unit, Department of Economics, University of Melbourne

Notes: (a) Includes work through organisations and care of adults but excludes care of children.

(b) Estimates of the HRU based on ABS earlier estimates

(c) Input hours (and output hours) comprise the following ABS time use categories –

	Minutes per person per day	Hours per person per year	Million hours per year
Support for adults	9	54.75	874
Unpaid volunteer work	4	24.33	388.5
Other volunteering	3	18.25	291.3
Total	16	97.33	1,553.80

7. Education [Number of hours of education]

Harvey and Mukhopadhyay (1996) called this "Education" and also "Personal Development" and counted the number of hours of education.

Table 5.7: Household Production of Education, Australia 2006: Experimental Estimates
(m = million)

Category	Item	Unit	Total All Households **per** year		Per Household		
					Per year	Per week	Per day
Output	q_i	hours(a)	2,622.1	m	329.6	6.32	0.90
	p_i	$/hour(b)	13.47		13.47	13.47	13.47
	v_i	$	35,319	m	4,440.0	85.15	12.16
Inputs	t_i	hours(c)	2,622.1	m	329.6	6.32	0.90
	w_i	$/hour	15.00		13.47	13.47	13.47
	l_i	$	35,319	m	4,440.0	85.15	12.16
	d_i	$	0	m	0	0	0
	e_i	$	0	m	0	0	0
	k_i	$	0	m	0	0	0
	m_i	$	0	m	0	0	0
GHP	ghp_i	$	35,319	m	4,440.0	85.15	12.16

Source: Households Research Unit, Department of Economics, University of Melbourne

Notes: (a) Includes education time of adults aged 15+ but excludes time of children aged 0-14 years.

(b) Standard Federal Minimum Wage of $13.47 per hour.

(c) Input hours (and output hours) comprise the following ABS time use categories –

Education time	**Minutes per person per day**	**Hours per person per year**	**Million hours per year**
Attend education course	14	85.17	1,359.60
Jobs related training		1	6.08
Homework/study/research	11	66.92	1,068.30
Other education	1	6.08	97.1
Total	**27**	**164.35**	**2,622.10**

8. All Household Production

These estimates are the aggregation of the seven component categories of household production. As the quantities of component outputs are in different units, there are no aggregates for the total quantity of all household services (Q_{hp}) and for the unit price of the aggregate quantity (P_{hp}).

However, if a series of satellite accounts of household production were constructed for a number of years, it would be possible to construct a series of constant price (or volume) estimates for Q_{hp} and a series of implicit price deflators for P_{hp}.

Table 5.8: Household Production of All Services, Australia 2006: Experimental Estimates
(m = million)

Category	Item	Unit	Total All Households per year		Per Household		
					Per year	Per week	Per day
Output	Q_{hp}		NA		NA	NA	NA
	P_{hp}		NA		NA	NA	NA
	V_{hp}	$	1,380,958	m	173,601	3,329.33	475.62
Inputs	T_{hp}	hours	35,651.2	m	4,482	85.95	12.28
	W_{hp}	$/hour	29.91		29.91	29.91	29.91
	L_{hp}	$	1,066,480	m	134,067	2,571.16	367.31
	D_{hp}	$	98,307	m	12,358	237.01	33.86
	E_{hp}	$	71,596	m	9,000	172.61	24.66
	K_{hp}	$	169,903	m	21,359	409.62	58.52
	M_{hp}	$	144,575	m	18,175	348.55	49.79
GHP	*GHP*	$	1,236,383	m	155,426	2,980.77	425.82

NA Not applicable

Source: Households Research Unit, Department of Economics, University of Melbourne

9. Estimates of Gross Market Product (GMP) and Gross Economic Product (GEP)

Housing owned by households is a large component of the household production of accommodation. The procedure adopted by Harvey and Mukhopadhyay to avoid double counting of the imputed rental value of owner-occupied housing (which is included in the estimates of market production, GDP) is to exclude this value from household production estimates.

However, a more satisfactory way is to adjust the GDP estimates to exclude this non-market production and actually include it in the GHP estimates. This procedure has been used by the Households Research Unit over many years in its estimates of GHP. The adjusted GDP estimates are re-named Gross Market Product (GMP). Adding GMP to GHP gives an estimate which can be called Gross Economic Product (GEP).

The following table shows estimates for GMP, GHP and GEP for Australia for 2006.

Table 5.9: Production of All Goods and Services, Australia 2006: Experimental Estimates
(m = million)

Category	**Item**	**Unit**	**Total All Households per year**		**Per Household**		
					Per year	**Per week**	**Per day**
GDP	GDP	$	1,006,564	m	126,535	2,426.71	346.67
Less	Dhp (a)	$	98,307	m	12,358	237.01	33.86
=GMP	GMP	$	908,257	m	114,177	2,189.70	312.81
+ GHP	GHP	$	1,236,383	m	155,426	2,980.77	425.82
= GEP	GEP	$	2,144,640	m	269,603	5,170.47	738.63

(a) Rental value of owner-occupied dwellings.

Source: Australian Bureau of Statistics Australian National Accounts: National Income Expenditure and Product (Catalogue No. 5206.0) March 2009 and estimates of the Households Research Unit, Department of Economics, University of Melbourne.

In Australia in 2006 the imputed rental value of owner-occupied dwellings, D_{hp} ($98.3 billion) equal to 9.8 per cent of GDP ($1,006.6 billion). Thus GMP ($908.3 billion) is just 90.2 per cent of GDP. The household economy produced well over half (57.6%) of the total Gross Economic Product of $2,144.6 billion. Put another way, the household economy contributed over a third (36.1 per cent) more than the market economy contributed.

10. Estimates of Labour and Capital Inputs to the Market Economy, the Household Economy and the Total economy

Using the 2006 time use survey data on the labour inputs to the market economy and data from the ABS National Accounts, the labour and capital shares of GMP can be calculated and compared with the labour and capital shares of GHP. The average market wage per hour can also be calculated to compare with the new estimates of the imputed value per hour of household work.

Table 5.10: Labour and Capital Inputs to Economic Production, Australia 2006:

Experimental Estimates(m = million)

Category	Item	Unit	Total All Households per year		Per Household		
					Per year	Per week	Per day
Labour Inputs							
Market	T_{mp}	hours(a)	17,675	m	2,221.9	42.61	6.09
Household	T_{hp}	hours	35,651	m	4,481.7	85.95	12.28
Total	T_{ep}	**hours**	**53,326**	**m**	**6,702.6**	**128.56**	**18.37**
Market	W_{mp}	$/hour	30.64		30.64	30.64	30.64
Household	W_{hp}	$/hour	29.91		29.91	29.91	29.91
Total	W_{ep}	$/hour	30.15		30.15	30.15	30.15
Market	L_{mp}	$(b)	541,502	m	68,072	1,305.50	186.50
Household	L_{hp}	$	1,066,480	m	134,067	2,571.16	367.31
Total	L_{ep}	$	1,607,982	m	202,139	3,876.66	553.81
Capital Inputs							
Market	K_{mp}	$(c)	366,755	m	46,105	884.20	126.31
Household	K_{hp}	$	169,903	m	21,358	409.62	58.52
Total	K_{ep}	$	536,658	m	67,463	1,293.82	184.83

Source: Estimates of the Households Research Unit, Department of Economics, University of Melbourne.

Notes:(a) Input hours comprise the following ABS time use categories –

	Minutes per person per day	Hours per person per year	Million hours per year
Employment related time -			
Main job	179	1,088.92	1,738.40
Other job	1	6.08	97.1
Work breaks	1	6.08	97.1
Other	1	6.08	97.1
Total	**182**	**1,107.17**	**17,674.70**

(b) The following data are from the latest ABS National Accounts for 2006 –

	$m
Compensation of employees	482,764
Labour share (2/3) of mixed income	58,738
Total labour market income	**541,502**

(c) K_{mp} = GMP - L_{mp}

The capital and labour shares of the two sectors of the total economy are very different. In the market economy, labour provides 59.6 per cent of GMP; in the household economy labour provides 86.3 per cent of GHP. These data show that the household economy is more labour-intensive than the market economy. Alternately, we can say the market economy is more capital intensive than the household.

11. Estimates of Average Wage Rates

There is a surprising concurrence in the overall estimate of $29.91 per hour for the (unpaid) household production labour with the $30.64 per hour for the (paid) market production labour.

The market estimates are gross wage rates, that is, they have not been adjusted for deductions of income tax and they include benefits such as superannuation contributions that accrue to the wage earner.

However, the estimates for the categories of household production vary significantly, as shown in the following table.

Table 5.11: Average Wage Rates in Economic Production, Australia 2006:
Experimental Estimates

Production Activity		$/hour
Accommodation		41.65
Meals		40.52
Clean Clothes		28.33
Child Care		21.32
Transport		28.71
Volunteering		24.09
Education		13.47
All household production	W_{hp}	**29.91**
All market production	W_{mp}	**30.64**
All economic production	W_{ep}	**30.15**

The highest values of time, according to these experimental estimates, are in providing accommodation, $41.65 per hour and in providing meals, $40.52 per hour. Transport ($28.71) and clothes laundry ($28.33) are near the average with volunteering ($24.09), child care ($21.32) and education ($13.47) significantly below the average value per hour.

Summary

Each day households provide the bulk of the community's needs for accommodation, meals, transport, clean clothes and personal care.

The total value of the accommodation, meals, transport, clothes care and child care provided on an unpaid basis by households can be estimated using output data from time use surveys (and other sources).

Harvey and Mukhopadhyay's (1996) ground breaking paper showed how diary-based time use surveys can be used to estimate the output quantities of major categories of household production. Specifically, they demonstrated that time use surveys can provide output data to "fill the boxes" of the household production satellite accounts for accommodation, meals and child care.

The new Australian research reported here builds on Harvey and Mukhopadhyay's innovative approach of using time use survey data to estimate the quantities of household outputs. It applies their methodology to the latest data for Australia and goes three steps further.

First, it includes transport as a category of household production. Second, it links the market price values of household outputs and the values of the non-labour inputs (the intermediate inputs of purchased materials and energy and the rental values of capital) to estimate the total values of the unpaid labour used in the various household production categories. Finally, by using the time use survey data on the input hours, it provides a new basis for estimating the values per hour of the labour used in each of these activities and overall in all household production.

Appendix

Allocation of Household Final Consumption Expenditure, Australia, 2006 ($ million, current prices)

	Household Production Category								
HFCE Category	**Accomm o-dation**	**Meals**	**Clean Clothes**	**Child Care**	**Transport**	**Voluntee r**	**Edu-cation**	***Total HP***	***Other Non HP***
Food		62,448						62,448	
Tobacco									10,249
Alcohol									11,602
Clothing			20,536					20,536	
Dwelling rent	98,307							98,307	
Energy	4,358	2,913	2,201	2,212				11,684	
Furnishings equipment	15,269	6,107	3,054	6,107				30,537	
Health									29,593
Vehicles purchase					20,523			20,523	
Vehicles operation					32,443			32,443	
Transport services									13,652
Communi-cations									15,789
Recreation culture									67,415
Education services									19,368
Hotels cafes restaurants									43,411
Insurance & financial services	20,000	1,000	1,000		10,000			32,000	8,247
Other goods & services	2,000	1,000	1,000	2,000				6,000	31,347
Total FCE (a)	139,934	73,468	27,791	10,319	62,966	0	0	**314,478**	**250,673**
Of which -									
Dwellings	98,307							98,307	
Equipment	15,269	6,107	23,590	6,107	20,523			71,596	
Intermediate Inputs	26,358	67,361	4,201	4,212	42,443			144,575	
Other Expenditure									250,673

Source: Australian Bureau of Statistics (2009) *Australian National Accounts* Catalogue No. 5206.0 Excel Spreadsheet 5206008, Household Final Consumption Expenditure

Note: (a) The aggregate Household Final Consumption Expenditure (HFCE) in 2006 was $565,151 million of which $314,478 was allocated as inputs to household production and the balance, $250,673 million was direct purchase of consumption goods and services from the market economy.

6. UNITED STATES NATIONAL ACCOUNTS OF HOUSEHOLD PRODUCTION

"The defenders of GDP often argue that it is both a rigorous measurement - and consequently – a useful way to compare progress across countries. Neither claim is true" (Marilyn Waring)

Estimates for the United States total economy 2003 – 2009?

It is not widely recognized that the official statistics of Gross Domestic Product (GDP), the summary measures of economic performance that are widely used as major tools of economic and social policy-making throughout the world, fall far short of covering the total economic performance of each and every country. Despite the UN Statistical Commission recommending more than 25 years ago that national statistical offices prepare accounts for the economic activities of households *outside* the present limited production boundary defined in the System of National Accounts, few offices have attempted to do so.

As a result of the lack of official statistics on the household economy, many researchers like myself have been motivated to define and estimate, in monetary terms, the economic production that occurs in the household outside the market. The quest for the best method and access to the appropriate data to establish the true magnitude of the household economy in relation to the market economy has been significantly aided by the release of continuous time use data in the United States. The well-regarded and recently established "output" valuation method is combined with continuous time use data to estimate the value of the household economy in the United States for a number of consecutive years (2003-2014?).

These estimates are used in this chapter to examine the way the household economy behaves cyclically in relation to the market economy.

The section provides estimates of the magnitude of Gross Household Product (GHP) in the United States in relation to Gross Market Product (GMP), Gross Economic Product (GEP) and the well-known Gross Domestic Product (GDP) for the years 2003 to 2014.

Some estimates of imputed wage rates for different categories of household work are provided in an Addendum. This is a unique approach to estimating the relative value of wages for the different productive activities within the household.

The details of the data sources and how the estimates are compiled are outlined in the Appendix – Data Sources and Methods.

Access to the world's first continuous time use survey, the American Time Use Survey (ATUS), has significantly contributed to the development of statistics on the value of the household economy. ATUS is a nationally representative survey that since January 2003

has collected continuous monthly data of how people in the United States spend their time.

As has been demonstrated in Chapter 3, National Time Accounts, time use surveys, such as the American Time Use Survey (ATUS), show that in most developed countries the volume of unpaid work in the household economy is greater than the volume of paid work in the market economy. Other statistics show that the value of the physical capital used in the household economy is less than the value of capital used in the market. Thus the question arises: "Is Gross Household Product (GHP) more or less than Gross Market Product (GMP)?"

The components of Gross Household Product

Household production includes the provision of accommodation, the preparation of food and meals, laundry and household cleaning, childcare, shopping, household repairs and maintenance, gardening and other household tasks.

The System of National Accounts (SNA) confines household production to "services" and excludes the production by households of "goods". Thus, the growing of rice and chickens for use within the household is regarded as production of goods to be included in the SNA estimates of GMP even though not for sale. Cooking rice and chickens for use within the household is regarded as production of meals and hence services and thus included in estimates of GHP.

Some services such as cleaning and shopping are regarded as "ancillary" services which contribute to "final" services; cleaning contributes to the final service of "accommodation" and shopping contributes mainly to the final service of "meals". Consequently, these final outputs can be reduced to just seven categories of services to be included in household production national accounts.

The seven final outputs are

- Accommodation
- Meals and snacks
- Clean clothes
- Childcare
- Transport
- Volunteering and
- Education

Table 2 shows estimates of these seven components of Gross Household Product for the United States for each of the years 2003 to 2009. The data are in constant 2005 dollars per household per week.

Table 6.1: Gross Household Product, United States of America (in constant 2005 dollars per household per week)

Year	2003	2004	2005	2006	2007	2008	2009
Accommodation	722	723	720	720	716	720	726
Meals and snacks	402	399	392	397	385	386	392
Clean clothes	136	135	134	135	137	124	117
Child care	468	450	468	457	449	466	440
Transport	636	636	626	615	627	583	584
Volunteering	84	86	76	70	76	74	75
Education	67	69	63	71	62	68	68
Total	**2,515**	**2,499**	**2,478**	**2,465**	**2,451**	**2,421**	**2,401**

Over the period 2003 - 2009 the coefficient of variation for US *aggregate* GHP is 0.6 per cent, GDP, 4.1 per cent, GMP, 4.0 per cent and GEP is 2.1 per cent. On a *per household* basis the coefficients are GHP 1.7 per cent, GDP and GMP both 2.5 per cent and GEP 1.0 per cent

The Magnitude of Gross Household Product of the United States

Table 6.2, below, shows the estimates for the United States in terms of constant 2005 dollars both as aggregate billion dollars per year for the total economy and as dollars per household per week.

This analysis reveals that over the years 2003 to 2009 in the United States GHP was between 21 to 34 per cent greater than GMP. It also shows that Gross Economic Product (GEP) is more than twice GDP. The US magnitudes are comparable to the estimates of GHP, GMP and GEP for 2006 for Australia shown in the previous chapter.

The monetary value of the total economic system has been measured in a number of countries. The measurements show that in many developed countries the Household Economy and the Market Economy are of comparable magnitudes.

Table 6.2 Gross Household Product, Gross Domestic Product, Gross Market Product and Gross Economic Product, United States of America (in constant 2005 dollars)

Year	2003	2004	2005	2006	2007	2008	2009
	$(2005) billion per year						
GHP	14,555	14,552	14,605	14,661	14,786	14,702	14,629
GDP	11,841	12,264	12,638	12,976	13,229	13,229	12,881
GMP	10,870	11,262	11,575	11,884	12,145	12,132	11,776
GEP	25,424	25,814	26,180	26,545	26,931	26,833	26,405
	$(2005) per household per week						
GHP	2,515	2,499	2,478	2,465	2,451	2,421	2,401
GDP	**2,046**	**2,106**	**2,144**	**2,182**	**2,193**	**2,178**	2,114
GMP	1,878	1,934	1,964	1,998	2,013	1,998	1,933
GEP	4,394	4,432	4,442	4,463	4,464	4,419	4,333

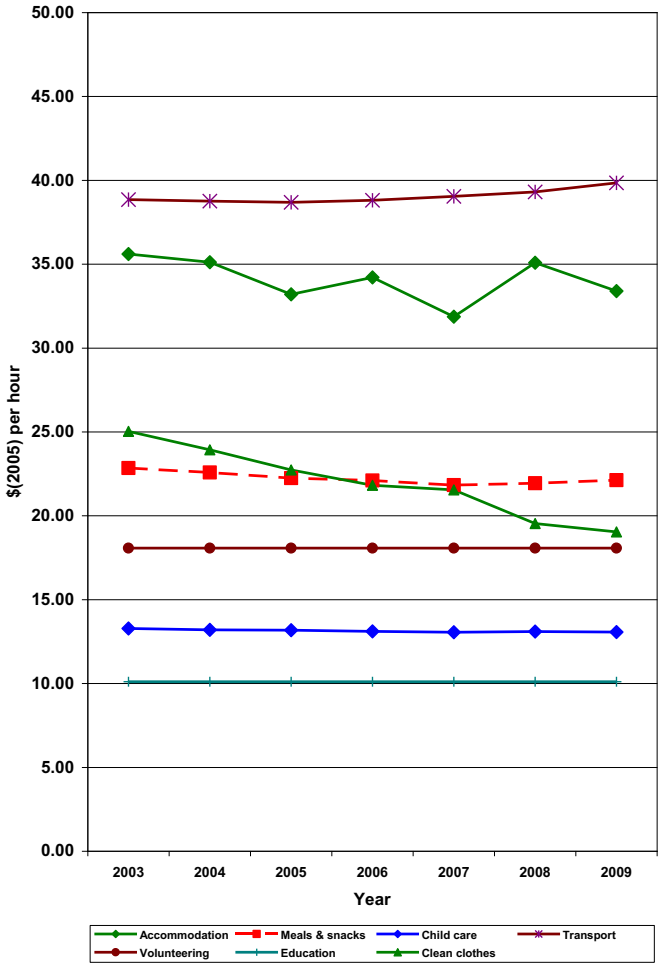
Imputed wage rates for categories of household work

A major criticism of the "input" method of valuing household production is that it uses wage rates taken from the market, either opportunity cost or replacement wages, which derive from the different scale, range and technology of market production.

Some estimates of the labor component of household production have used "opportunity cost" "average market" or "specialist" wage rates. The more rigorous method used in my analysis avoids these difficulties and is directly related to the scale, technology and organization of household production.

Figure 6.1 provides a graphical picture of the imputed wage rates of the several categories of household production in the United States over the years 2003 to 2009.

Figure 6.1 Imputed wage rates in household production, United States 2003 – 2009, (in constant 2005 dollars per hour)



The main point to note from these estimates is that the highest wage rate (approaching $40 per hour) is in transport, the driving of cars and other vehicles for up to 418 miles per household per week. This is the *only* category of household production for which household members have to pass tests and qualify for a license!

Method of Estimation

Unlike some of the earlier methods used to estimate the value of the household economy, this method follows the highly recommended "output" method of estimating GHP. A more detailed explanation of the national accounting procedures for output-based estimates of GHP is shown in Chapter 4 on GHP estimates for Australia for 2006. These procedures have been already published (Ironmonger and Soupourmas, 2009).

The detailed estimates begin with the data from the American Time Use Survey shown in Tables 6.2 and 6.3.

Table 6.2 Households, household population and persons per household, United States of America

Year	2003	2,004	2,005	2,006	2,007	2,008	2,009
Households '000	111,278	112,000	113,343	114,384	116,011	116,783	117,181
Population '000	290,326	293,046	295,753	298,593	301,580	304,375	307,007
Persons per household	2.609	2.616	2.609	2.610	2.600	2.606	2.620

Table 6.3 Household production labor input hours, United States of America (Hours per household per week)

Year	2003	2004	2005	2006	2007	2008	2009
Accommodation	14.14	14.12	14.47	13.84	14.76	13.51	14.40
Meals and snacks	16.74	16.70	16.58	16.81	16.43	16.41	16.54
Clean clothes	3.07	3.05	3.03	3.04	3.09	2.80	2.63
Child care	33.71	32.45	33.69	32.92	32.38	33.59	31.71
Transport	14.57	14.59	14.38	14.13	14.33	13.37	13.32
Volunteering	4.66	4.77	4.19	3.89	4.19	4.07	4.17
Education	6.67	6.85	6.20	7.00	6.09	6.76	6.68
Total	**93.56**	**92.53**	**92.54**	**91.63**	**91.28**	**90.52**	**89.45**

Source: ATUS

Table 6.4 ATUS activity codes used to compute these estimates were:

Accommodation	020101, 020199, 0203-05, 0209,029999, 0901. 0902, 0904. 099999,180280, 1809
Meals and snacks	020201-03, 020299, 07, 180701
Clean clothes	020102, 020103
Child care	0301-03, 0401-03, 180281, 180481, and TRTCHILD, TRTTOT
Transport	Location variable in episode file TEWHERE=1
Volunteering	15, 1815, 04, 180482
Education	06, 1806

We then apply estimates of the input-output coefficients obtained from a variety of United States and Australian sources to the ATUS data from Tables 6.2 and 6.3 we get the estimates shown in Table 6.5 below.

Table 6.5 Input-output coefficients and 2005 prices, United States of America

Input-Output Coefficient price in constant 2005 dollars				
Service	**Number**	**Per ATUS**	**$**	**Per**
Accommodation	98 per cent	Population days	45.02	Person per day
Meals and snacks	3.91 items	Meal prep hour	7.79	Meal or snack
Clean clothes	27.1 items	Laundry hour	1.64	Item laundered
Childcare	2.0 child hours	Adult care hour	6.94	Hour of care
Transport	28.66 miles	Driving hour	1.75	Vehicle mile
Volunteering	1.0 hour	Volunteer hour	18.07	Volunteer hour
Education	1.0 hour	Education hour	10.1	Education hour

Source: Authors' estimates based on estimates of Australian coefficients and prices plus a range of US online sources such as transport surveys, taxi fares, accommodation costs and meals prices

This gives estimates of the quantities of household production service outputs per household per week shown in Table 6.6.

Table 6.6 Quantities of Household Production Output, United States of America (Number per household per week)

Service	Unit	2003	2004	2005	2006	2007	2008	2009
Accommodation	Days	17.95	18	17.95	17.96	17.88	17.93	18.02
Meals and snacks	Meals	65.39	65.26	64.78	65.69	64.2	64.11	64.61
Clean clothes	Items	83.06	82.54	82.11	82.45	83.6	75.89	71.25
Child care	Child hours	67.43	64.9	67.38	65.83	64.76	67.18	63.42
Transport	Vehicle miles	417.6	418.2	412.1	405	410.8	383.1	381.7
Volunteering	Hours	4.66	4.77	4.19	3.89	4.19	4.07	4.17
Education	Hours	6.67	6.85	6.2	7	6.09	6.76	6.68

Source: Data from tables 6.3,6.4 & 6.5

These quantities in Table 6.6 are then valued at the 2005 market prices for similar services (shown in Table 6.5) to obtain estimates the Gross Value of Household Production Output for each of these services (Table 6.7). These are in constant $(2005) per household per week.

Table 6.7 Gross Value of Household Production Output, United States of America (in constant 2005 dollar per household per week)

	2003	2004	2005	2006	2007	2008	2009
	$(2005) per household per **constant 2005 dollar per household per week)**week						
Accommodation	808	810	808	809	805	807	811
Meals and snacks	510	509	505	512	501	500	504
Clean clothes	136	135	134	135	137	124	117
Child care	468	450	468	457	449	466	440
Transport	729	730	719	707	717	669	666
Volunteering	84	86	76	70	76	74	75
Education	67	69	63	71	62	68	68
Total	**2,802**	**2,790**	**2,773**	**2,760**	**2,746**	**2,708**	**2,681**

Source: Data for tables 6 & 7

Then deducting the values of the "intermediate" quantities of materials and energy purchased from the market economy (Table 9) we obtain estimates of GHP for each category (shown in Table 2).

Table 6.8 Intermediate Inputs to Household Production, United States of America

	2003	2004	2005	2006	2007	2008	2009
	$(2005) per household per week						
Accommodation	86	88	88	88	89	87	85
Meals and snacks	108	110	113	115	116	114	112
Transport	93	94	93	92	90	86	82
Total	**287**	**291**	**295**	**295**	**295**	**287**	**280**

Source: Bureau of Economic Analysis national income and product accounts, table 2.4.6, real personal consumption expenditures by type of product

Estimates of the rental values of the physical capital (dwellings, furniture, furnishings, equipment, vehicles and clothing) used in household production in each category (Table 10) are obtained from US Bureau of Economic Analysis national income and product accounts.

Table 10 Capital Inputs to Household Production, United States of America

	2003	2004	2005	2006	2007	2008	2009
			$(2005) per household per week				
Accommodation	218	227	239	247	246	246	245
Meals and snacks	20	22	24	25	26	26	26
Clean clothes	59	62	65	68	70	69	66
Child care	20	22	24	25	26	26	26
Transport	70	71	69	67	67	57	53
Total	**388**	**404**	**422**	**433**	**436**	**425**	**416**

Source: Bureau of Economic Analysis national income and product accounts, table 2.4.6, real personal consumption expenditures by type of product

These are deducted from the GHP estimates to give estimates of the labor components of the value added (Table 11).

Table 11 Labor Inputs to Household Production, United States of America

	2003	2004	2005	2006	2007	2008	2009
	$(2005) per household per week						
Accommodation	503	496	480	473	470	474	481
Meals and snacks	382	377	369	372	359	360	366
Clean clothes	77	73	69	66	66	55	50
Child care	448	428	444	431	423	440	414
Transport	566	566	556	548	560	525	531
Volunteering	84	86	76	70	76	74	75
Education	67	69	63	71	62	68	67
Total	**2,128**	**2,095**	**2,056**	**2,032**	**2,015**	**1,996**	**1,985**

Source: Data from tables 2 & 10

The next step is to divide these values by the total input hours of labor used in each category. These hours are obtained directly from (ATUS). (Table 5 above).

The result is the imputed labor wage rates per hour for each household production category and the weighted average wage rate for total household production (Table 12).

Table 12 Household Production Imputed Labor Wage Rates, United States of America

	2003	2004	2005	2006	2007	2008	2009
			$(2005) per hour				
Accommodation	35.61	35.12	33.21	34.21	31.87	35.08	33.39
Meals and snacks	22.84	22.58	22.24	22.10	21.82	21.93	22.12
Clean clothes	25.03	23.93	22.73	21.81	21.54	19.53	19.03
Child care	13.28	13.20	13.17	13.10	13.06	13.10	13.07
Transport	38.85	38.76	38.68	38.81	39.04	39.30	39.85
Volunteering	18.07	18.07	18.07	18.07	18.07	18.07	18.07
Education	10.10	10.10	10.10	10.10	10.10	10.10	10.10
Total	**22.74**	**22.64**	**22.22**	**22.18**	**22.08**	**22.05**	**22.19**

Source; Data from tables 5 & 11

In summary, three sources have been used for these estimates. The core is the ATUS data set which is supplemented by the BEA (?) national income and product accounts and estimates of input-output coefficients and prices by the Households Research Unit.

The values for the input-output coefficients and the prices for comparable services available from the market economy are based on estimates of Australian coefficients and prices plus a range of US online sources such as transport surveys, taxi fares, accommodation costs and meals prices (Table 6 above).

The values for the US coefficients are capable of verification by suitable surveys of household outputs such as the Daily Living in Australia survey conducted in Melbourne in November-December 2004 (Households Research Unit, 2011).

Similarly, the estimates of the average prices in 2005 of comparable services (accommodation, meals and snacks, clean clothes, etc) could be verified from more comprehensive US market information.

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"The monetary value of the total economic system has been measured in a number of countries. The measurements show that in many developed countries the Household Economy and the Market Economy are of comparable magnitudes." Move this quote to the body of the chapter?

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[xi] According to the Michelin Guide developed initially for travellers , one star signifies "a very good restaurant", two stars are "excellent cooking that is worth a detour", and three stars mean "exceptional cuisine that is worth a special journey". The listing of starred restaurants is updated once per year.

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[xiii] See for example Budig, M. J., & Folbre, N. (2004). Measuring parental childcare time. *Family time: The social organization of care. London: Routledge*, 51-68.

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[xv] Its impact upon household with young children must, therefore, be captured by the marginal increase in the service of producing meals.

[xvi] Holloway, S., Short, S. and Tamplin, S. (2002) Household Satellite Account (Experimental) Methodology London: Office for National Statistics, London

[xvii] While live-in nannies might be the closest substitute for the constraints of being a 'on call' parent Nancy Folbre argues that caring, even in the market economy, is undervalued and since children's capacities are, in economic terms, public goods there is no way of excluding third parties access to the benefits of these capacities.

[xviii] https://www.psychologytoday.com/au/blog/parent-tips-20/202301/how-overscheduling-prevents-skill-development and Tany, R. F., & Khanam, M. (2022). Development of Over-Scheduled Scale for Adolescents. *Dhaka University Journal of Biological Sciences*, *31*(2), 231-242.

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[xxvi] Goldschmidt-Clemont argues that the logic behind using 'opportunity cost of time is not relevant for macro-economic purposes because it corresponds to a modelling exercise based on a number of assumptions which do not apply to the overall population'. It draws on 'utility considerations which are outside the realm of national accounting', and most significantly, 'the value obtained carries no relation to actual household output', and this divergence from outputs departs markedly from 'one of the main characteristics of national accounting' (1993: 422).