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COMMITTEE ON STATISTICS

**Working Party on National Accounts**

**INCORPORATING ESTIMATES OF HOUSEHOLD PRODUCTION OF NON-MARKET SERVICES  
INTO INTERNATIONAL COMPARISONS OF MATERIAL WELL-BEING**

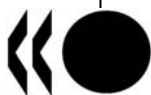
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*This document has been prepared by Nadim AHMAD and Seung-Hee KOH (OECD) and will be presented under item 3 of the draft agenda*

*This paper presents results from recent work in the OECD Statistics Directorate to construct estimates of household production of non-market services using time-use surveys. Whilst the results confirm the significant sensitivity inherent in the choice of price used to estimate the labour component of these activities, (when presented in national currencies), they also demonstrate that comparable and meaningful comparisons across countries are achievable when estimates are based on purchasing power parities.*

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## **INCORPORATING ESTIMATES OF HOUSEHOLD PRODUCTION OF NON-MARKET SERVICES INTO INTERNATIONAL COMPARISONS OF MATERIAL WELL-BEING**

### **Introduction**

1. Estimates of production, income and consumption in the System of National Accounts are generally based on the idea that households are final consumers, rather than producers, of goods and services. Goods and services produced by households for the market are included in economic aggregates, as are goods produced for own-consumption, such as agricultural products and own-account construction, but non-market services produced by households for own-consumption, with the notable exception of dwelling services, are not included in economic aggregates in the SNA.

2. There is little contention that many of the services produced by households for their own-use, such as cleaning services, preparation of meals, child-care etc contribute to material well-being and, moreover, that they share the characteristics of the same activities conducted by the market, which are included in the production boundary of the SNA. But they have always been excluded from the SNA production boundary on the general grounds that the transactions could not “be brought directly or indirectly into relation with the measuring-rod of money”, (Pigou, 1932) and, in particular, because of the perception that the imputations needed to estimate the size of these activities were relatively arbitrary; therefore reducing the accuracy, credibility, and usefulness of the accounts for analyzing, projecting, and informing policies.

3. Typically some contention has arisen however in the context of social welfare economics, such as the measurement of material well-being, where the arguments for inclusion in the production boundary are clear, but there has also been concern that the exclusion of such activities from economic aggregates, such as GDP, distorted international comparisons of economic activity; particularly comparisons between developed and developing economies, reflecting the higher proportion of household services, and substitutes such as restaurant services, produced outside of households in developed economies. Indeed, one of the main reasons that imputations for owner-occupied dwelling services are included in GDP is because of the significant distortions that arise in international comparisons when only market rental transactions are recorded in the accounts. In principle, the same argument can be applied when considering the exclusion of other non-market household services.

4. Perhaps the fundamental difference between the two types of services however is the ‘measuring-rod’. With owner-occupied dwellings it is relatively easy to argue that a dwelling, whether owned or rented, provides the same level of service to its household, and, so, the appropriate ‘measuring-rod’ for owner-occupied dwellings is the equivalent price for market rentals. With other non-market production of services by households however, the appropriate ‘measuring-rod’ is less clear. For example, what is the appropriate measuring-rod for valuing the labour used in preparing a meal at home by a qualified chef as opposed to the same meal prepared by a qualified accountant? Should it be the price that one would pay for somebody else to prepare the same meal (the replacement cost) or the opportunity cost of the individual making the meal?

5. The difficulty for the (SNA) accounts is that legitimate arguments can be made in favour of both options, and, moreover, that different types of activities may be considered within and out of scope;

leading to widely different estimates of household non-market production, and thus GDP, over time and across countries.

6. A recent study for the United States by Landefeld, Fraumeni and Vojtech (2008), for example, showed that extending the production boundary to include household production of non-market services, not already included in GDP, would increase GDP by 19% using the replacement cost approach (using a housekeeper's hourly wages), and 62% using the opportunity cost (using average hourly wages) approach. Interestingly however, average annual real growth over the period, 1985-2004, differed by only 0.1% percentage point between the two approaches.

7. The broad consensus remains that the core accounts should continue to exclude these activities from the GDP production boundary. However, notwithstanding the inherent measurement difficulties (namely the choice of estimates for labour costs), recent improvements in the statistical infrastructure of many countries (e.g. more detailed data on wages, improved data on non-market activities, and time-use surveys) have led many countries to produce household production satellite accounts (for example Australia, Canada, Finland, Germany, Hungary, Mexico, Nepal, and the United Kingdom<sup>1</sup>) that complement the traditional estimates of economic activity, and that are able to provide a more comprehensive assessment of the material well-being of households. These efforts have recently been given further momentum notably by the recommendations of the Commission on the Measurement of Economic Measurement of Economic Performance and Social Progress (Stiglitz-Sen-Fitoussi).

8. In this context it's important to note that policies designed to improve material well-being based on estimates of household income or consumption that lie within the SNA production boundary (and thus exclude non-market services) may be compromised in two, almost contradictory, ways. For example, estimates of levels of overall actual consumption of goods and services will be underestimated but, at the same time, if more of these non-market services are produced and purchased from the market over-time, estimates of growth in the actual consumption of goods and services will increase. So, on the one hand, levels of material well-being are likely to be underestimated but, on the other, growth is likely to be overestimated. Put more starkly, within the SNA accounting framework, if an individual returned to the work force and paid all of their take-home salary to a domestic servant/nanny to produce the services they were no longer able or willing to, their consumption of goods and services would increase, and, so too, apparently, would their material well-being.

9. It's equally important to note however that the inclusion of non-market household production in estimates of household consumption or income is not a simple panacea in the context of measuring overall, as opposed to material, well-being, as the estimates cannot accommodate for aspects such as 'choice'. An individual in one country for example may remain at home to raise their children because of a lack of child-care facilities or they may have to return to work through necessity. All other things equal, estimates of household consumption that included non-market services would be the same in both cases but interpretations of comparisons of overall well-being are more complex.

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<sup>1</sup> Australia: Soupourmas and Ironmonger (2002); Canada: Hammad (2003) and Harvey and Mukhopadhyay (2005); Finland: Rürger and Varjonen (2008) and Varjonen and Aalto (2006); Germany: Rürger and Varjonen (2008) and Schäfer (2004); Hungary: Szép (2003); Mexico: Gómez Luna (undated); Nepal: United Nations International Research and Training Institute for the Advancement of Women (1996); United Kingdom: Francis and Tiwana (2004) and Holloway et al. (2002). Household production accounts exist for two areas in Spain: Basque Spain (see Prado and Abando, undated), and Madrid (see Duran, 2007).

10. Taking advantage of the increasing recognition and demands from policy makers for more comprehensive measures of material well-being, this paper describes recent work<sup>2</sup> undertaken in the OECD Statistics Directorate in response to the developments in the statistical information systems across OECD countries.

11. The work is still in its early stages, and so the results presented below focus on estimates of household production of non-market services for one year, 2008. Future work will additionally focus on growth aspects.

12. The starting point for the work is the database of time-use surveys collected by the OECD's Employment, Labour and Social Affairs Directorate. This database collates national time use surveys conducted by national statistics institutes, for 2008 data, using a classification of activities based on 5 primary activity categories defined by the OECD. The five primary activities are:

- (i) paid work or study (work-related activities);
- (ii) unpaid work (household activities);
- (iii) personal care;
- (iv) leisure; and
- (v) other activities not included elsewhere.

13. For the purposes of measuring household production of non-market services, the relevant activity is unpaid work, which can, in theory, be broken down into the following six sub categories: routine housework; shopping; care for household members; care for non household members; volunteer work; and travel related to household activities.

14. Unfortunately, not all countries are able to provide a breakdown into all six categories and, so, this analysis looks only at total time spent on total unpaid work. Some of this time will be spent on activities related to the production of goods such as agricultural products for own-use, or the production of goods such as community housing, through voluntary work, that are not for own-use. The output related to the production of these goods will, at least in theory, be included within estimates of GDP, so, estimates of household production of non-market services that do not correct for these activities will be biased upwards. Equally, it's important to note that not all voluntary work will be consumed by households. For example voluntary work can include assisting teachers in schools, providing support to youth clubs and sporting activities, working in charity shops, working as guides in museums and galleries etc, and so estimates of household consumption that include these activities will also be biased upwards. Future work planned by the OECD Statistics Directorate will decompose the contribution made by the different sub categories.

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<sup>2</sup> For more detailed information on the methodology and data sources, see the forthcoming (2010) Statistics Directorate Working Paper : *Incorporating Household Production into International Comparisons of Material Well-Being*.

### *Valuing Leisure*

It's useful to say a few words here on why the paper focuses on time spent on household production and the implications on measuring overall well-being. From a time-use perspective, value could also be given to other ways in which time is spent; in particular leisure. Placing a value on time spent on leisure, such that it can be compared with the benefits gained from conventional consumption of market goods and services or the consumption of goods and services produced by households for their own-use, is considerably more challenging, both empirically and conceptually, than finding values for time spent on household production of goods and services; where market price equivalents of the goods and services produced are increasingly available. Moreover it's important to note that the concept of time spent on leisure does not always satisfy the underlying SNA basic first criterion (M. Reid (1934), T. P. Hill (1979)) for inclusion in the production boundary – namely that the associated good or service has to be capable of being provided by someone else. In this sense, however vital sleeping, exercising and socializing are for individual well-being these are not productive acts in the economic sense.

### **Methodology**

15. In principle two approaches exist to measure the total value of household production of non-market services. The first approach takes market price equivalents of the non-market services and applies these, adjusted for differences in quality, to estimates of the quantity of non-market services produced by households. But this approach is non-trivial as it requires good quality market price equivalent measures and data on quantities of services provided; neither of which is readily available. The second, more traditional, and achievable, approach is to measure the sum of costs involved in producing the non-market services. These costs include the intermediate consumption involved in producing the services, the costs of labour and the value of capital services used in production.

16. In practice however, as is the case in this paper, references and estimates of the value of household non-market production of services, typically only measure the value-added component of these activities (i.e. the labour and capital services components). This is partly because the goods and services used as intermediate consumption in the production of non-market services (such as food products used to produce meals) are already included in estimates of household final consumption. But also because estimates of how much of the share of household final consumption that is used in producing non-market services (and, so, the intermediate consumption component) is not readily available.

17. As such, all references below to the value of household production of non-market services should be interpreted as the value-added component of these services (excluding of course the value of owner-occupied dwellings services; which are already included in estimates of household final consumption in the SNA).

### ***Labour costs***

18. Two approaches are used to estimate the value of the labour supplied in producing these services. The first is the *replacement cost* approach; where an average post-tax, hourly wage, representative of the broad range of activities covered in the production of household production of non-market services, is constructed using data collected in the OECD PPP programme. The second, to provide some measure of the potential range of estimates (in practice an upper bound), is the *opportunity cost*<sup>3</sup> approach, which takes

<sup>3</sup> A full opportunity cost approach would calculate the opportunity costs for each individual.

the average post-tax hourly wage across the whole economy. Table 1 below provides a summary of the sources used for each country.

19. Conceptual arguments can be made in favour of both the opportunity and replacement cost approach. In practice, most studies have produced estimates based on replacement costs; following the underlying valuation principle that the ultimate goal is to obtain an equivalent market value of the non-market services produced. In other words, the price that would be paid for somebody else to produce the same quality of service.

20. One could argue that the cost of labour for any individual would approach the opportunity cost to the individual concerned i.e. how much could he/she earn if he/she spent his/her time in his/her paid employment rather than in producing non-market services. Certainly this would be true if the non-market activity was the same as the individual's paid profession. But the arguments in favour of the replacement cost approach, namely the equivalent price of labour in producing the same services (and quality of service), are considered more in line with national accounts concepts. Moreover the opportunity cost approach necessarily assumes that a person outside the labour market - e.g. a full-time housewife or retiree - would be able to find a job on the market according to his or her qualifications; which is a stretching assumption. One could just as convincingly argue that the opportunity cost was zero (see also, Abraham and Mackie (2007), for example, in the extreme case that the individual's competences have no value on the labour market.

21. This suggests that, ideally, the underlying general principle for the valuation of hourly labour costs should be the quality-adjusted price of a specialist worker in the activity being measured, where the quality is adjusted to reflect the productivity of non-specialised individuals. In practice however, as is the case in this study, many studies do not adjust for quality, and those that do generally do so using relatively arbitrary estimates that assume that the quality/productivity of the non-specialist is likely to be lower. Landefeld et al (2009), for example, assumed that the average hourly wage, used as a proxy for the replacement cost, was 75% of the specialist hourly wage in a number of activities.

22. Because this study focuses on total time spent on unpaid work, and because price information is not readily available for the six sub categories of unpaid work in time-use surveys, this study does not construct estimates based on the costs of specialised labour in specific activities, rather it constructs a general hourly labour cost based on prices of market activities that are representative of the main activities conducted by households in the production of non-market services, such as the costs for unregistered domestic servants.

23. However, that is not to say that estimates based on the opportunity cost approach are meaningless. At the very least they provide, in practice, an upper bound on estimates of household production, and, so, are also shown in this analysis.

24. The estimates of hourly wages for both the replacement and opportunity cost approach used here are net-of taxes and social security contributions. Not all studies have estimated labour costs on this basis. Some, for example, use gross measures. This study creates an equivalence between the concepts used to estimate the labour costs of unregistered (informal) labour and unpaid labour provided by households in non-market production.

25. For the replacement cost approach, when direct estimates of the hourly wages of unregistered workers are not available, estimates of hourly post-tax wage costs are based on hourly wage costs of registered workers adjusted for taxes and social security contributions using data from *OECD Taxing Wages 2009*, where the tax 'wedge' reflects the average of:

- (i) the tax and social security contributions paid by employees, as a percent of total wages, for a single person with no children earning two-thirds of the national average annual salary; and
- (ii) the tax and social security contributions paid by employees, as a percent of total wages of a single person with two children earning two-thirds of the national average annual salary.

26. The choice of cohorts in the calculation of the tax wedge for the replacement cost approach is based on the observation that in those countries where prices for unregistered workers are available they are typically at the lower end of the salary scale.

27. Similarly, for the opportunity cost approach the average tax wedge is calculated as the average of:

- (i) the tax and social security contributions as a percent of total wages paid by a single person earning 100% of the national annual average salary; and
- (ii) the tax and social security contributions as a percent of total wages paid by a sole earner married with two children earning 100% of the national annual average salary.

28. It's important to note in this context that estimates of 'net' (post-tax) prices based on registered workers may be biased downwards in comparison to the actual labour costs of unregistered workers since the price of labour charged by unregistered workers may appropriate some part of the implicit tax-wedge. However, notwithstanding this possibility, it is all the same useful to focus on post-tax estimates of the value of labour because they provide the basis for a more meaningful lower-bound of overall household production of non-market services that can be used in parallel with the de-facto upper bound created by opportunity costs; thus creating upper and lower bound estimates that can be used with a relatively high degree of statistical confidence.

**Table 1: Sources and methods to estimate post-tax hourly wages**

Country	Replacement cost approach	Opportunity cost approach
Australia	(2)	(4)
Austria	(1)	(3)
Belgium	(1)	(3)
Canada	(1)	(4)
Germany	(1)	(3)
Denmark	(1)	(3)
Spain	(1)	(3)
Finland	(1)	(3)
France	(1)	(3)
United Kingdom	(1)	(4)
Hungary	(1)	(3)
Ireland	(1)	(4)
Italy	(1)	(3)
Japan	(2)	(4)
Korea	(1)	(4)
Mexico	50% of the average net wage for the total economy	(4)
Netherlands	(1)	(3)
Norway	Average of an hourly wage of a child care worker (source, based on Statistics Norway statistics) and OECD PPP survey data, adjusted for tax and social security contributions.	(4)
New Zealand	(1)	(3)
Poland	50% of the average net wage for the total economy	(3)
Portugal	(1)	(4)
Sweden	(1)	(3)
Turkey	50% of the average net wage for the total economy	(4)
United States	(1)	(3)
Estonia	50% of the average net wage for the total economy	(3)
Slovenia	(1)	Average of monthly net wages 2008 (source: Statistical Office of the Republic of Slovenia)
(1)	Based on OECD PPP survey data for wage costs in relevant unregistered activities.	
(2)	Based on OECD PPP survey data for wages costs in relevant registered activities with adjustments for tax and social security contributions based on estimates from OECD "Taxing Wages 2007-2008"	
(3)	Average hourly gross wages: based on OECD Structural Analysis (STAN) and Productivity databases. Tax and social security contributions estimated from OECD "Taxing Wages 2007-2008".	
(4)	Average hourly gross wages: based on annual earnings estimates in "Taxing Wages 2007-2008" and hours worked data in the OECD Productivity database. Tax and social security contributions estimated from OECD "Taxing Wages 2007-2008".	



29. The overall approach to measure the (replacement of opportunity) costs of labour used in the production of household non-market services for own use can therefore be simply described as follows:

$$\begin{aligned}
 & \textit{Value of annual labour used in household production of non-market services in nominal currencies} \\
 & = \\
 & \quad \textit{average hourly post-tax labour costs} \\
 & \quad * \\
 & \quad \textit{average hours worked per day} \\
 & \quad * \\
 & \quad \textit{365 (in 2008)} \\
 & \quad * \\
 & \quad \textit{the population, 16 years and over.}
 \end{aligned}$$

### ***Valuing Capital services***

30. Like any other activity, capital and labour can be used interchangeably in the production of household non-market services. Clearly innovations and inventions such as the dishwasher, washing machine, microwave, etc have provided possibilities for substitution with labour. Including the contribution of such consumer durables is important therefore to fully reflect the consumption of goods and services by households in a consistent way across countries and over time.

31. Consumer durables used in this analysis are based on the Eurostat-OECD Classification of Final Expenditure on GDP categories;<sup>4</sup> which includes household appliances, motor vehicles and also categories of consumer durables, such as furniture, that provide capital services related to dwelling services. It is important to note in this context that the estimates of capital services produced below will be biased upwards since some consumer durables, such as cars, also provide capital services to commuting and leisure activities; and not just household non-market services. Future work will attempt to allocate only the relevant part of consumer durables to estimates of capital services used in household production of non-market services.

32. The approach is to create estimates the value of capital services (by estimating the productive stock of consumer durables constructed using the perpetual inventory method) based on the standard stock-flow relationship:

$$K^t = K^{t-1}(1-\delta) + I^t.$$

33. Where,  $K^t$  is the end-of the period net stock of consumer durables,  $I^t$  is the flow of purchases of consumer durables during period  $t$  in constant (chained) prices,  $\delta$  is the geometric rate of depreciation, set at 20%. Note that no distinction is made between different types of consumer durables in this analysis but this will be the subject of further work, as, indeed, will be assumptions concerning the depreciation rate.

34. The value of capital services (Jorgenson and Griliches 1967) is measured as the price of capital services per unit of the net stock multiplied by the net stock. The capital service price contains three elements: a return to capital, depreciation, and revaluation of capital goods. We estimate a simplified version of the capital service price for consumer durables as:

$$P_K^t = P_I^t [r+\delta].$$

<sup>4</sup> The precise classification categories used are: 11.05.11.1, 11.05.12.1, 11.05.31.1, 11.05.51.1, 11.06.13.1, 11.07.11.1, 11.07.11.3-5, 11.07.12.1, 11.07.13.1, 11.07.14.1, 11.08.21.1, 11.09.11.1, 11.09.12.1, 11.09.13.1, 11.09.21.1, 11.09.22.1, 11.12.31.1

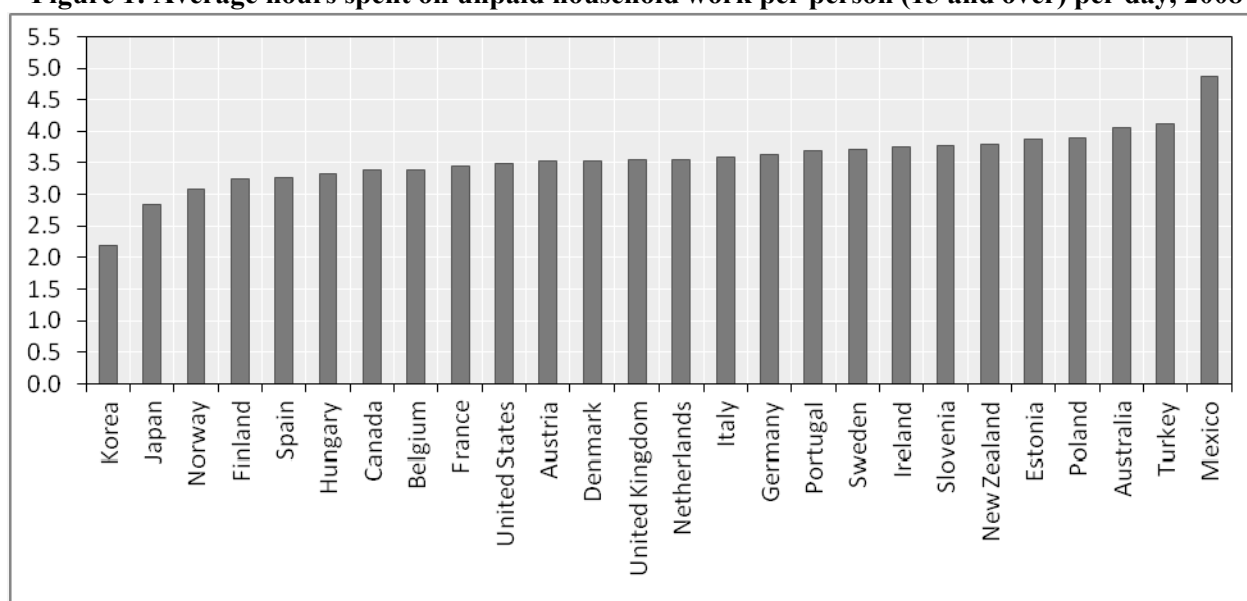
35. Where  $r$  is the real rate of return, set at 4% per year,  $P_K^t$  is the price of capital services and  $P_1^t$  is the price index of consumer durables. The value of capital services from consumer durables is therefore (again, future work will investigate the impact of different rates of return on the overall results):

$$P_K^t K^t = [r+\delta]P_1^t K^t.$$

## Results

36. Figure 1 below summarises the information available from the time-use surveys for 26 OECD countries. It shows that in most OECD countries the average time spent on unpaid household work falls between 3 and 4 hours per day, with the notable exceptions of Korea, where the average is just over two hours per day and Mexico, where the average is close to 5 hours per day.

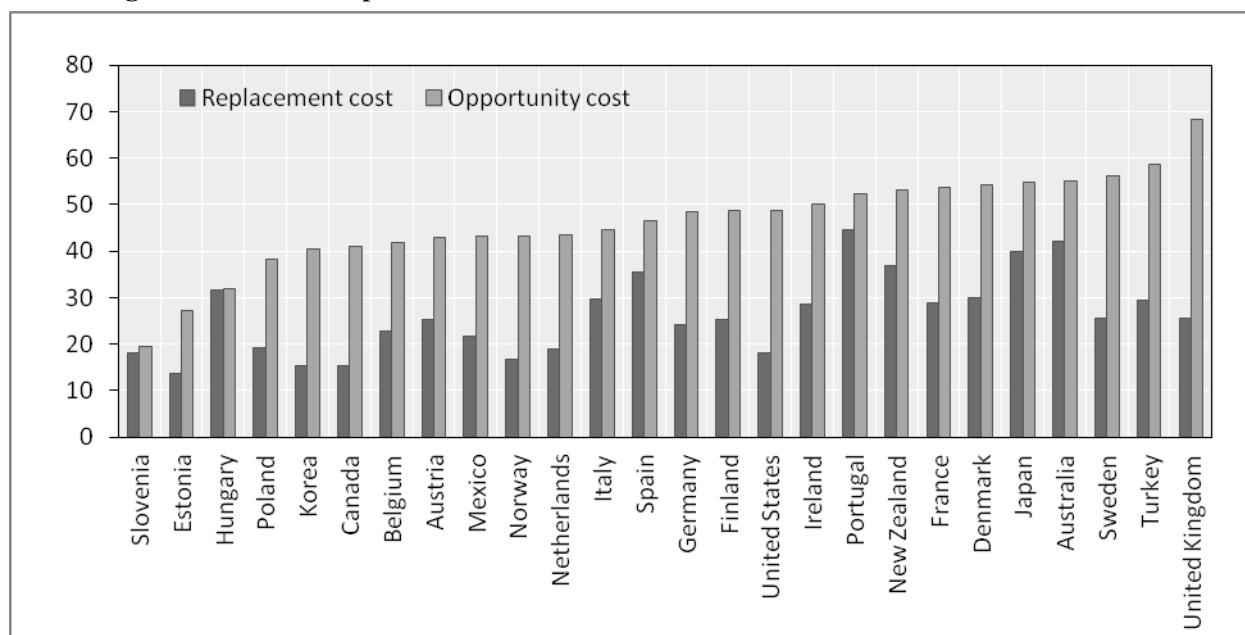
**Figure 1: Average hours spent on unpaid household work per person (15 and over) per day, 2008**



Source: OECD Time Use surveys (Austria and Denmark are set at the average for EU countries)

37. Figure 2 below presents the value of labour costs in household production of non-market services as a percentage of GDP based on the replacement cost approach and the opportunity cost approach.

38. Not surprisingly, (given the significant differences in the values of labour between the replacement and opportunity cost approaches) the chart shows considerable variations in the contribution of labour in household production of non-market services, depending on the approach. The contribution is close to 70% of GDP for example in the United Kingdom using the opportunity cost approach but about 25% using the replacement cost approach.

**Figure 2: Household production of non-market services, labour costs, % of GDP, 2008**

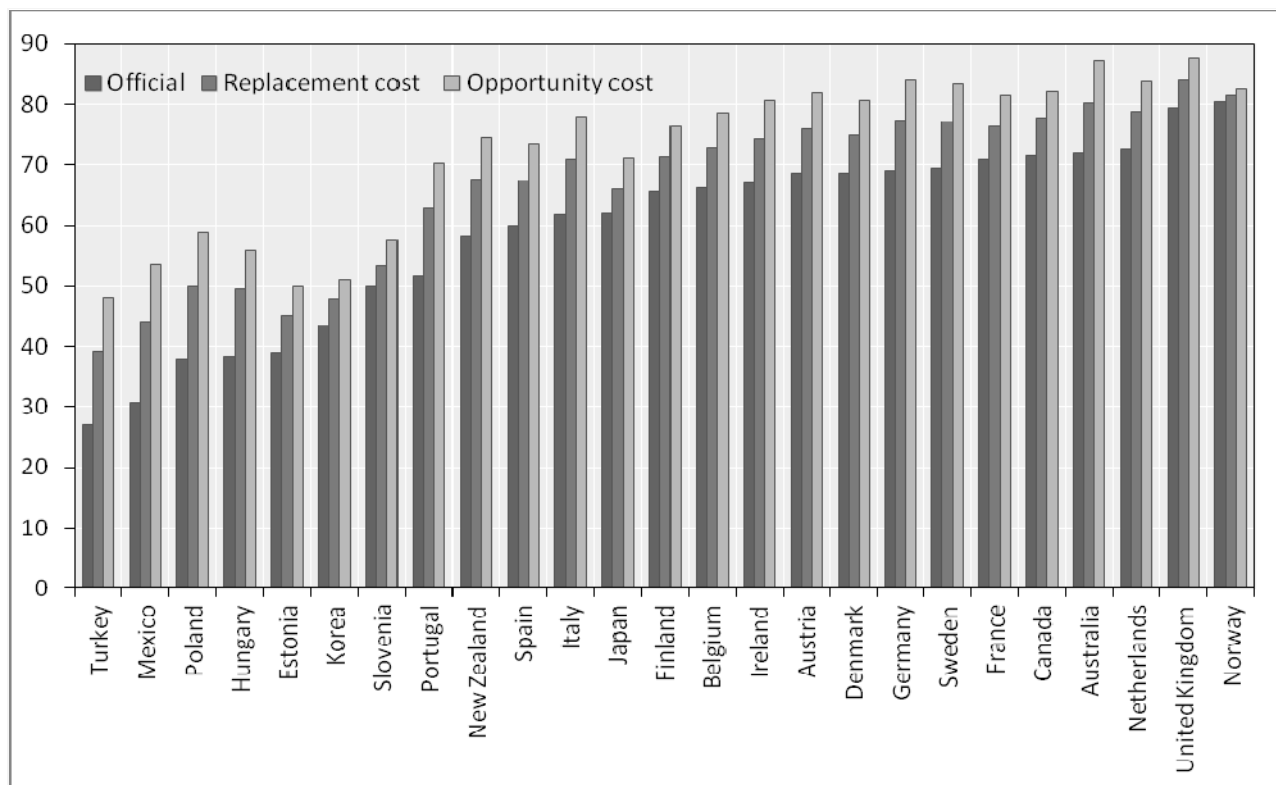
39. This, to some extent, confirms the concerns of many national accountants that the inclusion of these estimates within the GDP production boundary could risk undermining rather than strengthening it. However, volume comparisons as shown below, that compare countries using purchasing power parities (PPP), are much less affected by whether the replacement cost or opportunity cost approach is used, and indeed Landefeld, Fraumeni and Vojtech (2008) also demonstrated that this was the case (for the United States) for volume comparisons over time.

40. Figure 3 below illustrates this by comparing replacement cost and opportunity cost estimates of *total household consumption* per capita in 2008 PPPs with the United States set at 100; where *total household consumption* refers to *adjusted individual consumption* (AIC)<sup>5</sup> plus the imputed labour costs for household production of non-market services and is used rather than GDP per capita as the concept of actual individual consumption aligns more closely to material well-being.

41. Perhaps the single most important point relevant to this study is that the chart shows that the relative rankings of countries is little changed whether the opportunity cost or replacement cost approach is used, and that the positions relative to the United States are generally similar for both approaches – with the opportunity cost approach typically coming in no more than 5 points higher than the replacement cost approach on average. The most important message from a policy, as opposed to statistical, perspective however, is the fact that the positions of countries at the lower end of the consumption scale, relative to the US, (e.g. Mexico and Turkey), improve significantly when estimates of household production of non-market production are accounted for. Indeed, comparisons of total household consumption show improvements in the position of all countries relative to the United States.

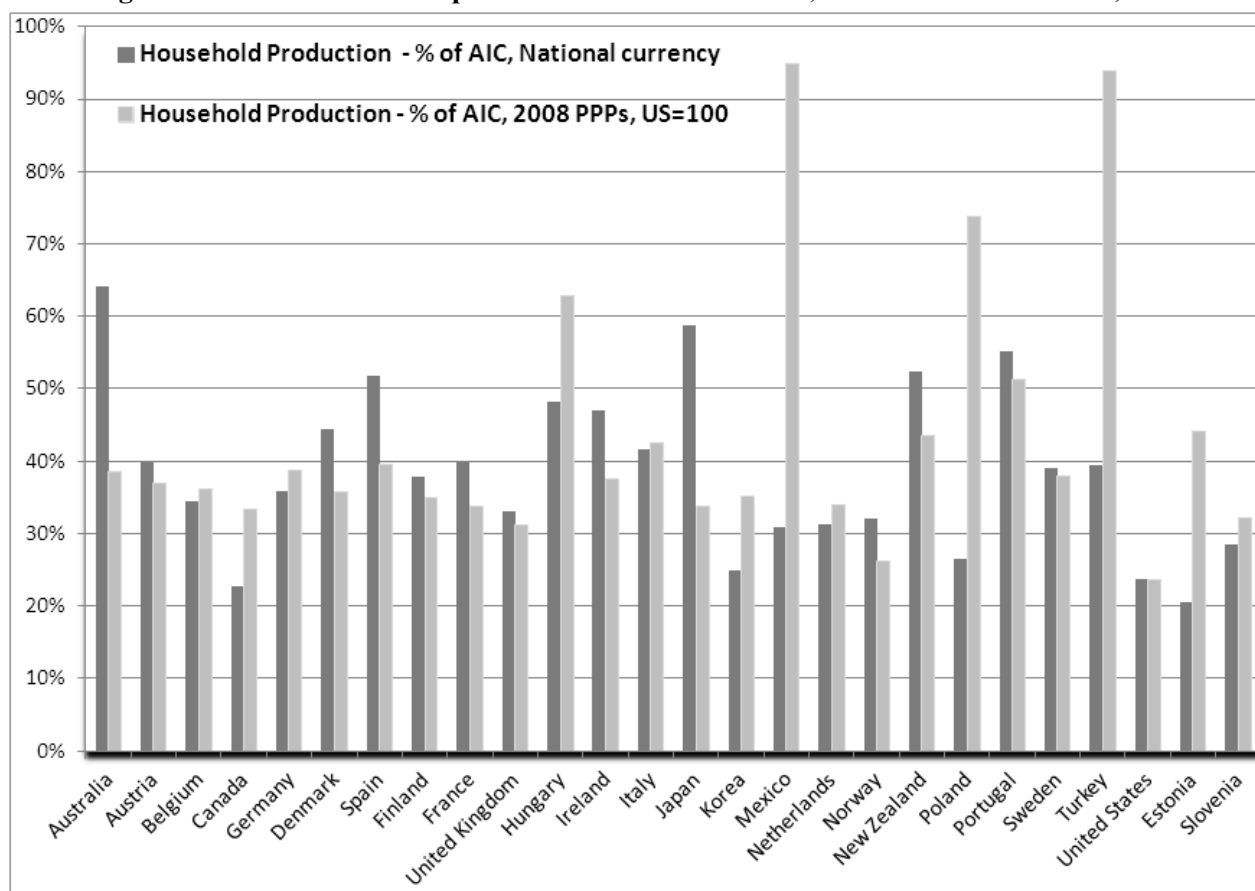
<sup>5</sup> When references to adjusted individual consumption are made in the context of estimates of total household consumption, AIC is exactly equivalent to household actual final consumption as described in the 2008 SNA (#9.81). When references to AIC are made in the context of total household consumption including the contribution of capital services however, AIC reflects household actual final consumption minus final expenditures on consumer durables.

**Figure 3: Total household consumption of non-market services: 2008 PPPs, US=100**



Source: OECD estimates

42. Figures 4 and 5 below (which analyse estimates based on the replacement cost approach) illustrate that much of this improvement in the positions of countries, relative to the United States, is largely a function of the fact that (on a PPP basis) the contribution of household non-market production as a share of actual individual consumption is higher in all countries than in the United States (Figure 4).

**Figure 4: Household consumption of non-market services, labour costs: % of AIC, 2008**

43. Figure 5 illustrates this further by decomposing the change in the relative position of countries into a price effect (which reflects the difference between the price of labour services relative to those in the United States and the price of total AIC relative to the AIC in the United States) and a (quantity) ‘hours effect’ (which reflects the difference between the average hours spent on household production on non-market services compared to the average hours spent in the United States).

44. It does this first constructing three supplementary estimates of household consumption of non-market services:

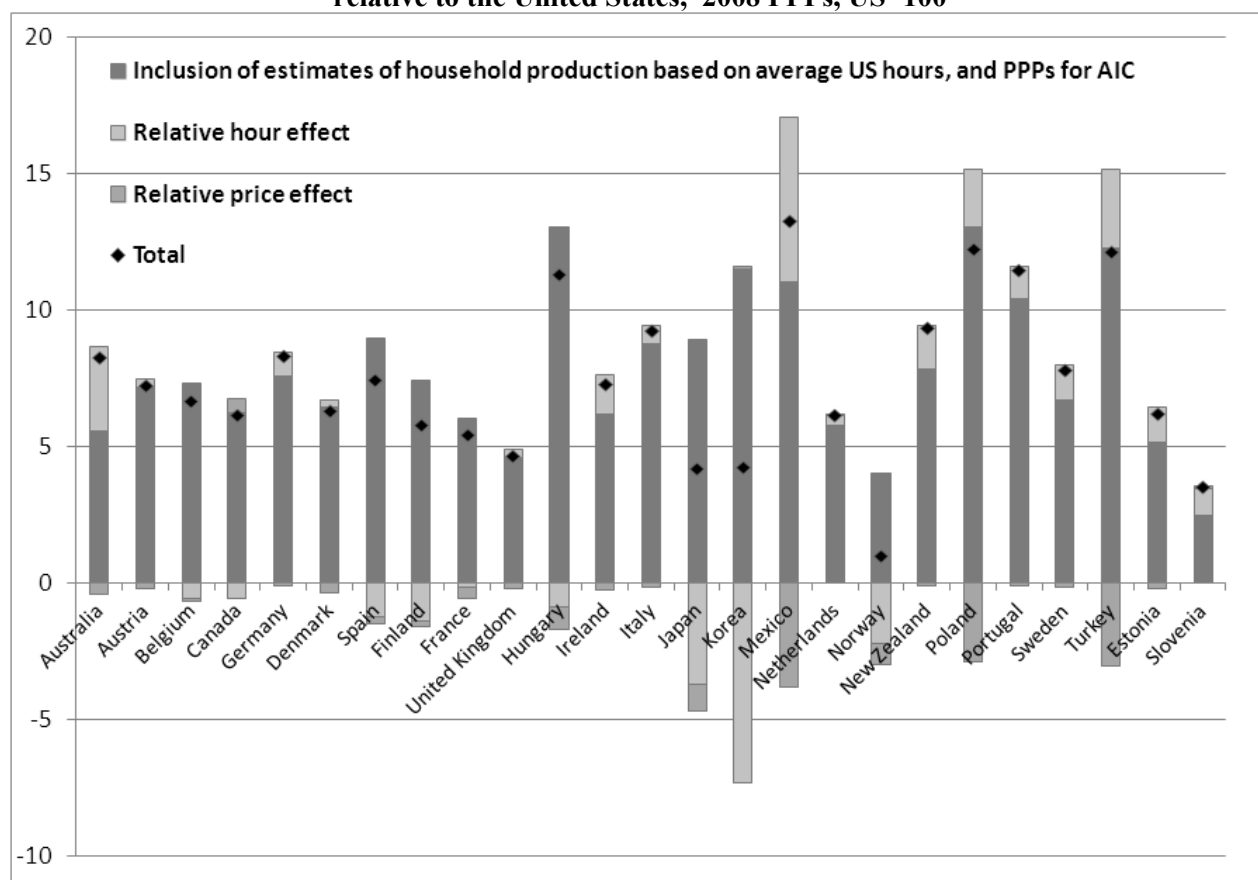
- (i) Total household consumption of non-market services, US dollars, 2008 PPPs, US=100, with average US hours used for each country and where the price of labour for a given country is equal to the average price for labour multiplied by the PPP for AIC in that country (**A**);
- (ii) Total household consumption of non-market services, US dollars, 2008 PPPs, US=100, with average US hours used for each country (**B**); and
- (iii) Total household consumption of non-market services, US dollars, 2008 PPPs, US=100, where the price of labour for a given country is equal to the average price for labour multiplied by the PPP for AIC in that country (**C**).

With this information it is possible to decompose the difference in the estimates of total household consumption on a PPP basis that include and exclude household production of non-market services into a relative price effect and a relative hour effect, as shown below.

45. Total household consumption including household production of non-market services (PPP), (*D*) minus AIC (PPPs) (*E*) =  $(A - E) + 0.5(C - A + D - B) + 0.5(D - C + B - A) = D - E$

*Relative Hourly*                      *Relative Price*  
*effect*    *effect*

**Figure 5: Decomposing the increase in estimates of household consumption of non-market services relative to the United States, 2008 PPPs, US=100**

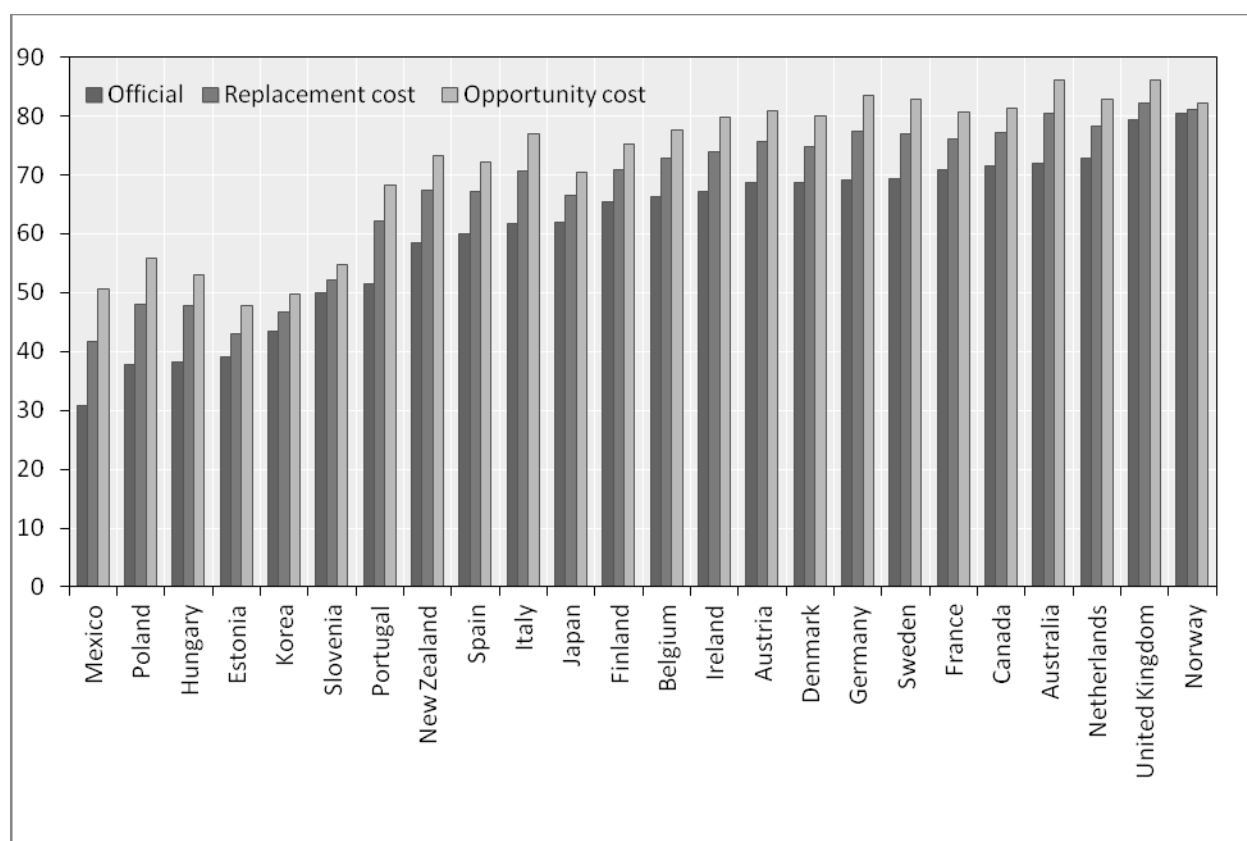


46. But recognising households as producers of household services is only one part of the story. Doing so also implies that consumer durables used in the production of these services are recorded as capital. In the same way therefore that estimates of owner-occupied dwellings can be, and often are, estimated using the user-cost approach so, too can estimates of the value of capital services provided by consumer durables. Figure 6 below therefore shows the relative positions of countries including both the contribution from household production of non-market services and the value of capital services provided by consumer durables used in production; estimated using the methodology described above.

47. Including the value of capital services, which represent about 5% of official GDP estimates, makes little material difference to the overall picture when compared in PPPs relative to the United States. But it's interesting to note that their inclusion results in a marginal improvement in the overall position of

the United States relative to nearly all other countries (except Japan), compared to the estimates that include only the contribution of labour costs.

**Figure 6: Total household consumption (plus capital services from consumer durables):2008 PPPs, US=100**



### Conclusions and Future Plans

48. The work is still in its early stages but it has already been able to illustrate that, even if there is considerable uncertainty about the value of household production of non-market services in a purely national context, meaningful cross country comparisons based on Purchasing Power Parities are obtainable. By extension, and certainly if one considers the work done at a national level (e.g in the United States) it follows that volume comparisons across time may also produce meaningful results.

49. Looking at volume movements in a national context will form part of the work programme going forward, subject to appropriate quality time-use surveys being made available. But a key part of the work programme will be to resolve a number of issues highlighted above: for example refining the estimates of capital services that remove double counting and creating estimates that value leisure. A full OECD Statistics working paper that incorporates the results shown above together with developments in these areas will be finalized in Spring 2011.

Table 2. Household production estimates using the replacement cost approach, 2008

	Hours spent on unpaid work	Population above 16 years age	Value of unpaid work	Net stock of consumer durables	Price index consumer durables	Value of capital services	Value of own-account household production (HP)		AIC converted with PPPs for AIC	Full consumption converted with adjusted PPPs	GDP	GDP +HP converted with adjusted PPPs	AIC converted with PPPs for AIC	Full consumption (AIC+HP) converted with adjusted PPPs	GDP	GDP +HP converted with adjusted PPPs
	Hours per day per person	1000 persons	Billions of national currency	Billions of chained 2000 national currency	2000=1	Billions of national currency	Billions of national currency	% of GDP	USD per capita	USD per capita	USD per capita	USD per capita	USA =100	USA =100	USA =100	USA =100
Australia	4.05	17306	527	306	0.75	55	582	46%	26242	36181	39555	49395	72	103	84	88
Austria	3.54	7067	71	69	0.92	15	87	31%	25045	34094	39848	48823	69	73	84	87
Belgium	3.38	8777	79	56	1.14	15	94	27%	24139	32808	37657	46259	66	69	80	82
Canada	3.38	27714	246	473	0.90	102	348	22%	26100	34816	38942	47700	72	74	82	85
Germany	3.64	71217	601	744	0.94	168	770	31%	25217	34955	37128	46896	69	71	79	84
Denmark	3.54	4481	523	505	0.99	120	643	37%	25056	33853	38598	47214	69	105	82	84
Spain	3.27	38898	387	227	1.04	57	444	41%	21877	30244	32967	41245	60	66	70	74
Finland	3.24	4421	47	45	0.80	9	55	30%	23891	31880	37628	45457	65	71	80	81
France	3.45	50893	561	488	0.82	96	658	34%	25871	34370	35678	44214	71	76	75	79
United Kingdom	3.54	50673	372	487	0.79	92	465	32%	28935	37108	37314	45558	79	73	79	81
Hungary	3.34	8537	8405	6208	0.92	1371	9777	37%	13952	21600	20680	28377	38	67	44	51
Ireland	3.75	3510	52	34	0.86	7	59	33%	24473	33523	43693	52262	67	79	92	93
Italy	3.60	50956	464	403	1.02	98	562	36%	22488	32018	32968	42476	62	66	70	76
Japan	2.85	110516	202318	130488	0.63	19680	221998	44%	22581	30002	33802	41070	62	108	72	73
Korea	2.18	40149	156754	185346	0.84	37275	194029	19%	15869	21063	26875	32098	44	60	57	57
Mexico	4.87	75360	2616	2264	1.16	628	3244	27%	11225	18851	15217	22841	31	46	32	41
Netherlands	3.55	13516	113	124	0.96	29	141	24%	26537	35251	43022	51770	73	72	91	92
Norway	3.08	3858	423	531	0.93	119	542	21%	29333	36486	61415	67434	80	110	130	120
New Zealand	3.79	3380	68	54	0.94	12	80	43%	21278	30380	29056	38252	58	78	61	68
Poland	3.89	32253	244	192	0.94	43	287	23%	13793	21490	18125	25781	38	43	38	46
Portugal	3.69	8998	74	51	1.10	13	88	53%	18810	28075	25206	34564	52	55	53	62
Sweden	3.72	7678	825	675	0.77	124	949	30%	25307	34815	39433	48880	69	103	83	87
United States	3.49	242934	2623	4433	0.82	871	3493	24%	36477	45323	47258	56104	100	100	100	100
Estonia	3.86	702	34	50	0.78	9	44	17%	14223	19697	21719	27263	39	51	46	49
Slovenia	3.77	1020	7	8	1.07	2	9	24%	18206	23395	29044	34195	50	44	61	61



Table 3. Household production estimates using the opportunity cost approach, 2008

	Hours spent on unpaid work	Population above 16 years age	Value of unpaid work	Net stock of consumer durables	Price index consumer durables	Value of capital services	Value of own-account household production (HP)		AIC converted with PPPs for AIC	Full consumption converted with adjusted PPPs	GDP	GDP +HP converted with adjusted PPPs	AIC converted with PPPs for AIC	Full consumption (AIC+HP) converted with adjusted PPPs	GDP	GDP +HP converted with adjusted PPPs
	Hours per day per person	1000 persons	Billions of national currency	Billions of chained 2000 national currency	2000=1	Billions of national currency	Billions of national currency	% of GDP	USD per capita	USD per capita	USD per capita	USD per capita	USA =100	USA =100	USA =100	USA =100
Australia	4.05	17306	691	306	0.75	55	746	60%	26242	51412	39555	65081	72	86	84	92
Austria	3.54	7067	121	69	0.92	15	136	48%	25045	48307	39848	63733	69	81	84	90
Belgium	3.38	8777	144	56	1.14	15	160	46%	24139	46319	37657	60321	66	78	80	86
Canada	3.38	27714	655	473	0.90	102	757	47%	26100	48607	38942	61807	72	81	82	88
Germany	3.64	71217	1211	744	0.94	168	1379	55%	25217	49830	37128	62010	69	83	79	88
Denmark	3.54	4481	943	505	0.99	120	1063	61%	25056	47763	38598	61588	69	80	82	87
Spain	3.27	38898	507	227	1.04	57	564	52%	21877	43056	32967	54439	60	72	70	77
Finland	3.24	4421	90	45	0.80	9	98	53%	23891	44894	37628	59014	65	75	80	84
France	3.45	50893	1045	488	0.82	96	1141	59%	25871	48147	35678	58022	71	81	75	82
United Kingdom	3.54	50673	990	487	0.79	92	1082	75%	28935	51468	37314	59900	79	86	79	85
Hungary	3.34	8537	8487	6208	0.92	1371	9858	37%	13952	31636	20680	38507	38	53	44	55
Ireland	3.75	3510	91	34	0.86	7	98	54%	24473	47622	43693	67520	67	80	92	96
Italy	3.60	50956	700	403	1.02	98	798	51%	22488	45946	32968	56587	62	77	70	80
Japan	2.85	110516	277757	130488	0.63	19680	297437	59%	22581	42076	33802	53526	62	70	72	76

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Korea	2.18	40149	415868	185346	0.84	37275	453143	44%	15869	29713	2687 5	41235	44	50	57	58
Mexico	4.87	75360	5231	2264	1.16	628	5860	48%	11225	30203	1521 7	33691	31	51	32	48
Netherlands	3.55	13516	259	124	0.96	29	287	48%	26537	49431	4302 2	66627	73	83	91	94
Norway	3.08	3858	1102	531	0.93	119	1221	48%	29333	49104	6141 5	80812	80	82	130	115
New Zealand	3.79	3380	98	54	0.94	12	110	60%	21278	43751	2905 6	51432	58	73	61	73
Poland	3.89	32253	488	192	0.94	43	532	42%	13793	33304	1812 5	37056	38	56	38	53
Portugal	3.69	8998	87	51	1.10	13	101	60%	18810	40763	2520 6	46867	52	68	53	66
Sweden	3.72	7678	1809	675	0.77	124	1933	60%	25307	49536	3943 3	64050	69	83	83	91
United States	3.49	242934	7012	4433	0.82	871	7883	55%	36477	59759	4725 8	70540	100	100	100	100
Estonia	3.86	702	68	50	0.78	9	78	31%	14223	28558	2171 9	36404	39	48	46	52
Slovenia	3.77	1020	7	8	1.07	2	9	25%	18206	32740	2904 4	44400	50	55	61	63

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