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Output-Based Estimates of the Gross Household Product of the United States 2003-2010: And some Interactions of GHP with Gross Market Product during the Great Financial Crisis (2008-2009)

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Output-Based Estimates of the Gross Household Product of the United States 2003-2010: And some Interactions of GHP with Gross Market Product during the Great Financial Crisis (2008-2009)

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Abstract

The American Time Use Survey (ATUS) now provides continuous estimates of US households' use of time over nine years - 2003 to 2011. These time use estimates provide the fundamental data necessary for constructing national accounts of production in the US household economy, not only the volume of labor inputs but also the household production output volumes. We use ATUS and other US data, including the Bureau of Economic Analysis National Income and Product Accounts, to provide experimental output-based estimates of the volume of Gross Household Product (GHP), the economic value added by unpaid household work and household capital, at constant 2005 prices for the nine years 2003 to 2011.

These new estimates are then used to investigate the hypothesis that during a recession in the market economy the household economy rises to take up a proportion of the fall in market activity.

Our paper is divided into three parts. In the first part we discuss the household economy, gross household product, the theoretical framework for estimating GHP and the categories of household outputs. Secondly we present our estimates of the GHP of the United States over the nine years 2003 to 2011 showing our methods and sources. Finally we discuss the results and draw some tentative conclusions about the interactions between the household and market economies of the US during the Great Financial Crisis of 2008 and 2009.

1. THE HOUSEHOLD ECONOMY AND GROSS HOUSEHOLD PRODUCT

1 Introduction

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, significantly fall short of covering the total economic performance of each and every country. Despite the UN Statistical Commission recommending almost 20 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.

To our knowledge, the Office for National Statistics of the United Kingdom is the only official statistical agency to have produced *output-based* estimates along the lines of the estimates in our paper (Office for National Statistics, 2000; Holloway, Short & Tamplin, 2002).

2 Gross Household Product

It is somewhat ironic that the name of the economic production by the market economic is called the Gross "Domestic" Product which would seem ideal as the name for the value added by households in domestic production. The origin of domestic in GDP is its use to denote the value added by all economic units operating within the borders of a country; the use of national in Gross National Product (GNP) is to denote the value added by all "national" units of the country both inside and outside these borders.

Over many years our research has used the name *Gross Household Product* (GHP) for the unpaid value added from household production (Ironmonger, 1994: 1996). Since the unpaid rental value of owner-occupied dwellings (by an historical quirk of fate) is included in GDP we deduct this from GDP to give a new concept, *Gross Market Product* (GMP). GHP and GMP can thus be added without any double-counting to give an estimate of *Gross Economic Product* (GEP).

Gross Household Product (GHP) is the economic value added by households using the unpaid labor (human capital) of their own members and their own capital (physical capital) to produce economic services for consumption without payment by members of their own or other households. This activity can be called the household economy.

3 A Framework for Estimating GHP

National accounting establishes clear categories and defined variables for which estimates are required – 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 labor (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:

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

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

where, over a specific period of time,

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

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:

$$v_i = p_i \times q_i \qquad (03)$$

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).

Similarly the gross value added in production of any commodity can be considered as:

$$g_i = v_i - m_i \qquad (04)$$

where, over a specific period of time

g_i = total value added in production of commodity i (dollars) and
m_i = total value in intermediate inputs used in production of commodity i (dollars)

The value of labor 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 labor input to commodity i (dollars)
t_i = total quantity of labor time input to commodity i (hours) and

w_i = wage rate of labor 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 labor 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) (Statistical Office of the United Nations, 1993) has defined which types of economic production are to be included within the SNA boundary of production and what types should be excluded. In regard to the household economy the SNA says this economic production should be included in "satellite" accounts which are consistent with the accounts for the standard accounts.

We also define a new variable

$$c_i = q_i / t_i \qquad (07)$$

where

c_i = total quantity of production of commodity *i* per hour of labor time input to commodity *i* (quantity per hour)
q_i = total quantity of production of commodity *i* (quantity) and
t_i = total quantity of labor time input to commodity *i* (hours)

The quantities of output per hour of labor input are governed by relatively slow changes in household technology taking place over decades and unrelated to cyclical factors. Hence over the relatively short period of our experimental estimates and in the absence of any information on changed household technology we have assumed these variables remained constant in the period 2003 to 2011.

4 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, child and adult care, shopping, household repairs and maintenance, gardening and other household tasks. 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 and 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. Thus there are just seven final categories of services now considered as final outputs that should be included in the household production satellite accounts (Varjonen et al, 1999; Varjonen & Niemi, 2000).

The seven final outputs are

Accommodation,
Meals,
Clean Clothes,
Care,
Transport,
Volunteering and
Education.

A further complication is that some production can be made using market capital and household labor (such as a Laundromat where households use their own labor time to produce clean clothes) and other production can be made using household capital and market labor (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 paper.

2. ESTIMATES OF UNITED STATES GROSS HOUSEHOLD PRODUCT

5 Households, Population and Labor Inputs

Our estimates start with the American Time Use Survey (ATUS) data on the number of households and household population, Table 1, and the household production labor input hours, Table 2.

Table 1 Households, population and persons per household, United States of America

Year	Households '000	Population '000	Adults per Household	Children per Household	Persons per Household
2003	111,278	286,200	2.025	0.547	2.572
2004	112,000	288,861	2.031	0.548	2.579
2005	113,343	291,656	2.033	0.540	2.573
2006	114,384	294,561	2.038	0.537	2.575
2007	116,011	297,499	2.035	0.529	2.564
2008	116,783	300,165	2.038	0.532	2.570
2009	117,181	302,764	2.047	0.536	2.584
2010	117,538	305,387	2.058	0.540	2.598
2011	118,682	307,390	2.053	0.537	2.590

Source: ATUS and US Census Bureau Current Population Survey

Table 2 Household production labor input hours, United States of America
t_i *and* T
Hours per household per week

Year	Accommodation t_1	Meals and snacks t_2	Clean clothes t_3	Care t_4	Transport t_5	Volunteering t_6	Education t_7	**Total T**
2003	14.14	16.74	3.07	34.61	14.57	4.66	6.67	**94.45**
2004	14.12	16.70	3.05	33.32	14.59	4.77	6.85	**93.40**
2005	14.47	16.58	3.03	34.36	14.38	4.19	6.20	**93.21**
2006	13.84	16.81	3.04	33.59	14.13	3.89	7.00	**92.31**
2007	14.76	16.43	3.09	33.04	14.33	4.19	6.09	**91.94**
2008	13.51	16.41	2.80	34.15	13.37	4.07	6.76	**91.08**
2009	14.40	16.54	2.63	32.31	13.32	4.17	6.68	**90.04**
2010	13.90	16.37	2.79	33.59	13.23	4.16	6.54	**90.57**
2011	12.46	16.07	2.59	32.18	13.59	4.01	6.61	**87.51**

Source: ATUS

The actual ATUS codes used for each category are shown in Appendix 1.

5 Estimates of Household Production Outputs

Table 3 gives our estimates of the output-input coefficients in the United States over the period of our estimates. The sources for our estimates are shown in Appendix 3.

Table 3 Output-input coefficients, United States of America

c_i

	Output-Input Coefficient	
	Number	Per ATUS Input
Accommodation	98 per cent	Population days
Meals and snacks	3.88 items	Meal prep hour
Clean clothes	29.56 items	Laundry hour
Care	1.26 hours	Care hour
Transport	28.66 miles	Driving hour
Volunteering	1.0 hour	Volunteer hour
Education	1.0 hour	Education hour

Source: Authors' estimates based on a range of US sources supplemented by estimates from surveys of households in Australia.

The quantities of household production output are obtained by using these coefficients with the population and number of households data from Table 1 (for accommodation days) and the labor input hours from Table 2 (for the other items).

Table 4 Quantities of Household Production Output, United States of America

q_i

Number per household per week

Year	Accommodation q_1	Meals and snacks q_2	Clean clothes q_3	Care q_4	Transport q_5	Volunteering q_6	Education q_7
Unit	Days	Number	Items	Hours	Vehicle miles	Hours	Hours
2003	18.00	64.93	90.62	43.60	417.6	4.66	6.67
2004	18.05	64.80	90.05	41.99	418.2	4.77	6.85
2005	18.01	64.32	89.58	43.29	412.1	4.19	6.20
2006	18.03	65.23	89.98	42.32	405.0	3.89	7.00
2007	17.95	63.75	91.21	41.63	410.8	4.19	6.09
2008	17.99	63.66	82.80	43.03	383.1	4.07	6.76
2009	18.09	64.16	77.74	40.70	381.7	4.17	6.68
2010	18.19	63.49	82.56	42.32	379.2	4.16	6.54
2011	18.13	62.35	76.50	40.55	389.6	4.01	6.61

Source: Data from tables 1, 2 & 3

Table 5 gives our estimates of the output prices in the United States in 2005. The sources for our estimates are shown in Appendix 4.

Table 5 Output 2005 prices, United States of America

p_i

	Price in 2005	
	$	Per
Accommodation p_1	40.40	Person per day
Meals and snacks p_2	4.84	Meal or snack
Clean clothes p_3	1.33	Item laundered
Care p_4	12.23	Hour of care
Transport p_5	1.0374	Vehicle mile
Volunteering p_6	13.48	Volunteer hour
Education p_7	9.90	Education hour

Source: Authors' estimates based on a range of US sources.

The next step is to estimate the gross value of these outputs in constant 2005 dollars by multiplying the quantities shown in Table 4 by the prices vector shown in Table 5.

The results are shown in Table 6 which can be added to give the total gross value of output, ***V***. Table 6 shows the average *gross outlays* per week (in real 2005 dollars) households would have to pay market sources to obtain the same quantities of services as they provided for themselves through their own unpaid labor and their own capital goods.

Table 6 Gross Value of Household Production Output, United States of America

v_i *and V*

$(2005) per household per week

Year	Accommodation v_1	Meals and snacks v_2	Clean clothes v_3	Care v_4	Transport v_5	Volunteering v_6	Education v_7	**Total *V***
2003	715	314	121	533	433	63	66	**2,245**
2004	717	314	120	513	434	64	68	**2,230**
2005	715	311	119	529	428	57	61	**2,220**
2006	716	316	120	518	420	52	69	**2,211**
2007	713	309	121	509	426	56	60	**2,195**
2008	714	308	110	526	397	55	67	**2,178**
2009	718	311	103	498	396	56	66	**2,148**
2010	722	307	110	518	393	56	65	**2,171**
2011	720	302	102	496	404	54	65	**2,143**

Source: Data for tables 4 & 5

6 Intermediate Inputs to Household Production

To estimate the value added by households own efforts we need to deduct from these gross estimates the values of the intermediate inputs of goods and services used in this production that were purchased from the market.

These estimates come directly from the Bureau of Economic Analysis National Income and Product Accounts Table 2.4.6U, real personal consumption expenditures by type of product. The item "Food and beverages purchases for off-premises consumption" is the largest intermediate input.

Table 7 Intermediate Inputs to Household Production, United States of America
m_i *and M*$
(2005) per household per week

Year	Accommodation m_1	Meals and snacks m_2	Transport m_5	**Total *M***
2003	86	106	86	**278**
2004	86	107	87	**280**
2005	87	109	87	**283**
2006	86	111	84	**282**
2007	87	111	83	**281**
2008	85	109	78	**272**
2009	84	108	75	**266**
2010	86	110	74	**270**
2011	86	110	72	**269**

Source: Bureau of Economic Analysis national income and product accounts, table 2.4.6U, real personal consumption expenditures by type of product (See Appendix 2)

Table 8 Gross Household Product, United States of America
ghp_i *and GHP*
$(2005) per household per week

Year	Accommodation ghp_1	Meals and snacks ghp_2	Clean clothes ghp_3	Care ghp_4	Transport ghp_5	Volunteering ghp_6	Education ghp_7	**Total *GHP***
2003	629	208	121	533	347	63	66	**1,967**
2004	630	207	120	513	347	64	68	**1,950**
2005	628	202	119	529	341	57	61	**1,938**
2006	629	205	120	518	336	52	69	**1,929**
2007	626	197	121	509	344	56	60	**1,914**
2008	629	199	110	526	319	55	67	**1,906**
2009	634	203	103	498	321	56	66	**1,882**
2010	636	197	110	518	319	56	65	**1,901**
2011	633	191	102	496	332	54	65	**1,874**

Source: Data for Tables 5 & 8

Table 9 gives our estimates from Table 8 converted to annual figures in billion dollars per year for all households.

Table 9 Gross Household Product, United States of America
ghp_i and GHP

$(2005) billion per year

Year	Accommodation ghp_1	Meals and snacks ghp_2	Clean clothes ghp_3	Care ghp_4	Transport ghp_5	Volunteering ghp_6	Education ghp_7	**Total *GHP***
2003	3,639	1,202	697	3,086	2,008	364	382	**11,376**
2004	3,668	1,203	698	2,991	2,021	375	395	**11,346**
2005	3,701	1,190	702	3,121	2,009	333	362	**11,417**
2006	3,741	1,214	712	3,019	1,998	312	412	**11,468**
2007	3,773	1,188	732	3,072	2,072	341	364	**11,540**
2008	3,816	1,205	669	3,196	1,940	333	406	**11,564**
2009	3,864	1,235	630	3,033	1,957	342	403	**11,463**
2010	3,887	1,205	671	3,168	1,949	343	396	**11,613**
2011	3,908	1,180	628	3,060	2,049	333	404	**11,561**

Source: Data from Tables 1 & 9

7 Capital Inputs to Household Production

The capital inputs to household production are our estimates of the annual rental values of the household owned dwellings, household furnishings, clothing, durable goods and equipment including vehicles. Ideally these rental estimates should be based on estimates of the capital stocks as has been done in estimates for Canada (Thoen, 1993).

The largest component is the rental value of owner-occupied housing which is available from the BEA National Income and Product Accounts (NIPA). For the other components we have used the annual purchases shown in NIPA Table 2.4.6U.

Table 10 shows our estimates of the capital inputs.

Table 10 Capital Inputs to Household Production, United States of America
k_i *and* K
$(2005) per household per week

Year	Accommodation k_1	Meals and snacks k_2	Clean clothes k_3	Care k_4	Transport k_5	**Total K**
2003	227	24	61	24	70	**405**
2004	236	26	64	26	70	**422**
2005	251	28	67	28	69	**444**
2006	260	31	70	31	66	**458**
2007	260	32	72	32	66	**463**
2008	259	32	71	32	57	**451**
2009	255	31	68	31	53	**437**
2010	262	33	72	33	54	**456**
2011	267	36	75	36	58	**471**

Source: Bureau of Economic Analysis national income and product accounts, table 2.4.6U, real personal consumption expenditures by type of product (See Appendix 2)

8 Labor Inputs to Household Production

Deducting the capital inputs (Table 10) from GHP (Table 8) gives the value of labor inputs shown in Table 11.

Table 11 Labor Inputs to Household Production, United States of America
l_i *and* L
$(2005) per household per week

Year	Accommodation l_1	Meals and snacks l_2	Clean clothes l_3	Care l_4	Transport l_5	Volunteering l_6	Education l_7	**Total L**
2003	402	184	60	509	277	63	66	**1,562**
2004	394	181	56	487	277	64	68	**1,528**
2005	377	174	52	501	272	57	61	**1,494**
2006	369	174	49	487	270	52	69	**1,471**
2007	366	165	49	477	277	56	60	**1,458**
2008	370	167	39	494	263	55	67	**1,455**
2009	379	172	35	467	268	56	66	**1,445**
2010	374	164	37	484	265	56	65	**1,445**
2011	367	155	27	460	274	54	65	**1,403**

Source: Data from Tables 8 & 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 the US time use survey known as the American Time Use Survey (ATUS) (see Table 2). 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
w_i *and* W
$(2005) per hour

Year	Accommodation w_1	Meals and snacks w_2	Clean clothes w_3	Care w_4	Transport w_5	Volunteering w_6	Education w_7	**Total W**
2003	28.44	11.00	19.53	14.72	19.03	13.48	9.90	**16.53**
2004	27.92	10.84	18.49	14.63	18.97	13.48	9.90	**16.36**
2005	26.08	10.49	17.10	14.58	18.91	13.48	9.90	**16.03**
2006	26.70	10.34	16.17	14.50	19.10	13.48	9.90	**15.94**
2007	24.77	10.04	15.86	14.43	19.34	13.48	9.90	**15.78**
2008	27.40	10.18	13.84	14.47	19.65	13.48	9.90	**15.97**
2009	26.32	10.42	13.45	14.46	20.15	13.48	9.90	**16.04**
2010	26.90	10.02	13.40	14.41	20.03	13.48	9.90	**15.96**
2011	29.43	9.67	10.41	14.29	20.19	13.48	9.90	**16.03**

Source: Data from Tables 2 & 11

9 GHP, GMP and GEP

To avoid double counting, the rental value of owner occupied housing (which is included in both GHP and GDP) is deducted from GDP to give Gross Market Product. Then an estimate of the total Gross Economic Product (GEP) is obtained by adding GHP and GMP. These estimates are shown in Table 13, both in $(2005) billion per year for all households and as $(2005) per household per week.

Table 13 Gross Household Product, Gross Domestic Product, Gross Market Product and Gross Economic Product, United States of America

Year	GHP	GDP	GMP	GEP	GHP	GDP	GMP	GEP
	$(2005) billion per year				$(2005) per household per week			
2003	11,376	11,836	10,865	22,242	1,967	2,046	1,878	3,844
2004	11,346	12,247	11,245	22,591	1,950	2,103	1,931	3,879
2005	11,417	12,623	11,550	22,976	1,938	2,142	1,961	3,898
2006	11,468	12,959	11,866	23,334	1,929	2,177	1,995	3,923
2007	11,540	13,206	12,122	23,663	1,914	2,189	2.009	3,922
2008	11,564	13,162	12,070	23,634	1,906	2,167	1,988	3,892
2009	11,463	12,703	11,609	23,072	1,882	2,085	1,905	3,786
2010	11,613	13,088	11,992	23,606	1,901	2,141	1,962	3,862
2011	11,561	13,315	12,219	23,780	1,874	2,158	1,980	3,853

Source: Data for Tables 8 & 9 and Bureau of Economic Analysis national income and product accounts

3. DISCUSSION OF RESULTS

Our research reveals that the world's largest economy, if measured correctly to include all "Gross Economic Product", is actually around 80 per cent larger than the conventional measure "Gross Domestic Product".

In the United States on average over the years 2003 to 2009 GHP was very close to half of all GEP; that is the US household economy produced about as much gross economic product (value added) as the US market economy. How do these two economies move together through time? What are the interactions between them during booms and recessions? Can these new estimates shed some light on these questions?

10 Interactions between Household Production and Market Production

Some twenty years ago one of us put forward the general hypothesis that

> "production and employment in the household economy will move in a counter-cyclical way to production in the market economy. When the market is booming with a strong demand for labour, the household will do less work

> at home. When the market is recessed the household will do more work. Thus the 'total' economy, the sum of the market and the household will be much steadier and have a smoother growth path than that shown by the figures we currently use to measure the total output of 'the' economy.' (Ironmonger, 1989, p 10)

Hence we started our research on the United States economy with the hypothesis that during the downturn following the Great Financial Crisis of 2007-08 there would be a counter-cyclical rise in household production to offset some, but not all, of the fall in market production. We expected to see a rise in GHP to coincide with the fall in GDP and GMP.

The aggregate data from Table 13 in $ billion per year are shown in graphical form in Figure 1.

The stall in growth in GDP and GMP in 2008 and the dramatic fall in 2009 during the GFC are shown clearly. Whilst GHP continued to rise in 2008, it also fell in 2009 in a pro-cyclical way. In the recovery of GDP and GMP growth in 2010 there was a rise in GHP but as GDP and GMP growth slowed slightly in 2011 GHP declined. Thus at the aggregate level there was no rise in aggregate GHP to offset the fall in GDP and GMP. The movements in GHP should be seen as overwhelmingly pro-cyclical.

11 The effects of the Great Financial Crisis on Gross Household Product and Gross Economic Product

We display the aggregate GDP, GMP, GHP and GEP data in the following four charts, Figure 1 to Figure 4.

In Figures 1 and 2 we display the levels of the variables over the nine years 2003 to 2011. Figure 1 shows the data in $(2005) billions and Figure 2 in $(2005) per household per week. With dashed arrows we have indicated the pre-GFC trends and continued these forward to 2011.

The slowdown in growth started on a per-household basis in 2007. The stall of aggregate growth in 2008 was a decline in GMP per household in 2008 below the level of 2006. In 2009 GMP per household declined rapidly to below the level of 2004.

Aggregate GHP was rising slowly and continued on trend in 2008 but fell below this growth path in 2009. On a per household basis GHP continued on a downward path in 2008 and 2009.

Thus from this analysis we conclude that there was no upward counter-cyclical response by the US household economy to the GFC.

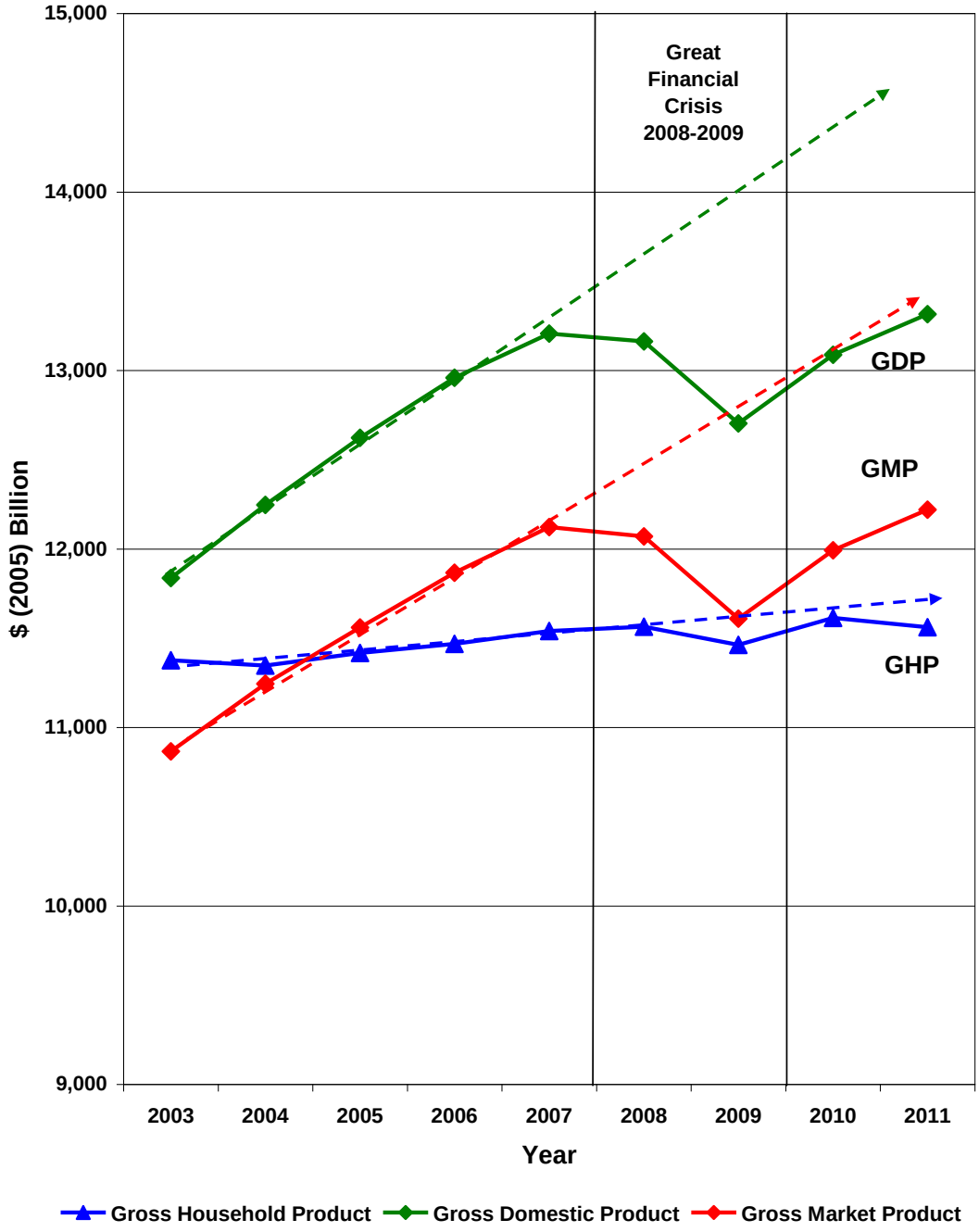

Figure 1 GDP, GMP and GHP, United States, $(2005) billion per year

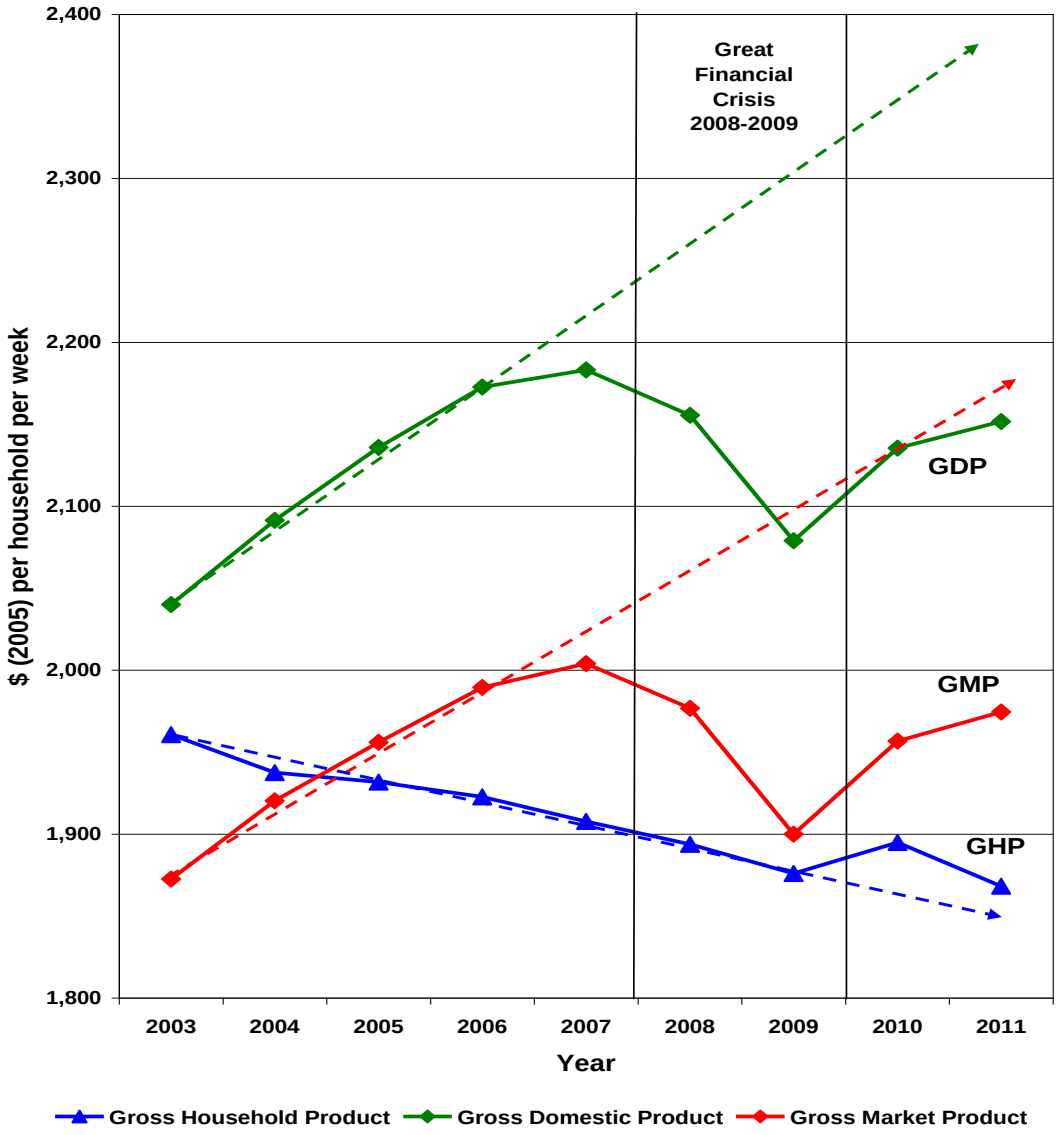

Figure 2 GDP, GMP and GHP, United States, $(2005) per household per week

Figure 3 and Figure 4 show the changes in GMP, GHP and GEP over the years 2004 to 2011. Figure 3 shows the aggregate data in $(2005) billion and Figure 4 in $(2005) per household per week. These charts further support the no counter-cyclical response by the US household economy that we detect. Indeed the recovery movement of GHP in 2010 following the recovery in GMP gives some support to the idea that the household moves in a pro-cyclical way.

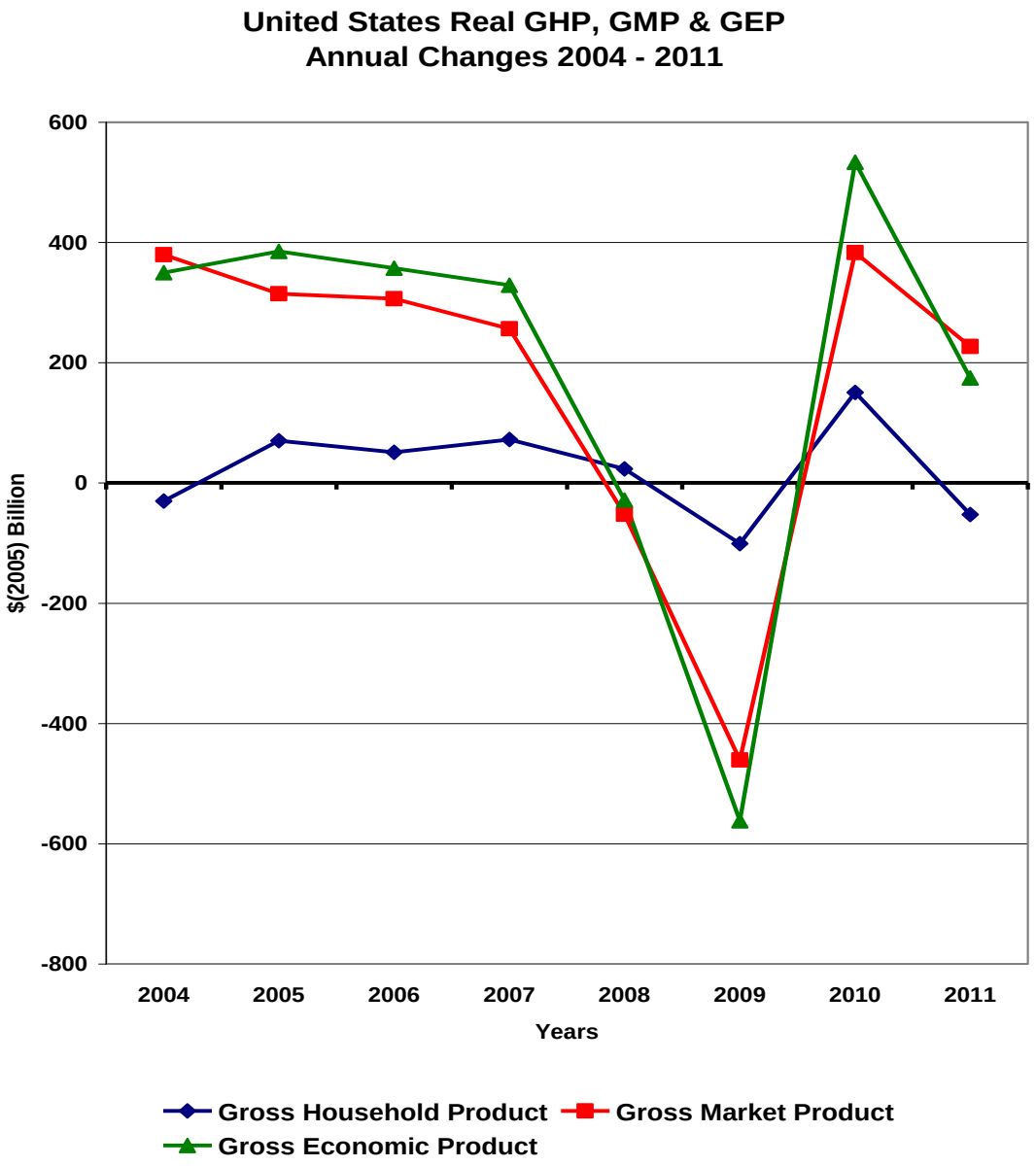

Figure 3 Changes in GMP. GHP and GEP, United States, $(2005) billion

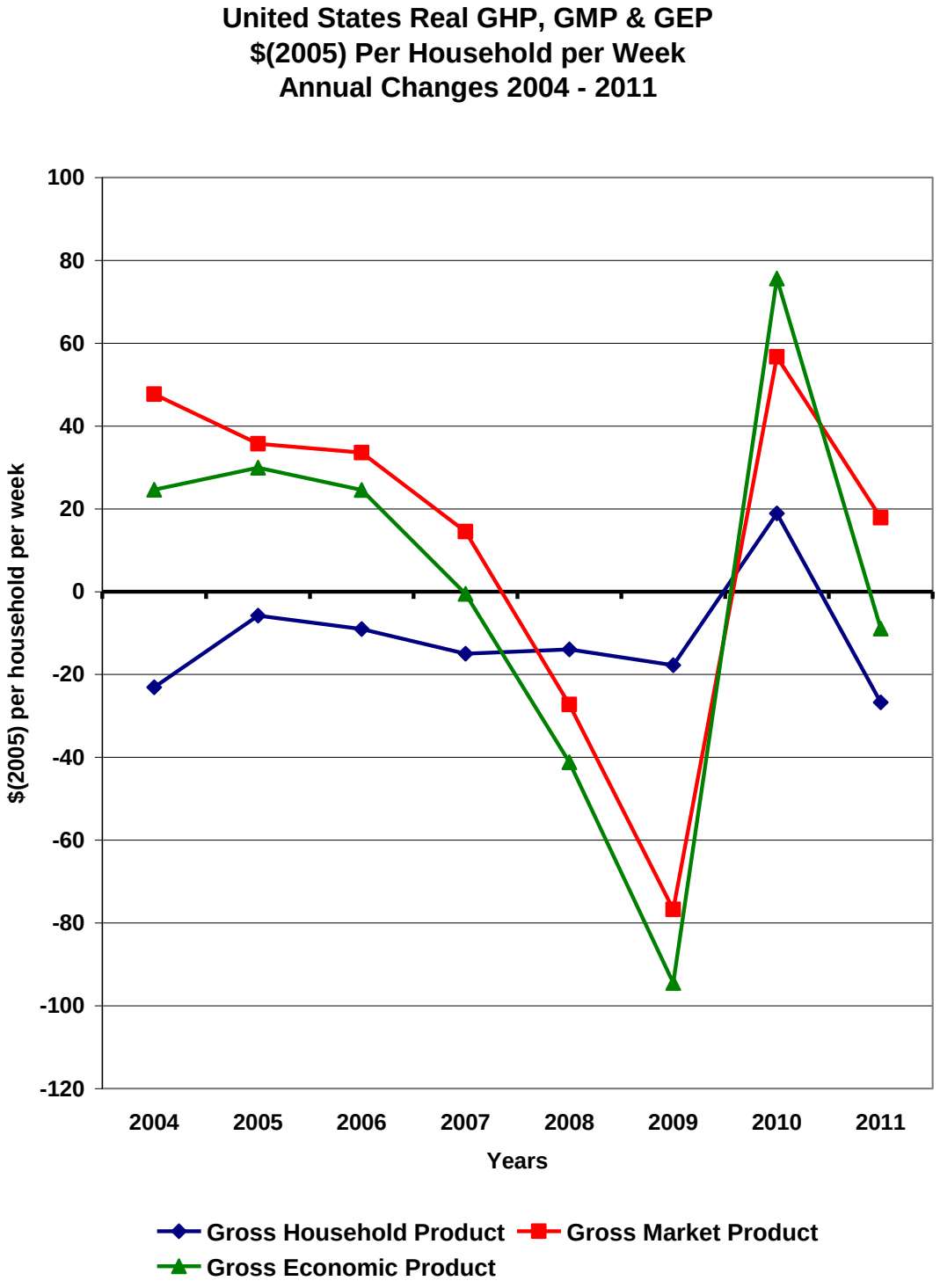

Figure 4 Changes in GMP. GHP and GEP, United States, $(2005) per household per week

12 The effects of the Great Financial Crisis on the components of Gross Household Product

Can we dig deeper into the estimates to more clearly understand why the hypothesis of a counter-cyclical rise in GHP did not take place? Perhaps the movements in the components of GHP will provide some answers.

Table 9 shows our estimates of these seven components of Gross Household Product for the United States for each of the years 2003 to 2011. The data are in constant 2005 dollars per household per week.

The economic reasoning behind the original (1989) hypothesis is that, in an economic downturn of the market economy, with less money income, households would save spending on items such as meals in restaurants, holidays in hotels and motels and hired child care. This would nevertheless be made up by more home prepared meals, more nights at home and more unpaid child care. Also, with less time in paid work, households would have more time for these categories of household production.

A graphical illustration of the course of the various components of US GHP before, and especially during, the GFC is provided by Figure 5 using the data from Table 9.

"Accommodation", with a contribution to GHP greater than $600 per household per week, is the largest component of household production. Over the period the value of Accommodation was fairly constant at approximately $629 per household per week over the six years 2003 to 2008. However, it rose to $634 in 2009, $636 in 2010 and $633 in 2011 (See Table 8 and Figure 5)

Hence we conclude that household production **increased** during the GFC for accommodation. This category supports the initial hypothesis.

The third largest component of GHP is "Transport" – motorized personal transport households provide by driving their own vehicles. "Transport" contributes more than $300 per household per week to United States GHP. Our estimates show a significant fall in the value of "Transport" in GHP from $344 per household per week in 2007 to $319 per week in 2008 and $321 in 2009. After another fall to $319 in 2010 there was a recovery to $332 in 2011.

One of the smaller components of GHP is "Clean clothes" which includes the capital and labor involved in maintaining a fresh daily supply of clean clothes to all household members. From 2003 to 2007 this contributed around $120 per household per week to GHP. In 2008 this fell to $110 per week and to $103 in 2009. Although it increased to $110 in 2010 it fell again in 2011 to only $102.

Thus we conclude that household production of transport and laundry **decreased** significantly in the GFC. These categories are pro-cyclical and hence are against the initial hypothesis.

The second largest component of GHP is "Care" – the care of children, handicapped and elderly adult household members. In the first years of the period care GHP has a

general downward trend with values of more than $500 per household per week; then there are two years (2009 and 2011) below $500. However, 2008 was $526 and 2010 was $518.

The fourth largest component of GHP is “Meals & snacks” with an average around $200 per week. “Meals & snacks” was on downward trend from $208 in 2003 to reach $199 per week in 2008. In 2009 this rose a little to $203 but continued on its downward trend to $197 in 2010 and $191 in 2011 (See Table 8 and Figure 5).

Although there were some changes in household production of volunteering and education during the GFC, these changes did not appear to be related in a systematic way to the GFC.

The decline in household motorized transport seems to be driven by two factors – (i) the decline in the volume of paid work in the market economy which would simultaneously result in a decline in the volume of trips driving to and from home to work; and (ii) with less income available other personal transport journeys to visit friends, go to recreational activities or even to go shopping would be reduced as an economy measure.

The decline in household laundry (clean clothes production) seems to be similarly related to the two factors involved in personal transport. The need for clean, ironed shirts for work would be reduced and similarly for the need for clean clothes for other away-from-home activities.

The transport and laundry decreases approximately balanced the accommodation increases, so we find the GFC had little effect on total GHP. In the four years 2003 to 2007 total GHP in the US declined on average per year by $14.8 per household per week in constant 2005 dollars. In 2008 and 2009 the decline was $15.7 per year.

Consequently, our current hypothesis that there would be a counter-cyclical rise in household production in the United States to offset the fall in market production during the recent GFC is disproved by our estimates.

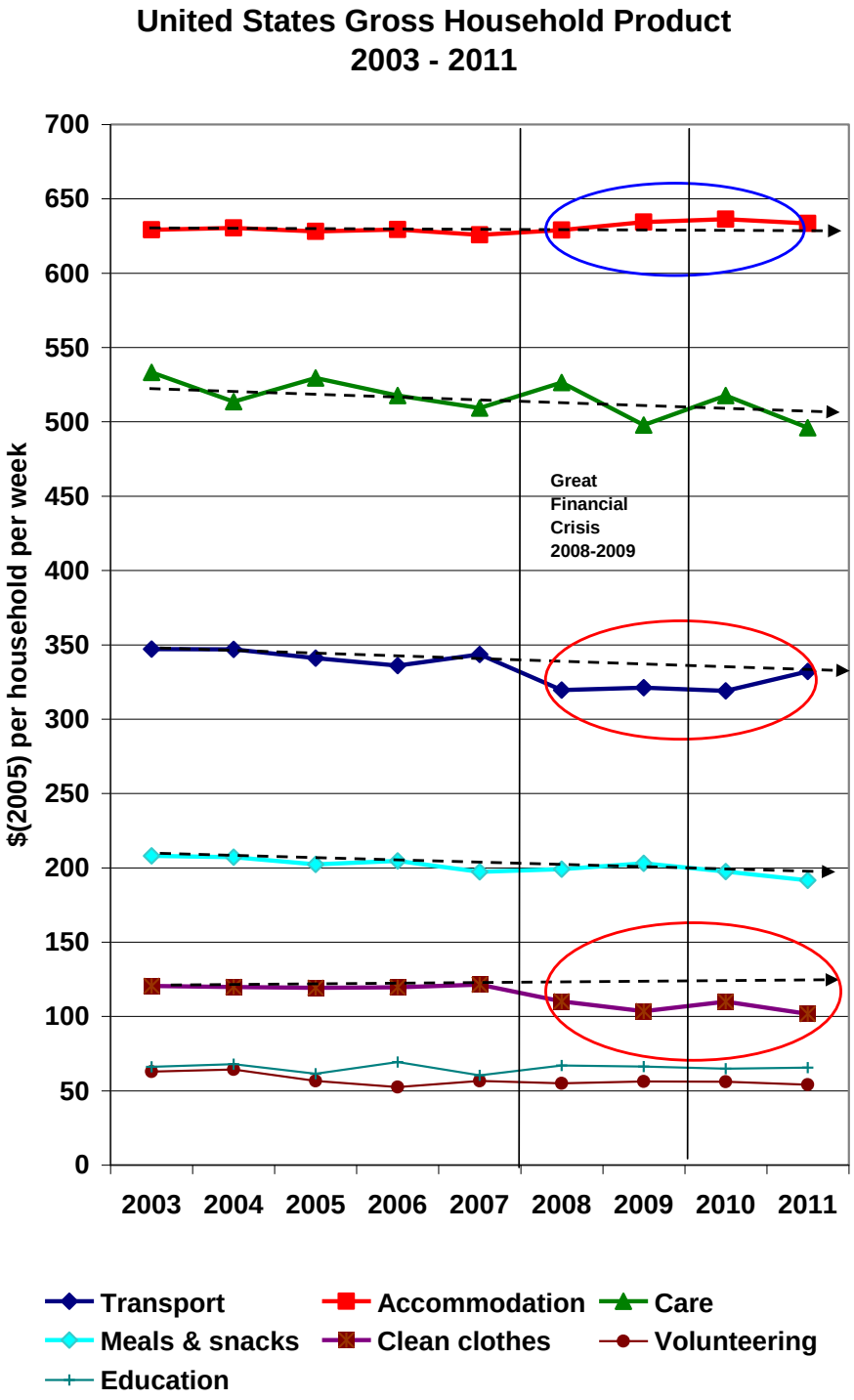

Figure 5 Gross Household Product, United States, $(2005) per household per week

13 Addendum: Changes in Purchases by US Households in the last Eight Years

Figure 6 shows the changes in real purchases by US households over the years from 2004 to 2011. They are from the Bureau of Economic Analysis National Income and Product Accounts Table 2.4.6U Real Personal Consumption Expenditures by Type of Product, in millions of chained (2005) dollars.

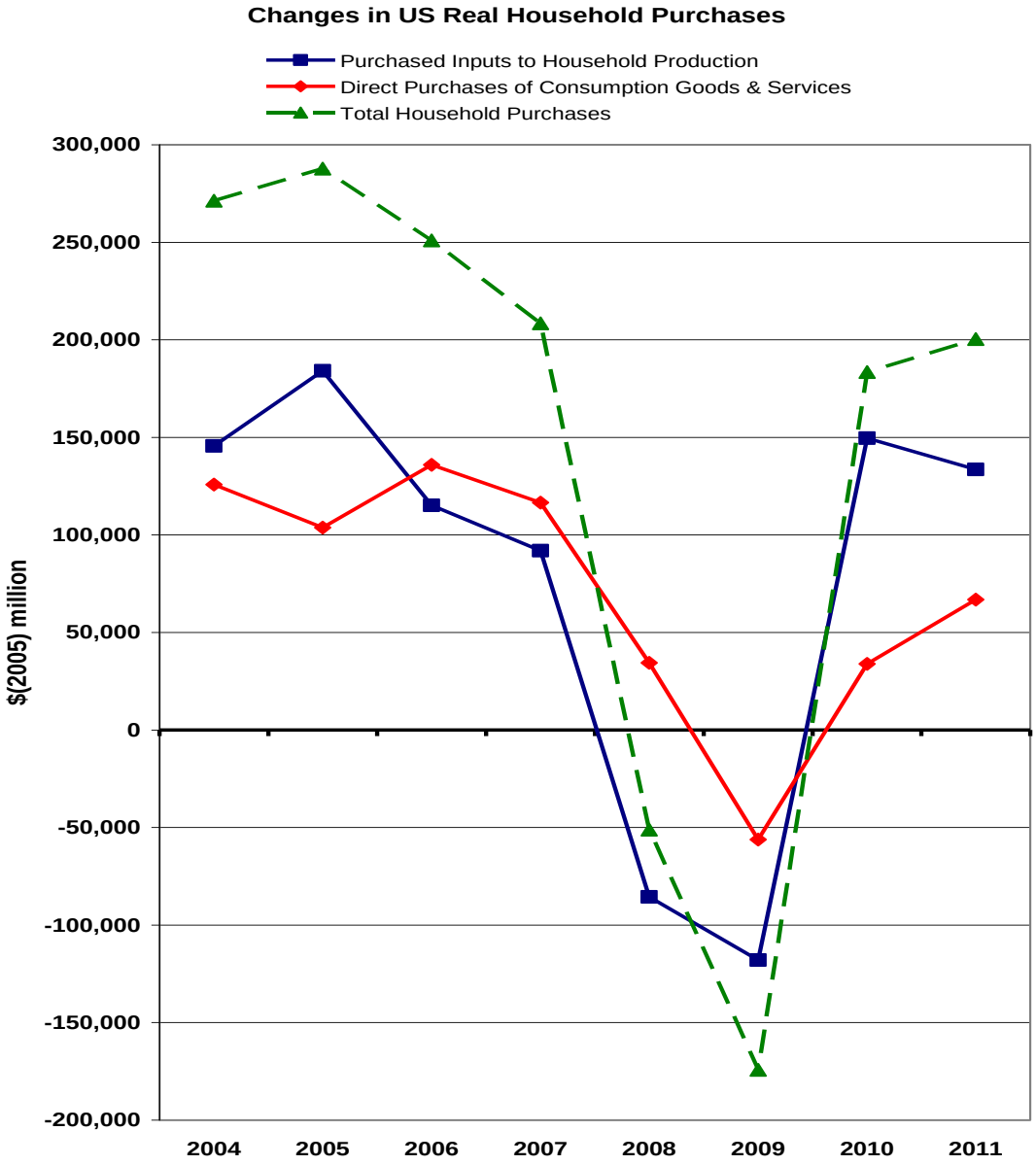

Figure 6 Changes in Household Purchases, United States, $(2005) million

We have allocated the NIPA data on purchases by US households into two categories (1) Purchased Inputs to Household Production (such as fuel, electricity and household equipment) and (2) Direct Purchases of Consumption Goods and Services (such as restaurant meals, public transportation, health and education services). The details of

the allocations to category (1) are shown in Appendix 2. Category (2) is the remainder of total household purchases.

The green dashed line in Figure 6 shows the dramatic falls in total household purchases in 2008 and 2009 and the recovery in 2010 and 2011.

Although direct consumption purchases fell in 2009, the declines in household production inputs in both 2008 and 2009 were the major factors in the falls in total purchases in those years. Again, the rises in household production inputs were the major factors in the increases in total household purchases in 2010 and 2011.

These data give further support to the hypothesis that household production is pro-cyclical not counter-cyclical.

SOME TENTATIVE CONCLUSIONS

We understand these are the first experimental *output-based* estimates of the value of United States household production.

We offer the following tentative conclusions:

(1) Our output-based estimates are larger than previous *input-based* estimates which rely on market wage rates. For example estimates for 2004 show US Gross Economic Product (GDP adjusted to include GHP) which range from 20 per more than GDP (using minimum wage rates) through 32 per cent more (using specialist wage rates) to 70 per cent more (using the average wage for all workers) (Landefeld, Fraumeni and Vojtech, 2009 Table 6).

Our estimates show GEP to range from 88 per cent more than GDP in 2003 down to 79 per cent more in 2011.

(2) Our estimates contradict the accepted hypothesis that the household economy moves in a counter-cyclical way to the market economy. The initial hypothesis (Ironmonger, 1989) was too broad as it failed to take into consideration the different interactions that the components of GHP have with the market economy.

The initial hypothesis needs to be modified to include the more complex relationships that exist between the household and the market.

(3) More resources are needed to improve the quality and the quantity of readily available United States data on the quantities of outputs produced by household production and the prices of market alternatives. In addition, to allow better allocation to the seven categories of household production, some changes could be made in the categories of consumption expenditures by type of product in the National Income and Product Accounts.

Acknowledgements

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Appendix 1

ATUS Category Codes for Household Production Labor Input Hours

Accommodation		
Interior cleaning	020101	020101
Housework nec	020199	020199
Interior maintenance, repair and decoration	020301-020399	0203
Exterior maintenance, repair and decoration	020401-020499	0204
Lawn, gardening and plants	020501-020599	0205
Household management	020901-020999	0209
Other household activities nec	029999	029999
Purchasing household services	090101-090199	0901
Purchasing home maintenance services	090201-090299	0902
Purchasing lawn and gardening services	090401-090499	0904
Purchasing other household services	099999	099999
Travel related to household activities	180280	180280
Travel related to purchasing household activities	180901-180999	1809
Meals and Snacks		
Food and drink preparation	020201	020201
Food presentation	020202	020202
Kitchen and food clean-up	020203	020203
Food & drink preparation, presentation, & clean-up, n.e.c.	020299	020299
Consumer Purchases	070101-079999	07
Travel for Consumer Purchases	180701	180701
Clean Clothes		
Laundry	020102	020102
Clothes maintenance	020103	020103
Care		
Caring for and helping household children	030101-030199	0301
Activities related to household children's education	030201-030299	0302
Activities related to household children's health	030301-030399	0303
Caring for household adults	030401-030499	0304
Helping household adults	030501-030599	0305
Caring for and helping non household children	040101-040199	0401
Activities related to non household children's education	040201-040299	0402
Activities related to non household children's Health	040301-040399	0403
Travel related to caring/helping household children	180381	180281
Travel related to caring/helping household adults	180382	180382
Travel related to caring/helping non household children	180481	180481
Secondary time spent on household and non household children < 13	TRTCCTOT	TRTCTOT
Transport		
Trips by car/truck/motorcycle as driver	Constructed variable using the location variable in the episode file TEWHERE =12	
Volunteering		
Volunteer Activities through Organisations	150101-159989	15
Travel for Volunteer Activities through Organisations	181501-181599	1815
Volunteer Activities to other households -support for adults	040401-049999	04
Travel for Volunteer Activities to other households -support for adults	180482	180482

Education

Education Activities	060101-069999	06
Travel for Education Activities	180601-180699	1806

Appendix 2

Allocation of NIPA Categories of Real Household Purchases to Capital and Intermediate Inputs to Household Production

NIPA Table 2.4.6U Details

Line number	Series Name D---RX	Category Name
Intermediate Inputs		
71	FXA	Food and beverages purchased for off-premises consumption
112	MFL	Motor vehicle fuels, lubricants, and fluids
115	FUL	Fuel oil and other fuels
129	HOU	Household supplies
136	OPH	Hair, dental, shaving and miscellaneous personal care products except electrical products
137	COS	Cosmetic/perfumes/bath/nail preparations and implements
161	UTL	Household Utilities
188	VMR	Motor vehicle maintenance and repair
194	PFT	Parking fees and tolls
266	FIN	Net household insurance
273	TIN	Net motor vehicle and other transportation insurance
321	HHM	Household maintenance
Capital inputs - dwellings and land		
156	OWN	Imputed rental of owner-occupied nonfarm housing
159	FAR	Rental value of farm dwellings
Capital inputs - equipment and vehicles		
4	MOT	Motor vehicles and parts
21	FDH	Furnishings and durable household equipment
36	REQ	Recreational goods and vehicles
60	ODG	Other durable goods
102	CLO	Clothing and footwear
124	REI	Recreational items
138	EAP	Electric appliances for personal care

The items have been allocated as follows:

Intermediate Inputs		
Accommodation	m1	= 115+129+136+137+161+266+321
Meals	m2	= 71
Transport	m5	= 112+188+194+ 273
Capital Inputs		
Accommodation	k1	= 0.5*(21+36+60+124+138) +156+159
Meals	k2	= 0.2*(21+36+60+124+138)
Clean clothes	k3	= 0.1*(21+36+60+124+138) +102
Care	k4	= 0.2*(21+36+60+124+138
Transport	k5	= 4

Appendix 3
Sources for Estimates of Output-Input Coefficients

Accommodation coefficient
The accommodation estimate that 98 per cent of bed nights are spent at home or in another home is based on a small survey of households in Melbourne (Households Research Unit, 2005). This showed 94.3 per cent were spent in own home, 4.4 per cent in another home and only 1.3 per cent were spent in commercial accommodation. Children spent the highest proportion of nights in another home (6.3%) and men spent the highest proportion in commercial accommodation (2.0%). Because our Melbourne survey did not include all the major holiday periods, we have used 2.0 per cent as our best estimate of the proportion of nights spent in commercial accommodation for a complete year.

Meals and snacks coefficient
Analysis of the ATUS eating episodes by location and time of day revealed that American adults reported on average only 2.7 breakfasts, 1.3 lunches, 3.5 dinners and 1.9 snacks at home per week! It seems to us that at home eating episodes were grossly under-reported in ATUS.

Consequently, our meals and snacks estimates are based on our judgment that in an average week household residents (including children) ate at home (or at another home) 5.6 breakfasts, 3.5 lunches, 5.25 dinners and 10.5 snacks. Using the average of 2.58 persons per household, we obtain an estimate of 37.0 meals and 27.1 snacks per household per week; a total of 64.1 meals and snacks. On average there were 16.5 hours per household week spent in meals and snacks preparation (including shopping). This gives an output-input coefficient of 3.88 items per hour.

Clean clothes coefficient
The number of clothing items laundered at home is based on the personal consumption diaries from the 2005 Survey of Daily Living in Melbourne. Households laundered 33.2 items per person per week for both adults and children. For the average US household of 2.56 persons this equates to 85.67 laundry items per household per week. On average there were 2.9 hours per household week spent in laundry and clothes care. This gives an output-input coefficient of 29.56 items per hour.

Care coefficient
The ATUS data show that 97.6 per cent of the input time of care was for care of children and 2.4 per cent was for care of adults. The data do not record the hours of care received. The coefficient of 1.26 hours of care received for every hour of care given is based on estimates for Australia in 1997. These show households input 188.3 million hours per week to provide 237.5 million hours of child care (Ironmonger, 2004 p. 104).

Transport coefficient
This coefficient is a very well known concept, the average speed of a vehicle, miles per hour (mph). Based on the 2009 US National Household Travel Survey (Santos,

McGuckin, Nakamoto, Gray and Liss, 2011) and the 2009 ATUS hours of driving the average speed was 28.66 mph.

Volunteering and Education coefficients

For these items the output hours are simply equal to the input hours.

Appendix 4
Sources for Estimates of Output Prices

These estimates are the output prices in the year 2005. This year is used because the constant price estimates of the United States national accounts are in 2005 dollars.

Accommodation price
A survey of some 17,251 chain hotels/motels found the average daily per person rates in 2005 for economy/budget prices per night ranged between $47 and $54, an average of $50.50 (Kalnins, 2006). We have discounted this by 20 per cent to allow for longer term stay to an average of $40.40 per person per night.

Meals and snacks price
A United States Department of Agriculture Statistical Bulletin gives the average cost with tip per meal/snack of commercially prepared meals away from home over the years 1982 to 1989 (Dumagan and Hackett, 1995). We have updated these prices to 2005 using the Consumer Price index increase for meals away from home. This gives the following: Breakfast $4.48, Lunch $5.66, Dinner 8.96, Morning snack $2.28 and Afternoon/Evening snack $2.91. Based on our earlier estimates of the numbers of these types prepared and eaten at home the overall average price in 2005 is $4.84 per meal and snack.

Clean clothes price
Household laundry consists of a wide range of garments from handkerchiefs, socks, singlets, bras, underpants, blouses, t-shirts, pyjamas, and nighties to sweaters, trousers, and skirts. According to information from laundry service companies in the United States the current (2011) prices for wash, dry and fold laundering show a range of prices from $1.25 to $1.65 per pound weight or from $25 to $35 per load. Prices for laundering shirts ranged from $1.25 to $2.50 an average price of $1.875 per shirt. We did not find prices for other typical laundry items. However, we consider the average commercial price for laundering the wide range of both adult and child sized garments would be approximately 80 per cent of the shirt price, $1.50. Allowing for inflation we estimate the average price in 2005 was $1.33.

Care price
US hourly rates of pay for nanny and aupair services in 2011 range from $8.17 to $17.11 (ordinary time) to $9.91 to $24.41 (overtime) (PayScale Inc, 2012). Assuming that one fifth was at overtime rates and that the mean was 10 per cent above mid-range point we estimate the 2011 rate was $14.89 per hour. Data on average earnings of non-supervisory employees in private other services industries (US Bureau of Labor Statistics, 2012b) was $17.32 per hour in 2011 and $14.34 in 2005, 82.79 per

cent of the 2011 rate. Using this movement in rates we estimate an hourly nanny rate for care in 2005 as $12.32

Transport price
A survey for 23 US cities showed an average mileage charge of 30 cents per mile with a flag-fall (initial charge) of $2.36 and the total average trip cost of $14.45 (Schaller Consulting, 2006). This works out to an average journey of 40.3 miles and the total charge thus 35.86 cents per mile. This calculation ignores any wait time charges which average $21.52 per hour. With our estimate of an average speed for cars of 28.66 mph this gives an average taxi trip time of 84.4 minutes.

Against this we have from the Melbourne Time Accounts (Ironmonger, 2008) the average trip time for a household car driver in 2005 was only 19.0 minutes and the average trip distance was only 7.5 km which is 4.66 miles. The cost of this distance by taxi would be flag fall $2.36 plus 4.66 times 30 cents = $3.76 (80.69 cents per mile). Including an estimated average wait time of 3 minutes per trip (cost $1.076) the total cost is 103.74 cents per mile.

Volunteering price
Volunteering covers the provision of a range of services to people in other households either directly or through organizations. Data on average hourly earnings in 2005 for non-supervisory employees in private industries (US Bureau of Labor Statistics, 2012b) was $16.71 in education and health, $14.34 in other services and $9.38 in leisure and hospitality. We have used the simple average of these three hourly rates ($13.48) as an estimate of the appropriate market wage rate for volunteering services.

Education price
The hourly wage rate for entry-level high school graduates in 2005 was $11.40 (Mishel, 2012). This was 2011 dollars so we adjusted by the movement in the US CPI (US Bureau of Labor Statistics, 2012a) to give a price of $9.90 per hour for education time.