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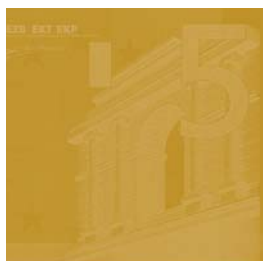
**DURABLE GOODS AND  
THEIR EFFECT ON  
HOUSEHOLD SAVING  
RATIOS IN THE EURO AREA**

by Jukka Jalava  
and Ilja Kristian Kavonius



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# DURABLE GOODS AND THEIR EFFECT ON HOUSEHOLD SAVING RATIOS IN THE EURO AREA <sup>1</sup>

by Jukka Jalava <sup>2</sup>  
and Ilja Kristian Kavonius <sup>3</sup>



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**Abstract**

The purpose of this paper is to estimate the impact of capitalising durable goods on the Euro area household saving ratios and disposable incomes for the first time. The reason for this exercise is twofold. Firstly, it is generally accepted that individual households regard consumer durables as assets even though they are not treated as such in the System of National Accounts 1993. Secondly, the issue is related to the definition of household saving ratios. For instance, the U.S. Federal Reserve Board publishes three household saving measures. The main difference between these saving ratios is that one is derived by treating expenditure on consumer durables as investments while the other ones are compiled by considering them to be household final consumption expenditure. We find that the effect of capitalising consumer durables on EA saving ratios is moderate. The impact is lower than it is in the US.

**JEL classification:** E21, E22

**Key words:** durable good, asset, saving ratio, disposable income, user cost

## Non-Technical Summary

The purpose of this paper is to estimate what the impact of treating consumer durable goods as investments is on the euro area household saving ratios and disposable incomes. The System of National Accounts 1993 (SNA93) does not treat consumer durables as investment goods, even though they are generally regarded by individual households as such. The idea of treating durables as investments has been discussed for many years. This accounting practice has also been suggested to be changed during the currently ongoing SNA update. The proposal was rejected because it was argued that the issue entails a fundamental change of the production and asset boundaries.

Recently Jorgenson and Landefeld (2006) have recommended that consumer durables be both treated as investments and that this should be reflected in GDP. Also Hulten (2006) relates capital to such expenditure that is made in order to increase or maintain future consumption in contrast with current consumption. The US Bureau of Economic Analysis already treats consumer durables as investments in their capital stock calculations (but does not record the impact of this treatment in GDP). In the US there are actually three alternative measures of personal saving: the National Accounts measure and two versions of flow of funds measures. The broader flow of funds measure includes net investment in consumer durables, net flows of government insurance and pension fund reserves, and net saving by farm corporations as the narrower does not include these items. The fact that the US uses different official saving ratios highlights the importance and usefulness of this kind of analysis; this paper seeks to extend this approach for the first time to the EA.

The result of this paper is that treating expenditure on consumer durables as investment increases the saving ratio in the EA between 1.0 and 1.8 per cent (the effect varies a lot between Member States from year to year and in some Member States it affects as much as 5 percentage points of household saving in certain years). This is lower than in the US, where the effect has been estimated to vary from 1.0 to 3.0 per cent. In the US as well as in the EA this figure is relatively constant over time. While the effect on the growth rate of household disposable income is unremarkable, the level of disposable income nevertheless increases by around 2.3 per cent and the growth of disposable income decreases annually around 0.5 percentage points. The effect on the growth rate of disposable income is actually surprisingly large considering that the effect on the level is modest.

What is the analytical meaning of this kind of exercise? Fiscal and especially monetary policy makers follow saving ratios. The Federal Open Market Committee systematically refers to saving ratios in their statements and/or minutes. According to the economic analysis pillar of the ECB's monetary policy the Eurosystem uses a broad range of economic and financial indicators in order to assess the outlook for price developments and the risks to price stability. If households even partially interpret durable goods in their actual behaviour

as investments, we believe that the saving ratios presented in this paper provide a useful complementary picture on households' behaviour. Consumer durables could be both treated as investments and the impact of this change on GDP recorded in the national accounting framework, either in the actual core accounting system or in separate satellite accounts as proposed by the ISWGNA. Thus, these kinds of alternative saving ratios could be used as aids for decision-making.

## 1. Introduction

The purpose of this paper is to estimate the impact of the capitalisation of consumer durable goods on the euro area (EA) countries and the EA household saving ratios and disposable incomes. The reason for undertaking this exercise is twofold. Firstly, the System of National Accounts 1993 (SNA93) does not treat consumer durables as assets, even though they are generally regarded by individual households as such. The idea of capitalising consumer durable goods in the current SNA93 has been discussed for many years.<sup>2</sup>

This treatment has also been suggested to be considered to be changed during the currently ongoing SNA update. The proposal was rejected because it was argued that the issue entails a fundamental change of the production and asset boundaries. However, the Inter-Secretariat Working Group on National Accounts (hereafter: ISWGNA) proposed to record capitalised consumer durable goods in the satellite accounts. Moreover the group recommended showing consumer durable goods as a memorandum item in the balance sheet but not in the totals of non-financial assets.<sup>3</sup>

The US Bureau of Economic Analysis already treats consumer durables as fixed assets in their capital stock calculations but does not include the services of these durables in GDP. Recently Jorgenson and Landefeld (2006) have recommended that consumer durables be both treated as assets and their services included in GDP. Also Hulten (2006) relates capital to such expenditure that is made in order to increase or maintain future consumption in contrast with current consumption.

Secondly, the method of measuring of household saving ratios in the EA does not take into account the actual behaviour of households. This can be contrasted with the practice in the US where three alternative measures of personal saving are presented: the National Income and Production Accounts (NIPA) measure and two versions of flow of funds measures. The broader flow of funds measure includes net flows of government insurance and pension fund reserves, net investment in consumer durables and net saving by farm corporations as the narrower, which is conceptually line with the NIPA concept, does not include these items. The fact that the US uses different official saving ratios highlights the importance and usefulness of this kind of analysis; this paper seeks to extend this approach for the first time to the EA.

The result of this paper is that treating expenditure on consumer durables as investment increases the saving ratio in the EA between 1.0 and 1.8 per cent. This is lower than in the US, where the effect has been

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<sup>2</sup> An overview of the discussion is provided in various articles of: Jorgenson, Landefeld and Nordhaus (2006).

<sup>3</sup> See: Harrison (2006).



estimated to vary from 1.0 to 3.0 per cent.<sup>4</sup> In the US as well as in the EA this figure is relatively constant over time. In the EA there is considerably more variation between individual EA countries, depending on the capital stock and the price development of the individual goods. While the effect on the household disposable income growth rate is unremarkable, disposable income nevertheless increases by around 2.3 per cent.

This paper is structured as follows. Section 2 provides a theoretical background, comparing the approach taken in this paper to official national accounting methodology (SNA93). This section also summarises the steps which will be taken in the estimation procedure part of the paper. Section 3 addresses the question of data availability and presents the estimation procedure for different components. Section 4 describes the results of this paper. Finally, section 5 draws some conclusions.

## 2. Theoretical background

In the case of goods, the SNA distinguishes between durable and non-durable. This distinction is not based on physical durability as such, but rather on whether the goods are used once only, or whether they are used repeatedly or continuously. A consumer durable good is thus defined as one, which may be used repeatedly or continuously over a period of more than a year, assuming a normal or average rate of physical usage.<sup>5</sup>

In practice, the SNA93 measures household consumption only by expenditure and acquisitions. Household consumption of durables is treated as “other household consumption”. Thus it is “commonly” assumed that the consumption of durables does not increase households’ consumption possibilities in the future.<sup>6</sup> This means that durable goods are already consumed in the “use of disposable income account” and therefore diminish saving. They are definitely not considered as an investment in the “capital account” (where they would not diminish saving). Additionally, if they were classified as an investment, they would provide a service or an income flow to the household.

To recognise households’ repeated use of durables, this article extends the production boundary by postulating that these durables are gradually used up in hypothetical production processes whose outputs consist of services. These services are then recorded as being acquired by households over a succession of time periods.<sup>7</sup>

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<sup>4</sup> See: Reinsdorf 2007. However, for instance Audenis, Grégoir and Louvot (2002) have estimated this effect far larger than Reinsdorf and the authors of this paper, varying between 8 and 11 per cent. Please also note that the estimation of this paper has been revised compared to the version of this paper presented in the IARIW-conference 2006.

<sup>5</sup> SNA93, paragraph 9.38.

<sup>6</sup> See: SNA93, paragraph 9.40.

<sup>7</sup> Ibid.

Housing, on the other hand, is classified as an investment in the SNA93. Investment in housing increases future consumption possibilities, because housing investment produces a stream of housing services over time. This kind of stream of services could similarly be estimated for consumer durable goods; however, the SNA treats these as consumption on the grounds that this kind of household production is outside the scope of GDP.<sup>8</sup>

This is arguably inconsistent as many durables (such as cars or different kinds of machines) do create a stream of services. In this paper we attempt to estimate the effect of this treatment in the EA countries.<sup>9</sup> We also estimate the effect using an identical, systematic method for all the EA countries, and additionally analyse why the effect may vary between countries. Our analysis is based on the theoretical concept of capital services based on the concept of productive capital as originally formulated by Jorgenson and Griliches (1967). The flow of capital services can be perceived as representing the services of fixed capital analogously to labour representing the services of human capital in production. Each of the vintages of the capital stock is converted into a standard “efficiency” unit; i.e., productive capital stocks (see OECD, 2001).<sup>10</sup> When multiplying the user cost of capital<sup>11</sup> with the productive capital stock the cost of capital services is obtained (see also Schreyer, Diewert and Harrison, 2005). This procedure, as will be shown later, is also how we calculate the output of consumer durables.

According to SNA93 capital stock measures are needed in the production account and for balance sheets. In the national accounts there are two measures of capital stocks: the gross capital stock and the net capital stock. The gross capital stock (GCS) is the value of the capital used in production, valued at “as new” prices, i.e. regardless of age or actual condition, at a certain point of time. GCS consists of the value of the cumulated past investments less the cumulated retirements of fixed assets. A capital good is retired from the capital stock when its service life expires. The gross capital stock does not take into account the possible decline in the capital good's productive capacity as it ages. Net capital stock (NCS) is the market value of the capital in use. The net value of the capital good is defined as the current purchaser's price of a new asset of the same type less the cumulated consumption of fixed capital.<sup>12</sup> The NCS is used to compute consumption of fixed capital according to SNA93. Consumption of fixed capital computed as stipulated by the SNA93 is the difference between gross value added and net value added (or GDP and NDP). Furthermore, consumption of fixed capital has an impact on gross output only in the case of non-market production. This is not the case with capital services calculated as productive capital stocks times their user costs where

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<sup>8</sup> See: Perozek and Reinsdorf 2002.

<sup>9</sup> Some papers have already discussed this topic, and it has been assumed that in some EA countries, the effect on the saving ratio would be smaller than in the US. See for instance: Audenis, Grégoir and Louvot 2002; Katz 1983. Additionally, the role of durables has also been investigated in some countries from the household wealth point of view. See for instance: Aron and Muellbauer 2006. Additionally, alternative saving ratios are presented for instance in: ABS, 2002 and Reinsdorf and Yan, 2002.

<sup>10</sup> This is done with equation 4 in section 3.4.

<sup>11</sup> See equation 2 in section 3.2.

<sup>12</sup> SNA93, para. 6.199.

capital services (including consumption of fixed capital) are calculated in an integrated way that ensures full coherence of the accounts.<sup>13</sup>

As already mentioned in the introduction, there are various ways and statistics to measure household saving. In this paper we base our analysis on the institutional sector accounts, and thus the saving ratio is defined as the ratio between the following economic transactions:

$$(1) \quad \text{Net household saving (B8)} / [\text{Net household disposable income (B6)} + \text{Adjustment for the change in equity of household pensions funds (D8)}]$$
$$=$$
$$\text{Net household saving (B8)} / [\text{Net household saving (B8)} + \text{Household final consumption (P3)}]$$

To estimate a household saving ratio for the EA countries adjusted for capitalised consumer durables and based on sector accounts, the following steps must be taken<sup>14</sup> (these steps are illustrated in a numerical example in Table 1):

- Expenditure on the purchase and maintenance of consumer durables must be deducted from household final consumption expenditure.
- The imputed rental value for consumer durables must be added to household final consumption expenditure.
- The imputed rental value for consumer durables less maintenance costs and taxes on production and imports (which include vehicle registration charges) must be added to the gross operating surplus of households.
- Households must deduct motor vehicle registration charges from other direct taxes payable.
- Expenditure on the purchase of consumer durables must be added to gross fixed capital formation.
- Consumption of fixed capital for consumer durables must be included in the consumption of fixed capital for households.

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<sup>13</sup> We thank an anonymous referee for pointing this out. See also Schreyer, Diewert and Harrison (2005).

<sup>14</sup> See: Harvey 2003.

**Table 1. Numerical example on the calculation of the durable goods' effect on saving**

P1	Output	472
P2	Intermediate consumption	0
K1	Consumption of fixed capital	342
D29	Other taxes	19
$B2 = P1 - P2 - K1 - D29$	Operating surplus (imputed rents)	111
$B2G = B2 + K1$	Operating surplus, gross (imputed rents)	453
B6	Old disposable income	3,997
D29	Other taxes	19
$B6 = B6 + B2 + D29$	New disposable income	4,127
P31	Consumption expenditure	3,666
P31D	Durable goods	411
$P31 = P31 - P31D + B2G$	New consumption expenditure	3,708
D8	Adjustment for the change in net equity in households pension funds reserves	45
$B8N = B6N - P31 + D8$	New saving	464

Source: authors' calculations. Underlying data: ECB.

### 3. Data availability and estimating procedure

This section addresses two main aspects: available and used data (sub-section 3.1) and the estimation procedure of output, intermediate consumption and taxes, and consumption of fixed capital (sub-sections 3.2-3.4).

#### 3.1. Available and used data

Data in Table 8 of the ESA95 transmission programme include non-financial accounts by institutional sector.<sup>15</sup> Luxembourg and Ireland do not compile sector accounts, and therefore cannot be included in the analysis. Moreover, some EA Member States compile statistics where the household sector and non-profit institutions serving households are treated as one sector. Therefore, non-profit institutions serving households are also included in the household sector in this analysis. This obviously ensures better comparability between Member State estimates. At the end of May 2006, the ECB and Eurostat published for the first time institutional sector accounts for the EU25 as well as for the euro area. This paper also includes these euro area estimates.<sup>16</sup>

Household consumption estimates broken down by goods are available for each EA Member State. This data is the so-called Table 5 of the ESA95 transmission programme. These series normally begin at the end of the 1980s. In order to estimate the consumption of fixed capital and the other necessary flows and stocks when

<sup>15</sup> See: Questionnaire ESA95, Tables, Eurostat.

<sup>16</sup> More information and the data can be found for instance at: <http://www.ecb.int/press/pr/date/2006/html/pr060531.en.html>



capitalising consumer durables, we have limited our analysis to the period 1999-2003.<sup>17</sup> In addition, with the aim of maintaining consistency between the Member State and EA price indexes, we have calculated an alternative price index for the EA by using Member State implicit price indexes. The reason for this is that due to different timing with regards to introducing chain linking, the EA price indexes differed from the aggregation of the Member State ones. The price indexes for each group of EA consumer durables were aggregated from the Member States' deflators using Törnqvist weights.<sup>18</sup> These price indexes were then used to deflate the current price series to obtain estimates in constant prices for the euro area.

There is however a problem using Table 5 data of the ESA95 transmission programme. First, the data are too aggregated in order to distinguish durable goods from non-durable ones. Therefore, certain assumptions had to be made when these data were used (see later in this article for more details). Slightly more detailed data than data from Table 5 of the transmission programme would be available in supply and use tables, but unfortunately the series only begin in 1995 or even later. Thus, the series would be too short to compile capital stocks that are a necessary intermediate step in estimating the consumption of fixed capital. In addition, extrapolation of the supply and use table series is not reasonable because the applied classifications in the two data sets are different. Table 5 data are classified using the COICOP<sup>19</sup> classification, whereas supply and use tables are classified using the CPA<sup>20</sup> classification. The durables have been separated from Table 5 aggregates as described in Section 3.4.

Harchaoui and Tarkhani (2004) have capitalised consumer durables in order to calculate the effects of consumer durables on productivity and GDP in Canada. They use a more detailed classification than we did for private consumption in order to classify durable and non-durable goods. This is certainly easier when focusing on only one country, but much more difficult for international comparisons, because the databases maintained by either international or European organisations do not currently include more detailed data on private consumption. The level of detail used in this paper is the most disaggregated level at which the European aggregates are available.

For car registration fees, no consistent source for all of the countries was available. Therefore, three different sources and estimation methods were used. Finland, Greece and the Netherlands provided data directly. Austria, Belgium, Greece, Italy, Spain and Portugal have their data in Eurostat's New Cronos database. The latter is recorded under the ESA95 transmission code D241 "Car registration fees". New Cronos data are used as primary data. However, when New Cronos data are not available, the data delivered by countries

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<sup>17</sup> Non-financial accounts by institutional sector for Europe are available only from 1999 onwards. This an additional reason not to go beyond 1999 in the analysis. Moreover, when the calculations were done some MSs had not delivered their Table 5 data of the ESA95 Transmission Programme after statistical year 2003. This was the reason to limit the analysis to 2003.

<sup>18</sup> That is, the weights were the arithmetic averages of year  $t$  and year  $t-1$  nominal shares.

<sup>19</sup> COICOP stands for Classification of Individual Consumption by Purpose Adapted to the Needs of Harmonized Indices of Consumer Prices (2000). See <http://europa.eu.int/comm/eurostat/ramon/>

have been used. There was however a level difference between the data delivered by the countries and that obtained from the New Cronos. For that reason, we considered Eurostat data to be more comparable and consistent between different countries than the data delivered by individual countries. For France and Germany the number of passenger cars was used as a proxy to estimate the amount of car registration fees.

The data used for rates of return are based on the ECB's Monetary Financial Institution (MFI) statistics. The weights for the rates of return were calculated from the Monetary Union Financial Accounts (MUFA). The exact computational procedure will be explained in sub-section 3.2.

### 3.2. Estimation of output

In this paper, consumer durables are treated in the same way as imputed rents in the national accounts. In principle, the logic of capitalising durable goods follows exactly the same logic as imputed rents. The SNA postulates that heads of households who own the dwellings that the households occupy are formally treated as owners of unincorporated enterprises that produce housing services consumed by those same households. As well-organised markets for rented housing exist in most countries, the output of own-account housing services can be valued using the prices of the same kinds of services sold on the market, in line with the general valuation rules adopted for goods or services produced on one's own account. In other words, the output of housing services produced by owner-occupiers is valued at the estimated rental that a tenant would pay for the same accommodation, taking into consideration factors such as location, neighbourhood amenities, and so forth, as well as the size and quality of the dwelling itself. The same figure is recorded under household final consumption expenditure.<sup>21</sup>

The rental markets for durables are not necessarily as well organised as the rented housing market, and thus it is difficult to find prices for similar services. For this reason, the output of rented consumer durables is calculated as a user cost or rental price. This is defined as the rate of return plus depreciation, minus capital gain/loss plus an interaction term:

$$(2) \quad r_t = p_{(t-1)}(q_t + d_t - \pi_t + d_t \pi_t),$$

where,  $r$  is the user cost,  $p$  designates the price index for new capital goods,  $q$  is the net rate of return,  $d$  is the rate of depreciation and  $\pi$  is the holding gain or loss, i.e. the change in prices from time  $t-1$  to time  $t$  (Hall and Jorgenson 1967; Ho, Jorgenson and Stiroh 1999; Diewert, Harrison and Schreyer 2004). The subscript denoting asset type has been suppressed for economy of exposition. The annual price changes were

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<sup>20</sup> CPA stands for Statistical Classification of Products by Activity in the European Economic Community, 2002 version. See <http://europa.eu.int/comm/eurostat/ramon/>

<sup>21</sup> SNA93, paragraph 6.89.

smoothed using a Hodrick-Prescott (1997) filter.<sup>22</sup> The net rate of return was calculated using the exogenous (external), ex-post method as described below.<sup>23</sup>

In previous empirical studies, a variety of different methods have been used to estimate rates of return. Many previous studies have applied debt and equity portions of the value of net stocks applied to borrowing rates in order to calculate rate of return.<sup>24</sup> This paper, in contrast, assumes that households hardly take out any loans to finance their purchases of durable goods. In 2003 the euro area households took EUR 13 billion consumer credits<sup>25</sup> as they were spending EUR 433 billion on durable goods<sup>26</sup>. This means to say that the euro area households bought around three per cent of their durable goods with credit. Debt and borrowing rates are therefore not applicable. Instead, we assume that households pay for durables out of spare income, which would otherwise be invested on the financial markets. This we term the alternative return. The weights of alternative return for durable goods have been calculated from the annual MUFA. Three different categories of assets have been used in the calculation: currencies and deposits, shares, and debt securities (including mutual funds). The returns of the currencies and deposits were calculated by using one-month Euribor (Euro Interbank Offered Rate). The returns of shares were calculated by using the Dow Jones Euro STOXX price index, and finally, the returns of debt securities were calculated by using the three-year euro area Government benchmark bond yield.

This approach can certainly be criticised because it does not take into account household debt, which could be included in this analysis for two reasons. First, one alternative to buying a durable is to repay the debt. However, as mortgage programmes are often fixed, this is not seen as an alternative to buying a durable. Second, it can be assumed that a loan has been taken out to buy a durable. Then the alternative cost would be not paying the interest for the loan. Loans are mainly taken only for vehicles, and hence this argument does not apply to all durables. As mentioned above, the share of durables, which have been bought with loan, is pretty small. Additionally, the published MUFA data do not distinguish mortgages from consumption loans. Therefore, it is rather difficult to make this estimation for the euro area.

The problem of estimating the exogenous, ex-post, rate of return is that due to the bursting of the stock exchange bubble, it is negative in the period 2001-2003. There are several ways to avoid this problem. The rate of return can be defined as for instance a three- or five-year moving average. Alternatively, the series can be smoothed using a filter. Figure 1 presents all these three options. In the final calculations the smoothed rates of return were used where the short-term variation is eliminated by using a Hodrick-Prescott

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<sup>22</sup> The smoothing parameter  $\lambda=100$  was used.

<sup>23</sup> The alternative would have been to use an endogenous, internal, net rate of return. Then capital income would have equalled gross value added less compensation of employees and the imputed income of self-employed.

<sup>24</sup> See Katz (1983) for a rather comprehensive list of different methods used in empirical studies.

<sup>25</sup> European Central Bank 2005, table 2.4.2.

<sup>26</sup> According the estimation procedure presented in table 2.

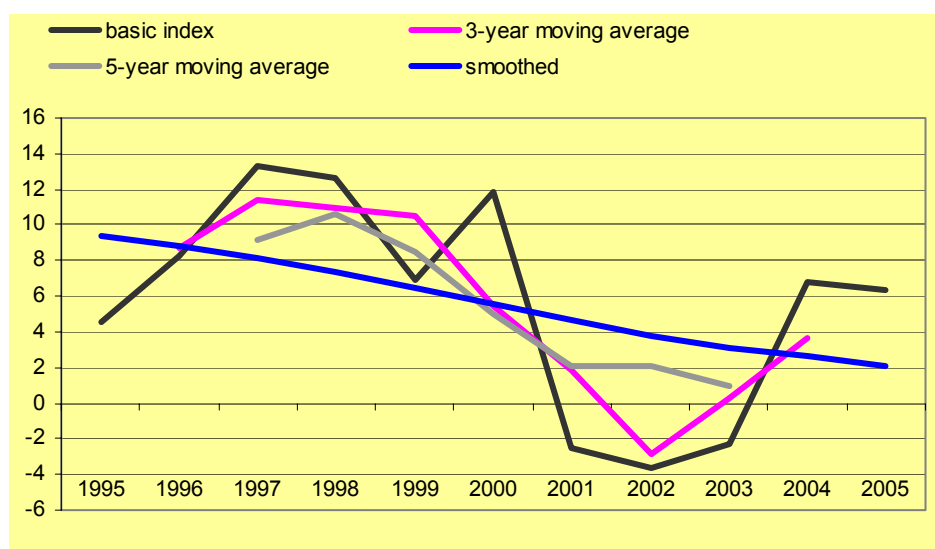
filter. The moving average series have the downside that several observations would be lost. Additionally, as can be seen in Figure 1, the volatility of the moving average series is still high.

The final step needed to calculate the outputs is to multiply the user cost with the constant price average<sup>27</sup> stock of consumer durables in the year in question:

$$(3) \quad cpYCD_t = r_r \overline{SCD}_t .$$

Section 3.4 describes how we calculated the stocks of consumer durables by type of asset.

**Figure 1. Rates of return for consumer durables. Basic index, 3 years moving average index, 5 years moving average index and smoothed index, %.**



Source: authors' calculations. Underlying data: ECB.

### 3.3. Estimation of intermediate consumption and other taxes on production

Theoretically, the maintenance and repair costs of personal vehicles could be included in intermediate consumption. Maintenance costs are indeed included in “operation of personal transport equipment”<sup>28</sup> in the COICOP classification. This group also includes fuels and lubricants for personal transport. Fuels and lubricants cannot be classified as a part of intermediate consumption because this category consists of the value of the goods and services consumed as inputs by a process of production, excluding fixed assets, whose consumption is recorded as consumption of fixed capital.<sup>29</sup> The use of fuel is not involved in the

<sup>27</sup> Year  $t$  and  $t-1$  average since the stock is the year-end situation and the other economic transactions are valued at the average prices of the year.

<sup>28</sup> COICOP code 07.2.

<sup>29</sup> ESA95, 3.69.



actual “renting or production process”, and therefore is counted as private consumption expenditure. This follows a similar logic as in imputed rents, where heating costs are counted as part of private consumption expenditure.

However, by using the transaction detail provided by the ESA95 transmission programme, fuels cannot be separated from maintenance costs. Maintenance costs cover only a small part of the operating cost of personal transport equipment. Owing to this classification problem, this paper assumes that maintenance costs are zero, and thus the intermediate consumption of durable goods is zero as well. Presumably, the estimation error made here is relatively small, since maintenance costs are most likely to be modest in relation to the price of a durable good.

According to the ESA95, other taxes on production (D29) consists of all taxes that enterprises incur as a result of engaging in production independently of the quantity or value of the goods and services produced or sold. Other taxes on production include in particular taxes on the use of fixed assets (vehicles, machinery and equipment) for purposes of production, whether or not such assets are owned or rented.<sup>30</sup> Therefore car registration fees have to be added to taxes on production and deducted from other taxes payable.

As mentioned in sub-section 3.1, there is either data from the New Cronos database or data delivered by the Member States themselves. These data have been used in the estimations when available. For the EA, data are unavailable and, therefore an aggregation of Member State data has been used. Direct data are available for all countries apart from Germany and France, where car registration fees were estimated by calculating average registration fees per car for those countries for which the data were available. Then the number of the registered cars was multiplied with the average value. The stock of passenger cars, i.e. the number of registered cars, was obtained from the International Road Federation’s World Road Statistics 2005.

### **3.4. Estimation of consumption of fixed capital**

Private consumption is divided into services and goods that can be classified durable, semi-durable or non-durable. Unfortunately we lacked detailed data on expenditure on durables. Therefore we used Finnish National Accounting figures from July 2005 of the annual share of consumer durables in each two-digit COICOP consumption group. We took the 1975-2003 average shares in Finland (see Table 2), and multiplied these shares with the national two-digit current price consumption expenditure figures of the other countries, which we downloaded from the ECB’s database. Having also downloaded the national two-digit expenditure figures at 2000 prices, we calculated the implicit price index that was used to deflate the consumer durables into constant prices. For those countries (see the appendix for details) that the time series

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<sup>30</sup> ESA95, 4.29.

did extend as far as 1970 we used the volume of total consumer expenditure for each country to estimate back data; in the case of the euro area we used German volume changes by type of asset.

Having compiled the required consumer durable series in constant prices, we then applied the following perpetual inventory equation to obtain year-end stocks of consumer durables:

$$(4) \quad SCD_t = SCD_{t-1}(1-d) + I_t = \sum_{\tau=0}^{\infty} (1-d)^{\tau} I_{t-\tau},$$

where  $SCD$  denotes stock of consumer durables,  $I$  is investment,  $d$  is the rate of depreciation and  $t$  is time. The symbol for the type of consumer durable has been left out for notational simplicity. The rates of depreciation used can be seen in Table 2.

**Table 2. Depreciation rates by type of consumer durable**

code	asset type	share of asset type durable	depreciation rate	source
<b>C05.1</b>	Furn. and furnish., carpets and oth. floor cov.	95.3 %	0.1179	Fraumeni 1997
<b>C05.3</b>	Household appliances	81.3 %	0.1500	Fraumeni 1997
<b>C05.5</b>	Tools and eq. for house and garden	39.2 %	0.1650	Fraumeni 1997
<b>C06.1</b>	Medical prod., appl. and eq.	35.9 %	0.2750	Fraumeni 1997
<b>C07.1</b>	Purchase of vehicles	100.0 %	0.2720	Jorgenson and Stiroh 2000
<b>C08.1</b>	Postal services	5.8 %	0.1833	Fraumeni 1997
<b>C09.1</b>	Audio-vis., photogr. and inform. proc. eq.	74.6 %	0.1833	Fraumeni 1997
<b>C09.2</b>	Oth. major dur. for recr. and culture	96.3 %	0.1650	Fraumeni 1997
<b>C12.1</b>	Personal care	2.8 %	0.1650	Fraumeni 1997
<b>C12.3</b>	Personal effects n.e.c.	51.4 %	0.1500	Fraumeni 1997

After compiling the stocks of consumer durables the depreciation rates can be computed using the equation:

$$(5) \quad CFC_t = I_t - (SCD_t - SCD_{t-1}),$$

where  $CFC$  denotes depreciation in millions of year 2000 euro. Finally, current price depreciation was obtained by multiplying the constant price depreciations with their respective price indexes.

## 4. Results

### 4.1. Gross rate of return, output and consumption of fixed capital

The gross rate of return is the part of equation 2 within brackets, that is:

$$(6) \quad GRR_t = q_t + d_t - \pi_t + d_t \pi_t.$$

The gross rates of return in the euro area by type of consumer durable can be seen in Table 3. (These have of course also been calculated for the individual Member States, but these rates are not shown here to save space – they can be obtained on request from the authors.) The gross rates of returns are asset-specific and since we are assuming identical net rates of returns for all assets the gross rates of return are in any particular year driven by differences in depreciation rates and asset inflation rates. The highest gross rates of return can be found in groups C06.1 and C07.1, which have also the highest depreciation rates. Over time, however, there is a decline across the board in all gross rates of return. This largely stems from declining net rates of return (see Figure 1).

**Table 3. Gross rates of return for consumer durables in the euro area, 1999-2003.**

	1999	2000	2001	2002	2003
<b>C05.1</b>	18.3 %	17.4 %	16.4 %	15.6 %	15.0 %
<b>C05.3</b>	21.6 %	20.7 %	19.7 %	18.9 %	18.2 %
<b>C05.5</b>	22.9 %	21.9 %	21.0 %	20.2 %	19.5 %
<b>C06.1</b>	34.3 %	33.4 %	32.4 %	31.6 %	30.9 %
<b>C07.1</b>	33.6 %	32.6 %	31.7 %	30.9 %	30.2 %
<b>C08.1</b>	25.0 %	23.9 %	22.9 %	22.0 %	21.4 %
<b>C09.1</b>	24.9 %	23.9 %	23.0 %	22.2 %	21.5 %
<b>C09.2</b>	23.0 %	22.1 %	21.1 %	20.3 %	19.6 %
<b>C12.1</b>	22.9 %	22.0 %	21.0 %	20.2 %	19.5 %
<b>C12.3</b>	21.4 %	20.5 %	19.5 %	18.7 %	18.0 %

Source: authors' calculations. Underlying data: ECB.

**Table 4. User costs of consumer durables in the euro area, 1999-2003**

	1999	2000	2001	2002	2003
<b>C05.1</b>	19.3 %	18.7 %	17.9 %	17.4 %	17.0 %
<b>C05.3</b>	21.7 %	20.9 %	19.9 %	19.1 %	18.4 %
<b>C05.5</b>	23.1 %	22.5 %	21.6 %	21.1 %	20.7 %
<b>C06.1</b>	37.1 %	36.3 %	35.6 %	33.9 %	33.6 %
<b>C07.1</b>	33.9 %	33.2 %	32.6 %	32.2 %	32.0 %
<b>C08.1</b>	24.5 %	22.0 %	20.0 %	18.8 %	18.1 %
<b>C09.1</b>	20.6 %	18.3 %	16.7 %	15.1 %	13.8 %
<b>C09.2</b>	24.0 %	23.6 %	23.0 %	22.7 %	22.3 %
<b>C12.1</b>	24.1 %	23.6 %	23.0 %	22.7 %	22.6 %
<b>C12.3</b>	22.0 %	21.2 %	20.5 %	20.1 %	19.8 %

Source: authors' calculations. Underlying data: ECB.

In order to estimate the output of consumer durables in current prices, we calculated the user cost in Table 4, shown as a percentage price of a new asset, using equation 2. Then we multiplied the user costs with the average constant price stocks of consumer durables by asset type (see Table 5). The major part of the output is consumption of fixed capital for the consumer durables as can be seen in Table 6.

The table shows that there is a shift in the level of total consumption of fixed capital, which comprised 72 per cent of total output in 1999, compared with 85 per cent in 2003. The most rapid relative increase was in asset group C08.1, where the ratio experienced a gain of 17 percentage points owing to fast capital stock growth. The most modest relative increase was in group C06.1, which only gained 9 percentages.

**Table 5. Output of consumer durables in the euro area in current prices in millions of euro, 1999-2003**

	1999	2000	2001	2002	2003
<b>C05.1</b>	129768	127713	124736	122554	120440
<b>C05.3</b>	35929	35657	35124	34936	34778
<b>C05.5</b>	7034	7002	6898	6864	6871
<b>C06.1</b>	21243	21568	21877	21569	22174
<b>C07.1</b>	188398	192460	194128	195127	195538
<b>C08.1</b>	3643	3643	3754	3944	4174
<b>C09.1</b>	44500	43594	43866	43551	43142
<b>C09.2</b>	11244	11386	11485	11715	11787
<b>C12.1</b>	2789	2798	2787	2804	2834
<b>C12.3</b>	27561	27119	26720	26456	26172

Source: authors' calculations. Underlying data: ECB.

**Table 6. Consumption of fixed capital of consumer durables in the euro area in current prices in millions of euro, 1999-2003**

	1999	2000	2001	2002	2003
<b>C05.1</b>	84360	87095	90557	94011	96274
<b>C05.3</b>	24676	25364	26369	27303	28119
<b>C05.5</b>	5087	5248	5422	5650	5829
<b>C06.1</b>	16795	17615	17887	18690	19582
<b>C07.1</b>	150286	159494	167080	173278	178008
<b>C08.1</b>	2377	2497	2743	3091	3452
<b>C09.1</b>	28900	30073	31303	32409	32947
<b>C09.2</b>	8137	8526	9069	9542	10016
<b>C12.1</b>	2030	2108	2226	2337	2429
<b>C12.3</b>	19314	19937	20870	21632	22097

Source: authors' calculations. Underlying data: ECB.

## 4.2. Saving, disposable income and household consumption

In table 7 can be seen the old household saving ratios. Table 8 presents the contribution of the capitalisation of durables on household saving ratios. The U.S. results vary between 1.0 and 3.0 per cent, whereas our

calculations show a lower impact in Europe of 1.0 to 1.8 per cent.<sup>31</sup> However, the overall figures conceal considerable variation in individual Member States, with the effect in some countries such as Finland and the Netherlands at 4 per cent in some years.<sup>32</sup> It should be borne in mind that comparison of our results with the US estimates is not straightforward, owing to methodological differences, such as the level of aggregation used in the calculations. The results are similar though there are methodological differences.

**Table 7. Traditional household saving ratios, as a per cent of household disposable income, 1999-2003<sup>33</sup>**

	1999	2000	2001	2002	2003
Austria	8.76	8.44	7.47	7.67	8.57
Belgium	12.72	10.91	11.81	11.14	9.16
Germany	9.46	9.21	9.42	9.91	10.30
Spain	5.91	5.87	5.68	5.67	6.03
Finland	0.44	-1.25	-1.78	-1.01	-0.15
France	12.00	11.91	12.67	13.84	12.86
Greece	5.81	4.60	3.40	2.14	2.16
Italy	9.77	9.19	10.22	10.39	10.60
Netherlands	9.62	6.78	9.70	8.66	8.46
Portugal	1.97	3.34	4.43	4.11	4.79
Euro Area	9.30	8.66	9.40	9.79	9.65

Source: authors' calculations. Underlying data: ECB.

**Table 8. Contribution of capitalisation of durables on the household saving ratios, percentage points, 1999-2003**

	1999	2000	2001	2002	2003
Austria	1.23	1.18	0.97	0.84	0.93
Belgium	1.15	1.43	1.07	0.73	0.92
Germany	1.10	0.98	1.19	0.79	0.60
Spain	3.22	2.34	1.99	1.25	1.27
Finland	3.17	3.15	2.14	2.66	3.78
France	1.45	1.47	1.47	1.27	1.08
Greece	3.06	1.64	1.72	1.89	1.97
Italy	1.63	1.65	1.19	0.93	0.81
Netherlands	3.75	3.78	2.93	2.69	2.12
Portugal	5.55	4.49	2.70	1.87	0.65
Euro Area	1.83	1.73	1.53	1.18	1.00

Source: authors' calculations. Underlying data: ECB.

<sup>31</sup> However, the results are different from those assumed or presented in Audenis, Grégoir and Louvot (2002), who estimated figures for France and the US, but not for the EA. They reported 6.3 per cent effect on the French household saving ratio in year 2000 and from 8 to 11 per cent effect on the U.S. households saving ratio.

<sup>32</sup> Sensitivity analysis with respect to the net rate of return was also performed; yet did not markedly alter the results. When we used the 1 to 5 year consumer credit index (extrapolated from 2003 backwards with 1-year euribor) the impacts on Euro Area saving ratios was 0.15-0.40 percentage points lower than those reported in table 8. Using only the 1-year euribor as net rate of return increased Euro Area saving rates by 0.02-0.17 percentage points. These computations are available from the authors by request.

<sup>33</sup> Please note that the euro area saving ratio presented in this table is not fully in line with one presented in Table 3.4.3 of the ECB Monthly Bulletin. The saving ratio presented in this article has been calculated from the non-financial accounts' side as the saving ratio in the ECB Monthly Bulletin has been calculated from the financial accounts' side. As the euro area financial and non-financial accounts show in the household sector a small discrepancy, also the saving ratios calculated from the two directions are slightly different.

Where the findings of this paper also depart from Audenis, Grégoir and Louvot is their conclusion that the magnitude of the difference between the sizes of the two saving ratios is directly related to the share of expenditure on durable goods in income. The results in this paper largely contradict this view. For instance in Germany the effect varies between 0.6 and 1.2 per cent with the share of durable goods in disposable income between 10 and 11 per cent, whereas in Finland the effect varies between 2.1 and 3.8 per cent, although the share of durables in disposable income is almost the same as in Germany (see tables 8 and 9).

As hinted in the previous sub-section different inflation rates and the actual underlying capital stock, coupled with the different depreciation rates for different products affects, also affect the contribution of durables to saving ratios. In Germany and Austria, these factors seem to have such a strong effect that they cancel out the certainly intuitively plausible thought of a high durables' share of the household disposable income implying a high effect on the saving ratio.

**Table 9. Durables' share of the household disposable income (the current SNA concept), per cent (%), 1999-2003**

	1999	2000	2001	2002	2003
Austria	11.20	10.83	10.71	10.62	10.53
Belgium	9.28	9.48	9.23	9.10	9.46
Germany	11.00	10.74	10.68	10.38	10.06
Spain	10.80	9.80	9.56	8.81	8.82
Finland	10.07	9.98	9.27	9.59	10.30
France	8.65	8.48	8.40	8.14	8.00
Greece	7.02	5.84	5.89	5.94	5.74
Italy	10.90	10.88	10.36	10.09	9.83
Netherlands	11.86	12.03	10.67	10.76	10.53
Portugal	14.71	13.24	11.79	11.05	10.79
Euro Area	10.28	10.12	9.82	9.49	9.26

Source: authors' calculations. Underlying data: ECB.

Table 10 presents contribution of capitalisation of durables on the growth rate of household consumption expenditure. The effect does not seem to be large in EA Member States. Mostly, the observed effect is less than one percentage point. At the EA-level the effect seems to be even smaller than at the Member State level. The reason for this is that the individual Member State negative and positive effects seem to cancel out the effect at the EA-level.

**Table 10. Contribution of capitalisation of durables on the growth rate of household consumption expenditure, percentage points, 2000-2003**

	2000	2001	2002	2003
Austria	-0.59	-0.36	-0.26	-0.50
Belgium	-0.61	-0.13	0.13	-0.37
Germany	-0.44	-0.75	-0.08	-0.09
Spain	0.40	-0.03	0.47	-0.49
Finland	-0.25	0.48	-0.85	-1.13
France	-0.54	-0.50	-0.11	-0.02
Greece	1.61	-0.87	-0.40	-0.19
Italy	-0.54	0.01	-0.25	-0.18
Netherlands	-0.38	0.00	0.18	0.45
Portugal	0.36	1.24	0.48	0.75
Euro Area	-0.39	-0.31	-0.03	-0.11

Source: authors' calculations. Underlying data: ECB.

As can be seen in table 11, the contribution of capitalisation of durables on the growth rate of disposable income is approximately half a per cent. As in the case of the household consumption expenditure, the effect is diminishing over time. The reason is that the estimation of the output is effected by the rate of return. The rate of return was high in year 2000 due to booming stock markets but when the stock markets were busting, also the rate of returns diminished. This trend can clearly be seen in tables 10 and 11. The diminishing rate of return also explains the mostly negative contribution of durables on the growth rates.

**Table 11. Contribution of capitalisation of durables on the growth rate of disposable income, percentage points, 2000-2003**

	2000	2001	2002	2003
Austria	-0.65	-0.61	-0.41	-0.38
Belgium	-0.31	-0.55	-0.27	-0.17
Germany	-0.60	-0.52	-0.52	-0.31
Spain	-0.68	-0.44	-0.39	-0.46
Finland	-0.35	-0.61	-0.29	0.11
France	-0.52	-0.47	-0.35	-0.26
Greece	0.00	-0.81	-0.23	-0.09
Italy	-0.52	-0.51	-0.55	-0.33
Netherlands	-0.54	-1.07	-0.15	-0.19
Portugal	-0.89	-0.77	-0.46	-0.48
Euro Area	-0.52	-0.54	-0.43	-0.31

Source: authors' calculations. Underlying data: ECB.

Table 12 presents the contribution of capitalisation on the level of disposable income. Averaged over the period 1999-2003 the effect varies between 1.5 and 3.0 per cent of disposable income. The share is actually

surprisingly small taking into account that the effect on the growth rates is also around 0.5 percentage points. This reflects the volatility of the estimates. A similar diminishing effect of durables on the level of disposable income can also be observed though it is not presented in table. The results and calculations of this paper can be received on request from the authors.

**Table 12. Contribution of capitalisation of durables on the level of disposable income, percentage points, average over the period 1999-2003**

	1999-2003
Austria	2.78
Belgium	1.76
Germany	2.69
Spain	1.82
Finland	2.19
France	1.95
Greece	1.65
Italy	2.47
Netherlands	2.43
Portugal	2.24
Euro Area	2.26

Source: authors' calculations. Underlying data: ECB.

## 5. Conclusions

The purpose of this paper was to estimate the impact of the capitalisation of consumer durable goods on the household saving ratios and disposable income of EA countries and on the EA-aggregate. We found that the saving ratios are in the euro area underestimated by approximately one to two percentage points, in 1999-2003, when treating consumer durables as is the present convention. The effect varies a lot between Member States from year to year and in some Member States capitalisation affects as much as 5 percentage points of household saving in certain years. The level of EA disposable income is increased by 2.3 per cent due to capitalising durables and the growth of disposable income decreases annually around 0.5 percentage points. The effect on the growth rate of disposable income is actually surprisingly large considering that the effect on the level is modest. The reason is the volatility in the underlying data, in particular the diminishing net rate of return. We furthermore found that the capitalisation effect is not necessarily directly related to the share of expenditure on durable goods in income. Different inflation rates and the underlying capital stock, coupled with separate depreciation rates for different asset types also affect the contribution of durables to saving ratios.

What is the analytical meaning of this kind of exercise? Fiscal and especially monetary policy makers follow saving ratios. The Federal Open Market Committee<sup>34</sup> systematically refers to saving ratios in their statements

<sup>34</sup> See: <http://www.federalreserve.gov/FOMC/#calendars>



and/or minutes. According to the economic analysis pillar of the ECB's monetary policy the Eurosystem uses a broad range of economic and financial indicators in order to assess the outlook for price developments and the risks to price stability.<sup>35</sup> If households at least partially interpret durable goods in their actual behaviour as investments, we believe that the saving rate presented in this paper provide a useful complementary picture on households' behaviour. Thus, these kinds of alternative saving ratios could be used to aid policy decision-making. Whereas SNA93 does not consider expenditure on consumer durables to increase future consumption possibilities in its core system, e.g. Jorgenson and Landefeld (2006) provide other measures. Consumer durables could be both treated as assets and their services recorded in the national accounting framework, either in the actual core accounting system or in separate satellite accounts as proposed by the ISWGNA.

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<sup>35</sup> European Central Bank 2003, pp 79-92.

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