A hybrid multi-region method (HMR) for assessing the environmental impact of private consumption[1]

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Key words: consumption patterns, environmental load, hybrid analysis, multi-region input–output analysis, physical process data.

Abstract

The environmental load from consumption can be reduced by changing consumption patterns. For an effective consumer policy to reduce the environmental load from society, we need insight into the environmental load from consumption patterns. This requires detailed accurate quantitative environmental information about many consumer products. Current methods for establishing this information about many consumer products do not combine process data with multiregional data. This paper aims to give more insight into the added value of using multiregional data and process data. It also proposes to combine both kinds of data into one application. The use of multiregional input–output data appears to be important to establish the total environmental load from consumption. Using multiregional data and process data both result in substantial changes in the estimated environmental load of consumption products on a more detailed level. The results indicate that using both multiregional and process data will improve the estimates of the environmental impacts of consumption patterns. Therefore we propose a hybrid multi-region (HMR) method, which is successfully applied for the Netherlands.

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[1] A slightly adapted version is published in Ecological Economics **69** (2010) p.p.2510-2516

Introduction

Concern about the environment has led to policies aiming to reduce the environmental load from society. Up to now, environmental policies have predominantly focused on technological improvements to increase eco-efficiency of domestic production, allowing consumption to develop freely. In the end, all goods produced are meant for consumption. This makes consumption an important driving force for the worldwide environmental load (Aalbers et al., 2007). Besides technology and the level of consumption, its composition (consumption patterns) is also important for the resulting environmental load. The environmental load caused by consumption can be reduced by changing consumption patterns. That is why environmental policy-making might benefit from quantitative information on the environmental load from consumption patterns. To distinguish differences in environmental load between consumption patterns, an accurate method is required for detecting possible differences between specific products (e.g. 'bread') or between groups of similar products (e.g. 'flowers and pot plants').

The objective of this paper is to explore and improve existing methods for calculating the environmental load of consumer goods. First we provide more insight into the added value of using multiregional and process data, compared with single-region input–output data. Next we combine the outcomes of this comparison in a 'hybrid multi-region' (HMR) method to get more reliable results of the environmental load from consumer goods on a detailed level.

Background

Consumer goods cause environmental load during their whole life cycle, from extraction of natural resources, production processes, actual use, to the time they are reduced to waste. Assessment of the environmental load from consumption only makes sense if this whole life cycle is considered. In the literature, this is generally referred to as Life Cycle Assessment.

Basically, two methods are available for making such an assessment: process analysis and input–output (IO) analysis. Both methods have their advantages and disadvantages. Environmentally extended input–output analysis is a well-established approach that assigns resource flows and environmental impacts to categories of final consumption (Suh, 2009). It makes use of generally available data, allows for a quick analysis, and gives a good overall picture of the environmental impact of consumption. One of the main disadvantages of the IO approach is that data are available only at a high level of aggregation. Although for most countries the IO tables distinguish 60 to 400 sectors or product groups, the limited availability of environmental data requires a further aggregation to about 30 to 60 sectors or product groups. This implies that various goods have to be attributed to the same sector. As a consequence, it is not possible to make a distinction between the (possibly widely divergent) environmental impacts of these different products. This limits the practicability of the IO method for assessment of environmental impact of consumption patterns, because such an assessment would require detection of differences between specific products.

Process analysis (see e.g. Boustead and Hancock, 1979) is a more appropriate method for determining the environmental impact of specific products. That is why generally process analysis is used for Life Cycle Analysis (LCA). To calculate the environmental impact of a specific product, an LCA includes all relevant physical processes required for the complete life cycle. Although, in principle, process analysis uses more detailed information than the IO approach, in practice it is often difficult to take all relevant processes into account, because there are so many, or because the required data are not available. Ignoring some of these processes can lead to serious underestimations (Suh et al., 2004). Moreover, process analysis is rather time consuming, which makes the method expensive.

Bullard et al. (1978) were the first to propose a hybrid energy analysis, combining process level data and IO data. In a tiered hybrid analysis (Suh et al., 2004), the life cycle is split into two parts - the 'major' processes that are most likely to make an important contribution to the environmental load caused by the product, and the 'remaining' processes. For the major processes process analysis is used, while IO is used for all the remaining processes. In this way, a hybrid analysis combines the rapidity of the input–output analysis with the accuracy of the process analysis. The system boundary is extended significantly, while preserving the specific character of the process in favour of the accuracy. Since the late 1990s, different forms of hybrid approaches have been proposed (e.g. Engelenburg et al., 1994; Joshi, 2000; Mayer, 2007), but they are still not widely used (Suh et al., 2004). Haas et al. (2005) mentioned an important shortcoming of existing hybrid methods - imported goods are treated as if they are produced domestically. This results in a relatively high uncertainty of estimates for countries that rely heavily on imports (Suh et al., 2004). To deal with differences in the environmental impact of production between countries, recent IO-based studies (e.g. Nijdam et al., 2005, Weber and Matthews, 2008, Peters and Hertwich, 2008) have used multiregional input–output (MRIO) data, taking into account the location of production processes. However, as indicated above, the aggregation level of IO data limits the practicability of this approach for assessing the environmental load from specific products. This means that existing hybrid methods can be more accurate in determining the environmental impact of specific products. But as far as they use input–output data, they do not take into account regional differences in environmental impact of production processes[2]. On the other hand: current IO-based approaches do take multiregional data into account, but

[2] Please note that as far as process analysis is used for the major processes, regional differences are taken into account.

lack a higher level of detail. That is why Wiedmann et al. (2009) recommend the use of a multi-region input–output method, improved by using process data to get reliable results on a more detailed level.

To explore the additional value of taking into account multiregional data and process data with respect to a single-region IO approach, we first apply two methods for estimating the environmental load from Dutch consumption: a multi-region input–output based application and a hybrid application. Next, we compare the results with a conventional single-region input-output approach to explore the additional value of taking into account multiregional data and process data, respectively. We combine these additional values to get more reliable results on the environmental load from consumer goods, on a detailed level. Finally we present the results from this 'hybrid multi-region' (HMR) method, followed by a discussion and conclusions.

Applications to estimate the environmental load from Dutch consumption patterns

In the Netherlands, recently, two methods have been applied for assessing the environmental load from household consumption - a multi-region IO application, as applied by Nijdam et al. (2005) (see Appendix A), and a hybrid application according to Benders et al. (2010). Both applications are designed to estimate the environmental load from Dutch consumption, at the level of about 350 consumption categories, as recorded in the Dutch Household Expenditure Survey for 2000 (CBS, 2002)[3]. The environmental intensities for these consumption categories[4] as calculated by both applications can easily be compared. The next paragraphs give a short description of both applications. To make the differences between the applications clear, we first shortly describe the common basis of both applications, which is single-region input-output analysis.

Single-region input-output analysis is based on an environmentally extended single-region input–output (EESRIO) model. This model uses sectoral monetary transaction matrixes describing the complex interdependencies of industries within *one* economy, to allocate environmental load to final consumption. These loads depict the environmental loads along the whole upstream supply chain. In this way imported goods are assumed to be produced by domestic sectors, taking into account only the domestic efficiencies.

[3] Each consumption category contains one type of product (e.g. bread) or group of similar products. (e.g. flowers and pot plants).

[4] Environmental intensity of a consumer product (goods or service) is defined as the environmental load caused during production, transport and trade of the product divided by its consumer price in monetary units. Environmental intensity can be expressed, for instance, in MJ/euro, m^2/euro and kg CO_2/euro.

Multi-region input–output analysis (MRIO) (see Nijdam et al., 2005) is based on an environmentally extended *multi*-region input–output (EEMRIO) model. Like the single-region input-output approach, this model uses sectoral monetary transaction matrixes to allocate environmental loads, but here the interdependencies of industries and trade within *and between* economies are taken into account. So, the calculated environmental loads depict the environmental load allocated to final consumption. Here, for imported goods the domestic efficiencies are taken into account.

The MRIO application first estimates the environmental intensities (i.e. the environmental loads per euro in turnover) of production for 105 sectors in the Netherlands and about 30 sectors in three import regions (OECD Europe, the Rest of the OECD and the Rest of the World), using an EEMRIO model. Now the environmental loads for the final deliveries of the 105 Dutch sectors can be calculated. The estimated environmental loads for the 105 final deliveries, are redistributed over 350 consumption categories from the Dutch Household Expenditure Survey (CBS, 2002), taking into account the proportional deliveries from the supplying sectors. An extended description of the MRIO can be found in Nijdam et al. (2005). Whereas Nijdam et al used figures of 1995, here we use an updated version, which is based on more recent data (see Appendix A).

If the environmental intensities for all four regions are set equal to the Dutch intensities, this MRIO application turns into a single-region input–output analysis, which in this paper is indicated as $MRIO^{SRIO}$.

The *hybrid environmental analysis (Hybrid)* combines process data and input-output data and is based on a practical application for energy analysis as described by Van Engelenburg et al. (1994) and Benders et al. (2001). As described above, this so-called tiered hybrid analysis (Suh et al., 2004) splits the life cycle of a product into two parts: major processes, for which process analysis is used, and remaining processes, for which single-region IO analysis is used. Application of the hybrid method for energy analysis was found suitable for rapidly and accurately calculating the direct and indirect energy requirements from large numbers of consumption categories (Vringer and Blok, 1995). The method detects differences between consumption categories, even if they are produced by the same economic sector (Vringer and Blok, 1995). For the comparison here, we use the most recent application of this method as described by Benders et al. (2010). Besides energy requirements, this application also includes environmental loads such as emissions of greenhouse gases and air pollutants and land use. This application uses IO tables for the Netherlands for the year 2000.

If all available process data are neglected, this Hybrid application turns into a single-region input–output analysis, which in this paper is indicated as $Hybrid^{SRIO}$.

In the next section we explore the additional value of taking into account multiregional data and process data with respect to a single-region IO approach using calculations for greenhouse gas (GHG) emissions and land use[5]. The total amount of GHG emissions and land use that can be attributed to Dutch consumer expenditures for 350 consumption categories was determined by multiplying the environmental intensities for the various consumption categories with the related expenditures, as recorded in the Dutch Household Expenditure Survey (CBS, 2002).

Additional value of using multiregional data

Economic globalisation means an increasing share of imported goods. Treating imported goods as if they were produced domestically, results in a relatively high uncertainty in the data for countries which rely heavily on imports (Suh et al., 2004). To quantify the effects of adding multiregional data for the Netherlands, which is a small country relying heavily on imports, we compare the results from the MRIO, as described in the previous section, with a calculation using a similar method except that the multiregional data is neglected ($MRIO^{SRIO}$). More specifically, we compare the environmental load due to consumption by an average Dutch household in the year 2000 (CBS, 2002) calculated in two different ways:

- MRIO – a calculation including region-specific environmental intensities for the Netherlands and all three import regions (multi-region input–output); and
- $MRIO^{SRIO}$ – a calculation assuming environmental intensities for all four regions to be equal to the Dutch intensities (single-region input–output).

The difference between $MRIO^{SRIO}$ and MRIO can be illustrated by the following example. In the Netherlands, the textile industry is small and does not produce the present domestic textile consumption. Moreover, the agricultural production of raw materials used in the textile industry takes place abroad. The $MRIO^{SRIO}$ estimates the environmental load from a typical coat, by using intensities from the Dutch textile industry and agricultural sector, however, this deviates from what is actually required. The MRIO provides more realistic estimates by taking into account region-specific intensities and sectoral structures, consistent with the national accounts.

[5] For calculating land use, we used the following factors to include the impact of land use: forest plantations: 0.8, build-up land:1.3, and crop land and farmland:1.0. See also Benders et al. (2010).

Table 1 A comparison for land use and GHG emissions of single-region input-output ($MRIO^{SRIO}$) and multi-region input-output (MRIO) analyses for an average Dutch household in 2000[*].

	Expenditures	Land use (m^2)		GHG (kg CO_2 eq.)	
	euros (2000)	MRIO	$MRIO^{SRIO}$	MRIO	$MRIO^{SRIO}$
Food	4921	9382	2741	8145	4766
Housing	5674	1073	972	4998	6597
Furnishings	2029	1309	222	2100	929
Clothing	1898	960	107	2003	979
Personal care	1054	200	55	1583	1663
Leisure indoors	2427	1081	257	2200	1173
Leisure outdoors	1880	387	128	2522	1994
Holidays	1435	804	137	1207	753
Labour	1773	319	78	2421	2019
Total	23091	15515	4698	27180	20874

[*] Here the total consumption is clustered into functional domains: Food contains: food, refrigerating, cooking, washing up and catering; Housing: rent, mortgage, local housing taxes, housing insurance, maintenance, heating and lighting; Furnishings: furniture, upholstery, decoration and gardening; Clothing: clothes, shoes, finery, washing drying and ironing; Personal care: nursery, self medication, cosmetics, toilet articles, hair dresser, shower and baths; Leisure indoors: reading matter, pets, audio and video; Leisure outdoors: day trips, family visits, sports; Holidays: holidays, domestic and abroad; Labour: college fees, books, commuting. For a more extensive description see Nijdam et al., 2005.

Table 1 confirms the statement by Suh et al. (2004) that treating imported goods as if they were produced domestically results in a relatively high uncertainty of estimates for countries that rely heavily on imports. For the Netherlands treating imported goods as if they were produced domestically results in underestimating the amounts of land use and GHG emissions assigned to consumption. The total amount of land use assigned in MRIO is three times the amount assigned in $MRIO^{SRIO}$. In relative terms, the difference is the largest for clothing, of which the majority is imported into the Netherlands. For GHG emissions the differences are smaller; the emissions assigned in MRIO are 30% higher than in $MRIO^{SRIO}$. This is not a surprising result, as production processes in the Netherlands are relatively efficient in the use of land and energy. By using only domestic IO data, the estimated total environmental load would be considerably underestimated.

Adding multiregional data not only affects the estimated total environmental load, but also results in substantial changes on the level of separate consumption categories. Adding multiregional data, on average[6], increases land use intensity by a factor of 7.2, with a standard

[6] Please note that this average was not weighted according to the average household expenditure on goods in the different product categories, so all intensities were treated as equally important.

deviation of 8.2. On average, GHG intensities increase by a factor of 2.3, with a standard deviation of 0.8.

Additional value of using process data

Suh et al. (2004), among others, stated that for specific products, physically-based process analysis would be more accurate than monetary-based IO analysis. They also argued that combining process analysis with IO analysis would give a better estimation of the environmental load from individual consumer products. In 2006, Kok et al. already made a comparison of an IO method and a hybrid method on an aggregated level. However, these two methods differed on several aspects, so the singular effect of using process data could not be established. To quantify the effect of using process data we compare the results from the Hybrid as described in the previous section with a calculation neglecting process data ($Hybrid^{SRIO}$). More specifically, we compare the environmental load due to consumption by an average Dutch household in the year 2000 (CBS, 2002) calculated in two different ways:

- Hybrid – a calculation taking into account process data in addition to (single-region) Dutch IO data; and
- $Hybrid^{SRIO}$ – a calculation based on (single-region) Dutch IO data only, neglecting available process data[7].

The difference between $Hybrid^{SRIO}$ and Hybrid also can be illustrated by the earlier example of the textile industry. Estimating the environmental load from several types of clothing using $Hybrid^{SRIO}$, it is not possible to distinguish differences between products produced within the same sector, for instance a cotton and a woollen coat. Adding process data to the analysis results in different intensities for those products. This is not only because figures for the specific production processes of cotton and wool are added to the analysis, but also because differences between the environmental load from the cotton produced abroad and domestic production processes are taken into account. Note that there is no automatic consistency with the total amount of environmental load according to the national accounts.

[7] We call this calculation $Hybrid^{SRIO}$ because neglecting the available process data a single-region input-output analysis is left. We used the name $Hybr^{SRIO}$ because this single-region input-output analysis differs slightly from the $MRIO^{SRIO}$ used for the MRIO, see next section.

Table 2 A comparison for Land use and GHG emissions of single Input-Output (Hybrid^{SRIO}) and Hybrid (Hybrid) analyses for an average Dutch household in 2000.

	Expenditures	Land use (m^2)		GHG (kg CO_2 eq.)	
	euros (2000)	Hybrid	Hybrid^{SRIO}	Hybrid	Hybrid^{SRIO}
Food	4921	5777	2223	6414	4.911
Housing	5674	801	429	5931	5632
Furnishings	2029	707	203	1118	970
Clothing	1898	448	99	1035	1008
Personal care	1054	233	43	1537	1524
Leisure indoors	2427	467	317	1294	1304
Leisure outdoors	1880	94	102	1622	1575
Holidays	1435	52	47	1979	1948
Labour	1773	69	55	1596	1574
Total	23091	8648	3517	22525	20446

Table 2 shows that using process data doubles the amount of land use assigned. This seems to be due to the fact that less efficient processes from abroad are taken into account. However, the total assigned amount is still about half that of the MRIO (Table 1). The Hybrid seems to assign only a part of the land use abroad, probably because the analysis is partly based on single-region input-output data. In absolute terms, the difference between land use assigned in Hybrid and in Hybrid^{SRIO} was the largest for food and furnishings. For the total amount of GHG emissions assigned, using process data has only a minor effect (+9%) and is the largest for housing.

Adding process data not only affects the total environmental load estimated, but also results in substantial changes on the level of separate consumption categories. Adding process data, on average, increased land use intensities by a factor of 4.0, with a standard deviation of 11.9. On average, GHG intensities increased by a factor of 1.3, with a standard deviation of 0.9[8].

Combining multiregional data with process data

In the previous section, we showed that, compared to single-region IO, using either multiregional IO data or process data has large effects on the estimated intensities for specific consumption categories, as well as on the total assigned GHG emissions and land use for

[8] Please note that these averages were not weighted according to the average household expenditure on goods in the different product categories, so all intensities were treated as equally important.

consumption. For a more accurate estimation of the environmental load, these results indicate the need for taking both factors into account, to obtain a more accurate assignment for environmental load due to consumption. Extending multi-region IO data with process data to improve the environmental information in IO tables is in line with the recommendation from Wiedmann et al. (2009).

As both regional and process data may add similar information, such as that of differences between domestic land use efficiencies and those abroad, both types of data cannot just be added up. This seems to be confirmed by the fact that using multiregional and process data both lead to higher average environmental loads (Tables 1 and 2). To check whether the effects on the separate environmental intensities of adding regional and process data are correlated, we plotted the effect of using physical process data (ΔPh = Hybrid - Hybrid^{SRIO}) against the effect of using multiregional IO data (ΔM = MRIO – MRIO^{SRIO}) for GHG emissions and land use at the level of 350 consumption categories (Figure 1).

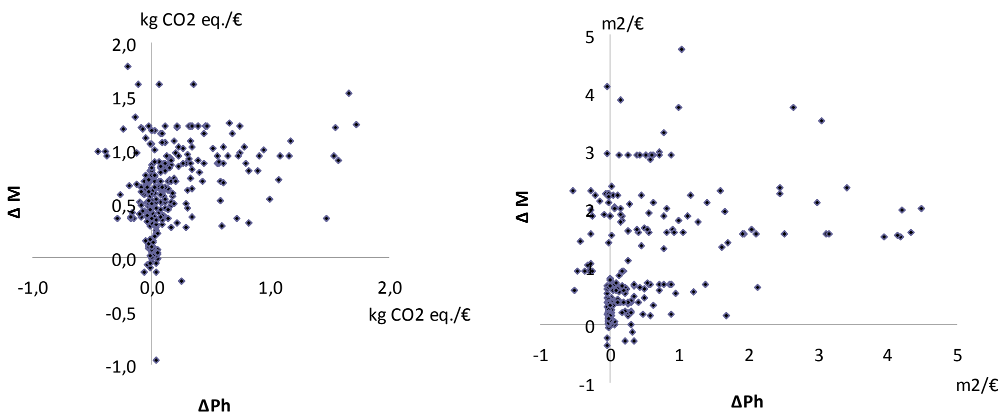

Figure 1 Change in GHG and land use intensities from the use of process data (ΔPh), versus the change in GHG and land use intensities from the use of multiregional data (ΔM), for all 350 consumption categories.

Figure 1 shows a very weak or no correlation between the effects of adding process data and multiregional data on GHG and land use intensities (GHG: R^2=0.00; land use: R^2 = 0.22). Apparently, multiregional data and process data add different kinds of information, which implies that combining additional information from process data and multiregional data will result in better estimates of intensities of specific consumption categories.

Although both multiregional data and process data contribute to distinguish differences in environmental intensities between specific consumption categories, the total environmental load from consumption is best represented by the MRIO. Whereas the Hybrid is the sum of more or less independent analyses, the MRIO divides the total environmental load in the different regions over consumption categories and is consistent with the national accounts (see Wiedmann et al., 2009). By adding the effect of both multiregional data and physical process data, the totals exceeded the MRIO totals (see also Tables 1 and 2). To keep the total amount of GHG emissions and land use within the limits of the MRIO totals, a correction was made. We use one correction factor for all consumption categories.

New intensities can now be calculated by adding the effect of using multiregional and process data to the intensities that are based on single-region IO, while taking into account the totals according to the MRIO analysis. In the comparisons presented above, two different variations of single-region IO analysis were used: $MRIO^{SRIO}$ and $Hybrid^{SRIO}$. Although the $MRIO^{SRIO}$ and $Hybrid^{SRIO}$ are based on the same principle, the outcomes slightly differ. This is mainly due to different sources for the trade margins. Moreover, in the $Hybrid^{SRIO}$, products are linked to just one sector, while the $MRIO^{SRIO}$ assumes a mix of relevant sectors for each product. Therefore, we use the $MRIO^{SRIO}$ to add the effect of multiregional data and physical process data, but this choice is more or less arbitrary.

Now the benefits of process data and multiregional data can be combined in a hybrid multi-region model (HMR) by adding the effect on the environmental load due to using physical process data, according to the hybrid method to the environmental load according to the multiple-region input–output method (Formula 1). To keep the total amount of GHG emissions and land use within the limits of the MRIO totals, a correction term is included.

$$IHMR_j = (IMRIO_j + \Delta IPh_j) * \left(\frac{\sum_{j=1}^{350}(MRIO_j)}{\sum_{j=1}^{350}(MRIO_j + \Delta Ph_j)} \right) \quad (1)$$

In which:

- $IHMR_{,j}$ = Intensity for category j, according to the hybrid multi-region method
- $IMRIO_{,j}$ = Intensity for category j, according to the multiple-region input–output method
- $\Delta IPh_{,j} = IHybrid_{,j} - IHybrid^{SRIO}_{,j}$ = Effect on intensity for category j, from the use of physical process data, according to the hybrid method
- $MRIO_j$ = Environmental load for category j, according to the multiple-region input–output method
- ΔPh_j = Effect on environmental load for category j, due to using physical process data, according to the hybrid method

Results for the hybrid multi-region model (HMR)

Table 3 shows the estimated environmental load for main consumption categories per average Dutch household of 2.3 persons, according to the MRIO, the hybrid, and the combination of those two methods - the so-called hybrid multi-region method (HMR) [9]. To limit land use and GHG emission levels to the MRIO totals, correction factors were applied of -25% and -7%, respectively. Details for all 350 consumption categories can be found in Appendix B.

Table 3 shows that using HMR or MRIO gives about the same result on the level of main consumption categories. However, process data showed to be of importance at the level of environmental load intensities for specific consumption categories. As an illustration, Table 4 presents calculated intensities for 10 detailed consumption categories concerning meat.

Table 4 shows that the HMR takes into account the differences between the categories according to both the Hybrid and the MRIO. To explain the calculated figures we discuss the results for fresh beef as an example.

For fresh beef the $MRIO^{SRIO}$ results in a land use intensity (LU-int) of 0.5 m^2/euro, taking only into account the environmental loads for the whole supply chain, assuming that production abroad is comparable with the Dutch sectors. Taking into account region-specific

[9] The composition of the main consumption categories is equal to the composition of the consumption domains according to Nijdam et al. (2005).

Table 3 A comparison for Land use and GHG emissions of Hybrid (Hybrid), multi-region Input-output (MRIO) and hybrid multi-region (HMR) analyses for an average Dutch household in 2000.

Main Consumption Category	Expenditures euros (2000)	Land use m^2 HMR	MRIO	Hybrid	GHG kg CO_2-eq. HMR	MRIO	Hybrid
Food	4921	9721	9382	5777	8962	8145	6414
Housing	5674	1086	1073	801	4918	4998	5931
Furnishings	2029	1363	1309	707	2091	2100	1118
Clothing	1898	984	960	448	1885	2003	1035
Personal care	1054	293	200	233	1482	1583	1537
Leisure indoors	2427	925	1081	467	2033	2200	1294
Leisure outdoors	1880	285	387	94	2387	2522	1622
Holidays	1435	608	804	52	1150	1207	1979
Labour	1773	250	319	69	2270	2421	1596
Total	23091	15515	15515	8648	27180	27180	22525

Table 4 Land use and GHG emission intensities for 10 expenditure categories concerning different kinds of meat according to the Hybrid (Hybrid), multi-region Input-output (MRIO) and hybrid multi-region (HMR) applications.

Description expenditures	Land use intensity m^2 per euro^{2000} MRIO	Hybrid	HMR	GWP intensity in Kg CO_2 eq. / euro^{2000} MRIO	Hybrid	HMR
Beef, fresh	2.5	4.7	5.0	2.1	2.4	3.4
Veal, fresh	2.5	0.2	1.6	2.1	0.8	1.9
Minced meat, fresh	2.5	5.0	5.2	2.1	2.6	3.5
Meat and meat products, frozen	2.0	4.6	4.6	1.7	2.3	3.0
Horse meat	2.0	2.4	3.0	1.7	1.4	2.1
Fresh meat, unspecified	2.0	3.6	3.8	1.7	2.0	2.7
Smoked meat	2.0	2.4	2.9	1.7	1.5	2.3
Ham	2.1	0.8	1.9	2.0	0.9	1.9
Bacon	2.1	1.0	2.0	2.0	0.9	1.9
Sausages and meat products	2.1	2.5	3.1	2.0	1.5	2.4

information adds 2.0 m^2/euro, which brings the total LU-int according to the MRIO for fresh beef to 2.5 m^2/euro. This is not surprising as a lot of fodder for Dutch cattle comes from agricultural production abroad, which is in general less efficient than the domestic agricultural sector.

An analysis for beef with the Hybrid results in a LU-int of 4.7 m^2/euro, taking into account process data of the production of beef, packaging and transport. If the process data is neglected, a single-region input-output analysis remains comparable with the $MRIO^{SRIO}$. So, using process data adds 4.2 m^2/euro to the LU-int of fresh beef.

To calculate the LU-int for fresh beef according to HMR, Formula (1) must be used in which IMRIO=2.5, the effect of using physical process data (ΔIPh) = 4.2 and the correction for land use is (-25%). So the LU-int for fresh beef according to the HMR becomes 5.0 m^2/euro.

Discussion

The results presented here indicate that combining multiregional and process data will improve estimates of the environmental impacts of specific consumer products. This makes the results from the presented HMR application likely to be better estimates than those of the two original applications. However, using the HMR application as presented in this paper has a disadvantage. By combining the Hybrid and MRIO applications into the proposed HMR application, insight into the composition of the environmental load from separate consumption categories is lost. That is why we recommend to improve the here presented application of HMR by a new build method, containing both process data and multi-regional IO data.

We also want to discuss three other issues related to the HMR application proposed here: a) the correction on total GHG emissions and, in particular, total land use; b) the consequences of the more or less arbitrary choice for one of the two applications of the single-region IO analysis; and c) the use of different base years (Hybrid: 2000; MRIO: 2002) for the HRM application presented in this paper.

ad. a We found that multiregional data and process data mostly not correlate on the level of the environmental load intensities for specific consumption categories. The use of both multiregional data and process data leads to more differentiation between the environmental intensities from consumption categories. However, for land use, we found a small correlation between the Hybrid and MRIO (R^2 of 0.22), which means that combining the effects of these in the HMR, to some extent, causes a double-counting. To correct for this, the HMR land use intensities have been scaled by 25%

so that the land use totals match the totals in the MRIO application. This correction resulted in an overestimation of the land use assigned to imported consumer products and analysed with much process data, and an underestimation for consumer products produced locally and analysed without any process data. On the level of individual consumption categories, this underestimation and overestimation due to the correction is at most 25% in the individual case that a correction is not applicable. This is acceptable, because the effect of using multiregional or process data exceeded this percentage for most consumption categories.

ad. b The choice for the $MRIO^{SRIO}$ application as a basis for the HMR was a practical, but arbitrary one. To examine the consequences of this choice, we compared two calculations. The first is using $MRIO^{SRIO}$ ($HMR = MRIO^{SRIO} + \Delta M + \Delta Ph * correction$) and the second is using $Hybrid^{SRIO}$ ($HMR = Hybrid^{SRIO} + \Delta M + \Delta Ph * correction$). The resulting environmental loads from the 350 consumption categories correlated quite strongly; R^2=0.97 for land use and R^2=0.86 for GHG emissions. Despite this strong correlation, about 10% (GHG) to 20% (land use) of the categories deviated by more than 10%, depending on the approach chosen. These deviations indicated the uncertainties in the results, caused by several choices (such as of source trade-margins, and of using one sector or a mix of relevant sectors) made by Nijdam et al. (2005) for the MRIO application and by Benders et al. (2010) for the Hybrid application.

ad. c The combined HMR application as presented in this paper, was based on data from 2002 (from MRIO) and from 2000 (process). Although Benders et al. (2010) used the most recent sources for the process data, most of the data was dated before 2000, because processes only change slowly. The use of different base years introduces errors, due to efficiency changes. However, the error made by using a different base year for ΔPh is minor compared to the errors due to the generic correction factor and the choice for the single-region basis.

Conclusions

The use of multiregional input–output data is important to establish the *total* environmental load from consumption. Using multiregional data or process data both result in substantial changes in the estimated environmental load of consumption products on a more detailed level. There are good reasons to assume that the use of both multiregional and process data will improve the estimates of the environmental impacts of consumption patterns.

We propose a hybrid multi-region (HMR) method, which is successfully applied for the Netherlands by making a more accurate estimation of the environmental load from 350 specific consumption categories. This level of detail would be required to distinguish differences in environmental load between individual consumption patterns, which could be relevant to policymakers. With the HMR method, a relatively fast analysis could be made of the environmental load from Dutch consumption, because for the Netherlands both a hybrid and a multi-region input–output application were available, designed for the same consumption categories. We recommend to improve the here presented application of HMR by a newly built method, containing both process data and multiregional IO data.

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Appendix A. An update of the multi-region input–output approach (MRIO) as was described by Nijdam et al. (2005)

Nijdam et al. (2005) described a multi-region input–output application (MRIO) for the Netherlands for Dutch household consumption in the year 2000, based on sectoral environmental intensities from 1995. To make an update we used the following data:

- We used the Dutch input–output table for 2002, which consists of 105 economic sectors (CBS, 2005)
- The foreign input–output tables, which distinguish 30 economic sectors, are obtained from the GTAP database version 6 (Dimaranan, 2006). We derived the imports from each sector from the trade data in this database.
- The used environmental data sources are:
  - GHG emissions in the Netherlands were obtained from the Dutch Pollutant Release and Transfer Register (PRTR, 2007)
  - GHG emissions abroad were taken from Van Aardenne et al. (2005) and Rose and Lee (2008)
  - Land use data were mainly obtained from FAO databases (FAO, 2006).
- All monetary data were indexed to the euro level from 2000.
- The *direct* GHG emissions from private consumption, for example, related to heating and driving, were derived from the Dutch PRTR (2007). The direct land use was obtained from Statistics Netherlands (CBS, 2007)

Also we improved the mapping from sectoral intensities to 350 expenditure intensities. This mapping is carried out with a so-called conversion matrix that splits the consumer price of consumption items into contributions from production sectors, trade and transport margins, and value-added taxes. The conversion matrix used for the update is an improved version of the original one used by Nijdam et al. (2005). Three improvements were made:

  - To link the products in the Budget Survey to products in the supply table of the National Accounts, detailed information from Statistics Netherlands was used.
  - A more detailed analysis of the price structure. The Budget Survey uses consumer prices to value goods, whereas National Accounts use producer prices (in basic prices). For the decomposition of the consumer price into basic price, product taxes and subsidies, and trade and transport margins, information of Statistics Netherlands was used. Thus, the consumer price could be peeled down to the basic price more accurately for the new

conversion matrix. Furthermore, for every product category in the National Accounts, it is known which part is produced abroad. The imports of every product, therefore, could be calculated separately with the conversion matrix.

- Finally, the new conversion matrix was updated by using data from 2000, except the supply table which is from 2002.

Appendix B. Land use and GHG emission intensities and the effect of using physical process data and multiregional data.

Table B1 shows the intensities and the effect of using physical process data (ΔPh) and multiregional data (ΔM) for all consumption categories on the most detailed level, both for land use and GHG emissions. To restrict the amount of land use and GWP emissions to the MRIO totals, all land use intensities were reduced by 25% and all GWP intensities were reduced by 7%. Some remarks have to be made:

1. The expenditure figures are taken from CBS (2002) The deviation of the mean for the average Dutch household can be large, especially for less frequent expenditures.
2. The total expenditure given here - € 23,092 per household - is not equal to the total expenditure according to CBS (2002) - € 24,743 euros per household. In our calculations we excluded expenditures on medical healthcare (€ 337), fines, local taxes and motor vehicle taxes (€ 791), donations (€ 247), other insurances (€ 199) and other expenditures not specified (€ 77). These expenditures are excluded because the expenditures on healthcare can be influenced limitedly by Dutch consumers and taxes/donations are non-consumption expenditures. For other insurances and other expenditures not specified the environmental load could not be established because the MRIO figures were not available.
3. We stress that table B1 does not answer questions like "What's the 'best buy' (i.e. the 'product' with the lowest environmental load) because such a question can only be answered after a functional analysis of the expenditure has been performed.

Table B1 Land use and GWP emissions for the average Dutch household, according to the hybrid multi-region (HMR) method. The expenditures are taken from the budget survey 2000 (CBS, 2002). Mind that for the smaller categories, the statistical error in the expenditures may be large.

Category number	Description	Expenditure	**Land Use** IMRIO^SRIO	delta M	delta Ph	IHMR	HMR	**GWP** IMRIO^SRIO	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
	Total	23.092				0,7	15.515				1,18	27.181
v110000	Whole meal bread	101	1,1	1,9	1,6	3,5	355	0,9	0,9	0,1	1,8	182
v110100	White bread	72	1,2	1,8	1,0	3,0	216	0,9	0,9	0,2	1,8	131
v110200	Rusk and other sorts of bread	19	1,3	1,9	0,6	2,9	53	1,0	0,9	0,2	1,9	36
v110300	Bread with raisins	24	1,2	2,0	0,1	2,5	58	0,9	1,0	-0,1	1,7	39
v1105	Cake, biscuits and pastry	254	1,1	2,1	1,4	3,5	889	0,9	1,0	0,2	2,0	500
v110710	Wheat meal	8	1,0	2,3	3,4	5,1	39	1,0	0,9	0,2	2,1	16
v110720	Rice	12	1,0	2,3	1,6	3,7	44	0,9	1,1	3,5	5,1	61
v110730	Pastry	12	1,0	2,3	2,4	4,4	52	1,0	0,9	0,1	2,0	23
v110740	Potato-flour, starch	2	1,0	2,4	0,0	2,6	6	1,0	1,0	0,3	2,1	5
v110750	Other flours	25	1,0	2,3	-0,3	2,3	59	0,9	1,1	0,0	1,8	46
v1108	Other bread	2	1,2	1,8	1,3	3,2	8	1,0	0,8	0,2	1,9	5
v1110	Potatoes	53	0,5	3,3	0,8	3,5	184	0,7	1,3	0,7	2,4	129
v111110	Endive and lettuce	24	0,5	1,8	0,2	1,8	44	0,7	0,9	0,6	2,0	47
v111120	Spinach	2	0,6	1,7	0,5	2,1	4	0,6	1,0	0,7	2,1	4
v111130	Other (leafy) vegetables	14	0,7	1,6	0,3	1,9	26	0,5	1,0	0,2	1,7	23
v111210	Cauliflower	17	0,6	1,6	0,3	1,9	32	0,5	1,0	0,3	1,7	29
v111220	Sprouts	3	0,7	1,6	0,4	2,0	6	0,5	1,0	0,3	1,8	5
v111230	Other cabbages	7	0,6	1,6	0,9	2,4	16	0,6	1,0	0,9	2,3	16
v111310	Green beans	15	0,5	1,8	0,1	1,8	27	0,7	0,9	0,4	1,8	27
v111320	Other fresh pulses/leguminous plants	2	2,5	-0,3	0,4	2,0	3	1,8	-0,2	0,3	1,7	3
v111410	Carrots	7	0,7	1,6	0,8	2,3	17	0,5	1,0	0,6	2,0	15
v111420	Onions	8	0,7	1,6	1,1	2,5	21	0,5	1,0	0,8	2,2	18

Category number	Description	Expenditure	Land Use IMRIO^SRIO	delta M	delta Ph	IHMR	HMR	GWP IMRIO^SRIO	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v111430	Other carrot- and tuberous plants	4	0,4	1,9	0,2	1,8	7	0,8	0,8	0,8	2,2	8
v111510	Tomatoes	18	0,3	2,0	0,2	1,8	33	0,8	0,7	1,1	2,4	44
v111520	Other fresh vegetables	69	0,3	2,0	0,1	1,8	121	0,9	0,7	0,6	2,0	138
v111600	Dried vegetables	9	0,7	2,1	0,0	2,1	19	0,7	0,8	0,9	2,3	21
v111710	Vegetables, canned or bottled	37	0,6	2,1	-0,1	2,0	74	0,7	0,8	0,4	1,8	67
v111740	Sauerkraut	2	0,5	2,2	-0,2	1,9	4	0,7	0,9	0,3	1,7	3
v111750	Frozen vegetables	9	0,5	2,2	0,1	2,1	19	0,7	0,9	0,8	2,2	20
v112010	Apples	34	0,5	2,9	0,9	3,3	109	0,5	1,2	0,7	2,3	76
v112020	Pears	7	0,5	2,9	0,4	2,9	21	0,5	1,2	0,5	2,0	14
v112110	Strawberries	10	0,5	2,9	0,0	2,6	26	0,5	1,2	0,2	1,8	18
v112120	Cherries	3	0,5	2,9	0,1	2,7	8	0,5	1,2	0,3	1,9	5
v112130	Berries and raspberries	1	0,5	2,9	0,3	2,8	3	0,5	1,2	0,2	1,8	2
v112140	Prunes	2	0,5	2,9	0,4	2,9	6	0,5	1,2	0,3	1,9	4
v112150	Peaches	5	0,5	2,9	0,6	3,0	15	0,5	1,2	0,4	1,9	10
v112160	Melons	5	0,5	3,0	0,7	3,1	14	0,5	1,2	0,4	2,0	9
v112170	Grapes	8	0,5	2,9	0,5	3,0	23	0,5	1,2	0,3	1,9	15
v112210	Oranges	28	0,5	2,9	0,7	3,1	88	0,5	1,2	0,5	2,0	56
v112220	Mandarins	16	0,5	2,9	0,5	3,0	48	0,5	1,2	0,3	1,9	30
v112230	Other citrus fruit	5	0,5	2,9	0,5	3,0	14	0,5	1,2	0,3	1,9	9
v112300	Bananas	26	0,5	2,9	0,6	3,1	79	0,5	1,2	0,4	1,9	50
v112400	Other fresh fruit	12	0,5	2,9	0,6	3,0	35	0,5	1,2	0,5	2,0	23
v112500	Jams and marmalades	11	0,7	2,1	0,3	2,3	26	0,7	0,8	0,3	1,8	20
v112600	Fruit, dried/candied	6	0,5	2,2	1,2	3,0	19	0,7	0,9	0,6	2,0	13
v112700	Fruit in juice	8	0,5	2,2	0,1	2,2	17	0,7	0,9	0,3	1,7	13
v112720	Fruit, compote/sauce	9	0,5	2,2	0,5	2,4	21	0,7	0,9	0,4	1,8	16
v112810	Nuts and peanuts	30	0,5	8,0	3,7	9,2	274	0,7	2,5	0,4	3,3	96
v112820	Peanut spread	6	0,5	1,6	4,3	4,9	31	0,7	0,7	0,6	1,8	11
v1129	Potatoes, vegetables and fruit not specified	3	0,7	2,1	0,6	2,6	7	0,5	1,0	0,5	1,9	5

Category number	Description	Expenditure	**Land Use** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR	**GWP** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v113000	Sugar	16	1,1	2,8	0,6	3,4	53	0,9	1,3	-0,1	1,9	30
v113120	Honey	4	1,3	3,9	0,2	4,0	14	1,8	-0,1	-0,1	1,5	5
v113130	Sugar products on bread	1	1,1	1,9	0,0	2,2	3	0,9	0,9	0,2	1,8	3
v113200	Confectionary	58	1,1	1,9	0,0	2,2	128	0,9	0,9	0,2	1,8	105
v113300	Chocolate paste/butter on bread	15	1,1	3,5	7,9	9,4	140	0,9	1,6	-0,1	2,2	33
v113400	Other confectionary	57	1,1	3,5	3,0	5,7	328	0,9	1,6	0,1	2,4	136
v113500	Coffee	77	1,7	3,8	1,0	4,9	374	1,0	1,0	-0,4	1,5	112
v113600	Tea	17	1,7	3,8	2,6	6,1	102	1,0	1,0	-0,4	1,5	25
v113700	Cacao	1	0,8	3,8	5,7	7,7	9	0,7	1,8	-0,2	2,1	2
v114010	Mineral and soda water	11	0,5	0,5	0,0	0,7	7	0,6	0,3	0,2	1,1	12
v114020	Fruit and vegetable juices	63	0,5	4,7	1,0	4,7	298	0,6	2,1	0,5	3,0	190
v114030	Other non-alcoholic beverages	102	0,5	0,4	0,5	1,1	109	0,6	0,3	0,8	1,6	164
v114050	Non-alcoholic beer and wine	2	0,2	0,7	0,3	1,0	2	0,4	0,5	0,2	1,0	2
v114110	Beer	102	0,2	0,5	0,3	0,8	78	0,4	0,3	0,2	0,8	78
v114120	Wine	149	0,2	0,2	0,3	0,4	66	0,4	0,3	0,0	0,6	91
v114200	Spirits and liquors	78	0,1	0,1	0,0	0,2	14	0,2	0,0	0,0	0,3	23
v11430	Beverages not specified	2	0,5	0,5	0,0	0,7	1	0,6	0,3	0,0	0,9	1
v115000	Margarine	28	1,0	2,2	2,5	4,3	120	0,8	1,1	0,3	2,1	59
v115100	Other oils and fats	25	1,0	2,2	6,3	7,2	179	0,8	1,1	1,2	2,9	72
v115110	Fats for frying and deep frying	15	1,0	2,2	6,3	7,2	111	0,8	1,1	1,2	2,9	44
v115120	Salad oil	9	1,0	3,7	12,1	12,7	120	0,8	1,7	3,1	5,3	50
v116010	Beef, fresh	63	0,5	2,0	4,2	5,0	318	0,9	1,2	1,5	3,4	213
v116020	Veal, fresh	5	0,5	2,0	-0,3	1,6	9	0,9	1,2	-0,1	1,9	10
v116110	Pork, (fat), fresh	15	0,5	1,6	0,9	2,3	35	0,9	1,1	0,1	1,9	30
v116120	Other pork, fresh	78	0,5	1,6	0,6	2,0	155	0,9	1,1	0,1	1,9	148
v116200	Minced meat, fresh	88	0,5	2,0	4,5	5,2	458	0,8	1,2	1,7	3,5	310
v116300	Offal	25	0,5	1,5	4,2	4,6	115	0,8	0,9	1,6	3,1	76
v116400	Meat and meat products, frozen	27	0,4	1,6	4,1	4,6	123	0,8	0,9	1,5	3,0	81

Category number	Description	Expenditure	**Land Use** IMRIO^SRIO	delta M	delta Ph	IHMR	HMR	**GWP** IMRIO^SRIO	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v116510	Horse meat	1	0,4	1,6	1,9	3,0	4	0,8	0,9	0,6	2,1	3
v116520	Other meat products	13	0,5	1,5	3,9	4,5	57	0,8	0,9	2,2	3,7	47
v116550	Fresh meat, unspecified	6	0,4	1,6	3,1	3,8	23	0,8	0,9	1,2	2,7	16
v116600	Smoked meat	10	0,4	1,6	1,9	2,9	29	0,8	0,9	0,7	2,3	23
v116710	Ham	52	0,4	1,7	0,4	1,9	96	0,8	1,2	0,1	1,9	98
v116720	Bacon	12	0,4	1,7	0,5	2,0	24	0,8	1,2	0,1	1,9	23
v116800	Sausages and meat products	106	0,4	1,7	2,0	3,1	329	0,8	1,2	0,7	2,4	259
v116910	Fried minced meat	4	0,4	1,6	3,2	3,9	15	0,8	0,9	1,1	2,6	10
v116920	Ready-to-use meat dishes	6	0,6	1,4	1,7	2,8	16	0,9	0,9	0,6	2,1	12
v116930	Canned of bottled meat	11	0,4	1,6	2,1	3,1	35	0,8	0,9	0,6	2,2	25
v116940	Other meat and meat products not specified	1	0,4	1,6	2,5	3,4	2	0,8	0,9	0,9	2,5	2
v117010	Deer	1	0,4	1,6	-0,3	1,3	2	0,8	0,9	-0,4	1,3	2
v117020	Poultry	76	0,5	2,0	0,8	2,5	192	0,9	1,2	-0,1	1,9	145
v117100	Fish, fresh	25	0,0	0,2	0,0	0,2	4	1,6	1,6	0,4	3,3	82
v117130	Fish, frozen	8	0,0	2,2	0,0	1,7	14	1,1	2,8	-0,9	2,8	23
v117210	Herring	7	0,0	2,3	0,0	1,7	12	1,6	2,3	-0,6	3,1	22
v117220	Herring, pickled	2	0,0	2,2	0,0	1,7	3	1,1	2,8	-1,5	2,2	4
v117310	Fried fish	5	0,0	2,2	0,0	1,7	9	1,1	2,8	-1,3	2,4	13
v117320	Dried and smoked fish	14	0,0	2,2	0,0	1,7	24	1,1	2,8	-1,5	2,2	30
v117340	Preserved fish	5	0,0	2,2	-0,1	1,7	9	1,1	2,8	-0,6	3,1	16
v117500	Other fish	2	0,0	2,3	0,0	1,7	4	1,6	2,3	-0,6	3,1	7
v118000	Milk	120	1,1	0,9	0,1	1,6	187	1,5	0,5	0,6	2,4	288
v118100	Yogurt	5	1,3	0,9	-0,3	1,5	8	1,8	0,4	0,1	2,1	11
v118200	Custard and porridge	73	1,3	0,9	-0,4	1,4	103	1,8	0,4	-0,2	1,9	136
v118310	Coffee milk	16	1,3	0,9	-0,5	1,3	21	1,8	0,4	-0,2	1,8	29
v118320	Cream	5	1,3	0,9	-0,3	1,5	8	1,8	0,4	1,5	3,4	17
v118400	Ice cream	20	1,2	0,6	-0,5	1,0	20	1,7	0,2	0,0	1,7	34
v118600	Butter	17	1,2	2,3	-0,5	2,2	38	1,7	1,0	3,2	5,5	92

Category number	Description	Expenditure	**Land Use** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR	**GWP** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v118700	Cheese	192	1,2	1,1	0,3	2,0	375	1,7	0,5	1,0	3,0	576
v118800	Eggs	24	0,5	2,1	3,0	4,2	100	0,9	1,5	1,7	3,8	91
v1189	Other dairy products not specified	1	1,3	0,9	0,2	1,8	1	1,8	0,4	0,7	2,7	2
v119010	Salt, spices and condiments	36	1,0	1,9	-0,1	2,1	76	1,0	0,9	0,1	1,8	67
v119040	Dressings, mayonnaise etc.	37	1,0	1,9	0,2	2,3	85	1,0	0,9	0,2	1,9	72
v119100	Soup and meat stock	29	1,0	1,9	1,1	3,0	86	1,0	0,9	0,6	2,3	67
v119250	Main course dishes, frozen/canned etc.	64	1,0	1,9	-0,2	2,0	127	1,0	0,9	0,1	1,9	121
v119310	Coffee and tea, in restaurant, etc.	43	0,2	0,6	0,0	0,5	23	0,4	0,3	0,0	0,7	30
v119320	Beverages, in restaurant, etc.	116	0,2	0,6	0,0	0,5	62	0,4	0,3	0,0	0,7	80
v119410	French fries, rolls, snacks, etc. in restaurant	118	0,2	0,6	0,0	0,6	73	0,5	0,2	0,0	0,7	86
v119420	Other meals, in restaurant, etc.	355	0,2	0,6	0,0	0,6	220	0,5	0,2	0,0	0,7	258
v119430	Meals, delivered and take-away	101	0,5	0,4	0,0	0,6	63	0,7	0,1	0,0	0,7	74
v119440	Meals, place of consumption unknown	12	0,2	0,7	0,0	0,6	8	0,5	0,3	0,0	0,7	9
v119500	Candy, not at home	9	1,1	-0,2	0,0	0,6	6	0,9	-0,1	0,0	0,7	7
v119600	Ice cream, not at home	22	1,2	-0,3	0,0	0,6	14	1,7	-1,0	0,0	0,7	16
v119700	Outdoor consumption not specified	313	0,2	0,7	0,0	0,6	194	0,4	0,3	0,0	0,7	227
v1198	Other food products and beverages	7	1,0	1,9	0,8	2,7	20	1,0	0,9	0,3	2,1	15
v220010	Rent	1.809	0,2	0,0	0,1	0,2	386	0,2	0,0	0,1	0,3	481
v220020	Rental value	2.883	0,2	0,0	0,1	0,2	590	0,2	0,0	0,1	0,3	761
v220040	Additional costs	119	0,0	0,0	0,1	0,1	15	0,2	0,0	0,1	0,3	32
v220200	Wall paper and painting costs	91	0,1	0,2	0,3	0,4	38	0,5	0,6	0,0	0,9	84
v220300	Other maintenance costs	86	0,1	0,2	1,7	1,5	128	0,5	0,3	0,1	0,8	71
v221010	Construction of central heating	1	0,1	0,1	0,0	0,1	0	0,5	0,3	0,3	1,0	0
v221020	Boilers and geysers	3	0,0	0,1	0,0	0,1	0	0,4	0,6	0,0	0,9	3
v221030	Construction of other fixed equipment	7	0,0	0,1	0,0	0,1	1	0,4	0,4	0,1	0,8	5
v221110	Materials/maintenance central heating	4	0,1	0,1	0,0	0,1	1	0,5	0,5	0,3	1,2	5
v221120	Materials/maintenance other fixed equipment	55	0,3	-0,1	0,3	0,4	22	0,5	0,5	0,3	1,2	65

Category number	Description	Expenditure	Land Use IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR	GWP IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v221140	Service for maintenance central heating	58	0,1	0,1	0,0	0,1	6	0,3	0,5	0,1	0,8	46
v221150	Service other fixed equipment	39	0,1	0,0	0,0	0,1	4	0,4	0,4	0,1	0,8	30
v221400	Rent fixed equipment	11	0,0	0,1	0,0	0,1	1	0,3	0,4	0,1	0,8	9
v222000	Rent and maintenance garden	84	0,1	1,4	0,0	1,1	92	0,2	1,2	0,0	1,3	113
v222100	Other costs garden	156	0,1	1,4	0,5	1,5	227	0,6	0,8	0,1	1,4	225
v222200	Indoor plants and flowers	138	0,1	1,5	0,0	1,2	172	0,7	0,9	0,3	1,8	248
v224010	Furniture (set), cabinet	100	0,1	0,4	0,3	0,6	64	0,4	0,6	0,1	1,0	101
v224020	Other dining room and living room furniture	205	0,2	0,4	0,3	0,7	136	0,4	0,6	0,1	1,0	214
v224110	Bedroom and nursery furniture	29	0,1	0,2	0,3	0,5	15	0,4	0,4	0,1	0,8	22
v224120	Other bedroom and nursery furniture	75	0,1	0,2	0,3	0,5	38	0,4	0,3	0,1	0,8	57
v224140	Prams, buggies	8	0,0	0,4	0,0	0,3	3	0,3	0,7	0,0	0,9	7
v224210	Furniture garden, kitchen and study (set)	25	0,2	0,4	0,3	0,6	15	0,4	0,6	0,2	1,1	27
v224220	Other furniture garden, kitchen and camping	17	0,2	0,4	0,3	0,6	10	0,4	0,6	0,2	1,1	19
v224240	Other furniture	26	0,5	0,0	0,3	0,6	16	0,4	0,6	0,1	1,0	26
v224310	Net curtains	8	0,0	0,6	0,2	0,6	5	0,6	0,7	0,0	1,1	9
v224320	Curtains and material for curtains	51	0,0	0,6	0,2	0,7	34	0,6	0,6	0,0	1,1	53
v224330	Blinds and wire blinds	47	0,1	0,4	0,0	0,4	17	0,6	0,4	0,3	1,2	56
v224410	Lino	12	0,1	0,3	0,0	0,3	3	0,6	0,9	0,0	1,4	16
v224420	Parquet	33	0,9	1,3	0,8	2,3	75	0,3	0,5	0,1	0,9	28
v224500	Carpets, etc.	81	0,0	0,6	0,0	0,5	42	0,6	0,6	0,0	1,1	89
v224600	Other furniture textiles	37	0,1	0,5	0,2	0,7	25	0,4	0,8	0,0	1,1	39
v224700	Wall decoration	39	0,1	0,6	0,0	0,5	22	0,4	0,4	0,1	0,8	33
v224800	Statues, vases and knick-knacks	49	0,0	0,3	0,0	0,2	12	0,5	0,9	0,1	1,3	65
v224900	Mattresses	25	0,1	0,2	0,2	0,4	11	0,4	0,4	0,1	0,8	19
v225000	Blankets	2	0,0	0,6	0,1	0,6	1	0,6	0,6	0,0	1,1	2
v225210	Sheets and pillow-cases	33	0,0	0,6	1,2	1,4	45	0,6	0,7	-0,2	1,0	32
v225220	Quilts, eiderdowns	21	0,0	0,6	0,1	0,6	12	0,6	0,7	0,0	1,1	23
v225230	Other bedding	2	0,0	0,6	1,2	1,4	3	0,6	0,7	-0,2	1,0	2

Category number	Description	Expenditure	**Land Use** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR	**GWP** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v225300	Household linen	19	0,1	0,5	0,9	1,2	22	0,6	0,7	-0,1	1,0	19
v2255	Domestic decoration not specified	5	0,0	0,4	0,3	0,5	2	0,0	1,5	0,1	1,4	7
v226010	Electric food processors/utensils	28	0,0	0,2	0,0	0,2	5	0,4	0,5	0,1	0,9	25
v226050	Other food processors/utensils	2	0,0	0,2	0,0	0,2	0	0,4	0,4	0,1	1,0	2
v226100	Refrigerators and freezers	26	0,0	0,2	0,0	0,2	5	0,4	0,5	0,2	1,0	25
v226300	Pottery and glassware	25	0,0	0,3	0,0	0,2	6	0,5	0,8	0,1	1,3	32
v226330	Other cutlery and kitchen utensils	77	0,1	0,2	0,5	0,5	42	0,5	0,7	0,3	1,4	109
v226500	Stoves	5	0,0	0,2	0,0	0,2	1	0,4	0,8	0,1	1,2	6
v226600	Other cooking apparatus	20	0,0	0,2	0,0	0,2	4	0,4	0,8	0,1	1,2	25
v226720	Gas heaters	3	0,0	0,2	0,0	0,2	1	0,4	0,8	0,1	1,2	4
v226730	Other heaters and stoves	2	0,0	0,2	0,0	0,2	0	0,4	0,8	0,1	1,2	3
v226800	Lamps and armatures	51	0,0	0,2	0,0	0,2	10	0,4	0,6	0,1	1,0	49
v226910	Bulbs and fluorescent lamps	11	0,0	0,2	0,0	0,2	2	0,4	0,6	-0,1	0,8	9
v226920	Cords, plugs and switches	7	0,0	0,2	0,0	0,2	1	0,4	0,6	0,1	1,0	7
v227010	Vacuum cleaners	12	0,0	0,2	0,0	0,2	2	0,4	0,5	0,1	0,9	11
V227100	Washingmachines and tumble diers (electric)	56	0,0	0,2	0,0	0,2	11	0,4	0,5	0,1	0,9	52
V227210	Electric irons	3	0,0	0,2	0,0	0,2	1	0,4	0,5	0,0	0,8	2
v227215	Cleaning appliances not electric	19	0,0	0,2	0,0	0,2	3	0,5	0,7	0,2	1,3	24
v227220	Washing and ironing requisites	5	0,0	0,2	0,0	0,2	1	0,5	0,7	0,2	1,3	6
v227310	Brushes, brooms, sponges etc.	10	0,0	2,2	0,0	1,7	17	0,5	0,4	0,1	0,9	9
v227340	Accessories cleansing apparatus	4	0,0	0,2	0,0	0,2	1	0,3	0,9	0,1	1,2	5
v227510	Alarm clocks	2	0,0	0,2	0,0	0,2	0	0,3	0,6	0,1	0,9	1
v227520	Clocks	5	0,0	0,2	0,0	0,2	1	0,3	0,6	0,1	0,9	5
v227610	Electric sewing machines	5	0,0	0,2	0,0	0,2	1	0,4	0,5	0,0	0,8	4
v227620	Needlework tools	1	0,1	0,2	0,0	0,2	0	0,5	0,7	0,2	1,3	2
v227630	Other textile apparatus and accessories	1	0,0	0,2	0,0	0,2	0	0,4	0,8	0,0	1,1	1
v227710	Other electric apparatus	26	0,0	0,2	0,0	0,2	5	0,3	0,6	0,0	0,8	21

Category number	Description	Expenditure	**Land Use** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR	**GWP** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v227730	Other tools and articles	41	0,1	0,1	0,0	0,2	8	0,4	0,8	0,1	1,2	51
v227800	Repair and maintenance household appliances	10	0,0	0,1	0,0	0,1	1	0,3	0,1	0,0	0,4	4
v227900	Hire of household appliances	4	0,0	0,1	0,0	0,1	0	0,3	0,2	0,1	0,6	2
v228000	Fire- and burglary insurance	86	0,0	0,0	0,0	0,0	3	0,2	0,1	0,0	0,2	20
v229010	Natural gas	492	0,0	0,1	0,0	0,1	39	10,5	-3,8	0,0	6,2	3.062
v229020	Calor- and propane gas	1	0,0	0,3	0,0	0,2	0	1,9	1,1	0,0	2,7	3
v229110	Electricity	425	0,0	0,1	0,0	0,1	48	5,5	0,5	0,0	5,6	2.375
v229120	Batteries, aggregates etc.	20	0,0	0,4	0,0	0,3	6	0,4	1,2	0,1	1,6	32
v2292	Solid and liquid fuels	2	0,2	0,8	0,0	0,7	2	5,8	0,4	0,0	5,8	13
v229620	Collective energy costs	51	0,0	0,1	0,0	0,1	4	5,0	-3,8	0,0	1,1	58
v229640	Energy costs in rent	7	0,0	0,1	0,0	0,1	1	5,1	-3,9	0,0	1,1	8
v229700	Matches and candles	16	0,0	0,4	0,0	0,3	5	10,6	3,1	0,0	12,8	204
v330000	Mens coats	38	0,0	0,4	0,1	0,4	16	0,3	0,5	0,0	0,8	30
v330100	Suits, jackets and trousers	130	0,0	0,4	0,2	0,4	58	0,3	0,5	0,0	0,8	99
v330200	Cardigans and jersey/sweater	43	0,0	0,4	0,1	0,4	18	0,5	0,3	0,0	0,8	32
v330250	Shirts	72	0,0	0,4	0,1	0,4	29	0,4	0,5	0,0	0,8	55
v330300	Other outer wear	17	0,0	0,4	0,1	0,4	7	0,5	0,4	0,0	0,7	13
v330400	Night gowns and underwear	17	0,0	0,6	0,2	0,7	11	0,4	0,7	0,0	1,0	16
v330500	Mens sportswear and campingclothes	15	0,0	0,4	0,0	0,3	5	0,4	0,5	0,0	0,8	12
v330550	Mens clothes not further specified	3	0,0	0,4	0,1	0,4	1	0,4	0,5	0,0	0,8	2
v330600	Ladies coats	69	0,0	0,4	0,1	0,4	26	0,3	0,5	0,0	0,8	54
v330650	Dresses, blouses, trousers and skirts	321	0,0	0,4	0,0	0,4	115	0,3	0,5	0,0	0,8	248
v330700	Ladies stockings	22	0,0	0,4	0,0	0,4	8	0,5	0,3	0,0	0,8	17
v330750	Cardigans and jersey/sweater	111	0,0	0,4	0,1	0,4	44	0,5	0,3	0,0	0,8	83
v330800	Other outer wear	16	0,0	0,4	0,1	0,4	7	0,3	0,5	0,0	0,8	13
v330850	Night gowns and underwear	63	0,0	0,6	0,0	0,5	34	0,4	0,7	0,0	1,0	64
v330900	Ladies sportswear and campingclothes	19	0,0	0,4	0,0	0,3	7	0,4	0,5	0,0	0,8	15
v330950	Ladies clothes not further specified	4	0,0	0,4	0,0	0,4	1	0,3	0,5	0,0	0,8	3

Category number	Description	Expenditure	**Land Use** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR	**GWP** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v331000	Boys coats	11	0,0	0,4	0,2	0,5	5	0,3	0,5	0,0	0,8	9
v331050	Suits, jackets and trousers	21	0,0	0,4	0,4	0,6	14	0,3	0,5	0,0	0,8	16
v331100	Cardigans and jersey/sweater	16	0,0	0,4	0,1	0,4	7	0,5	0,4	0,0	0,8	12
v331150	Shirts	10	0,0	0,4	0,1	0,4	4	0,4	0,5	0,0	0,8	8
v331200	Other outer wear	5	0,0	0,4	0,1	0,4	2	0,4	0,4	0,0	0,8	4
v331300	Night gowns and underwear	7	0,1	0,7	0,5	0,9	6	0,4	0,7	-0,1	1,0	7
v331400	Boys sports-wear and campingclothes	6	0,0	0,4	0,0	0,4	2	0,4	0,5	0,0	0,8	5
v331550	Boys clothes not further specified	0	0,0	0,4	0,1	0,4	0	0,3	0,5	0,0	0,8	0
v331800	Girls coats	10	0,0	0,4	0,1	0,4	4	0,3	0,5	0,0	0,8	8
v331900	Dresses, blouses, trousers and skirts	51	0,0	0,4	0,1	0,4	20	0,3	0,5	0,0	0,8	39
v332000	Cardigans and jersey/sweater	18	0,0	0,4	0,1	0,4	7	0,5	0,3	0,0	0,8	14
v332050	Other outer wear	9	0,0	0,4	0,0	0,4	3	0,5	0,4	0,0	0,8	7
v332100	Night gowns and underwear	10	0,1	0,7	0,1	0,6	6	0,4	0,8	0,0	1,1	11
v332150	Girls sports-wear and campingclothes	5	0,0	0,4	0,0	0,3	2	0,4	0,5	0,0	0,8	4
v332200	Girls clothes not further specified	1	0,0	0,4	0,0	0,4	0	0,3	0,5	0,0	0,8	1
v33250	Baby clothes	29	0,1	0,4	0,1	0,4	11	0,4	0,5	0,0	0,8	22
v3327	Clothes unspecified (age, sex, unknown)	21	0,0	0,4	0,1	0,4	8	0,3	0,5	0,0	0,8	16
v3328	Clothing accessories	32	0,0	0,7	0,1	0,6	20	0,4	0,8	0,0	1,1	34
v333100	Material for clothes	15	0,0	0,6	0,2	0,7	11	0,5	0,6	0,0	1,1	16
v333150	Knitting wool	2	0,0	0,6	0,4	0,8	1	0,6	0,6	0,0	1,1	2
v333160	Requisites, haberdashery	11	0,1	0,6	0,1	0,5	5	0,5	0,7	0,0	1,1	11
v333200	Hire and charge for making clothes	5	0,0	0,1	0,0	0,1	0	0,3	0,0	0,0	0,3	2
v3340	Other clothing and requisites	3	0,0	0,6	0,1	0,5	1	0,4	0,7	0,0	1,1	3
v335000	Mens shoes	56	0,1	0,7	0,9	1,3	70	0,5	0,7	0,2	1,2	69
v335100	Other mens footwear	7	0,1	0,7	1,4	1,6	11	0,5	0,7	0,4	1,5	10
v335200	Mens sports shoes	13	0,1	0,7	0,1	0,6	9	0,5	0,7	0,0	1,1	15
v336000	Ladies shoes	108	0,1	0,7	0,3	0,9	93	0,5	0,7	0,0	1,1	117
v336100	Other ladies footwear	9	0,1	0,7	0,7	1,1	10	0,5	0,7	0,1	1,2	11

Category number	Description	Expenditure	**Land Use** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR	**GWP** IMRIO^{SRIO}	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v336200	Ladies sports shoes	10	0,1	0,7	0,1	0,7	7	0,5	0,7	0,0	1,1	11
v33700	Boys shoes	29	0,1	0,7	0,8	1,2	35	0,5	0,7	0,2	1,3	37
v33710	Girls shoes	31	0,1	0,7	0,9	1,3	39	0,5	0,7	0,2	1,3	39
V33720	Infant and baby footwear	1	0,1	0,7	0,6	1,0	1	0,5	0,7	0,1	1,2	2
v3375	Footwear unspecified (age. sex unknown)	2	0,1	0,7	0,6	1,0	2	0,5	0,7	0,1	1,2	3
v3376	Hire of footwear	3	0,0	0,1	0,0	0,1	0	0,3	0,0	0,0	0,3	1
v338000	Shoe repairs	8	0,0	0,2	0,0	0,1	1	0,3	0,1	0,0	0,4	3
v338100	Repairing materials	3	0,1	0,3	0,0	0,3	1	0,5	1,1	0,0	1,4	4
v338200	Leather goods etc.	46	0,1	1,3	1,6	2,3	104	0,5	1,1	0,2	1,6	75
v338300	Jewellery and watches	85	0,0	0,4	0,0	0,3	27	0,3	0,7	0,0	0,8	72
v338400	Other finery	11	0,0	0,4	0,0	0,3	4	0,3	0,6	0,0	0,9	10
v338500	Repairs to finery	9	0,0	0,1	0,0	0,1	1	0,3	0,1	0,0	0,3	3
v339	Clothing, footwear and accessories not specified	1	0,0	0,6	0,2	0,6	0	0,4	0,8	0,0	1,1	1
v440000	Wages for domestic staff/servants	160	0,0	0,0	0,0	0,0	1	0,1	0,0	0,0	0,1	9
v440100	Laundry, dry cleaning, dye works	17	0,0	0,1	0,0	0,1	1	0,2	0,1	0,0	0,3	5
v440230	Window-cleaning service etc.	34	0,0	0,1	0,0	0,1	4	0,1	0,2	0,0	0,3	12
v440240	Babysitting, nursery etc.	184	0,1	0,1	0,0	0,1	23	0,2	0,1	0,0	0,3	54
v441000	Water	153	0,0	0,1	0,0	0,1	10	0,4	0,5	0,0	0,9	139
v441110	Household soap	0	0,1	0,2	0,0	0,2	0	0,4	0,6	0,1	1,1	0
v441200	Washing powders etc.	55	0,1	0,2	0,2	0,3	19	0,4	0,6	0,3	1,3	70
v441210	Detergents	16	0,1	0,2	0,0	0,2	3	0,4	0,6	0,1	1,1	17
v441300	Other cleaning articles and insecticides	38	0,1	0,2	0,0	0,2	7	0,4	0,6	0,1	1,1	42
v442000	Toilet-articles	134	0,1	0,2	0,9	0,8	113	0,5	0,4	0,1	0,9	114
v442100	Toilet paper	32	0,1	0,6	2,1	2,1	68	0,5	0,3	0,6	1,3	41
v442200	Sanitary towels	16	0,1	0,6	0,7	1,1	17	0,7	0,1	0,0	0,8	12
v442300	Visits to (public) baths/toilet/sauna	11	0,1	0,1	0,0	0,1	1	0,3	0,1	0,0	0,3	3
v443000	Hairdresser	153	0,0	0,1	0,0	0,1	13	0,2	0,1	0,0	0,3	41
v443110	Electrical articles for hair care	5	0,0	0,2	0,0	0,2	1	0,4	0,5	-0,1	0,7	4

Category number	Description	Expenditure	**Land Use**					**GWP**				
			IMRIO[SRIO]	delta M	delta Ph	IHMR	HMR	IMRIO[SRIO]	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v443120	Other articles for hair care	68	0,1	0,2	0,0	0,2	11	0,4	0,4	0,0	0,8	54
v444000	Chiropodist, manicurist, beauty salon	34	0,0	0,1	0,0	0,1	4	0,2	0,1	0,0	0,3	10
v444100	Cosmetics and perfumery	101	0,1	0,2	0,0	0,2	17	0,4	0,4	-0,1	0,7	69
v550000	School fees, course and professional training	75	0,1	0,1	0,0	0,1	6	0,2	0,1	0,0	0,3	20
v550100	Music-, dancing- and sports lessons	81	0,1	0,0	0,0	0,1	6	0,3	0,0	0,0	0,3	26
v550150	Course fees	167	0,0	0,1	0,0	0,1	9	0,2	0,1	0,0	0,3	52
v550200	Study books and educational appliances	103	0,1	0,7	0,2	0,7	71	0,4	0,4	-0,1	0,7	69
v550300	Other educational costs	26	0,0	0,0	0,0	0,1	2	0,3	-0,1	0,0	0,2	5
v550400	Typewriter, counting machine/calculator	1	0,0	0,4	0,0	0,3	0	0,3	0,8	0,0	1,0	1
v550450	Computer and assesories	219	0,0	0,4	0,0	0,3	74	0,3	0,8	0,0	1,0	228
v550460	Other stationary	53	0,1	0,4	0,0	0,4	19	0,3	0,6	0,0	0,9	46
v550500	Newspaper and weekly papers	190	0,1	0,7	0,5	1,0	192	0,4	0,5	0,2	1,0	187
v550610	Books	90	0,1	0,7	0,2	0,7	61	0,4	0,4	-0,1	0,7	60
v550620	Journals, periodicals and magazines	39	0,1	0,7	0,1	0,7	27	0,4	0,5	-0,1	0,7	29
v551100	Hire sports accommodations	59	0,2	-0,1	0,0	0,1	5	0,3	-0,1	0,0	0,3	18
v551210	Sailing boats and motorboats	16	0,0	0,2	0,0	0,2	3	0,4	0,5	0,1	0,9	15
v551250	Sports goods	36	0,1	0,4	0,0	0,4	13	0,3	0,8	0,0	1,0	35
v551300	Games	10	0,1	0,4	0,1	0,4	5	0,3	0,8	0,0	1,0	10
v551400	Contribution sports clubs	124	0,1	0,3	0,0	0,3	40	0,3	0,5	0,0	0,8	97
v551610	Caravans etc.	89	0,0	0,2	0,0	0,2	21	0,4	0,6	0,3	1,3	117
v551620	Other camping equipment	21	0,1	0,4	0,2	0,5	10	0,5	0,4	0,0	0,9	19
v551640	Hire and maintenance camping equipment	19	0,0	0,1	0,0	0,1	1	0,4	0,0	0,0	0,3	6
v55170	Holyday insurance	42	0,0	0,0	0,0	0,0	1	0,2	0,1	0,0	0,2	10
v55180	Other costs weekend-spendings	98	0,2	0,7	0,0	0,6	63	0,7	0,0	0,0	0,7	67
v551900	All-inclusive holidaytrips, domestic	63	0,0	0,2	0,0	0,2	12	0,2	0,8	0,0	0,9	58
v551950	Other holiday costs, domestic	92	0,1	0,8	0,0	0,6	60	0,2	0,5	0,0	0,7	63
v552100	All-inclusive holidaytrips, abroad	482	0,1	0,2	0,0	0,2	89	0,9	0,1	0,0	0,9	449
v552200	Other holiday costs, abroad	506	0,1	0,8	0,0	0,7	336	0,2	0,5	0,0	0,7	345

Category number	Description	Expenditure	**Land Use** IMRIO[SRIO]	delta M	delta Ph	IHMR	HMR	**GWP** IMRIO[SRIO]	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v55250	Holiday costs not specified	24	0,1	0,8	0,0	0,6	15	0,2	0,5	0,0	0,7	16
v553100	Entrance fees concert, theatre, etc.	71	0,2	0,2	0,0	0,3	21	0,4	0,3	0,0	0,7	47
v553200	Musical instruments	11	0,1	0,4	0,0	0,4	4	0,3	0,8	0,0	1,0	11
v553300	Hire and repairs of musical instruments	14	0,2	0,0	0,0	0,1	2	0,3	0,0	0,0	0,3	5
v553510	Radios	2	0,0	0,4	0,0	0,3	1	0,3	0,7	0,0	1,0	2
v553520	Audio amplifier	14	0,0	0,4	0,0	0,4	5	0,3	0,7	0,1	1,0	14
v553530	Car radios inclusive accessories.	9	0,0	0,4	0,0	0,3	3	0,3	0,7	-0,1	0,8	8
v553600	Television sets	59	0,0	0,4	0,1	0,4	24	0,3	0,7	0,1	1,0	60
v553710	Gramophones	1	0,0	0,4	0,0	0,3	0	0,3	0,7	0,1	1,0	1
v553720	Cassette and tape recorders	12	0,0	0,4	0,0	0,3	4	0,3	0,7	0,0	0,9	11
v553730	Videos	51	0,1	0,4	0,0	0,3	17	0,5	0,5	0,0	1,0	49
v553800	Soundequipment (combined)	46	0,0	0,4	0,0	0,3	16	0,3	0,7	0,1	1,0	46
v553900	Hire/repairs audio/video equipment	26	0,0	0,1	0,0	0,1	2	0,3	0,0	0,1	0,4	10
v554000	Records, cassettes and compact disks	78	0,0	0,4	0,0	0,3	25	0,3	0,6	-0,1	0,8	64
v554110	Radio and television license fee	30	0,2	0,2	0,0	0,3	8	0,4	0,3	0,0	0,6	19
v554120	Radio/TV programme magazine	22	0,1	0,3	0,6	0,8	17	0,4	0,4	0,0	0,7	16
v554130	Fee subscription television	10	0,0	0,3	0,0	0,3	3	0,2	0,5	0,0	0,6	6
v554300	Film and projection equipment	0	0,0	0,2	0,0	0,2	0	0,3	0,6	-0,1	0,8	0
v554350	Photo cameras	19	0,0	0,2	0,0	0,2	3	0,3	0,5	-0,1	0,7	13
v554450	Film and photo accessories	76	0,1	0,2	0,6	0,6	45	0,3	0,5	0,0	0,8	57
v554455	Optical instruments and accessories	1	0,0	0,3	0,0	0,2	0	0,3	0,8	0,1	1,2	2
v554610	Purchase of pets	14	1,2	4,1	0,0	4,0	56	1,8	1,2	-0,2	2,6	37
v554620	Costs tending pets	167	0,4	-0,3	0,2	0,3	44	0,5	-0,1	0,0	0,4	66
v554650	Services provided by clubs	3	0,1	0,1	0,0	0,1	0	0,2	0,1	0,0	0,3	1
v554700	Cultural clubs	79	0,1	0,4	0,0	0,3	26	0,3	0,5	0,0	0,7	57
v554750	Lincenses and taxes relaxation	6	0,0	0,1	0,0	0,1	0	0,0	0,3	0,0	0,3	2
v554800	Other entrance fees	62	0,3	0,2	0,0	0,3	18	0,3	0,3	0,0	0,7	41
v554900	Other hobbies	16	0,1	0,3	0,0	0,3	4	0,3	0,4	-0,2	0,5	8

Category number	Description	Expenditure	**Land Use** IMRIO^SRIO	delta M	delta Ph	IHMR	HMR	**GWP** IMRIO^SRIO	delta M	delta Ph	IHMR	HMR
		Euros (2000)	m2/euro				m2	kg CO2 eq/euro				kg CO2 eq
v555000	Party articles	30	0,1	0,1	0,0	0,2	6	0,5	1,0	0,0	1,4	43
v5551	Toys	93	0,1	0,3	0,0	0,3	30	0,3	1,2	0,0	1,4	130
v556000	Cigars	11	0,3	1,4	-0,4	1,0	11	0,2	0,6	-0,3	0,5	6
v556100	Cigarettes	145	0,3	1,0	-0,3	0,7	106	0,2	0,4	-0,2	0,4	61
v556200	Other tobacco articles	79	0,3	1,0	-0,3	0,8	62	0,3	0,4	-0,1	0,5	40
v556300	Smokers accessories	2	0,0	0,3	0,0	0,3	1	0,3	1,2	0,0	1,4	3
v557000	Train	167	0,1	0,1	0,0	0,2	29	0,7	0,1	0,0	0,7	119
v557110	Taxi	23	0,1	0,1	0,0	0,2	4	0,7	0,1	0,0	0,7	16
v557120	Other public transport	82	0,2	0,0	0,0	0,2	14	2,6	-1,8	0,0	0,7	58
v557200	Purchase bicycles	82	0,0	0,3	0,0	0,2	18	0,4	0,7	0,0	1,0	80
v557300	Bicycle accessories and repairs	48	0,0	0,2	0,0	0,2	9	0,3	0,9	0,0	1,1	54
v557400	Mopeds, motor cycles and scooters	37	0,0	0,2	0,0	0,2	6	0,3	0,4	-0,1	0,6	22
v557500	Repair mopeds, motor cycles and scooters	16	0,0	0,1	0,0	0,1	1	0,3	0,0	0,0	0,3	5
v5576	Cars	1.454	0,0	0,2	0,0	0,1	205	0,2	0,5	0,0	0,8	1.122
v557910	Car/motor cycle storage	35	0,0	0,1	0,0	0,1	3	0,3	-0,1	0,0	0,2	9
v557920	Bicycle/moped storage	2	0,0	0,1	0,0	0,1	0	0,3	-0,1	0,0	0,2	1
v558010	Insurance car	303	0,0	0,0	0,0	0,0	11	0,2	0,1	0,0	0,2	72
v558020	Insurance motor cycle, scooter	8	0,0	0,0	0,0	0,0	0	0,2	0,1	0,0	0,2	2
v558030	Insurance moped and bicycle	9	0,0	0,0	0,0	0,0	0	0,2	0,1	0,0	0,2	2
v558040	Other insurance vehicles/vessels etc.	8	0,0	0,0	0,0	0,0	0	0,2	0,1	0,0	0,2	2
v558110	Petrol, oil for cars and motor cycles	875	0,0	0,1	0,0	0,1	62	4,0	0,0	0,0	3,7	3.253
v558120	Other petrol and oil	1	0,0	0,1	0,0	0,1	0	0,6	0,4	0,0	0,9	1
v558200	Telephone	614	0,0	0,0	0,0	0,0	27	0,2	0,2	0,0	0,4	217
v558300	Postal expenses	27	0,0	0,0	0,0	0,0	1	0,2	0,0	0,0	0,2	6
v558420	Driving lessons	48	0,0	0,1	0,0	0,1	4	0,2	0,1	0,0	0,3	14
v558430	Cargo services	16	0,1	0,1	0,0	0,1	2	0,7	0,4	0,1	1,2	18