MISTRA SUSTAINABLE CONSUMPTION
FRÅN NISCH TILL MAINSTREAM

Potentials and consequences of altered consumption practices

WP2 summary report

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1 Introduction

The purpose of this report is to compile the main findings from work package 2 (WP2) "Potentials and consequences of altered consumption practices", a part of the research program Mistra Sustainable Consumption - from niche to mainstream. While the sustainability problems related to current consumption patterns are relatively well understood from previous quantitative consumption research (e.g. Hertwich & Peters, 2009; Steen-Olsen et al, 2012), the transformation towards sustainable consumption needs to be guided by assessments of the expected effects of the available alternatives to mainstream consumption patterns. The starting point of WP2 is the mapping of emerging of potentially sustainable consumption practices carried out at the start of the research programme (Kamb et al 2019, Lehner et al 2019, Thorson et al 2019). Analyses of potentials and consequences of the upscaling of these practices are performed in relation to environmental, social and economic indicators. The results of these assessments are also intended to guide choices in the subsequent WPs that address how consumption patterns may be transformed (WP3-5) (see Figure 1.1).

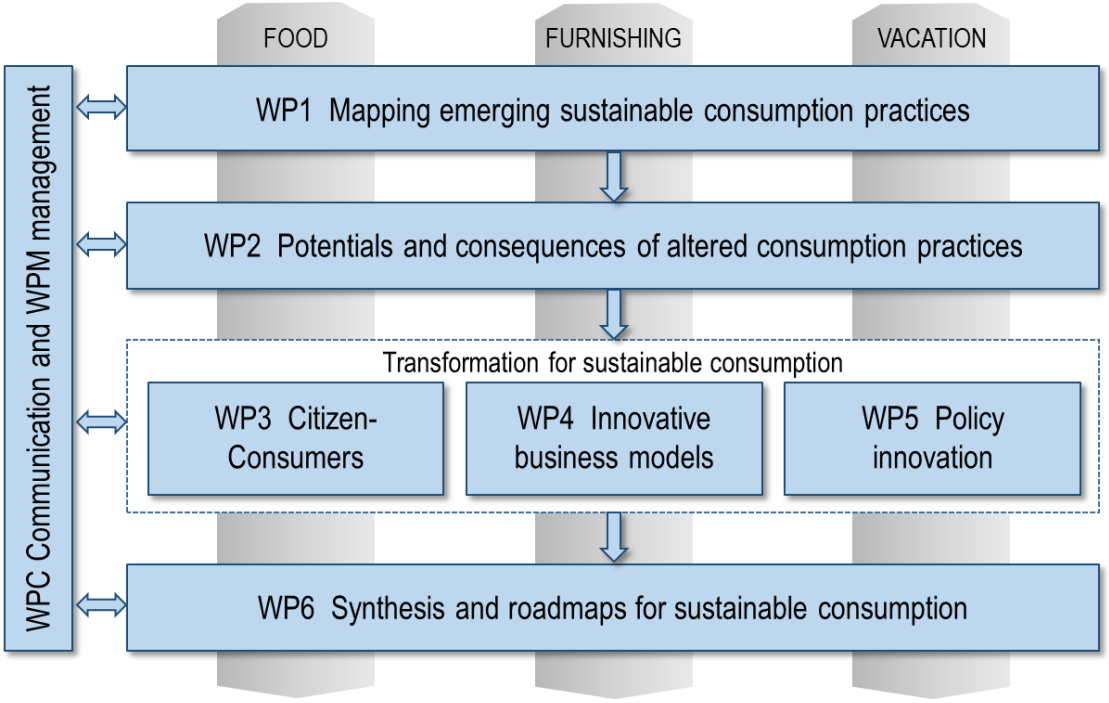

Figure 1.1. Work packages and focus areas in the research programme Mistra Sustainable Consumption.

The research questions of WP2 were defined as:

1. What aggregated environmental consequences, on local to global levels, can be expected from of the scale up of emerging consumption practices (e.g. sharing, voluntary simplicity and consumption of eco-efficient products), also considering rebound effects?

2. What public health consequences can be expected from the scale up of these new practices?

3. What macro-economic consequences can be expected from large-scale changes in consumption patterns?

4. Which are the emerging consumption practices that have the greatest potential to be scaled up without negative side effects?

This report summarizes the current state of the different tasks within the work package as of December 2022. It's noteworthy, however, that all tasks of this work package have not been finalized or published yet. Hence some results and conclusions may be updated and completed in later publications from the research program.

The structure of the report is as follows: Section 2 describes the scope and delimitations of the research, Section 3 to 7 provides summaries of the different tasks performed in the work package, and finally Section 8 is a newly written macro-economic comment on the results.

2 Scope

The topic of this work package, "potentials and consequences of altered consumption practices", could of course incorporate many different areas of sustainability. In this section, we describe the delimitations of the analyses that follow the plan for the research program which describes the environment and public health as the main focus areas. A smaller part of the work package is also addressing macro-economic effects.

There are several different definitions of sustainable consumption in the literature, two of which are quoted here as examples:

> The use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the lifecycle, so as not to jeopardize the needs of future generations (Ofstad, 1994).

> Sustainable consumption is an umbrella term that brings together a number of key issues, such as meeting needs, enhancing quality of life, improving efficiency, minimizing waste, taking a lifecycle perspective and taking into account the equity dimension; integrating these components parts in the central question of how to provide the same or better services to meet the basic requirements of life and the aspiration for improvement, for both current and future generations, while continually reducing environmental damage and the risk to human health (UNEP 2001).

Clearly, definitions differ regarding what sustainability dimensions that are identified. In the Mistra Sustainable Consumption program, the ecological dimension of sustainable development has a relatively strong focus on greenhouse gas (GHG~~)~~ emissions, as motivated by its top position on the political agenda. In addition, quantifications of land use, blue water consumption, and use of toxic chemicals have been analyzed. An important aspect that has not been included in this project is biodiversity (although biodiversity may be indirectly affected by all the other four studied indicators). Connecting consumer behaviour directly to biodiversity loss would be a very interesting but challenging task from a data perspective and this is something for future research to consider.

The project does not only consider direct effects of specific consumer behaviours (e.g. effects of a vegan diet on emissions from food consumption) but also second order effects, i.e. how one behaviour may affect other behaviours through for example rebound effects from respending. Second order effects are specifically analyzed in the research summarized in Sections 5 and 6 while the scenarios described in Sections 3 and 4 also incorporate different assumptions to account for such effects.

The analyses of social sustainability aspects have been limited to public health and employment effects in this work package, hence excluding central aspects such as cohesion/capital/trust and fairness/equity/justice aspects (see e.g. Gagnon et al 2009, Murphy 2012, Holmberg & Larsson 2018 for reviews on social sustainability). Some of these aspects are highlighted in other parts of the program that rather focus on ways to transform consumption patterns. Fairness, for example, has been studied in work package 5 in the analysis of policy instruments for sustainable consumption (Larsson, Matti, Nässén, 2019).

Jackson & Michaelis (2003) also identified differences regarding what types of changes that are emphasized in the different definitions of sustainable consumption:

> A second, related point of variation between these definitions lies in the extent to which they imply consuming more efficiently, consuming more responsibly, or quite simply consuming less. Some definitions leave this question entirely unspecified. Some insist that sustainable consumption implies consuming less. Others assert that it does not mean consuming less (Jackson & Michaelis 2003).

In this regard the Mistra Sustainable Consumption program has consciously avoided to take a rigid stance on whether sustainable consumption should be interpreted in the strong critical version (consuming less, sufficiency) or the weaker version (consuming differently and more effectively). Rather we see a need to assess the potential of both (1) the downsizing of goods and services by consuming less (Carlsson Kanyama et al 2013), and (2) the shifting to more resource-efficient products and services (Bicket & Vanner 2016), as well as (3) the sharing of goods and services (Mont, 2004).

3 Potential environmental and socioeconomic effects overseas due to the mainstreaming of sustainability-motivated niche practices in Sweden

Nils Brown, Mårten Berglund & Viveka Palm

This summary is based on the report Brown, N. Berglund, M, Palm., V., 2021. Potential environmental and socioeconomic effects overseas due to the mainstreaming of sustainability-motivated niche practices in Sweden.

3.1 Introduction and aim

Previously in the MISTRA sustainable consumption project, consumption practices which have the potential to reduce environmental pressures compared to current average consumption practices have been surveyed for each of the three focus areas for MISTRA sustainable consumption – vacations (Thorson et al 2019), furnishing (Lehner et al 2019 and food (Kamb et al 2019). These are termed ”niche practices” since they are currently performed by a relatively small number of consumers in Sweden.

The aim of this work has been to evaluate how environmental pressures and socioeconomic indicators (value added and employment) may change *outside of Sweden* when niche practices such as those surveyed are scaled-up (mainstreamed) so that they are practiced by all consumers in the country.

3.2 Method

A baseline for Sweden’s national consumption was established by classifying the total national private consumption (in monetary terms) into 27 categories according to the Classification of Individual Consumption by Purpose (COICOP). The number of categories was determined by the need to reflect the changes in national consumption due to the integration of the niche practices with sufficient granularity and also the desire to avoid unnecessarily large quantities of data. The environmental pressures and socioeconomic indicators due to the baseline national consumption were quantified using the PRINCE hybrid environmentally-extended input-output model (Palm et al, 2019). The environmental pressures and socioeconomic indicators were classified according to the same 27 COICOP categories as mentioned above. They were further classified according to 8 geographical areas (where the pressures and socioeconomic outcomes arise) – Sweden, Rest of Europe, Russia, China, North America, Rest of World (Africa), Rest of World (Asia), Rest of World (Americas). Going beyond the standard PRINCE method, a special model was developed to calculate the environmental pressures for each of the eight COICOP food categories reflecting their widely varying environmental intensities.

A number of considerations were applied in selecting the niche practices to be assessed from the results of the MISTRA SC surveys. Firstly, it was intended to assess at least two niche

practices from each of the MISTRA SC focus areas. Secondly, the potential for the input-output method applied to meaningfully assess the practices was considered. Thirdly, practices were selected based on their judged potential for delivering large changes in environmental pressures and socioeconomic outcomes. It was also intended to select practices based on the possibility of being able to demonstrate interesting results related to the study's aims. The 10 mainstreamed niche practices that were assessed in this study are shown in Table 3.1 below. Table 3.1 also summarizes the assumptions used when making the initial changes in baseline consumption expenditure for each niche practice.

As well as direct changes in consumption expenditure, indirect changes were also modelled. A key parameter here was the difference in total national consumption expenditure after applying direct changes according to the mainstreamed niche consumption practice. In most cases, national consumption expenditure after applying direct changes due to the niche practice was less than the baseline. In these cases, three scenarios for indirect changes were considered:

- ”Reduced income” assuming that people reduce their income according to the reduction in consumption expenditure, for example by working less.
- ”Redistributed consumption” assuming that the surplus arising from mainstreaming the niche practice is redistributed proportionally to COICOP consumption categories not directly affected by the niche consumption practice.
- ”Increased investment” assuming that the surplus arising from mainstreaming the niche practice is saved and therefore contributes to increased investment.

In some cases, the national consumption expenditure after mainstreaming the niche practice was greater than in the baseline. In which case, three other scenarios for indirect effects were considered:

- ”Increased income” – assuming that people increase their income to balance the increased expenditure.
- ”Redistributed consumption” – assuming that people reduce their consumption in CIOCOP categories not directly affected by the niche practice in question to meet the change in demand due to the mainstreaming.
- ”Decreased investment” – assuming that people reduced savings and therefore investment to meet the increased consumption due to the mainstreamed niche practice.

In two cases niche consumption practices were mainstreamed by assuming no change in total consumption expenditure compared to the baseline. In these case modelling of indirect effects in this way was not relevant.

Considering all selected mainstreamed niche practices and scenarios for indirect effects a total of 26 different adjusted national consumption profiles were modelled.

After establishing the monetary consumption profiles including indirect and direct effects of the niche practices selected, the changes in environmental pressures and socioeconomic outcomes were modelled using intensity values derived from the baseline values as modelled by PRINCE noted above.

3.3 Results

The Tables 3.2, 3.3 and 3.4 summarise the results of the assessment of each selected mainstreamed niche practice in combination with assumed scenarios for indirect effects. These tables have been produced specifically with the aim of addressing the research question for the work with the focus on changes occurring *outside of Sweden*. The data have nevertheless been simplified for this summary by aggregating into only three geographical regions, as shown in the tables.

One key insight with the specific aims of the study in mind is that for changes of about one percent or more (as shown in the tables) the geographical distribution of total changes in environmental pressures and socioeconomic performance that occur *outside of Sweden* roughly follows the geographical distribution *of overall* pressures and performance in the baseline. However, there are some exceptions to this, as noted below.

For greenhouse gas emissions, food-related mainstreamed niche practices show changes compared to the baseline that broadly follow the distribution of overall greenhouse gas emissions between the regions considered. However, for other mainstreamed niche practices, the distribution of the changes varies from the distribution of overall greenhouse gas emissions in the baseline. For example, for bus and train-related mainstreamed niche practices, the change in greenhouse gas emissions in Europe due to the niche practices is proportionally greater than greenhouse gas arising in Europe overall.

Reductions in land use due to food-related mainstreamed niche practices shown in Table 3.2 are almost 25 percent for the Rest of Europe, slightly larger than the region's proportion of overall environmental pressure in the category in the baseline of about 15 percent. Changes in land use for other mainstreamed niche practices are in general much smaller than for food-related practices. Distribution of changes amongst the various regions (Table 3.3 and 3.4) for these mainstreamed niche practices varies considerably from the distribution for land use from Swedish consumption in the baseline, depending of course on the practice and scenarios in question. One exception to this is the 5.7 percent reduction in land use arising for "reduced living area" in the reduced income scenario, where the proportional reduction in Sweden (Table 3.4) is only slightly greater than that for land use from total baseline consumption.

Only for vegan diet and the redistributed consumption scenario in "reduced living area" do changes in blue water consumption amount to more than one or two percent in either direction. For these niche practices with comparatively larger changes in blue water consumption, the distribution of the changes shown in 3.2, 3.3 and 3.4 broadly follows the overall geographical distribution of blue water consumption in the baseline. Where changes in blue water consumption are smaller, the distribution of changes differs considerably from the distribution of overall blue water consumption.

Changes in the use of toxic chemicals are largest for the reduced income scenario for "reduced living area" at -5.6 percent compared to the baseline. The proportional decrease in Sweden here at -32 percent of the total decrease is slightly larger than the environmental

pressure in Sweden in the baseline of about 20 percent. The increased investment scenario for "reduced living area" is also interesting since the total change in the use of toxic chemicals is distributed roughly equally between the three regions shown in Table 3.4, in contrast to the domination of the Rest of Europe in the category for Swedish consumption in the baseline. Changes in the use of toxic chemicals are also relatively large for "vegan diet". As shown in Table 3.2, the regional distribution of the changes roughly matches the regional distribution for the environmental pressure category as a whole, where pressures arising in the Rest of Europe account for about 70 percent. This pattern is also roughly followed for the other two food-related mainstreamed niche practices. For mainstreamed niche practices where the change in the use of toxic chemicals is smaller, less than about one percent or so, some deviation in the regional distribution of changes from the overall regional distribution for the environmental pressure category can be seen. One example of this is for train vacation (b) where over 90 percent of the total reduction arises in Sweden.

The largest change in value added is seen for the reduced income scenario for "reduced living area" at – 5.5 %. Here, the proportion of the total change occurring in Sweden at 84 % is only very slightly larger than Sweden's proportion of the total value added in the baseline of about 75 %. Meanwhile, for food-related niche practices that also show relatively large reductions in value added, changes in the Rest of Europe amount to between 32 % and 45 % of the total changes. These proportions are larger than the Rest of Europe's proportion of the total value added in the baseline of about 20 %. For mainstreamed niche practices where the change in value added was smaller, the regional distribution in the changes differed somewhat from the regional distribution for value added as a whole.

The change in employment was largest for all scenarios for "reduced living area", spanning from a decrease of 3.6 % to an increase of 4.5 % compared to the baseline. In the reduced income and redistributed consumption scenarios the regional distribution of the changes as shown in the table is broadly similar to the regional distribution of employment in the baseline. On the other hand, the regional distribution of the changes in the increased investment scenario saw an overrepresentation of changes in the Rest of Europe and the Rest of the World (and underrepresentation for Sweden) as compared to the baseline distribution. For food-related mainstreamed niche consumption practices changes in Sweden were also underrepresented and changes in the Rest of the World and the Rest of Europe overrepresented compared to the baseline distribution. The reduced income scenario of "sustainable home furnishings and appliances" is another example where the regional distribution of changes in employment do not follow exactly the regional distribution of changes in the baseline. In this case, changes in Sweden are underrepresented and changes in the Rest of the World are overrepresented compared to the baseline. For most other mainstreamed niche practices, the total changes in employment are comparatively smaller and the regional distribution can vary widely compared to the regional distribution in the baseline.

3.4 Discussion

An important point to raise here is that though the study is focussed on changes arising outside of Sweden, much of the results that have been produced are of a wider interest for MISTRA SC and more broadly, not least in demonstrating the potential overall changes in environmental pressures and socioeconomic performance that can arise due to the mainstreaming of niche practices. A few issues related to this can be brought up here.

The overall changes arising in environmental pressures and socioeconomic performance do seem modest in this study compared to the total baseline pressures. One significant reason for this is that each mainstreamed niche practice in and of itself was only aimed a smaller portion of the total baseline pressures. One key absence that is important to note is that at for no niche practices was a change in habits of private car use considered. Larger indicator changes may have arisen had this been done, in light of the fact that car transport accounts for about one third of total greenhouse gas emissions from private consumption for example. This can be compared to greenhouse gas emissions arising due to food consumption in the baseline which account for only 20 percent of the total.

The results as presented are best considered a *screening* of potential changes in environmental pressures and socioeconomic outcomes rather than anything more specific. With this in mind, it is interesting to note for example the differences in magnitude in the changes between different mainstreamed niche practices summarised in the tables below. It is also significant that the changes noted to some extent arise outside of Sweden. On the other hand, further analysis would be useful to understand more specifically the amount by which environmental pressures and socioeconomic outcomes change in light of the mainstreamed niche practices, and where specifically the changes may arise.

The method assumed that monetary changes in the national consumption profile would arise for each of the geographical areas in proportion to their original monetary consumption in the baseline. This assumption is implicit in the way that the original PRINCE model evaluates environmental pressures due to Sweden's imports, as described in more detail in Palm, et al. (2019). This meant that it was not possible in the study to evaluate specifically if changes in imports from particular geographical areas could change environmental pressures or socioeconomic outcomes.

Table 3.1. Summary of assumptions applied for modelling the mainstreaming of niche practices.

MISTRA SC focus area	Name of mainstreamed niche practice	Summary of assumptions for expenditure profile
Food	Lacto-ovo vegetarian diet	Expenditure on meat and fish set to zero. Additional expenditure on milk, cheese and eggs, vegetables and cereals and grains in light of this evaluated based on a protein balance.
Food	Non-bovine/ porcine diet	Expenditure on pork and beef products is set to zero. Additional expenditure on poultry, milk, cheese and eggs, vegetables and cereals and grains based on a protein balance.
Food	Vegan diet	Expenditure on all animal products (meat, fish, dairy products and eggs) is set to zero. Additional expenditure on vegetables, cereals and grains based on a protein balance.

Holiday	Bus holiday (a)	Baseline expenditure on air transport (COICOP 0733) set to zero. Baseline expenditure on bus transport (COICOP 0732) increased by an equivalent amount to yield unchanged total consumption expenditure.
Holiday	Bus holiday (b)	Baseline expenditure on air transport (COICOP 0733) set to zero. Baseline expenditure on bus transport (COICOP 0732) increased by half of the original baseline expenditure on air transport.
Holiday	Train holiday (a)	Baseline expenditure on air transport (COICOP 0733) is set to zero. Expenditure on rail transport (COICOP 0731) increased by an equivalent amount.
Holiday	Train holiday (b)	Baseline expenditure on air transport (COICOP 0733) is set to zero. Expenditure on rail transport (COICOP 0731) increased by double the baseline expenditure on air transport.
Holiday	Staycationing	Reductions to baseline expenditures railway transport (COICOP 0731), bus transport (COICOP 0732) by 25 percent air transport (COICOP 0733) by 50 percent restaurants and hotels (COICOP 11) by about 11 thousand MSEK (the baseline expenditure on the subcategory of hotels, COICOP 1120) Increases to baseline expenditure: housing and utilities (COICOP 04) would increase by about 2 percent due to increased energy and maintenance costs from being at home more
Furnishing	Sustainable home furnishing and appliances	Baseline expenditure on furnishing and household equipment (COICOP 05) is reduced by 22 percent.
Furnishing	Reduced living area	Reductions to baseline expenditure: Housing (COICOP 04) by 18 percent Furnishings and household equipment (COICOP 05) by 20 percent

Table 3.2. Summary of changes (as a percentage of the global total baseline for Swedish consumption) in environmental pressures and socioeconomic performance due to food-related mainstreamed niche practices. The colour coding has been applied for each indicator separately, but for a red-to-green scale for all the mainstreamed niche practices together.

Main-streamed niche practice	Scenario for indirect effects	Country	GHG	Land use	Blue water cons.	Use of toxic chems	Value added	Emp.
Vegan diet	Increased income	Sweden	-2,2%	-3,1%	-1,1%	-0,4%	-1,5%	-0,8%
		Rest of Europe	-2,5%	-1,8%	-3,4%	-1,4%	-0,8%	-0,9%
		Rest of World	-1,9%	-2,8%	-6,4%	-0,3%	-0,2%	-1,4%
		Total	-6,6%	-7,7%	-10,9%	-2,1%	-2,5%	-3,1%
	Redistributed consumption	Sweden	-2,3%	-3,2%	-1,1%	-0,5%	-1,6%	-0,8%
		Rest of Europe	-2,5%	-1,8%	-3,5%	-1,5%	-0,8%	-0,9%
		Rest of World	-2,0%	-2,8%	-6,5%	-0,3%	-0,2%	-1,5%
		Total	-6,8%	-7,8%	-11,1%	-2,3%	-2,6%	-3,2%
	Reduced investment	Sweden	-2,2%	-3,2%	-1,1%	-0,5%	-1,6%	-0,8%
		Rest of Europe	-2,5%	-1,8%	-3,4%	-1,5%	-0,8%	-0,9%
		Rest of World	-2,0%	-2,8%	-6,4%	-0,3%	-0,2%	-1,5%
		Total	-6,7%	-7,8%	-10,9%	-2,3%	-2,6%	-3,2%
Non-bovine/porcine diet	Reduced income	Sweden	-0,7%	-2,4%	-0,2%	-0,2%	-0,5%	-0,3%
		Rest of Europe	-0,8%	-1,4%	-0,5%	-0,6%	-0,3%	-0,4%
		Rest of World	-0,6%	-2,1%	-0,9%	-0,1%	-0,1%	-0,8%
		Total	-2,1%	-5,9%	-1,6%	-0,9%	-0,9%	-1,5%
	Redistributed consumption	Sweden	-0,6%	-2,2%	-0,1%	-0,1%	-0,2%	-0,1%
		Rest of Europe	-0,7%	-1,3%	-0,4%	-0,3%	-0,2%	-0,3%
		Rest of World	-0,5%	-2,0%	-0,7%	-0,1%	-0,1%	-0,6%
		Total	-1,8%	-5,5%	-1,2%	-0,5%	-0,5%	-1,0%

	Increased investment	Sweden	-0,7%	-2,1%	-0,1%	0,0%	-0,3%	-0,1%
		Rest of Europe	-0,7%	-1,3%	-0,4%	-0,3%	-0,2%	-0,2%
		Rest of World	-0,5%	-2,0%	-0,7%	0,0%	0,0%	-0,5%
		Total	-1,9%	-5,4%	-1,2%	-0,3%	-0,5%	-0,8%
Lacto-ovo vegetarian diet	Reduced income	Sweden	-0,7%	-2,8%	-0,1%	-0,3%	-0,8%	-0,4%
		Rest of Europe	-0,9%	-1,6%	0,0%	-0,9%	-0,5%	-0,5%
		Rest of World	-0,6%	-2,5%	-0,5%	-0,2%	-0,1%	-0,9%
		Total	-2,2%	-6,9%	-0,6%	-1,4%	-1,4%	-1,8%
	Redistributed consumption	Sweden	-0,5%	-2,6%	0,0%	-0,2%	-0,6%	-0,3%
		Rest of Europe	-0,8%	-1,5%	0,1%	-0,6%	-0,4%	-0,5%
		Rest of World	-0,5%	-2,4%	-0,4%	-0,1%	-0,1%	-0,8%
		Total	-1,8%	-6,5%	-0,3%	-0,9%	-1,1%	-1,6%
	Increased investment	Sweden	-0,6%	-2,5%	-0,1%	-0,1%	-0,6%	-0,3%
		Rest of Europe	-0,8%	-1,5%	0,0%	-0,7%	-0,4%	-0,4%
		Rest of World	-0,5%	-2,4%	-0,4%	-0,1%	-0,1%	-0,7%
		Total	-1,9%	-6,4%	-0,5%	-0,9%	-1,1%	-1,4%

Table 1.3. Summary of changes (as a percentage of the global total baseline for Swedish consumption) in environmental pressures and socioeconomic performance due to vacation-related mainstreamed niche practices. The colour coding has been applied for each indicator separately, but for a red-to-green scale for all the mainstreamed niche practices together. GHG – greenhouse gas emissions, Emp. – employment.

Main-streamed niche practice	Scenario for indirect effects	Country	GHG	Land use	Blue water cons.	Use of toxic chems	Value added	Emp.
Bus holiday (a)	One scenario	Sweden	-0,7%	0,1%	0,0%	0,1%	0,6%	0,3%
		Rest of Europe	-1,3%	0,0%	0,0%	-0,6%	-0,4%	-0,3%
		Rest of World	-0,2%	-0,1%	-0,2%	-0,1%	-0,1%	-0,3%
		Total	-2,2%	0,0%	-0,2%	-0,6%	0,1%	-0,3%
Bus holiday (b)	Reduced income	Sweden	-0,9%	0,0%	0,0%	0,0%	0,1%	0,1%
		Rest of Europe	-1,3%	0,0%	0,0%	-0,8%	-0,5%	-0,3%
		Rest of World	-0,4%	-0,1%	-0,2%	-0,1%	-0,1%	-0,4%
		Total	-2,6%	-0,1%	-0,2%	-0,9%	-0,5%	-0,6%
	Redistributed consumption	Sweden	-0,7%	0,2%	0,1%	0,1%	0,4%	0,3%
		Rest of Europe	-1,3%	0,0%	0,1%	-0,6%	-0,4%	-0,3%
		Rest of World	-0,3%	0,0%	0,0%	0,0%	-0,1%	-0,2%
		Total	-2,3%	0,2%	0,2%	-0,5%	-0,1%	-0,2%
	Increased investment	Sweden	-0,8%	0,3%	0,0%	0,1%	0,4%	0,3%
		Rest of Europe	-1,3%	0,0%	0,0%	-0,6%	-0,4%	-0,2%
		Rest of World	-0,3%	0,0%	-0,1%	0,0%	0,0%	-0,2%
		Total	-2,4%	0,3%	-0,1%	-0,5%	0,0%	-0,1%
Train holiday (a)	One scenario	Sweden	-0,6%	0,1%	0,0%	0,1%	0,7%	0,4%
		Rest of Europe	-1,3%	0,0%	0,0%	-0,6%	-0,4%	-0,3%
		Rest of World	-0,2%	-0,1%	-0,2%	-0,1%	-0,1%	-0,3%
		Total	-2,1%	0,0%	-0,2%	-0,6%	0,2%	-0,2%
Train holiday (b)	Increased income	Sweden	-0,2%	0,2%	0,0%	0,3%	1,7%	0,9%
		Rest of Europe	-1,1%	0,0%	0,0%	0,0%	-0,3%	-0,2%
		Rest of World	0,4%	0,0%	-0,1%	0,0%	0,0%	-0,1%
		Total	-0,9%	0,2%	-0,1%	0,3%	1,4%	0,6%
	Redistributed consumption	Sweden	-0,5%	-0,2%	-0,1%	0,1%	1,1%	0,6%
		Rest of Europe	-1,3%	-0,1%	-0,2%	-0,5%	-0,4%	-0,4%
		Rest of World	0,1%	-0,2%	-0,5%	-0,1%	-0,1%	-0,4%

		Total	-1,7%	-0,5%	-0,8%	-0,5%	0,6%	-0,2%
	Reduced investment	Sweden	-0,3%	-0,4%	0,0%	0,0%	1,2%	0,5%
		Rest of Europe	-1,3%	-0,1%	0,0%	-0,4%	-0,5%	-0,5%
		Rest of World	0,1%	-0,2%	-0,3%	-0,1%	-0,1%	-0,5%
		Total	-1,5%	-0,7%	-0,3%	-0,5%	0,6%	-0,5%
Staycationing	Reduced income	Sweden	-0,8%	0,1%	0,0%	0,0%	-1,2%	-0,8%
		Rest of Europe	-1,0%	-0,1%	-0,2%	-0,9%	-0,4%	-0,3%
		Rest of World	-0,6%	-0,2%	-0,4%	-0,1%	-0,1%	-0,4%
		Total	-2,4%	-0,2%	-0,6%	-1,0%	-1,7%	-1,5%
	Redistributed consumption	Sweden	-0,2%	0,8%	0,3%	0,2%	-0,4%	-0,2%
		Rest of Europe	-0,7%	0,2%	0,3%	0,1%	-0,1%	0,0%
		Rest of World	0,0%	0,2%	0,5%	0,1%	0,0%	0,2%
		Total	-0,9%	1,2%	1,1%	0,4%	-0,5%	0,0%
	Increased investment	Sweden	-0,6%	1,0%	0,0%	0,4%	-0,4%	-0,2%
		Rest of Europe	-0,8%	0,1%	-0,1%	-0,2%	-0,1%	0,0%
		Rest of World	-0,1%	0,1%	0,0%	0,1%	0,1%	0,2%
		Total	-1,5%	1,2%	-0,1%	0,3%	-0,4%	0,0%

Table 3.4. Summary of changes (as a percentage of the global total baseline for Swedish consumption) in environmental pressures and socioeconomic performance due to furnishing-related mainstreamed niche practices. The colour coding has been applied for each indicator separately, but for a red-to-green scale for all the mainstreamed niche practices together. GHG – greenhouse gas emissions, Emp. – employment.

Main-streamed niche practice	Scenario for indirect effects	Country	GHG	Land use	Blue water cons.	Use of toxic chems	Value added	Emp.
Sustainable home furnishings and appliances	Reduced income	Sweden	-0,1%	-0,3%	-0,1%	-0,2%	-0,5%	-0,3%
		Rest of Europe	-0,3%	-0,2%	-0,2%	-1,4%	-0,3%	-0,4%
		Rest of World	-0,6%	-0,5%	-0,7%	-0,3%	-0,1%	-0,8%
		Total	-1,0%	-1,0%	-1,0%	-1,9%	-0,9%	-1,5%
	Redistributed consumption	Sweden	0,4%	0,4%	0,2%	0,1%	0,4%	0,3%
		Rest of Europe	0,0%	0,0%	0,2%	-0,6%	-0,1%	-0,1%
		Rest of World	-0,2%	-0,1%	-0,1%	-0,2%	-0,1%	-0,3%
		Total	0,2%	0,3%	0,3%	-0,7%	0,2%	-0,1%
	Increased investment	Sweden	0,1%	0,6%	0,0%	0,3%	0,3%	0,3%
		Rest of Europe	0,0%	0,0%	-0,1%	-0,7%	0,0%	0,0%
		Rest of World	-0,1%	-0,1%	-0,2%	-0,1%	0,0%	-0,1%
		Total	0,0%	0,5%	-0,3%	-0,5%	0,3%	0,2%
Reduced living area	Reduced income	Sweden	-2,1%	-3,9%	-0,6%	-1,8%	-4,6%	-1,7%
		Rest of Europe	-0,6%	-0,7%	-0,4%	-3,3%	-0,6%	-0,6%
		Rest of World	-1,7%	-1,0%	-1,0%	-0,5%	-0,3%	-1,2%
		Total	-4,4%	-5,6%	-2,0%	-5,6%	-5,5%	-3,5%
	Redistributed consumption	Sweden	0,8%	-0,8%	0,9%	-0,9%	0,0%	1,3%
		Rest of Europe	1,0%	0,4%	1,9%	1,4%	0,8%	0,7%
		Rest of World	0,9%	1,1%	3,4%	0,3%	0,2%	1,7%
		Total	2,7%	0,7%	6,2%	0,8%	1,0%	3,7%
	Increased investment	Sweden	-1,0%	0,5%	-0,3%	0,4%	-0,6%	1,1%
		Rest of Europe	0,7%	0,1%	0,1%	0,5%	1,1%	1,3%
		Rest of World	0,7%	0,7%	1,4%	0,5%	0,5%	2,1%
		Total	0,4%	1,3%	1,2%	1,4%	1,0%	4,5%

4 Shifting expenditures on food, holidays and furnishings may lower greenhouse gas emissions by almost 40%

Annika Carlsson Kanyama, Jonas Nässén & René Benders

This summary is based on three publications in the Mistra Sustainable Consumption programme: Carlsson Kanyama et al (2021), Carlsson Kanyama and Dunér (2020), and Carlsson Kanyama et al (2019). The latter also contains estimates of land and water use not included in this summary.

4.1 Introduction

In this study, we present new and rather detailed GHG intensities for 217 products and services covering all areas of consumption. These intensities also cover some available but not yet mainstream low-carbon products and services in the consumption categories of choice for the study. Matching those intensities with expenditure data from households enables the quantification of the total GHG reduction potentials from a change in consumption patterns towards these low-carbon alternatives. Here, we also consider the price of the mainstream products and their alternatives. The calculations involve the assumption of constant expenditures in each consumption category meaning that the estimated potentials are not prone to the risk of rebound effects due to re-spending of saved money on other consumption (see Alfredsson 2004; Nässén and Holmberg 2009; Druckman et al 2011).

In short, the main research question of the paper is:

What is the greenhouse gas emission reduction potential if household expenditures are shifted to low-emitting, affordable, convenient and available alternatives in the areas of food, holidays and furnishings?

4.2 Methods

The analysis of greenhouse gas emissions of product and services was made by a software called the Energy Analysis Program (EAP). A thorough description of the program, the updates of the databases and the assumption made for the calculations of each item is presented in Carlsson Kanyama et al (2019). Here, only a brief summary is made.

The method used in EAP is hybrid approach, proposed by Bullard et al (1978) in which process and input-output analyses are combined. Van Engelenburg (1994) defined a method to operationalize this hybrid methods in a step-by-step approach. EAP is the result of the implementation of this approach into a user-friendly software tool. Calculating the environmental impacts of a product in EAP involves a number of steps (Figure 4.1).

A substantive effort was made to collect information for updating the databases in EAP with data from 2016 whenever possible. Sources of information for this update ranged from international statistics about producer prices, to national statistics about greenhouse gas

emissions in manufacturing, wholesale and retail to available databases showing greenhouse gas emissions from production of various goods and during transportation (for a full account see Carlsson Kanyama, 2019, Appendix 1).

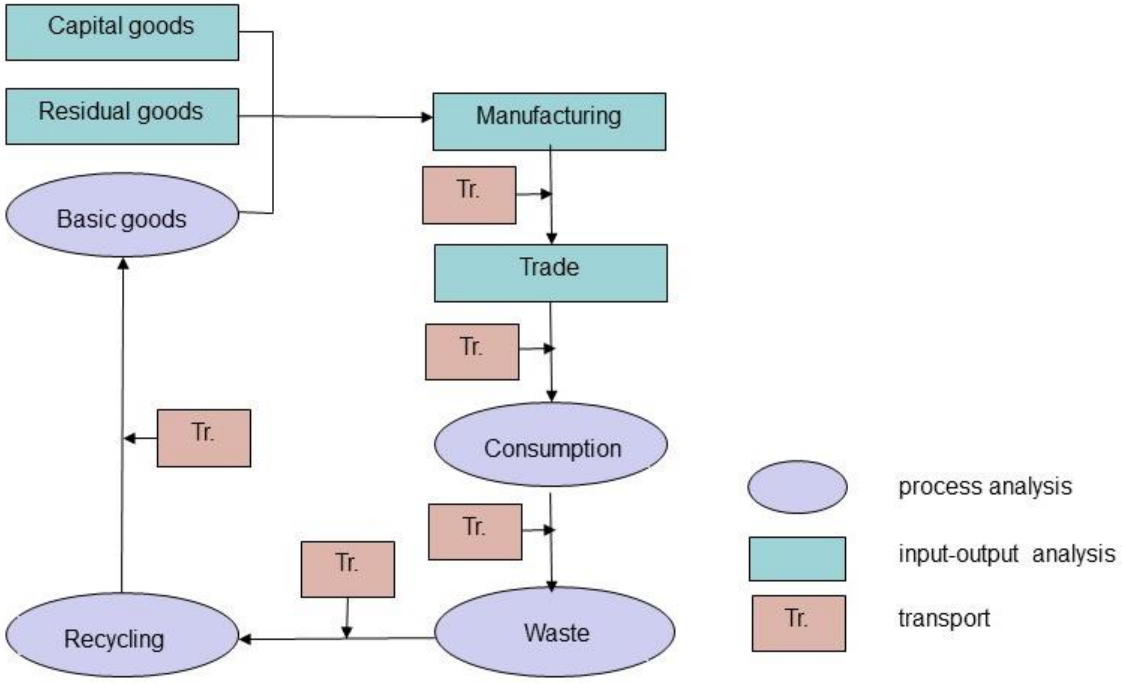

Figure 4.1. The different steps necessary for calculating the environmental impacts of a product in EAP.

The 217 intensities (kg greenhouse gas emissions/SEK) were then matched with suitable expenditures to portray the total greenhouse gas emissions of three household types: average persons, single men and single women. This calculation was done in two steps; the first one was to match current expenditures with relevant emission intensities and the second one was to match the same amount of expenditures with alternative products and services in the area of food, holidays and furnishings.

4.3 Results

Figure 4.2 shows the calculated emissions intensities (kg greenhouse gases/SEK) for the 217 products and services sorted from lowest to highest where each dot is the result of one analysis. The highest emissions intensity (lamb and goat meat) is more than 1000 times higher than the lowest one (second-hand cars), but this is difference is of course much less interesting than the differences between products and services that can replace one another as presented below.

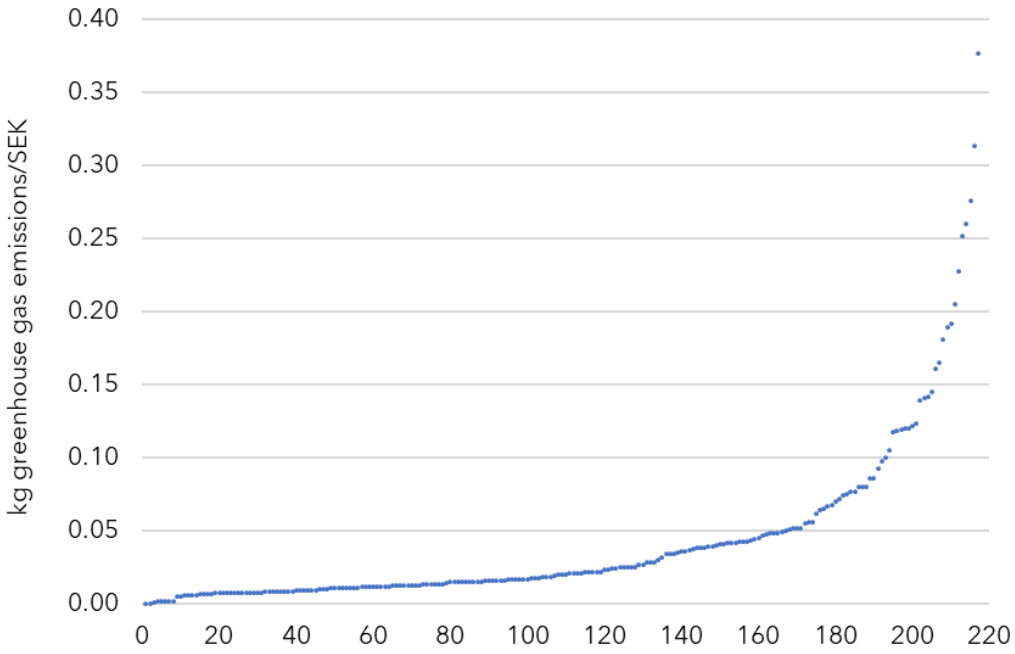

Figure 4.2. Greenhouse gas intensities (kg CO_2e/SEK) for 217 products and services sold to consumers. Each dot represents a product or a service.

Food

Figure 4.3 shows the various emissions intensities for meat and dairy alternatives and locally produced vegetables as well as different types of mainstream foods. Meat and dairy products have much higher emissions than all replacements. The emissions intensity of pork is e.g. five times as high as for tofu, milk is five times as high as oat milk and cheese is four times as high as vegan cheese. The prices of the meat and dairy replacements may be both higher and lower compared to the products that they replace. Oat milk may be up to 50% more expensive than milk and meat replacements may be both more and less expensive than meat. Vegan cheese is generally more expensive than ordinary cheese, but the prices of cheese vary a lot depending on the quality. As a result, shifting the same amount of expenditures from meat and dairy products to its replacements will most certainly lower the total intake of dairy-like products but not of meat-like products. In total, a shift of expenditures to meat replacements and dairy replacements as well as more locally produced vegetables may lead to reductions of GHG emissions by 32-38 % for the different analysed households. The change from buying plant-based options instead of meat and dairy products contributes with the main part of the emissions reduction.

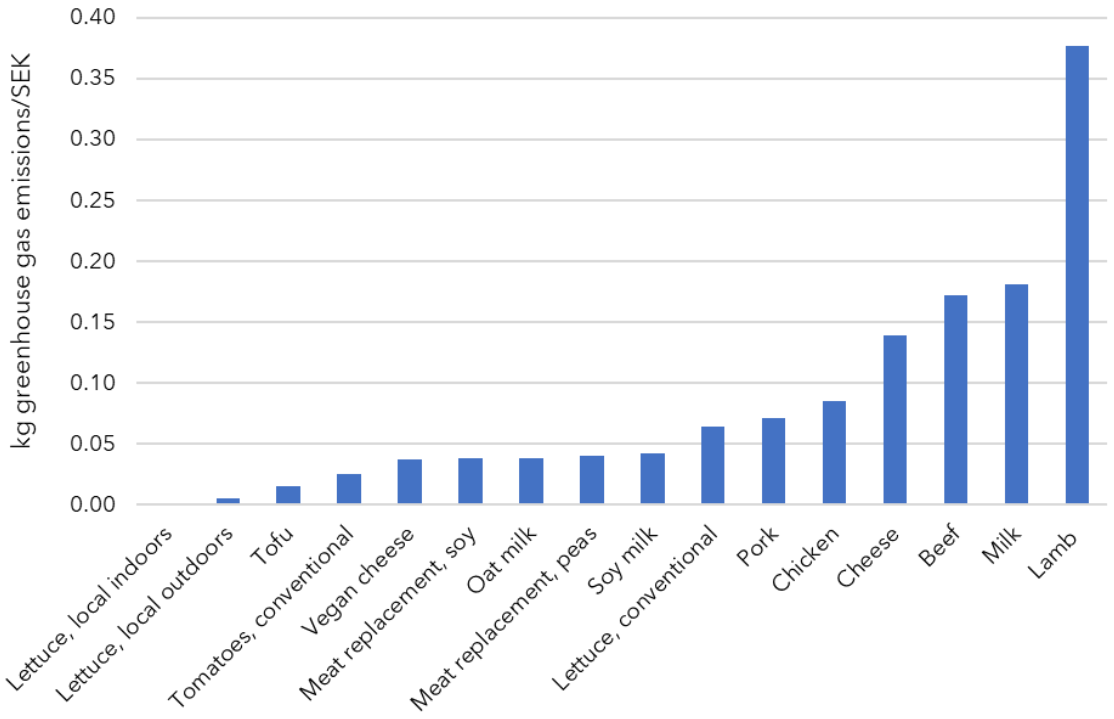

Figure 4.3. Greenhouse gas emissions/SEK for meat, dairy products and conventional vegetables and various replacements.

Holidays

Figure 4.4 shows the various emissions from different types of holidays ~~today~~ and some less carbon-intensive alternatives. As can be seen, the lowest emissions come from staycation and a package holidays by train in Sweden. The staycation includes activities such as concerts and massage and the package holiday by train in Sweden includes train and hotel. The package holiday abroad by train is supposed to go to Italy and includes 6 nights. Such packages are available to Swedish consumers (Travel and climate, 2019). The package holiday abroad by plane was assumed to last a week and go to the Canary Islands as Spain is the most popular destination for Swedish holiday travellers (Vagabond, 2017). Shifting expenditures from high emitting options such as holidays by plane and car to train travels and staycation may or may not mean that travelling diminishes depending on the prices of the options. When we assume that all money that is spent on package tour by plane and car travels is instead spent on a train trip to Italy (11 000 SEK) and the rest on staycation the drop in emissions from holidays is substantial, 85 to 90% in the three analysed households. We assume that expenditures on hotels and holiday cottages remain the same.

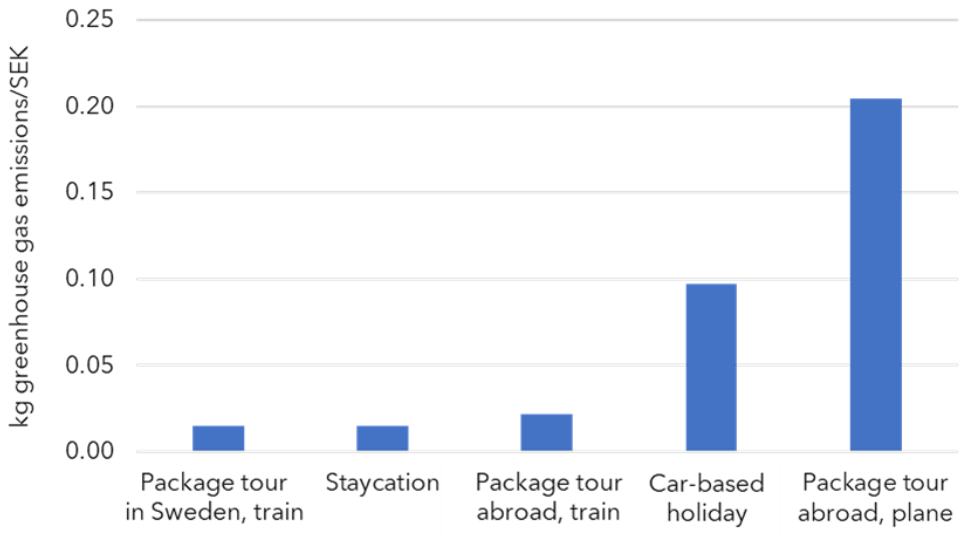

Figure 4.4. Greenhouse gas emissions/SEK for various holiday options.

Furnishings

For furnishings, the total emissions are much lower than for the two other studied areas, and the GHG emissions intensities are also lower. Figure 4.5 shows the various emission intensities for some rather different types of new furnishing products as well as emissions from alternatives such as repair, renting and second-hand purchases. Second-hand products have clearly the lowest emissions. New furnishing products, however, have varied emissions and not all new products are more polluting than the alternative practices. By shifting 20 % of the expenditures to second-hand furnishing and 80% of the expenditures to repairing furnishing the total GHG emissions would drop by 51-72% for the analysed household types. With this shift in expenditures, the number of products entering the household is about the same as before.

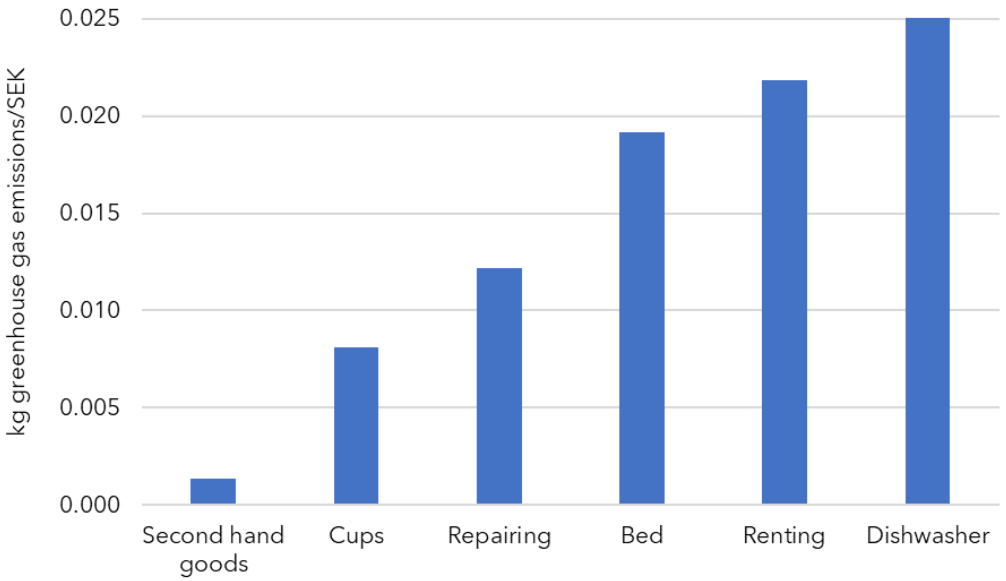

Figure 4.5. Greenhouse gas emissions/SEK for some examples of new furnishings and alternatives.

Total GHG emissions

The total consumption related greenhouse gas emissions were estimated to 6.9 tons per year for the average person, 10.0 per tons per year for single men, and 8.4 tons per year for single women. The average person has lower emission than both single men and single women primarily because the average household also includes children and because expenditures for housing and transport is shared in households with several members. Food and drinks account for between 21-25 % of the total emissions while holidays account for 30-33% (30% of the total car travel was allocated to holidays) and furnishings 2-5%. Combining the potentials for reductions by shifting expenditures for food, holidays and furnishings, leads to total reductions 4.4 tons per year for the average person, 6.4 tons per year for the average single man and 5.2 tons per year for the average single woman, i.e. total reductions of 36-38%. Furnishings is a rather small emissions category that was primarily included to look more closely at the effects of second-hand, sharing and renting behaviours. Similar choices in other categories traditionally based on purchasing of new products (e.g. clothing) would naturally lead to larger potentials.

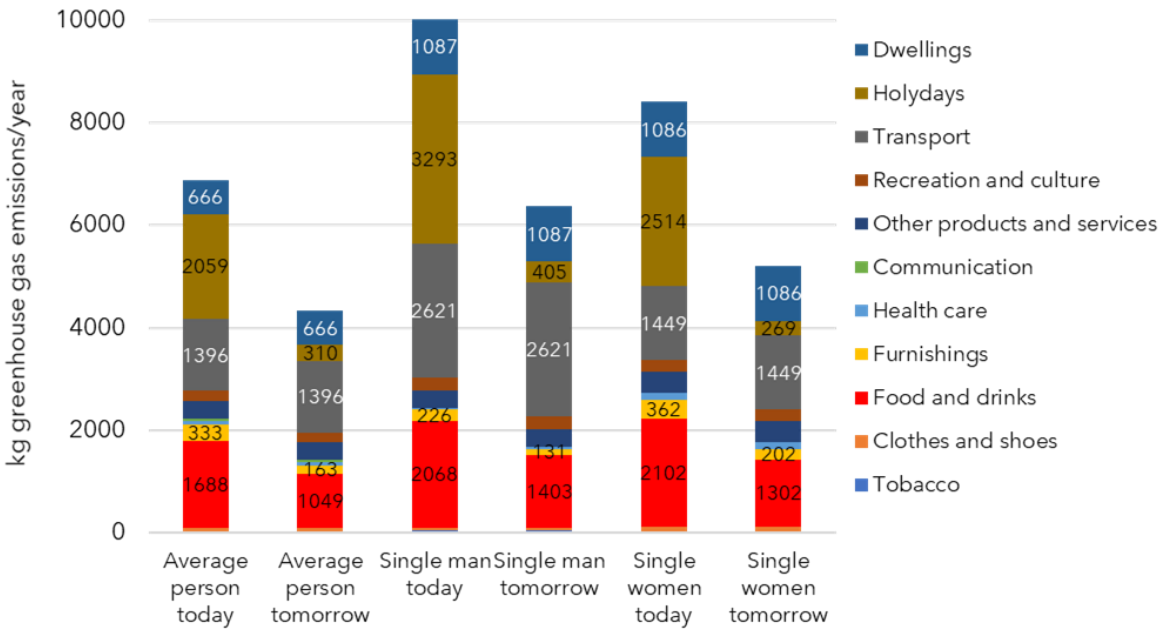

Figure 4.6. Total consumption related greenhouse gas emissions/per year today (2016) and after changed expenditures for three average persons in Sweden (the average person, the average single man and the average single women).

4.4 Discussion

In this paper we have shown that consumption-based greenhouse gas emissions can be lowered by almost 40% given changed purchases for food, holidays and furnishings with examples from three household types. As expenditures remained the same before and after the change there are no rebound effects to be considered. Emissions intensities were estimated for 217 categories of products and services available on the market, both mainstream options and options considered as new low-carbon alternatives. Prices and expenditures for these items were considered when modelling the possible changes so that the amounts of alternative products purchased remained realistic compared with amounts purchased before the change. It is also worth noting that the reduction potentials shown in this study do not require costly investments as is the case for buying an electric car or solar panels which are other options for climate-aware households. Therefore, our examples are easy to comply with from an economic point of view.

5 Second order environmental effects from upscaling of sustainable consumption practices

Hanna Eggestrand & Åsa Svenfelt

This summary is based on the report Eggestrand, H, Svenfelt, Å, 2021. Andra ordningens miljöeffekter (In Swedish).

5.1 Introduction/background and aim

A consumption practice causes direct environmental effects arising from production, use and waste management. When analysing a consumption practice's total environmental impact, it is however important to look beyond such first order effects and to also address the issue of indirect, but potentially far-reaching, impacts – so called second order effects, for example economic rebound effects.

Second order environmental effects can be considered the rings on the water, arising when a practice affects how people spend their money, their time or how they use space (Börjesson Rivera, 2014). This means that even if an alternative consumption practice has less direct environmental impact, engaging in the practice may imply spending more or less money than before, it can take more or less time, it can require certain equipment or a different way of using space etcetera. These changes may bring additional undesirable, or desirable, consequences for the environment – but these consequences are often unintentional and unforeseen.

If consumption practices intended to lessen the net environmental impact result in environmentally harmful activities expanding, the desired and expected decrease in net impact might be smaller than expected or be entirely missing (so called positive rebound, Sorrel et al 2020). In the worst case, the second order effects could even be greater than the first order environmental benefits, known as the Jevon's paradox (Alcott 2005). However, if environmentally burdensome activities or consumption are avoided, there is a potential for additionally decreased environmental impact also through the second order effects (so called negative rebound[Error! Bookmark not defined.]).

Nevertheless, the impacts of second order environmental effects are commonly overlooked. Therefore, the aim of this study was to identify what types of second order environmental effects that could arise if niche consumption practices framed as sustainable were scaled up.

5.2 Method

To meet the aim, the study combined a qualitative and a quantitative analysis. The qualitative part will be presented here. The quantitative part builds on the qualitative part and will be published elsewhere.

Selection of environmental effects and practices

An initial qualitative analysis was made to identify possibility/risk for second order environmental effects if niche consumption practices previously identified within the programme (in relation to food, vacationing and furnishing) were scaled up to become mainstream (Kamb et al 2019, Thorson et al 2019, Lehner et al 2019). On the basis of this analysis certain environmental effects, based on Börjesson Rivera et al (2014), as well as consumption practices were selected for further analysis. Table 5.1 presents an overview of the second order environmental effects.

Since the current study focused on the consumption practices on a household level, it was not possible to draw relevant conclusions on a societal level. Hence, economy-wide rebound effects and transformational rebound effects were excluded. Additionally, rematerialisation effects were also excluded since these were assumed to be marginal in relation to furnishing, eating and vacationing. Out of 17 prioritised practices, nine were selected for a deeper analysis.

Interviews

The next step was to better understand what it can mean for a household to be engaged in a consumption practice, including what it means in relation to how they spend their time and money. Interviews with households self-identified as engaged in consumption practices of interest were conducted. In total, nine interviews took place during May to October 2019. For more information on the households, see Table 5.2.

The interviews were semi-structured and carried out in two parts. The first part focused on general information about the household; what it means to them to be engaged in the consumption practice in question; whether there is a "before and after" engaging in the practice; what the practice means in relation to use of time and space; whether the practice has led the household to consume more of "something else"; and finally whether the household members have gained any new consumption related insights, including whether they have any principles for food, furnishing and/or vacationing.

The second part of the interview focused on the household's expenditures to understand whether the interviewee thought they were spending more, less or similar to the average, for each type of consumption – and, importantly, *why* that was the case. To aid this exploration, a visual representation in the form of a stacked bar chart was used (see Figure 5.1), giving the interviewee something to refer to. The bar chart indicated what type of consumption an average Swedish household with a similar income spends their money on (COICOP-level one), based on data from Statistics Sweden from 2012 (SCB, 2020). During the interview, the interviewer guided the interviewee in constructing their own stacked bar chart, using the physical cards, to represent their own household's expenditure.

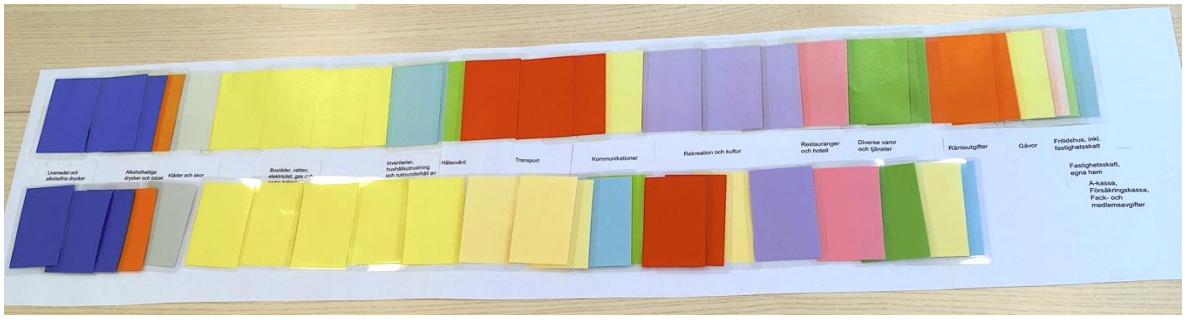

Figure 5.1. The stacked bar chart on the top represents expenditures for an average household with a certain income level, and the lower stacked bar chart represents the interviewee´s estimated expenses. Each card represents a certain amount of money (SEK).

All interviews were recorded, six of them were transcribed and the other three, the content was compilation in bullet point format. For each of the interviews, a summary of how the household described the practice in question was compiled, after which the transcription/compilation was analysed with regards to second order environmental effects.

5.3 Findings

In this section, a summary of the risks and opportunities for second order environmental effects that could emerge if the consumption practices were scaled up to become mainstream are presented.

Direct economic rebound

The interviews indicated limited risk/opportunity for direct economic rebound. In relation to two of the food consumption practices (“replace animal products with plant based products”; “reduce unhealthy food consumption”), there was some indication that money could be freed up and directed towards other types of food (vegetables and organic, high-quality, produce). Moreover, it could also be that the households purchase fewer, more expensive, products. Hence, potential direct economic rebound could be negative, meaning decreased environmental impact.

Indirect economic rebound

Several of the consumption practices could bring a change in expenditures between consumption categories. Some (e.g. “replace animal products with plant-based products”; “reduce unhealthy food consumption”) indicated such a change, without it being clear whether the practice required or freed up money. Others could more clearly outline the nature of the changed costs, with “train vacationing” being associated with higher costs for accommodation whereas “share/exchange homes” meant less money was being spent in that category. “Staycationing” in turn described a decrease in transportation costs but increase in expenses for restaurants and cafés. “Purchase food directly from the producers” was associated with higher costs, whereas both of the furnishing practices (“exchange furniture between private individuals”; “live simply”) meant decreased expenses. The household practicing “living simply” had therefore chosen to spend more money on organic food.

Induction

Based on the interviews, induction, meaning that a consumption practice leads to additional consumption, seems limited. The household "replacing animal products with plant-based products" however describe that they acquired a food processor and two cookbooks when initiating their practice. In the case of "cultivating by yourself or together", the necessary equipment was made available by the association overseeing the cultivation. There were also examples of consumption practices inducing additional consumption not necessary to engage in the practice in question (e.g. "purchasing food directly from the producers" buying more luxurious food products than intended).

Although practicing "living simply" could invite additional consumption, engaging in this practice was part of a greater change in priorities for the interviewed household and they have not had the economic means to replace what has been cleared out.

Time rebound

Several of the interviewed households engaged in a food related practice ("replace animal products with plant-based products"; "reduce unhealthy food consumption"; "purchase directly from the producers") conclude that it takes somewhat more time to cook "from scratch". Ordering from producers (through a so-called "REKO-ring") is also a said to be time consuming. The household "reducing unhealthy food consumption" exemplifies how less time is spent watching TV now than before. The environmental consequences of such a change in time use is unclear but would relate to the decreased energy use.

In cases where the consumption practice is more central to the interviewed household's way of life (mainly "cultivating by yourself or together"; "live simply"; "exchange furniture between private individuals"), it is less clear cut what time the consumption practice in itself requires. For instance, the initial clearing of furniture and home decoration made by the household practicing to "live simply" has made it possible for the family to spend more time together, doing crafts and engaging in different projects. There also seems to be a difference in how much time is essential to engage in a practice at all and how much time the household members "allows" it to take. In the case of "share/exchange homes" and "exchange furniture between private individuals", the practice is described in part as a hobby. Some interviewees have also decreased their paid work time ("cultivating by yourself or together"; "staycation"; "exchange furniture between private individuals"; "live simply").

Learning about production and consumption

The interviewees engaged in food related consumption practices were all thinking about issues such as proximity of production, nutritional content, animal welfare and environmental impact. Such concerns were central reasons for being engaged in the practice in question. The interviewee "cultivating by yourself or together" has increased her understanding of how nature "is interconnected. The interviewee practicing to "purchase food directly from the producers" has become more observant on environmental issues, as has the "train vacationer" – although the social aspects of the practice was more central for starting to engage in it.

Scale effects

Few instances where learning has increased the efficiency of the practice were noted. The household "replacing animal products with plant-based products" have noted a decrease in food waste and the interviewee "cultivating by yourself or together" has been able to rationalize some aspects of the cultivation.

Space rebound

Space rebound can occur on several different scales. For instance, the household practicing "staycationing" has moved to a bigger, more central, apartment, but rarely stays in hotels or use other facilities away from the home region. "Cultivating by yourself or together" has had consequences for surfaces in the neighbourhood, seeing a lawn being turned into an area for cultivation, including berry bushes and fruit trees. In the case of the household practicing to "live simply", the more fundamental restructuring of everyday life has also consequences for the use of space, but it is not entirely clear whether more or less space is required.

Beyond the own practice

In general, it can be concluded that all of the interviewees reflect upon practices beyond the one in focus of the interview. In particular, everyone – regardless of the practice in focus – expressed that they prioritize organic and/or local and/or vegetarian food. Several of the households also purchase second-hand furniture and have reassessed whether they need to have a car. The households engaged in a practice centered on sharing or simplicity described how they were increasingly reflecting on how to balance work, income and spare time.

From the interviews, it was clear that the different consumption practices are nestled. The most concrete example was in relation to the household practicing "exchange furniture between private individuals" who also touched on aspects such as purchasing second hand, repairing, renewing upcycling and borrowing/lending.

5.4 Discussion

The results illustrate that engaging in alternative consumption practices indeed could mean that money, time and space are used in different ways than before, and it could inspire new knowledge and insights.

Generally, the interviewees did not indicate that engaging in the consumption practices in focus had led them to spend money or time on activities associated with significant environmental impact. When the practices require more time and money than before, which would mean less consumption in other consumption categories and fewer other activities, the effects could even be desirable in the sense that they could decrease the environmental impact.

The results indicate a risk/opportunity for second order environmental impact in the current economic context. If measures to encourage sustainable consumption are put in place, for instance making it cheaper to engage in such consumption practices, the situation – and hence

the indirect effects – would change. Moreover, the characteristics among the households engaged in the consumption practices would differ if they became more mainstream. Aspects such as age, place of residence and work would also likely influence the occurrence and magnitude of second order environmental effects.

Several studies have shown that environmental impact from consumption is strongly associated with expenses (e.g. Carlsson-Kanyama et al. 2019), indicating that a (voluntary) drop in income could be desirable from an environmental point of view, e.g. downshifting (Lorek & Fuchs, 2013) or sufficiency (Alcott, 2008). The results of this study suggest that households engaged in sharing or living simply, associated with smaller costs, were also questioning how to prioritize work and income over free time. However, the mainstreaming of such practices could have far-reaching societal consequences, which requires another type of analysis.

Viewing sustainable consumption through a practice lens, i.e. as contextualized activities rather than a well-defined type of behaviour with a clear beginning and end, means that one practice is not isolated from another. This, in turn, brings challenges when attempting to conclude whether an effect is a consequence of a certain practice. Is it, for instance, the "cultivating by yourself or together" that has led to a cut-back in work time, or that the interviewee prioritizes second-hand purchases, or are the latter two independent phenomena – even though they have occurred in parallel and influenced one another? Such questions could indicate the need to analyze a household's lifestyle, rather than focusing on individual practices (see e.g. Sorrell et al. 2020).

In addition to challenges stemming from the nature of second order effects, the study design (i.e. assumptions based on information gathered from interviews; only one interview per practice; the households in the study resembling one another from a socioeconomic point of view and in that they had some pre-existing interest making them engaging in their practice) also brings limitations. The study gives an *indication* of risks/opportunities for second order environmental effects. When the second order environmental effects are positive (i.e. causes an increased environmental impact), policy instruments should seek to dampen them. On the contrary, then the effects are negative (i.e. decreased environmental impact), measures should be taken to reinforce them.

5.5 Appendix

Table 5.1. Overview of first and second order environmental effects, based on Börjesson Rivera et al. (2014), with own examples for private consumption.

Effect		Example
First order environmental effect		Direct environmental effects from production, use and waste disposal. For example, decreased climate impact and less waste by repairing furniture instead of purchasing new, or when a product with big climate impact is replaced (e.g. tofu replacing red meat).
Second order environmental effects	Rematerialisation	Increased environmental impact when a digital product is re-created in material form, i.e. digital photos being printed.
	Induction	The opportunity to consume can induce additional consumption. For example, people buying more than intended when second-hand buys are made easier (e.g. through online services or malls with pre-owned products).
	Direct economic rebound	When a changed cost for a practice causes increased or decreased consumption within the same consumption category. For example, when more expensive train travels mean less money is available for vacation trips.
	Indirect economic rebound	When a changed cost for a practice causes increased or decreased consumption within a different consumption category. For example, when cheaper second-hand furniture frees up money for other types of consumption.
	Economy-wide rebound effects	Changes in prices leads to economy-wide effects and the functioning/organization of the society. For example, if the majority of clothes are bought second-hand, this would affect the clothing industry. Could also be consequences from introducing a new tax.
	Time rebound	Changed practices requiring more or less time. Freed up time can be used differently, with different consequences for the environment, and when a practice requires more time less can be spent on something else.
	Space rebound	Changed practices can in turn change how space is being used, for instance could a decrease consumption of ”stuff” lessen the need for shopping malls.
	Learning about production and consumption	The understanding of production and sustainable consumption can increase through closer connection between different actors. For example, one can learn what is in season when visiting the farmer’s market.
	Scale effects and learning in production and consumption	Learning over time can increase the efficiency of the practice. For example, with training, the time required to cook organic food can decrease.
	Changed practices	In focus for the study. Connections between different practices could be relevant.
	Transformational rebound effects	Changes affecting the entire society. For instance, the need for a different type of infrastructure if many stop flying.

Table 5.2. Information about the interviewed households. All lived in an apartment unless otherwise stated. Disposable income refers to the average disposable income in the quartile group that the interviewed household stated their income is.

	Consumption practice	Household members	Age span	Total disposable income of the household	Housing and employment
Food	Reduce unhealthy food consumption	Woman (interviewee) and man, two children.	40-50 yrs	Within quartile 4 (715 280 SEK)	Live in the inner city of a metropolitan area. Work within marketing and finance.
	Replace animal products with plant-based products	Woman and man (interviewees).	20-30 yrs	Within quartile 3 (403 600 SEK)	Couple living in a big city. Recently finalized technical university studies.

	Cultivate by yourself or together	Woman (interviewee).	50-60 yrs	Within quartile 2 (253 230 SEK)	Lives in a big city and works within education.
	Purchase directly from the producers	Man (interviewee) and woman.	50-60 yrs	Within quartile 4 (715 280 SEK)	Lives in the inner city of a big city.
Vacationing	Train vacationing	Man (interviewee) and one child.	40-50 yrs	Within quartile 3 (403 600 SEK)	Lives in a big city, works within the event industry.
	Share/exchange homes	Woman (interviewee) and man, one child.	50-60 yrs	Within quartile 3 (403 600 SEK)	Couple with a teenager, living in house in a suburb to a big city. Freelance work.
	Staycationing	Woman (interviewee) and man, one small child.	30-40 yrs	Within quartile 4 (715 280 SEK)	Live in a big city. Work with HR and within a municipality.
Furnishing	Exchange furniture between private individuals	Woman (interviewee) and man, two children.	30-60 yrs	Within quartile 3 (403 600 SEK)	Live in a smaller city. The interviewee works with design and crafts.
	Live simply	Woman (interviewee) and man, one small child.	30-40 yrs	Within quartile 1 (125 680 SEK)	Live in a sparsely populated area. Work within education and on a freelance basis.

6 Measuring the direct and indirect effects of four low-carbon behaviours

David Andersson & Jonas Nässén

This summary is based on preliminary findings from an ongoing sub-project using data-sets from the Svalna-application. This sub-project will be finalized during 2022.

The method for estimating GHG emissions from consumers is published in Andersson D., 2020. A novel approach to calculate individuals' carbon footprints using financial transaction data–App development and design. *Journal of Cleaner Production*, *256*, 120396.

6.1 Introduction

This sub-project analyses the total effect, direct and indirect, of different low-carbon behaviours on the overall carbon footprint. In this study we investigate the carbon footprint of four low-carbon behaviours using a sample of 715 carbon calculator users. We analyze the four main areas of GHG emissions from the Swedish population, namely short distance travel, long distance travel, residential energy and food. For each of these four main categories of GHG emitting activities, we have chosen one indicator of a significant low-carbon behaviour, i.e. not owning a car, not flying, not living in a detached house, and having a vegan diet. It is important to acknowledge that these behaviours are not necessarily pro-environmental by intent, people may of course choose not to buy a house or car or not to fly for economic reasons or they may have personal preferences or other circumstances that make them favour other types of consumption. Moreover, there may be other ideological reasons than reducing emissions; people may for example keep a vegan diet in protection of animal rights. Nevertheless, upholding each of these behaviours lead to substantially lower GHG emissions on average as opposed to not doing so. In fact, the isolated effect of these four behaviours alone would sum up to a reduction of GHG emissions by 50%.

There are at least three potentially important factors that may affect the net-effect of different low-carbon behaviours. 1) financially driven rebound effects that counteract the initial reduction in carbon footprint through re-spending in other consumption domains and related GHG emissions. 2) Psychologically motivated spillover effects that describes how doing a pro-environmental behaviour in one consumption domain may lead either to further efforts to avoid carbon intensive behaviours in other domains i.e. positive spillover, or alternatively that the initial pro-environmental behaviour leads to an increase in another domain, i.e. negative spillover. Also, 3) different behaviours may be interlinked so that one behaviour implies another behaviour, such as for example living in a separate house that is typically situated outside the city center also entails owning a car.

6.2 Methods

To collect data on the carbon footprint of respondents we collaborated with Swedish carbon calculator Svalna, that make use of financial transaction data to estimate users carbon footprint (Andersson 2020). The Svalna app estimates the carbon footprint associated with individual purchases of private consumers. By connecting their bank account(s) and/or credit cards to Svalna's app, users can get an overview of the carbon footprint from their spending's in different consumption categories. The carbon footprint calculated by Svalna is divided into four main categories: 1) goods and services, 2) transportation, 3) residential energy, and 4) food and beverages (with several subcategories). The method for estimating emissions relies on a hybrid approach with data from three types of primary sources (see figure 6.1).

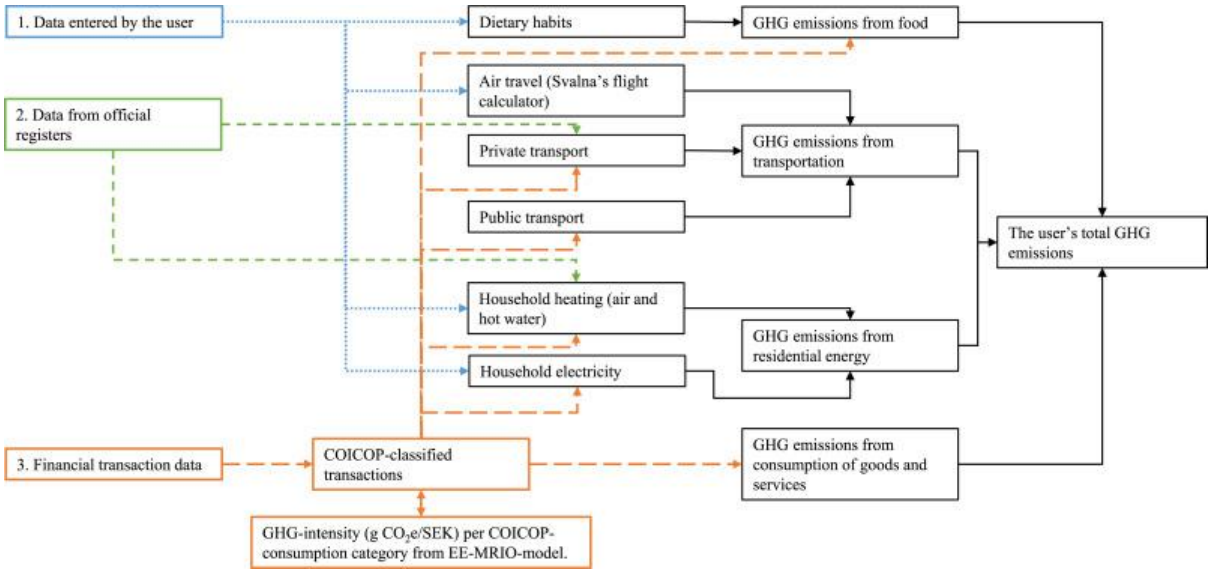

Figure 6.1. Schematic overview of how Svalna combines data from various sources in order to estimate GHG emissions at the individual level (Andersson 2020).

As a first step, the app estimates the carbon footprint associated with individual purchases of private consumers by allowing users to connect their bank account(s) and/or credit cards to the app. All transactions (credit/debit card transactions, invoices, internal/external bank account transactions, cash withdrawals etc.) are classified according to a modified version of the Classification of Individual Consumption According to Purpose (COICOP) scheme developed by the UN statistics division containing 65 different categories. Greenhouse gas emissions associated with the vast majority of purchases done by the user are then estimated as the product of the expenditure and the GHG intensity (gCO_2e/monetary unit) of the associated COICOP consumption category. Users are asked to classify transactions that are not automatically identified by the system, and the algorithm is improved with each piece of additional information. Here the users can also indicate if a specific purchase was bought second hand in order to lower their carbon footprint.

Second, Svalna make use of data from official registers where financial information is not eligible. Users living in multi-dwelling houses are typically connected to the local district heating network and pay for heating as part of their rent, which means that the financial data cannot be used. Svalna's solution is to instead ask the user to fill in their street address and size of accommodation. This information is then used together with data on the energy performance (kWh/m^2) of the user's property obtained from the National Board of Housing, Building and Planning (2019) as identified via the user's home address, and combined with data on CO_2e/kWh from the corresponding local district heating network. Users who chose to fill in their vehicle's registration number allows the system to automatically collect data from the Swedish Transport Agency (2019) on fuel type, fuel-efficiency and distance travelled between the last two vehicle inspections (where odometer readings are registered).

Lastly, users are asked to answer some questions in a user profile when generating their account. The questionnaire contains questions on e.g., dietary habits, number of people in the household and also allow the user to enter information on air-travel (departure/arrival destination) during the last two years so that an air-travel calculator can estimate GHG emission from each flight. See Andersson, 2020 for a comprehensive description. As researchers, we did not have access to unaggregated transaction data or any data that could help us identify respondents.

A total of 2005 participants answered the survey, but all of these did not connect transaction data to the account. We also only included historical data prior to the Covid-19 pandemic which limited the final sample to 709 respondents.

6.3 Preliminary results

Figure 6.2 shows the distribution of GHG emissions in the final sample. Even though the sample is clearly biased towards people with at least a high interest for the environment, the sample average for total emissions is as high as 7.6 CO_2e/cap. Travelling accounts for 25% of which around half is short-distance travel (primarily car use) and half long-distance travel (primarily aviation), food 24%, housing 16%, and miscellaneous other products and services 35%. Figure 6.3 shows how the emissions increase with total expenditures, revealing a pattern that is similar to previous analyses using other types of data sources (Nässén

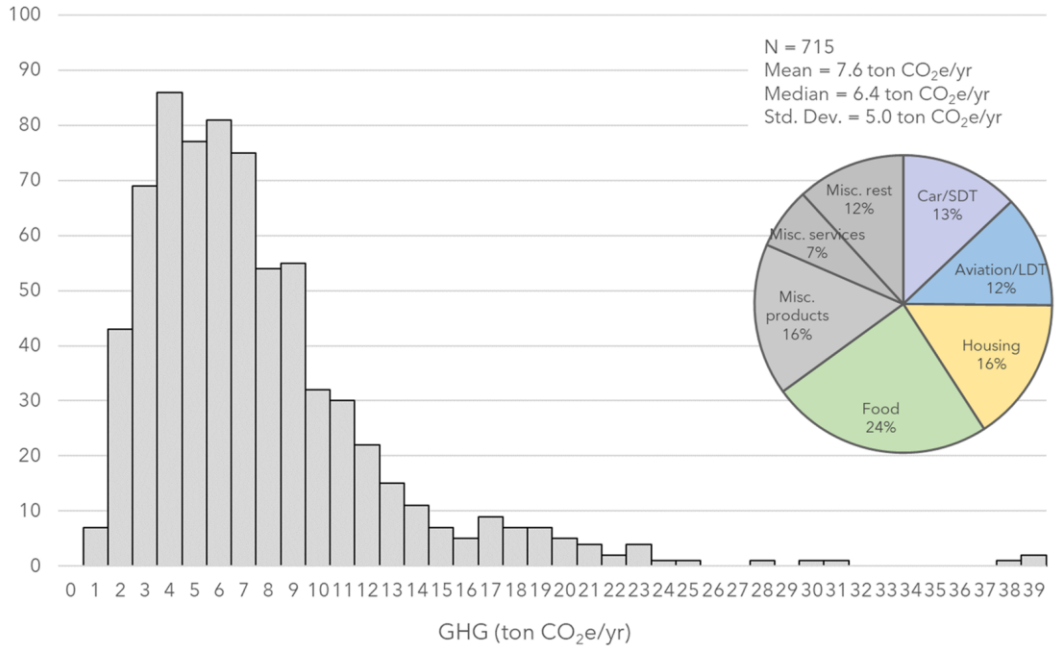

Figure 6.2. Descriptives and frequency plot of the total GHG emissions of the final sample.

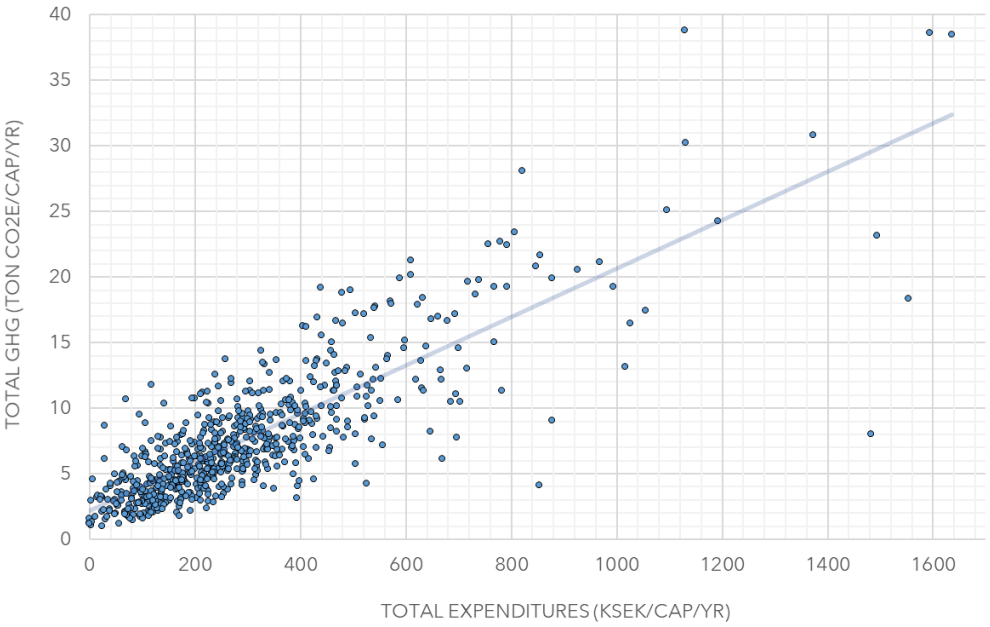

Figure 6.3. Relationship between total expenditures and total GHG emissions (N=715).

Figure 6.4 summarizes the direct and indirect effects of four low-carbon behaviours from multivariate analysis: not owning a car, not flying, not living in a detached house, and having a vegan diet. Controlling for socio-demographic variables (household size, sex, age, urban/rural, total expenditures) we see, for example, that having a vegan diet is associated with 1.29 tons CO_2e/cap/yr less than a mixed diet. A rebound effect could have been expected to result in a lower reduction in total emissions, but instead we see that a vegan diet is associated with 1.55 tons CO_2e/cap/yr less emission in total, i.e. slightly lower emissions

also in the other categories. Similar patterns are for not owning a car and not living in a detached house, whereas not flying is associated with a minor rebound effect of 2%. Each of the specific indirect effects should be seen as an indication and have a low statistical significance.

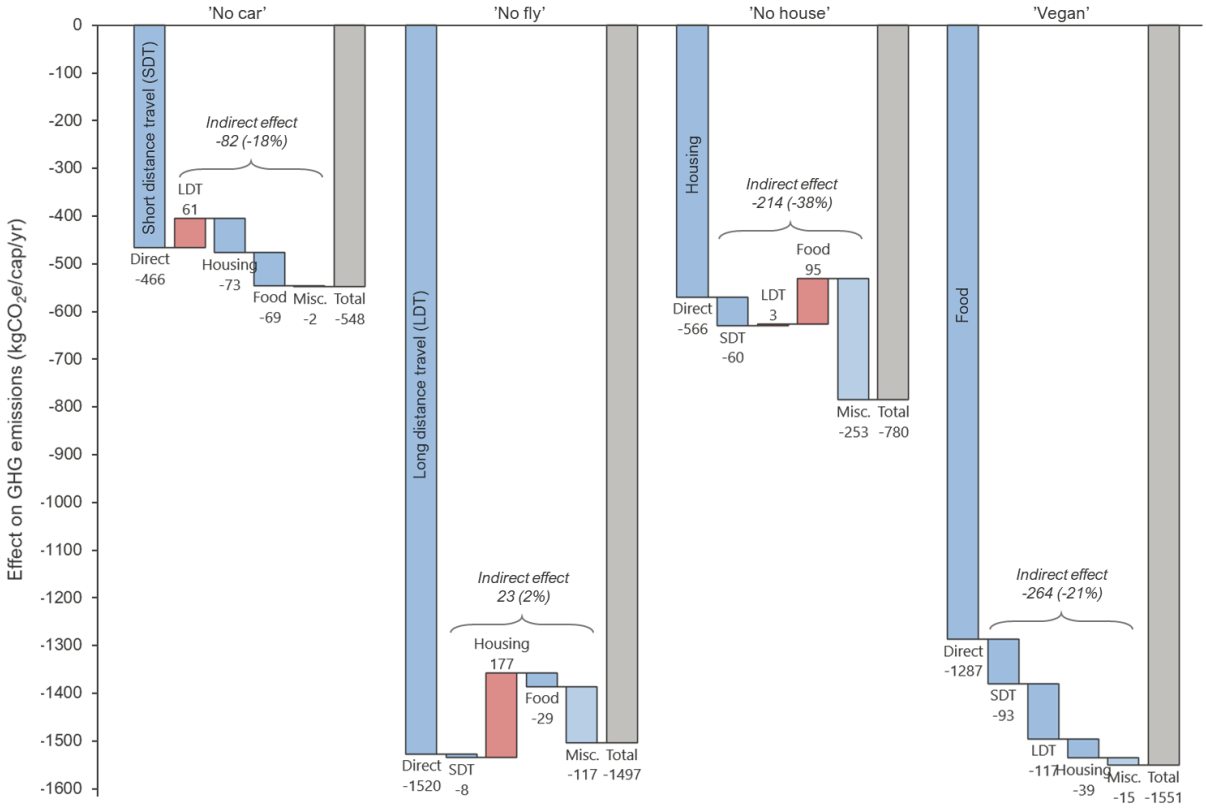

Figure 6.4. Direct, indirect and total effects on GHG emissions from four low-carbon behaviours.

The results from this analysis point towards no or negative rebound should be interpreted with caution provided the non-representative sample. As a first analyses this type of sample is useful since we could also target relatively large groups of green consumers, for example as many as 80 vegans that are extremely scarce in representative samples like the national dietary survey. We only use historical data in the analysis, i.e. data from before the respondents had connected with the Svalna application, but these respondents may still to be unusually motivated to keep down emission and hence also avoid rebound effects. Therefore, future research using transaction-based data would benefit from more ambitious approaches to attract samples that are closer to being representative.

7 Health impact assessment of adoption of sustainable dietary practices in Sweden

Liselotte Schäfer Elinder & Emma Patterson

This summary is based on the paper Potential Health Impact of Increasing Adoption of Sustainable Dietary Practices in Sweden (Patterson E, Eustachio Colombo P, Milner J, Green R, Elinder LS, 2021, BMC Public Health 21).

7.1 Introduction

The way food is produced, distributed, and consumed today contributes to about 25–30% of total greenhouse gas emissions (GHGE) (1) as well as impacting many other aspects of environmental sustainability (2). Although production methods, waste and overconsumption are significant contributors to this, a shift in the balance of our diet away from foods of animal origin and towards more plant-based foods would have both health and environmental benefits (3). For the average Swedish diet to be more in line with a healthy and sustainable food pattern, it would require an increase in the intake of vegetables, fruits, whole grains, legumes and nuts, and a lower intake of red and processed meat, added sugar, refined grains, and starchy vegetables (3). The "Mistra Sustainable Consumption – from niche to mainstream" programme aims to generate knowledge on how niche practices can become mainstream in Sweden. In work package 1 of the programme, dietary practices currently deemed niche, sustainable and suitable for scaling up were identified in workshops, literature reviews, reports, websites, magazines, social media and a web-based questionnaire to stakeholders and private citizens. What would the impact be on public health if these practices were adopted? Can we quantify the number of lives that would be saved, and provide policymakers with convincing arguments to take the regulatory and policy actions needed to promote these practices?

7.2 Methods

To answer this, a health impact assessment was performed, using the IOMLIFET life table method (4). A health impact assessment calculates the difference between expected mortality under current or simulated conditions. Life table calculations allow for the changes in the age structure in the future population that are induced by changes in mortality risks, and the subsequent changes in survival curves can be summarised as e.g. years of life lost (YLL) or changes to life expectancy (4). YLL is a summary measure of premature mortality representing the years of potential life lost across a population due to premature deaths before a set age. Specifically, we calculated the how many years of life would be expected to be saved over 20 and 30 years in Sweden because of sustainable dietary practices becoming more mainstream compared to if diets remain unchanged. The diseases included in this calculation of YLL were incidence of ischaemic heart disease, stroke, type 2 diabetes and colorectal cancer.

From the many food-related practices suggested in work package 1, we identified the ones which would plausibly result in improved health as well as lower GHGEs. We further limited them to changes involving dietary factors for which there is robust data linking them to disease outcomes according to the Global Burden of Disease (GBD) 2017 analysis (5). In the end we modelled:

1) Reductions in red and processed meat, assuming the meat was replaced by a) poultry/fish, b) vegetables, and c) a 50:50 mixture of vegetables and legumes

2) Reductions in intake of sugar sweetened beverages (SSBs) assuming replacement by water

3) Reductions in milk assuming replacement by a plant-based drink.

All replacements were by equal weight. For each scenario we modelled partial (25% and 50% decrease with replacement) and full (100% decrease with replacement) implementation. Changes were modelled at the level of food groups rather than individual foods. Poultry, fish or plant-based drink were considered neutral in terms of the health impact because these foods are not considered risk factors according to GBD 2017.

Estimates of current dietary intake in the adult Swedish population were from the latest nationally representative adult dietary survey, Riksmaten 2010-11 (6). The average intakes of red meat, processed meat, vegetables, legumes, milk and SSBs were calculated. Definitions of dietary factors used in the GBD 2017 were followed. Intakes were calculated for men and women separately. Data on population size for 2011 was obtained from Statistics Sweden (7) and disease-specific mortality rates for Sweden in 2011 were taken from the GBD 2017 database (8). The diseases for which the dietary risk factors in the scenarios are related to are ischaemic heart disease (IHD), ischaemic stroke, type 2 diabetes and colorectal cancer.

With chronic diseases there is often a cumulative effect of an exposure. For IHD, stroke and type 2 diabetes we estimated this to reach a maximum after approximately 10 years, and 30 years for cancers (9).

7.3 Results

The results from the health impact modelling suggest that, had Swedish adults made a “moderate” combination of these dietary changes in 2011 – i.e. a 50% reduction in red and processed meat (replacing it with vegetables), in milk and in SSBs - a reduction of approximately 513,200 YLL could have been achieved over 20 years (Figure 7.1). If a more “extensive” combination had been adopted - a 100% reduction in red and processed meat (replacing it with vegetables and legumes), in milk and in SSBs - a reduction of 1,076,900 YLL could have been achieved over a 20-year perspective, and 2,420,900 YLL over a 30-year perspective. Uncertainty ranges for the estimates were wide, but even at the lower ranges the estimates for a “minor” combination of scenarios (changes at the 25% level) were positive and substantial.

7.4 Discussion

If some of the dietary practices identified by the "Mistra Sustainable Consumption" stakeholders as sustainable niche practices became mainstream in the Swedish population, this would be expected to result in reductions in diet-related GHGEs as well as having considerable public health benefits. The results suggest that the gains could be in the region of a million YLL for the "extensive" scenarios (changes at the 100% level), mainly due to a reduction in IHD. The practice that had the highest impact was reducing the intake of red and processed meat and replacing it with a mixture of vegetables and legumes. This practice alone could prevent about a fifth of YLL due to IHD. In general, the overlap between foods that have lower environmental impact and also improve health is usually high, with the notable exception of fish and sugar, where health and environmental impacts may act in the opposite directions (10).

One of the major limitations of these simulations is that replacements may have consequences for energy balance and nutritional adequacy. Given that half of all Swedish adults have a positive energy balance and are overweight or obese, energy deficits would lead to further health gains through weight loss. Regarding nutritional adequacy, some of our scenarios would be almost neutral in terms of impact on micronutrient intake, for example replacing SSB with water. Furthermore, a study from the Nordic region using the same dietary survey data as in our study concluded that the effects on overall dietary quality would be minimal if processed meat was reduced to zero and red meat to 43 g per day (11). We only examined YLL, not years of life lived with disability (YLD), which means that we have most likely underestimated total health benefits by not accounting for impacts on morbidity. Furthermore, the analysis was limited to the effect on GHGEs, but other aspects of environmental sustainability such as water and land use are also important and should be included in future studies.

The widespread adoption of these niche sustainable dietary practices could result in considerable improvements in public health in Sweden over the long term, especially for men. They should therefore be promoted through a range of measures, using the current available evidence on how food-related behaviours can be influenced, as described in another Mistra report (12).

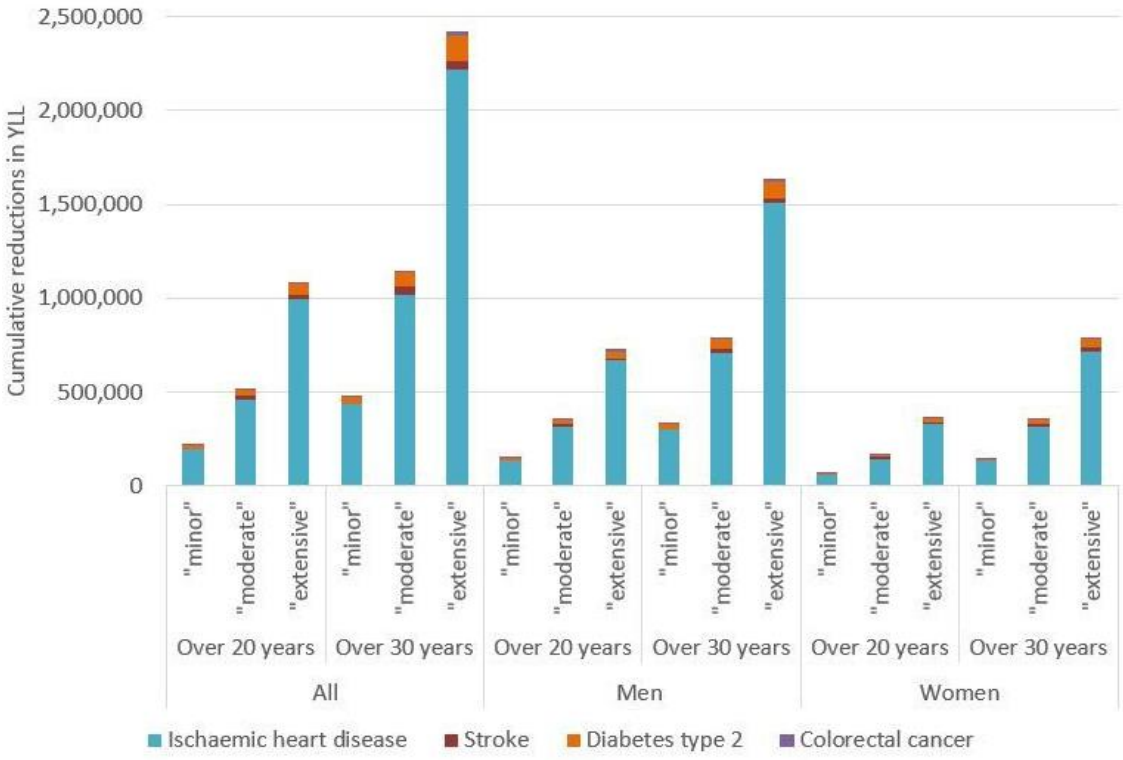

Figure 7.1. Cumulative reductions in YLL over 20 and 30 years for the different combinations of diet scenarios. “Minor” refers to 25% decrease in each dietary component with replacement, “moderate” to 50% decrease with replacement and “extensive” to 100% decrease with replacement (see text for further details).

8 Macroeconomic effects

Rob Hart

In this report we analyse the effects of changing consumption practices from various perspectives, including detailed study of the decisions and motivations of individual households based on interviews, and various studies based on hypothetical changes in patterns of household consumption. The conclusions about the effects on resource use and emissions build on a technique known as input–output analysis. Here we put these different approaches into an overall macroeconomic context, with the aim of helping the reader to understand the underlying mechanisms. We build the discussion around Figure 8.1.

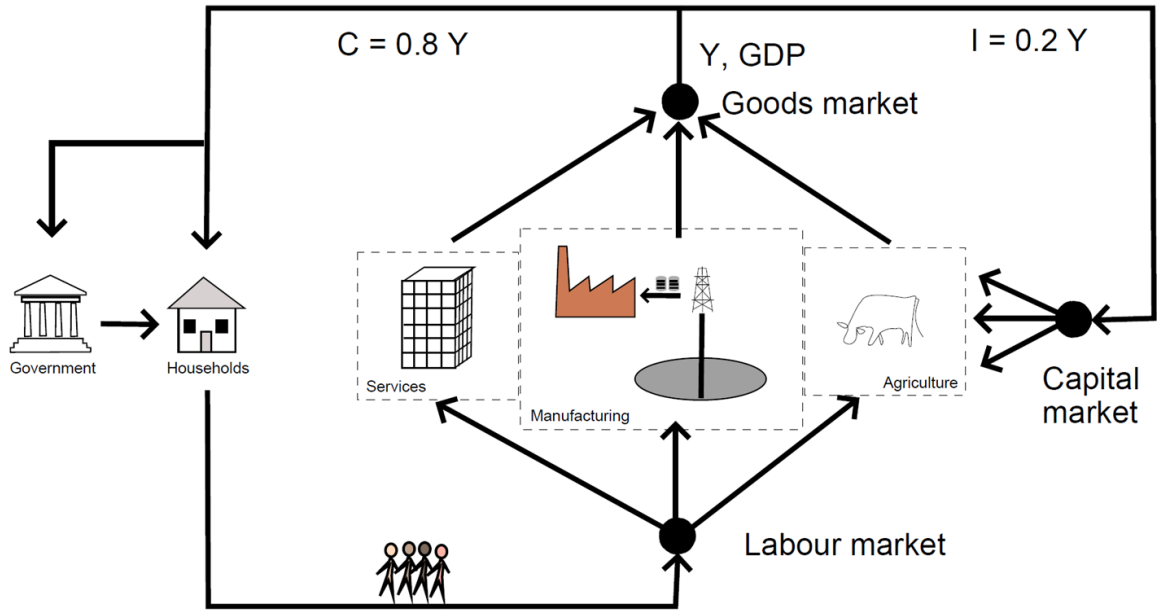

Figure 8.1. The circular flow of inputs and outputs in the economy. To the left we see the government and households, and in the centre, we have production in three sectors: services, manufacturing, and agriculture.

8.1 The circular flow and changing consumption choices

In Figure 8.1 we see how household labour inputs feed into different sectors in the economy. We illustrate a service sector, a manufacturing sector, and an agricultural sector, but the reader should think of each sector as consisting of a multitude of subsectors producing different goods and services. Some of these goods (such as oil in the picture) are used as inputs in other sectors, thus the interlinkages between the sectors are complex. Other goods are 'final products' and enter the goods market. The total value of these final products is known as GDP, labelled Y. Of GDP, around 80 percent (by value) is purchased by households, i.e. it is consumed, whereas around 20 percent is sent to the capital market, i.e. it consists of things like machines and factories, which will contribute to future production over many years. Thus Y = C + I. Note also that of the consumption goods, many are bought

directly by households, but many others (such as healthcare and education) are effectively bought by the state and then passed on to households for free or at greatly reduced prices.

The circular flow can be used to illuminate many processes in the economy, including the short-run business cycle, and the cycle of obsolescence and renewal of capital goods—and associated technological progress—which lies behind the long-run development of the economy. Here however we focus on changes that households can achieve here and now by changing their own behaviour, as discussed in Carlsson Kanyama et al (2021). We thus rule out what economists call changes in production technology, i.e. changes in the quantities of inputs needed to produce a given quantity of output.

Consider now individual households. Each household purchases a basket of goods each year, and receives another basket from the state. Furthermore, each household provides a certain quantity of labour. Now consider a societal trend such that many households decide, due to a change in preferences, to alter the composition of their consumption baskets, for instance reducing consumption of beef and increasing consumption of vegetable products, which we will call 'beans'. This trend is thus in line with the analysis of Section 4 above.

The shift in expenditures from beef to beans will lead to consequences in all three markets, goods, capital, and labour. Assume first that the beans are equally costly to produce as the beef. Then the effects can be summarized as follows.

- Demand for beef falls, demand for beans increases.
- This sends price signals to producers, who reduce production of beef and increase production of beans.
- The production increase is associated with shifts of capital and labour from beef production to bean production.

We know that beef production requires greater areas of land than production of beans, and also leads to higher emissions of greenhouse gases due to both the extra crops that must be grown to feed to cows, and due to the methane emissions from the cows themselves. However, since we have assumed that costs are equal, it must be so that production of the finished bean products involves the more intensive use of other inputs than land, perhaps during processing to make the final 'bean-based' product. This shows the need for the 'input–output' methodology used in the studies described above: in order to find overall effects on emissions of consumption changes, we need to trace the knock-on effects through the whole economy of the reallocation of productive inputs.

In Section 4 we see that the effects of 'green shifts' in consumption patterns in food, holidays, and furnishings may be reductions in GHG emissions of up to 40 percent. This may seem to be a modest reduction given the drastic long-run reductions in GHG emissions required to halt global heating and given the very large differences in emissions between (for instance) meat products and vegan equivalents. The reason for the lower overall numbers is twofold: firstly, large parts of the food consumption basket (such as consumption of grains) remain essentially unchanged; and secondly the production technology is (as previously

noted) unchanged. Similarly, in Section 3 we see that the overall effects of upscaling of the niche practices is typically modest, for similar reasons. Exceptions are (for instance) for staycationing combined with reduced labour supply, since large financial savings can be made through this practice: if these savings are respent, overall benefits are modest. But if staycationing is part of a 'downshift' (as discussed below) the environmental benefits are much larger.

8.2 Macroeconomic consequences of changing preferences

Consider now the macroeconomic consequences of the 'beef to beans' shift, or more generally shifts towards sustainable consumption practices that do not lead to changes in total expenditure, either because the 'green' goods cost the same as their 'brown' counterparts, or because any money left over is respent across the full range of goods (i.e. on the average consumption basket).[1] The short story is that the consequences are modest. In the short run, the reallocation of resources may cause some dislocation: as demand for beef falls, it may not be straightforward for workers employed in the beef industry (and others which are tightly associated with it, such as meat-packing) to move seamlessly into the industries associated with bean production. However, given our assumption that overall costs are equal, this is essentially a short-run macroeconomic problem. As we see in Section 7, a far more important consequence of such a shift—apart from the environmental benefits—would be an increase in life expectancy or a reduction in years of life lost (i.e. premature mortality) corresponding to several months per person in Sweden.

The macroeconomic consequences of shifting consumption patterns are much more interesting when these shifts also involve changes in the total value of the goods and services purchased by households, as discussed in Sections 3 and 5. Returning to Figure 8.1, if the total value of household's purchases declines, there are two options of interest:[2] the first of these is an increase in investment, the second is an decrease in labour supply. If purchases decline but production and labour supply is maintained, the result must be an increase in investment in capital. From the household perspective, earnings are unchanged, but an increasing share is spent on saving for the future rather than consuming today. The short-run consequence of this depends on the emissions-intensity of capital investments compared to the emissions-intensity of the consumption foregone. As we see in Section 3 capital investment is slightly less emissions-intensive than the average basket of consumption goods, hence if consumers reduce consumption of an emissions-intensive good and invest the savings then the result will be a short-run decline in emissions.

[1] Note that if the green basket is more costly then we assume that reductions are made in purchases of the average basket.

[2] A third option would be an increase in government consumption.

The long-run effects of a shift into investment may be profound. In general, we expect increased investment to lead to increased production in the future. This may sound like a bad idea from an environmental perspective, but this is not necessarily the case. If we want to rapidly reorientate production towards clean goods, then a higher rate of investment will be needed as 'dirty' capital will be retired earlier than planned, to be replaced by newly constructed 'clean' capital. And the argument applies even more strongly if we also want to transform production technology, rather than just shifting the composition of what we produce—to achieve such technological change we need investment both in research and development, and in new capital goods. Hence a rapid shift to green products and green production methods will necessarily involve a medium-run reduction in consumption in relation to investment.

The alternative to increasing investment—when the total consumption expenditure of a household declines—is decreased income, typically through decreased labour supply.[3] Decreased income implies lower production, and hence unambiguously lower environmental effects, since there is no re-spending of any kind.[4] This can be seen clearly in the data from Section 3. Furthermore, such 'downshifting' is clearly close to the idea that many have of what sustainable consumption is about.

If consumption decreases and investment stays the same, GDP must decrease. (Recall that Y = C + I.) Will such a decrease create unemployment? The short answer is no. The decrease was, by assumption, caused by a voluntary decrease in labour supply, hence no effect on the rate of unemployment is to be expected.[5] Instead, decreased labour supply will be unambiguously good for the environment. Why then are governments so keen to encourage labour supply? A problem when labour supply declines is that government income declines, since government income is typically in proportion to GDP. This implies that the government must either increase the rate of taxation, or decrease government consumption, implying reductions in (for instance) expenditure on health care and education. Furthermore, there is a presumption that labour supply is typically below the level that would be socially optimal, since labour supply is discouraged by taxation. If taxes have to be raised further, this would exacerbate the so-called deadweight losses of taxation. See for instance Swedish Ministry of Finance (2017), where the trade-off between 'efficiency' and 'equity' is discussed. On the other hand, in the literature on sustainable consumption and status goods the presumption that labour is undersupplied is strongly questioned. If we consume not because consumption gives us 'intrinsic' utility, but rather relative consumption gives utility, then we will oversupply

[3] The decrease could be in labour hours, or in salary through a move to a lower-paid job.

[4] However, it should be noted that a voluntary reduction in labour supply—such as early retirement—may be associated with a change in the pattern of remaining consumption towards emissions intensive goods, such as holiday cruises and international air travel.

[5] The rate of unemployment is defined as the ratio U/(U + W), where U is the number of working-age adults who are both without work and seeking work, and W is the number of working-age adults in work.

labour in a race for status, and measures which—in a coordinated way—dampen labour supply will raise everyone's utility. See for instance Wendner and Goulder (2008).

Finally, note that Figure 8.1 does not allow for international trade, which is central to the analysis of Section 3 above. However, in principle the addition of trade makes little difference to our analysis. To account for trade we must widen the system boundary to include multiple countries, hence we expect environmental costs and benefits of shifting consumption patterns to show up in different places.[6] But there is no sense in which Sweden as a whole risks losing 'international competitiveness' through changing patterns of consumption or labour supply: the competitiveness of individual firms on the international market depends on the efficiency of those firms relative to other firms in the national economy, but the average competitiveness of the economy as a whole depends on how global markets value the national currency relative to the currencies of trading partners. This works through the system of international currency exchange rates: exchange rates adjust such that a country with relatively high labour productivity will also have high labour costs per hour (and vice versa). The upshot is that if, for instance, Swedes reduce their working hours by 10 percent (either through changing preferences or changes in government policy), Swedish GDP would be expected to decline by 10 percent (in the long run, relative to business-as-usual). This applies irrespective of the degree to which the Swedish economy is integrated into the global economy. For a discussion of this, by a Nobel laureate, see Krugman (1994).

8.3 Policy for sustainable consumption

The above analysis presupposes that changing consumption patterns arise through changing preferences. If we instead assume that they are brought about through government policy then the analysis changes in important ways. In general consumers are rather insensitive to changing prices, especially for product types (rather than individual brands).[7] Hence if we assume unchanged preferences then rather drastic changes in the relative prices of products would be needed to significantly shift patterns of consumption and labour supply. If this were to be done through subsidization (for instance, subsidized railways) then this would require increased taxation on other goods, and lower labour supply. On the other hand, if it is done through taxation this could in theory be achieved by shifting the tax burden from (for instance) taxes on labour to taxes on emissions-intensive goods, which would have broadly neutral effects on labour supply, despite popular ideas to the contrary.[8] Finally, if the goal is

[6] For instance, if we cut our consumption of meat and dairy, GHG and land benefits are mainly felt in Sweden and Europe, our main trading partner for animal products. However, water use falls in Asia where irrigated agriculture dominates, and chemical use falls much more in the rest of Europe than in Sweden, a reflection of the relatively low use of chemicals in Swedish agriculture.

[7] This sensitivity is measured by economists as the elasticity of demand, where an elasticity greater than 1 indicates that a 1 percent price increase leads to a quantity reduction of more than 1 percent. For most groups of products, such as cars, grains, telecommunications, etc, the measured elasticities are well below 1. On the other hand, consumers may be much more flexible in shifting between alternative versions of the same product.

[8] See for instance Goulder (1995).

both changing consumption patterns and downshifting, then the means to achieve this would go hand-in-hand, since higher taxes would tend to achieve both, as shown by Wendner and Goulder (2008).

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About the research programme

Mistra Sustainable Consumption – from niche to mainstream is a research programme consisting of researchers from: KTH Royal Institute of Technology, Chalmers University of Technology, Lund University, University of Gothenburg, Karolinska Institutet, Luleå University of Technology, The Swedish University of Agricultural Sciences and Statistics Sweden. KTH is the programme host. The research is conducted in cooperation with societal partners from businesses, public authorities and non-governmental organisations.

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