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by

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Sustainability and the Problem of Consumption

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abstract

Strong growth in disposable income has inflated consumption to unprecedented, but not sustainable levels. In this process consumer behavior has been changing. To explain the driving forces of this development, the paper introduces a theory of evolving consumer preferences that is molded in an evolutionary paradigm. The theory allows to better assess how individual welfare would be directly affected by policy measures designed to make consumption sustainable. Such policy measures are likely to also trigger indirect welfare losses by negative employment effects. The policy debate therefore needs to pay attention to both direct and indirect welfare effects. As a concrete proposal a redesign of consumption taxes is discussed that accounts for both concerns.

Keywords: consumption, preferences, growth, sustainability, satiation, welfare, consumption tax

JEL-Code: A 13, D01, D03, D11, D62, H 23, H24, Q01, Q38

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1. Introduction

A good part of the human kind today enjoys what by historical standards are affluent consumption opportunities. Average per capita consumption has in many places grown way beyond what was – in view of "nature's parsimony" (as Ricardo once put it) – not even dared to be hoped for in earlier times. The soaring quantitative growth of consumption was made possible by technical progress, injected into human production processes via capital accumulation. Labor productivity thus grew, i.e. the value of labor rose relative to the value of the natural resources processed with labor's help. As a result, human claims on materials, biomass, energy, atmosphere, and space that serve consumption directly or indirectly expanded ever since. The consequence is a seriously increasing environmental stress, degradation, and resource depletion. Due to the ignorance of the complex ecological system the threats implied have for long gone unnoticed (Faber, Manstetten, and Proops 1992). At least since the Brundtland report (United Nations World Commission on Environment and Development 1987; for a more recent assessment see the Millennium Ecosystem Assessment 2005) the problems are, however known to the general public.

The environmental impact has so far been caused mainly by expanding consumption in the developed economies, representing the lesser fraction of the world population. (In the U.S., for example, consumer expenditures grew in real terms by no less than 500% over just hundred years from 1901 to 2000, see U.S. Bureau of Labor Statistics, Report 991,2006). If per capita consumption were to unfold similarly for the rest of the world population – as all developmental policies propagate and aim to support – environmental damages would multiply. Without decisive changes being made, global environmental stability and the long-term quality of life on this planet are going to be severely threatened. It is a pressing question, therefore, what can be done to make a transition to consumption patterns that are sustainable.

The question is particularly urgent in the developed world that has taken the lead in shaping consumer aspirations (see Daly 1996, Jackson and Marks 1999, Myers and Kent 2004, Spangenberg 2004, Schor 2005, Alcott 2008). Yet the discussion of remedies focuses mostly on measures aiming at changes at the production side. With respect to consumption of goods and services a certain perplexity prevails (see Røpke 2009). In part this may be due to a conflict of normative values that arises here. A growing consumption is usually seen as better serving the needs or preferences of human beings, i.e. raising individual welfare. This is of normative value in its own right. However, if not sustainable, this normative value conflicts with justice and fairness considerations. The ecological impact of current consumption in the developed economies may affect future consumption opportunities. Future generations particularly in the less developed economies in may face much worse terms for serving their needs (see Baumgärtner & Quaas 2010).

Conventional environmental economics does not address this conflict. Instead it locates the problem in the occurrence of externalities of economic behavior (Ayres 2008). Its strategy would therefore call for forcing not only producers but also consumers to internalize the full social costs of their activities (e.g. Russell 2001). This is a highly desirable aim indeed. Considerable progress could be made in its pursuit – for the production side. (A significant example is the creation of institutions for assigning and trading pollution entitlements.) However, with respect to consumer behavior this strategy has turned out to have limited success. In view of the often prohibitively high costs of enforcing a private internalization of social costs this is not entirely surprising. In order to reach a sustainable consumption additional policy measures will therefore be necessary. Besides the strategy focusing on the private internalization of social costs a huge number of policy measures have been proposed. Prominent among them are environmental standards and regulations and specific environmental taxes and subsidies. All of them have a highly selective impact and are connected with considerable administrative expenses.

Among the proposals with a broader impact a currently popular idea is a process and product innovation strategy. It aims at raising the resource efficiency of each unit of consumption by a factor X (X = four, ten, or greater; see von Weizsaecker e.a. 1979, Schmidt-Bleek 1994, Meyer, Distelkamp and Wolter 2007). Once ways have been found to reduce the "ecological rucksack" of products and services correspondingly, this strategy would help saving costs. This means that it should be incentive compatible. For the proponents of this strategy, an attempt to reduce the ecological rucksack by subsidizing R&D thus holds a great promise without threatening to reduce welfare. Such an attempt is, of course, a bet on future innovativeness. There is an irreducible risk that innovativeness fails to live up to the expectations. Moreover, if the factor-X policy should turn out to be effective, there is a non-negligible risk of triggering a rebound effect. Precisely because of the saved costs, production and consumption may expand and (partly) thwart the resource savings as it has repeatedly been observed (see, e.g., Sorell 2009).

In view of the importance of the problems it seems warranted to extend the discussion of possible policy strategies to measures that target consumption directly. If the anthropogenic use of nature cannot be reduced otherwise so as to reach sustainability, sacrifices in the level and in the further growth of consumption may be deemed legitimate. Moreover, how sure is it that a growing consumption is always satisfying the needs or preferences of human beings better? To assess this question a thorough explanation of the way in which humans satisfy their needs or preferences is required, i.e. an explanation of the sources of human welfare. Canonical economic theory offers little in that direction. It simply assumes that the consumers' invariable preferences are insatiable (an assumption not least motivated to ensure unique solutions for the utility maximization calculus, see Deaton and Muellbauer 1980, Chap. 2.1). By implication every expansion of consumption then qualifies as welfare gain. Yet the sweeping claim that more is always preferred to less does not do justice to what happens on the demand side of growing economies. It is a well known fact that the income elasticity of demand differs substantially between expenditure categories. In some categories, the dramatic growth of disposable income has created a situation showing signs of satiation. In other categories, in contrast, there are no signs of satiation whatsoever (see, e.g., Lebergott 1993).

In order to come to grips with an explanation of what seems to be rather complex need or preference satisfaction patterns a more elaborate theory is necessary. The present paper suggests a behavioral approach that is molded in an evolutionary paradigm (Witt 2001, 2010a). It allows to inquire more deeply into the – changing – motivation underlying the consumers' spending behavior. By doing so, the normative implications of both the present patterns of consumption and possible, policy induced, sacrifices can better be assessed. It is often claimed that consumer preferences co-evolve with rising income (see, e.g., Norton et al. 1998). To be more specific regarding the explanation of preference change the hypothesis of a multi-level learning process will be introduced. Where the canonical version of preference theory is based on a uniform preference index, this learning process implies a decomposable preference index. It corresponds to quite a variety of different motivational mechanisms. With a growing consumption their effects on welfare call into question some of the established views on preference satisfaction.

In an exemplary fashion this will be demonstrated in the present paper for a specific policy strategy to be proposed, namely a gross redesign of consumption taxes. More specifically, a reformed sales or value added tax is suggested. For reasons to be explained it needs to be combined with a progressive taxation of personal consumption expenditures. Such a taxation has prominently been advocated in recent years in a different context by Robert Frank (1997, 1999, 2011). In order not to inflate the present size of the tax burden, such a redesigned taxation of consumption will have to be substituted for the progressive taxation of income now collected in most countries. As will be shown, an assessment of whether or not there are direct welfare sacrifices resulting from this policy strategy depends on the particular motivations underlying the (taxed) consumption behavior.

Policy strategies focusing on consumption like the one proposed are complicated by possible indirect welfare effects. They can result from the fact that any change in the course of the growth path of consumption is necessarily affecting economic growth in general. A transition to more sustainable consumption patterns may therefore result in slackening growth rates (considered a necessity by some authors, see Alcott 2008, Latouche 2009, Maretinez-Alier et al. 2010). Yet, in the most developed economies the political credo nowadays is to foster economic growth. This is so not least because of the employment problems that the ongoing labor saving technological progress causes. (The problems are tried to be cured by creating new jobs through output expansion.) Obviously, a policy acceptance problem can arise here (Hayden 1999). Sustainability oriented policies that risk to affect economic growth negatively may have few chances to find majority support in democratic voting. A policy debate that ignores this question would be delusory (van den Bergh 2011a). It will therefore have to be shown how the proposed taxation of consumption accounts for the indirectly arising welfare effects of a sustainable consumption.

The argumentation in the paper is structured as follows. Sections 2 elaborates on the behavioral foundations that are necessary for explaining the motivational mechanisms of need or preference satisfaction and the changes that occur with the secular growth of consumption. Drawing on that explanation, Section 3 discusses the normative implications of the approach, focusing on the welfare or preference satisfaction criterion. Section 4 turns to the specific policy strategy proposed for enhancing the sustainability of consumption, the redesigned taxation of consumption. It elaborates on both the technical features of the suggested measures and the welfare aspects of changes likely to be induced by the measures. Section 5 offers a short summary.

2. Explaining Consumer Preferences and their Evolution

Over the last century, per capita real income has seen an unprecedented growth. Consumption expenditures grew similarly in real terms. How did consumers respond to what is, in a sense, a process of emerging affluence? It has been conjectured that the motivations underlying consumer behavior – the revealed preferences of textbook economics – change when the ability to spend increases (Norton et.al. 1998). But how does this happen? Canonical preference and utility theory are of little help in answering this question. In fact, they even leave open what it is that generates utility or, more generally speaking, what motivates observable consumer behavior. Answers can, however, be provided by drawing on well established hypotheses from biology, behavioral sciences, and psychology.

In the naturalistic perspective of these disciplines, a first, basic answer is the following. Observations of the behavior of all higher animal species, including man, show that organisms which are deprived of a need are motivated to act in a way that reduces deprivation. The action can be a randomly chosen one. Or it can be an action that has been experienced to be able to reduce deprivation, if there are any previous experiences. The needs, i.e. the contingencies under which deprivation occurs, can be manifold. However, we focus here on a specific subset of needs that have over and again been found in experiments to motivate economically relevant action. [1] The subset is made up of needs such as that for sleep, for something to drink, for something to eat, for maintaining body temperature, for shelter, for physical activity, for affection, for status recognition, for sensory arousal. Humans can also be in need

[1] Several very different need theories have been suggested in the literature. An often cited one is that of Maslow (1987) to which Jackson and Marks (1999) refer. However, unlike the behavioral interpretation of needs adopted here, Maslow's theory has found little empirical support (see Wahba and Bridwell 2002) as Maslow (ibid., p. xix) himself admits. The subset of needs discussed here also relates to the theory of "visceral motivational influences"(Loewenstein 2000) in behavioral economics.

(show signs of deprivation) regarding their cognitive consistency (Festinger 1957), the level of achievement (McClelland 1961), a positive self–image (Higgins 1987), or their autonomy and self-determination (Deci and Ryan 1985). Using a utilitarian language, it can be argued that utility emerges from the (temporary) reduction or removal of deprivation of such physiological and psychological needs by suitable actions.

For explaining the motivational dynamics underlying consumer behavior it is important to notice the following relationship: the satisfaction of the specific needs just mentioned is associated with a primary reinforcement in the sense of instrumental or operant conditioning. [2] Obviously, the motivation for (or the utility derived from) taking an action changes systematically over time when deprivation decreases with the satisfaction of the underlying need. However, there are differences between the needs in how easily deprivation can be reduced (where we are interested here only in those needs for which this effect is brought about by expanding consumption). [3] The intake of food or something to drink, for example, is subject to homoeostatic controls. The motivation for additional consumption therefore usually vanishes as consumption reaches an upper bound per unit of time. This bound represents the physiological satiation level. In the case of food it is mostly determined by the caloric intake (see Manig and Moneta 2009).

What effect results if consumption expenditures grow in real terms with rising disposable income? It can be conjectured that differences in the satiability of needs translate into different income or expenditure elasticities of the goods serving these needs. That the elasticities differ is a long established fact. Unlike in the seminal work of Ernst Engel (see Chai and Moneta 2010) an attempt to explain the differences is, however, no longer made by modern utility theory. In the example of food and drinks, a rising consumption enabled by the larger income tends to quickly drive the intake of calories close to the satiation level (leaving an increasing waste of food out of consideration). Hence, the income elasticity of calorie rich food and drinks is smaller than one. This does not necessarily mean, however, that the corresponding expenditures also stagnate. When facing a growing market saturation an industry like the food industry has strong incentives to develop innovative products that, in one or other way, elicit extra expenditures.

This can be accomplished by quality innovations. They may allow to realize a higher price per calorie that is consumed, provided consumers do not reduce their calorie intake in an offsetting manner. Successful examples are the large scale import of exotic produce from all over the world or the rise of organically grown produce. Another innovation strategy available to the producers targets at reducing the average caloric content of their products at by and large the same price without deteriorating their taste. Consumers can then experience the reward of enjoying an appreciated taste such as sweetness more often without approaching the physiological satiation level as quickly as before. An instructive example of this kind of innovations are food stuffs and soft drinks like Diet Coke made with low-calorie, artificial sweeteners (Ruprecht 2005). Satiation is postponed and sales can expand further.

In the subset of needs considered here, there are of course also needs that cannot as easily be

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[2] See, e.g., Herrnstein (1990), Staddon and Cerutti (2003). Note that the reverse is not true; preimary reinforcement can also result in other ways (Lea 1983). The fact that the mentioned physiological and psychological needs are so widely shared among humans, and not only humans, points to innate contingencies.

[3] In a huge empirical literature in economics research, preference change is dubbed "habit formation" without explaining it. A rare exception is Pollak (1978) who suggests to relate empirically observed habit formation effects to different satiation features of physiological and psychological needs.

satiated by increasing quantitative consumption as those for food and drinks. As per capita income rises, consumer expenditures therefore tend to be reshuffled in the direction of goods that serve less easily satiable needs. The empirically recorded differences in the income elasticities of the expenditure categories provide telling examples. One of the most significant cases is the need for social recognition and status. To satisfy this need, exclusive consumption items are purchased by which one can distinguish oneself from others and signal a desired social status. The exclusiveness and status-signaling capacity of these consumption items can go lost, however. This happens if, as a result of a rising income, lower income groups increasingly become able to acquire those items too. In order to restore a status signaling exclusiveness of consumption, other – and usually more expensive – items need to be purchased. As already explained by Hirsch (1978) and Frank (1999, 2011), rising per capita income triggers unstable status races similar to arms races. They tend to bid up the expenditure share for status consumption as consumers get more affluent.

The need for sensory and cognitive arousal is another example of a need motivating economically increasingly significant expenditures. The reason is, however, a different one. In the case of status seeking, spending extra amounts can fail to satisfy the need in a lasting way, i.e. raise the relative status, because the effect of additional expenditures is neutralized by similar increases in spending by *others*. In the case of seeking arousal, the extra amount that is spent to reach the satiation level fails to keep arousal at a level that high because of a dulling or stupefaction effect. This has already been noted by Scitovsky (1981). The effect emerges spontaneously. Over time it brings arousal down to a level where deprivation is again felt. This is an example of endogenous preference change known in the literature as hedonic adaptation (Binder 2010, Chap. 6).

Compare the case of the need for food in which (for other reasons) satiation is also only temporarily attained but no preference change is involved. If hunger comes back, eating the same meal over and again will do. In the case of arousal, however, the adaptation process dilutes the arousing value of an already experienced stimulus. Ever new, sufficiently strong, stimuli are necessary to regain need satisfaction. (Hence, what is sufficiently arousing is also defined in relative terms here, albeit this time in relation to experiences following from one's *own* spending.) Usually, the set of consumption opportunities that generate sufficiently strong, new stimuli at the same (low) cost tends to be exhausted after a while. Further satisfaction of the need sooner or later then calls for expanding the corresponding expenditures. This instability is reflected in the growth of spending in real terms on, for example, all sorts of entertainment and the services of the information and communication industries. Another significantly benefitting industry is tourism, particularly long haul and adventure tourism (see Chai 2007) – an extremely resource intensive form of entertainment. [4]

Another example in which – yet other – adaptation processes seem to be responsible for the fact that a need is difficult to satiate are the (most likely innate) cognitive needs. A notable one is that for keeping up a positive self-image (see, e.g., Gollwitzer and Kirchhof 1998, Pyszczynski et.al 2004). Identity discrepancies represent a state of need deprivation that creates a motivation to act (Dunning 2007). This motivation seems to have become a substantial trigger of consumption activities in economies with high per capita income as rising expenditure shares for cosmetic surgery, impaired potency treatments, anti-aging products, etc. show. (Likewise, doing something that is not compatible with one's self-image – which would cause need deprivation – is likely to induce an avoidance motivation.) What self-image one develops is to a large extent contingent on social norms. Since these norms often tend to rise with increasing per capita income in the relevant peer group, an unstable development of the corresponding

[4] The corresponding household expenditure categories have been observed to grow much faster with rising income than average consumption expenditures (see Report 991, 2006 by the U.S. Bureau of Labor Statistics).

consumer expenditures can again be triggered. If everybody is striving to spend enough in order to be sure that the norm is at least met, the norm and the expenditures tend to wind-up. Consequently, the individually felt deprivation – caused by not living up to the norm – does not disappear. [5]

The differences in satiability between needs offer producers of consumer goods and services an opportunity to prevent a saturated demand. They can diversify into products and services that serve less easily satiable needs. Often the simplest means of diversifying are innovations that appeal to several needs simultaneously, where the needs have different satiation characteristics. When consuming more of such "combination goods", consumers reach the satiation levels of the needs, one after the other. However, a (successively reduced) motivation to further expand consumption continues to exist up to the satiation level of the least easily satiated need. Product differentiation strategies aiming at addressing needs that are less easily satiable than those the products originally served therefore promise to generate some extra demand. A good example is the attempt to add features that are able to signal status or a particular group identity like in apparel, foot ware, bags, etc. [6] A further example is the adding of features appealing to sensory and cognitive arousal as in the case of exotic food mentioned above that may for this reason induce a higher willingness to pay. A special case of combination goods are those which, in addition to their original function, serve to maintain a positive self-image, e.g, by assuring fairness ("fair trade" products) or environmentally friendly production methods.

Important as the inter-personally widely shared basic needs are for explaining the motivation to consume (or the utility derived from consumption), it is not the only motivational force. The dynamics by which the motivational forces (the preferences) change are also subject to other, more idiosyncratic influences. In terms of the suggested behavioral approach these influences arise, for one, from newly emerging motivations that are conditioned on previously experienced satisfaction of the mentioned needs. This is known as conditioned reinforcement or conditioning learning (see Leslie 1996). Suppose a specific consumption act is carried out that reduces deprivation of one of the mentioned needs. Suppose further that this rewarding experience coincides repeatedly with other actions or events that have initially no rewarding or aversive connotations. An association is then learned over time by which the originally neutral action can gain a reinforcing power. What emerges is a so-called conditioned reinforcer or, to refer to the corresponding consumption motivation, an "acquired want". [7] While the basic needs that were mentioned are presumably largely innate, the individually emerging structure of acquired wants is likely to reflect influences of the social and cultural environment in which conditioning has taken place.

The second kind of influences that have an idiosyncratic effect on the motivational dynamics are

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[5] For a discussion of this phenomenon in the context of consumption expenditures serving hygiene and personal cleanliness norms see Woersdorfer (2010).

[6] The ability of consumption items to signal status is to a large extent a matter of spontaneously emerging conventions and can therefore to a certain extent be influenced by the producers' promotional activities, see Witt (2010b).

[7] See Witt (2001) giving the example of a person learning an association between eating as primary reinforcer and a particular setting in which eating takes place. Suppose attributes of this setting (architecture, furniture, tableware, table music etc.) are initially experienced as neutral. By virtue of the association with the rewarding eating experience they may, however, become conditioned reinforcers. A consumption motivation of its own is then established. It may eventually induce expenditures on goods and services creating the appreciated setting that exceed by far the expenditures on food, i.e. the primary reinforcement on which the acquired wants are conditioned.

cognitive influences. The consumption of goods and services is instrumental for attaining need satisfaction. The instrumental value associated with a particular good or service may have unconsciously been realized through reinforcement learning. [8] Or it may be consciously recognized by cognitive reflection. If a consumption activity is mediated by cognitive reflection of means-ends relationships, the resulting choices may deviate from those that reinforcement contingencies alone would predict. This is particularly relevant for goods that satisfy a need not by literally being eaten up at once, but by providing "services" over their life time by which a need is satisfied. A coat that provides the service of preserving the body temperature of the person wearing it may be taken as an example. In such a case, the motivation to purchase a consumption good may not be the same as that for using its services.

Obviously, satiation occurs, if at all, with respect to the amount of the services consumed per unit of time. The *use* of one coat would suffice to provide the services in a cold day. In contrast, the motivation to *purchase* more than one coat may be guided by cognitively constructed additional motives not subject to the same satiation characteristics as the need of preserving body temperature. Thus, reflections on aspects such as fashion, function, esthetics, convenience etc. may be good for inducing purchases of additional coats. In fact, it can often be observed that consumers with a sufficiently high income deliberately extend their reflections on the instrumental value of consumption goods beyond the immediate services which these goods provide. Producers can stimulate this by advertising. Ads may suggest arguments that persuade consumers of additional reasons for why multiple purchases of more or less differentiated products make sense – even though they often provide similar or even the same services in terms of the needs to which they appeal. [9]

3. Welfare Aspects of the Evolving Consumer Behavior

The quantitative growth of consumption in the developed economies makes increasingly use of nature in a way that is not sustainable. It thus undermines the possibilities of the less developed economies and of future generations to similarly benefit from nature as the present generation in the developed economies does. The international and inter-generational conflict about the distribution of consumption opportunities raises questions of justice and fairness. For example, is the quest for making consumption patterns sustainable of equal moral relevance for the rich and the poor? Why should the very poor today care about not impairing the use that future generations can make of nature when they themselves can make no use of it that guarantees their survival? In a world wide perspective, this argument applies mostly to consumers in the least developed countries. By the very same justice and fairness considerations that inform sustainability concerns it would not seem legitimate to place the burden of

[8] Note that reinforcement learning takes place whenever the level of deprivation of a need is high. If the value of an action for reducing need deprivation (the reward) differs systematically between alternative actions, organisms adapt to these differences according to the so-called matching law (Leslie 1996, Herrnstein 1997).

[9] An instructive case is that of footwear providing the "service" of protecting against pain and coldness (Frenzel Baudisch 2006). In principle this service could be, and in states of less affluence has been, accomplished with one pair of shoes. This changed with the soaring growth of per capita income in the 20th century. The footwear industry developed functionally differentiated shoes for all sorts of purposes, appealing with the functional differentiation to cognitively mediated motives for multiple purchases. But since only one pair of shoes can still be worn at a time, the average utilization rate of the services of each single pair of shoes over its life time decreases significantly. Except, of course, shoes live proportionately longer – something often prevented by fashion changes or decaying materials, see Chai et.al. (2007).

restraining consumption on the poorest consumers in any generation, particularly the presently living one (see Witt and Schubert 2010 for a discussion).

Questions like these clearly go beyond a mere welfare calculus. Nonetheless, an assessment of the legitimacy of policy measures aiming at bringing consumption to sustainable levels would be incomplete if it would not consider potential welfare effects too (welfare understood as preference satisfaction). Such a consideration can help to identify possible trade-offs in the pursuit of the potentially conflicting normative values involved. Furthermore, policy measures that aim at enforcing more sustainable consumption patterns may affect welfare differently so that efficiency considerations (in terms of more or less welfare sacrifices) become relevant. What predictions does the behavioral approach to preference theory outlined in the previous section imply in this respect? In this approach, utility is interpreted as an index for the satisfaction of innate needs, acquired wants, and cognitively constructed consumption motives. It can be decomposed accordingly. Changes in welfare can therefore be traced back to the changes in the satisfaction of the single needs, acquired wants, and cognitive motives. The latter changes are brought about, in turn, by how the consumers' spending behavior responds to changes in income.

The dramatic historical shift of the income constraint over the past century has enabled a growth of total spending on consumption. However, this growth was not evenly distributed over the expenditure categories. The differences have been explained in the previous section by the differential satiation dynamics of needs, acquired wants, and cognitive motives. [10] In addition, a systematic influence has been attributed to the producers' innovative response to a retarding growth of their sales as it follows from satiation. Given these hypotheses, the motivational constellations and the producers' response can be expected to trigger three different trends when the consumers' ability to spend increases further:

(i) an inflation of expenditure shares of needs which are for various reasons difficult to satiate (inherently slow or absent satiation);

(ii) an increasing consumption of innovative goods and services that have been designed to delay market saturation by adding features which, in contrast to the original features, appeal to needs that are difficult to satiate (innovation induced delay of satiation);

(iii) a rising expenditure share of consumption that is shaped by conditioning learning (newly acquired wants that are not themselves satiable) and/or by cognitively constructed motives decoupling the purchases of goods from satiation tendencies that may occur with respect to the "services" these goods provide (no satiation due to learning new motivations).

The specific developments which the three trends will produce also depend on what particular needs are involved. In contrast to the canonical version of preference theory based on a uniform preference index, the suggested behavioral approach thus requires to distinguish quite a variety of possible cases and different welfare effects. Moreover, the subjective welfare assessments of one and the same consumption level may not be the same before and after learning has taken place. Some of the most significant, possible developments are the following (see also Table 1).

[10] Each single need that is deprived induces a preference for an action capable of satisfying that need. In the context of consumption activities this motivates a corresponding expenditure. Competing motivations are realized according to the relative degree of deprivation and subject to budgetary constraints.

Table 1 about here

How an *inherently slow or absent satiation* underlying *trend (i)* works out hinges on what particular, difficult to satiate, need is involved and for what reasons it is difficult to satiate. The need for status and social recognition is an important case in point as competition for status by means of conspicuous consumption is a strong driver of consumption growth (Frank 1999, 2011). Need or preference satisfaction is tied to the social recognition one obtains by signaling one's status via spending more on appropriate consumption items than certain others do. But, if everyone spends proportionately more, this does not change anyone's relative position. A preference change or adaptation over time is not implied here. The motivation to spend ever more results from the fact that status is not defined in absolute but in relative terms. Accordingly, the process by which consumption expenditures wind up proportionately prevent anyone's level of preference satisfaction or welfare from rising. Conversely, a policy intervention by which pure status consumption is stabilized or even cut back proportionately would not result in a direct reduction of individual welfare. [11]

In the case of the need for sensory and cognitive arousal, satiation can only be reached through the consumption of sufficiently arousing stimuli. However, the dulling or stupefaction effect implies that satiation does not last. The consumption of new, sufficiently strong stimuli is necessary for to bring back satiation over and again. As mentioned, the process is likely to continue to work only, if over time the expenditures on goods and services serving the need are raised. For this reason, the temporary increase in arousal realized by additional expenditures entails only temporary welfare gains. Yet, if the expenditures are not raised, or even reduced, the possibilities of satisfying the need by consuming new stimuli is cut down. This triggers a welfare loss.

How intense and lasting arousal is experienced hinges, of course, on several individual and culturally contingent factors. Among them are individual sensitivity, interests, training, education, and what consumers have been exposed to before. The latter factor is not independent of the kind of stimuli offered by the industry. This leads to a more complicated situation. Firms in such industries as the entertainment industry or the tourism industry have an incentive to raise their sales by offering goods and services that elicit additional and/or more spectacular stimuli. This competition can also take forms of an arms race. The consumers' preference adaptation may then accelerate and requires a more rapid growth of the corresponding expenditures to avoid direct welfare losses. [12]

The *innovation induced delay of satiation* that drives *trend (ii)* is a hybrid case. Suppose a good has characteristics that serve to satisfy a need that is easy to satiate with a rising quantity consumed. The relevant need may, for instance, be that for something to eat, to drink, or to uphold body

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[11] Frank (1997). This statement is no longer valid if the consumed items are combination goods simultaneously serving other needs. For instance, a major motivation to buy a luxury car may be a deprived need for social status recognition. But driving such a car may also be a significant way of satisfying a deprived need for arousal. Furthermore, by virtue of an association being learned between the rewarding status and arousal experience on the one hand and the experience of the attributes of the car on the other, the latter may become a conditioned reinforcer. The fact that the car is then felt as a nice place to be means, of course, that preference satisfaction would be reduced, if the luxury car could no longer be enjoyed.

[12] As Scitovsky (1981) has vividly described, if these stimuli are missing, deprivation of the need for arousal can rise in the form of an increasingly nagging feeling of boredom.

temperature. In a growing economy the markets for the corresponding goods sooner or later tend to face saturation. Since there is no indication of a preference change or adaptation, the welfare effects are straight forward. Up to the satiation point, increases in consumption raise preference satisfaction while decreases reduce welfare. Beyond the satiation point a further expansion of consumption would mean no welfare gain and a contraction of consumption no welfare loss. However, as mentioned, producers of such goods have strong incentives to respond to market saturation by product differentiation or innovations. In this way they can add characteristics appealing to less easily satiable needs. Preferred candidates are the two just discussed needs for status / social recognition and for arousal. In this way, food or drinks are given an innovative "entertaining thrill"; clothes are decorated with status-signaling brand symbols. As far as these additional needs are concerned, we can accordingly refer back to the welfare effects already diagnosed for the motivational mechanism (i).

Now consider the case of *no satiation due to learning new motivations* which is responsible for *trend (iii)*. It falls into two sub-cases. One deals with the reward associated with pursuing newly learned wants (acquired by conditioning learning, i.e. non-cognitive learning). The other refers to changing contingencies due to cognitive learning (a deepening perception of, and deliberation on, cognitively constructed motives). Both forms of learning disconnect the motivation to spend from immediate satiation tendencies in the underlying needs, if there are any. Hence, this mechanism can keep a motivation to consume alive beyond all bounds as long as new wants are learnt or plausible reasons for additional expenditures can still be constructed.

However, there are differences between the two sub-cases. The first sub-case deals with an extension of existing preferences by learning new ones. In the second sub-case it is the knowledge of how to satisfy preferences by new and usually more differentiated consumption options that changes. The preferences themselves are not necessarily affected. It is possible, though, that knowledge and preferences co-evolve. This happens if a repeated experience of newly recognized, more differentiated consumption options results in a refinement of preferences through conditioning learning as argued elsewhere (Witt 2001). For instance, the more a consumer learns about gourmet cuisine, say, or about a particular type of music, the more differences in the options of eating or listening to music are realized. The differences often start to be valued on their own and nourish additional consumption motivation. In principle, these preference changes are reversible. An extinction of the learned association between primary and secondary reinforcers or a complete forgetting (unlearning) of previously commanded consumption knowledge are possible. The result would be a corresponding preference reversal.

The described extension and refinement of preferences pose a problem for welfare assessments. If preferences change from a date t_1 to a later date t_2, a common measuring rod for the level of welfare at the two dates is not longer available. [13] Preference satisfaction, and hence welfare, can now be assessed either according to the past preferences or according the present ones. Assume that the current state of preferences is taken as the relevant basis for evaluation. Let t_1 be the present state. Suppose an income increase in t_1 would allow a consumer to spend x units of her budget more on something that serves a want w. Assume further that, because of her learning history, the consumer has not yet acquired that want. The corresponding preference will only have emerged in t_2, say. Obviously, the extra expense x in t_1 would not cause a welfare increase. Now let us move on to t_2. Suppose that, because of an income increase in t_2 the consumer decides to spend x units more on something that serves the now acquired want w. In this case, her welfare would be increased. However, if she were forced to spend x units less on w in t_2, this would result in a direct welfare loss. (This is the constellation denoted in Table 1.)

[13] For a thorough discussion of the problem see Binder (2010). The problem does not turn up if, as usually, consistent and time-invariant preferences are assumed. However, this assumption has for good reasons come under attack, see Sugden (2006).

Only entirely myopic agents are, however, blind to everything else but the current state of their preferences when assessing their preference satisfaction. Human agents have a powerful memory. It can be expected that they are at least in part aware of their earlier states of preferences. On this basis they and can extrapolate to a certain degree what future developments their preferences may take. If so, they should also be aware of the asymmetry of their welfare judgments before and after learning has taken place. The insight then is: had there been no opportunity to learn extended and more refined preferences, there would be no sense of missing anything when the corresponding consumption opportunities have to be foregone. Once learning has taken place, however, foregoing the opportunities turns into a sacrifice. (Something similar holds for consumption expenditures induced by new knowledge allowing to cognitively construct new motives for spending.) Having such an insight seems to challenge the clear-cut welfare judgments that suit entirely myopic agents only. [14]

The asymmetry is an inevitable correlate of preference changes. For this reason it is also occurs in connection with the need for arousal an its inherent stupefaction effect (which is a special case of preference adaptation). A striking example is the consumption of the services of the tourism industry. At the end of the 19th century, a leisure trip from Manchester to Blackpool was considered a major source of arousal. Nowadays, with the substantially higher disposable income, at least a trip to the Balearic Islands can be assumed to be necessary to trigger a similar arousal. [15] Imagine that, for some reason, trips abroad would no longer be feasible. It would not be not unlikely then that many, if not all, of the consumers having experienced such trips would feel deprived of stimuli to whose enjoyment they have adapted. In terms of the current state of their preferences this amounts to a direct welfare loss. It is an open question – also dependent on the extent of forgetting – whether the feeling of loss is likely to remain. After an individual adjustment time, consumers may regain sensibility for the less strong stimuli elicited by traveling, e.g., to Blackpool. The asymmetry in the welfare assessment can also be put the other way round. Had the consumers never experienced the new, stronger stimuli of the Balearic Islands trip, it would simply be irrelevant for their state of preference satisfaction should that opportunity no longer be feasible.

Before turning to the policy implications in the next section, the aspects arising from a normative view on the suggested behavioral approach can be summarized as follows. Whether restraining consumption by some policy intervention is considered morally legitimate requires a normative value judgment. Justice and fairness criteria may suggest this in order to arrive at more sustainable consumption patterns. The likely consequence would be direct welfare losses – there is only one case in Table 1 in which cutting back on consumption does not seem to cause a direct welfare loss. This is the case in which consumption serves pure status signaling purposes.

However, except where consumption serves not yet satiated needs, preference changes are an issue. Indeed, most of the cases in which a welfare loss has been indicated in Table 1 do involve some form of preference change over time. In these cases, the discussed asymmetry may condition the relevance of the welfare assessment. Potential welfare losses are diagnosed where they would perhaps

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[14] Concerning the anticipation of the preference adaptation it can be argued that the asymmetry is at the core of the "hedonic treadmill" syndrom. By learning more extended and more refined preferences, the welfare gains promised *ex ante* by an increase in overall consumption do not last long *ex post*. The experience often is that past increases in overall consumption have not raised subjectively felt preference satisfaction – an experience often responded to by seeking greater preference satisfaction through yet further expanded consumption; see Binswanger (2006) for a discussion.

[15] See Chai (2007) for a detailed discussion. A big difference between the two ways of triggering arousing experiences is, of course, their resource and energy intensity, i.e. their "ecological rucksack".

not have been diagnosed on the basis of the preferences one has had earlier. Moral intuition may suggest to make a difference here – at least where the change in preferences is driven by learning processes as in the case of the motivational mechanism underlying trend *(iii)*. Not unlike in the case of a personal responsibility for falling victim to an addiction, it can be argued that there is a personal responsibility for the preferences one learns. Suppose one is going to learn preference which are already known to induce consumption that is not sustainable. Sacrifices in terms of these learned preferences can then be anticipated. When becoming necessary later, can such sacrifices be claimed to be of the same moral relevance as "ordinary" welfare losses (resulting from an increasing deprivation of immutable basic needs)? In view of the motivational constellations *(i)* – *(iii)* this question seems relevant for the larger part of the motivations driving the growth of consumption in the developed economies. If so, this is an important information for assessing the conflict between individual preference satisfaction and justice and fairness considerations

4. Taxing for Sustainability – A Specific Proposal

In the light of the motivational theory discussed above, a spontaneous change of consumer behavior that would bring relief for the sustainability problem is difficult to imagine. Nor can it be expected that an impulse in that direction will spontaneously come out of the producers' competitive activities. Producers may have incentives to economize on natural resources and to reduce waste. Provided such savings would not be more than offset by raising the demands on more expensive labor inputs (as it currently often is the case). The competitive process may sometimes also generate an advantage for suppliers of more energy efficient and more long-living consumer products. Yet, in an economic system that is committed to growth, producers cannot do better than trying to evade a saturation of their markets by all sorts of innovations aiming at creating *additional* demand and to grow. If it would only be an additional demand for goods and services that do not contribute to environmental stress, degradation, and resource depletion, there would be no problem. Yet, this is not the case. Policy interventions therefore seem necessary. However, they can only be expected to gain sufficient support in democratic voting, if their legitimacy can convincingly be stated.

Whether a policy intervention is considered legitimate or not will ultimately hinge on a value judgment. Yet, it is also necessary to know what can, and what cannot, be accomplished by means of specific policy measures to be chosen. Most likely, different measures have different strength and weaknesses. For a comparison it is useful, therefore, to formulate some criteria that can help regarding the legitimacy question.

- A *first criterion* is the effectiveness of policy measures in bringing consumption of materials, biomass, energy, atmosphere, and space per unit of time to sustainable levels. (This criterion corresponds to the normative value of intra- and inter-generational justice and fairness in dealing with competing resource claims.)

- A non-negligible side aspect of the effectiveness is how lasting the impact of a measure is. It may be introduced as a *second criterion*, namely the effectiveness in preventing or reducing rebound effects.

- A *third criterion* is the efficiency of a measure in terms of keeping welfare losses, if any, as low as possible. (This criterion corresponds to the normative value that economic welfare, i.e. individual preference satisfaction, can claim to have.) [16]

[16] Ideally one would wish to balance welfare losses and gains against each other that accrue from a policy measure. It may be possible to roughly approximate welfare losses arising from interventions

- A non-negligible side aspect of this criterion is the distinction between direct and indirect welfare effects already mention in the introduction. It may be accounted for by a *fourth criterion*: to what extent are policy measures able to keep the indirect welfare losses down that can result from unemployment rising with a slackening economic growth.

With this catalogue of criteria at hand, differences between policy measures are easy to identify. Consider, for instance, the conventional policies that try to enforce the internalization of social costs, e.g. by introducing a waste certificate trade with upper ceilings. They are doing well with respect to the second criterion (van den Bergh 2011b) and the third criterion. Yet, while being important, they are obviously not sufficient regarding the first criterion. Furthermore, their impact regarding the fourth criterion is unclear. The factor-X policy relying on subsidies for resource-saving R&D promise to accomplish the third criterion well. But they may fail to accomplish the first criterion if technical improvements are not coming forth or need too much time. In addition, this policy (as most environment-oriented innovations, see van den Bergh 2011b) is particularly prone to fail with respect to the second criterion. Further, its effect concerning the fourth criterion is not clear. Similarly, other policy measures to be proposed are likely to have strengths and weaknesses regarding the suggested criteria. The straight forward suggestion following from these findings is to rely on a mix of measures rather than one measure alone in order to make consumption sustainable.

It is in this sense that yet another element of a sustainability-oriented policy strategy will now be discussed. This is a redesign of the taxation of consumption. The goals is to lead to changes in the anthropogenic use of nature, i.e. to satisfy the *first criterion* (effectiveness in bringing consumption to sustainable levels). To accomplish this goal a tax on consumption expenditures has to be substantial in size. Put differently, a large revenue from the tax is necessary – substantially larger in any case than that of the sales or value added taxes presently collected in most countries. Yet, there is no reason inherent in the sustainability argument for raising the total tax burden. A significant increase in the revenue of the consumption tax would therefore require a reduction of the revenue from another tax with similar volume, i.e. a tax substitution.

Usually, the only candidate for such a substitution is the income tax. In democracies it is difficult to imagine, though, that such a tax substitution would find majority support, if consumption were to be taxed with a flat rate when income has been taxed progressively. (A flat rate tax would have a regressive effect. It would lead to a relatively lower tax burden for the rich with a relatively lower share of their income going to consumption expenditures than for the poor.) If the overall progression in taxation is not to be lowered or even given up, the progressive income tax has to be replaced by an equally progressive consumption tax. A progressive consumption tax is not a new idea. [17] Taxing consumption rather than income progressively has been advocated in recent years by Robert Frank (e.g. 1997, 1999, 2011). For him this would be first choice as a measure for restraining wasteful (not welfare enhancing) positional

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into consumers' choices. However, the welfare gains associated with a prevention of future disastrous ecological crises are not only hypothetical, but also impossible to quantify in a reliable, objective manner. For this reason the trade-off between safe-guarding the ecological future on the one hand and immediate and future consumer welfare on the other cannot be made precise in welfare-theoretic terms (Gowdy 2005). Decisions on whether and to what extent to intervene into consumption behavior will therefore have to be made on a different basis. Risk perceptions of, and risk preferences over, future treats and developments are likely to play an essential role – attitudes in which both societies and policy makers at different times and places differ a lot (Witt and Schubert 2008).

[17] Long ago Friedman (1943) proposed it as a means to finance the fiscal burden of wars.

consumption in status races in which the consumption of the rich take the lead. [18] Moreover, a progressive consumption tax implies incentives to save and invest rather than to consume. It can therefore be expected to be more favorable to economic growth than a progressive income tax. In the context of sustainability oriented policy measures, the saving incentives would be a welcome side effect of a progressive consumption tax as they could benefit the capital accumulation necessary for developing more resource efficient products and technologies.

The progressive tax scale means that agents who spend more on consumption have to pay more than proportionately more taxes than those consuming less. For this reason, a progressive tax on consumption expenditures has to be levied on the individual consumer or household. This is a major difference to a sales or value added tax that is based on transactions and collected from the traders or suppliers as tax debtors. From the point of view of the taxing technique a progressive consumption tax has to be collected in the same way as the progressive income tax is collected. In declaring their income, the tax subjects would basically only have to document any use of income other than for consumptive purposes and deduct that amount from their tax base. [19] To reduce fiscal risks involved in the restructuring of tax revenues from a progressive income tax to a progressive consumption tax, the transition can be imagined to proceed in steps. The revenues of the one would then gradually increase while the revenues from the other would be reduced accordingly.

A progressive tax scheme would, of course, affect all consumption, not only positional consumption as Frank has it in mind. Indeed, it is for its sizeable overall effect that such a tax suggests itself as a powerful instrument to reduce environmental stress, degradation, and resource depletion caused by modern consumption patterns more generally. A progressive consumption tax with a substantial tax revenue can also be expected to do well with respect to the *second criterion* (preventing rebound effects). However, precisely because of its effectiveness regarding the first two criteria, a progressive consumption tax has a negative impact on the level and growth of consumption expenditures. This poses a problem with respect to the *third criterion* (efficiency in avoiding direct welfare losses). As has been explained in the previous section, the direct effects on preference satisfaction resulting from a reduced consumption are in many cases negative and lasting (see the last column of Table 1). The purely status-oriented, positional consumption center stage in Frank's writings is a significant exception.

No doubt, expenditures motivated by the need for status and social recognition have a huge share in the consumers' budgets, particularly in the most developed economies. But the share of expenditures serving the satisfaction of other needs and wants is also substantial. Lowering that consumption (before tax) would, unlike in the case of pure status consumption, result in direct welfare losses – albeit in many cases based on the discussed asymmetry of welfare assessments following from learning. The significance of the asymmetry argument would seem even greater if, due to unlearning, such welfare losses would only be experienced temporarily. The legitimacy of interfering with individual consumption plans by taxing consumption may in this light appear normatively more plausible than it would be the case without recognizing the influences of learning and unlearning.

A progressive taxation of consumption is likely to have a negative impact on the level and growth

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[18] He explains the tendency to engage in such races and their wastefulness by a socio-biological argument (most explicitly in Frank 2011). Such behavior follows a disposition inherited from the time of the early humans when the relative status within a group or band determined the reproduction chances. Wherever this is the case, the rules of wasteful sexual selection shape the genetic foundations of the relevant behavioral repertoire of a species.

[19] See, e.g., the concrete proposal for how the tax due can be assessed in Frank (1997).

of consumption expenditures (before tax). It can therefore be expected to run into problems with the *fourth criterion* (keeping down indirect welfare losses resulting from a rising unemployment). A growing consumption is the ultimate precondition for a growth of economic output. But most developed economies face long term declining growth rates already. With a growing labor productivity continuously setting free a notable share of the labor force, the almost undisputed political credo is to solve employment problems by a sufficient overall growth of output. In this way, it is hoped, sufficiently many new employment opportunities can be created. For this reason, policy measures with a negative impact on economic growth cannot be expected to find much support in democratic decision making. This would not be different for the suggested tax substitution, although in abstract terms the need for sustainability-oriented change is broadly acknowledged in public.

The policy dilemma implied here seems to have paralyzed much of the impetus in the debate on what to do about consumption that is not sustainable in its present form. Given the constraints of democratic decision making processes it is indispensable therefore to take the employment effects of any policy measure seriously – the proposed redesign of the taxation of consumption being no exception. A key insight in this context is that both employment problems and the lack of sustainability of consumption are two sides of the same coin (Røpke 1999). The current consumption patterns are the outcome of the same competitive substitution processes in which employment opportunities for human labor are lost. Labor-intensive goods and services are replaced wherever possible by production processes and products that make use of nature's resources instead. The reason is that technical progress and capital accumulation have worked in the direction of making resource-intensive production processes relatively cheaper than labor intensive ones (Ayres and Warr 2009). Prices not reflecting the full social costs of the utilization of natural resources have boosted that process.

The consequence of the substitution process is that less labor (in hours worked) is needed per unit of output (with same or higher utilization of natural resources). Rising wages, following the increasing labor productivity, lower the cost ratio between resource-intensive and labor-intensive processes even further. At the same time rising real wages mean that one hour of human labor can make ever larger direct and indirect claims on the consumption of materials, biomass, energy, atmosphere, and space. The concomitants of the substitution process can be observed everywhere as a rise of industries in which resource-intensive production, often in the form of mass production, prevails. Conversely, industries producing labor-intensive goods and services such as custom-made artisan works, health care, personal assistance, education, research, law enforcement, defense, etc. decline.

In order to reach sustainability without increasing the employment problems, the terms of the ongoing substitution process must be changed and the present trend be reverted. This requires to given incentives for labor-intensive production techniques at the expense of resource-intensive ones. Likewise final demand for goods and services must be encouraged in which human labor is re-substituted for nature's resources. The suggested progressive consumption tax cannot accomplish this goal. The way it is collected on the basis of the size of the individual consumer's declared expenditures it cannot discriminate between labor-intensive and resource-intensive consumption. However, with the substitution of the income tax by a progressive consumption tax having about the same tax revenue, a value added tax can still be left in place. Its revenues can be instrumentalized to create the necessary incentives.

A value added tax can discriminate between labor-intensive and resource-intensive production and consumption by a fairly simply device. At each stage in the value chain, the labor cost share in the value added at the particular stage needs to be singled out and declared by the producers or traders. It can then either be deducted in full from the tax base (the value added at the stage), or it can be taxed at a lower rate than the remaining stage value added. In an open economy, importers would be required to declare a labor cost share for the imported goods and services. To discourage relocations of resource-

intensive production processes to places outside the tax jurisdiction, the share should be calculated fictitiously on the basis of the average domestic labor cost share of comparable goods and services at the same stage of the value added chain. Unlike in the case of a non-discriminating value added tax, a pre-tax allowance is no longer possible. The tax would be due in each of the transactions over the value chain. This means that the tax to be paid for a purchased product or service can no longer be added as a fixed percentage of the final price in the final transaction with the consumer. Nonetheless, the incidence of a discriminative value added tax would still be such that the final consumer has to bear it.

The effect of the discriminatory value added tax would be a lower cost of employing the factor labor at all stages of the value chain. With a significantly higher tax rate levied on the non-labor part of value added, [20] producers would have a strong incentive to re-substitute labor-intensive for resource-intensive production processes. With competitive relative prices changing similarly consumers could be expected to substitute away from resource-intensive goods and services to more labor-intensive ones. Substitution processes presently going in the opposite direction could be countered or even reversed. Thus, by redesigning the sales tax into a discriminative value added tax as outlined, not only a wholesale reduction of the "ecological rucksack" over the entire value chain could be accomplished. It seems realistic that it would also be possible to alleviate, if not compensate, negative employment effects which a progressive consumption tax consumption would cause.

5. Conclusions

Utilitarianism once started with the twin interest in explaining economic behavior and in assessing its legitimacy from a "moral science" perspective. During the 20th century, the explanatory program was narrowed down to an abstract theory of preferences and demand. The moral science part mutated into an equally abstract welfare theory. The former development has not been helpful for explaining the complex process by which consumption grows. The latter development has not improved the grasp of the normative aspects of that growth. In the present paper a behavioral theory of consumption has therefore been presented. Molded in the evolutionary paradigm it explains the innate dispositions and motivational mechanisms on the basis of which consumption has grown to unprecedented levels. As was shown, by going back to the underlying motivational forces, processes of preference change and adaptation can be identified. The insights thus gained have also shed new light on how the changes in preference satisfaction or welfare associated with increases or a decrease of consumption may be assessed from a normative point of view.

The way it takes place in the most developed economies, consumption is not sustainable. The suggested theory of consumer behavior has been used to discuss the effects of policy measures aiming at making consumption more sustainable. Such policy measures are likely to reduce the growth or even the level of consumption. This results in direct welfare effects which differ with respect to what needs are affected by a reducing or no further growth of consumption. However, through their impact on economic growth at large, such policy measures usually also trigger indirect welfare losses by negative employment effects. To be more specific, a concrete policy measure has been discussed, namely a redesign of the taxation of consumption. It consists of a substitution of the existing income tax by a progressive

[20] Let s, $0 < s < 1$, be the average labor cost share over the entire value chain and τ, $0 < \tau < 1$, the present (pre-reform) rate of a value added tax. If f, $0 \leq f < 1$, is the fraction of the tax rate levied on non-labor value added, the rate τ^* of the discriminative value added tax that generates the same tax revenue as the non-discriminative tax would have to be set at

$$\tau^* = \tau / [1 + s(f\text{-}1)] > \tau .$$

Hence, τ^* is the larger, the smaller f and the larger s.

consumption tax, combined with a reform of the sales tax. The latter would create a value added tax that discriminates against resource-intensive goods and service. This combination is neutral with respect to the size of the overall tax burden. It can technically be implemented with no particular additional tax collecting bureaucracy. And it seems effective in making consumption more sustainable while keeping direct and indirect welfare losses at tolerable levels.

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		likely effects		
		preference change involved	*welfare gain by consuming more*	*welfare loss by consuming less*
(i) inherently slow or absent satiation	*example pure status seeking*	no	no	no
	example arousal	yes	temporarily	yes
(ii) innovation-induced delay of satiation	*satiable part*	no	yes	yes
	non-satiable part	see mechanism (i)	see mechanism (i)	see mechanism (i)
(iii) no satiation due to learning new motivations	*acquired wants*	yes	yes	temporarily
	cognitive motives	possible	yes	temporarily

Table 1 Likely Direct Welfare Effects Implied by Different Motivational Constellations