

WHEN DO SOCIAL NORMS REPLACE STATUS-SEEKING CONSUMPTION?

AN APPLICATION TO THE CONSUMPTION OF CLEANLINESS

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ABSTRACT

Interdependencies in consumer behavior stem from either status-seeking consumption or compliance with social norms. This paper analyzes how a consumption act changes from a means to signal the consumer's status to a means of norm compliance. It is shown that such a transformation can only be understood when consumer motivations other than social recognition are taken into account. We depict norm emergence as a learning process based on changing associations between a specific consumption act and widely shared, non-subjectivist consumer needs. Our conjectures are illustrated by means of a case study: the emergence of the cleanliness norm in the 19th century.

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1. MOTIVATION

To a great extent, consumption behavior is motivated by the desire to appeal to the consumer's social environment. Status-seeking consumption as well as compliance with social norms are manifestations of such a motivation. Whereas luxurious variants of cars or wristwatches might be desired to indicate the superior social status of their owner (Frank, 1999), other consumption goods are merely purchased to demonstrate conformity with referent others (Leibenstein, 1950). A further category of actions or inactions acknowledge social norms such as the nonsmoking norm or the norm of tipping in restaurants.

How and why then would the meaning of a specific consumption act change from being a means to signal the consumer's status to becoming a means of norm compliance? Theories on status-seeking consumption cannot contribute much to answering this question, as no consumer motivations other than social recognition are considered. In contrast, the literature dealing with the emergence of social norms suggests that changes in normative expectations and behavior stand in context with newly emerging "problems" or "dilemmas" within a community (e.g., Demsetz, 1967; Cornes and Sandler, 1986; Ostrom, 2000). In order to understand the transformation of a consumption activity from representing "status seeking" to being "norm fulfilling," as it is argued here, one would have to trace how an additional motive – other than social recognition – became associated with the specific consumption act.

The subject is dealt with in the context of a concrete case study: the consumption of cleanliness in the form of laundry washing, which underwent significant transformations in the 19th and 20th centuries. Cleanliness in terms of clean clothes is the

outcome of a household production activity (Michael and Becker, 1973). With the term “cleanliness consumption,” we refer to the inputs into household production processes, i.e., both expenditures on consumer goods and services, as well as the utilization of these tools. Clean clothes are assumed to have instrumental value for more fundamental human preferences – basic consumer needs.

The case study seeks to explain the emergence of a social norm of cleanliness in the 19th century, which eliminated the status-signaling property of cleanliness. It will be argued that cleanliness turned from a private into a public good when social networks radically changed in the period of industrialization and urbanization in the Western world. Infectious diseases put the basic consumer need for health at risk. When consumers understood the association between cleanliness and health, the formation of a social norm was triggered.

Our research specifically addresses the evolving associations between consumption goods (or activities), on the one side, and consumer motivations for consuming these goods, on the other. In this respect, our approach is very much in line with Lessig’s account of changing “social meanings” of behavior (and the regulation thereof) (Lessig, 1995, 1996, 1998). Similar to Lessig, the role of shared social understandings for norm emergence is elaborated, starting from the basic assumption that the consequences of consumption behavior have to be “learned” by consumers. Essentially, Lessig takes a “top down” perspective on norm emergence by focusing on the regulator’s motivation and the techniques available for altering shared social understandings. Changing social meanings in turn affect consumer behavior because of

the consumers' concern for social recognition: whether actions are taken or not depends upon the changing evaluations of this behavior in the eyes of others.

Our approach is more general in that it studies evolving beliefs about how consumption behavior affects the satisfaction of basic consumer needs. We take a psychologically informed “bottom up” approach to norm emergence. At the core of our argument is the assumption that consumer preferences are not entirely subjective, but that consumers have a propensity to share certain motivations due to their genetic inheritance (Witt, 2001). Taking into account this material specification of consumer preferences, we arrive at a better understanding of why some norms emerge more easily than others. The joint experience of negative externalities unifies consumers in their search for a solution to the problem, making them more attentive to public campaigns which foster cooperative behavior, reducing the collective action problem involved, and eliminating opposition from those consumers whose status is challenged by the formation of new social norms.

The remainder of the paper is structured as follows. Section 2 introduces the terms of central importance to our analysis: status-seeking consumption and social norms. In Section 3, we introduce our model of norm emergence. Common conjectures from the broader institutional economics literature (i.e., new externalities, mechanisms of social sanctioning, and knowledge dissemination) will be complemented by hypotheses we derive from a behavioral consumption theory (Witt, 2001). Section 4 presents the conceptualization of the consumption of cleanliness and what is assumed to be its major determinants. Section 5 confronts the model of norm emergence with the case study. It is shown when and how the cleanliness norm came into being, replacing the status distinction of clean appearance. Section 6 concludes.

2. STATUS-SEEKING CONSUMPTION AND SOCIAL NORMS

2.1 Status-Seeking Consumption

Economists have long recognized that many consumption decisions are motivated by the desire to receive social recognition, i.e., for the effect that a certain consumption behavior is expected to have on the individual's social environment. According to this theory, it is for the desire to please one's peers that consumers purchase the latest fashion (Leibenstein, 1950; Bernheim, 1994), and it is for the satisfaction derived from being awarded esteem that they acquire a piece of fine arts or an expensive watch (Frank, 1989).

The literature on status-seeking consumption originates with Thorstein Veblen's work on "conspicuous consumption" and Duesenberry's "relative income hypothesis" (Veblen, 1994 [1899]; Duesenberry, 1949). Veblen claimed that "[i]n every community where goods are held in severalty it is necessary, in order to his own piece of mind, that an individual should possess as large a portion of goods as others with whom he is accustomed to class himself; and it is extremely gratifying to possess something more than others. (...) [T]he end sought by accumulation is to rank high in comparison with the rest of the community in point of pecuniary strength." (Veblen (1994, p. 20)) In their striving for status, individuals purchase some commodities, such as jewelry, that serve no other purpose than to demonstrate wealth (ibid, p. 53). According to Veblen, such consumption goods must be both "wasteful" and visible in order to please "the observers whose good opinion is sought." (ibid, p. 69) Duesenberry (1949) put forth the dichotomy of absolute versus relative income and/or consumption, claiming that consumption and savings behavior were affected by concerns of social standing. Underlying this

dichotomy is the idea that human well-being is a function of both the amount and types of goods affordable as such as well as in comparison to others.

Research has since then addressed the psychological phenomenon that “what one person consumes, the other feels forced to consume as well.” As discussed most prominently by Robert Frank, the desire to “keep up with the Joneses” can lead to a situation in which consumers continually increase their levels of consumption in an effort to out-consume their neighbors (Frank, 1989, 1999). These increases in relative expenditure are met by increased spending on the part of other consumers who seek to defend their relative position in social standing. Striving for status via conspicuous goods is therefore a zero-sum game and a “positional treadmill.”¹

Game theoretic analyses of this phenomenon do not discuss the possibility of an upper limit for these spirals of spending (e.g., Khalil, 1997; Baumol, 2004). This is in line with Veblen’s claim that the desire for status is not satiable (Veblen (1994, p. 21)). In addition, the majority of studies on status consumption externalities analyze the consumption dynamics stemming from interdependent preferences without asking which other motives are met by a specific consumption act (e.g., Carroll *et al.*, 1997; Brock and Durlauf, 2001; Liu and Turnovsky, 2005). However, it cannot be denied that most status goods do have certain properties that are useful to the consumer apart from providing

¹ Veblen discusses the consumption of positional goods (in the form of conspicuous goods) in the context of status concerns, whereas Frank interprets positional goods more from an instrumental perspective: consumption is not so much motivated by the positive social rewards as such (hence a need for social recognition) as by the desire to keep one’s social standing.

status distinction (Hirsch, 1976; Veblen, 1994). In fact, some goods appear to be more positional than others (Frank, 1985; Alpizar *et al.*, 2005).

Which effects these “useful properties” have on consumption patterns is usually not elaborated. We want to draw attention to the question of which motives other than social comparison might be served by a specific consumption behavior, for these other motives might also influence the consumption patterns. This is different from comparing consumption goods on the basis of their exclusiveness only. For example, other consumer motives could lead to satiation phenomena in demand, thus putting an end to spirals of spending. Less obviously, the consumption act might become related to a social norm, once the properties of the good have been explored.

2.2 Social Norms

Generally, a social norm can be defined as “a rule governing an individual’s behavior that third parties other than state agents diffusely enforce by means of social sanction.” (Ellickson, 2001) According to Opp, constitutive elements of most definitions of norms are behavioral regularity, collective normative expectations, and sanctioning (Opp, 2001). For example, individuals might expect others to refrain from smoking in public places (Lessig, 1995), or it is expected that one cleans up after having had a picnic in a public park. In game theoretic accounts, norms are interpreted as equilibria in repeated games (e.g., Schotter, 1981) or as “rules” of the game established in previous interactions (North, 1991). Different types of social norms can be distinguished; norms of cooperation, norms of reciprocity, and consumption norms are only a few examples (Elster, 1989).

A large body of experimental economic research has been devoted to the study of social interactions that are characterized by a social dilemma, such as the provision of a public good where individuals have an incentive to free ride on others' contributions (e.g., Fehr and Gächter, 2000; Keser and van Winden, 2000; Fehr and Fischbacher, 2004). Contrary to what is individually rational, many players do make financial contributions to public goods. Apparently, there exist cooperation and reciprocity norms, transforming prisoners' dilemma type of interactions into coordination games (Camerer (1997, p. 170)). Field studies also indicate a cooperative propensity in humans, which hinders the over-consumption of common-pool resources (Ostrom, 2000). This strand of research illustrates that social norms do exist and that they often involve the internalization of externalities, hence "solving" a social dilemma. It is another question, though, how these cooperative solutions, or norms, came into being in the first place. This aspect will be analyzed more thoroughly in Section 3.

Consumption norms can be defined as "norms that attach a reputational value to consumer behavior." (Corneo and Jeanne (1997, p. 334)) This concept usually covers the more familiar theme of conformist elements in consumer choices, which do not necessarily stand in context with social dilemmas (Leibenstein, 1950; Bikhchandani *et al.*, 1992).

We merge the ideas of social norms and consumer behavior by studying how consumption patterns are affected by newly emerging social norms. Our analysis draws upon Ellickson's (2001) definition of norms. Norms are not understood as behavioral regularities only, which emerge for no apparent reason. However, we do not assume that emerging norms are necessarily effective and provide efficient solutions to externality

problems. Therefore, our analysis encompasses cases where norms emerge only as “side products” of other measures to solve an externality problem, and where the effective solution cannot be attributed to the norm only. We will, however, not analyze different types of regulations on the basis of their effectiveness and efficiency for problem solving (e.g., Posner, 1996).²

2.3 Social Norms Replacing Status-Seeking Consumption

Our research is inspired by the following, overarching questions: What motivates consumption behavior for particular goods and services? When and why do the motivations for consuming certain goods change? How and why does the meaning of a specific consumption act change from being a means to signal the consumer’s status to being a means of norm compliance? Theories on status seeking consumption cannot contribute much to understanding this issue, as no motives other than social recognition are considered. Theories on norm emergence, on the contrary, go one step further, suggesting that because of newly emerging externality problems, consumers are motivated to start coordinating their behavior (Section 3).

Clearly, the motivations associated with a certain good have an impact on consumption patterns (Witt, 2001). To begin with, when a good serves the purpose of status seeking, expenditures on this good will not necessarily have an upper limit (Veblen, 1994). By contrast, no straightforward argument supports the assumption that consumption undertaken in order to fulfill other consumers’ expectations, i.e., comply

² Compare Posner’s (1996) arguments about the inefficiency of privately provided norms in contrast to state intervention.

with a social norm, will show an inherent tendency to rise. Furthermore, in the case of norm-fulfilling consumption behavior, the social environment determines consumer choices by prescribing what should be consumed and how much of it. For status-seeking purposes, the consumer can choose from a broader set of options, i.e., basically expensive and visible items. Finally, consumption goods, which are related to social norms, rather than status items, might be demanded by a greater number of consumers, giving rise to a standardization of goods.

Evolving associations between consumption goods, on the one side, and consumer motivations for consuming these goods, on the other, will be termed “learning processes.” We study the driving forces behind changing mutual expectations leading to the emergence of a social (consumption) norm. It is argued here that in order to understand this transformation, one has to trace how and why a consumer motivation other than social recognition became associated with a specific consumption act (here: consumption of cleanliness, Section 4).

3. THE EMERGENCE OF SOCIAL NORMS

In this section, we present our model of norm emergence, which will bring together several strands of literature. This model draws upon prominent hypotheses from the broader institutional economics literature: first, the Demsetz hypothesis on newly emerging externalities (Demsetz, 1967; Coleman (1990, ch.10)); second, works emphasizing the role of social sanctioning and rewarding in establishing norms (Coleman (1990, ch.11); McAdams, 1997; Posner, 1998); and third, the accounts of Lessig and

Ellickson in which highly influential individuals take the lead in supplying norms via public campaigns (Lessig, 1995; Ellickson, 2001). In addition, some conjectures, stemming from a behavioral consumption theory, will be introduced (Witt, 2001). At the core of our argument is the assumption that consumer preferences are not entirely subjective, but that consumers share certain motivations due to their genetic inheritance. The resulting framework lends itself to examining why, in a specific historical context, a consumption act changed from a means to signal the consumer's status to a means of norm compliance.

3.1 New Externalities

The idea that newly occurring externalities would foster changes in existing property rights regimes has most prominently been propagated by Harold Demsetz (Demsetz, 1967; Alchian and Demsetz, 1973).³ According to Demsetz (1967), an externality is present when the action of one agent has an effect on the welfare of another without being reflected in the price of that action, and when “the cost of bringing the effect to bear on the decisions of one or more of the interacting persons is too high to make it worthwhile.” (ibid, p. 348) Accordingly, so Demsetz hypothesizes, new property rights will develop whenever the benefits of internalization exceed its costs. An exogenous shock to a stable group (i.e., technological change, emergence of a new market) (Demsetz, 1967) or an endogenous change in the composition of a group can produce these new externalities in the first place (Coleman (1990, ch.10); Ellickson, 2001).

³ We assume that Demsetz's (1967) general argument holds for technological as well as consumption externalities.

Demsetz develops a valuable starting point for analyzing both changing property rights regimes and emerging social norms (Opp (1983, ch.3)).⁴ However, it has been argued that Demsetz commits the functional fallacy of explaining the existence of property rights or norms by their usefulness, without addressing the process by which these new institutions came into being (e.g., Posner, 1979). The author examines an example of a public good – a common-pool resource – whose “tragic” fate, overexploitation, results from the discrepancy between individual and collective rationality (Hardin, 1968). But he does not pay attention to the collective action problem (Olson, 1965) that poses itself when agents aim to overcome this dilemma situation: although everybody would be better off with a norm in place, effectively preventing overexploitation of the common resource, nobody has an incentive to act in a cooperative way as long as other actors cannot be expected to cooperate as well.

Demsetz’s analysis deals with the utilization of a public good, the common-pool resource. In the following, the argument will deal with the *provision* of a public good, which is of relevance for the case study of cleanliness consumption addressed later. A pure public good is characterized by two attributes: first, non-rivalry in consumption which holds “when a unit of the good can be consumed by one individual without detracting (...) from the consumption opportunities still available to others from that same unit.” (Cornes and Sandler (1986, p. 6; *italics omitted*)) Second, non-excludability

⁴ Witt (1987) even argues that the case study of beaver hunting which Demsetz (1967) uses to illustrate his argument does not provide evidence for the emergence of a property rights regime, but rather of a “regulated community right” (i.e., communal ownership in combination with curtailment of use), which comes close to the concept of a social norm.

of benefits once the public good has been provided. Hence, externalities exhibit specific properties in the context of public goods, namely that individuals have an incentive to free ride on the provision of these goods, as they can benefit from the contribution of others without having to pay for it. The outcome of this individually rational behavior is that the public good will not be provided in sufficient measure on the basis of private action.

The two standard solutions to externality problems focus on ways in which the price of the consumption activity can be “corrected” to reflect its full social cost. Pigou (1920) suggested taxation and public provision of the good, while Coase (1960) advocated the specification and tradability of property rights so that actors are incentivized to privately bargain for monetary compensation. Despite their theoretical appeal, these policy options may fail in many real world contexts.⁵ In this case, norms might emerge as alternative, nonmarket and nonmonetary solutions to externality problems (e.g., Demsetz, 1967; Cornes and Sandler, 1986; Coleman, 1990).⁶

3.2 Social Feedback

One attempt to harmonize the findings from experimental research (Fehr and Fischbacher, 2004) as well as field studies (Ostrom, 2000) with the economic model of

⁵ For example, policy makers might not be able to quantify the externality. Or the group of actors involved is too large, causing transaction costs to exceed the welfare gains from internalization etc. (e.g., Baumol, 1962; Davis and Whinston, 1962; Buchanan, 1969; for an overview, see Ellickson, 1973).

⁶ No such dilemma exists when non-contributors can be excluded, at a reasonable cost, from enjoying the benefits of a good in the first place, as is the case for impure public goods (club goods) (Buchanan, 1965).

rational, self-interested individuals is to invoke mechanisms of decentralized social sanctioning in combination with repeated interaction. In fact, sanctioning opportunities often enhance cooperative behavior in experiments (Fehr and Gächter, 2000).⁷ Axelrod (1984) illustrated that the “tit-for-tat” strategy (reciprocity), which starts off from cooperative play in a repeated prisoner’s dilemma game, on average yields a higher payoff than other strategies.

The effect of social sanctioning mechanisms on fostering norm emergence has been pointed out by many scholars (Axelrod, 1986; Coleman (1990, ch.11); McAdams, 1997; Posner, 1998). These approaches share the assumption that individual behavior is affected by the feedback that individuals can expect to receive from their social environment when engaging in certain behavior. By rewarding cooperative behavior and sanctioning noncooperative behavior, social feedback supports the formation of a social norm of cooperation.

However, sanctioning is also a public good whose costly provision individuals would prefer to be taken care of by others. Axelrod (1986) tackled this issue by introducing meta-norms of sanctioning. Similarly, McAdams (1997) suggested that acts of sanctioning will themselves be socially rewarded. Individuals confer positive esteem

⁷ The fact that individuals do not maximize their payoffs even in one-shot games where no sanctioning is possible (the “dictator game”; Camerer and Thaler, 1995) points to the preexistence of norms of fairness. Some argue that this makes the assumption of purely selfish individuals obsolete (Fehr and Fischbacher, 2004).

on those who support the provision of a public good by sanctioning non-contributors.⁸ Posner (1998) may have a similar idea in mind when arguing that sanctioning produces a “signal,” which might pay off for the individual in terms of future cooperative interactions and transactions. Overall, these approaches shift the problem of collective action to higher-order levels without convincingly solving it.

3.3 New Information and “Managers” of Norm Emergence

A more elaborate distinction between individual actors on the basis of the role they play in the process of norm emergence is found in Lessig’s account of the regulation of “social meaning” (Lessig, 1995, 1996, 1998) as well as in Ellickson’s treatise on the “market for norms.” (Ellickson, 2001)

Ellickson (2001) frames norm emergence analogously to the stylized diffusion process of an innovation within society whereby actors are modeled as heterogeneous (Rogers, 1995).⁹ Several types of leading figures promoting norm emergence are

⁸ McAdams (1997) rules out the potential second-order dilemma by claiming that what can be termed the “social police” derives net benefits from encouraging cooperative behavior; likewise, rewarding these norm enforcers causes zero net costs.

⁹ For an earlier treatment of the emergence of new institutions within a framework of the diffusion of innovations, see Witt (1989, 1992). When the emergence of an institution depends upon the individuals’ choice to adopt or not to adopt a new type of behavior, central agents of collective action might play a decisive role in establishing the critical mass: “All that these agents have to achieve is to induce a sufficient number of other agents to expect that collective adoption will come about, so that the expectation becomes self-fulfilling.” (Witt (1989, p. 167)) The critical issue for those change agents is to attract the individuals’ selective attention in order to modify their knowledge – the basis on which the individuals make their

distinguished.¹⁰ Among them are scientists whose interest in promoting change stems from their personal motivation to generate new knowledge and make it public. Scientists are assumed to have the best “technical knowledge” of a subject, i.e., of the situation which is characterized as an externality problem, though they themselves are not necessarily best suited to communicate the benefits of change to the public. This is the task of opinion leaders. The actions of these leading figures are motivated by social approval of those who demand the emergence of the new norm.

Although Ellickson’s account revolves around the core idea of how social sanctions and rewards bring about new norms when it is assumed that actors put different weight on social esteem, the author also calls attention to the relevance of knowledge change. New externalities might come about as a result of changes in group composition. Likewise, the acquisition of new knowledge about externalities and their probable causes is a potential triggering factor of new social norms. In principle, two cases can be distinguished: new scientific information either makes actors aware of the existence of a certain problem, or new information makes them believe that a well-known problem can be solved in a better way by a different behavioral regularity.¹¹ In order to change

decisions (Witt, 1992). Similarly, Kübler (2001) addresses the case where cooperative behavior itself is non-observable, and she argues that conditional cooperation would be enhanced if individuals were made to believe that many other actors follow the norm as well.

¹⁰ Ellickson (2001) distinguishes three types of actors: a) strongly motivated individuals who would personally gain from the existence of the norm, b) “norm entrepreneurs” who benefit from being promoters of change (e.g., the “scientific community”), and c) opinion leaders who promote public action through communication.

¹¹ See also Vercelli (1998).

consumer behavior, new knowledge must diffuse within society. In this context, both the existence of new knowledge as well as its relevance and application have to be communicated in order to receive consumer attention. Ellickson stresses that it matters a great deal for the successful formation of the norm who communicates this new knowledge to the actors involved. Only specific actors have an impact on others' opinions.¹²

Ellickson's framework of norm emergence shares several elements with Lessig's account developed earlier, concerning the regulation of "social meaning." In a series of papers, Lessig formulates a positive theory of norm emergence and derives policy implications for the regulation of consumer behavior (Lessig, 1995, 1996, 1998). He develops the idea that what types of behavior are shown by people and considered as "normal" depends upon the social meaning of that behavior, i.e., the shared social interpretations of these actions.¹³ Varying meanings affect consumers' mutual expectations. For example, when smoking has a very negative image, you do not expect others to tolerate your smoking. Based on this assumption, Lessig illustrates how changes in behavior can be brought about by altering the social meaning of certain actions.

¹² Ellickson (2001) describes opinion leaders as follows: "[A]n opinion leader is likely to be a person to whom other members of the group are unusually prone to defer in order to avoid being socially out of step. An opinion leader may have earned this trust through prior accomplishments in the arena of norm enforcement and change." (ibid, p. 16)

¹³ Lessig (1995) defines meanings as "the semiotic content attached to various actions, or inactions, or statuses, within a particular context." (ibid, p. 951) Meanings are "associations, one idea that gets tied to another." (ibid, p. 958) He is interested in those associations that a group of interacting individuals shares.

The emergence of a social norm is dealt with as a special case (Lessig, 1995). In line with Ellickson, two elements play a central role in norm emergence: new information distributed via public campaigns, and central agents promoting the formation of a new norm. The two approaches differ, however, in their concrete assumptions: Ellickson's leading figures promote norm emergence mainly to gain social recognition (e.g., being honorable scientists), whereas Lessig's managers of meaning foster the changing meanings for other underlying reasons (including status concerns as a special case).

Lessig (1995) illustrates his arguments by a comprehensive case study – the emerging nonsmoking norm in the U.S. in the second half of the 20th century (for which he is usually quoted). This norm is the result of public campaigns that distributed information on the health effects of smoking (concerning both the smoker herself as well as secondhand smokers), coupled with the creation of a negative image of smokers as “irresponsible” and “weak.” Lessig compares this situation to the 19th century, when smoking was the privilege of men, indicating their superior social status.

Lessig provides valuable and detailed insights into the process of norm emergence while discussing a case of consumption behavior that was once a status signal, but became related to a social norm at some point in time. As in Ellickson's framework, public campaigns are the main driving forces behind changes in consumer behavior. However, neither Lessig nor Ellickson provide a full account of the effectiveness of newly distributed information. Ellickson simply relates the effectiveness of these campaigns to who communicates the information, whereas Lessig claims that society has to be “open” to embrace the change.

Lessig essentially provides a “top down” approach. He shows how some individuals, who have an interest in defending or changing social meanings, can achieve these goals: the techniques of meaning management are presented. Lessig does not provide a general starting point for understanding the openness of a community to change (which would amount to a “bottom up” approach). Although he acknowledges that not all attempts at meaning regulation are necessarily effective, he does not elaborate on the conditions making processes of social learning more or less likely (in contrast to individual learning, see 3.4).

Moreover, Lessig does not explicitly deal with the general factors triggering new attempts to alter social meanings. The concept of shared social understandings mainly applies to a society’s agreement on which behavior is “normal,” and what it says about a person deviating from this expected behavior (the idea of images). Thus, Lessig concentrates on only one specific consumer motivation – the consumers’ striving for social approval. He assumes that actions which at some point become related to negative images via public campaigns will no longer be taken or decline in frequency in order to avoid social ostracism. The consumers’ desire to appeal to their social environment is thus the way through which changed social meanings can have an effect on consumer behavior. In this sense, Lessig includes the idea of social feedback mentioned earlier. However, the idea is not generalized to cover evolving social understandings that affect other consumer needs.

We argue that a psychologically informed consumer theory can shed light on many of the above mentioned questions. Specifically, it could contribute to a better

understanding of the effectiveness of public campaigns which modify social meanings and social norms.

3.4 Basic Needs and Consumer Learning

Our model of norm emergence draws upon the strands of literature that relate new social norms to, first, new consumption externalities, second, mechanisms of social feedback, and third, the relevance of leading figures in communicating new knowledge to other actors. In addition, two original hypotheses will be derived in this subsection. The resulting model of norm emergence, it is argued here, is equally suited for understanding the transformation of the meaning of a consumption act from a means of status signaling to a means for fulfilling a social norm. The terminology of “meaning” is in line with Lessig’s understanding, namely that the properties of consumption acts are partly the result of processes of social construction: a group of individuals agrees upon which types of goods function as status signals or what kind of behaviors are norm fulfilling. In contrast to Lessig, we are not only interested in the process that brings about the change in meaning, but also in asking about the contingencies of these changing associations. We find them in the evolving understandings about the *non-constructed properties* of goods, i.e., conjectures about the functional relationship between consumption acts and the satisfaction of basic consumer needs (other than social recognition). The theoretical framework to be developed will also shed some light on what influences the effectiveness of newly distributed information in changing consumer behavior.

Our approach differs from the above mentioned accounts in a number of ways. In general terms, we put greater emphasis on analyzing norm emergence as a *learning*

process than do the former. In line with Denzau and North (1994), we assume that norm formation is strongly affected by individuals' "mental models," i.e., the interpretation and internal representation of their environment.¹⁴ By taking into account epistemological barriers, a trial-and-error mechanism of change is proposed here. Moreover, we present a material specification of consumers' preferences and of the content of social norms. The core of our argument is formulated in the following hypothesis:

H.1: Individuals share certain basic preferences and derive utility from the same actions due to commonalities in basic human needs. This enables them to coordinate their behavior for achieving common goals.

The theoretical framework underlying this hypothesis is a behavioral consumption theory, the "Learning to consume" approach by Witt (2001) (hereafter learning theory of consumption), whose central concept is that of a consumer need. Consumer "needs" are depicted as behavioral dispositions of the consumer, motivating her to take certain actions. Examples of such needs, which consumers are genetically endowed with, are the wants for nutrition, i.e., caloric intake, air, liquids to drink, the avoidance of pain (health),

¹⁴ Denzau and North (1994) argue that new experiences which make individuals adjust their interpretation of the environment might result in new institutions, given that these mental models are "shared" by the interacting individuals.

social recognition, etc. (basic needs).¹⁵ As these basic needs are part of our genetic repertoire, they are universally shared by humans.¹⁶ When consumers feel deprived of a basic need, they are motivated to compensate for this by suitable consumption acts. The common genetic basis of humans gives rise to commonalities in what consumers desire, i.e., what motivates them to take action, and from what kind of actions they derive utility, implying that preferences are not of a completely subjectivist nature, which is one of the core assumptions of standard neoclassical economics.

Let us imagine that many consumers are affected by a newly occurring endogenous or exogenous shock such as a newly emerging consumption externality. Let us further assume that this externality problem jeopardizes basic human needs. In view of the commonalities in the consumers' basic preferences, this will have two effects. First, all consumers experience the externality in a similar way and, second, all of them share the common goal to solve the externality problem. This general propensity to share goals makes consumers willing to take coordinated action. Interestingly, the material specification of commonalities in consumer preferences as widely shared, *non-subjectivist* basic needs provides an intuitive argument, why payoff structures in prisoner's dilemma games should be symmetric for players: as actors show

¹⁵ Witt (2001) uses the terminology of consumer "wants" instead of "needs." He explicitly distinguishes between innate wants and learned wants. As we do not address learned wants in this paper, we will stick to the more familiar term of basic needs in order to denote innate consumer desires.

¹⁶ The basic needs correspond to the "primary reinforcers" that psychology has identified in empirical research. Psychological findings indicate that, if the satisfaction of these primary reinforcers is hindered, humans are motivated to take actions (Skinner, 1953).

commonalities in their preferences, they share a motivation to act and derive the same utility from cooperative solutions.¹⁷

Externalities are usually defined in an abstract way, as discrepancies between social and private costs, or by pointing to the attributes of the good in question (i.e., non-excludability of benefits and non-rivalry in consumption). However, intuition suggests that externalities in the form of, say, an open-air concert or the spread of an infectious disease (Cornes and Sandler (1986, p. 115)) have quite different effects on individual welfare. Only the latter seriously jeopardizes the basic need for health. We suggest distinguishing externality problems by the extent to which they affect shared consumer needs (deprivation of basic needs). We conjecture that the emergence of norms is much more likely in the latter than in the former case because of different degrees of problem awareness (i.e., magnitude of the problem). For example, in case of a spreading infectious disease, individual benefits from vaccination are considerable. Individuals might therefore have a strong incentive to provide the public good of public health by getting vaccinated, although they know that this benefits free riders as well. The social dilemma is much less pronounced in such a case facilitating conditional cooperation.

To ask which kind of actions would bring about an internalization of the externality is to ask about the *content* of social norms. We argue that it is of little help to assume per se that actors will know ex ante which behavior counts as cooperative (in game theoretic terms: the strategy for obtaining the specified payoffs). In game theoretic studies, the outcome of repeated social interactions ultimately depends on the frequency

¹⁷ This argument also holds for commonalities in learned consumer preferences. However, we do not address learned preferences in this paper (see Witt's (2001) explanations on so-called "acquired wants").

with which *well-defined* cooperative or noncooperative strategies are chosen. But such a framework blocks the perspective on the process of norm emergence that might be characterized by trial-and-error mechanisms of change.¹⁸ Externalities might be observable, for example, long before the causes of their emergence are understood and strategies for eliminating the problem are identified. We frame norm emergence as a process of consumer learning by drawing attention to the effects of changes in knowledge on norm formation. When externalities jeopardize shared consumer needs, the learning of strategies for externality internalization (i.e., what counts as cooperative behavior) corresponds to forming associations between consumption acts and the satisfaction of consumer needs. This is the subject of the learning theory of consumption.

Consumer learning of new behaviors can take several forms. Witt (2001) suggests that consumers acquire new behavioral repertoires in basically two ways: either by individual trial-and-error learning or by communicating with and imitating others (social learning process).¹⁹ On an individual basis, to understand the causal connection between certain behaviors and the satisfaction of consumer needs (the content of the social norm) depends first of all on the quality of feedback (Einhorn and Hogarth, 1978), i.e., on how clearly an effect can be traced back to a specific cause, for example through sensory experiences. Finding a solution to an externality problem on an individual basis might

¹⁸ Game theoretic analyses work with abstract representations of structures of social interaction to derive conclusions which can be generalized. The same degree of abstraction holds for experimental research where cooperative behavior boils down to the distribution of monetary payoffs. The material content of the equilibrium or norm, whose payoffs are known to the actors, is not subject to discussion. In other words, it is unspecified which type of actions (i.e., consumption behavior) constitute norm compliance.

¹⁹ For a more detailed picture of social learning processes, see the work of Bandura (1986).

often prove impossible, as the outcome of an individual's behavioral strategy depends upon the joint behavior of the interacting individuals. As a result, consumers might turn to others whose information they find more credible. Thus, they can also economize on individual learning costs and react more quickly to new externality problems. In addition, they do not have to generate potentially harmful experiences themselves (think of an individual who is ill and has to find a suitable treatment by herself). In general, the more strongly a problem affects a consumer's basic needs (magnitude of problem), and the more difficult it is to find own "recipes" for problem solving (quality of feedback), the more likely she will turn to others for advice.

Witt argues that the process of information acquisition is guided by those needs that the consumer is most deprived of. When many consumers experience deprivation in the same way, and when they turn to the same sources of information, similarities in behavior will occur (behavioral regularity). Thus, the effectiveness of information provision in terms of changing consumer behavior largely depends on the consumers' problem awareness:

H.2: Knowledge dissemination is the more effective, in terms of triggering behavioral adaptations, the more strongly a problem affects the consumer's basic needs, and the less she can solve the problem through individual learning.

The second hypothesis implies that, in order to understand why new information produces changes in behavior, it is necessary to open the "black box" of consumer motivations. Consumer attention to information is selective, and knowledge progress

need not always trigger behavioral adaptations. By taking into account the role of basic consumer needs in consumer learning processes, we arrive at a better understanding of why information provision will be more effective in some cases than in others. Clearly, this adds to the understanding of norm emergence.

Social learning, including communication with, and imitation of, other individuals, also stems from the individual's desire for social approval. Consumers learn new behavioral patterns simply to please their peers. In Witt's conception, consumers learn which consumption acts satisfy the basic need for social recognition. This learning process is brought about by social feedback: whenever the social environment rewards a certain behavior, consumers are inclined to show this behavior more frequently in the future (and vice versa), for they will want to continue receiving the positive rewards from others by fulfilling the latter's expectations.²⁰ Thus, social feedback can lead to the formation of behavioral regularities. This idea has already been introduced in the reviewed hypotheses on norm emergence. Through immediate feedback, the social environment defines which type and level of consumption behavior has to be demonstrated in order to receive social approval. In this way, an originally individual consumption act is turned into a socially determined activity. This type of learning process obviously depends upon repeated social interactions and "visible" behaviors.

Drawing upon Witt (2001), we argue that such a social feedback mechanism can even have long-run implications for consumption patterns. For behaviors exhibited by

²⁰ This idea of learning by reinforcement is subject of many learning models both in psychology as well as economics (see, e.g., Bush and Mosteller, 1955; Roth and Erev, 1995). The psychological term is "operant conditioning." It has been studied extensively by Skinner (1953).

individuals for the social reward will eventually become rewarding in their own right, as consumers start to associate the positive feedback with a specific behavior itself (“associative learning”).²¹ This means that they will continue to perform these consumption acts even if positive social feedback occurs only from time to time. Why certain consumption acts rather than others might be subject to social recognition is understood in light of the preceding discussion on norm emergence.

4. THE CONSUMPTION OF CLEANLINESS

In this section, we introduce our conceptualization of the consumption of cleanliness. Cleanliness in the form of clean clothes is the outcome of a household production activity, a “commodity” if you wish (Michael and Becker, 1973).²² With the term “consumption” of cleanliness, we refer to the inputs into household production, i.e., both

²¹ According to Witt (2001), associative learning occurs when a formerly neutral stimulus (a certain behavior) coincides sufficiently often with the satisfaction of a basic need (e.g., social recognition) so that the positive feedback from the satisfaction of the need becomes associated with the former neutral stimulus. Social recognition as a basic need can bring about such new associations. In other words, if a consumer underwent deprivation in terms of social recognition, and if the consumer learns that she receives positive feedback when a specific behavior is demonstrated, this behavior will be shown more frequently in the future. The stimulus becomes eventually rewarding in its own right. A prominent case is money which has been shown to be a strong secondary reinforcer (Camerer *et al.*, 2005).

²² In contrast to Michael and Becker (1973), we do not claim that consumers necessarily maximize their utility through household production activities, and that preferences are constant. Moreover, we do not intend to analyze time allocation patterns in light of changing opportunity costs.

consumer expenditures on goods and services, as well as the utilization of such tools. Clean clothes (synonymous with cleanliness) have instrumental value for more fundamental consumer preferences – the above mentioned basic needs. Two basic needs are nowadays associated with clean clothes: health and social recognition. This means that whenever cleanliness is consumed, the basic needs for health and social recognition will be satisfied.

In the medical field, it is common knowledge that the washing of textiles can contribute to hygiene via disinfection. Effectiveness, however, depends upon the type of textiles and laundering practices: higher temperatures and ample rinsing of clothes substantially reduces the number of microorganisms (Nichols, 1970; Terpstra, 1998). More recently, the disinfectant potential of laundering has been neglected - on the one hand because of changes in the properties of textiles, on the other hand out of ecological concerns (Sattar *et al.*, 1999; SIFO, 2003). If hygiene is insufficient, however, fabrics can have negative health effects. For example, infections can spread through “cross-contamination” when bacteria are transmitted from clothing to hand (Neely and Maley, 2000; Sattar *et al.*, 2001). A lack of hygiene can also cause an infestation of the body louse on clothing, thereby transmitting pathogenic bacteria (Raoult and Roux, 1999).

Surveys indicate that clothes are not only washed for health reasons but for social motives as well, pointing to the existence of a cleanliness norm (SIFO, 2003). When asked in a survey how much they agree (on a five-point scale) with the statement that “it is embarrassing to wear clothes with a body odour,” a large share of respondents in several European countries “fully agreed.” (Greece: 80%; Netherlands: 80%; Norway: 74%; Spain: 95%) Cleanliness is expected of everyone, and there exists a mutual

understanding of what this means (Douglas, 1984). Apparently, a cleanliness norm exists, and it affects consumption patterns – in choosing their level of cleanliness, consumers look to the opinions of others.

At present, the majority of households in industrialized countries uses washing machines to ensure cleanliness. In the U.S., the diffusion degree of this device amounts to about 80%, pointing to a saturated market (EIA, 2006). In the U.K., 92% of all households are equipped with a clothes washer (Rickards *et al.*, 2004). Washing machines have diffused rapidly in all industrialized countries since the beginning of the 20th century (figure 1). Interestingly, the amounts of laundry per consumer today are multiples of what consumers used to wash fifty (Shove, 2003) or more than a hundred years ago (Klepp, 2003).

- figure 1 about here -

We concentrate on cleanliness in the form of clean clothes, ensured by laundering and, to a lesser extent, body hygiene. In principle, a great part of our argument can also be applied to other household production activities such as house cleaning.²³ The reason why we focus on clothing is interest in analyzing norm emergence in situations of repeated social interactions. Certainly, the cleanliness of the consumer's home can also be observed by others when entering it. But cleanliness reflected in the outer appearance (absence of odors and/or stains) is “mobile” and something that the consumer “carries to” all sorts of social interaction, for example the workplace, school, etc. Ultimately, consumers will take what they can most easily and immediately observe as an indicator

²³ I would like to thank an anonymous referee for pointing this out.

of the other consumer's overall cleanliness - and as a proxy for her health status (see Section 5). This does not exclude that an emerging norm of cleanliness will "spread" to other cleaning activities as well.

In Section 4, it was pointed out that the need for social recognition is satisfied when others reward the behavior of an individual. This reward obviously depends on "doing the right thing" in the eyes of others: both the type of consumption act and the level of consumption which is rewarded with social esteem, is socially determined. According to this framework, transformations in consumer behavior occur, when the social feedback related to a specific consumption act changes (or, in other words, when the consumption acts that receive positive social feedback vary), and/or when the level of expected consumption is altered. The impact of the social environment on the consumption of cleanliness is exactly of this sort: the outer appearance of a person affects her social standing, and the notion of cleanliness itself is a social construct. This means that society defines when a consumer can be considered "clean" (Cowan, 1983; Douglas, 1984).²⁴ Household advice books, popular novels, and advertisements in the media such as women's magazines reflect how the definition of cleanliness has evolved over time (e.g., Matthews, 1987).

²⁴ Mary Douglas (1984) points out that society defines what "being clean" means: "As we know it, dirt is essentially disorder. There is no such thing as absolute dirt: it exists in the eye of the beholder." (ibid, p. 2)

5. THE EMERGENCE OF THE CLEANLINESS NORM

This section deals with the emergence of the norm of cleanliness. We interpret the associations between clean clothes, on the one side, and social recognition and health, on the other, as manifestations of earlier learning processes. It should be kept in mind that both social recognition and health could in principle be associated with many other types of consumption acts. We look for the driving forces behind these learned associations.

The above mentioned survey indicates that cleanliness, particularly the absence of body odor, seems to be a norm that has now become a concern for every member of society (SIFO, 2003). In the past, cleanliness used to be a signal of social status. The status connotation of cleanliness was still present in many countries until the middle of the 19th century (e.g., Ashenburg (2007, p. 169)). Few people could afford to spend enough money and time on their outer appearance - being "clean" in terms of the prevailing definition of cleanliness. Apparently, the normative expectations that consumers had of one another changed at some point during the transition from the 19th to the 20th century. When everybody started to expect of everybody else to be clean, the status distinction by cleanliness vanished. Consequently, the number of consumers demanding cleanliness significantly increased. In addition, the level of the individual's consumption of cleanliness had now become socially determined. The explanation of this development will be given in the next section. A central role in the historical transformation has been played by the other basic need involved in cleanliness consumption, namely health.

5.1 Stylized Historical Development

This section aims to illustrate how processes of social learning triggered the formation of a social norm and thereby removed the status gains which could formerly be derived from cleanliness. A stylized overview of the historical development is given before the facts are interpreted in light of the model of norm emergence developed in Section 3.

During the 19th century, major changes took place in the geographic distribution of inhabitants in Britain when industrialization triggered internal migration. Increasing numbers left the rural environment to work in the emerging manufacturing sector (Mathias (1983, ch.5 and ch.6); Floud (1994, p. 18)). Within the cities, population density was fostered by the absence of cheap public transport, which would have allowed inhabitants to move further away from the workplace (MacKinnon (1994, p. 280)). The rising population density coincided with bad living conditions in the urban habitat. At that time, the main proximate cause of death of younger people were infectious diseases such as typhoid, cholera, and tuberculosis (Baines, 1994). In fact, 19th century Britain was shaken by a couple of serious epidemics. Among the most lethal diseases was smallpox (Oxley, 2003). This is a viral infection transmitted by close contacts between people via droplet infection.²⁵ In general, increases in population density raised the likelihood of contracting an infectious disease, independent of the channel of transmission and social class (Oxley, 2003). In addition, the factories built in the 1820s and after accommodated a great number of employees, often working in a dusty or humid environment (e.g., textile mills), thus fostering chronic diseases such as tuberculosis and respiratory

²⁵ Typhoid and cholera, on the contrary, are waterborne diseases.

diseases. Average height serves as a proxy for standard of living, and it is estimated to have declined in the first decades of the 19th century (Baines (1994, p. 34)).

Similar trends hold for the U.S. The share of people employed in agriculture declined from 1810 to 1860, accompanied by migration from rural to urban areas. Like in Britain, life expectancy decreased during the first half of the 19th century. Migration, interregional trade and close proximity of inhabitants at the workplace and the emerging public schools fostered the spread of infectious diseases (Costa and Steckel, 1997). Water supply and sewage systems were inadequate, allowing endemic diseases to spread “from the slums to the homes of the wealthy.” (Fee (1994, p. 232))

In the 19th century, little was known about the actual causes of such lethal diseases as smallpox and plague. Competing theories existed as to their origin.²⁶ The so-called “germ theory of disease” was fully established only at the end of the 19th century. It is mainly attributed to the pioneering work of Louis Pasteur and Robert Koch, who identified the connection between pathogen microorganisms and disease.²⁷ The new medical knowledge was brought to the U.S. by young Americans having studied bacteriology in Germany (such as William Henry Welch or Alexander C. Abbott) (Fee, 1994). Of central importance for the development and acceptance of the germ theory

²⁶ On the one hand, there were ideas about “spontaneous generation” of life from lifeless matter as well as the miasma theory of disease, hypothesizing that illnesses were triggered by “bad air” (Mokyr, 2000). On the other hand, there had been conjectures since the 16th century that tiny living entities existed, which could trigger transformations in organic matter.

²⁷ By analyzing the process of fermentation of wine, Pasteur proofed the existence of microorganisms in 1857. Koch demonstrated in 1876 that microorganisms could be grown in a pure culture outside the body and that disease could be produced artificially by inoculating animals with the cultures (Osler, 1913).

were the microscope and the method of experimental testing. Agents of disease could be visualized, replicated, and associated with the symptoms of disease. Based on data collection and statistical inference, beliefs about actual causal dependencies between microorganisms and disease turned into objective, “replicable” knowledge (Cunningham, 1992; Warner, 1992). Hence, the laboratory enabled a knowledge progress which would not have been possible in a personal trial-and-error manner (Mokyr, 2000).

Once these insights became common knowledge, the improvement of sanitary conditions in U.S. urban areas became one of the major pillars in the fight against disease. This included cleaning the water supply, establishment of sewage systems, etc. In addition, quarantine was practiced more consequently than before (Costa and Steckel, 1997). Many of these measures targeted the channels of disease transmission. In terms of prevention, the practice of vaccination became gradually established by codifying it into British law (Oxley, 2003). In the U.S., vaccination was complemented by improvements in medical technology, in particular the introduction and mass-production of antibiotics between 1930 and 1950 (Costa and Steckel, 1997).

Besides these structural and legal measures, the individual consumer’s behavior was also targeted. The goal was to increase the cleanliness standards of all members of society, independent of class. For that purpose, the new scientific knowledge had to diffuse within society. “Home economists,” i.e., (female) scientists studying housework, were the central agents in public campaigns for hygiene in the U.S. (Strasser (1982, ch.11); Matthews (1987, ch.6); Attar, 1990). As leading figures of the Hygienic Movement, they were devoted to make housekeeping an object of scientific inquiry and

share their scientific findings with the public (Andrews and Andrews, 1974).²⁸ Home economists distributed their knowledge in the form of household advice books, leaflets, women's magazines as well as teaching (e.g., Cowan, 1976; McClary, 1980; Sivulka, 2001). Often, objective information was paired with moral appeals (Mokyr, 2000).²⁹ Thus, consumers were not only educated about the impact of hygiene on health; they were also urged to immediately incorporate this new knowledge into their daily practices. Consumer health turned into a matter of personal responsibility:

Homemakers had to be persuaded that they were the primary guardian at the household gate, armed with mop and sponge, charged with keeping out the microscopic enemy. The responsibility of homemakers to keep the domestic environment germ-free was the main logical prerequisite to "blaming" inadequate maternal care for the high infant and child mortality rates that still plagued the United States and Britain in the late nineteenth century. (Mokyr (2000, p. 17))

At that time, however, middle-class consumers did not have to be convinced of the "gospel of cleanliness." (Tomes, 1998) They had already maintained fairly high cleanliness standards before the germ theory of disease became fully established (Matthews (1987, ch.2)). This is nicely reflected in household advice books, popular novels, and advertisements in the media such as women's magazines. Matthews argues that middle-class consumers practiced a kind of "cult of domesticity" for which the rise

²⁸ Andrews and Andrews (1974) draw the following comparison: "In regimenting her time to strict schedules, the housekeeper was to employ the standards of efficiency which industrial efficiency experts like Frederick Taylor applied to strictly commercial enterprises in the early twentieth century." The corresponding association of Domestic Science was founded in 1908 (Matthews (1987, p. 151)).

²⁹ "Cleanliness was no longer next to Godliness, it had become almost the same thing." (Mokyr (2000, p. 25))

of the genre of the “domestic novel” is an indicator (ibid, p. 11).³⁰ Middle- and upper-class consumers were motivated to keep themselves, their clothes, and their homes clean for the status gains they derived from this.

In the middle of the 19th century, the Hygienic Movement gained momentum, and the fight against disease turned into a fight against dirt as such (Mokyr, 2000). The moral connotations of housework and hygiene persisted until the beginning of the 20th century. As Cowan puts it:

Laundering was not just laundering, but an expression of love; the housewife who truly loved her family would protect them from the embarrassment of tattletale gray. (...) Cleaning the bathroom sink was not just cleaning, but an exercise of protective maternal instincts, providing a way for the housewife to keep her family safe from disease. (Cowan (1976, p. 16))

In this context, it was also emphasized that others expected these higher standards of cleanliness:

Women who failed at these new household tasks were bound to be guilty about their failure. (...) Readers of the better-quality women’s magazines are portrayed as feeling guilty a good lot of the time (...): guilty if their children go to school in soiled clothes, guilty if all the germs behind the bathroom sink are not eradicated, (...), embarrassed of being accused of having body odor, (...) guilty if their daughters are unpopular because of old-fashioned, or unironed, or - heaven forbid – dirty dresses. (Cowan (1976, p. 16))

Furthermore, home economists worked hand in hand with producers of the new equipment which was said to improve consumers’ hygiene and eventually their health.

³⁰ So-called domestic novels praised the merits of “good housekeeping.” Matthews (1987) dates them to the middle of the 19th century.

Scientists actively supported the advertising of new products by pointing to their benefits in producing hygiene (Matthews (1987, ch.6)). In fact, many of these tools had been available before 1875. But only after the intense marketing efforts of producers and home economists did the demand for soap, washing and cleaning equipment, etc. substantially expand (Vinikas, 1992; Mokyr and Stein, 1997; see table 1 for an example).³¹

- table 1 about here -

5.2 Interpretation from the Learning Perspective

The emergence of the cleanliness norm, it is claimed here, can be dated to the period between the middle of the 19th and the beginning of the 20th centuries. This norm emerged when people were urgently looking for ways to solve the problem of the spread of infectious diseases that occurred in the period of industrialization and urbanization. Infectious diseases can be interpreted as a consumption externality (Cornes and Sandler (1986, p. 115)), which emerged with an increased local proximity of consumers. Due to this radical change in social networks, consumer behavior, including consumption of cleanliness, turned from a private into a public good: issues which had previously been people's private concerns, such as waste disposal, now required coordinated action on the part of consumers.

³¹ Edwards (1962) points out that falling prices of soap products in the first half of the 19th century did not significantly increase the demand for soap (ibid, p. 135). According to Andrews and Andrews (1974), the beginnings of a washing machines industry in the United States can be dated back to 1860, and "by 1873 the United States Patent Office had received over 2,000 applications for such devices." (ibid, p. 317)

Of central importance for the emergence of the cleanliness norm was the basic want for health and the deprivation experienced by consumers at that time. Each individual must have realized the problem and can be assumed to have searched for ways of solving it. But consumers were not well equipped to decide how best to achieve improvements in health. For the traditional beliefs as to how disease emerged and how to address it had become obsolete. In principle, each consumer could, by the trial-and-error method, find out what the best strategies were for improving their health. However, as health is a delicate issue, it is not likely that consumers would simply have “experimented” with such a fundamental aspect of life.

The case study reveals that behavioral strategies for satisfying the want for health came about by a process of social, not individual learning.³² On the one hand, consumers turned to those they regarded as experts in health matters for the fact that they lacked “personal recipes” for avoiding pain. On the other hand, home economists were motivated to disseminate their knowledge about the importance of hygiene. Both the search for information and actual information provision probably coincided to a high degree.³³ This alone would bring about similarities in behavioral adaptations. But the social feedback consumers received for their behavior is another crucial element in the transition process that resulted in the cleanliness norm.

³² At the beginning of the 20th century, a large variety of new consumer products became available. As consumers could in many cases not rely on former experiences as to how to use certain products (Cowan (1976, p. 14)), they were generally in need of guidance and orientation. In other words, the need-satisfaction potential of many newly advertised products had to be explored.

³³ Interestingly, home economists were both scientists and opinion leaders.

Due to the germ theory of disease the public-good nature of health was understood. Consumers formed new beliefs as to the existence and origins of consumption externalities. When it was realized that in narrow surroundings individual health translated into the health status of others, measures were taken to coordinate consumer behavior. This was done not only by education, but also by means of social feedback. In fact, information campaigns by home economists and public health officials did not only communicate “objective” information. In addition, their messages contained strong, moral connotations, pointing to what was expected of consumers by society. References to social ostracism in case of deviating behavior were also part of advertisements. Beliefs were altered as to which behavior was normal and expected. For example, the use of soap was promoted at schools at the beginning of the 20th century (Peet (1952, p. 568)). Taken together, these forms of social feedback hint at the emergence of a social norm (Ellickson, 1991).

Upper-class consumers did not need to change their behavior substantially, as they had already kept fairly high standards of cleanliness before. Household advice books can certainly not be taken at face value in practical terms, but they indicate the importance cleanliness had for the well-to-do. At that time, one could show oneself to be different from the lower classes by being clean: cleanliness was visible, i.e., conspicuous and rare. The lower-class consumers, on the contrary, were deprived of both social recognition and cleanliness. When greater cleanliness was demanded of them, they would not only improve their health, but their social standing as well. Still, to view the increase

in the consumption of cleanliness merely as a process of social emulation would not do justice to the phenomenon at hand.³⁴

Processes of social emulation are triggered by the need for social recognition, whereas the process analyzed here clearly stems from the basic want for health of which consumers felt deprived (externality problem). So deprivation in terms of health ultimately explains the transformation of cleanliness being a signal of status to being a means to fulfill a social norm. Had a process of social emulation taken place, then upper-class consumers, whose social status was challenged by efforts of all consumers to improve in cleanliness, might have tried to oppose this undesired trend. In fact, there is evidence of such endeavors in the past, i.e., upper-class consumers defending their social standing through regulations (e.g., Lessig (1995, p. 1027 on smoking)).³⁵ That upper-class consumers did not become active in this way can be seen as an indicator of the magnitude of the problem all consumers faced. Due to knowledge change, behavioral adaptations took a certain direction, and social motives guided the learning process. But

³⁴ Certainly, one could argue that the lower class imitated the consumption patterns of the upper class, when growing incomes during industrialization made this possible.

³⁵ According to Lessig (1995), early nonsmoking regulation focused on maintaining gender inequality i.e., social status structures. At some point in the 19th century, women started to smoke cigarettes (not cigars like men did). Men feared they would lose their superior social status to women, and so they opposed this imitation by legislation, which prohibited the sales of cigarettes: “Regulation arose originally to defend the social status of the male.” (ibid, p. 1027) Lessig uses the term “defensive construction” for this type of meaning regulation. Obviously, imitation and social emulation was not possible in the case that Lessig studied, because those who would have lost their status position were powerful and determined enough to oppose this trend.

the consideration of the basic need for health is necessary to understand why expectations changed. At the end, consumers had learned to associate health with visual cleanliness, and norm compliance was manifested in the outer appearance of consumers.³⁶

In the previous section, it was mentioned that no functionalist perspective on norm emergence is taken here. In the 19th century, when infectious diseases were still prominent, a positive effect on health by increasing cleanliness of the body, of clothes, and the private habitat could have been achieved – although the eradication of infectious diseases will be attributed mostly to improvements in public infrastructure. Naturally, public health continues to be a public good today. However, infectious diseases such as smallpox play virtually no role in modern industrialized countries. Hence, the potential impact of less-than-clean clothing or insufficient personal hygiene on the provision of this public good is much less pronounced today.³⁷

³⁶ Interestingly, today white clothes are common in occupations where hygiene plays an important role, for instance in the medical field. The use of white clothing might be related to the learned association of cleanliness and health: dirt is easily visible on white clothes, allowing the patient to draw (limited) inferences about the hygienic standard of the physician.

³⁷ It is a difficult task to evaluate how far personal hygiene contributed to the eradication of infectious diseases in comparison to the improvements of sanitary conditions as well as the practice of vaccination. For diseases which are transmitted by droplet infection it is not unlikely that clothing and textiles could have served as vectors of disease transmission. Hence, more intense laundering as well as other practices of hygiene could have made a contribution in terms of disinfection. Luckin (1984), e.g., sees a connection between increased personal hygiene and the decline of typhus in 19th century London (the body louse, which functions as a vector of disease transmission, thrives in dirty clothing). However, the major impact on consumer health is probably to be attributed to vaccination, better sewage systems as well as the introduction of antibiotics (Mokyr, 2000).

6. CONCLUSION

This paper addressed the transformation of a consumption act from a means to signal the consumer's status to a means of norm compliance. We argue that this process can only be understood by opening the "black box" of consumer motivations and by tracing how an additional motive – other than social recognition – became associated with a specific consumption act.

The evolving associations between consumption activities, on the one side, and the satisfaction of consumer needs, on the other, are interpreted as manifestations of consumer learning processes. We show how an understanding of the process of norm emergence benefits from a material specification of consumer preferences and of the content of social norms. At the core of our argument is the assumption that consumer preferences are not entirely subjective but that consumers have a propensity to share certain motivations due to their genetic inheritance (Witt, 2001).

By linking externality problems to the concept of basic needs, we have opened up a psychologically informed perspective on norm emergence that could shed some light on what affects the consumer's willingness to cooperate despite the possibility of free riders. When externalities jeopardize consumers' needs, the learning of strategies for externality internalization corresponds to forming associations between consumption acts and the satisfaction of consumer needs. To depict norm emergence as a learning process means to reject the assumption that actors know *ex ante* which kind of strategy or behavior will bring about the internalization of a newly occurring externality. We hypothesize that the more severe the externality problem is in terms of affecting consumer needs, and the more difficult it is to find solutions on an individual basis, the more likely are social

learning processes. Consumer attention to public campaigns greatly depends on these two factors.

Our argumentation is exemplified by a novel case study: the emergence of the cleanliness norm in the 19th century in the Western world, which eliminated the status-signaling property of clean appearance. Individual consumption of cleanliness turned from a private into a public good when population density rose in the period of growing industrialization and urbanization. When consumers had learned to associate the consumption of cleanliness with health, the formation of the social norm of cleanliness was triggered.

REFERENCES

Alchian A. A., Demsetz H. (1973): 'The Property Right Paradigm', *Journal of Economic History*, 33 (1), pp. 16-27.

Alpizar F., Carlsson F., Johansson-Stenman O. (2005): 'How much do we care about absolute versus relative income and consumption?', *Journal of Economic Behavior & Organization*, 56, pp. 405-421.

Andrews W. D., Andrews D. C. (1974): 'Technology and the housewife in nineteenth-century America', *Women's Studies*, 2, pp. 309-328.

Aoki M. (2001): *Toward a Comparative Institutional Analysis*, MIT Press, Cambridge/Mass.

Ashenburg K. (2007): *The dirt on clean, An unsanitized history*, North Point Press, New York.

Attar D. (1990): *Wasting girls time: The history and politics of home economics*, Virago, London.

Axelrod R. (1984): *The Evolution of Cooperation*, Basic Books, New York.

Axelrod R. (1986): 'An Evolutionary Approach to Norms', *American Political Science Review*, 80 (4), pp. 1095-1111.

Baines D. (1994): 'Population, migration and regional development, 1870-1939', in Floud R., McCloskey D. (eds.):

The Economic History of Britain since 1700, Volume 2, second edition, Cambridge University Press, Cambridge.

Bandura A. (1986): *Social Foundations of Thought and Action - A Social Cognitive Theory*, Prentice Hall, Englewood Cliffs.

Baumol W. J. (1962): 'On Taxation and the Control of Externalities', *American Economic Review*, 62 (3), pp. 307-322.

Baumol W. J. (2004): 'Red-Queen games: arms races, rule of law and market economies', *Journal of Evolutionary Economics*, 14, pp. 237-247.

Bernheim D. B. (1994): 'A Theory of Conformity', *Journal of Political Economy*, 102 (5), pp. 841-877.

Bikhchandani S., Hirshleifer D., Welch I. (1992): 'Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades', *Journal of Economic Perspectives*, 12 (3), pp. 151-170.

Brock W. A., Durlauf S. N. (2001): 'Discrete Choice with Social Interactions', *Review of Economic Studies*, 68, pp. 235-260.

Buchanan J. M. (1965): 'An Economic Theory of Clubs', *Economica*, 32, pp. 1-14.

Buchanan J. M. (1969): 'External Diseconomies, Corrective Taxes, and Market Structure', *American Economic Review*, 59 (1), pp. 174-177.

Bush R. R., Mosteller F. (1955): *Stochastic Models for Learning*, John Wiley and Sons, New York.

Camerer C. F., Thaler R. (1995): 'Anomalies, Ultimatums, Dictators and Manners', *Journal of Economic Perspectives*, 9 (2), pp. 209-219.

Camerer C. F. (1997): 'Progress in Behavioral Game Theory', *Journal of Economic Perspectives*, 11 (4), pp. 167-188.

Camerer C. F., Loewenstein G., Prelec D. (2005): 'Neuroeconomics: How neuroscience can inform economics', *Journal of Economic Literature*, 43 (1), pp. 9-64.

Carroll C. D., Overland J., Weil D. N. (1997): 'Comparison Utility in a Growth Model', *Journal of Economic Growth*, 2, pp. 339-367.

Coase R. H. (1960): 'The problem of social cost', *Journal of Law and Economics*, 3, pp. 1-44.

Coleman J. S. (1990): *Foundations of Social Theory*, The Belknap Press of Harvard University Press, Cambridge/Mass.

Corneo G., Jeanne O. (1997): 'Snobs, bandwagons, and the origin of social customs in consumer behavior', *Journal of Economic Behavior & Organization*, 32, pp. 333-347.

Cornes R., Sandler T. (1986): *The Theory of Externalities, Public Goods, and Club Goods*, Cambridge University Press, Cambridge.

Costa D. L., Steckel R. H. (1997): 'Long-term trends in health, welfare and economic growth in the United States', in Steckel R. H., Floud R. (eds.):

Health and Welfare during Industrialization, The University of Chicago Press, Chicago and London.

Cowan R. S. (1976): 'The "Industrial Revolution" in the Home: Household Technology and Social Change in the 20th Century', *Technology and Culture*, 17 (1), pp. 1-23.

Cowan R. S. (1983): *More Work for Mother*, Basic Books, New York.

Cunningham A. (1992): 'Transforming plague, The laboratory and the identity of infectious disease', in Cunningham A., Williams P. (eds.):

The laboratory revolution in medicine, Cambridge University Press, Cambridge.

Davis O. A., Whinston A. (1962): 'Externalities, Welfare, and the Theory of Games', *Journal of Political Economy*, 70 (3), pp. 241-262.

Demsetz H. (1967): 'Toward a Theory of Property Rights', in Furubotn E., Pejovich S. (eds.):

The Economics of Property Rights, Cambridge/Mass.

Denzau A. T., North D. C. (1994): 'Shared Mental Models: Ideologies and Institutions', *Kyklos*, 47 (1), pp. 3-31.

Douglas M. (1984): *Purity and danger, An analysis of the concepts of pollution and taboo*, Ark Paperbacks, London.

Duesenberry J. (1949): *Income, Saving, and the Theory of Consumer Behavior*, Harvard University Press, Cambridge/Mass.

Edwards H. R. (1962): *Competition and monopoly in the British soap industry*, Clarendon Press, Oxford.

Einhorn H. J., Hogarth R. M. (1978): 'Confidence in Judgment: Persistence of the Illusion of Validity', *Psychological Review*, 85 (5), pp. 395-416.

Ellickson B. (1973): 'A Generalization of the Pure Theory of Public Goods', *American Economic Review*, 63 (3), pp. 417-432.

Ellickson R. C. (2001): 'The Market for Social Norms', *American Law and Economic Review*, 3 (1), pp. 1-49.

Elster J. (1989): 'Social Norms and Economic Theory', *Journal of Economic Perspectives*, 3 (4), pp. 99-117.

Energy Information Administration [EIA] (2006): *Annual Energy Review 2005*, Washington D.C.

Fee E. (1994): 'Public Health and the State: The United States', in Porter D. (ed.): *The History of Public Health and the Modern State*, Rodopi, Amsterdam and Atlanta.

Fehr E., Gächter S. (2000): 'Cooperation and Punishment in Public Goods Experiments', *American Economic Review*, 90 (4), pp. 980-994.

Fehr E., Fischbacher U. (2004): 'Social norms and human cooperation', *Trends in Cognitive Sciences*, 8 (4), pp. 185-190.

Floud R. (1994): 'Britain, 1860-1940: a survey', in Floud R., McCloskey D. (eds.): *The Economic History of Britain since 1700*, Volume 2, second edition, Cambridge University Press, Cambridge.

Frank R. H. (1985): 'The Demand for Unobservable and Other Nonpositional Goods', *American Economic Review*, 75 (1), pp. 101-116.

Frank R. H. (1989): 'Frames of Reference and the Quality of Life', *American Economic Review*, 79 (2), pp. 80-85.

Frank R. H. (1999): *Luxury Fever*, The Free Press, New York.

Hardin G. (1968): 'The Tragedy of the Commons', *Science*, 162, pp. 1243-1248.

Hirsch F. (1976): *The Social Limits of Growth*, Harvard University Press, Cambridge/Mass.

Keser C., van Winden F. (2000): 'Conditional Cooperation and Voluntary Contributions to Public Goods', *Scandinavian Journal of Economics*, 102 (1), pp. 23-39.

Khalil E. L. (1997): 'The Red Queen paradox: a proper name for a popular game', *Journal of Institutional and Theoretical Economics*, 153 (2), pp. 411-415.

Klepp I. G. (2003): 'Clothes and Cleanliness', *Ethnologia Scandinavia*, 33, pp. 61-73.

Kübler D. (2001): 'On the Regulation of Social Norms', *Journal of Law, Economics & Organization*, 17 (2), pp. 449-476.

Lebergott S. (1993): *Pursuing Happiness: American Consumers in the Twentieth Century*, Princeton University Press, Princeton.

Leibenstein H. (1950): 'Bandwagon, Snob and Veblen Effects in the Theory of Consumers' Demand', *Quarterly Journal of Economics*, 64 (2), pp. 183-207.

Lessig L. (1995): 'The Regulation of Social Meaning', *University of Chicago Law Review*, 62, pp. 943-1045.

Lessig L. (1996): 'Social Meaning and Social Norms', *University of Pennsylvania Law Review*, 144 (5), pp. 2181-2189.

Lessig L. (1998): 'The New Chicago School', *Journal of Legal Studies*, 27 (2), pp. 661-691.

Liu W.-F., Turnovsky S. J. (2005): 'Consumption externalities, production externalities, and long-run macroeconomic efficiency', *Journal of Public Economics*, 89, pp. 1097-1129.

Luckin B. (1984): 'Evaluating the sanitary revolution: Typhus and typhoid in London, 1851-1900', in Woods R., Woodward J. (eds.):

Urban Disease and Mortality in Nineteenth-Century England, St. Martin's Press, New York.

MacKinnon M. (1994): 'Living standards, 1870-1914', in Floud R., McCloskey D. (eds.): *The Economic History of Britain since 1700*, Volume 2, second edition, Cambridge University Press, Cambridge.

Mathias P. (1983): *The first industrial nation, The Economic History of Britain 1700-1914*, second edition, Routledge, London and New York.

Matthews G. (1987): *Just a housewife, The rise and fall of domesticity in America*, Oxford University Press, New York.

McAdams R. H. (1997): 'The Origin, Development, and Regulation of Norms', *Michigan Law Review*, 96, pp. 338-433.

McClary A. (1980): 'Germs are everywhere: The germ threat as seen in magazine articles 1890-1920', *Journal of American Culture*, 3 (1), pp. 33-46.

Michael R. T., Becker G. S. (1973): 'On the New Theory of Consumer Behavior', *Swedish Journal of Economics*, 75 (4), pp. 378-396.

Mokyr J., Stein R. (1997): 'Science, health, and household technology: the effect of the Pasteur Revolution in consumer demand', in Bresnahan T. F., Gordon R. J. (eds.):

The Economics of New Goods, Studies in Income and Wealth, Vol. 58, The University of Chicago Press, Chicago and London.

Mokyr J. (2001): 'Why "More Work for Mother?" Knowledge and Household Behavior, 1870-1945', *Journal of Economic History*, 60 (1), pp. 1-41.

Neely A. C., Maley M. P. (2000): 'Survival of enterococci and staphylococci on hospital fabrics and plastic', *Journal of Clinical Microbiology*, 38, pp. 724-726.

Nichols P. S. (1970): 'Bacteria in laundered fabrics', *American Journal of Public Health*, 60 (11), pp. 2175-2180.

North D. C. (1991): 'Institutions', *Journal of Economic Perspectives*, 5 (1), pp. 97-112.

Olsen M. (1965): *The Logic of Collective Action*, Harvard University Press, Cambridge/Mass.

Opp K.-D. (1983): *Die Entstehung sozialer Normen*, J.C.B. Mohr (Paul Siebeck), Tübingen.

Opp K.-D. (2001): 'How do norms emerge? An outline of a theory', *Mind & Society*, 3 (2), pp. 101-128.

Osler W. (1913): *The evolution of modern medicine*, Yale University, Yale.

Ostrom E. (2000): 'Collective Action and the Evolution of Social Norms', *Journal of Economic Perspectives*, 14 (3), pp. 137-158.

Oxley D. (2003): "'The seat of death and terror': urbanization, stunting, and smallpox", *Economic History Review*, 61 (4), pp. 623-656.

Peet R. (1952): 'Dynamics of the Soap Industry', *Journal of the American Oil Chemists' Society*, 29 (11), pp. 564-572.

Pigou A. C. (1920): *The economics of welfare*, Macmillan, London.

Posner E. A. (1979): 'Some Uses and Abuses of Economics in Law', *University of Chicago Law Review*, 46 (2), pp. 281-306.

Posner E. A. (1996): 'Law, Economics, and Inefficient Norms', *University of Pennsylvania Law Review*, 144 (5), pp. 1697-1744.

Posner E. A. (1998): 'Symbols, Signals and Social Norms in Politics and the Law', *Journal of Legal Studies*, 27, pp. 765-798.

Raoult D., Roux V. (1999): 'The Body Louse as a Vector of Reemerging Human Diseases', *Clinical Infectious Diseases*, 29, pp. 888-911.

Rickards L., Fox K., Roberts C., Fletcher L., Goddard E. (2004): *Living in Britain, Results from the 2002 General Household Survey*, National Statistics, London.

Rogers E. M. (1995): *Diffusion of Innovations*, fourth edition, The Free Press, New York.

Roth A. E., Erev I. (1995): 'Learning in extensive form games: experimental data and simple dynamic models in the intermediate run', *Games and Economic Behavior*, 6, pp. 164-212.

Sattar S. A., Tetro J., Springthorpe S. (1999): 'Impact of changing societal trends on the spread of infections in American and Canadian homes', *American Journal of Infection Control*, 27, pp. 4-21.

Sattar S. A., Springthorpe S., Mani S., Gallant M., Nair R. C., Scott E., Kain J. (2001): 'Transfer of bacteria from fabrics to hands and other fabrics: development and application of a quantitative method using *Staphylococcus aureus* as a model', *Journal of Applied Microbiology*, 90, pp. 962-970.

Schotter A. R. (1981): *The economic theory of social institutions*, Cambridge University Press, Cambridge.

Shove E. (2003): *Comfort, Cleanliness and Convenience, The Social Organization of Normality*, Berg, Oxford and New York.

Sivulka J. (2001): *Stronger than dirt: A cultural history of advertising personal hygiene in America, 1975-1940*, Humanity Books, Amherst/NY.

Skinner B. F. (1953): *Science and Human Behavior*, Macmillan, New York.

Statens Institutt For Forbruksforskning [SIFO] (2003): *An investigation of domestic laundry in Europe – habits, hygiene and technical performance*, National Institute for Consumer Research, Oslo.

Strasser S. (1982): *Never done, A history of American housework*, Henry Holt and Company, New York.

Terpstra P. M. J. (1998): 'Domestic and institutional hygiene in relation to sustainability. Historical, social and environmental implications', *International Biodeterioration & Biodegradation*, 41, pp. 169-175.

Tomes N. (1998): *The gospel of germs: Men, women, and the microbe in American life*, Harvard University Press, London.

Veblen T. (1994) [1899]: *The Theory of the Leisure Class*, Macmillan, New York.

Vercelli A. (1998): 'Sustainable Development, Rationality and Time, in Faucheux S., O'Connor M., van der Straten J. (eds.):

Sustainable Development: Concepts, Rationalities and Strategies, Kluwer, Dordrecht.

Vinikas V. (1992): *Soft soap, hard sell: American hygiene in an age of advertisement*, Iowa State University Press, Iowa.

Warner J. H. (1992): 'The fall and rise of professional mystery, Epistemology, authority and the emergence of laboratory medicine in nineteenth-century America', in Cunningham A., Williams P. (eds.):

The laboratory revolution in medicine, Cambridge University Press, Cambridge.

Witt U. (1987): 'The Demsetz-Hypothesis on the Emergence of Property Rights Reconsidered', in Pethig R., Schlieper U. (eds.):

Efficiency, Institutions, and Economic Policy, Springer, Berlin.

Witt U. (1989): 'The evolution of economic institutions as a propagation process', *Public Choice*, 62, pp. 155-172.

Witt U. (1992): 'The endogenous public choice theorist', *Public Choice*, 73, pp. 117-129.

Witt U. (2001): 'Learning to consume – A theory of wants and the growth of demand', *Journal of Evolutionary Economics*, 11, pp. 23-36.

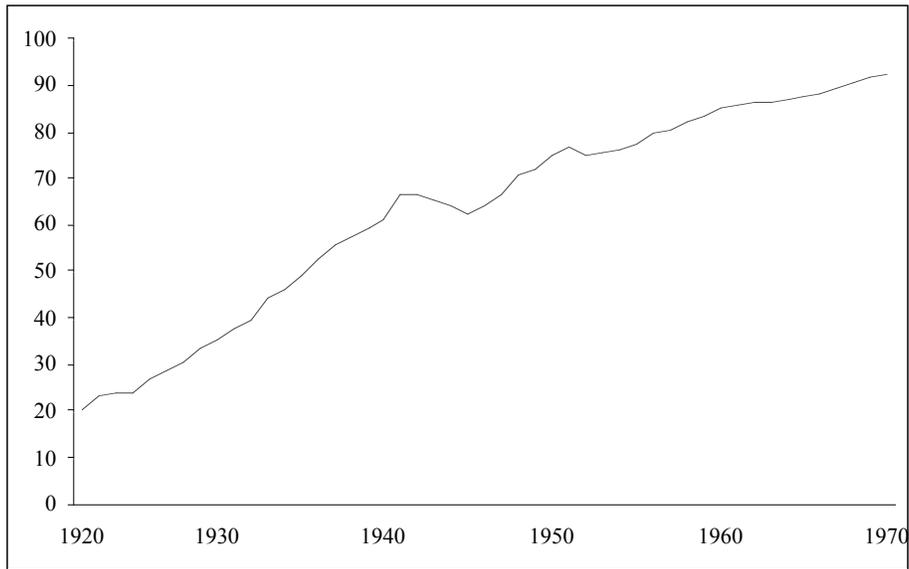


Figure 1. Adoption of washing machines from 1922 to 1970 (in percent of wired U.S. households). Source: Bowden and Offer (1994).

Table 1. Consumption of soap products in Great Britain

<i>Year</i>	<i>Annual consumption per capita (pounds)</i>
1801	3.6
1811	4.1
1821	4.5
1831	4.4
1841	6.4
1851	7.1
1861	8.0
1871	10.7
1881	14.0
1891	15.4
1900	17.4
1912	18.0

Source: Edwards (1962, p. 135).