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Changing your role models: Social learning and the Engel curve

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ABSTRACT

By relating Engel curves and social learning, we explain the existence of differently shaped Engel curves—an interesting phenomenon in the theory of demand. A formal approach to cultural learning within a population of consumers accounts for some cognitive foundations of these demand patterns. We find that a changing influence of an individual's role models due to her increasing income, which entails new reference groups providing social identity, leads to the diffusion of new consumption behaviors. Thereby, the resulting Engel curves' shape depends on the underlying learning dynamics. The approach contributes to an explanation of structural change and economic development.

1. Introduction

This paper relates social learning and Engel curves. An Engel curve describes how consumers' purchases of a good or service vary as the consumers' total resources such as income vary holding prices fixed (Lewbel, 2008). The existence of differently shaped Engel curves is an interesting phenomenon in the theory of demand (e.g., Hausman et al., 1995; Banks et al., 1997).[1] We present a formal approach that accounts for some of their cognitive and behavioral foundations. Thereby, we contribute to an explanation of structural change and economic development that are, to a great extent, the result of systematically changing consumption patterns as per capita income rises.

Economics has begun to integrate aspects of social learning into the modeling of human behavior (e.g., Kuran, 1987; Frank, 1997; Brock and Durlauf, 2007; Gasana, 2009; Gifford, 2009). Accordingly, we postulate that agents' behavioral repertoires are crucially influenced by processes of social learning, especially by certain role models in their environment (Bandura, 1986; Richerson and Boyd, 2005). This accounts for an essential characteristic of human nature, namely that of being subject to change as a result of cultural learning.[2] We explicitly analyze interpersonal and social context effects on consumer demand (e.g., Granovetter and Soong, 1986). Moreover, rather than examining utility functions directly, we make assumptions about social learning dynamics in, and cultural specificities of, social groups. Finally, this view underscores the importance of behavioral change and learning in the process of economic development (e.g., Stiglitz, 2002).

By characterizing social learning processes taking place within populations of consumers, we derive differently shaped Engel curves that are close to linear in some cases and highly nonlinear in others. Engel curves also allow us to calculate the income elasticity of demand, which is an important aim of empirical demand analysis. The theoretical model presented below will specify how income elasticities vary with income, thereby differentiating between different classes of commodities – including inferior goods – in a unified framework. Among other things, it is shown how the changing influence of role models in social learning leads to highly income elastic Engel curves that can explain some empirically observed patterns of demand.

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[1] Ernst Engel (1895) was the first to study the systematic relationship between household expenditures and income.

[2] Our model implies endogenous change of preferences for different consumption behaviors due to the influence of role models and the general frequencies of behaviors in an individual's social environment. This modification of the behavioral and motivational underpinnings of human consumption decisions contrasts with the usual assumption of exogenous and stable preferences in most fields of economics.

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The paper proceeds as follows. Section 2 develops a simple model of cultural evolution within a population of consumers, i.e., consumer behavior is presented in terms of social learning. Several Engel curves are derived from the model's dynamics in Section 3. Next, Section 4 discusses the model's implications as to income elasticities of demand, nonlinearly varying weights of role models, and inferior goods. Empirical phenomena that can be better understood with the help of the model are the subject matter of Section 5. Section 6 concludes the paper.

2. The model

We look at the case where the individual is faced with only two commodities or consumption behaviors. To model the cultural transmission of two alternative consumption behaviors via social learning, we begin by labeling the variants, say *a* and *b*. For illustration, assume *a* representing the variant "modern consumption behavior" and *b* the variant "traditional consumption behavior". Think of, for example, a developing country's society that hitherto has been characterized by a consumption regime based on domestic, traditional commodities and that is now opened to international trade and new, "modern" consumption patterns. The state of the population is determined by the frequency of consumers with the variant *a*, labeled *p*.

Moreover, the model comprises processes that change the frequency of the two cultural variants: reflecting humans' evolved psychology, cultural transmission processes are biased; people tend to socially acquire some cultural variants rather than others (Richerson and Boyd, 2005, p. 69). The model incorporates two biases of social learning, a role model and a conformity bias.

Anthropological evidence indicates that the adoption of cultural variants is conditioned by the observable attributes of individuals exhibiting the variant (e.g., Harrington, 1999). In human phylogeny, selection favored social learners who were able to evaluate potential models and copy the most successful among them, thereby saving the costs of individual learning (Rogers, 1983; Boyd and Richerson, 1985; Henrich and Gil-White, 2001; Labov, 2001). Hence, in model-based learning there is a predisposition to imitate successful or prestigious individuals, i.e., there exists a *model-based bias* in cultural transmission.

Another evolved learning bias is what anthropologists refer to as the *conformist bias* (Aronson et al., 2002, Ch. 8; Cialdini and Goldstein, 2004; Kameda and Diasuke, 2002; Henrich, 2004). Due to this bias, agents pick the cultural variant, i.e., in our context, a certain consumption behavior, that is used and accepted by the majority of models in a population, whereas they discriminate against behaviors that are rare in the local population. Conformist transmission belongs to the class of frequency-dependent biases. It increases the likelihood of adoption of locally favored cultural variants especially if the environment changes slowly and the information available to an individual is poor (Boyd and Richerson, 1989).

We assume that a consumer is influenced by a set of cultural role models consisting of one "modernizer" and two "traditionalists". The cultural role model M1, the "modernizer", is assumed to always show behavior *a*, i.e., this agent or medium is exclusively exhibiting the "modern" consumption behavior. On the other hand, role model M3 exclusively exhibits the "traditional" consumption behavior. These two models represent a society's conflicting behavioral forces. Finally, role model M2 may show either behavior, i.e., this "traditionalist" is willing to possibly switch to behavior *a*. To depict the models' importance in different social roles in the cultural transmission process, we assign different weights to them, A_M for the agent showing the "modern" consumption behavior and A_T for two members of the population when both are proponents of the "traditional" consumption behavior, whereby $A_M + A_T = 1$. A large value of A_i means that the consumer is disproportionately likely to acquire the consumption behavior of this/these model/s. We argue below that the "modernizer's" influence as a role model is increasing with income available to the population of consumers.[3] Therefore, her weight, A_M, is assumed to be dependent on income y:

$$A_M = \frac{y\alpha_M(1 \pm D)}{(\alpha_T + y\alpha_M)(1 \pm D)}, \tag{1}$$

where α_M is the basic weight of the "modernizer" that may depend on an individual's social role, charisma, or prestige.[4] In addition, α_T represents the basic weight of two members of the "traditional" peer group, whose total weight is given by

$$A_T = \frac{\alpha_T(1 \pm D)}{(\alpha_T + y\alpha_M)(1 \pm D)}. \tag{2}$$

Consequently, the actual weight of the *i*th model depends on (1) her basic weight α_i ($\sum_i \alpha_i = 1$), (2) population income y, and (3) the commonness of her behavioral variant in the set of models, expressed by the conformity bias parameter D. We assume $-1 \leq D \leq 1$, i.e., if $D > 0$, cultural transmission creates a force increasing the "majority model's" weight and thus the frequency of the more common variant in the group (our conformist bias or "bandwagon effect", see Leibenstein, 1950). If $D < 0$, transmission increases the frequency of the rarer variant in the population (which would introduce an "anti-conformist" force or "reverse bandwagon effect"). Finally, the weights of the "modernizer" and the "traditionalists" are normalized by the denominator so that A_i gives the weight of the *i*th model relative to the other models encountered by the individual in question.

Moreover, we assume that the importance of different cultural role models in an individual's social environment changes with her income.[5] Reaching higher income classes implies new norms as to how people think that they and their reference group should behave/consume.[6] In this context, social identity plays a crucial role for it indicates an agent's social category and corresponding self-image (Akerlof and Kranton, 2005, 2000; Pecchenino, 2009). An individual's reference group functions as a provider of positive social identity through comparing itself with, and distinguishing itself from, other comparison groups along salient dimensions that have an easily observable value differential, such as, for example, income (see Commins and Lockwood, 1979; Tajfel, 1982; Frank, 1997; Neumark and Postlewaite, 1998; Andersson, 2008). Consumption norms, style of living, manner, speech, and transaction partners among other things vary with social categories. Moreover, these characteristics are often described by referring to archetypal role models who represent appropriate behavior in a given social category. If role models are from a "matching identity", their observed behaviors are positively weighted in cultural transmission. After having reached an income class that enables an agent to join, for example, the local golf club, she will get into closer contact with – and will be influenced by – this reference group's role models as well as the corresponding consumption norms and will

[3] We abstract from distributional issues here: an increase in the population's income leads to proportional increase of a single member's income.

[4] As a referee has indicated, there are other determinants of a role model's influence in cultural transmission than income. Within the scope of our model, we assume that these are captured by the parameters α_M and α_T. Among these largely income-independent determinants are, for example, the authority of leading religious figures or the reputation of persons of outstanding merits in political or military affairs.

[5] Also demographic changes can modify the influences of role models in cultural transmission.

[6] For ease of formal analysis, we do not consider income classes but a continuous range of income.