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by

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CONTINUOUS MARKET GROWTH BEYOND FUNCTIONAL SATIATION

Time-Series Analyses of U.S. Footwear Consumption, 1955 – 2002

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ABSTRACT: Market growth is driven by product innovation. Beyond functional satiation the marginal utility of product performance and variety decreases. We argue that social comparisons underlying innovation diffusion results in consumer motivations for upward assimilation toward the behavior of better performing others, even beyond functional requirements. We distinguish consumption growth patterns driven by functional vs. assimilating motivations. These patterns are tested by time-series analyses of U.S. Footwear consumption between 1955 and 2002. The acceleration of market growth since the 1970s is statistically explained by changes in price, cross-price elasticity, and the increasing demand for innovations, according to our theoretical account of consumption motivations beyond functional satiation.

KEYWORDS: Product Innovation, Innovation Diffusion, Consumption Growth, Social Comparison, Time-Series Analysis

JEL CLASSIFICATION: C22, D01, D12, L67, O33

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I. INTRODUCTION

The correlation between the growth of product variety and the growth of consumption is a stylized fact of aggregate market dynamics (Bils & Klenow, 2001). In order to absorb a growing product variety, a consumer population has to have heterogeneous preferences ex ante or has to develop such preferences as new products are introduced into the market. Several studies that explore the impact of market demand highlight how heterogeneous consumer needs influence product development at the level of technology projects (von Hippel, 1988), business strategy (Day, 1990), and the broader evolution of technological trajectories or industries (Abernathy & Clark, 1985; Christensen, 1997; Malerba, Nelson, Orsenigo, & Winter, 1999; Adner & Levinthal, 2001; Adner, 2002; Windrum, 2005; Tripsas, 2006). Commonly, the correlation between product innovation and consumption growth is assumed to result from the latent heterogeneity of consumer preferences; this paper aims at providing a motivational explanation for this correlation. In a second stage, the paper tests this explanation by analyzing the growth drivers of U.S. footwear consumption between 1955 and 2002.

In his seminal conceptualization of product innovations, Lancaster (1991, pp. 59) points to satiation effects with respect to product characteristics, i.e., the relevant functional features of a product. In their experimental works, Meyer and Johnson (1995) find that, while consumers have a minimum threshold for acceptable product performance, there is no analogous boundary that specifies a maximum limit on the functional performance that a consumer would be willing to accept. At the same time, consumers face decreasing marginal utility from increases in functionality beyond their requirements. Christensen (1997) shows that consumption growth beyond functional satiation relies on “performance oversupply”: Once consumers’ requirements for a specific functional attribute are met, evaluation shifts to a greater emphasis on attributes that were initially considered secondary or tertiary (ibid, pp. 169).

Analytic models of innovation demand indicate that the distribution of functional satiation thresholds within a consumer population, and the assumptions about how consumers subsequently react to performance oversupply, are crucial for the resulting growth pattern and the dynamic structure of aggregate market demand (cf. Adner et al., 2001; Adner, 2002; Windrum, 2005; Tripsas, 2006). While marginal utility attributions change as different product characteristics become relatively more important, demand is still assumed to be insatiable. In this paper, we scrutinize this assumption of insatiability from a consumer perspective: when functional needs of the consumer are met, what motivates further consumption? Taking this perspective leads us to analyze how consumers learn about new products and what motivates them to consume them (cf. Witt, 2001; Frenzel Baudisch, 2006a).

Christensen (1997, p. 172) emphasizes that changes in product functionality, i.e., his concept of ‘performance oversupply,’ are the essential drivers of market growth and innovation diffusion. In contrast to this, most models of innovation diffusion do not allow for changes in product functionality. The number of previous adopters is usually modeled as the determinant for individual adoption of innovation (cf. Rook, 2006). Even if other motivations and moderators for innovation diffusion were identified (cf. Abrahamson & Rosenkopf, 1997), they rarely found their way into analytic models of the innovation diffusion process. This paper focuses on motivational and learning processes in innovation diffusion processes at the individual and social level.

Our theorizing about consumer behavior is based on findings of experimental psychology about the cognitive limitations of the individual and the resulting social processes between individuals (cf. Simon, 1982). Multiple studies have shown that social comparison processes influence economic behavior (Frank, 1985; Karlsson, Dellgran, Klingander, & Gärling, 2004). Our starting point is Festinger’s (1954) social comparison theory: Especially in uncertain situations, boundedly rational individuals have to continuously make comparisons with others in order to evaluate their own opinions and performances. Newer developments of Festinger’s theory (Collins, 2000; Suls & Wheeler, 2000; Buunk & Mussweiler, 2001) indicate that social comparison processes tend to motivate individuals to assimilate their behaviors upward to those of ‘better performing’ others. Building upon Bandura’s (1986, pp. 169) discussion of motivational aspects in the innovation diffusion process in consumer markets, we argue that social comparison processes underlie the diffusion of information about new and better performing products and, at the same time, motivate the adoption of such better performing products.

Our paper describes the conditions under which social comparison processes translate into consumer motivations in a commodity market. These conditions are formulated into hypotheses that distinguish a market regime of mainly functional consumption from one of a mainly ‘upward assimilating’ consumption of ‘oversupplied’ product functionality. In this sense, the paper contributes to the research about the evolution of consumption (e.g. Bianchi, 1998; Witt, 2002).

Our theoretical account is tested by using macro data on U.S. footwear consumption between 1955 and 2002. We have chosen this market for testing, because the basic functionality of shoes is very stable, and hence market boundaries are as well. Having been a 'necessity' until the 1960s, the product category 'footwear' becomes a 'luxury' category with respect to the income elasticity in the U.S. (Weisskoff, 1994; Kim, 2003) in the early 1970s. While these case studies of the U.S. footwear market have merely described this change in the income elasticity of shoes consumption, we offer an explanation for this change and subsequently test it. In concrete terms, we show that with increasing product variety shoe consumption grows faster than personal income: Time-series analyses of U.S. footwear consumption between 1955 and 2002 identify significant changes in income, price, and cross-price elasticity, as well as an increasing importance of innovative products for the expansion of consumption since the 1970s. These changes in the parameterization of demand are in accordance with our hypotheses about the change in the predominant consumer motivation: Before the 1970s, shoes were predominantly consumed for functional purposes; while since the 1970s U.S. consumers predominantly buy the 'oversupplied' shoe variety, being motivated by social comparison processes.

In section II, we introduce our theoretical account of consumer motivations and behavior. Section III presents the historical case study of U.S. footwear market and the relevant data. In section IV, a series of statistical models are estimated to test our hypotheses. Section V discusses the statistical results, and section VI concludes.

II. THEORY

This section sheds light on the motivations for the consumption growth beyond functional satiation. We outline how consumers learn about new products in a "performance oversupply" situation (Christensen, 1997, pp. 169). We argue that, when consumers learn about new products, such learning processes inherently motivate more consumption. Hence, such processes have implications for the pattern of consumption growth, which can be tested.

1. Functional satiation and performance oversupply

The stylized fact of the correlation between the increase in product variety and consumption growth is found across all product categories regardless of their functionality or the maturity of the industry (Bils et al., 2001). In his seminal works on product innovation, Lancaster (1971, pp.145-156; 1991, pp.60-67) discusses satiation effects with respect to certain product characteristics. Lancaster (1991, pp.69-80) models these satiation effects by differentiating sub-utility functions with respect to different product characteristics. Meyer and Johnson (1995) show that consumers have a minimum threshold for acceptable product performance, but there is no analogous boundary that specifies a maximum limit on the functional performance that a consumer would be willing to accept. Consumers attribute decreasing marginal utility to increases in functionality beyond their requirements. Christensen (1997) shows that consumption growth beyond such functional satiation relies on the “oversupply” of new product varieties: Once consumers’ requirements for a specific functional attribute are met, evaluation shifts to place greater emphasis on new attributes of new product varieties that were initially considered secondary or tertiary (ibid, pp. 169).

Lancaster’s (1991) conceptualization of sub-utilities with respect to product characteristics implies a different consumption pattern of when satiation is reached with respect to different characteristics, i.e., different income elasticity. The most straightforward empirical observation in this respect is Engel’s law, which describes the decreasing share of expenditure on food, because personal income further increases over time as the need for caloric intake is satiated. In several empirical case studies, Christensen (1997) shows how the marginal utility of given product characteristics changes as functional satiation is reached. This impacts on the demand and, thereby, the supply structure of this market.

Adner and Levinthal’s (2001) model of aggregate consumer behavior incorporates functional satiation effects as changes in marginal utility and hence price elasticity. The authors show that the growth of a market can be extended beyond functional satiation by increasing product performance at a constant price level. Such a supply strategy takes advantage of the apparent insatiability of demand with respect to product performance, taking into account consumers’ decreased willingness to pay for such product enhancements beyond their functional requirements. But what motivates consumers to buy products beyond their functional satiation? How is this related to the change in price elasticity? What determines the demand ordering of product characteristics beyond primary functionality?

With respect to the last question, Christensen (1997, pp. 175) describes how functional complementarities between products can heighten consumers’ functional satiation level. He uses the example of functional complementarities between computer hardware and software. He refers to the products of Microsoft™ that demand an increase in computer processing power; hardware and software producers profit from these complementarities between their products. When complementarities between products of different functional categories exist, the overall complexity of consumption activities increases. These activities involve more and increasingly interlinked products. Such complementing consumption activities imply that the functional satiation point for one product can be extended due to the consumption of the complementing product. Complementarities between products drive the evolution of more complex consumption patterns and, in this sense, postpone functional satiation effects.

If no complementarities with other products exist or are created, then functional satiation should eventually be reached in the product market. This implies that the boundaries are well defined with respect to product functionality - like in the case of shoes or food, and unlike in the case of cellular phones and mobile services, or computers and software, etc. Hence, only if there are no complementarities across functional product categories, a market regime of "performance oversupply" can be identified as described by Christensen (1997). In order to analyze the motivational underpinnings of consumption beyond functional satiation, we have to find a case study where there are no complementarities between products. The phenomenon we want to explain is a high growth rate in a well-delimited market due to product innovation.

2. *Consumer behavior, innovation diffusion, and social comparison*

Christensen (1997, p. 172) explicitly links his theory of market growth due to performance oversupply to the diffusion process of innovations. The subsequent performance improvements of new products with respect to their functionality, reliability, convenience, and, lastly, their prices drive their diffusion process, i.e., the increase in the demand for such products. By contrast, most models of innovation diffusion do not allow for changes in product functionality. In his review of innovation diffusion studies, Rook (2006) finds that the number of previous adopters is usually modeled as the main determinant for individual adoption decisions. Even if other motivations and moderators for innovation diffusion have been identified (cf. Abrahamson et al., 1997), they have rarely found their way into analytic models of the innovation diffusion process. As mentioned earlier and following Rook's (2006) analysis of the economic psychology of innovation diffusion, we focus on learning and motivational processes that drive the adoption of new products.

Due to their limited cognitive resources, humans also have limited information about their complex environment, e.g., consumers about all the products supplied to the markets. Festinger's (1954) social comparison theory explains why people use others as reference groups, i.e., as models for their own behavior and opinions: Especially when uncertain, people continuously make comparisons with others to evaluate their own opinions and performance. The so-called "similarity hypothesis" is the core assumption of the theory stating that "given a range of possible persons of comparison, someone close to one's own ability and opinion will be chosen for comparison” (ibid, p. 121). This can be informative and serve to form more precise opinions about oneself and social reality and also stimulate improvement of one’s performance. People can thus either create informational consensus with the reference group concerning the issue under evaluation and thus become more similar, or engage in actions that are increasingly similar to those of the reference group. Early works of Bandura (1965) and colleagues (1963a; 1963b) provide further evidence for this idea by showing that direct observation of a successful model leads to imitation of this model.

If people compare their abilities with others, there is a “unidirectional drive upwards,” which is an orientation toward others who show slightly better performances and, consequently, enjoy higher prestige, status, and success (Festinger, 1954, p. 124). The reasons why people choose to compare upward results in improved performance are numerous. First, observing another person who is proficient at a task may reveal useful information about how to improve (Buunk et al., 2001). Second, seeing another person succeed may increase the motivation to improve (Collins, 2000). Individuals may come to identify with successful comparison targets, leading to imitation of such individuals’ actions (Bandura, 1986, ch. 2).

Furthermore, Bandura (1986, ch. 4) describes how such social comparison processes underlie innovation diffusion processes within populations. Economic models of innovation diffusion focus on the number of previous adopters, being the most important determinant for the individual’s adoption decision (cf. Rook, 2006). Social psychological research has shown, though, that the unanimity of behavior within a reference group is more important for motivations to imitate such behavior than the actual number of adopters (e.g. Asch, 1956 for the identification of this phenomenon). Turner (1991, p. 15), summarizing such findings, states that in social influence processes, such as innovation diffusion, “consensus mattered more than numbers.” Studies of Kruglanski et al. (1993) show that it is exactly this need for consensus in a group that occasionally causes herd behavior. Especially under stress or uncertainty, groups exhibit a "cognitive need for closure", which is a "desire for a definite answer on some topic, *any* answer as opposed to confusion and ambiguity" (Kruglanski, 1989, p. 14, italics in original). Vermeir et al. (2002) have shown the relevance of the “need for closure” for consumer behavior. In a series of experimental studies of social comparisons, Fox and Tversky (2000) interpret the behavior of their subjects as being driven by “ambiguity aversion”; a psychological concept that is closely related to the cognitive need for closure.

Hence, in the aggregation process from the individual to the social level, social comparison processes motivate the conformity to one's reference group. This motivation is stronger, the more the group is inclined to unanimously adopt a particular new behavior. If a particular behavior becomes consensual in a group, then this behavior becomes a constituting characteristic of group membership.

The elaboration of conformity motivations is linked to the discussion of innovation diffusion processes in Christensen (1997, p. 172): From a diffusion process perspective, Christensen's argument is that later adopters are increasingly less motivated by the functional aspects of a new product. In his view, 'laggards' ultimately adopt a certain innovation, but out of functional considerations. We hold that they are increasingly motivated by conformity considerations, i.e., because the majority of consumers in the market has already adopted the functionality of the product. This situation motivates laggards to conform; and this motivation is stronger, the stronger the trend for unanimity in the early diffusion process has been.

Lastly, building on Bandura's (1986, pp. 169) discussion of the innovation diffusion process in consumer markets, we argue that social comparison processes underlie the information diffusion of new, better performing products. Also, social comparison processes tend to motivate the assimilation of individual behavior toward that of the 'better performing' (Collins, 2000). During the diffusion process, a second motivational process arises from social comparisons, that is, a conformity motivation (Turner, 1991). Thus, social comparison processes occur and influence individual behavior not only when functional innovations are being diffused, but also when functional satiation prevails and new products are 'oversupplied' to consumers. The information about functional innovations diffuses via social comparison processes and at the same time motivates consumption beyond functional satiation. In a variety oversupply regime beyond the functional satiation of consumers, the motivational aspects of social comparison processes become relatively more important, as the functional benefits of new products are valued less. This differential in the importance between functional motivations vs. motivations generated by social comparison should lead to observable differences in consumer behavior.

So, we have argued that changes in consumer motivations underlie the change of consumer behavior that Christensen (1997) describes in his theory of variety oversupply and that Adner and Levinthal (2001), in turn, formalize in a growth model. Functional innovations are usually sold with a price premium and thereby drive market growth. Beyond functional satiation, innovation and price cuts together drive market growth in a variety oversupply regime, as the marginal utility decreases for further product innovation (Adner et al., 2001). Thus, two phases of market growth can be identified: A growth phase where functional performance and rising prices drive market growth, and a variety oversupply phase where market growth is driven by innovation and stagnating or falling prices. These two phases are separated by the point of functional satiation with respect to the consumers' requirement of this market's product.

In Adner and Levinthal's (2001) model, the transition between the functional and the oversupply phase of market growth across the point of functional satiation is seamless, while Christensen (1997) emphasizes that incumbent firms tend to fail to recognize this point and then oversupply product performance to the market. This makes them vulnerable in case of the market entrance of disruptive technologies. Furthermore, the shift from one growth phase to another is blurred because of different satiation points of heterogeneous consumers. In short, while the transition between two identified growth phases of a market is difficult to identify, these two phases should be clearly distinguishable due to the differences in the underlying consumer motivations.

3. Hypotheses

This section proposes three hypotheses to distinguish between high-growth market regimes where consumers are predominantly motivated either by functional product performance or by social comparison processes.

Innovation drives consumption growth, either due to functional motivations of consumers or to social comparison processes that motivate consumption of oversupplied product performance or variety. Functional advancements of a product aimed at unsatisfied functional wants of consumers increase consumption. Such wants can stem directly from physiological needs (cf. Witt, 2001). As outlined above, new consumer wants arise from the evolution of more complex consumption activities over time. Beyond functional satiation, consumption of oversupplied product performance or variety is driven by assimilation and conformity motivation. In both motivational arguments, market growth is driven by product innovation:

> ***HYPOTHESIS 1: Product Innovation.*** *Within a given market, the emergence of product innovation is positively correlated with the growth of consumption expenditure.*

Consumption growth before and beyond functional satiation in a market should be distinguishable in terms of price elasticity, because the underlying motivational processes are different. Functional consumption of products should be price inelastic, because they provide services that consumers actually need, as in the case of food or shoes bought for foot protection. Observing the aggregate market level and given the variable quality of products, there should be no significant price effect on the expenditure for functional consumption; if any, it should be negative as inflation diminishes the overall purchasing power of consumers. For example, people show a price-inelastic demand for foot protection, but they can use different qualities of shoes to protect their feet. As shoe prices rise, they choose cheaper shoes of lower quality for their purposes; the expenditure should therefore not be significantly influenced by price changes.[1]

Consumer wants that are satiated lose their motivational power over the behavior of consumers (Witt, 2001). Given that no complementarities between the product in the analyzed market and other products emerge, functional improvements beyond the point of satiation are not bought for their initial functional service. Rather, assimilation and conformity motivations are active in such an innovation diffusion process, and hence consumers should be more price sensitive. Both motivations are aimed not so much at the usage of the new product as its mere possession. Personal experience tends to be a stronger source of motivation than motivations arisen from social comparisons with other (cf. Kahneman, Knetsch, & Thaler, 1991; Kahneman & Tversky, 2000, part 3 and 6). Hence, there is a differential in the motivational strength between the individual consumption motivation due to functional wants and the motivation due to social comparison. This differential is measurable in terms of the price elastiticity of expenditure. In terms of time, the expansion of a market beyond functional satiation aimed at adoption laggards is increasingly price driven.

> ***HYPOTHESIS 2: Price Elasticity of Expenditure.*** *Aggregate consumption expenditure for functional purposes is not significantly influenced by the development of product prices. Beyond functional satiation, expenditure is characterized by a significantly negative price elasticity.*

The distinction between consumption motivated by functional wants and one motivated by social comparison offers another analytic insight into price responsiveness. Substitution effects measured by cross-price elasticity should vary for such differently motivated consumer behavior. Goods that are consumed for their functionality cannot be substituted by products with different functions. On the other hand, consumption

[1] Note that the argumentation is essentially dynamic, hence the argument is longitudinal. Thus, the argument does not reject 'cross-sectionally' declining demand curves due to increasing prices. At a high price only consumers with a high willingness to pay, due to a very special requirement in terms of functionality, purchase products, while the large majority starts buying only at lower prices.

predominantly motivated by social comparison processes is largely independent of the functionality of the product, as functional satiation is reached. As any product can satisfy this need for closure, we should be able to observe substitution effects between products of different functionality, when they are bought to satisfy this need for closure. Nevertheless, when analyzing aggregate market dynamics assimilation and conformity motivations are likely to be active at the same time.

Goods that are consumed for their functionality cannot be substituted by products with different functions. On the other hand, consumption that is predominantly motivated by social comparison processes is largely independent from the functionality of the product, given that functional satiation is reached. Here substitution effects between functionally different products can occur.

> ***HYPOTHESIS 3: Substitution Effects.*** *Aggregate consumption expenditure for functional purposes is not influenced by the development of prices of other goods. Beyond functional satiation, expenditure is characterized by a significantly positive cross-price elasticity with respect to other goods.*

In the following, the case study of the U.S. footwear market is developed. The data series for testing the proposed hypotheses are introduced.

III. THE DATA: THE U.S. FOOTWEAR MARKET

From the 1910s to the 1940s, the average U.S. consumer bought around three pairs of shoes per year. (Szeliski & Paradiso, 1936; Mack, 1956). Mack (1956) identified personal income as the most important determinant for shoe consumption between 1929 and 1941. She added that when income does not fluctuate as extremely as it did during the period of observation, the influence of other factors may be more evident. During the Great Depression in the 1930s and World War II, personal income fluctuated extremely due to political and macroeconomic turmoil so that behavioral influence factors other than income dominated consumer behavior. Therefore, the case study presented in this paper concentrates on the period after World War II, specifically from 1955 to 2002, because per capita income in the U.S. has been steadily rising ever since.[2]

FIGURE 1 about here: Total shoe expenditure per capita and its relation to personal income per capita, U.S., 1955-2003 [US$ of the year 2000] (Bureau of Economic Analysis, National Income and Product Accounts, 2003)

[2] In 1974, aggregate personal income in the U.S. actually declines due to the first oil crisis. The effects of decline will be discussed in further detail below.

FIGURE 2 about here: Net Trademark Registrations in the U.S. Footwear Market, Number of Registered Trademarks in the U.S. Footwear Market, 1955-2002 (U.S. Patent and Trademark Office, 2004)

FIGURE 3 about here: Consumer Price Index, Price Index for Shoes, and Relative Shoe Prices, U.S. 1955-2002 (Bureau of Economic Analysis, National Income and Product Accounts, 2003)

FIGURE 4 about here: Nonrubber shoe consumption volume, domestic production and imports, U.S., 1960-2001 (American Association for Footwear and Apparel, 2004)

FIGURE 1 shows the development of real shoe expenditure per capita (*ShExp*) on the left scale and the percentage of shoe expenditure of per capita dispensable income on the right scale. The U.S. footwear market grows continuously between 1955 and 2002, hinting at an overall characterization of footwear as a normal good (income elasticity > 0). The early empirical studies of the U.S. footwear market by Szeliski and Paradiso (1936) and Mack (1956) classify shoes as normal goods. Since the mid 1970s the U.S. footwear market grows faster than personal income as the share of expenditure on shoes increases. At the beginning of the time series shown in FIGURE 1, the share of income spent on footwear decreases (0 < income elasticity < 1), while at the end of the time series it increases (income elasticity > 1). The growth rates of shoe expenditure are lower than those of overall income in the 1950s and 1960s, hinting at a characterization of shoes as a necessity, while they are higher in the 1980s and 1990s, hinting at a luxury market for shoes.

Kim (2003) finds structural change in consumer behavior for clothes and shoes in 1970, but shows no theoretical ambition to explain this change. He merely describes that clothes and shoes together were ‘necessities’ before 1970 and ‘luxury’ goods afterwards, but offers no explanation for this change in the income elasticity.

Contrary to earlier studies of U.S. shoe consumption in the 1930s and 1940s, later studies mention product variety, new designs, and fashion as the main drivers of consumption growth, but do not provide any statistical analyses on this topic (Hadjimichael, 1990; Barff & Austen, 1993; Weisskoff, 1994). Present market studies of the U.S. footwear market stress the importance of fashion and new designs for the growth of this market (e.g. Abess, 2004). FIGURE 2 plots the registrations of footwear trademarks (*TMreg*) in the U.S. market. These data are a proxy for the variety of products in this market and thus for the innovation activity of the suppliers. Trademarks are registered at the U.S. Patent and Trademark Office (USPTO, 2004). They do not only account for new products, but also new brands, repositionings of old products, and other marketing innovations.

FIGURE 2 pursues a very flat lapse in the 1950s and 1960s; in the mid 1970s the registration of trademarks takes off and very quickly increases in the 1980s and 1990s. Payson (1994) analyzes the supply of consumer commodities in the Sears catalog between 1928 and 1993. He (1994, pp. 118) finds a surge in the variety of new men's shoes supplied starting in 1968. Weisskoff (1994, p. 59) also emphasizes this increase in product variety since the 1970s.

Interestingly, the increase in income elasticity is not driven by upscale, highly priced shoes. FIGURE 3 plots the development of the consumer price index (*CPI*) and the price index for shoes (*ShPI*) and the ratio of the two against each other, i.e., the relative price of shoes (*relprice*) (Bureau of Economic Analysis, 2004). Relative shoe prices are about stable until 1970, then start falling. Note that in the mid 1970s high inflation strikes the U.S. economy (cf. Cooper & Lawrence, 1975). In 1974, the U.S. per capita income decreases for the only time in the postwar period. This period of economic turmoil accompanying the oil crises of 1973/74 will therefore be treated specially in the empirical analyses.

Falling relative prices since 1970 imply that the growth of the U.S. footwear market is driven by the increase in the number of shoe purchases. Data on nonrubber footwear consumption (*cons*) and production (*prod*) as well as imports (*imp*) in terms of quantities is displayed in FIGURE 4 (American Apparel & Footwear Association, 2003). Nonrubber consumption constitutes about 75 % of total footwear consumption, but unfortunately not the total. Nevertheless, the form of these curves reflects the large trends in footwear consumption. An overall growth trend in shoe consumption is evident when we look at the whole time series of shoe consumption in FIGURE 4. The supply of footwear undergoes severe changes in the period of observation. Footwear imports from low-wage countries like Korea, Taiwan, and China increase simultaneously as U.S. production declines in the 1970s and 1980s (Hufbauer, Berliner, & Elliott, 1986; Hadjimichael, 1990; Weisskoff, 1994). The 1980s show a dramatic rise in consumption driven by imports. These trends have been cross-validated with several other studies of the U.S. shoe market (e.g. Hadjimichael, 1990; Weisskoff, 1994; American Apparel & Footwear Association, 2003). Dominating the U.S. market since 1980, imports from low-wage countries have managed to increase their market size as the relative price level for shoes kept falling, cf. FIGUREs 1, 2, and 3 (Hadjimichael, 1990; American Apparel & Footwear Association, 2003). It is the sheer amount of shoe purchases that overcompensates for price declines which in turn make up the luxury character of the category 'footwear' as a whole in the U.S. since the mid 1970s.

IV. MODELS AND TESTS

This section develops the time-series models for an analysis of the structural change in U.S. footwear consumption. These models test the analytic hypotheses to determine whether there is a transition from a functional regime to a performance oversupply consumption regime, and when it occurs.

The relation between the time series is tested for cointegration (Johansen, 1991), cf. TABLE 1. The lag length of the vector autoregressive (VAR) model is one based on the Schwarz Information Criterion (SIC) because all time series are annual data and relatively short (n < 50) (Lütkepohl, 1993, Ch. 4.3). The trace test, using maximum eigenvalues, indicates no cointegration at the 10% significance level[3]. This is an astonishing finding as such, because it hints at a non-linear or linear-but-changing relation between these time series for the period of observation. An equilibrated relation between income and shoe expenditure over time does not seem to exist, even when taking into account the development of prices and trademark registrations. The findings of Weisskoff (1994) and Kim (2003) have already suggested such a finding, but they do not test for cointregation.

TABLE 1 about here: Results of Cointegration Rank Test of All Time Series

Neither a VAR model nor an error-correction model can be applied to analyze the data series, as they are not cointegrated. In the remainder of the analysis, a Box-Jenkins methodology will be used, differencing the data series to make them stationary. This drops information about the dynamics of the series, but as no cointegration between the series is found, no information can be lost that concerns the relation between the data series.[4] Precisely this change in the relations between the data series, which underlies the nonexistence of their cointegration between them, is the subject of the following statistical analyses. A multivariate regression analysis is proposed, using time dummies to test the change in the parameterization of consumption over time.

Stock-adjustment or habit-formation models as specifications of the more general ECM approach are not used for two reasons, one is methodological and one theoretical. Such models rely on the correct specification of the disequilibrium effect between the time

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[3] The test assumes deterministic terms to be common in the time series and the decomposition of the deterministic effects inside and outside the cointegrating space is modeled as being flexible, i.e., not uniquely identified.

[4] As a result of the differencing of the data time series, their variance structure will be significantly reduced so that the R^2-values of the regression results will be relatively smaller in the subsequent analyses.

series. It is precisely this disequilibrium effect that is the subject of our analysis. In addition, the theoretical account proposed above hypothesizes a change in the motivations of consumers over time. Hence, the types of stocks and habits should be different at the beginning and the end of the time series, as consumption motivations are also different. Such model specifications would not be parsimonious nor effective to identify the changes in motivations, especially considering the shortness of the time series (48 observations).

Lastly, as the paper focuses on the footwear market, a system of demand models is not estimated. The clear-cut functional boundaries of the shoe market allow for the generation of a time series of trademark registrations as an indicator of innovation activities. The generation of such time series would be very difficult for a whole demand system and is left for future research.

All introduced data series analyzed below are integrated of order 1, written as I(1), except for the price indexes I(2). Before the analyses, the time series are logarithmized to account for substantial level differences between the variables, adding the prefix 'log' to the variables' names. The annual differences in all data series are taken for the analysis, adding a 'Δ' to the variables' names. All logarithmized, first-annual-differenced variable time series and the two logarithmized, second-annual-differenced price indexes reject an augmented Dickey-Fuller (1981) test for unit roots at the 10% level, and most reject it at the 5% level, i.e., they are stationary.[5]

In all models the dependent variable is the annual change in U.S. shoe expenditure. The main explanatory variable is the annual change in personal income. First of all, periods of high market growth have to be identified. We do not test the hypotheses in the presented order because their operationalization is somewhat new. The influence of product variety on consumer behavior has been rarely analyzed in time-series models, and the variable "trademark registrations" is a novel indicator. Therefore, we estimate the effects of traditional influence factors on consumer behavior, i.e., income and product prices, before introducing this new variable. Consequently, the statistical models initially identify a consumption regime with high growth rates. Subsequently, the price and cross-price elasticities and, then, the effect of product variety are estimated (cf. the models in TABLE 2).

[5] The logarithmized first annual difference time series of the trademark registrations reject the null hypothesis of having a unit root at the 6.4% significance level. This result, being reasonably close to 5%, means we need not include the second annual differences into the regression analyses.

TABLE 2 about here: Time-Series Models

All models are estimated by means of ordinary least-square regressions over the stationary time series of the variables between 1955 and 2002, i.e., 48 observations are included. All models omit regression constants because all data series are transformed into time series of annual differences, rendering constant regressors obsolete. TABLE 3 yields the estimation results. In addition to giving out the Durbin-Watson statistic for each model, two Breusch (1978)-Godfrey (1978) tests for autocorrelation are conducted for one and two lagged periods because annual data is used. The nonexistence of autocorrelation cannot be rejected for any of the models. The structural change in MODELs 2 through 4 in the time series, modeled by dummy interactions, induces heteroskedasticity in the regressions; these models are estimated with a Newey-West (1987) covariance matrix with three lag truncations.

TABLE 3 about here: Estimation Results for MODELs 1–4

MODEL 1 is estimated as a benchmark for the values of the statistical parameters of the other three models. Change in shoe expenditure is modeled as an outcome of the change in personal income over time. The estimation parameter c_1 is interpreted as the income elasticity for footwear consumption between 1955 and 2002,[6] ε being the error term.

MODEL 1 in TABLE 2 yields an adjusted R^2 of 0.180; the coefficient c is interpreted as income elasticity, which is 0.916, indicating a necessity good. A highly significant Chow (1960) breakpoint test, which is estimated for the year 1971 (F-stat = 6.804, P = 0.012), indicates a structural break in the time-series model, linking shoe expenditure with income changes.

In order to analyze this structural change, a dummy variable *el71* is introduced in MODEL 2, interacting with income changes. MODEL 2 estimates a subsequent increase in income elasticity starting around 1970, and the adjusted R^2 of MODEL 2 is 0.270, being a 150.00% increase in comparison to the first model.[7] Regression coefficients are significant as can be seen in TABLE 2. From 1955 to 1970, the income elasticity for footwear in the U.S. is estimated to be smaller than one (c_1 = 0.441). After 1972, it is

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[6] Given that $\frac{d\log f(x)}{d\log x} = \frac{1}{f} x \frac{df}{dx} \cong \frac{[f(x+\Delta) - f(x)]/f(x)}{[(x+\Delta)-x]/x}$ is interpreted as the *elasticity* of *f* with respect to *x*, i.e., the percent change in *f* resulting from a 1% increase in *x* (Hamilton, 1994, pp. 717).

[7] In a Box-Jenkins model, values of the adjusted R^2 that are above 0.25 are generally believed to indicate a good model fit.

estimated to be larger than one, which indicates footwear has become a luxury good ($c_1 + c_2 = 0.441 + 0.816 = 1.257$).

MODEL 3 uses changes in personal income and overall price changes as well as shoe price changes to estimate changes in shoe expenditure. Changes in the footwear-specific inflation are regressed on the change in consumption expenditure for shoes. According to HYPOTHESIS 3, the cross-price elasticity for shoes in the U.S. footwear market should be insignificant for the period of functional consumption, but negative for the period of overconsumption. The cross-price elasticity is interpreted to be the estimation coefficient for the 'consumer price index' *CPI*. If this coefficient is significant, the development of prices of other products, i.e., the inflation changes, has a significant influence on the change in shoe expenditure. A substitutive product should have a positive value of the estimation coefficient for relative prices, a complementing product a negative one.

In MODEL 3, the dummy variable *el71* interacts with both price variables in order to analyze the cross-price and price elasticity with respect to the change in income elasticity estimated in the previous model. To account for the inflation that struck the U.S. economic shortly after the oil crisis of 1973/4, a second dummy variable *el77* is introduced to interact with the data series measuring overall price change, i.e., inflation, *CPI*. By letting the data series for overall price changes interact with the two dummies *el71* and *el77*, heavy price fluctuations in the mid 1970s can be accounted for.

MODEL 3 estimates no significant cross-price elasticity for shoe consumption before 1971. The luxury consumption regime in the U.S. footwear market is estimated to start in 1971; it is characterized by a negative cross-price elasticity after 1977 and a negative price elasticity already after 1971. The adjusted R^2 of MODEL 3 is 0.294, which is an increase of 163.28% compared to MODEL 1.

All coefficients except c_3 c_4 c_6 are significant. The model estimates indicate that the income elasticity increases in 1971 from that of a necessity ($c_1 = 0.487$, P = 4.2%) to that of a luxury ($c_2 = 0.789$, P = 0.2%; $c_1 + c_2 = 1.275$). The cross-price elasticity for footwear consumption expenditure is insignificant before 1977 and becomes positive for the period after 1977 ($c_5 = 1.502$, P = 0.0%). Price elasticity of shoe expenditure is insignificant before 1971 and becomes negative in 1971 ($c_7 = –1.182$, P = 0.4%).

The time series of the number of registered trademarks *TMreg* in the U.S. footwear market is used as a proxy for the variety of product supply in this market. An increase in product variety is interpreted as the introduction of new products, i.e., innovations in the market. Larger values of the variable for innovativeness of product supply (*TMreg*) indicate the presence of more and newer products in the U.S. footwear market. The registration of new trademarks should have significant effects on consumption expenditure in both consumption regimes. The time series of trademark registrations interacts with the *el71* to test for a change in the influence of innovations between the two consumption regimes.

MODEL 4 estimates an insignificant negative influence of product innovations on consumption expenditure (c_8) before 1970 and a significant positive one after 1971 (c_9). The most interesting finding is that the increase in income elasticity from necessity to luxury (c_2) is not significant any more as the proxy time-series for product variety is introduced. By accounting for price changes and the increase in product variety, MODEL 4 provides a statistical explanation for the increase in income elasticity. The cross-price and price elasticities for footwear consumption (c_7 c_9) keep the same signs as in MODEL 3, while MODEL 4 yields an adjusted R^2 of 0.300, which constitutes an increase of 166.25% in comparison to the first model.

Only the regression coefficients c_1 c_5 c_7 and c_9 are significant. The estimated income elasticity is estimated to be below one for the whole period of observation (c_1 = 0.724, P = 2.5%). Before 1977, there is no significant influence of overall price changes, i.e., inflation, on shoe consumption expenditure. After 1977, price increases of other products raise the consumption expenditure on shoes (c_5 = 1.561, P = 0.1%). It becomes price elastic in 1971 (c_7 = –1.071, P = 0.4%). Starting in 1971, product innovations positively influence the expenditure on footwear (c = 0.212, P = 4.4%). To further analyze the causal relationship between the variety of supplied shoes and the changes in the U.S. footwear consumption, a series of Granger (1969) causality tests between these time series is conducted.

TABLE 4 about here: Pairwise Granger Causality Tests between Average Age of Registered Trademarks and Shoe Expenditure with 2, 4, 8, and 12 Lags

Granger causality tests (1969) with four, eight, and twelve lagged variables are performed to test for causal relationships between product supply and expenditure in the short, medium, and long run. In the first regression, the null hypothesis indicates that changes in shoe expenditure (Δlog*ShExp*) do not Granger-cause changes in the product variety in the U.S. footwear market (Δlog*TMreg*). In the second regression, it denotes that innovation (Δlog*TMreg*) does not Granger-cause changes in expenditure (Δlog*ShExp*). TABLE 4 shows the ambiguous results. They indicate that the increase in shoe expenditure and the provision of more product variety are interdependent or endogenous processes, rather than reflecting a clear-cut causal relationship between the former.

V. DISCUSSION

U.S. footwear consumption between 1955 and 2002 was analyzed with respect to four variable constructs, i.e., personal income, the consumer price index, shoe prices, and product variety. The lack of cointegration between these data series rejected equilibrated relations between them and hinted at structural changes in this market. Three hypotheses about simultaneously occurring structural changes in the parameterization of aggregate consumer behavior have been tested and substantiated.

The estimation results of MODEL 2 reproduce the increase in income elasticity found by Kim (2003): shoes as an aggregate category became a luxury good around 1970, having been a mere necessity before. In MODEL 3, the increase in income elasticity is reproduced, although price developments are included in the regression models. The lack of cointegration already hinted at a non-equilibrated relationship between income, prices, and expenditure. The main finding of MODEL 3 is that the incorporation of product prices *cannot* explain the increase in the income elasticity in the U.S. footwear market. According to HYPOTHESES 2 and 3, the changes in the parameterization of demand, more concretely, cross-price and price elasticity, indicate that U.S. footwear market enters an oversupply regime. This is the case, as income elasticity increases above unity *and* the demand shows a significantly positive cross-price elasticity vis-à-vis other products after 1977 as well as a significantly negative price elasticity after 1971.

The fact that the cross-price elasticity between shoes and other consumer products becomes positive only after 1977 (not 1971 as hypothesized) can be attributed to the high inflation rate in the mid 1970s in the U.S. economy. Due to the first oil crisis, real personal income decreases in 1974 for the only time in the whole period of observation, namely between 1955 and 2002. High overall inflation, i.e., high increase in CPI, and the decrease in income result in an overall decrease in consumption (cf. Bureau of Economic Analysis, 2004). The cross-price elasticity for shoes becomes positive in 1971 as hypothesized, but not yet significant. A significantly positive cross-price elasticity of shoes with other products would have indicated that the overall decrease in consumption did not affect shoe consumption in this period. Moreover, this would have indicated an increase in shoe consumption against the general trend of declining expenditure and rising prices during this period. Evidently, the income decline and the simultaneous high inflation in the mid 1970s negatively affected consumer behavior in the U.S. Abstracting from this period of turmoil, HYPOTHESIS 3 is substantiated.

The estimates of MODEL 4 substantiate the predictions of HYPOTHESIS 1. This predicted that product innovation would be a significant driver of footwear expenditure. After 1971, the model estimates show that product innovation correlates with increased expenditure. Most interestingly, the introduction of product innovation into the regression model eliminates the significance of the increase in income elasticity. In other words, the combination of explanatory variables, i.e., product prices and product innovation, in MODEL 4 statistically accounts for the increase in income elasticity.

The Granger causality tests between the time series of trademark registration and footwear expenditure offer interesting, albeit ambiguous results. It seems that the provision of greater product variety is both a result and a (Granger) cause of increased income elasticity. This finding rejects both clear-cut explanations of demand-pull or supply-push for the increase in U.S. footwear consumption expenditure. It is rather the *interdependence* of expenditure and product variety in the U.S. footwear market that leads to the growth of the market. It would therefore be more accurate to describe the growth of product variety and consumption expenditure as an endogenous development. The demand and supply of new products coevolve rather than one causing the other in this regime.

1. Demand and Supply Dynamics

The character of demand is completely different in the 1950s and 1960s than in the 1980s and 1990s. The parameterization of demand according to the proposed hypotheses indicates that aggregate U.S. footwear consumption after 1970 increases as a result of the oversupply of product variety. The period before 1970 is not characterized by high market growth as product variety is rather stable. The U.S. footwear market seems to be in a regime of functional satiation before 1970. FIGURE 2 indicates a lack of product innovation before the 1970s, which is also identified by Payson (1994) and Weisskoff (1994). The number of shoes purchased per capita also remains stable until the 1970s (cf. Szeliski et al., 1936; American Apparel & Footwear Association, 2003).

The question arises as to why the regime of functional satiation continues for so long, and why the oversupply regime starts around 1970. Until the 1950s, global production of footwear was almost completely monopolized by the United Shoe Machinery Company (cf. Hoover Jr., 1933; Clark, 1957). The monopoly seemingly provided little incentive for product innovation. In 1953, a lawsuit against the United Shoe Machinery Company broke its U.S. monopoly (cf. Clark, 1957) and introduced competition into the U.S. footwear industry. New and foreign producers were now able to enter the U.S. market, and prices started to fall, mainly due to cheaper imports (cf. Weisskoff, 1994). Furthermore, Weisskoff (1994, p. 59) emphasizes an increase in product variety and attributes this to the imports pouring into the U.S. market: "A[a]n unresponsive domestic [footwear] industry has continued to produce shoes according to traditional techniques while foreign producers have undertaken a virtual revolution in materials, design, techniques of construction, and marketing."

Competition in the U.S. footwear was now based on product prices and innovation occurring at the same time, constituting oversupply regimes from the consumer perspective. The changed patterns of demand and competition led to a complete restructuring of the U.S. footwear industry (cf. Frenzel Baudisch, 2006b): from the 1970s, manufacturing and product innovation in the U.S. footwear market became increasingly separated. Until 1960, the U.S. footwear industry was vertically almost completely integrated into the United Shoe Machinery Company. By the 1980s, the U.S. footwear industry had become organized as a modular and global network.

2. *The Submarket for Athletic Footwear*

Especially the industrial and demand dynamics of submarket for athletic footwear have received much attention and are sketched below. In the late 1970s and 1980s, the athletic footwear market was one of the fastest growing consumer product market (Hadjimichael, 1990, pp. i-ii). The internationalization of athletic footwear production is well documented in several case studies (e.g. Korzeniewicz, 1994). In 2002, athletic shoes made up 18.73% of the U.S. national market (American Apparel & Footwear Association, 2004). Since the 1990s, athletic shoes are decreasingly used for sport purposes, and the casual wearing of sport shoes becomes more important instead (Abess, 2004). Already during the rise in athletic footwear consumption in the 1980s only about 20% of consumer actually use their athletic shoes for sports (Ramirez, 1990). In the sport user segment of the athletic footwear market, the specialization of athletic footwear for different sport purposes is becoming increasingly important, e.g., running shoes for different terrains or outdoor vs. indoor shoes (Abess, 2004). This specialization of individual consumer behavior in the athletic footwear market drives the increase in product variety. New high-tech sport shoes diffuse into the mass market, with prices falling, as a new style or new technology is introduced. In the mass market for athletic shoes the distinction between functional and social consumption motivations is blurred, as most athletic shoes are not used for sports. The relatively small segment of sport users of athletic shoes could be interpreted as lead users for the mass market of consumers, who in turn overconsume the functionality of athletic shoes, i.e., do not do sports wearing them. The athletic footwear market is a particularly clear example of performance oversupply and consumption because athletic shoes are actually rarely used for sports in the U.S.

VI. CONCLUSIONS

This paper proposes a theoretical account of the motivations of consumers to buy products beyond their functional satiation. We have analyzed the growth process of a satiated product market that Christensen (1997) describes as a 'variety oversupply' regime. Drawing on Festinger's (1954) social comparison theory and its newer developments (e.g. Suls et al., 2000; Buunk et al., 2001), we have developed Christensen's perspective on innovation diffusion processes into a theoretical proposition about how consumers learn about new products and, thereby, become motivated to consume them. In addition, we draw upon Bandura's (1986, ch.4) discussion of the social psychological processes underlying the innovation diffusion within consumer populations in order to formulate our theoretical account, presenting several hypotheses. These distinguish between market growth regimes driven by functional motivations vs. motivations that arise from social comparison processes. Social comparison processes lead to a motivation aspiring to be like better performing others at the individual level. At a social level of analysis, social comparison leads to conformity motivations with respect to one's reference group. Such motivations are hypothesized to become more prevalent and are responsible for market growth when functional satiation is reached in a given market.

The hypotheses about the motivational underpinnings of the high growth rate of innovative markets after functional satiation are tested with time-series analyses of U.S. footwear consumption. In the 1950s and 1960s, U.S. footwear consumption is characterized by low growth rates and a low price sensitivity. Since the 1970s, the parameterization of our models of U.S. footwear consumption has changed completely; it is now characterized by a rather high income elasticity and a high price sensitivity. This demand pattern is highly responsive to the supply regime that has been evolving in parallel since the 1970s (cf. Frenzel Baudisch, 2006b): the supplied product variety in combination with falling relative product prices expands consumption to date. The estimation results of our models substantiate our hypotheses that after the 1970s the growth of the U.S. footwear market is driven by the oversupply of product variety and performance, and that consumption growth is driven by motivations that stem from social comparison processes.

Given this, substitution effects between functionally different products can occur. The reason is that social comparison processes are not limited to one particular market defined by the functionality of its products. According to our hypotheses, we find substitution effects relating to other products for consumption in the variety oversupply regime. Nevertheless, these hypotheses call for further scrutiny. One remaining question is whether there are substitution effects between product categories that are predominantly driven by social motivations. Moreover, in markets beyond functional satiation, such substitution effects between functionally different products may have competitive implications for firms operating in (sub)markets, which have shown no substitutive relation before functional satiation (cf. Adner, 2002).

Our theoretical hypotheses add to an explanation of the stylized fact of the correlation between innovation and consumption growth (cf. Bils et al., 2001). The robustness of this correlation, regardless of the functional aspects of the product categories or their maturity, could also be due to such innovation-driven substitution effects that this paper has developed.

Several studies that explored the impact of market demand highlight how heterogeneous consumer needs influence product development at different levels of analysis (e.g. von Hippel, 1988; Christensen, 1997; Adner et al., 2001; Windrum, 2005). The theoretical account developed in this paper provides a deeper understanding of how consumer heterogeneity comes about and, hence, how demand patterns change over time as markets mature. In combination with Frenzel Baudisch's (2006b) historical case study of the U.S. footwear industry, this paper shows how demand regimes coevolve with the industry structure, leading in turn to sustained market growth well beyond functional satiation.

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VIII. TABLES

TABLE 1: Unrestricted cointegration rank test (Max. eigenvalue) Data series: *ShExp Inc CPI ShPI TMreg*			
Sample (adjusted): 1957 2002 Included observations: 46 after adjustments			
Hypothesized no. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical value
None	0.487591	74.56824	79.34145
At most 1	0.344389	43.81120	55.24578
At most 2	0.249774	24.39054	35.01090
At most 3	0.195736	11.17101	18.39771
At most 4	0.024709	1.150912	3.841466

TABLE 2:	Time-series models
MODEL	Equation
1: Income elasticity	$\Delta \log ShExp = c_1 * \Delta \log Inc + \varepsilon$
2: Income elasticity change	$\Delta \log ShExp = c_1 * \Delta \log Inc + c_2 * el72 * \Delta \log Inc + \varepsilon = \begin{cases} c_1 * \Delta \log Inc + \varepsilon & \forall t \in \{1955; 1970\} \\ (c_1 + c_2) * \Delta \log Inc + \varepsilon & \forall t \in \{1971; 2002\} \end{cases}$
3: Cross-price elasticity and price elasticity	$\Delta \log ShExp = c_1 * \Delta \log Inc + c_2 * el71 * \Delta \log Inc + c_3 * \Delta^2 \log CPI + c_4 * el71 * \Delta^2 \log CPI + c_5 * el77 * \Delta^2 \log CPI + c_6 * \Delta^2 \log ShPI + c_7 * el71 * \Delta^2 \log ShPI + \varepsilon$
4: Product variety	$\Delta \log ShExp = c_1 * \Delta \log Inc + c_2 * el71 * \Delta \log Inc + c_3 * \Delta^2 \log CPI + c_4 * el71 * \Delta^2 \log CPI + c_5 * el77 * \Delta^2 \log CPI + c_6 * \Delta^2 \log ShPI + c_7 * el71 * \Delta^2 \log ShPI + c_8 * \Delta \log TMreg + c_9 * el71 * \Delta \log TMreg + \varepsilon$
Time dummies	$el71 = \begin{cases} 0 & \forall t \in \{1955; 1970\} \\ 1 & \forall t \in \{1971; 2002\} \end{cases}$ $el77 = \begin{cases} 0 & \forall t \in \{1955; 1976\} \\ 1 & \forall t \in \{1977; 2002\} \end{cases}$

TABLE 3: Estimation results for MODELs 1 – 4 Dependent variable: ΔlogShExp				
Variable	MODEL 1	MODEL 2	MODEL 3	MODEL 4
	Coefficient Prob.			
c1 (ΔlogInc)	0.916 0.000	0.441 0.016	0.487 0.042	0.724 0.025
c2 (el71*ΔlogInc)		0.816 0.000	0.789 0.002	0.321 0.297
c3 (Δ2logCPI)			-1.272 0.392	-1.561 0.262
c4 (el71*Δ2logCPI)			1.301 0.398	1.521 0.301
c5 (el77*Δ2logCPI)			1.502 0.000	1.562 0.001
c6 (Δ2logShPI)			0.379 0.160	0.360 0.191
c7 (el71*Δ2logShPI)			-1.182 0.004	-1.071 0.004
c8 (ΔlogTMreg)				-0.133 0.143
c9 (el71*ΔlogTMreg)				0.212 0.044
Adjusted R-squared	0.180	0.270	0.294	0.300
Durbin-Watson stat	1.716	1.973	1.978	2.042
Breusch-Godfrey serial correlation LM Test:				
F-statistic probability 1-lag	0.346	0.989	0.972	0.829
F-statistic probability 2-lag	0.617	0.733	0.988	0.830

TABLE 4: Pairwise Granger Causality Tests between number of registered trademarks (TMreg) and shoe expenditure (ShExp)				
Pairwise Granger Causality Tests for 48 observations	lags			
Null hypothesis	2	4	8	12
ΔlogTMreg does not Granger Cause ΔlogShExp	8.9%	9.5%	6.9%	19.6%
ΔlogShExp does not Granger Cause ΔlogTMreg	8.1%	4.1%	15.2%	4.4%

IX. FIGURES

FIGURE 1: Total shoe expenditure per capita and its relation to personal income per capita, U.S., 1955-2003 [US$ of the year 2000] (Bureau of Economic Analysis, National Income and Product Accounts, 2003)

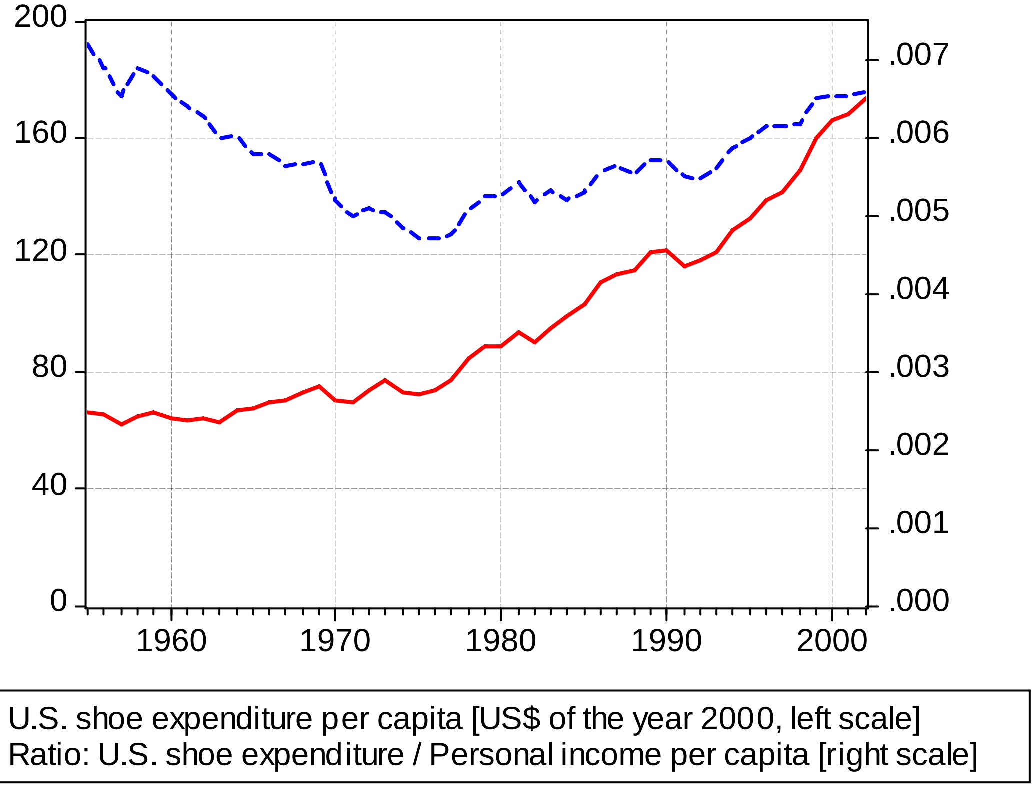

FIGURE 2: Net trademark registrations in the U.S. footwear market, number of registered trademarks in the U.S. footwear market, 1955-2002 (U.S. Patent and Trademark Office, 2004)

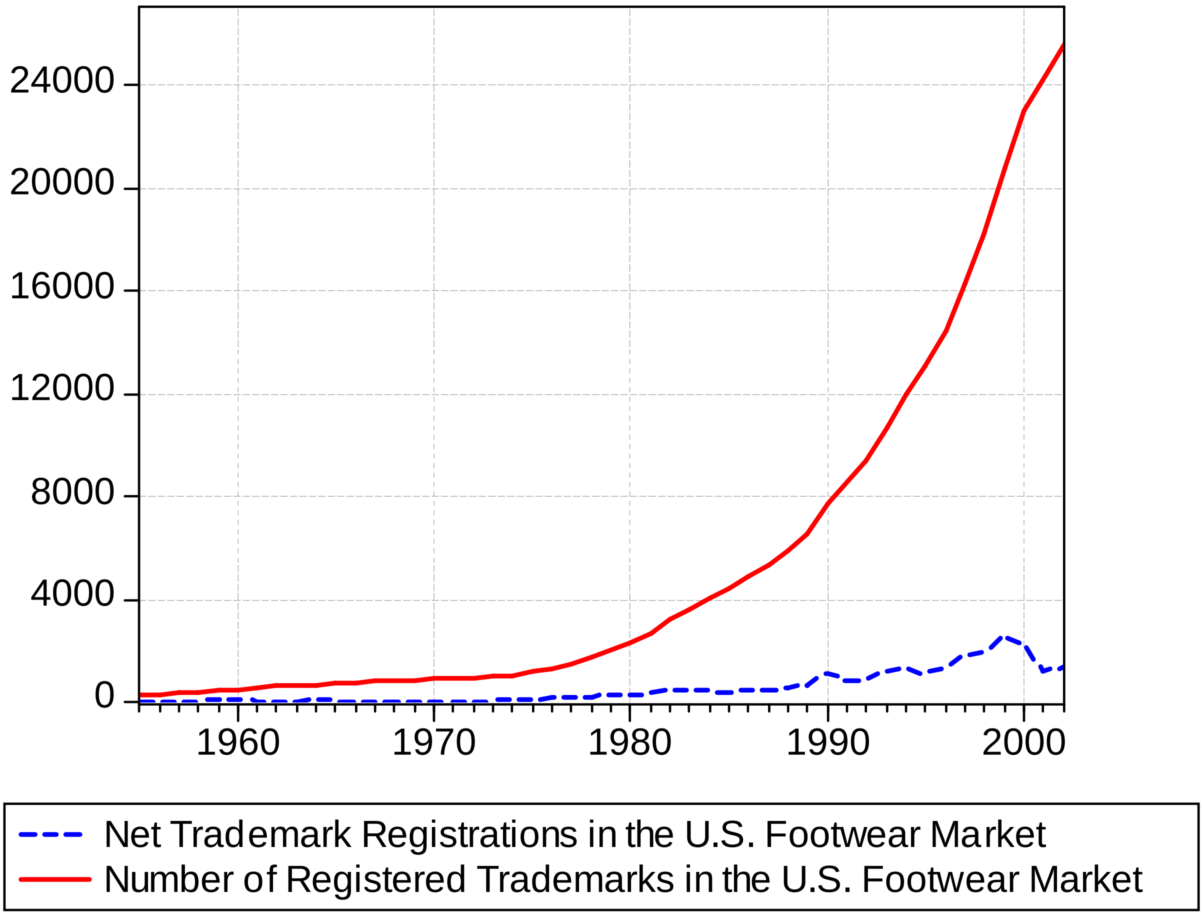

FIGURE 3: Consumer Price Index, price index for shoes, and relative shoe prices, U.S. 1955-2002 (Bureau of Economic Analysis, National Income and Product Accounts, 2003)

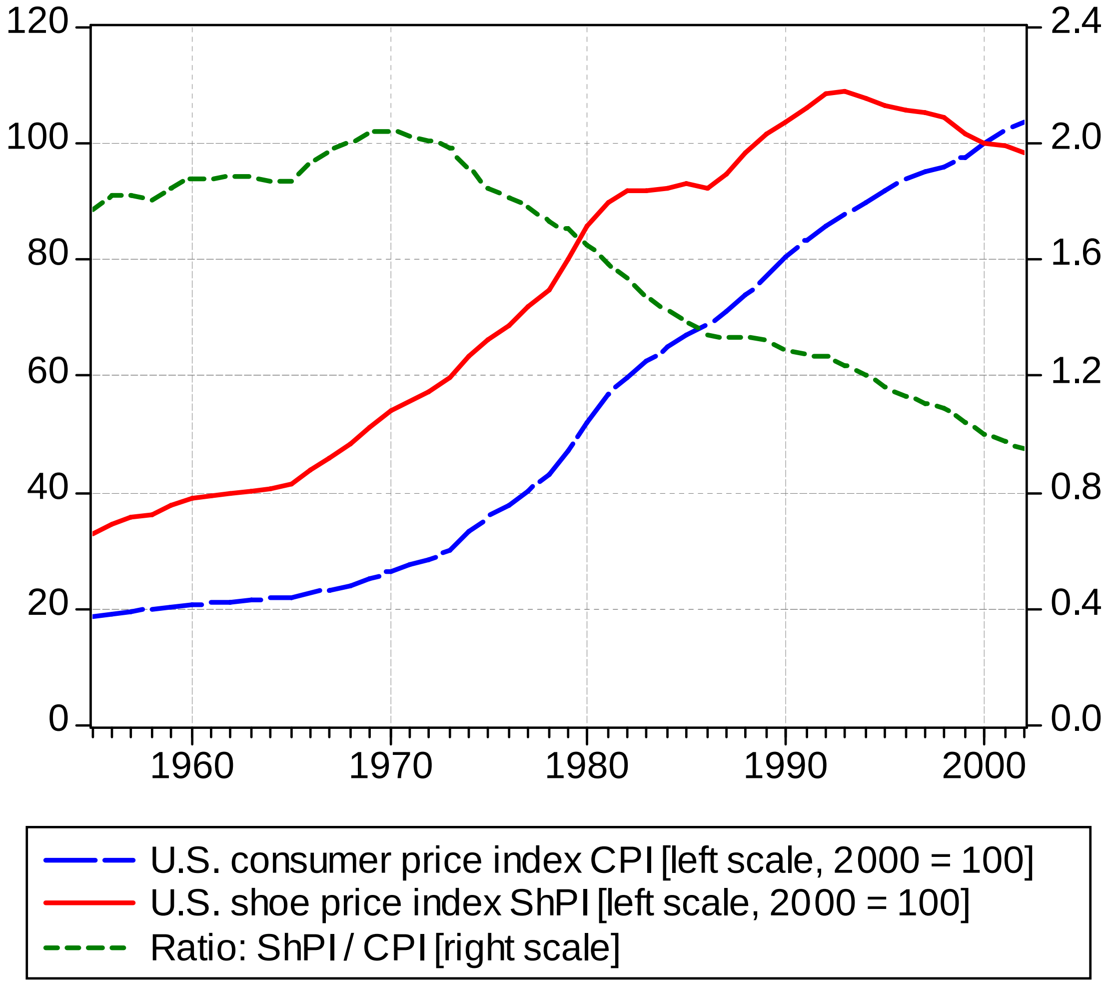

FIGURE 4: Nonrubber shoe consumption volume, domestic production and imports, U.S., 1960-2001 (American Association for Footwear and Apparel, 2004)