Propensity to search: common, leisure, and labor models of consumer behavior

Malakhov, Sergey

Pierre-Mendès France University

January 2015

Sergey MALAKHOV
Ph.D., Applied Economics,
Pierre-Mendès-France University,
Grenoble, France

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Abstract

The analysis of the propensity to search specifies the "common" or the ordinary model of consumer behavior based on the synthesis of the neoclassical approach with satisficing concept, and "leisure" and "labor" models of behavior that represent different combinations of conspicuous consumption, leisure, and labor. While the "common model" of behavior demonstrates a moderate propensity to search, "leisure" and "labor" models of consumer behavior exhibit vigorous propensities to search that results in purchase of unnecessary items and therefore in overconsumption. This trend is also presented in home production where vigorous propensity to search takes the form of the vigorous propensity to produce at home. The analysis of trends in allocation of time provides grounds for the assumption that men have more accentuated propensity to search and to produce at home than women that results in overconsumption of unnecessary items.

Keywords: propensity to search, propensity to produce at home, consumption-leisure choice, Veblen effect

JEL Classification: D11, D83.

Introduction

The previous papers on the optimal consumption-leisure choice under price dispersion have demonstrated the importance of the concept of propensity to search, i.e., to substitute labor for search (Malakhov 2012, 2013, 2014a, 2014b, 2014c). The basic assumption of this concept is that labor and search always "move" in opposite direction, or the value $\partial L/\partial S$ is always negative because labor and search represent different sources of income. The analytical significance of this concept needs a particular effort that could summarize results of comparative analysis of different models of consumer behavior produced by different propensities to search. And that effort is realized in the paper presented here. It is organized as follows. Part I describes the moderate propensity to search in the "common model" of behavior, i.e., in the model that explains the everyday economic behavior on the basis of the synthesis of the methodology of optimization with the satisficing approach. Part II illustrates the vigorous propensity to search in the "labor model" and in the "leisure model" of behavior. The comparative static analysis of the vigorous propensity to search in Part III describes the behavior of *laborholics* during sales and the mechanism of the Veblen effect. Part IV analyses home production under the assumption that propensity to produce at home represents a specific form of the propensity to search with regard to the statistical data on the allocation of time in the USA during last decades. The analysis of the propensity to produce at home results in the assumption that disequilibrium conspicuous consumption represents an important factor of consumer demand.

Part I. Propensity to search in "common model" of behavior

The static optimal consumption-leisure choice can be described by the Cobb-Douglas utility function $U(Q,H)=Q^{-\partial L/\partial S}H^{-\partial H/\partial S}$ subject to the equality of marginal savings on search to its marginal costs:

$$max\, U(Q,H)\ subject\ to\ w\frac{\partial L}{\partial S}=Q\frac{\partial P}{\partial S} \quad (1.1)$$

$$\Lambda = U(Q,H)+\lambda\left(w-\partial P/\partial S\frac{Q}{\partial L/\partial S}\right) \quad (1.2)$$

$$\frac{\partial U}{\partial Q}=\lambda\frac{\partial P/\partial S}{\partial L/\partial S} \quad (1.3)$$

$$\frac{\partial U}{\partial H}=-\lambda Q\frac{\partial P/\partial S}{(\partial L/\partial S)^2}\partial^2 L/\partial S\partial H=-\lambda\frac{w}{\partial L/\partial S}\partial^2 L/\partial S\partial H \quad (1.4)$$

where the value of price reduction or marginal savings on purchase $\partial P/\partial S$ is given by a location and price settings of a store, the value ($-\partial L/\partial S$) is equal to the share of non-leisure time in the time horizon of the consumption leisure choice ($-\partial L/\partial S=(L+S)/T$),), the value ($-\partial H/\partial S$) is equal to the share of leisure time ($-\partial H/\partial S=H/T$), and the value of the time horizon T is equal to the time until the next purchase or to the commodity lifecycle (Fig.1):

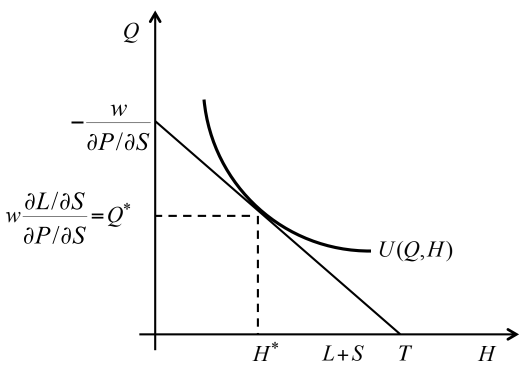

Fig.1. "Common model" of behavior

The optimization problem results in the "common model" of behavior. The key attribute of the "common model" of behavior is the moderate propensity to search $\partial L/\partial S$. Here it is limited, as we can see at Figure1, by the [-1;0] interval. While the value of the propensity to search can by literally described by the "whiskey-soda-ice" metaphor, when ice (search) displaces both whiskey (labor) and leisure (soda) in the glass (Malakhov 2013), it can be directly derived from the optimization problem:

$$\frac{Q^*}{Q_{\partial L/\partial S=-1}} = \frac{w\partial L/\partial S \Big/ \partial P/\partial S}{-w \Big/ \partial P/\partial S} = \frac{L+S}{T} \Rightarrow \frac{\partial L}{\partial S} = -\frac{L+S}{T} \quad (2)$$

The static resolution of the utility maximization problem gives the way to the comparative static analysis of the satisficing decision where one part of the constraint, the value $\partial P/\partial S$, is softened; the consumer reserves the labor income and takes a chance to search the pre-determined quantity in different places of purchases where he finally finds the satisficing price P_P that equalizes marginal costs of search with its marginal benefit and therefore maximizes the utility of the consumption leisure choice with respect to the given wage rate w and to the chosen place of purchase $\partial P/\partial S$ (Malakhov 2014a). If we re-arrange the presentation of the propensity to search we can easily show that its derivative with respect to leisure time is equal to the inversed value of the time horizon T:

$$\frac{\partial L}{\partial S} = -\frac{L+S}{T} = \frac{H-T}{T} \quad (3.1)$$

$$\partial^2 L / \partial S \partial H = 1/T \quad (3.2)$$

The utility maximization problem and the satisficing decision procedure becomes interconnected by the equilibrium price P_e where $P_e=w(L+S)>P_P=wL$, that enters into the marginal rate of substitution, of leisure for consumption in the following form:

$$-\frac{dQ}{dH} = \frac{\partial U/\partial H}{\partial U/\partial Q} = -\frac{w}{\partial P/\partial S}\partial^2 L/\partial S\partial H = -\frac{w}{T\partial P/\partial S} = \frac{w}{w(L+S)} = \frac{w}{P_e} \quad (4)$$

Part II. Propensity to search in " labor" and in "leisure model" of behavior

As we can see, the "common model" of behavior takes place when search plays a supporting role with regard to labor. Here the search only adjusts labor costs to the ***satisficing*** level. It happens because when $\partial L/\partial S>-1$, the constraint in Equation (1.1) produces the "common" relationship between the wage rate and marginal savings on purchase $w>Q|\partial P/\partial S|$. But if the consumer can get from the search marginal savings greater than the wage rate, that ***aspiration*** changes his model of behavior. The relationship $w<Q|\partial P/\partial S|$ results in vigorous propensity to search $\partial L/\partial S<-1$. Now the labor starts to play a supporting role to the search. However, the vigorous propensity to search changes the relationship between search and leisure. This relationship becomes positive, or $\partial H/\partial S>0$, due to very simple reasoning:

$$L + S + H = T \Rightarrow \partial L / \partial S + 1 + \partial H / \partial S = 0 \quad (5)$$

However, the positive $\partial H/\partial S$ relationship changes the sign of the second derivative $\partial^2 L/\partial S\partial H$. It becomes negative – the increase in leisure time decreases the value of propensity to search $\partial L/\partial S$ and increases its absolute value $|\partial L/\partial S|$. It happens because here either the increase in labor supply reduces both search and leisure or the fall in labor supply contributes to both search and leisure.

The negative second derivative $\partial^2 L/\partial S\partial H$ does not affect the marginal utility of consumption in Equation (1.3) but it changes the value of the marginal utility of leisure in Equation (1.4). The latter becomes negative.

Unfortunately, it is difficult to find the natural algorithm for this kind of the redistribution of time like the "whiskey-soda-ice" metaphor makes it for the "common model" of behavior. We can try to derive the geometrical algorithm for $\partial L/\partial S<-1$; $\partial H/\partial S>0$ relationships.

Equation (1.4) tells us that the vigorous propensity to search $\partial L/\partial S<-1$ produces the "negative leisure" (Fig.2):

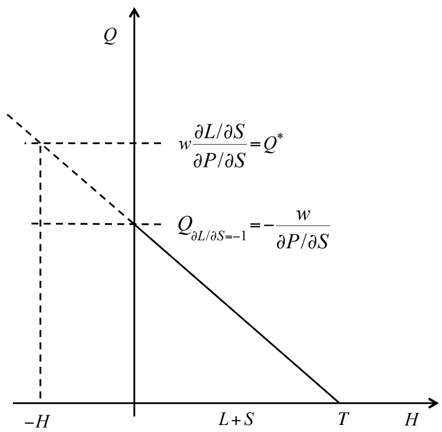

Fig.2. "Negative" leisure

However, the negative second derivative $\partial^2 L/\partial S\partial H$ changes not only the marginal utility of leisure itself. It also changes the consumption-leisure relationship. The negative second derivative $\partial^2 L/\partial S\partial H$ changes the sign of the marginal rate of substitution of leisure for consumption in Equation (4) and the value $\partial Q/\partial H$ becomes positive.

While this is rather easy to state the fact that both the vigorous propensity to search $\partial L/\partial S<-1$ and the negative second derivative $\partial^2 L/\partial S\partial H$ result in "bad" leisure, it is more difficult to present the graphical solution for normal consumption and "bad" leisure keeping in mind all geometrical proportions produced by Figure 2. Here we can pay attention to the fact that the positive $\partial H/\partial S$ relationship also changes the shape of the utility function $U(Q,H)=Q^{-\partial L/\partial S}H^{\partial H/\partial S}$. The change in the shape of the utility function needs a change of the leisure axis. As a result, the graphical resolution of the "normal consumption – "bad" leisure" relationship takes the following form (Fig.3):

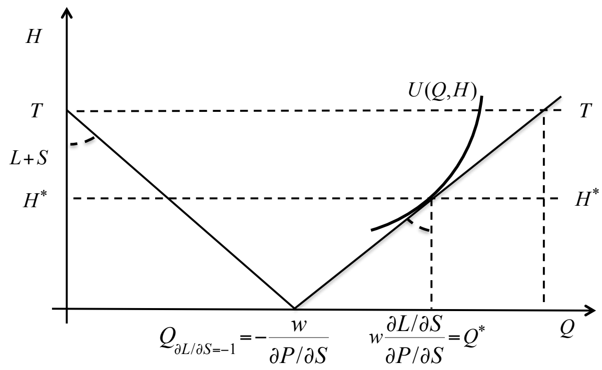

Fig.3. Normal consumption and "bad" leisure

If we re-arrange the constraint of the model from Equation (1.1) with respect to Figure 3, keeping in mind that Equation (5) always tells us that $\partial L/\partial S=-(1+\partial H/\partial S)$, we get the following result:

$$Q^* = \frac{w}{\partial P/\partial S}\partial L/\partial S = -\frac{w}{\partial P/\partial S}(1+\partial H/\partial S) = -\frac{w}{\partial P/\partial S}(1+\frac{H}{T}) \quad (6)$$

It looks like the consumer cannot get the target level of consumption if he spends all time only for labor and search ($Q_{\partial L/\partial S=-1}<Q^*$).[1] However, when search is more efficient than labor and marginal savings on purchase are greater than the wage rate, the consumer can cut labor time in favor of both search and leisure. And the increase in leisure time provides him with a missing quantity of consumption *dQ(H)*:

$$Q^* = Q_{\partial L/\partial S=-1} + dQ(H) = -\frac{w}{\partial P/\partial S}(1+\frac{H}{T}) = -\frac{w}{\partial P/\partial S} - \frac{w}{\partial P/\partial S}\frac{H}{T} = Q_{\partial L/\partial S=-1} + dH\frac{\partial Q}{\partial H} \quad (7)$$

The mathematical calculation of the optimal consumption Q^* can provide another graphical resolution. We can expose it in the following form (Fig.4):

[1] Here we pay attention to the fact that the time horizon is given or $T \neq T(Q)$. Of course, when consumer buys a quality item with longer lifecycle the value of the time horizon should be changed. But in this case the equilibrium marginal savings are also changed or the consumer followed by the satisficing decision procedure chooses another place of purchase. The analysis of change in place of purchase or the choice under $T=T(Q)$ assumption stays beyond the scope of this paper. Partially that problem was discussed in the analysis of shorter shelf-life under price discount (Malakhov 2014a) and in the examination of the phenomenon of sunk costs sensitivity (Malakhov 2014 b).

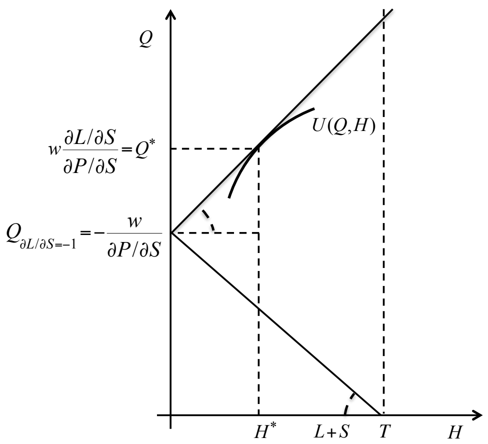

Figure 4. "Bad" consumption and normal leisure.

While the utility function is still described as $U(Q,H)=Q^{-\partial L/\partial S}H^{\partial H/\partial S}$, the comeback of consumption to the vertical axis changes again its shape. Now the utility function represents the consumer choice of "bad" consumption and normal leisure.

We can denote the choice of normal consumption – "bad" leisure as the "labor model" of behavior because here the vigorous propensity to search reduces both search and leisure time in favor of labor. And the combination of "bad" consumption with normal leisure can be denoted as the "leisure model" of behavior.

The key difference between two models is the value of the marginal utility of money income, which is described here by the value of the Lagrangian multiplier $MU_w=\lambda$ (Malakhov 2013). Its negative value changes signs of marginal utilities of both consumption and leisure. The negative marginal utility of money income $MU_w=\lambda$ makes marginal utility of consumption negative and, accompanied by the negative $\partial^2L/\partial S\partial H$ value, it makes marginal utility of leisure positive.

However, both models have one important feature in common. Literally, both models could present ***the behavior of the low-wage rate individual in the high-price.*** And according to Equation (6) for both "labor" and "leisure" models the propensity to search is described by the following relationship:

$$\frac{\partial L}{\partial S}=-\frac{H+T}{T} \quad (8)$$

The value of the vigorous propensity to search tells us that at the given wage rate the time horizon is not sufficient to get and to use the target level of consumption. To understand this phenomenon let's imagine two individuals – high-wage rate and low-wage rate – who makes the same purchase at the same price ($Q^*=1;P_W=P_w$) in one high-price store ($\partial P_W/\partial S_W=\partial P_w/\partial S_w$).

There the high-wage rate individual makes the satisficing purchase that corresponds to the equilibrium price (Malakhov 2014a):

$$W\frac{\partial L}{\partial S}=W\frac{H-T}{T}-W\frac{L+S}{T}=\frac{\partial P}{\partial S}\Rightarrow W(L+S)=-T\partial P/\partial S=P_e \quad (9)$$

The equilibrium price P_e is equal to the sum of labor and transaction costs of the high-wage rate individual. But it is not true for the low-wage rate individual:

$$w\frac{\partial L}{\partial S}=-w\frac{H+T}{T}=\frac{\partial P}{\partial S}\Rightarrow w(H+T)=w(L+S+H)=-T\partial P/\partial S=P_e \quad (10)$$

Here we simply develop the P.Diamond's conclusion that we "have a single-price equilibrium with the price now equal to the willingness to pay of those [buyers] with high willingness to pay" (Diamond 1987,p.434). If high willingness to pay corresponds to high wage rate then the equilibrium price should be determined by the behavior of high-wage rate consumers.[2] However, here the equilibrium price is equal not ***to the willingness to pay*** of high-wage rate individuals that equals to the reservation level but to their ***willingness to accept*** (Malakhov 2014a). This assumption clarifies not only the behavior of high-wage rate consumers who buy big-ticket items at their ***satisficing level*** in their convenient price niche but also the behavior of low-wage rate consumers who buy the big-ticket item at their ***aspiration level*** in the price niche. The willingness to accept of high-wage rate individuals recovers only costs incurred during work and search (Eq. 9). The willingness to accept of low-wage rate individuals recovers not only costs of purchase but also costs of forgone consumption, i.e., costs of leisure time (Eq. 10).

This assumption needs a reconsideration of the concept of the time horizon. The satisficing decision matches the time of product lifecycle with the time until next purchase. It means that in the "common model" of behavior the next purchase happens only after the utilization of a good. We see that it is not true for both "labor" and "leisure" models of consumer behavior. The time until next purchase, i.e., the time horizon of the consumption-leisure choice, is shorter than the product lifecycle. In the "common model" the consumer enters the market with cash balances; he searches for an item; he buys it; he recovers his money balances spent for the purchase by labor time, and then he consumes the chosen item. However, it is not true for both "labor" and "leisure" models. There at the T value the consumer is ready to buy another item but he has not yet used the purchased item (Fig.5a). If he decides to consume it just after the purchase it means

[2] The high-wage rate individual has higher willingness to pay because he starts searching in very-high-price store that is excluded from the search by the low-wage rate individual. Thus, the time of search of the high-wage rate individual is longer, or $dS_W>dS_w$. Because at the level of the price of purchase both individuals have the same marginal costs, or $W\partial L_W/\partial S_W=w\partial L_w/\partial S_w$, the reservation level or the willingness to pay of the high-wage rate individual is higher, or $WL_{0W}>wL_{0w}$ due to the simple reasoning that $dWL(S)=dS_W\partial L_W/\partial S_W$. This result should not look unexpected because it represents the form of so-called paradox of little pre-purchase search for big-ticket items (Malakhov 2014a). Here the purchased item represents a cheap item for the high-wage rate individual and an expensive item for the low-wage rate individual.

that leisure time squeezes labor time out from the time horizon. As a result, for the moment T of the next purchase money balances are not restored and the consumer can buy an item only cheaper than the first one (Fig.5b).

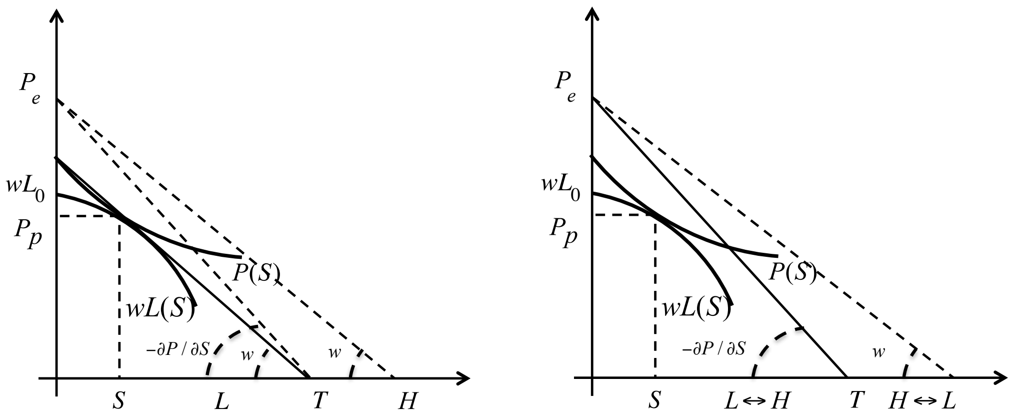

Fig.5(a,b). Postponed (a) and immediate (b) consumption of big-ticket item

We see that the vigorous propensity to search for the target level of consumption results not only in the purchase of an item in the upper price niche but also in the readiness to purchase another item before the first item will be utilized. Evidently, these two items are substitutes because both items meet some need. If the purchase of the second item happens when the consumption of the first item has not yet started, the consumer could spend the same amount on the second item that seems to be a perfect substitute for the first item (Fig.5a). However, usually people begin to consume immediately after the purchase and they combine labor and leisure time (Fig.5b). Thus, when the purchase of the second item happens this good is buying at a lower price because money balances have not been restored after the first purchase. Low-wage rate individuals cannot buy everyday in upper price niches and they should come back to their convenient price niche. In this case the second item will be an imperfect substitute for the first item.

The last consideration is very important. It looks like it is a second item meets a particular need while the first item does not. The purchase of the first item has not completely satisfied that need and only the purchase of the second item has done it. Other words, the first item doesn't look totally necessary. This situation is well known. When the family goes to sales in order to choose a new suit for her head, they discover a luxury suit for a "reasonable price". However, everybody understands that it is not reasonable to wear such a luxury suit everyday, may be, only on weekends and parties. And the family buys another everyday suit. It might happen at the same moment if a seller proposes a special discount for two suits, or two weeks later when the family discovers the ink spot on the luxury sleeve.

In addition, when the leisure time totally goes beyond the time horizon, i.e., the cycle of purchase (Fig.5a), the purchase of the first item looks even less necessary.

Part III. Comparative statics of "labor" and "leisure" models of behavior

If we analyze the behavior of the utility function $U^*=U(Q^*,H^*)$ with respect to the optimal levels of consumption and leisure, i.e., to the levels that provide the equality of marginal costs of search to its marginal benefit in Equation (1.1) and with regard to changes in the wage rate and in the absolute value of marginal savings, we get the following results (Appendix):

$$\frac{\partial U^*}{\partial w} = \lambda \quad (11);$$

$$\frac{\partial U^*}{\partial |\partial P/\partial S|} = -\lambda \frac{w}{|\partial P/\partial S|} \quad (12)$$

We can use these results in order to understand the behavior of the indirect utility function $v(w, |\partial P/\partial S|)$:

$$dv(w,|\partial P/\partial S|) = dw\frac{\partial v}{\partial w} + d|\partial P/\partial S|\frac{\partial v}{\partial |\partial P/\partial S|} = 0;$$

$$\lambda dw - \lambda \frac{w}{|\partial P/\partial S|} d|\partial P/\partial S| = 0;$$

$$\frac{d|\partial P/\partial S|}{dw} = \frac{|\partial P/\partial S|}{w} \Rightarrow e_{|\partial P/\partial S|,w} = 1 \quad (13)$$

The analysis of Equation (13) discovers the nature of the indirect utility function that takes the form of a cubic parabola with the saddle point at $e_{|\partial P/\partial S|,w}=1$ (Malakhov 2014c):

$$v(w,|\partial P/\partial S|) = v(w,|\partial P/\partial S|(w)) \quad (14.1)$$

$$\partial v/\partial w = \lambda(1 - e_{|\partial P/\partial S|,w}) \quad (14.2)$$

If we come back to the "labor model" of behavior we see that the increase in utility happens only with the decrease in the absolute value of marginal savings $|\partial P/\partial S|$ with respect to the wage rate. There are two possible scenarios of the decrease in marginal savings.

First, the decrease in marginal savings increases labor supply and reduces both search and leisure time. The vigorous propensity to search is used by individuals in order to substitute "bad" leisure for normal consumption (Fig.6):

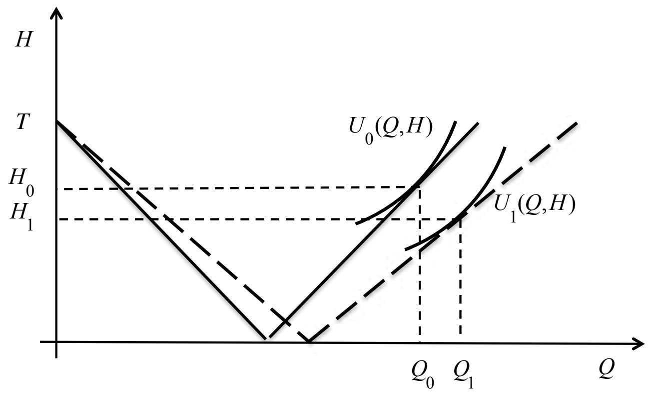

Fig.6.Substitution of "bad" leisure by normal consumption

We see that here individuals try to escape from "bad" leisure by increasing labor supply. However, if we follow the assumption of the diminishing efficiency of search ($\partial P/\partial S<0$; ($\partial^2 P/\partial S^2>0$), the lower $|\partial P/\partial S|$ value presumes the extended search but Figure 6 decreases the time of search in favor of labor time. It means that Figure 6 describes the vigorous propensity to search under the fall in prices that happens ***externally***. And sales represent the best example that matches this *laborholic* type of behavior.

This type of behavior is well known. Moreover, sometimes it looks like the manifestation of conspicuous labor (Bellezza et al. 2014). Sales are organized for that kind of people because well-advertised sales save time of *laborholics* and keep their reputation of smart-shoppers. Today this tradition is well developed by online shopping. Sales happen occasionally but Internet gives a chance to get discounts permanently. Other words, Internet successfully, and the competition between search engines confirms it, exploits the smart-shopping behavior of *laborholics*. Unfortunately, and our favorite example of the table tennis bought on sales and got in a season its proper place in the garage confirms it, that kind of behavior leaves no time for consumption.[3] And this is the fact of purchase and the following possession of a status item, a boat, may be, that becomes symbolic and in that sense conspicuous. This is the reason why sometimes the idea of the restriction on working hours seems to be an appropriate tool for the reduction of welfare losses of conspicuous consumption. However, the restriction on working hours stimulates the search and raises the level of "bad" leisure. Thus, the "labor model" of behavior becomes very close to the "leisure model" of behavior. It happens when "bad" leisure complements consumption (Fig.7):

[3] It also seems that *laborholics* should suffer more than others from the habit to purchase meals when the refrigerator is not empty.

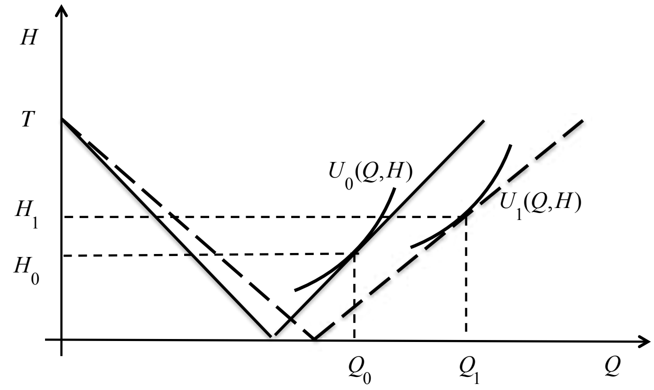

Fig.7.Complementarity of “bad” leisure with normal consumption

However, the resolution of the problem of the increase in utility under the complementarity of “bad” leisure with normal consumption needs very elastic demand. Indeed, the increase in utility happens here only when the increase in “bad” leisure is compensated by a more significant growth in consumption. But the need “to kill time” seems to be inappropriate attribute of the elastic demand. Here we should be concentrated on the ***demand for elastic necessities***. While we can imagine that kind of behavior, for example, when an individual likes luxury suits but he dislikes parties where he can expose his fashionable wear, such cases can be used in the theory of games when a wife approves the purchase of a luxury suit for her husband because it will be put on for the theater but really they are neither representative nor frequent. Unfortunately, there is an evident example that produces this kind of behavior. This is the consumption of drinks and drugs (Hampson '02, K. 2002, West, S. E. and Parry, I. W. H. 2009).

The example of drinks when search for lower prices decreases labor supply and increases leisure time might serve as a distinction of the “labor model” from the same rule of allocation of time in the “leisure model”. Living at southwest, Frenchmen often visit their neighbors in order to buy cheap drinks. The example of drugs often hides that difference because sometimes search for drugs exhibits the search for high-price products, when, for example, marijuana is substituted for cocaine, and therefore it exposes the “leisure model” of behavior.

If we come back to Equations (11) and (12), we can see that the negative marginal utility of money λ of relatively excess money balances changes signs of both marginal utilities of money income MU_w and marginal savings $MU_{|\partial P/\partial S|}$. According to Equation (12) the negative marginal utility of money transforms the marginal disutility of marginal savings into the positive marginal utility. Thus, the negative marginal utility of money stimulates search for high prices with greater marginal savings on purchase. Moreover, this is the only way to increase the indirect utility $v(w, |\partial P/\partial S|(w))$ in Equation 14 (Malakhov 2014c) because the reduction in marginal savings and therefore in price of purchase decreases the utility level. The "leisure model" of behavior produces Veblen effect (Fig.8):

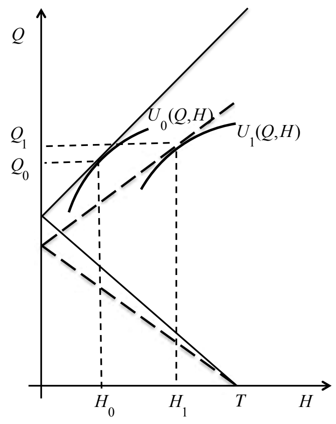

Fig.8.Veblen effect.

Here the increase in marginal savings and therefore in purchase prices, other words, the choice of a more luxury store, gives an opportunity to raise the utility level because the growth in "bad" consumption is compensated by the more significant extension in normal leisure.

There is no need to present examples of this kind of behavior but one important note should be done with regard to the difference between the time horizon, i.e., ***the cycle of purchase***, and ***the product lifecycle***. Let's come back to our favorite example of the table tennis, which is left in the garage because a family buys darts. Indeed, when the consumption is "bad" individuals don't buy products – they buy leisure time. Playing darts substitutes playing tennis. In this sense even our table tennis could be lucky if it is purchased after the boat – from the point of view of leisure time playing tennis substitutes boat trips.

Part IV. Propensity to search and propensity to produce at home

When Aguiar and Hurst analyzed life-cycle prices they made an important assumption with regard to the price of time:

"The price of time is assumed to be the same for the shopper and the home producer, but does not necessarily equal a market wage…A household faces a static cost-minimization problem about whether to allocate time to shopping and home production or purchase market goods instead".(Aguiar and Hurst 2007, p.1536)

In addition, they directly compared the price of time μ with marginal savings on purchase:

$$-\frac{\partial p}{\partial s}Q = \mu \quad (15)$$

This assumption has some important applications to the concept of the propensity to search. First, we can suppose that it is the propensity to search that adjusts the wage rate to the price of time, more precisely, to the price of leisure time. Field studies in economics of tourism and in economics of transportation also esteem the price of leisure as a fraction of the wage rate:

"*Another common approach is to assume that the marginal value of leisure time is a fraction of the wage, with ¼ to ½ often used in practice by reference to the value of time saved in transportation studies (e.g., Cesario 1976).*" (*Larson and Shaikh 2004, p.264*).

We can see that if we take the value of the propensity to search for the "common model" of behavior as $\partial L/\partial S= -(L+S)/T$, it will corresponds to results of the most studies of the allocation of time where the share of non-leisure time is oscillating between ¼ and ½. In addition, if the propensity to search adjusts the wage rate to the price of leisure in the "common model" of behavior, why it cannot do the same in the "leisure model" of behavior where the marginal utility of leisure is positive and therefore should have a positive price? If we follow this assumption we get that the price of leisure time in the "leisure model" of behavior is greater than the wage rate. This assumption can explain why people voluntarily substitute labor for leisure in the "leisure model" of behavior that reproduces the classical backward-bending labor supply curve.

Then we can come back to Aguiar and Hurst and develop their assumption saying that a ***propensity to search***, i.e., to substitute labor for search, can take the form of ***a propensity to produce at home***, i.e., to substitute labor for home production. Thus, the value of search S can take the form of home production, the price of purchase can represent the price of inputs for home production, and the value of marginal savings or the price reduction can be calculated with respect to the corresponding market price of a service or of a final product. Under this assumption the "common model" of behavior illustrates satisficing as well as rational choice of inputs and time for home production that leaves a chance to consume an output. And the value of the equilibrium price $P_e=w(L+S)$ as the equivalent of the ***willingness to accept*** gets an additional important confirmation because it really represents the market price, for example, of a meal prepared at home. On the other hand, an engineer who wants to make garden chairs himself and who thinks he gets a significant price reduction with regard to the market price of the garden furniture, might sell it if the price will cover not only costs of inputs and costs of production, but also costs of forgone leisure, or $P_e=w(L+S+H)$.

This is very difficult to assign some activities like gardening and even house maintenance to home production itself because they can also represent a form of leisure. When an activity is finished, individuals who like home production begin to do something else, leaving leisure time for consumption of the results of the previous activity for other days. And they begin to buy inputs for the new activity, may be, even new tools because a lovely organized tool storage in the garage that could be presented with proud to neighbors also have some residual symbolic value. Thus, the cycle of purchase of inputs for home production is really much shorter that the total lifecycle of a particular home activity. Activities can substitute each other and sometimes they are substituted by market purchases. It happens when an engineer mows only the lawn in front of the window, leaving the total surface of the garden to neighbor's son.

It is interesting to get the retrospective view on allocation of time from the point of view of propensity to produce at home. When we make the comparison of the allocation of time in 1965 and in 2003 in the USA based on the data from Aguiar and Hurst (2007a), we see that during that period women increased the time for total market work – from 22,45 to 24,93 hours per week while they decreased the time for the total non-market work and child care – from 38,46 to 30,01 hours per week. And the leisure time was increased respectively by 5,97 hours per week. Hence, we could suppose that during that period women generally followed the "common model" of behavior. But when we take the data for men, we see the decrease in the total market work - from 51,58 to 39,53 hours per week and the increase in total non-market work and child care - from 11,11 to 16,67 hours per week. And the leisure time was increased by 6,49 hours per week. Hence, we could suppose that during that period men generally followed the "leisure model" of behavior. Of course, the use of such aggregates for the analysis of the propensity to search and the propensity to produce at home is not absolutely correct. It cannot provide us with grounds for definite conclusions but it could serve as a basis for some assumptions. Indeed, it seems that women are more balanced in everyday economic activity; they make purchases in appropriate price niches, and they do at home only necessary things, while men often visit upper price niches where they buy unnecessary items, and at home they could be occupied with unnecessary activities.

Conclusion

The very profound analysis of welfare effects of conspicuous consumption and conspicuous/inconspicuous leisure, presented in Arrow and Dasgupta (2009), discovered different relationships of both consumption and labor supply with a social optimum. In particular, the combination of conspicuous consumption with inconspicuous leisure results in consumption and labor supply over the social optimum. That conclusion corresponds to properties of the "labor model" of behavior. Arrow and Dasgupta also paid attention to the ambiguity of a welfare effect when both consumption and leisure were conspicuous. The paper presented here explains that ambiguity when it recognizes the possibility of visual resemblance of "labor" and "leisure" models of behavior. To makes things really divisible one needs to accept the relativity of the concept of the optimum quantity of money with respect to different consumption patterns and different living standards in order to explain the waste of money and therefore their negative marginal utility even on low social levels.

It seems that the paper of Arrow and Dasgupta (2009) on conspicuous consumption was not occasional because their participation in the earlier investigation of overconsumption (Arrow at al. 2004) discovered the real concern for the macroeconomic equilibrium of that one of the most outstanding duets of the modern economic thought. The idea of the vigorous propensity to search that can double the consumption shows that the concern for social welfare had serious reasons because this concept adds to the analysis of the equilibrium the problem of "bads".

It is not surprisingly that the analysis of the equilibrium with "bads" often uses the example of garbage (Hara 2005). That idea had cheerfully expressed the contrast between "common", "labor", and "leisure" models of behavior a year before Alfred Marshall published the first volume of his "Principles of Economics":

"*How many people, on that voyage, load up the boat till it is ever in danger of swamping with a store of foolish things which they think essential to the pleasure and comfort of the trip, but which are really only useless lumber. How they pile the poor little craft mast-high with fine clothes and big houses; with useless servants, and a host of swell friends that do not care twopence for them, and that they do not care three ha'pence for; with expensive entertainments that nobody enjoys…It is a lumber, man – all lumber! Throw it overboard…Let your boat of life be light, packed with only what you need – a homely home and simple pleasures, one or two friends, worth the name, someone to love and someone to love you, a cat, a dog, and a pipe or two, enough to eat and enough to wear, and a little more than enough to drink; for thirst is a dangerous thing.*" (*Jerome K.Jerome 1889, pp.37-38)*

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Appendix

The calculation of the marginal utility of money income and the marhinal utility (disutility) of marginal savings uses the elasticity of the key equation of the model that provides the constraint to the problem of the maximization of utility:

$$w\frac{\partial L}{\partial S} = Q\frac{\partial P}{\partial S};$$

$$1 + e_{\partial L/\partial S,w} = e_{Q,w} + e_{\partial P/\partial S,w} \qquad (16)$$

$$e_{\partial L/\partial S,\partial P/\partial S} = e_{Q,\partial P/\partial S} + 1 \qquad (17)$$

A) Marginal utility of money income

$$\frac{\partial U^{*}}{\partial w}=\frac{\partial U}{\partial Q}\frac{\partial Q}{\partial w}+\frac{\partial U}{\partial H}\frac{\partial H}{\partial w}=\lambda\left[\frac{\partial P/\partial S}{\partial L/\partial S}\frac{\partial Q}{\partial w}-\frac{w}{\partial L/\partial S}\partial^{2}L/\partial S\partial H\frac{\partial H}{\partial w}\right]=$$

$$=\lambda\left[\frac{\partial P/\partial S}{\partial L/\partial S}\frac{\partial w\partial L/_{\partial S}}{\partial w}\frac{1}{\partial P/\partial S}-\frac{w}{\partial L/\partial S}\frac{\partial^{2}L/\partial S\partial w}{\partial^{2}L/\partial S\partial w}\partial^{2}L/\partial S\partial H\frac{\partial H}{\partial w})\right]=$$

$$=\lambda\left[\frac{1}{\partial L/\partial S}(\frac{\partial L}{\partial S}+w\frac{\partial L/\partial S}{\partial w})-e_{\partial L/\partial S,w}\frac{\partial^{2}L/\partial S\partial H}{\partial^{2}L/\partial S\partial w}\frac{\partial H}{\partial w}\right]=$$

$$=\lambda\left[1+e_{\partial L/\partial S,w}-e_{\partial L/\partial S,w}\frac{\partial^{2}L/\partial S\partial H}{\partial^{2}L/\partial S\partial w}\frac{\partial H}{\partial w}\right]$$

$$\left.\frac{\partial^{2}L/\partial S\partial H}{\partial^{2}L/\partial S\partial w}\frac{\partial H}{\partial w}\right|_{common}=\frac{\partial^{2}L/\partial S}{\partial H}\frac{\partial H}{\partial w}\frac{1}{\partial^{2}L/\partial S\partial w}=\frac{\partial(H-T)/T}{\partial H}\frac{\partial H}{\partial w}\frac{1}{\partial((H-T)/T)/\partial w}=$$

$$=\frac{\partial H/\partial w}{T}\frac{T}{\partial H/\partial w}=1;$$

$$\left.\frac{\partial^{2}L/\partial S\partial H}{\partial^{2}L/\partial S\partial w}\frac{\partial H}{\partial w}\right|_{leisure/labor}=\frac{\partial^{2}L/\partial S}{\partial H}\frac{\partial H}{\partial w}\frac{1}{\partial^{2}L/\partial S\partial w}=\frac{\partial(-H-T)/T}{\partial H}\frac{\partial H}{\partial w}\frac{1}{\partial((-H-T)/T)/\partial w}=$$

$$=\frac{-\partial H/\partial w}{T}\frac{T}{-\partial H/\partial w}=1;$$

$$\frac{\partial U^{*}}{\partial w}=\lambda\left[1+e_{\partial L/\partial S,w}-e_{\partial L/\partial S,w}\right]=\lambda$$

B) Marginal utility (disutility) of marginal savings

$$\frac{\partial U^{*}}{\partial(\partial P/\partial S)}=\frac{\partial U}{\partial Q}\frac{\partial Q}{\partial(\partial P/\partial S)}+\frac{\partial U}{\partial H}\frac{\partial H}{\partial(\partial P/\partial S)}=\lambda\left[\frac{\partial P/\partial S}{\partial L/\partial S}\frac{\partial Q}{\partial(\partial P/\partial S)}-\frac{w}{\partial L/\partial S}\partial^{2}L/\partial S\partial H\frac{\partial H}{\partial(\partial P/\partial S)}\right]=$$

$$when\ \partial^{2}L/\partial S\partial H\frac{\partial H}{\partial(\partial P/\partial S)}=\pm\frac{1}{T}\frac{\partial H}{\partial(\partial P/\partial S)}=\pm\frac{\partial((H-T)T)}{\partial(\partial P/\partial S)}=\frac{\partial(\partial L/\partial S)}{\partial(\partial P/\partial S)}$$

$$then\ \frac{\partial U^{*}}{\partial(\partial P/\partial S)}=\lambda\left[\frac{\partial P/\partial S}{\partial L/\partial S}\frac{\partial Q}{\partial(\partial P/\partial S)}-\frac{w}{\partial L/\partial S}\frac{\partial(\partial L/\partial S)}{\partial(\partial P/\partial S)}\right]=\left[\frac{w}{Q}\frac{\partial Q}{\partial(\partial P/\partial S)}-\frac{w}{\partial L/\partial S}\frac{\partial(\partial L/\partial S)}{\partial(\partial P/\partial S)}\right]=$$

$$=\lambda\frac{w}{\partial P/\partial S}\left[\frac{\partial P/\partial S}{Q}\frac{\partial Q}{\partial(\partial P/\partial S)}-\frac{\partial P/\partial S}{\partial L/\partial S}\frac{\partial(\partial L/\partial S)}{\partial(\partial P/\partial S)}\right]=$$

$$=\lambda\frac{w}{\partial P/\partial S}\left[e_{Q,\partial P/\partial S}-e_{\partial L/\partial S,\partial P/\partial S}\right]=\lambda\frac{w}{\partial P/\partial S}(-1)=-\lambda\frac{w}{\partial P/\partial S}$$

$$\frac{\partial U^{*}}{\partial(\partial P/\partial S)}=-\lambda\frac{w}{\partial P/\partial S}\ and$$

$$\frac{\partial U^{*}}{\partial|\partial P/\partial S|}=-\lambda\frac{w}{|\partial P/\partial S|}$$