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Consumption-Leisure Complementarity versus Income Elasticity of Demand under Equilibrium Price Dispersion

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> *"There was George, throwing away in hideous sloth the unestimable gift of time; his valuable life. Every second of which he would have to account for hereafter, passing away from him, unused. He might have been up stuffing himself with eggs and bacon, irritating the dog, or flirting with the slavey, instead sprawling there, sunk in soul-clogging oblivion." (Jerome K.J. Three men in a boat (to say nothing of the dog) 1889, p.63)*

If the time horizon for consumption is divided between labor, search, and leisure, the search represents any activity, which decreases labor costs of the purchase price. The search costs are allocated between pre-purchase search and after-purchase treatment of the bought item, including shopping and home production. While these activities reduce leisure time and might be pleasurable, the search does not enter directly into the consumption-leisure utility function. The search determines the equilibrium price reduction, which creates marginal savings on purchase and serves as the part of the budget constraint to the optimal consumption-leisure choice under the equilibrium price dispersion. In this way the search provides both the consumption-leisure substitutability and complementarity.

The income elasticity of demand produces the trade-off between efficiency and pleasure for both pre-purchase search and after-purchase treatment. The search for inelastic demand is very efficient in malls while the search for elastic demand is more pleasurable either like the habit of leisurely shopping in boutiques or in the form of the willingness to take care of purchased big-ticket items.

The trade-off between efficiency and pleasure of the after-purchase treatment including home production becomes clear on the analytical level of the attributes of the purchased item when the demand for cars is analyzed as the demand for mileage, the demand for trees in gardening is observed like the demand for fruits, and the demand for vinyl disks depends on number of records of songs and symphonies.

The income elastic demand of attributes hides the shift from the "common model" of behavior to the "leisure model" when consumers purchase excessive and unnecessary quantity of attributes that gets the negative marginal utility of consumption.
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1.Introduction

The problem of the consumption-leisure complementarity plays an important role in the analysis of different fields in economic science, from the economics of taxation to the theory of real business cycle. The theory of the optimal consumption-leisure choice under equilibrium price dispersion discovers some critical trade-offs of the allocation of time that enable the understanding of everyday consumer behavior where the search serves as the vehicle to the consumption-leisure complementarity and substitutability.

The main objective of the search activity is to decrease labor costs of purchase. Sometimes the pre-purchase search includes the choice between different options of after-purchase costs of treatment that can be either included in the purchase price or imposed on the buyer. The trade-off between ***willingness to pay*** for an item and ***willingness to take care*** of it takes place. In this sense search costs are divided between *ex ante* costs $S_{ex\,ante}$ and *ex post* costs $S_{ex\,post}$. Both $S_{ex\,ante}$ search costs and $S_{ex\,post}$ search costs substitutes not only labor costs. The search also changes leisure time. However, when search substitutes leisure it should be more or less pleasant. But in general the rate of pleasure in consumption is

discovered by the income elasticity of demand. By this way the problem of consumption-leisure complementarity comes to the analysis of changes in the allocation of time between labor, search, and leisure under wage growth.

The discussion about income elasticity of education represents a good illustration of the scope of the analysis presented in this paper. While traditionally education is esteemed as a luxury (Friedman [1969] 2005), there are some doubts in its income elasticity (Haq 2011). The model of the optimal consumption-leisure choice reminds that education includes not only the classroom practice but also the homework. The last one can be considered as the after-purchase treatment with *ex post* search costs. Here the problem of the willingness to take care of the bought item, i.e., the pleasure of homework with regard to the leisure itself, becomes very important. And the dependence of the income elasticity of education on the willingness to substitute leisure by homework seems to be unequivocal.

However, the willingness to work at home depends on the education program, which consists of different subjects and fields of study. And these subjects might initiate different willingness to work at home. By this way the economic analysis in general as well as the analysis of the income elasticity and the allocation of time in particular should descend to the lower level of the attributes of education, i.e., to the level of fields of study.

2.Search as the vehicle for the substitutability of consumption and leisure

The model of consumption-leisure choice under equilibrium price dispersion takes the search as the general activity, which decreases the price of purchase. This consideration automatically establishes the labor-search relationship in the form of the propensity to search $\partial L/\partial S<0$. The propensity to search tells us that any activity, either before or after the purchase, which decreases the labor supply at the given wage rate for the consumption, can be regarded as the search. While the shopping represents the search itself with its *ex ante* search costs $S_{ex\ ante}$, home production and any after-the-purchase treatment of the bought item that can be included in the price at the moment of purchase is considered to be *ex post* search costs $S_{ex\ post}$. This consideration explains the establishment of the equilibrium price at the level of the willingness to accept or to sell of buyers with positive search costs:

$$w(L+S) = -QT\partial P/\partial S = QP_e \quad (1)$$

The rule of the equilibrium price simply re-writes the budget constraint for the implicit maximization of consumption-leisure utility $U(Q,H) = Q^{-\partial L/\partial S}H^{\partial H/\partial S}$, which is constrained by the equation of the marginal costs of search to its marginal benefit, given by the explicit cognitive process of search of the optimal price for the pre-determined quantity to be purchased:

$$w\frac{\partial L}{\partial S} = -w\frac{L+S}{T} = Q\frac{\partial P}{\partial S} \quad (2)$$

The common question about money in the utility function gets here the direct answer. While the purchase explicitly starts with the search of the quantity demanded for the fixed time horizon, the shopping process covers the implicit adjustment of both marginal values of money and leisure to its optimal values. And the search plays a central role in this adjustment because at the optimal level we get not only the marginal utility of the wage rate but also the marginal (dis)utility of the price reduction Malakhov 2013,2015):

$$MU_w = \lambda \quad (3.1)$$

$$MU_{\partial P/\partial S} = -\lambda\frac{w}{\partial P/\partial S} \quad (3.2)$$

These considerations answer to the other common question about the utility of home production. Traditional approach to the allocation of time includes home production into the utility function (Becker 1965). If we take home production as the form of *ex post* search that decreases the purchase price of final products to the price of inputs, the analysis of the utility of search seems to become compulsory. But it does not matter. The search already takes part in the maximization of utility because it changes the part of the budget constraint $\partial P/\partial S<0$. When the search decreases the absolute value of price reduction $|\partial P/\partial S|$ under the law of diminishing return $\partial^2 P/\partial S^2>0$ it increases the utility $U(Q,H)$. The search raises cash balances to be spent on consumption and cuts the leisure time. Here the search increases the utility until marginal utilities of both money an leisure get its optimal values for the given quantity and for the given

time horizon. Indeed, when the search explicitly represents the choice of a price for the quantity demanded for the given time horizon, the implicit trade-off between marginal utilities of money and leisure takes place. Of course, at the moment of purchase the final adjustment can be done because the quantity demanded does not definitely mean the quantity purchased (McCafferty 1977). And the time horizon can be also reconsidered. But this final adjustment simply states the fact that explicitly the purchase follows the implicit optimization process of the consumption-leisure choice under price stickiness. And the search also plays here the important role because with incurred *ex ante* costs and planned *ex post* costs it determines the reduction of sticky price ∂P/∂S at the moment of purchase. We can buy the roast beef in the restaurant but we can also can make it at home and get the price reduction with regard to the price in restaurant. We can buy at the moment the big orange tree at high price and enjoy it by viewing only with watering and spring fertilization but we can also buy a small tree at low price and enjoy it not only by its viewing but also by its growing with our everyday care. We are also "buying" miles in the same way – we can get taxi or we rent a car and enjoy driving itself.

All these examples tell us that the search works as the substitute for the leisure. Either the search for an item to be purchased or the after-purchase treatment of this item provides some pleasure. It means that the search not only facilitates the understanding of consumption-leisure substitutability but it works like a vehicle for this substitutability. We can change the optics of the analysis and look at the consumer choice from the point of view of the quantity to be purchased. If we take the allocation of time with regard to consumption for the given time horizon we simply state the fact that:

$$T=L+S+H; \ 0=\partial L/\partial Q+\partial S/\partial Q+\partial H/\partial Q \quad (4)$$

Here we get the illustration of the economy on scale of search for the given labor-consumption relationship ∂L/∂Q. If the economy on scale of the search does not take place or the value of the search-consumption relationship ∂S/∂Q is significant we get an unimportant value of the marginal rate of substitution of leisure for consumption MRS=∂Q/∂H that facilitates the substitution. Indeed, people can substitute leisure by pleasurable search $S_{ex\ ante}$ and after-the-purchase care $S_{ex\ post}$ of important items. On the other hand, when we make purchases of necessities in malls, where we really gets the economy on scale of search (we get the values $\partial S/\partial Q_{min}$ and $\partial Q/\partial S_{max}$), we arrive to the important value of the MRS=∂Q/∂H which enables the complementarity. There, in malls, the search is not so pleasurable as in boutiques.

The last consideration becomes more important when we turn to the question what happens with the search-leisure substitutability under the increase in wage rate. Other words, we should pay attention to the income elasticity of demand.

3.The income elasticity of demand

We start with the general overview of the wage elasticity of demand in the "common model" of behavior, which keeps marginal utilities of both consumption and leisure positive in the following Cobb-Douglas utility function:

$$U(Q,H)=Q^{-\partial L/\partial S}H^{-\partial H/\partial S} =Q^{(L+S)/T}H^{H/T}$$
$$subject\ to\ w\partial L/\partial S=Q\partial P/\partial S \qquad (5)$$

The key attribute of the "common model" is the negative search-leisure relation ship (∂H/∂S<0) that limits the propensity to search:

$$-1<\partial L/\partial S<0 \quad (6.1)$$

It is easy to present the value of propensity to search in the "common model" with regard to the allocation of time (Malakhov 2013):

$$\partial L / \partial S = -w\frac{L+S}{T} \quad (6.2)$$

The Equation (6.2) determines the behavior of the marginal costs of search:

$$\partial^2 L/\partial S^2<0 \quad (6.3)$$

The Equation (6.3) tells us that the increase in the absolute value of the propensity to search takes place when consumers increase the time of search. The reduction in the search time in favor of both labor and leisure diminishes the absolute value of the propensity to search.

The analysis of the income elasticity comes to the question what happens with the allocation of time under the wage growth. Other words, we should analyze the wage elasticity of the propensity to search. We can present the budget constraint in the elasticity form with respect to the wage rate where we can take the absolute value of the propensity to search for the better understanding of its behavior:

$$w\frac{\partial L}{\partial S} = -w\frac{L+S}{T} = Q\frac{\partial P}{\partial S} \Rightarrow 1 + e_{|\partial L/\partial S|,w} = e_{Q,w} + e_{|\partial P/\partial S|,w} \quad (7)$$

The increase in wage rate produces two effects – the income effect and the consumption effect. We can present theses effects for the given time horizon in the following form:

$$dL(w,Q(w))+dS(w,Q(w))+dH(w,Q(w))=0 \quad (8)$$

These effects change the allocation of time. We can avoid cumbersome calculations of differentials if we take the graphical presentation of changes in the allocation of time under wage growth (Figure 1):
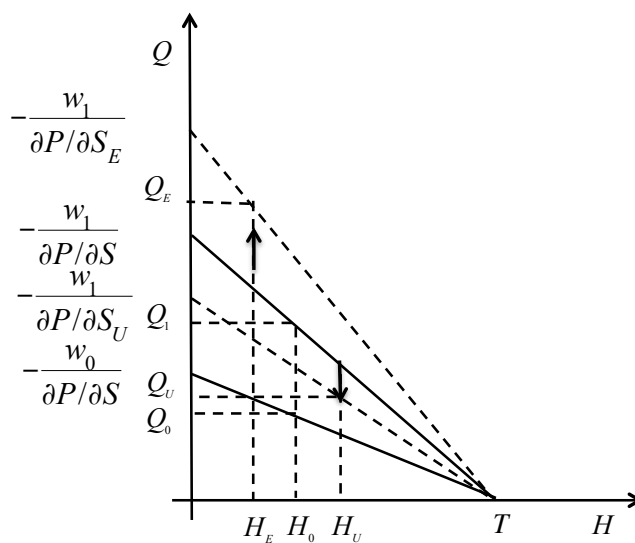
Figure 1. Allocation of time with regard to the wage elasticity of consumption

We see that income inelastic demand Q_U increases leisure while income elastic demand Q_E reduces it. The unit elasticity Q_I does not change the allocation of time.

Here we have the starting consumption pattern (Q_0,H_0) at the budget constraint $(T;w_0/(-\partial P/\partial S))$. The increase in wage rate rises the budget constraint to $(T;w_1/(-\partial P/\partial S))$. The unit elasticity does not change the allocation of time and the consumption pattern becomes (Q_I,H_0). The increase in the inelastic demand reduces the search and increases the leisure to (Q_U,H_U). The budget constraint $(T;w_1/(-\partial P/\partial S))$ shifts downward to $(T;w_1/(-\partial P/\partial S_U))$ because the reduction of search increases the absolute value of the equilibrium price reduction $|\partial P/\partial S|$. The increase in the elastic demand expands the search and cuts the leisure to (Q_E,H_E). The budget constraint $(T;w_1/(-\partial P/\partial S))$ shifts upward to $(T;w_1/(-\partial P/\partial S_E))$ because the increase in search reduces the absolute value of the equilibrium price reduction $|\partial P/\partial S|$.

We see that the increase in wage rate results in different budget constraints for different elasticity of demand. This happens because both income and consumption effects change the allocation of time. The increase in wage rate makes the search less interesting. As a result, the income effect reduces the time of search. When the consumption effect is unimportant and small, i.e., when the consumption is income inelastic, consumers increase both labor and leisure time and cut search efforts under large income effect. The reduction in time of search increases the absolute value of the equilibrium price reduction $|\partial P/\partial S|$ under the diminishing efficiency of search, or $\partial^2 P/\partial S^2>0$.

However, the reduction in time of search decreases the absolute value of the propensity to search $|\partial L/\partial S|$ (Equations 6). It means that the wage elasticity of the absolute value of the propensity to search is negative, or

$$e_{|\partial L/\partial S|,w} < 0 \qquad (9)$$

Coming back to the Equation (7), we can see that even under the constant price reduction $|\partial P/\partial S|$ the wage elasticity of consumption falls below the unity level. And the positive income elasticity of the absolute value of price reduction makes the consumption more inelastic:

$$e_{|\partial L/\partial S|,w} < 0; \; e_{|\partial P/\partial S|,w} = 0; \; e_{Q,w} < 1 \qquad (10.1)$$
$$e_{|\partial L/\partial S|,w} < 0; \; e_{|\partial P/\partial S|,w} > 0; \; e_{Q,w} << 1 \qquad (10.2)$$

If we take into account the increase in labor time, the total income elasticity of demand falls dramatically:

$$e_{|\partial L/\partial S|,w} < 0; \; e_{|\partial P/\partial S|,w} > 0; \; e_{Q,w} << 1; \; e_{Q,wL} <<< 1 \qquad (10.3)$$

The analysis of the income elastic demand is more sophisticated. To provide the income elastic demand consumers need the positive wage elasticity of the propensity to search $e_{|\partial L/\partial S|,w} > 0$. It seems that elastic demand should increase the individual labor supply. But in order to increase consumption of elastic goods by the way of the increase in labor supply consumers will cut both search and leisure time. The search-leisure relationship becomes positive, or $\partial H/\partial S > 0$ due to the strong propensity to search, or $\partial L/\partial S < -1$. And they quit the "common model" and follow either "labor" or "leisure" model of behavior (Malakhov 2015, 2018a). However, under models the propensity to search changes its value:

$$\partial L / \partial S < -1; \partial L / \partial S = -\frac{H+T}{T} \qquad (11)$$

We can see that "labor model", where consumers reduce both search and leisure and leisure gets the negative marginal utility, cannot produce the elastic demand because the reduction of leisure time makes the wage elasticity of propensity to search negative. In the "leisure model" both consumption and money get the negative marginal utility, i.e., become excessive and unnecessary. Here, the positive wage elasticity of the propensity to search takes place only when consumers increase leisure time in order to compensate the negative marginal utility of excessive and unnecessary consumption. While the search-leisure relationship becomes positive, it changes the consumption-leisure relationship that also becomes positive, or $\partial Q/\partial H > 0$. And consumers should decrease labor supply.

There is another way to provide the income elastic demand. The consumption effect can keep the elastic demand within the "common model" with positive marginal utility of both consumption and leisure as it presented by Figure 1. However, here consumers also should reduce labor supply in favor of search. Moreover, they should substitute leisure by pleasurable pre-purchase search and after-purchase care.

4. Pleasurable search and care

Figure 1 definitely states the fact that in the "common model" the wage elastic demand decreases the time for leisure. The Equation 7 supports this visual conclusion. The wage elastic demand $e_{Q,w} > 1$ needs the increase in the absolute value of the propensity to search. But the increase in non-leisure time means the decrease in leisure time. However, when the behavior of the propensity to search is determined by $\partial^2 L/\partial S^2 < 0$ rule (Equation 6) the rise in its absolute value takes place only with increase in the time of search and the decrease in labor supply.

The increase in the time of search reduces the absolute value of the equilibrium price reduction $|\partial P/\partial S|$. But the rule of the diminishing efficiency of search $\partial^2 P/\partial S^2 > 0$ tells us that the total wage elasticity of marginal benefits should be greater than one, or

$$e_{Q,w} + e_{|\partial P/\partial S|,w} > 1 \qquad (12)$$

Indeed, we cannot expect that under the search the price is falling faster than the consumption is rising. The Equation (12) also states the fact that wage elastic demand can be produced only with the increase in time of search and the respective growth of the absolute value of propensity to search.[1]

The income effect increases the absolute value of the equilibrium price reduction because the search becomes less interesting with regard to the new level of wage rate but the large consumption effect

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[1] Here we should take with prudence the idea of price elasticity because under the search it does not correspond completely to the general concept of price elasticity (S.M.)

of the elastic demand overwhelms the income effect and decreases the absolute value of the equilibrium price reduction.

We can see how both the positive wage elasticity of the propensity to search and the negative wage elasticity of the equilibrium price reduction increase the wage elasticity of consumption. In addition, the decrease in the wage elasticity of labor supply also reinforces the total income elasticity of demand:

$$1 + e_{|\partial L/\partial S|,w} = e_{Q,w} + e_{|\partial P/\partial S|,w} \; ;$$
$$e_{|\partial L/\partial S|,w} > 0; \; e_{|\partial P/\partial S|,w} < 0; e_{Q,w} > 1 \quad (13.1)$$
$$e_{L,w} < 0; \; e_{Q,wL} >> 1 \quad (13.2)$$

However, when we talk about income elastic demand we really need the rise of income in order to provide the consumption growth. And it is hardly compatible with the negative wage elasticity of labor supply. At least, in order to provide the elastic demand the decrease in labor supply should be insignificant. Here the search should cut primarily the leisure. It means that for the given time horizon the phase of enjoyment from the purchase, i.e., the time of leisure, should be much greater than the time to work and to search:

$$|\partial L/\partial S| << |\partial H/\partial S| \quad (14.1)$$
$$(L+S)/T << H/T \quad (14.2)$$

But in order to substitute leisure the search should be rather pleasurable. It is simple to imagine the enjoyable pre-purchase search, or $S_{ex\ ante}$. People really enjoy the shopping of elastic goods. This is not the same as the everyday shopping of necessities. And there is no economy on scale of search in boutiques that takes place in malls. Here the value of consumption-search relationship $\partial Q/\partial S$ is very low. People walking down the streets and look leisurely at the windows of boutiques. In some sense, the search looks here very inefficient but just this feature makes it really comfortable. In addition, the unimportant $\partial Q/\partial S$ value results in the low marginal rate of substitution $MRS=-\partial Q/\partial H$, which facilitates the substitution of leisure for consumption.

The best example of pleasurable pre-purchase search is clothing that Blundell and Walker considered as the substitute to female leisure (Blundell and Walker 1982).

We see that the "common model" requires a large consumption effect for elastic demand. When income effect starts to dominate consumption effect the item becomes the necessity and its elasticity declines. Here the question what happens with unit purchases becomes reasonable, when we buy a car or an electronic device, for example. In these cases the consumption effect can be proved only under the model of attributes (Lancaster 1966). If we come back to the analysis of Blundell and Walker who considered transport to be the strong substitute to male leisure, we can explain that phenomenon only by the intention of men to purchase the mileage.

However, if we take the mileage as the key attribute of the elastic demand for transport we should agree with the assumption that driving represents the form of specific "home production" with regard to the corresponding market service provided by taxi drivers (Malakhov 2018b).

When after-purchase treatment of an item decreases its purchase price the after-purchase costs can be considered as *ex post* search costs $S_{ex\ post}$. And with the help of the model of attributes we can take it as the form of home production. While the statistics on the income elasticity depends on the methodology and sometimes it gives inconsistent results, we can illustrate this specific elastic demand, followed by *ex post* search, by some common examples.

In medical care the increase in quantity of medical services is supported by visits to medical centers. In education the process of learning at schools if followed by homework. In tourism the recreation needs travelling. However, to become real substitutes for leisure in the "common model" all these activities should decrease the price of consumption with respective decline in the absolute values of marginal savings $|\partial P/\partial S|$. And the price reduction takes place with regard to the corresponding market service. In medical care visits to medical centers substitutes expensive domiciliary visits. In education the homework decreases the price of teaching. A road trip reduces time to be spent on the seaside but it is cheaper than the airplane journey.

Coming back to the inconsistent results of the analysis of income elasticity (Malakhov 2018a) we can explain this inconsistency with the help of the consumption-search relationship. When we go to medical center and try to pass few examinations during one visit we get the economy on scale of the search. Therefore, such medical services are not more than necessities. But when reading medical

journals and careful choosing of an appropriate medical center precedes the examination, it really becomes a luxury good.

The allocation of time responds definitely to the change in quantity to be purchased for this very specific elastic "home production". We get the value $\partial L/\partial Q<0$ because we try to buy cheap inputs, the value $\partial S/\partial Q>0$ because we undertake important efforts to add value to cheap inputs, and the value $\partial H/\partial Q<0$ because these pleasurable efforts reduce leisure itself.

Here we get the direct resemblance with the analysis of the "theorem of lemons". There we stated the fact that the equilibrium price of a mile for the car with expected great mileage consists of lower labor costs per mile but higher search and care costs per mile than for the car with short expected mileage. When we buy the potted orange tree we expect to get pleasure from its growth, this is the quantity in centimeters or in oranges demanded, and its viewing, i.e., hours of leisure. Unfortunately, potted oranges have some lifecycle and the big potted orange tree has shorter time horizon than the small tree. As a result, the labor costs per orange, i.e., the purchase price per centimeter or fruit, will be less for the small tree than for the big tree. But costs of care per centimeter or per fruit will be greater for the small tree. We become really attached to the plant under our personal care.

Here again we should pay attention for such dual activities like gardening and pets' care that was classified by Aguiar and Hurst like leisure as well as home production because these activities are something one can purchase on the market (Aguiar and Hurst 2007). Now when we talk about pleasurable care, i.e., about *ex post* search costs that substitute leisure, we can say that if some leisure activity decreases the price of consumption with regard to the corresponding market service, it should be classified as home production.

However, the turn to K.J.Lancaster's microeconomics hides the pitfall of the "leisure model" of behavior. We can buy a very good car but we can have not enough time to use completely its horsepower. The same thing takes place when we have no time to use all the functionality of an electronic device even its demand is very elastic. It means that we buy some excess attributes. Here the best illustration can be found in the practice of sales of vinyl records.

We can spend a lot of time to treat the disk, i.e., to bear $S_{ex\,post}$ costs. But the cleaning, although it gives us some pleasure, cannot substitute listening of records. And there are too much songs or symphonies. Other words, we need some leisure time to enjoy the item. The deficit of leisure occurs and it results in the "leisure model" of behavior. The 7-inch disk needs less time to clean it as well as less time to listen it than the 12-inch disk. It means that the time for both after-purchase care and leisure is increasing. The leisure-search relationship becomes positive, or $\partial H/\partial S>0$. This is the "leisure model" of behavior where some records get negative marginal utility because they are excessive and unnecessary.

We see that the income elastic demand again takes place when the wage elasticity of labor supply is negative. Buying elastic goods, consumers come to the side of the pitfall of the "leisure model". The cut of labor time is being rewarded by savings on purchase $Q\partial P/\partial S$. At the higher wage rate level the consumer can afford to change the price niche and to buy products of higher quality. For example, the consumer chooses 18-year whiskey instead of 12-years aged. And there he discovers some new things. First, he recognizes the fact that he can get more marginal saving on purchase $|\partial P/\partial S|$ for the same quantity of drinks Q. Second, he discovers the better taste. And he undertakes two commonsense actions. First, he continues the search until he gets great price discount. He does it not only because Jones are living aside and he should confirm his reputation of the smart-shopper but because high price gives him a chance to make an economy with respect to his wage rate. Second, he changes the consumption-leisure pattern. Usually changes in the quality are followed by changes in consumption patterns. While one 12-years drink has taken a quarter of an hour, the 18-years drink with better taste takes a half an hour. It means that the consumer increases both search and leisure time. The same thing happens with meals. Let's take a consumer who has usually prepared the cheap pork with potatoes but after the increase in wage rate he decides to cook the expensive veal with eggplants under the delicious red wine-based sauce. Evidently both the time of search of inputs and the time of cooking are increasing. It's not worth debating here that a time for dinner party is also increasing.

This is just the pitfall of the "leisure model". When the leisure-search relationship becomes positive, or $\partial H/\partial S$, the negative elasticity of labor supply turns out to be stronger under the vigorous propensity to search $\partial L/\partial S<-1$. Now the propensity to search is calculated not on the base of labor and search costs $w(L+S)$ but on the base of costs of *missed pleasure* $w(H+T)$. Tasting the 18-years whiskey, we increase quantity of drinks because we want to compensate high-quality drinks that have been missed before (Malakhov 2017, 2018a).

Just here the income elastic demand takes place with the increase in leisure time. But the vigorous propensity to search changes the consumption-leisure relationship $\partial Q/\partial H$. It becomes positive. This change occurs because the marginal utility of leisure becomes negative. But if it is negative we should expect here the decrease in both leisure and search in favor of labor. The increase in both leisure and search can be explained only by the change of the sign of the Lagrangian multiplier. When it becomes negative the leisure recovers its positive marginal utility but now the marginal utility of consumption turns out to be negative. However, the consumer does not feel the decrease in utility. Conversely, he feels better because the negative marginal utility of labor income $\lambda=MU_w$ changes the sign of the marginal disutility of price reduction (Equations 3.1, 3.2). The change of price niche and the following increase in the absolute value of price reduction $|\partial P/\partial S|$ now raises the utility level.

We see that leisure and search become **complements** in the "leisure model" of behavior. And this **quasi-complementarity** between consumption and leisure appears because now "bad" consumption complements "good" leisure. There even the home production might result in unnecessary consumption, producing the "gardening on the boat" effect (Malakhov 2012).

5. Conclusion

The analysis of consumption-leisure complementarity under the equilibrium price dispersion discovers another critical difference in the behavior of *shoppers*, i.e., consumers with zero search costs, and *searchers,* i.e., consumers with positive search costs. Shoppers reduce labor supply for the inelastic demand and increase it for the elastic demand (Malakhov 2014). The search produces the opposite effects. Searchers increase labor supply for inelastic demand and cut it for elastic demand, either under "common" or "leisure model" of behavior.

Taken alone, the income effects definitely moves the elastic demand towards the "leisure model" of behavior with the consumption of unnecessary items (Malakhov 2018a). However, the willingness to take care of quality items keeps the marginal utility of elastic consumption positive within the "common model" of behavior. But this reconsideration of behavior needs more detailed analysis of consumption on the level of its attributes.

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