Invisible hand at consumption-leisure production possibility frontier: the allocation of time between goods and services under wage and price dispersions.

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Abstract

If the equilibrium price is equal to the lowest willingness to pay of consumers with zero search costs, it accumulates under price dispersion the willingness to sell of consumers with positive search costs. The searcher buys optimally at a low price, which equalizes marginal costs of his search with its marginal benefit and maximizes his consumption-leisure utility but now with respect to the equilibrium price. The suboptimal satisficing purchases represent corner solutions; consumers either buy optimally or quit the market.

The producer meets the consumer with a price, like he knows in advance his willingness to pay and the time spent on search. The consumption-leisure production possibility frontier optimally allocates his time between production and delivery; it determines not only the quantity to be purchased and the price, but also the meeting point, where the producer stops consumer's search and sells him goods with leisure. Being unaware of how much the consumer has spent on labor and search, the producer unintentionally optimizes his consumption-leisure choice.

Key words: invisible hand, consumption-leisure choice, production possibility frontier, search, price dispersion
JEL classification: D11, D83.

Introduction

The voluminous literature on the Invisible hand can be divided into three general threads: the skeptical, regarding this famous notion as the metaphor (Stiglitz 2002, Schlefer 2012); the enthusiastic, recognizing its role in the analysis of the self-interested individual behavior (Stigler 1976, Sen 2009); and the teleological, if not theological, based on Adam Smith's religious background (Macfie 2003, Oslington 2012).

The enthusiastic approach to the most famous allegory of the economic thought is owing to the continued interest in inner workings of the market in itself. Indeed, "*the view that competitive equilibria have some special optimality properties is at least as old as Adam Smith's invisible hand…*" (Arrow 1985, p.110).

The transformation of the classical consumer labor-leisure choice into the labor-search-leisure choice discovers some optimality properties of imperfect markets and their potentials to the self-organization under price dispersion (Malakhov 2018). This methodological comeback to the basic principles of microeconomics is explained by the recent trends in the economics of search. Its fundamental results had been successfully documented by two comprehensive overviews (Baye *et al*. 2006, McCall and McCall 2008). And during last years the economics of search has been developed in the very promising direction of matching modeling; the issue that seems to be very important in the understanding of the inner coherence of the economy. However, sometimes the outcomes of this research thread look to a large extent instrumental, paying attention to particular attributes of the matching process like matching stability (Liu *et al*. 2014), meeting technologies (Lester *et al*. 2014), or sorting through search (Chade *et al*. 2017).

The instrumental approach to the search and matching pays more attention to active buyers and sellers, and less attention to the potentials of the market in resources allocation where time remains the most important input. The labor-search-leisure model demonstrates how the search is rewarded by the purchase price, which provides the optimal allocation of consumers' time between labor, search, and leisure. However, the efficient search doesn't mean that active consumers calculate marginal values of his efforts. When they follow the simple 'it's enough to spend time' rule, the marginal values of search become automatically equated. It looks like the producer who is unaware of consumers' allocation of time comes to the right place at the right time with the 'just price', which unintentionally maximizes the consumption-leisure utility function (Malakhov 2020b). However, the question how the producer invariably comes there remains the open issue for qualitative assessment of the inner market mechanism, presented literarily by Adam Smith: "*he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention*" (Smith 1976, *Wealth of Nations*, p.456).

This paper tries to answer to this question. The analysis of the Invisible hand is organized as follows.

Part I starts with the presentation of the behavioral labor-search-leisure choice. The behavioral explicit choice model is transformed into the implicit consumption-leisure utility maximization model. The paper tries to minimize the cumbersome examination of marginal values of search, used earlier in the labour-search-leisure model. Here, the analysis of the consumption-leisure utility is levelled up to absolute values, which facilitate the presentation of the inner coherence of the market.

Part II presents the particular consumption-leisure production possibility frontier. The paper argues that producers, delivering goods to some point of sale, provide not only consumption but also leisure time, and their simple self-interested decisions result in the maximization of customers' consumption-leisure utility.

Part III pays attention to home production and dual activities. When the time horizon until next purchase is divided between labor, search, and leisure, home production represents a specific form of search where consumers search low prices for inputs with respect to the market value of finished goods. When the home production provides some pleasure, it becomes a dual activity where the willingness to pay depends on the leisure-search trade-off like it happens in pleasurable shopping that takes place in boutiques.

Part I. Labor-search-leisure model

If we start with the traditional problem of search for the fixed quantity demanded Q (Stigler 1961), we get the intersection of $QP(S)$ curve and labour income $wL(S)$ curve with regard to the time of search S:

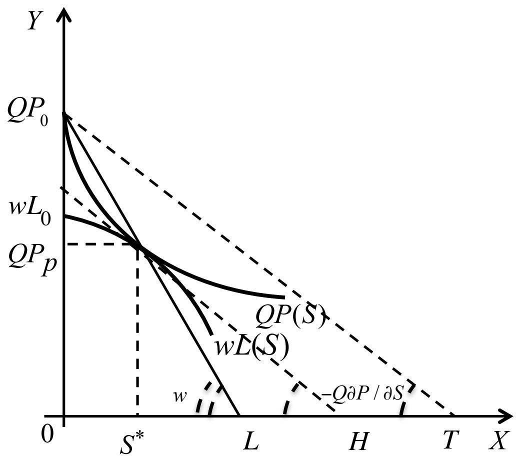

Fig.1. Behavioral optimal search

where S – the search; L – labor; H – leisure; T – time horizon until next purchase; Q – quantity demanded; w – wage rate; wL_0 – willingness to pay; P_P – purchase price.

The straight line with the slope w, passing the intersection point, i.e., the purchase, gives us the QP_0 value on the $0Y$ axis and $(S+L)$ value on the $0X$ axis. The straight dotted line from the point QP_0 with the slope ($-Q\partial P/\partial S$), i.e., the tangent to the moment of purchase, gives us the value of the time horizon T on the $0X$ axis.

These considerations result in the following equation:

$$w(L+S) = -Q\frac{\partial P}{\partial S}T = QP_0 \quad (1)$$

The behavioral model of the optimal search uses the assumption of the diminishing efficiency of the search or $\partial^2P/\partial S^2>0$. However, the shape of the labor cost curve $\partial^2wL/\partial S^2<0$ can and should be proved.

Let's take Eq.1 as the budget constraint to some consumption-leisure utility function $U(Q,H)$, keeping in mind that for the given time horizon $T=L+S+H$ the value $\partial L/\partial H+\partial S/\partial H=-1$:

$$\mathcal{L} = U(Q,H) + \lambda(w(L+S) - QP_0) \tag{2.1}$$

$$\frac{\partial \mathcal{L}}{\partial Q} = \frac{\partial U}{\partial Q} - \lambda P_0 = 0 \tag{2.2}$$

$$\frac{\partial \mathcal{L}}{\partial H} = \frac{\partial U}{\partial H} + \lambda w\left(\frac{\partial L}{\partial H} + \frac{\partial S}{\partial H}\right) = \frac{\partial U}{\partial H} - \lambda w = 0 \tag{2.3}$$

$$\frac{\partial U/\partial H}{\partial U/\partial Q} = MRS(H\ for\ Q) = \frac{w}{P_0} \tag{2.4}$$

For the moment this utility function looks implicit because here the value of consumption Q becomes a variable, and value of price reduction $\partial P/\partial S$ stays constant (Fig.2):

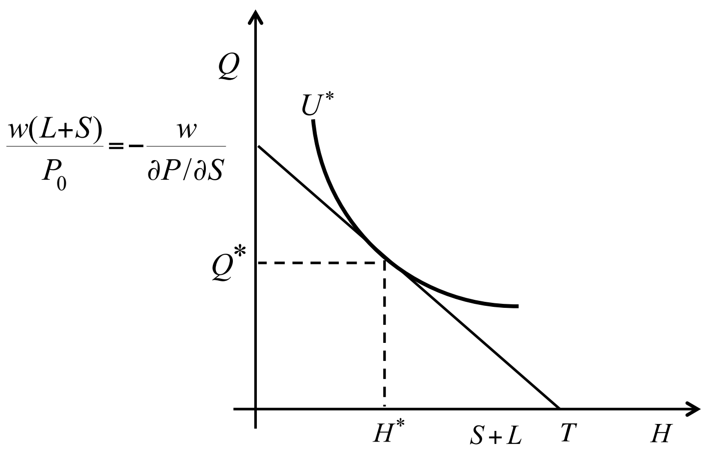

Fig.2. Consumption-leisure utility

where S – search; L – labor; H^* – leisure; T – time horizon until next purchase; Q^* – quantity purchased; U^* - consumption-leisure utility.

However, its implicit optimal solution, where the fixed $\partial P/\partial S$ value displays the given place of purchase, matches the optimal explicit behavioral choice when the variable $\partial P/\partial S$ value exhibits a sequential search. There, the search really becomes optimal because Eq.1 also provides the equality of its marginal values at the purchase price level:[1]

$$QP_0 = -Q\frac{\partial P}{\partial S}T \ = w(L+S) \tag{3.1}$$

[1] The equation of the marginal values of search (3.2) is used as the constraint in the basic labour-search-leisure model where it produces very specific values of the marginal utility, which nevertheless give the same results

$$Q\frac{\partial P}{\partial S}=-w\frac{L+S}{T}=w\ \frac{\partial L}{\partial S} \tag{3.2}$$

While the value of the marginal benefit on purchase $Q\partial P/\partial S$ is widely used in economics either with respect to the units of search (Stigler 1961) or to the time of search (Aguiar and Hurst 2007b), the value of the marginal costs looks rather unusual. Here, it is equal to the wage rate times the *propensity to search* $\partial L/\partial S$. This is the key variable of the labor-search-leisure model. The propensity to search provides the optimal allocation of time in the explicit behavioral model and the maximization of the implicit consumption-leisure utility. But its value comes from the simple natural reasoning. When we fill the glass (time horizon) with whiskey (labor) and soda (leisure), an ice cube (search) spills the drink over the edge of the glass. The volume of the spilled soda is equal to the volume of the ice cube times the soda's share in the glass or

$$dH(S)=-dS\frac{H}{T}=dS\frac{\partial H}{\partial S} \tag{4.1}$$

$$L+S+H=T_{const;}\frac{\partial L}{\partial S}+1+\frac{\partial H}{\partial S}=0 \tag{4.2}$$

$$\frac{\partial L}{\partial S}=-1+\frac{H}{T}=-\frac{L+S}{T} \tag{4.3}$$

Now it is easy to show with Eq.4.3 that the derivative of the value of the propensity to search $\partial L/\partial S$, when$1<\partial L/\partial S<0$, is negative, or $\partial^2 L/\partial S^2<0$.[2]

The logic of the behavioral model takes the value of time horizon as the time until next purchase. The analysis of the propensity to search shows that the value of the time horizon doesn't appear accidental in the behavioral search model. It really gives a consumer some leisure time to enjoy the item. However, the time horizon is often pre-determined by some calendar. If it takes place, the Eq.1 is ceasing to be unconditioned.

The confirmation of the reliability of the budget constraint (Eq.1) needs some algebraic manipulations. First, we rearrange it to get the physic trade-off between leisure and consumption:

$$w(L+S)=QP_0\Rightarrow\frac{w}{P_0}=\frac{Q}{L+S}=MRS\ (H\ for\ Q) \tag{5}$$

[2] While the value $\partial L/\partial S$ is always negative because labour and search represent alternative sources of income, it might come to $\partial L/\partial S<-1$. Here the consumption-leisure choice occurs under the leisure model of behaviour where the positive leisure-search relationship $\partial H/\partial S>0$ results in positive $\partial Q/\partial H$ trade-off, which produces negative marginal utilities and anomalies like Veblen effect. But when it happens, the natural analogy with the whiskey, soda, and ice doesn't work. The economic choice looses its natural grounds, and the Invisible hand becomes helpless (Malakhov 2018).

If the consumer early stops the search, its marginal costs will be less than its marginal benefit. The inequality of the marginal values of search at the purchase price level results in the corner solution at the equilibrium price level:

$$-w\frac{L+S}{T} > Q\frac{\partial P}{\partial S} \tag{6.1}$$

$$w(L+S) < Q\frac{\partial P}{\partial S}T = QP_0 \tag{6.2}$$

$$\frac{w}{P_0} < \frac{Q}{L+S} \tag{6.3}$$

Theoretically, this situation cannot take place at the moment of purchase. If we come back to the moment of the intention to buy when the fridge is empty ($Q, L, S \to 0; T_{\mathrm{const}}$), l'Hôpital rule gives us the following result:

$$\lim_{H\to T} Q(H) = \lim_{H\to T}(L+S)(H) = 0; \frac{\partial(L+S)}{\partial H}|_{T_{const}} = -1 \tag{7.1}$$

$$\lim_{H\to T}\frac{\partial Q/\partial H}{\partial(L+S)/\partial H} = -\frac{\partial Q}{\partial H} = \lim_{H\to T}\frac{Q}{L+S} \tag{7.2}$$

And we get the unit elasticity of cost on purchase with respect to consumption:

$$e_{w(L+S),Q} = \frac{\partial(L+S)}{\partial Q}\frac{Q}{L+S}|_{L_0;S_0;Q_0\to 0;T_{const}} = \frac{\partial(T-H)}{\partial Q}\frac{Q}{L+S} = \left(-\frac{\partial H}{\partial Q}\right)\left(-\frac{\partial Q}{\partial H}\right) = 1 \tag{8}$$

We see that the consumer doesn't make cumbersome calculations of marginal values. He needs from the very beginning only the realistic evaluation of his purchasing power and his efforts $w/P_0=Q/L+S$. If the consumer overestimates the value of his efforts from the very beginning, finally he finds himself 'in the corner'. And he should either quit the market or accept its rules; he adjusts his aspirations and spends more efforts on purchase. But if this starting evaluation is realistic, he buys optimally with respect to Eq.8 any quantity, which automatically equalizes the marginal values of his search. The consumer follows the 'it's enough to spend time' rule and stops the search when total efforts on purchase, both on labour and search, correspond to the quantity purchased. He looks satisficing but his purchase is optimal because the purchase price optimizes his allocation of time (Malakhov 2020b).

This unit elasticity rule illustrates the stability of preferences. But in our case it means that Eq.6.3 cannot take place at the moment of purchase. The inequality of the marginal values of search, i.e., the corner solution, appears at the moment of the intention to buy when the consumer doesn't even start to work and to search because the quantity demanded isn't worth money and efforts.

Nevertheless, the comparative statics can produce such inequality. It happens when the arbitrage at the zero search level takes place.

The consumer starts the search with the willingness to pay $WTP=wL_0$. When he buys at a low price, he gets an option either to consume or to re-sell the item. If he sells it, the resale price will be equal to his costs $w(L+S)$. And we can consider this value as his willingness to accept or to sell (Fig.3):

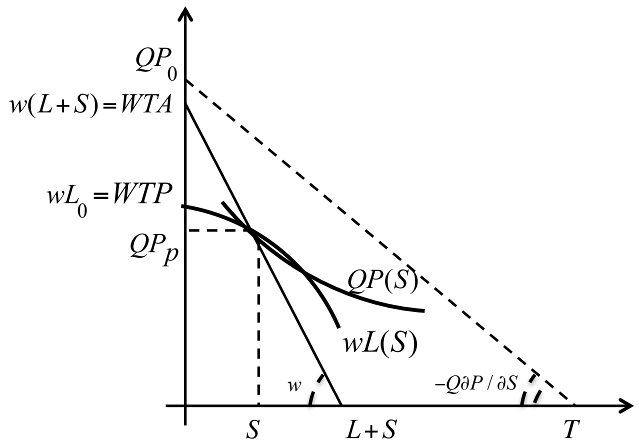

Fig.3.Suboptimal behavioral choice

This particular *WTP-WTA* relationship becomes more clear when we take the home production as a specific form of the search. Indeed, "the opportunity cost of time of the shopper is the same as that of the person undertaking home production." (Aguiar and Hurst 2007b, p.1594). While the time horizon is divided between labor, search, and leisure, the search represents any activity, which decreases the purchase price. The consumer can buy the grilled steak in the restaurant, or he can make it at home. There, his *WTP* is limited by the price of inputs, while his *WTA* goes up with the market price of grilled steak. Theoretically, and sometimes it happens in real life, the skilled consumer can sell the output of home production to his neighbor who hasn't time for home production because his opportunity costs are higher.

Here we come to the understanding of the nature of QP_0 value. The economics of search had successfully developed for a long time the concept of consumers' heterogeneity (Diamond 1987). It describes *shoppers*, consumers with zero search costs, and *searchers*, consumers with positive search costs (Stahl 1989).

Now we understand that the QP_0 value represents the willingness to pay of *shoppers* who have no time to search. But the zero search level has a specific attribute – even if *shoppers* have different opportunity costs of time, i.e., different willingness to pay, there is no price dispersion at this level, since otherwise some *shoppers* become *searchers*. It means that the QP_0 value is equal to the lowest willingness to pay among *shoppers*. The P_0 value is the equilibrium price or $P_0=P_e$.

And the consumer can use it. If he decides to re-sell the bought item, he becomes a 'producer' who bears some costs. And his costs, both average and marginal, really come to the equilibrium level:

$$w(L+S) = QP_0 = WTA \tag{9.1}$$

$$\frac{w(L+S)}{Q} = AC = \frac{\partial w(L+S)}{\partial Q} = MC = P_0 = P_e \tag{9.2}$$

However, if the consumer is smart and skilled, his costs might be lower than the equilibrium level $WTA=w(L+S)<QP_e$. The lower price appears at the zero search level. The arbitrage process starts, and it finishes with the new equilibrium price. It means that former suboptimal purchases now become optimal. New equilibrium price equalizes marginal values of search and corner solutions disappear.

Part II. Consumption-leisure production possibility frontier

The unit elasticity rule (Eq.8) tells us that if the consumer realistically estimates the efficiency of his efforts at the moment of the intention to buy (MRS_0 *(H for Q)*$=Q/L+S=w/P_e$) , he optimally buys any quantity. It means that the producer appears on the market with the quantity and price that being summarized with consumer's search costs produce the optimal purchase. The producer comes to the right place at the right time with the 'just price' and optimizes intentionally by $QP_p=wL$ value the allocation of consumer's time horizon and maximizes his consumption-leisure utility. It looks like the producer knows in what manner the consumer allocates his time. But if the producer is unaware of it, all the composition becomes really enigmatic.

Let's take a simplified example of the producer who allocates his time between farming and delivery. There are two extreme cases where he is not concerned about the consumer's allocation of time - when he sells "door to door", to a high-income *shopper* with zero search costs, and at his site, the farm, for example, to a low-income *searcher* coming there from the downtown. But between these two extremes there is a middle-income customer who is not ready to pay the price at 'the door' and to go to 'the farm.' And the question what price and point of sale the producer should to choose for him remains open.

When the producer's total working time is constant, his total costs *TC(Q)* are also constant. The producer chooses the target quantity demanded *Q* and gets the price *P* on the basis of his average costs *AC*. His total costs become proportional to output. It means that his production function exhibits constant return to scale both for farming *f* and delivery *d*. And their average and marginal costs become equal:

$$TC(Q) = aQ; a = AC = MC \tag{10.1}$$

$$P = AC = AC_f + AC_d = MC = MC_f + MC_d \quad 0.2)$$

$$AC_f = MC_f; AC_d = MC_d \tag{10.3}$$

The delivery from the farm to some point of sale increases the consumer's leisure time *H* but reduces the output *Q*. It means that the consumers' leisure is not costless for the seller. But when he is unaware of the consumers' allocation of time 'the price of consumer's leisure' for him is equal to its opportunity costs, i.e., marginal costs of delivery:

$$MC_H = MC_{Qd} \tag{12}$$

Now we can construct some virtual production possibility frontier, limited by two extremes – by 'the farm' and 'the door' (Fig.4):

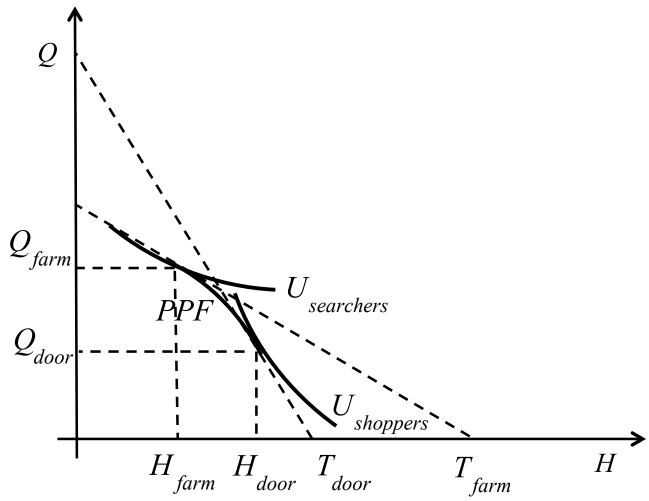

Fig.4. Consumption-leisure production possibility frontier

Along this virtual frontier the farmer produces and sells not only goods. He also trades consumers' leisure. For consumers, any point on this frontier represents the w/P_e ratio with respect to their wage rates. It is low at 'the farm' and high at 'the door.' Low-income consumers spend much time on search and the high-income consumers don't search at all. But for the producer any point of the *PPF* represents a particular combination of his time spent on the farm and on his way to the point of sale. But when the costs of leisure are equal to the costs of delivery, the rate of product transformation *RPT* (Q_d *for* Q_f) looks as follows:

$$dTC(Q,H) = dQ\frac{\partial TC}{\partial Q} + dH\frac{\partial TC}{\partial H} = 0 \tag{13.1}$$

$$-\frac{dQ}{dH} = \frac{\partial TC/\partial H}{\partial TC/\partial Q} \tag{13.2}$$

$$dTC(H) = dH\frac{\partial TC}{\partial H} = dTC(Q_d) = dQ_d\frac{\partial TC}{\partial Q_d} \quad (13.3)$$

$$dTC(Q) = dQ_f\frac{\partial TC}{\partial Q_f} + dQ_d\frac{\partial TC}{\partial Q_d} = 0 \quad (13.3)$$

$$-\frac{dQ_f}{dQ_d} = \frac{\partial TC/\partial Q_d}{\partial TC/\partial Q_f} = \frac{MC_d}{MC_f} = RPT \quad (13.4)$$

where Q_f – goods in farming; Q_d – goods in delivery

When the constant total costs' function is convex with respect to the price-quantity trade-off, it becomes concave with respect to the trade-off 'goods in farming – goods in delivery.' The *PPF* is concave because goods in farming and goods in delivery exhibit constant returns to scale but only with respect to the target consumption level *Q*. Farming and delivery use time in different proportions but these proportions change over the frontier; the supply to the 'door' becomes more time intensive as well as the production on the 'farm' needs more time per unit because of the expansion of the 'cultivated' area. And the set of production function with respect to different output levels looks as follows (Fig.5):

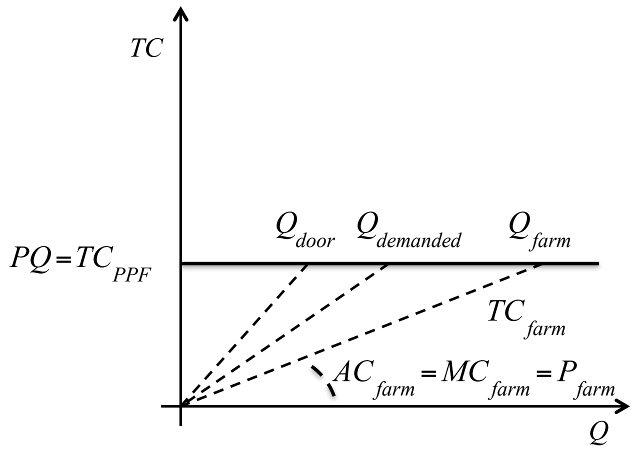

Fig.5. The set of production functions under constant total costs of the production possibility frontier

So, the choice of the point of sale changes both the output and its price. The sale on the farm with regard to the downtown raises the output as well as its marginal costs of production MC_f but its marginal costs of delivery MC_d, i.e., of leisure, MC_H, fall.[3]

Here the producer is not concerned about the total leisure time. Only leisure between 'the door' and 'the farm' is traded. Any consumer has an option to go to the farm where he keeps in anyway some leisure time. But he can buy a little more leisure to avoid going there.

[3] As we can see at Fig.4, the high wage rate reduces the time horizon until next purchase. This consideration corresponds to the statistics on the shopping frequency with respect to income (Kunst 2019).

It means that the re-allocation of time between farming and delivery meets once some optimal consumer's choice:

$$-\frac{\partial Q}{\partial H}=\frac{MC_H}{MC_Q}=\frac{MC_d}{MC_f}=\frac{w}{P_e}=\frac{Q}{L+S} \tag{14}$$

In this way the equilibrium simplifies the farmer's decision-making. *The RPT (Q_d for Q_f)=MRS (H for Q)* is equal under the constant return to scale with respect to the quantity demanded Q to the 'time in farming' – time in delivery' T_d/T_f ratio:

$$\frac{Q}{L+S}=\frac{w}{P_e}=\frac{MC_d}{MC_f}=\frac{AC_d}{AC_f}=\frac{TC_d}{TC_f}=\frac{T_d}{T_f} \tag{15}$$

The farmer knows his productivity on the farm; he takes the target quantity Q and gets the time in farming T_f. And the time in delivery T_d appears as the residual value with respect to the total working time. He spends time in delivery T_d and comes to the meeting point where he finds the consumer who has spent some time on search S.

We see that this matching occurs almost automatically. And it really looks like the work of the Invisible hand. The 'just price' adds to its mystique by meeting the consumer's wishes. There is no doubt that the producer has set the price, which unintentionally optimizes the buyer's allocation of time and maximizes the utility of his consumption-leisure choice. When the total output is sold, sales are equal to the labor income spent on the purchase where the price is the same for both parts:

$$PQ=wL\Rightarrow P=\frac{wL}{Q} \tag{16}$$

This 'just price' confirms the successful matching because it stays from the very beginning on the production possibility frontier. When the producer is going to the meeting point, he can be stopped by some consumers with a proposal to sell them his output. But this occasional meeting cannot be optimal to the producer because consumers who have spent more time on search don't give him the price he is expecting. And he rejects the proposal and continues his way to 'his' consumer (Fig.6):

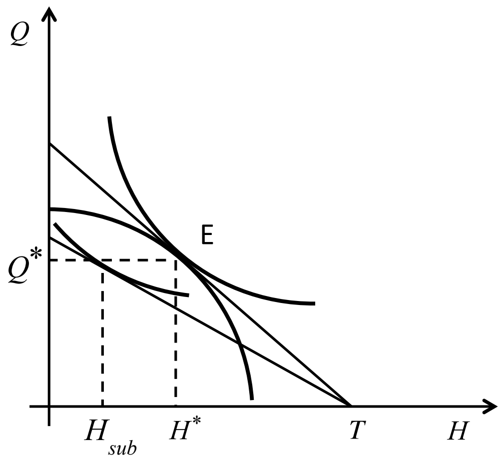

Fig.6. Suboptimal and optimal sale

The price P for the given quantity Q uniquely identifies the allocation ($T_d;T_f$) of total producer's time. If he is more productive, he will spend less time on the farm but more on delivery. And the producer will comer closer to the potential buyer. The production possibility frontier will change its shape and establish the new equilibrium trade-off T_d/T_f equal to the consumption-leisure trade-off of the consumer who stays 'in the corner' with higher labor time L and lower search time S under $\partial^2L/\partial S^2<0$ rule. He is ready to pay higher price, and it really will become higher because of greater productivity and closer delivery. Being unaware that they have launched the arbitrage process, both parts will be satisfied by the good trade.

However, the farmer can overestimate the value of his efforts. But then he should either quit the market or accept its rules, like a consumer does it in 'the corner.' The game theory describes 'satisficing sellers' who adjust their aspiration levels (Berninghaus et al. 2011). However, like consumers' satisficing decisions become optimal (Malakhov 2020b), here the sellers' satisficing decisions become optimal, now with respect to their actual market value of producer's efforts, i.e., to the price. And the suboptimal sale on Fig.6 becomes optimal with respect to lower value of producer's efforts and lower production possibility frontier.

The producer also can make a mistake in evaluating the target consumption level Q. But here he can rely only on his commercial skills and talents.

The last consideration opens the way from the short run analysis of one trade to the long run analysis when the farmer makes sales regularly. The analysis of long run decisions needs many specifications that go beyond the scope of this paper. But it can contribute to the understanding of the basic principles of long-term relationships. The Equations (10.2) and (14) result in the following consideration:

$$P = MC_f + MC_d = MC_f\left(1 + \frac{w}{P_e}\right) \tag{16.1}$$

$$\frac{w}{P_e} = \frac{P - MC_f}{MC_f} = \frac{P - AC_f}{AC_f} = m \tag{16.2}$$

where m is the sales markup.

The long-term relationships need the trust. Here the trust is provided by the Equation (16.2). The trader cannot earn more than his customers. At the equilibrium his sales markup is equal to the consumers' purchasing power. But the seller doesn't get money for nothing. He is selling his skills and experience like the customer gets wages also for his skills and experience.

We see that for both short and long run decisions the producer's knowledge is very limited. In the long run he needs the information about the purchasing power. And in the short run he doesn't need the information even about the consumer's willingness to pay. The only thing he needs is the quantity demanded.

These considerations confirm the assumption made once by Kenneth Arrow:

"*The notion of the inner coherence of the economy – the way markets and the pursuit of self-interest could in principle achieve a major degree of coordination without any explicit exchange of information, but where the results may diverge significantly from those intended by the individual actors – is surely the most important intellectual contribution that economic thought has made to the general understanding of social processes*." (Arrow, op.cit., p.108).

Part III. Home production and dual activity

When Eugen Slutsky wrote his notes on the theory of the marginal utility, he paid particular attention to the difference between trade units and consumption units (Slutsky 2010). The labor-search-leisure model definitely needs that distinction because it becomes very important at the zero search level. If we look at the automobile market, the consumption unit that shoppers can buy there without efforts is the mile in the taxicab. It becomes the equilibrium price on the market where vehicles are traded with regard to their expected mileage. The purchase of a car turns into the acquisition of input when driving becomes a specific form of home production, here the 'production of miles.' As a result, independent taxi drivers can make the efficient arbitrage at the zero search level with respect to their willingness to accept (Malakhov 2019).

However, the driving can be pleasurable. Here we come to the problem of dual activity. There are some activities like gardening and pets' care that can be classified as both leisure and home production because these activities provide direct utility but are also something one can purchase on the market (Aguiar and Hurst 2007a). The search also can be purchased on the market, for example, when house buyers and tourists hire agents to find the property and leisure they need. The shopping can be either tedious, when consumers buy necessities in malls, or pleasurable, when they leisurely observe windows in the downtown. But it doesn't mean that we should evaluate a specific utility of the search. The labour-search-leisure model solves this problem with the help of the value of the propensity to search. When the search is pleasurable, consumers easily substitutes leisure for it, and their high willingness to pay remains almost unchanged, while the tedious search significantly cuts the willingness to pay because here the leisure stays almost unchanged. And it happens on the market of 'lemons' where bad cars can be valued as necessities while good cars as luxuries and sellers of good cars don't quit the market (Malakhov 2019).

While both the problems of consumption units and dual activities have been well studied by the characteristic model approach (Lancaster 1966) and the economics of time, the labour-search-leisure optics opens the way to the more profound analysis of these phenomena. Further study can lead to the review of the traditional dilemma 'to produce or to buy,' but even under such reconsiderations it will confirm the basic principles of the division of labour, chosen by Adam Smith as the cornerstone for his *Wealth of Nations*.

Conclusion

The labour-search-leisure model demonstrates how both buyers and sellers, following simple decision rules, can meet each other on the imperfect market. From the theoretical point of view, the producer fails only if he overestimates the value of his efforts – the same mistake the consumer makes when he comes 'to the corner.'

Actually, if producers and consumers don't make correct estimations of their efforts, then imperfect markets keep them spending more time to meet each other. Their matching is ceasing to be frictionless. However, the labor-search-leisure model doesn't claim to justify some matching rule; it discovers the potentials of the market to enable the matching process. Although this presentation is academic, it underlies many practical decisions like the common greengrocer's choice of the place for his store with respect to the purchasing power in the area where the target income group is living. There, he gets his gains and makes residents happy in a way Adam Smith was speaking about.

The introduction of different productivity on production itself and delivery doesn't change the logic of the model. There, the results would be reconsidered under the assumptions either of the labour advanced or services advanced technological progresses where services present vehicles that provide consumers' leisure (Malakhov 2020a).

The limited scope of this paper leaves many questions in abeyance, first of all the study of long-run decisions when the point of sale is transformed into a store on a local market where the purchase price becomes a 'just price' because it equalizes the seller's markup with the local consumer's purchasing power.

But even in its limited scope the paper provides grounds for the conclusion that the competitive equilibrium can exist without any explicit exchange of information under price dispersion where both sellers and buyers suffer from transaction costs.

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