

ECONOMICS OF PRODUCTIVE CONSUMPTION AND MULTIPOINT EXPANSION OF NASH BARGAINING PROBLEM

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Abstract

If investment opportunities associated with acquisition, maintenance, and the use of human capital were exploited based on their performance regardless of their ownership, then, from the perspective of productive consumption economics, the distribution of social wealth would be considerably more even, thus not causing problems. Each contract between the owner of investment opportunities and the owner of financial resources can be interpreted as a specific Nash bargaining problem, where payoffs are expressed as income from the use of investment opportunities. A comparison of the microeconomic model of supply and demand of financial resources and investment opportunities with the model of contracts based on Nash bargaining problem enables (1) to identify the role of investment in a social position as the most important barrier to exploiting investment opportunities related to the acquisition, maintenance, and the use of human capital and (2) to describe the mechanism of its effects. This mechanism is based on the idea that the return on investment opportunities available to those who use the opportunity to invest in a social position increases at the expense of the return on investment opportunities of those who are victims of positional investment. The presented model offers several recommendations for solving the issue of wealth and poverty by improving the capital market.

Key words: capital market, game theory, human capital, investment, Nash bargaining problem, productive consumption economics, social wealth

JEL classification: C70, C78, D31, E44

Introduction

The paper is based on the assumption that at a time when the role of human capital and investment in human capital is growing, an economic concept that considers consumption to be the final effect of the economic process is not sufficient. This was assumed by J. von Neumann (1945-1946) as early as 1932. At a time of increasing importance of the productive services sector, i.e. services that contribute to the acquisition, preservation and utilisation of human capital (e.g., education, health care, family upbringing etc.), the productive effects of consumption are increasingly important and it is justified to consider productive consumption economics as an extension of neoclassical economics.

If the productive consumption economics is to develop into a full-fledged theoretical economic system, it must, among other things, create its own theoretical apparatus. The apparatus should include a way of valuing the economic effects arising from productive consumption, as well as a way of addressing the issue of their distribution. We will show that in solving the second question, a very significant support can be provided by solving problems that follow from the Nash (S, d) bargaining problem.

It turns out that the issues outlined are very closely related to the question of why are some people rich and others poor. There are many answers to this question. However, if we start from the consequences of including productive effects of consumption, none of the commonly considered reasons is sufficient. It is a question that is in many ways similar to the famous question of why it is dark at night, for which a sufficient answer based on theory had been sought for centuries. In our case, it is about revealing different strategies of investing in the acquisition of human capital and investing in a social position, which can be described by models based on the aforementioned Nash bargaining problem. Based on this, we will also get an answer to the question of what hinders the promotion of trends leading to a more

comprehensive use of productive effects of consumption and what prevents the implementation of reforms aimed at promoting productive effects of consumption.

Structure subject and methods

First, we will briefly introduce the economics of productive consumption as an overlap of neoclassical economics, including its introduction in the context of the development of economic theory. Consequently, we will show the relevance of the analogy between “Why is it dark at night?” And “Why are people rich and others poor?” in the field of productive consumption economics. For this we will utilise schemes describing the use of investment opportunities associated with the acquisition and preservation of human capital. We will show that these schemes can be transformed into Nash bargaining problem, clearly showing that the concept of Nash bargaining problem needs to be supplemented in order to answer the question of what prevents investment opportunities related to the acquisition and application of human capital from being used based on their rate of return, regardless of who owns the financial resources necessary for this.

To the above we will use conceptual analysis, original schemes using limit variables and the relationship between limit and total variables, the concept of Nash bargaining problem and its own follow-up concept. At the same time, we will identify relevant societal issues related to the application of our approach. The concepts and follow-up models that we will continually create and confront with reality will allow us to uncover (read from reality) connections that are not visible without this theoretical backing (i.e. these “reading” concepts or models).

The nature of the problem requires a broader, interdisciplinary approach, as the substance of what is at issue is manifested in the thematic essential theoretical and practical contexts. The authors are aware of the fact that, as a result, some of their procedures may be burdened by misleading simplification or underutilisation of the level of knowledge achieved in each area. It is also due to the fact that during the interpretation we emphasise the imagination in order to bring the results closer to experts from various areas of the theory, which are related to our topic.

Economics of productive consumption as an extension of neoclassical economics

The main difference between economics of productive consumption and neoclassical economics is the following: According to neoclassical economics, the consumer focuses on maximizing his benefit and consumption has effects only in the form of subjectively perceived experience. Economics of productive consumption emphasizes that consumption is productive in the sense that it brings significant income effects. The mechanism of subjectively perceived experience is a mere decision-making, the consumer (more precisely an economic entity) maximizes the present value of his future income in the long term in accord with its life strategy in the given social conditions.

The basic characteristics of neoclassical economics are the following (Sojka 2010):

- The concept of the consumer as a rational subject who maximizes his benefit (derived from his preference).
- The concept of an economic process as a single act that begins with production and ends with consumption (the reproduction perspective is being abandoned).
- The explanation of human behaviour from the perspective of selecting alternatives.
- The rejection of the classical model of exchange, replacing the concept of exchange in its dual determinacy as the result of marginal costs (in the form of marginal rates of product transformation) during the production of individual consumption goods with marginal utility (marginal rate of substitution) during goods consumption.

The main motivation for replacing classical economics with neoclassical was the significant increase in the quantity of resources available to owners of labour power, i.e. consumers. Consumption has ceased

to be the mere reproduction of labour power but it is becoming an area characterized by a choice of various alternatives in consumption according to the individual preferences of the consumers and in accordance with their wage-earning capabilities. Classical economics did not address these issues, because at the time the importance of decision-making among consumption alternatives was marginal. In other words, neoclassical economics began to emerge at a time when employees (owners of labour) were receiving so high income that decisions how to use it and which goods to consume became one of the most important phenomena in real economy (Valenčík et al. 2014).

If we consider the focus of households' behaviour on maximizing the present value of future income, then spending current income to maximize future income will be different in different cultural and institutional conditions. At the same time, these differences will primarily be characterized by different household strategies for the long-term income orientation of households at different historical times and different communities, and secondly, as these strategies translate into the benefits of individuals in the form of perceived perks or experiences. For example, a conspicuous consumption (Veblen 1899) can be characterized as the form of the institutionally conditioned relationship between investing in the development of a person's abilities and its social position. Conspicuous consumption is from our point of view one of the ways how people try to maximize their future income and it can be related to economics of productive consumption.

Another example that can be related to economics of productive consumption is the article by J. von Neumann *A Model of General Economic Equilibrium* (von Neumann 1945-1946) in which he formulated an idea of a theoretical concept where all goods are reduced to intermediate consumption good. The article was based on the author's lecture at Princeton in 1932. It represents one of the most frequently cited articles, and yet to this day not all the ideas the author incorporated into it have been sufficiently extracted Napoleoni (1968). While J. von Neumann along with O. Morgenstern (1944 pp. 617–632) axiomatized the neoclassical theory of utility in the appendix of the famous book that gave rise to the creation of game theory based on his own theory of preferences, J. Von Neumann gives priority in the article to expressing universal economic balance through the production power of consumption goods in the topological space he proposes, whereby he ultimately quite closely approximates the economics of productive consumption.

The last example that can be seen as the predecessor of economics of productive consumption mentioned here is theory of human capital (e.g. Becker 1993). The theory attempts to overcome the obsolete concept of three factors of production (labour, land, capital) that emerged during the ancient periods of classical economics. It considers that human capital is created through investment “in people”, just as capital is created through investments in land, its transformation, its conversion to a tool, and technology. However, human capital theory sprang from the earth of neoclassical economics and did not manage to come to terms with its fundamental prerequisite (and limitation), namely that consumption ends with utility. It devoted attention in only a partial manner to the retroactive influence of certain forms of consumption (or rather what appears to neoclassical economics as consumption) on production. But Becker's ideas on the role of “imagination capital” Becker (1997) is still significant, detailing the method of intertemporal choice.

Just as with classical and neoclassical economics, the creation of economics of productive consumption is a product of its time. Objective demand for economics of productive consumption arise at a time when:

- Processes of spreading innovation waves and the technological advancement of the economy capable of carrying out innovation are on such a level that they offer essentially unlimited options for the use of accumulated human capital as the factor of production that contributes the most to economic growth and concurrently defines the form it takes.
- Development of an institutional system has reached a stage where the state is capable of technically, technologically, and organizationally supporting the practical execution of Human Capital Contracts (HCC). The state in particular helps secure transfer of part of income from those who in the past consumed some productive service and as a result of this consumption experienced increased income to those who provided the productive service. Practically, the given transfer can be carried

out when paying taxes. With its activities the state can also contribute to ensuring that those who received the productive service do not avoid paying the relevant share, etc.

- On one hand this leads to ever greater economic disparity and subsequently to social segregation (including the emergence of excluded enclaves), the manifestation of which is the limiting of equality of opportunities to apply capabilities as a result of wealth and income barriers. On the other hand, technologies, methods of organizing labour, etc. concurrently offer the option to open paths to an economy making full use of investment opportunities in the acquisition, retention, and application of human capital, to a society in which the free development of each is a condition of the development of all.
- Households have enough resources to resolve immediate problems, so they can devote the saved time to a long-term strategy of lifelong development and application of the capabilities of their members as the basic and most important source of future income. This at the same time consists of a strategy connected with the enhancement of cross-generational cohesiveness, a strategy that is based on use of productive services as a resource for developing, retaining, and applying human capabilities.

The idea of seeing consumption as a productive (partially productive, predominantly productive, or completely productive with exceptions) phenomenon is so attractive that it has been appearing independently with numerous authors from various parts of the world, yet with a very close interpretation. One of the main proponents of cultivating this idea is Steger (2002), who gave the impetus for this in his article "Productive consumption, the intertemporal consumption trade-off and growth". In his concept of productive consumption enables the satisfaction of current needs and at the same time increases the productive potential of work. He emphasizes that the view of intertemporal choice thereby substantially changes. He places productive consumption into immediate connection with growth of the supply of human capital and on this basis creates simple macroeconomic growth models. One of the most natural contributions to defining and analysing productive consumption is the article "Inclusive growth through creation of human and social capital" Dinda (2014), which partially builds on the above article by Steger, yet relies on other sources as well, some of which also reference issues of productive consumption. In the area of productive consumption, he draws a distinction between human and social capital. He sees social capital as a prerequisite for human application. But he does not identify the phenomenon we describe as investment into social position, where the option to obtain or apply human capital by one subject takes place to the detriment of another subject. It can be considered highly motivating that he presents productive consumption as associated with eliminating the inclusion of asset differences incurred and with the creation of equal opportunity for social advancement. In this sense, he interprets the positive role of social capital as well. He considers in detail the role of education and health care. He uses simple, primarily microeconomic models to express his ideas. He focuses on the issues in question in subsequent and previous essays as well, such as Dinda et al. (2000). Psárská (2019) uses the theoretical basis of productive consumption for analysing behaviour of households in Slovakia. He considers deviations from fully rational behaviour and seeks to explain their causes in terms of behavioural economics. From a methodological perspective this consists of a beneficial approach, because the "higher level of rationality" that is incorporated into the theoretical basis of economics of productive consumption is presented in direct confrontation with the actual behaviour of people. Psárská gathered and analysed extensive empirical material related to the actual behaviour of households and used the theory of productive consumption to formulate certain recommendations for the area of various VAT rates.

It is worth noting certain other approaches to the use of the idea of productive character of consumption. Zwick (2013) shifts the issues of productive consumption into the position of philosophical essays of social visions associated with overcoming conflicts between labour and capital. His essay is inspiring, and yet rather remote from real economic processes. Suen, W., Mo, P. H. (1994) in their older study present an interesting idea based on that every act of consumption has (as previously mentioned) two types of effects – utility and income effects. Considering the income effect, they construct a "shadow price" and attempt specific analyses that are not entirely convincing. This is partially due to that what we perceive as utility is also manifested in the human psyche by expected income. Ichiroh, D. (2010)

interprets productive consumption from the perspective of population growth dynamics and with the use of a suitable mathematical model demonstrates that there is a very close correlation between productive aspects of consumption and population growth in less developed countries. Households compare future returns from growth in the numbers of members of households to options for investing in human capital for the purpose of acquiring and retaining capabilities, however relatively rationally. For similar findings see Yernzkyan et al. (2017).

Learnings obtained from study of essays that address issues of productive consumption or reference issues of productive consumption can be summarized as follows:

- While the concept of “productive consumption” is relatively frequented, used in various contexts and various parts of the world, its content is interpreted very similarly and the idea of the importance of productive aspects of consumption both from the theoretical and the practical perspective is gradually growing.
- During an analysis of the duality of utility and income effects, we cannot lose sight of the fact that expected income effects are reflected directly in generating subjectively experienced utility, i.e. when examining the role of productive consumption we cannot get by with a simple supplementation of a neoclassical approach.
- Decision-making on the basis of productive aspects of consumption is associated with a higher level of rationality and the models that are based on the productive effects of consumption are a very suitable supplement (reflection) of phenomena identified by behavioural economics.
- One of the most significant roles when constituting the theory of productive consumption as a significant off shoot of the existing main current of economic theory is the exact differentiation of investing into development of capabilities and if applicable the prerequisites for its application, which does not come at the cost of the others, and investment into social capital, which is focused on limiting equal opportunities derived from asset and income disparities; theoretical tools used thus far are not sufficient for analysing phenomena in this area.
- This is associated with the fact that, on the contemporary level of theoretical analysis of issues of productive (particularly income) effects of consumption, it is important to develop proprietary methods for the economics of productive consumption without which this area of research will not mature into the form of a relatively independent and forward-looking theory.

Why is it dark at night, why are there rich and poor people? – How trivial becomes nontrivial

Why are some people rich and others poor? A seemingly trivial question. After all, it is so obvious – there are a number of causes, and each of them sufficiently explains why are some people rich and others poor. It is almost as simple as the question: Why is it dark at night?

The experience of trying to find an answer to a seemingly, but only seemingly trivial question “Why is it dark at night?” can also be summarised as follows: The attractiveness of this question arises only when we look at it from the perspective of our idea of the infinity of the Universe in space and time. Without this idea, the magic or meaning of the question escapes us. But once we look at it from this point of view, we get a number of ideas to refine our idea of the infinity of the Universe. We find that the Universe is infinite in a much more complicated way than our original idea of it. The idea which gave rise to the Olbers’ paradox. It is only from a position of enriched vision of the infinite nature of “our” Universe that we are able to give an accurate answer to why is it dark at night. In doing so, we find that there are probably other universes than “our” universe.

We will encounter something very similar in solving the problem of property differentiation. The point of view from which the answer to the question “Why are some rich and others poor?” arises as an interesting problem is only in terms of economic theory that is able to look at reality. In particular, by prism of looking at the “economic universe” as the relationship between the owners of financial resources and the owners of investment opportunities, including investment opportunities related to the acquisition, preservation and utilisation of human capital.

Then, the following question arises: “*Why are investment opportunities (including those related to the development, preservation and utilisation of human capital) not exploited based on their rate of return?*” (or what prevents the above).

A methodological analogy with the question “*Why is it dark at night?*” is already fully visible here. Here are some aspects:

- Milton Friedman was the first to realise this question and put it in specific terms in the field of education (as early as 1955, but it is rather his reflections on the subject in the popularly written “*Capitalism and Freedom*” from 1961 that are known). He claims that it is due to the difficulty of contracts in the area.
- More generally, we can find the reason in the fact that it is very difficult to identify the rate of profitability of investment opportunities associated with the acquisition, preservation and utilisation of human capabilities (more influences conditioning the economic effects in this area, long horizon in which the effects are manifested, problem of continuity of individual investments, etc.). But the most important reason why there is no apparent corresponding tendency in this direction is not answered by the mere difficulty in estimating the rate of return. Evidently, there is a phenomenon of aversion to reforms that would allow the exploitation and distribution of effects related to the exploitation of investment opportunities in the area of acquisition, preservation and utilisation of human capital based on its rate of return, irrespective of who disposes of the financial resources (who is their owner).
- The question posed in terms of exploiting investment opportunities has one more aspect. It is about vertical mobility. It is about minimising the limitations of the possibility of the free development of human abilities and their utilisation connected with the respective social ascension and income effects by the initial property and income situation of the country, family, ethnicity, etc.
- The history of the development of economic theory also enters this issue. One of the famous solutions to the problem of wealth and poverty is Marx’s theory of surplus value. It assumes that competition between the capitalists and competition between the workers themselves (under the conditions of the existence of the “reserve army of the unemployed”, i.e. unemployment in the blue-collar professions) pushes the price of labour to the level of reproductive costs. I.e. the fact that the capitalist is pushing for the labourer to have the lowest wage is driven by the “engine of competition”. But why are we not able to identify an “engine of competition” that would operate with sufficient ardour in conditions where investing in the qualification of the labourer (in his human capital) could give the capitalist a major competitive advantage? Also – today, the place of the capitalist is taken by boards of directors and supervisory boards representing shareholders, for the most part represented by funds in which people save for retirement or health. They should not mind finding ways to gain competitive advantages based on the development, preservation and utilisation of human capital that companies have at their disposal.

Some authors emphasize rationality considerations to the exclusion of everything else. However, it seems doubtful that the equilibrium selection problem of game theory is likely to be solvable by a technique in reality that ignores what may be common knowledge (human capital) among the players about the social norms of their culture. At the other extreme there are authors who argue that social norms are so important that strategic issues can be neglected altogether. This view tends to be expressed most forcefully when the coordination problem is framed in a bargaining context.

This brings us to the fundamental, to the part that required the greatest labour. If we use the theory of cooperative games to express the above-mentioned microeconomic problems, we can reformulate the questions as follows: *Why cannot the contracts in the field of use of investment opportunities based on their rate of return be described entirely through Nash bargaining problem?*

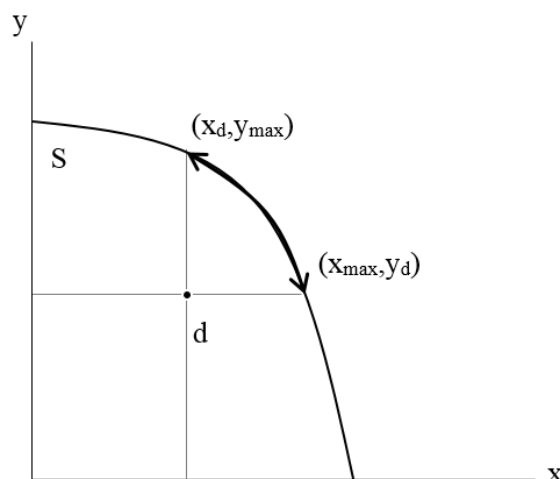
We will see that the question can be even more precisely targeted at the nature of the problem, but to do this it is necessary to use the appropriate game theory apparatus, which will be discussed in the next chapter.

Contracts in the area of acquisition, preservation or utilisation of human capital and Nash (S, d) bargaining problem

Nash (S, d) bargaining problem can be briefly summarised in the following figure.

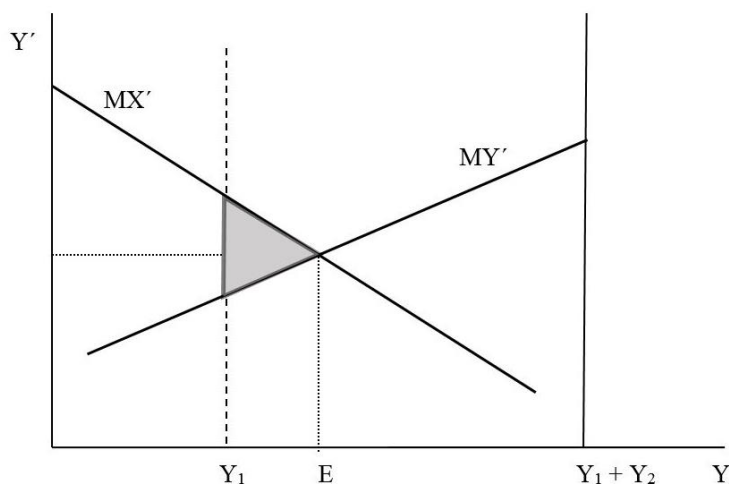
We have a point **d** (disagreement point) and a set **S**, which represents the achievable combinations of the effects **x** for one player and the effects **y** for the other player. The bold curve bounded by arrows represents the set that meets the requirements of feasibility, individual and collective rationality. The solution to Nash bargaining problem is one of the points inside the set.

Fig. 1. A graphical representation of Nash two-player bargaining problem



The supply and demand of financial resources and investment opportunities can be described by the following figure.

Fig. 2. Supply and demand of financial resources and investment opportunities



Y is the current income

Y' is the future income

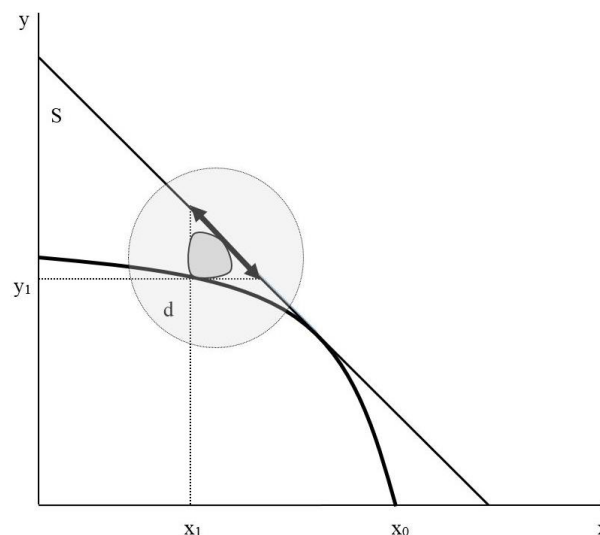
MX' is the marginal yield curve of investment opportunities of the first entity (player A)

MY' is the marginal yield curve of investment opportunities of the second entity (player B)
 Y_1 is the current income of player A (in the following we will also use the term “poorer player”)
 Y_2 is the current income of player B (in the following we will also use the term “richer player”)
 E is the point where $MX'_1 = MY'_1$

The shaded triangle shows the possibility of increasing the future income if investment opportunities based on their rate of return, regardless of who disposes of the relevant financial resources (who is their owner).

From here we get to the following Nash bargaining problem (the same relationship is considered for other coordinates).

Fig. 3. Expression of supply and demand of financial resources and investment opportunities as Nash (S, d) bargaining problem



d is the point of disagreement; it corresponds to a situation in which the financial resources are not used to realise someone else's investment opportunities;

S is the set of maximum attainable sums of incomes obtained by using investment opportunities based on their rate of return, irrespective of who owns them; it is bounded by a 45° slope with the coordinate axes expressing the payoffs of the individual players;

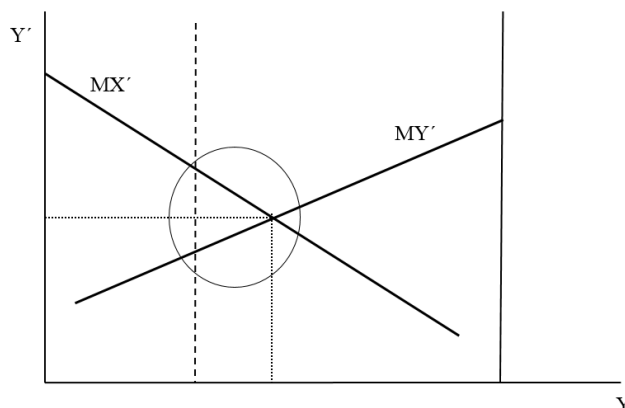
the bold part of the line bounding the S-set bounded by the arrows is a subset of the S-set that meets the requirements of individual rationality, collective rationality, and feasibility;

the shaded area between the d point and the bold portion of the line surrounding the S-set is formed by the achievable revenue distribution points using the creditor-debtor relationship at a given budget constraint (i.e. when one player uses the other player's financial resources to realise their investment opportunities in such a way that his payoff increases without reducing the payoff of the other).

Note that **S** has a specific shape and the position of **d** is determined by both the marginal yield curves of the investment opportunities available to each player (which set the curve on which they lie) and the budget constraints of the players (which set the point where they lie on this curve).

For a better understanding, please see the following figure.

Fig. 4. The area of Pareto improvements of given possibilities to use the financial resources of one player to realise the investment opportunities of the other player Černík, Valenčík (2016)



Here the circle specifies an area of Pareto improvements provided by the possibility of using one player's financial resources to realise the other player's investment opportunities on the graph of supply and demand of financial resources and investment opportunities belonging to the two entities. The same is expressed in the previous Figure 3, in which the axes of the coordinates are represented by the payoffs of individual players.

The above dual representation of the relationship between the creditor and the debtor, i.e., the relationship in which both players can increase their payoffs based on the fact that one of them uses the other player's financial resources to realise their own investment opportunities (and vice versa – one provides own financial resources to realise the investment opportunities of the other player) is very important for detecting important phenomena that occur in real financial markets. In our paper, we will focus on the already mentioned question *Why cannot the contracts in the field of use of investment opportunities based on their rate of return be described in full enough through Nash bargaining problem?* We will further be modifying this question to a certain degree.

What prevents the capital market from exploiting investment opportunities based on their rate of return? The essence of the problem

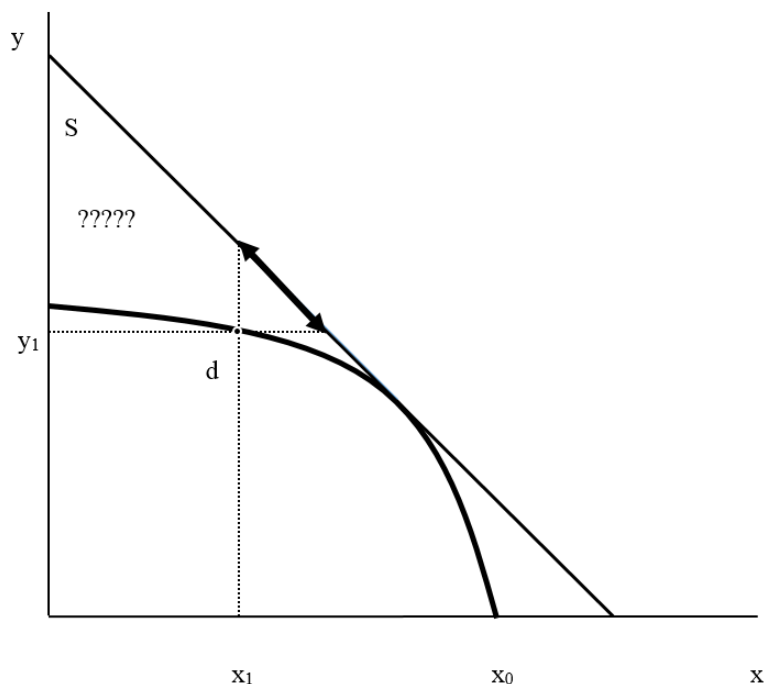
Now we come to the very essence of the problem that we have begun to raise from the question of why some are rich and others poor. If the capital market functioned well enough, including a segment that allows the financial resources of one player to be used to realise the investment opportunities associated with the development, preservation and utilisation of the other player's human capital, there would be no problem of the rich/poor relationship as we are currently see in different contexts. People's income would depend primarily on the opportunities they have to develop, preserve and utilise their skills. Improvements in the capital market would gradually remove the barriers that are currently preventing this because of the current imperfection of the market. As we have said, Friedman considered these shortcomings to be a major obstacle to the full exploitation of human skills in education. However, the problem is more complicated, because as the society develops, not only we do not observe tendencies to eliminate the shortcomings of the capital market, but we observe their increase. It is also possible to identify the phenomenon of aversion to reforms that would remove these shortcomings, both from the richer and the poorer. Since this is not a matter of randomness, but rather a systematic deviation (and very clearly describable from the position of economics of productive consumption), it is appropriate to answer the question of what caused the present situation.

After a brief explanation of the issue, we will be able to reword the question as to why some are poor and other rich in the following clearer and descriptive manner: *What is missing in the figure describing the use of investment opportunities associated with the development, preservation and utilisation of*

human capital, based on the model of Nash (S, d) bargaining problem? Or briefly: What do we not see in the figure but do in reality?

Let's take a good look at the following figure:

Fig. 5. Here is what should be seen and cannot be seen



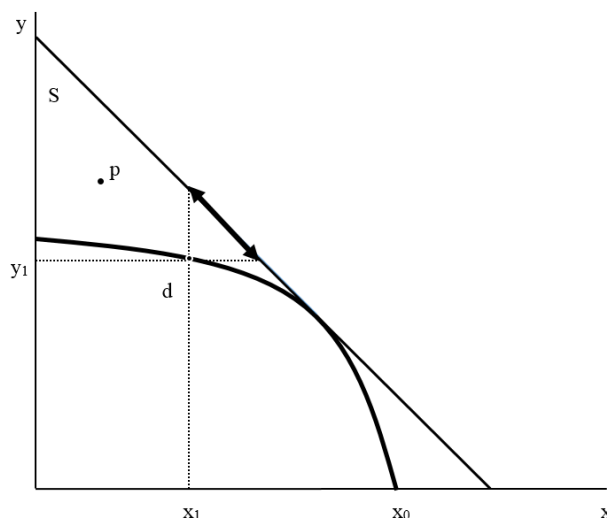
What do we see? We do not see what we want to see. What we care about. In the area marked **?????**. We do not see what would allow us to answer the question why some are rich and others poor.

Let's recall. If the economic system had the engine of competition that would have an effect during the exploitation of investment opportunities associated with the development, preservation and utilisation of human capabilities, there would be no problem of wealth and poverty as we see it today. Each person could develop and utilise their skills based on their rate of return and exploiting these investment opportunities by one person would benefit the other. But there is something preventing it. And probably very strongly, because the economy increasingly requires full development of capabilities as a source of its efficiency. But what prevents it?

We do not see the “thing” depicted in this figure. We only see how efficiency could be improved if the capital market played its part in exploiting investment opportunities.

In the figure above, we are not even able to see what prevents investment opportunities from being used based on their rate of return. If a richer player with more financial resources is to give preference to an alternative to that offered by the creditor position described in the figure above, that alternative has to exist. Let's see what it might look like.

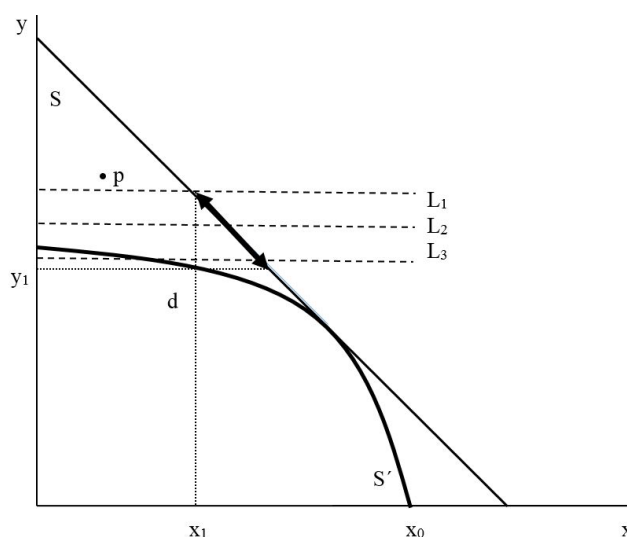
Fig. 6. An alternative opportunity for the richer player. Point **p**



If the richer player has the opportunity to use his or her material advantage to achieve the division at **p** (and the poorer player will not be able to respond), he or she will not have an interest (in terms of individual rationality) to participate in solving Nash bargaining problem. This could be the key to revealing the nature of the phenomena that we observe in relation to the relationship of wealth and poverty. Considering the role of **p** in relation to the original Nash bargaining problem, we can understand and consequently call it a multipoint extension of Nash bargaining problem. In this paper we will not take into account the possibility of the second player reacting to the choice of strategy corresponding to point **p**, which would correspond to other points of extension of Nash bargaining problem.

Let's now look at what situations can arise in terms of the position of point **p**.

Fig. 7. Positions of point **p**



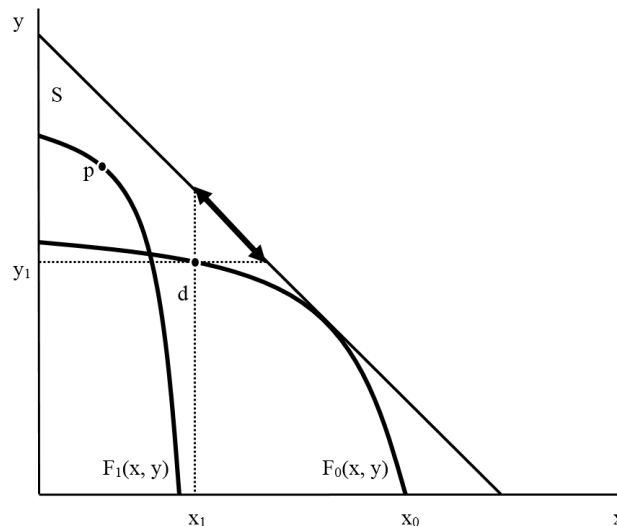
If **p** is above or on line **L₁**, the richer player chooses that point.

If **p** is on line **L₂** and it lies between lines **L₁** and **L₃**, the solution to Nash bargaining problem will be affected by the position of **p**.

If p is below or on line L_3 , it does not affect the game.

What allows the richer player to “touch” the solution at $p(x_p, y_p)$? He or she is allowed by the phenomenon, which we call **investing in a social position**, or in short, **positional investment**. The logic of this investment is shown in the following figure.

Fig. 8.



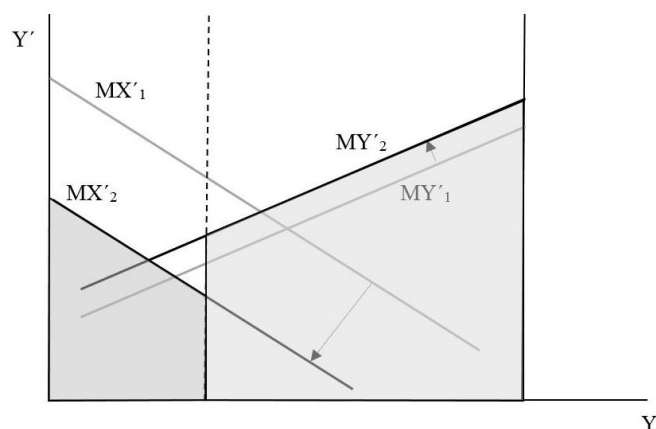
What we read directly from the figure plays an extremely important role in the interpretation of p . If the set bounded by the curve $F_0(x, y)$, i.e. derived from the marginal yield curves available to each player (i.e. point p would have to lie within or on the boundary of that set), would not generally have such a position to significantly (as a sacrificed opportunity and in terms of the principle of individual rationality) influence the players' orientation to the solution provided by Nash bargaining problem. It is possible to imagine cases in which this statement would not apply, but these are the exception rather than the rule. Therefore, positional investment must influence the profitability of the investment opportunities available to players. This is a very important conclusion that we can see from Figure 8, but it would deserve a more detailed justification and analysis of the implications, which goes beyond the scope and potential of our contribution. We can formulate the following conclusions:

1. In the absence of an increase in the profitability of the richer player's investment opportunities, there would generally not be a situation in which positional investment would be reimbursed. (By “generally” we mean in a situation where the curves correspond to situations normal in reality.)
2. The fact that point p lies on the curve $F_1(x, y)$ is given by the assumption of individual rationality of each player.
3. The efficiency of the system is reduced.
4. Improvements are possible even in the new situation.
5. The effect arises when the differences in the size of financial resources are not too great. If they were too great, the effect of positional investment is minimal or negative. Then it pays to invest in patronage or charity.
6. Depends on the expected future efficiency of the system. Will the investment opportunities expand or diminish.
7. An important phenomenon related to the fact that it works for those with similar assets: Positional investment competition. The engine of this competition is acting against the engine of competition aimed

at exploiting the investment opportunities associated with investment in human capital based on their rate of return and regardless of who owns the financial resources.

The above figure 8 corresponds to the following figure 9, which expresses the same, but by financial resources of marginal variables in the chart of supply and demand of financial resources and investment opportunities.

Fig. 9. Change of the return on investment opportunities available to individual players as a result of positional investment



In the figure, the shifts of the marginal yield curves from the investment opportunities available to each player are indicated by arrows. It can also be seen here that the creditor becomes a debtor and the debtor becomes a creditor. We see that also in reality. Poorer people tend to have fewer investment opportunities and so tend to save money for the worse while the richer invest their savings in profitable projects. Indebtedness is occurring in many countries today, but it is rather a follow-up phenomenon that could be analysed separately.

Methodological note: I will briefly mention the meaning of “reading models”, i.e. the models through which we can discover the most important things in reality. They can be of an analytical form (expressed by a system of functions) or of a graphical form (i.e. represented by graphs). Where in the confrontation we do not need to use or cannot use the calculation (for example, because we are not able to accurately measure numerical values), as is the case if social reality is the subject of research, it is preferable to use graphical representation. A classic example is the Laffer curve. In our case, we have shown that positional investment must affect the profitability of the investment opportunities available to players and that it is the essence of its operation and achieving effects for the player who has the option of positional investment.

Summary and discussion

If the economy of productive consumption is to go beyond the neoclassical economy, which is periodically contingent on the growth of the role of the productive services sector, i.e. services contributing to the acquisition, preservation and utilisation of human capital, it must, among things:

1. Describe the developmental trends of the economic system, which are associated with the growth of the role of productive effects of consumption, and at the same time identify what prevents these tendencies from being fulfilled.
2. To reach a point where it will develop its own theoretical apparatus.

We have shown that both can be achieved through a concept derived from Nash bargaining problem, which we called a multipoint extension of Nash bargaining problem. A brief presentation of the simplest

cases shows that this apparatus can prove to be very effective, for example in explaining the non-trivial problems associated with why some are rich and others poor, what problems it can lead to and how to solve them.

In interpreting this issue, we emphasised the clearness that is directly related to the clarity of interpretation, and in some cases may thus be misleading. In further investigation, we consider it important to pay particular attention to the following guidelines for developing an apparatus based on the multipoint extension of Nash bargaining problem:

- To consider the possibility of the second player's reaction to the choice of strategies related to positional investment by the first player, or other mutual reactions, which leads to interesting and non-trivial game dilemmas, which can be solved by a two-matrix games apparatus.
- Exploring multiplayer games in which coalitions can form. One case is the division of society into interest groups in terms of their attitude to reforms.
- To describe more possible influences on what determines the profitability of investment opportunities in the field of acquisition, preservation and utilisation of human capital available to individual players. So far, we have taken into account only the influence of positional investment. A very important case is the possibility of reforms, which increase the profitability of investment opportunities of all or most players, which in more developed models allows for the identification of the phenomenon of aversion to this type of reforms.¹
- Very interesting and from the point of view of clarifying the real behaviour of people is the question of positional equilibrium, i.e. the distribution of revenues, which does not deteriorate or improve the possibilities of players in relation to positional investment and possible defence against positional investment in the following game.

The relevant objection to the presented approach is that players can evaluate the complex social reality very differently and therefore the concepts and models we use do not have sufficient informative value. It can be shown that even this objection can be dealt with both in a theoretical way and in practical terms.

The above-mentioned expansion options are discussed by Valenčík et al. (2019). When solving these tasks, it is necessary to compare formalised concepts and models with social reality, while improving the mathematical expression of the relevant issues.

Conclusion

In our paper we dealt with issues that arose from practical knowledge related to the preparation and implementation of reforms aimed at strengthening the role of the productive services sector, i.e. services that contribute to the acquisition, preservation and utilisation of human capital. The use of the game theory apparatus resulted from the effort to clarify certain phenomena we encountered in this area and from the need to cover research in the given field with a general theoretical basis in the form of economics of productive consumption and to equip this general theoretical system with a suitable apparatus. We are aware that the effort to maintain direct contact with practical applications, which is necessary when navigating in complex theoretical terrain in view of the choice between the many directions in which the theoretical concept can be developed, imposes a number of hidden assumptions on the used and improved game theory apparatus. This may lead to erroneous deliberations or biases. The most appropriate form of defence against this danger is the improvement of mathematical foundations and, in particular, appropriate forms of cooperation with research activities in related fields, which this paper may also contribute to.

¹ At present, the Ministry of Labour and Social Affairs has decided to prepare and implement a bold reform of the pension system in the Czech Republic, which significantly strengthens motivation for long-term employment in the labour market and is a typical example of reform that increases the profitability of investment opportunities available to people. Contradictory public reactions suggest that the phenomenon of aversion to reforms described in Valenčík et al. (2019) truly exists.

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