







offer here the essence of this principle, outlined in the most general philosophical form by Karl Popper himself (Popper, 1947).

*In all matters, we can only learn by trial and error, by making mistakes, and improvements; we can never rely on inspiration, although inspirations may be most valuable, as long as they can be checked by experience. Accordingly, it is not reasonable to assume that the complete reconstruction of our social world, would lead at once to a workable system. Rather we should expect that due to lack of experience, many mistakes would be made which could be eliminated only by a long and laborious process of small adjustments; in other words, by that rational method of piecemeal engineering whose application we advocate.*

From this quote it is seen the main trait of piecemeal engineering approach is that it is based on “trial and error” rather than a prior historicist visions (“inspirations” as in fascism or communism). But the fundamental assumption of “trial and error” in social policy, require that they be sufficiently small on a step-by-step basis, in order not to damage the public well-being achieved. In the e-system offered here, these are small self-sustaining subsidies for UBI and corresponding production. This is the same way as science is innovated, while preserving the knowledge previously achieved. It is namely the essence of piecemeal social engineering. In this way the Popper’s principle is an introduction of his philosophical conception of scientific method into social politics.

It will be further shown that this principle is specifically practicable in implementing a closed non-saving e-payment system for distribution of basic income and corresponding production.

### **Basic idea of Keynes-like e-system**

The basic idea of the e-system, offered for part (sub-economy) of an economy, consists in the following considerations:

- Complete exclusion of both leakages and savings in the implementation of central expenditures on Universal Basic Income (UBI) consumption and related production. Then, in formula (1.3)  $R$  is equal to the tax rate, which is always less than one ( $R < 1$ ). Thus, the amount  $S$  of investment made for production is always greater than the initial investment  $I$ , which is part of the subsidy once distributed to consumers and entrepreneurs. This creates a Keynes multiplier for the relevant investments in the production of and for the UBI consumption of the citizens from the respective tax revenues;
- Accelerate multiplier action over time for each one-off subsidy through specific e- system rules, according to which all funds will be spent entirely on UBI and production costs (without e-salaries) in a relatively short time (for example - one week) and fully recovered at the center for UBI subsidies and in entrepreneurs' accounts (see Appendix I to the article for details);
- Unlimited number of times (weeks) repetitions of the multiplier action, i.e. - as many times (weeks) as there are repetitions of multiple weekly UBI subsidies and entrepreneurial investments.

It is clear that every week, the whole subsidy is reimbursed and starts to play the role of an electronic tax base, which circulates in two cycles - consumer and production (**Figure 1**). As is well known, the tax base is the amount of money that is multiplied by the tax rate to obtain the tax liability. In this case, for the whole e-system, the tax base is equal to the central subsidy and is the same in all weeks of the year unless additional funding is available. Under the conditions above formulated, there exist two exact dependencies: The cost of the UBI consumption is equal to the taxation on the entire initial subsidy, which in turn is equal to the sum of the UBI consumption and production cost. The validity of these two dependencies for the tax base accumulated after any number of subsidies is the mathematical essence of the e-system. This validity is demonstrated in Appendix III to this article. Of course, the accumulated tax base in the e-system can be gradually increased or stopped to grow according to the principle of Popper for piecemeal engineering.

The core of the idea for Keynes -like e-system is that, thanks to the closeness and non-saving properties of the e-system, (which ensures full recovery of the subsidy), it becomes a perfection (improvement) of the multiplier  $1/R$ , as it would function as a kind of kinetic accumulator of working money. This capability of the proposed system to accumulate e-money in the form of an e-tax base enables the implementation of the above-stated Popper's principle of piecemeal engineering. This is done by making gradual accumulations in the e-system of small annual subsidies of the central administration (region, state, community). After a certain period of initial accumulation of e-tax base in the system, the aforementioned kinetic accumulator does not require further central financing. The gradual accumulations lead to also gradual increases in the e-tax base for UBI and corresponding production, as well as to gradual (and therefore conveniently controlled) changes in the behavior of working and non-working people, and of entrepreneurs.

So, the proposed e-system enables the introduction of an UBI system to be implemented cost-effectively, through the yearly accumulation of relatively small subsidies in the form of a tax base, which recovers weekly. In addition, the accumulation of an increasing tax base can be either continued or discontinued depending on scientifically sound monitoring, which is entirely possible in a gradual setting. Finally, as liberal institutions remain unchanged in society and it has been proven that the monetary circulation outside the e-system is stabilizing, the introduction of UBI with the proposed e-system is socially safe.

### **Novelty and value of the model in the context of existing literature**

By author's knowledge, here presented e-model has not analogues in the UBI literature at present. This seems to be confirmed by a recent review of UBI publications (Tan, Adereth & Balakrishnan, 2019), where no UBI models of this type are mentioned. In that review the considered papers do not refer models of this type too (Hoynes & Rothstein, 2019; Kasy, 2018; Banerjee, Niehaus & Suri, 2018; Widerquist, 2018; Francese & Prady, 2018). Nevertheless, the properties of the here proposed model require comparisons with some recent UBI investigations, cited below in the present text.

## LITERATURE REVIEW AND HYPOTHESES

A large number of research findings in the fields of psychology science and behavioral science show that the time background of an individual's birth and the cultural & physical environment of an individual's growth will determine his or her personalities and preferences, and further produce different cognitive abilities, thinking patterns and values (Malmendier & Geoffrey, 2011; Driesch et al., 2015). These differences can affect individual behavior decision-making, and ultimately reflect in the business decision-making process, thus affecting employees' behavior choice. As an important demographic characteristic of CEO, age has a complex and diverse impact on CEO's behavior, strategic choice and management style in the process of duty performing, showing the characteristics of non-linear change. From different theoretical perspectives, the impact of CEO age on employees' turnover has two completely opposite expectations, but each has its own internal logic possibility, that is, positive impact and negative impact. This paper attempts to put forward the competitive hypotheses of the relationships between the two and intends to test and compare the correctness of the two possible logical paths in practice through empirical data.

The term of piecemeal engineering is introduced by Popper (1947) in a general social context. But in the present consideration, the term is filled with the specific content of introducing electronic tax base, which is self-sustaining, so that there is no need for endless of external funding. When an outer gradual financing is applied, the e-tax base would gradually increase without any loss, and the subsidizing could be terminated, if necessary, for social security reasons. Such gradualism would be a reliable condition for scientific monitoring the human behavior aspects (possibly in terms of neuro-economics (Neumärker, 2007) of the construction named here "e-tax base". In this way, the corresponding experiment would be economically non-expensive as well as scientifically informative and socially safe. We consider this is the first (general) value of the model to the existing literature.

The paper sets itself the task of applying Keynes model of electronically closed money circulation and Popper's method of piecemeal engineering, to both economic performance and the above-mentioned human aspects of UBI introduction. In this regard, the questions about the time allocation effects of working and non-working people (Kuss & Neumärker, 2018) and the pursuits of the entrepreneurs (D'Mello, 2019), would arise in a new light. This issue can be considered as a second (specific) value of this paper to the literature.

The gradual increase in the electronic-tax basis of basic income will also lead to a gradual decline in the monetary use of time by workers and to becoming more and more leisure people with their own time for non-monetary activities. Thus, there is a possibility for gradual development in the socio-economic rethinking, which is discussed by Kus & Neumärker in the above cited paper. In a moderate (or slow varying) practical context, it could be understood the potential humanitarian consequences for the individual and social well-being of the working and non-working earners of universal basic income. The division of ordinary dichotomy into working and leisure time in real context could also be considered as a third value of this model to the literature.

The expected real trends in basic income entrepreneurial activities discussed by D’Mello, would be gradual too. In the context of a gradually increasing electronic tax base for basic income, entrepreneurs' productivity would also change gradually. So “the early evidence from UBI experiments and innovation within peer-production and open-source communities to discuss topics related to motivation, creativity, entrepreneurial intentions, and entrepreneurial privilege” (D’Mello, 2019) can become up to date. This can be called the fourth value of the model for literature.

At the end, a fifth value to the UBI literature is that, the value of the approach proposed here is to open up new perspectives for elaborating specific electronic platforms (software programs) of the proposed closed and piecemeal type. This also opens the way for solving the instrumental aspects of the problem of introducing UBI in the form of common dividends (Standing, 2019).

## **FUNCTIONS AND STRUCTURE OF THE PROPOSED E-SYSTEM**

### **Functional list and block diagram of the electronic system**

We start with a specific description of the functions and structure of the e-system offered. Due to appropriate administrative provisions embedded electronically in the system, the last is multifunctional in a sense that it has numerous functions (properties). The latter are governed by the administrative rules cited below against each function in the list and set out in detail in Appendix I to the article or by previous functions in the same list. The functions (properties) themselves are as follows:

(a) Complete closing of the electronic money circulation only for the purposes of Universal Basic Income (UBI) consumption and production costs (without electronic salaries, which are not allowed in this model); (This function is subject to rules 9 and 10 in Appendix I)

(b) Full utilization (“non-saving” - by analogy with Keynes theory) of the money for UBI and corresponding production, over a relatively short period of time (in this paper - one week); (Subject to rules 3, 4, 6, 7, 8 and 9 in Appendix I)

(c) Full self-recovery of the necessary funds for the UBI in the body of its central (for the region, the state and so on) issuance, as well as for the total (i.e. - for the whole system) amount of production costs; (Subject to rules 5, 6 and 12 in Appendix I)

(d) Cumulation of central subsidies for the UBI and related production, and in this way increasing the total (for the system) e-tax base, which is equal to the sum of all subsidies during the years; (Conditioned by function (c))

(e) Temporary financing of central issues for UBI and corresponding production, with a duration not exceeding a limited number of years; (Conditioned by function (c))

(f) Unlimited functioning of the model from some point onwards when the annual central financing will not be required due to the weekly reimbursement of money in the electronically closed system; (Conditioned by function (c) and (d))

(g) Gradual increase of the total money sum in the system (Popper's principle of piecemeal engineering (Popper, 1947) as a result of accumulating relatively small annual subsidies, according to the capabilities of the economy considered; (Conditioned by function (d))

(h) Gradual change expected in the behavior of working and non-working people and entrepreneurs, with a view to successful adaptation of modern society to the introduction of UBI. (Conditioned by function (d))

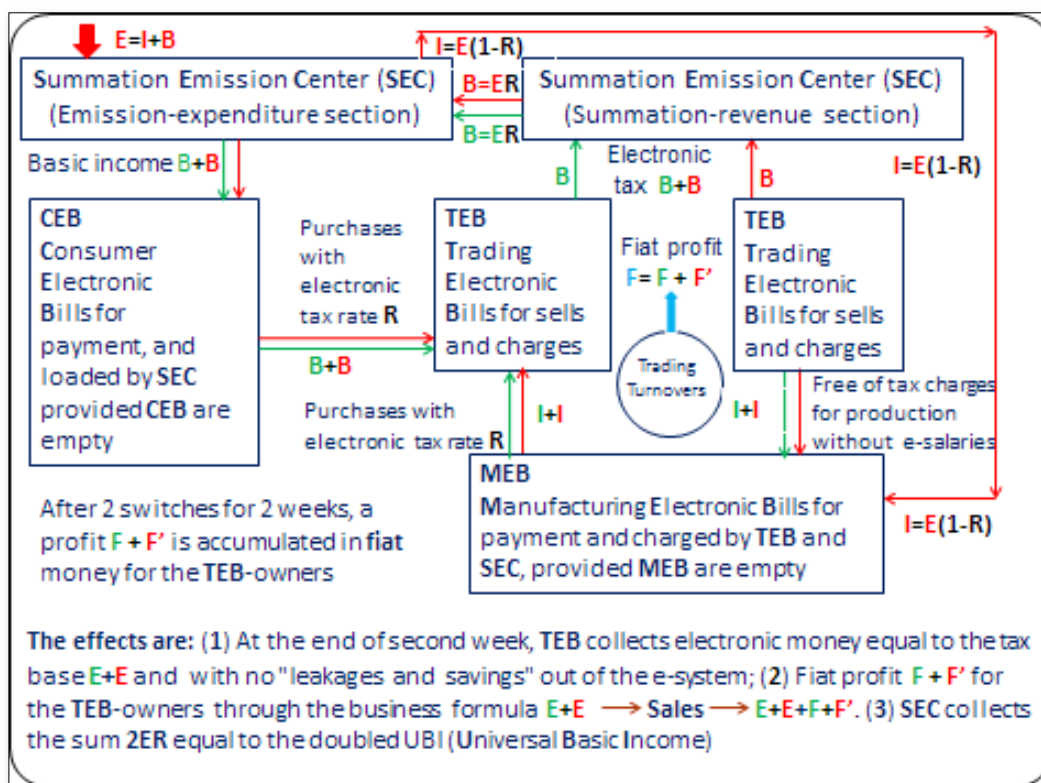
The last two functions (g) and (h) are specific manifestations of the Popper principle of piecemeal engineering. These two functions result directly from the function (d). The first six functions (a, b, c, d, e, f) are interconnected and express in their entirety the Keynes model of closed and non-saving economy. Thus, Popper's principle turns out to be based on Keynes's model in the considered case. This is a central feature of the present model that is essential for its further understanding.

The functions (a, b, c, d, e, f, g, h) are related as follows: The first two functions or properties (a) and (b) ensure the fulfillment of (c), and through (c) - of all subsequent properties (d, e, f, g, h). In doing so, (c) directly enforces (d), and (c) and (d) together ensure the implementation of (e). Functions (g) and (h) are also conditioned by the direct action of (c) and (d). Thus, the properties (a, b, c, d, e, f, g, h) are linked in a hierarchy multifunctional system in which the closeness (a) and the not-saving (b) are the determining functions.

From the above, it is seen that the proposed system is characterized by hierarchical multi- functionality. It also has a relatively complex structure. For ease of understanding, we further consider as a "leading image" the flowchart in Figure 1 presenting structure and functions of the proposed system. It presents a Keynesian, i.e. closed and non-saving (Keynes, 2003) economy (namely sub-economy) in a region (state, union, state, province) separated from the free market in it (in the region). The sub-economy is based on an electronic payment system that allows for a gradual increase of the regional subsidy E, both administratively and technically designed to play the role of an electronic tax base. (As it was defined in the introduction, this tax base is an amount of money, which is multiplied by the tax rate to receive tax liability). The e- money has been administratively regarded as equivalent as a currency to fiat (real) money outside the system, i.e. - in the free market.

As it was said, the electronic subsidy E plays role of an e-tax base, which is issued once a year if necessary. For every  $R$  fixed in the interval ( $0 < R < 1$ ), the e-payment system we introduce restores the consumable part B on a weekly basis, provided that the production part I is restored on a weekly basis too. Concerning this, Trade Electronic Bills (TEB), Consumable Electronic Bills (CEB) and Manufacturing Electronic Bills (MEB) are introduced, as they are shown in Figure 1 by corresponding blocks (rectangles). In the figure, the notation SEC means Summation Emission Center. The green letters and arrows denote an initial (or accumulated during previous weeks) charging the bills. The red ones mean post-initial (steady) quantities of charging bills, when external subsidy is available.





**Figure 1.** Flowchart of the structure and functions of the proposed system: red symbols E show the sequential distribution of the e-tax base, imposed on the previously filed tax-base E (green symbols). The entire subsidy E is issued once a year, but the amounts for the individual basic income B and production I are reimbursed weekly.

It is seen that the e-money E, intended for basic income and production circulates in two different circuits, respectively, - consumer and production. The production part and the consumer part of the regional e-subsidy are interconnected in a certain way, fixed by the e-tax rate R. This subsidy (e-tax base E) intended only for manufacturing costs I (without salaries) in the regional economy and consumable basic income B for the residents in the respective region. The tax rate R is defined by equality  $B = ER$ . In more detail, the mathematical essence of the closed sub-economy presented in Figure 1 is described in appendix III to this article.

The exclusion of electronic wages in the model (Figure 1) is made, in view of the following considerations:

From a purely technological point of view, the exclusion of electronic salaries guarantees that employees (salaried) do not save electronic money. This ensures that one of the basic requirements in Keynes's theory of the failure of the economy in question to increase its efficiency (a higher Keynes multiplier) is ensured. Otherwise, i.e. if electronic salaries are allowed, it would be impossible to oblige employees to save their own money, and full refund of the e-tax base in the e-system would not be possible.

It is also important, that the employee is most often economically compelled to participate in production developed on the free initiative of the private entrepreneur. The latter agrees to trade in non-convertible electronic money of their own choosing, while the worker may be economically forced to work for that money instead of convertible fiat ones. This would be to

create a new kind of inequality that the proposed system excludes.

On the other hand, in accordance with the principle of piecemeal engineering, by eliminating electronic wages, the system leaves unchanged social security institutions and does not directly affect employment in the fiat-money sector. The institutions and employment themselves are not directly influenced, but some gradual outflow is, of course, possible. Of course, an appropriate monitoring of this outflow could be also possible in the context of the above said piecemeal engineering.

At the end, with modern automation, the entrepreneur could use the “labor” of robotic systems to pay for some kind of e-wages in the form of production costs. Automation is a technology by which a process or procedure is performed with minimal human involvement (Groover, 2014). The potential for the possible impact of electronic financing in the proposed system on automation, and through it - on consumer demand in electronic and fiat money needs comment which is done in the conclusion of this paper.

### **Movement of the money in the e-system during the weeks of the year**

It is important to note that the defined above quantities  $B$ ,  $E$ ,  $I$  and  $R$  have total meaning, i.e. they are applicable to all participants (as a whole) in the electronic payment system. From a systemic point of view, the quantities  $B$  and  $I$  (as well as  $E$ ) are extensive and each of them is equal to the sum of the respective individual values  $B_i$  ( $i = 1, 2, \dots, N$ ) and  $I_k$  ( $k = 1, 2, \dots, M$ ), for the individual market agents - consumers and entrepreneurs, which numbers are  $N$  and  $M$  respectively. The tax rate  $R$  is intensive from a systemic point of view. Only the movement of the total quantities  $B$ ,  $E$  and  $I$  are considered further.

On the first day of first full week, from the first year of introduction of UBI, Consumable Electronic Bills (CEB) and Manufacturing Electronic Bills (MEBs) are charged by the Summation-Emission Center (SEC) with electronic money quantities  $B$  and  $I$  respectively, here  $E = B+I$  is the entire central subsidy. The movement of money in the e-system is as follows:

The money supply  $B$  moves in the consumer circle, i.e. – it goes from SEC to CEB, then - to Trading Electronic Bills (TEB) until for a week the whole amount  $B$  is directed to TEB. The money supply  $I$  moves in the production circle, i.e. after moving from SEC to MEB at the beginning of the first week, then the whole amount is directed to the TEB, to where the money supply  $B$  is directed too.

Thus, at the end of the first week, the entire central subsidy  $E = B + I$  was directed to the TEB. This movement of e-money is a manifestation of the function (b) of the previous section 2.1., which in turn is conditioned by rules 3, 4, 6, 7, 8 and 9 in Appendix I, as well as by the prohibition of pay with electronic money.

At this transaction to TEB, the subsidy  $B$  is subject to taxation equal to  $B = ER$ , where  $R$  is the tax rate. The tax  $B$  goes to SEC. In this way, at the end of the first week, the same amount of money  $B$ , transferred from the SEC to the CEB at the beginning of the week, is returned to SEC at the end of the week. However, the amount of money  $I = E-B$  remains at the TEB, from which it passes to the MEB in the beginning of next week, when the quantity  $B$  is

transferred from SEC to MEB.

By the end of next week, the money  $B$  is again directed from the CEB to the TEB and the quantity  $I$  is moving from the MEB to the TEB.

Thus, at the end of the next week too, the whole central subsidy  $E = B + I$  is again directed to the TEB. In this transaction to the TEB, the subsidy  $E$  is again subject to taxation equal to  $B = ER$ , where  $R$  is the tax rate.

Further, the same movement of e-money is repeated in the coming weeks until the end of the year, when a new central subsidy is possible. The latter is superimposed on the previous one  $E = B + I$ . An increased amount of money  $2E$  is obtained which moves and distributes in a manner analogous to that described here. We just need to replace  $E$  with  $2E$ , instead of  $B$  to take into account  $2B$ , and instead of  $I$  to take  $2I$ . After a number of  $n$  years, all the monetary quantities  $E$ ,  $B$  and  $I$  would be multiplied by  $n$ , provided that an electronic subsidy  $E$  was issued every year. The mathematical essence of this process is discussed more detail in Appendix III.

### SOCIAL-ECONOMIC PECULIARITIES OF THE MODEL

The administrative rules described in Application I provide correlation between the respective payments, realized both for production and basic income, by using the tax rate  $R$  for this purpose. This is done in order to avoid the possible high real (not just financial) costs. (The problem is discussed in the work of Tcherneva (Tcherneva, 2019) for the case of subsidy used only for basic income.)

As it is shown in the Appendix I, the electronic-bill system is formed as Keynesian economy. There the regional subsidy plays role of fully restored e-tax base (every week) and no new one is needed except in order to increase it, if possible, gradually (annually-by piecemeal). Thus, an indefinitely large multiplier effect is achieved in terms of Keynes's theory (Keynes, 2003). The novelty of the present approach lies in the proposed e-platform. The last is indifferent to the literary dispute over the question: Are the potential costs of universal basic income illusory (financial) or real? (Colombino, 2019; Tcherneva, 2019; Widerquist, 2017; Greenstein, 2017). The e-platform software provides for the specific interests of bill users. As a result of these interests, the proposed platform for distributing the e-tax base (regional subsidy) is closed, unsaving (in the bills) and gradually realizable, as it is at the same time Keynesian, as well as piecemeal engineering in the term of Popper (Popper, 1947).

The system preserves and accumulates the regional subsidy (e-tax base), which is why it is indifferent to the aforementioned dispute: In any case, it is able to achieve certain costs, regardless of whether they are financial or real. Considering its gradual property, the novelty of the e-system is also that its practical application is socially safe. Thus, the resolution of the above said dispute becomes a matter of the need for an ethical and scientifically sound social experiment, which the paper proposes, and which can always be terminated or continued according to the obtained economic results and their human dimensions.

The conceptual content of this paper lies in the essential application of

the concept of closed system, which requires the following clarification: On the one hand, the proposed e-system is unilaterally closed (e-money leaks are not possible, but state subsidies are allowed). However, in the interval between the two consecutive subsidies emissions, the platform is completely closed and in this sense Keynes's theory (Keynes, 2003) is fully applicable.

According to this theory, in the specific case of the proposed e-platform, the unlimited essence of the multiplier effect consists in the fact, that the total value of the goods and services, produced for an unlimited time, is also infinitely greater than a one-off regional e-monetary investment that causes them. Thus, through the platform and for an unlimited time, the production repeatedly recovers the initial e-monetary state subsidy. The latter is used for weekly recurring basic income and for production (manufacturing) costs in of the entrepreneurs. Separately, the entrepreneurs make a profit in fiat money, as shown in **Figure 1** with a blue arrow. So, the proposed e-management allows its implementation to be gradual, step by step, during the years and in a completely controlled manner. In this sense, it is appropriate to use the term piecemeal engineering proposed by Karl Popper in a more general social context (Popper, 1947).

It can also be said that the paper offers a combination of paternalistic means (basic income) while maintaining the institutions of the liberal society (in this case, the free fiat money market). Given this, the term liberal paternalism is appropriate (Mitschell, 2005; Sunstein & Thaler, 2003).

Generally speaking, it is possible a gradual realization of the proposed model in every country all over the world, depending on the specific conditions of the economy considered (or an economic community such as the EU for example). As it was noted above, it is always possible to cease central subsidizing of the e-system in the presence of even the smallest negative effects of its implementation. At the same time, all the benefits gained from its implementation are retained due to the proven ability to fully recover the state subsidy invested. In this sense, it is possible to refer to piecemeal engineering in the terms of Karl Popper. This sense is particularly clear in the following quote from his book *The Open Society and its Enemies*:

“Powerful interests must become linked up with the success of the experiment. All this does not contribute to the rationality, or to the scientific value, of the experiment. But the piecemeal method permits repeated experiments and continuous readjustments. In fact, it might lead to the happy situation where politicians begin to look out for their own mistakes instead of trying to explain them away and to prove that they have always been right. This – and not Utopian planning or historical prophecy – would mean the introduction of scientific method into politics, since the whole secret of scientific method is a readiness to learn from mistakes” (Popper, 1947).

## **EVALUATION OF E-TAX BASE FOR BASIC INCOME AND PRODUCTION IN BULGARIA AND GERMANY**

According to the latest data from the National Statistical Institute in Bulgaria, the population of the country is about 7 million for 2018. The state budget of Bulgaria for 2019 is over BGN 25,6 billion. (<https://www.nsi.bg/en/content/6708/population-districts-age-place-residence-and-sex>),

<http://dv.parliament.bg/DVWeb/showMaterialDV.jsp?idMat=132563>)

In the absence of the e-payment system offered here, the introduction of UBI in Bulgaria seems impossible due to the following two circumstances:

- (a) Leakage of UBI funds outside the national economy that is still not competitive enough. That means the monetary *out-flux* prevails in comparison with the *influx* one;
- (b) Lack of compensation of UBI's cost by corresponding increased productivity as a result of appropriate production, what means significant difference between the financial and real cost of the basic income.

The proposed e-payment system eliminates the circumstances (a-b), whereby the introduction of UBI is possible even in a small economy like the Bulgarian one, as follows:

Let there be a government subsidy (e-tax basis) of BGN 700 million for production and basic income under the weekly e-payment system outlined here. This means that every citizen of Bulgaria receives BGN 50 per week, which makes a total of BGN 350 million per week for the whole population. Assuming that the electronic tax is  $R \approx 0.5$ , then from the subsidy for production also remain 350 million per week for distribution between trading companies (the first week the distribution is equal between them, and the next, according to the electronic revenue in each TEB from CEB of the consumer citizens) For one month, each citizen will receive and spend BGN 200, so the total consumption (by e-payment) of the population will amount to BGN 1 billion and BGN 400 million. The investments made for production by trading companies during the month, will reach the same value. These weekly and monthly subsidy allocations for production and universal basic income will be repeated throughout the year and in subsequent years without essential modification (according to the nature of the elementary mathematical model justified in the above paragraphs).

But for the Bulgarian standard of living, BGN 200 a month is not enough for a decent existence of any citizen of the country, even if he or she is a minor. Especially, that is true if the citizen has no income other than UBI. On the other hand, the BGN 700 million makes essentially smaller than 3% of the state budget of the country. So, it is quite normal and possible, after one year, that the monthly basic income and the corresponding investment for production be increased with a new subsidy (new e-tax base) of BGN 700 million from the new budget. The new subsidy will be superimposed on the previous subsidy, and thus the resultant e-tax base will become BGN 1,400 billion, which means that every citizen will receive (and spend if he wishes to receive) weekly BGN 100 or monthly BGN 400. The last amount is a bit of more than the average pension in Bulgaria for the year 2019. It is almost adequate for the current Bulgarian standard of living, even more so that the e-monetary system leaves the existing social institutions in society unchanged and most Bulgarians, besides UBI, will be able to receive other income (profits, salaries, pensions, scholarships, social benefits) as it is now. The monthly total consumption (by e-payment) of the population will amount to BGN 2,800 billion, and the same amount will be invested for production by the trading companies during the month.

A new subsidy of BGN 700 million can be granted in the next (third)

year and superposed on the previous two will result in a monthly UBI of BGN 600 per person. Such an income is essentially more than the average pension for the country, in which the corresponding institution will continue to exist. Thus, normal prosperity for its citizens could occur in the country. Of course, this would happen only if the general tendency of national economy development is also normal. Only then the government subsidy can increase continuously. Otherwise, its increase may be stopped, leaving the e-payment system functioning at the corresponding current level.

A similar assessment of what has been done so far for a small economy like Bulgaria can be made for a relatively large economy like Germany. In addition, the relatively higher requirements for social welfare indicators in Germany can be taken into account. It should be noted that due to the high competitiveness of the German economy, the circumstance (a) is eliminated on its own since, for the German economy, the above-mentioned *influx* prevails. Nevertheless, the condition (b) remains valid even for the leading US economy, as shown in Cherneva's article (Tcherneva, 2019). But the proposed e-payment system even eliminates this condition, so a German estimate would look like this:

The population of Germany for the year 2019 is approximately equal to 80 million (<https://www.livepopulation.com/country/germany.html>). The state budget of the country amounts to €356.4 billion (<https://www.dw.com/en/german-parliament-approves-record-budget-for-2019/a-46420414>). On this background, let us assume that it has granted an annual government subsidy of EUR 8 billion for UBI and production of the e-payment system offered here with an electronic tax rate  $R \square 0.5$ . This subsidy represents only 2.24% of the annual state budget of the country. But its granting on the base of proposed e-system means that every citizen of the country receives a weekly basic income of €50, which makes €200 per month. For the whole population, the weekly UBI amount is €4 billion. The same amount remains for a weekly investment in the production of the manufacturing sector. If the subsidy is granted next year, it will be superimposed over the previous one and the monthly UBI will increase to €400. And if the same subsidy continues in the coming years, then in just 5 years, every German citizen will receive a monthly UBI of €1,000, which is most often mentioned in the literature. In addition, under the proposed e-payment system, an amount of € 20 billion will circulate weekly in the economy of the country, providing a level of production that meets basic income of €1000 per month for every citizen in the country.

It is essential for the social feasibility of the proposed Keynesian e-payment system to show that its implementation, because of its gradual property, will not be overwhelming for the state budget, even for the small country. In addition, if Popper's method of *piecemeal engineering* is followed, the conditions for its functioning should leave unchanged the basic principles governing the existing monetary circulation, the stability of the latter, and the work of all social institutions in a liberal society (country).

## CONCLUSION

The present development envisages a gradual increase in electronic money supply, which can lead to an increase in both the consumption with

electronic money and a corresponding increase in production (through the development of automation, eventually). This can lead to a relative decrease in consumption with fiat money circulating outside the electronic payment system for UBI. In doing so, a number of questions arise: How long can UBI money be increased without this happening? How significant will the decline in purchasing power in fiat money be as a result of the increase in e-money for UBI and production (automation)? How significant will the reduction in fiat profit and the corresponding decrease in entrepreneurial activity be? - and similar.

The answers to these questions are in the practical application of the proposed e-payment system, which is being introduced gradually in the light of these issues and in order to avoid social disturbances. It seems possible to introduce in this way a kind of "electronic socialism" in which the capitalist mode of production and distribution will simply gradually disappear as unnecessary. This is in view of the declining capitalist profit, based on wages, labor and fiat (not electronic) money for UBI and production.

But it also seems possible that the "peaceful coexistence" (as it used to be said before) of the two systems – "socialist" and "capitalist" - can continue in the future, but already - on the wings of high technology!? It will all depend on this - Will production create more new jobs than the number of old ones eliminated? The answer given by Vermeulen, B., Kesselhut, J., Pyka, A. and Saviotti P.P. to this question is sufficiently defined: "Finally, we study several macro-level scenarios on employment and find that mankind is facing "the usual structural change" rather than the "end of work" (Vermeulen, Kesselhut, Pyka & Saviotti, 2018). Therefore, there is reason to believe that a "peaceful coexistence" between a kind of electronic socialism and future high-tech capitalism would be possible.

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## Appendix I. Administrative and economic basis of the model functions

The cash circulation in the proposed electronic payment system is “driven” by the relevant administration (SEC) and population in a given region (region, state or group of countries). It is the administrative rules and the citizens who carry out the functions (a, b, c, d, e, f, g, h) of paragraph 1, and thus cause the ‘revival’ of Figure 1.

The following provisions shall apply to the activities of the SEC:

1. Issuance and provision of the so-called Manufacturing Electronic Bills (MEB) and Trade Electronic Bills (TEB) to trading companies wishing to receive electronic investment from the SEC for production. In SEC, each company may have at most one MEB and one TEB.

*This rule 1 constitutes the system by supplying it with market agents (manufacturers and traders who sell and buy goods and services with electronic money).*



2. Issuance and provision of Consumable Electronic Bills (CEBs) to all eligible persons in the area wishing to receive basic income in the form of electronic money.

*This rule 2 also constitutes the system by supplying it with buyers of goods and services.*

3. In the availability of a new central subsidy (possibly provided at the beginning of the year if necessary), the SEC charges each MEB (provided that its balance is not positive) with an amount of electronic money equal to the ratio of the total electronic money in the SEC (intended for production) to the number of MEB holders.

*The rule 3 defines the manner in which a central subsidy is distributed between eligible companies producing or trading electronic money received from SEC. This distribution between companies is made at the beginning of the year, when the administration (SEC) has increased the central subsidy (electronic tax base), finding that necessary and possible.*

*The requirement for a non-positive balance ensures the non-retention of funds in the manufacturing electronic cards MEB, which is directly related to the absence of any congestion in the cash flow of the e-system and to the recovery of the electronic money.*

***This rule 3 directly determines the realization of function (b), and in particular - the complete utilization of the total amount, earmarked for production costs.***

4. The SEC charges each CEB at the beginning of each week (provided that its balance is not positive) with one and the same amount of electronic money equal to the ratio of the total electronic money in the SEC intended for basic income - to the number of CEB holders.

*This rule defining the manner in which the central subsidy earmarked for basic income is distributed among eligible consumer citizens. It is clear that at the beginning of the year (when proceeding with the distribution of the subsidy), this rule applies in conjunction with the previous rule 3. The latter does not apply during the rest of the year, when the entire electronic tax collected is used as universal basic income (UBI).*

*As in the previous rule 3, the requirement in rule 4 of a positive balance ensures that funds are not held in consumable electronic cards (CEB). Thus, Rules 3 and 4 ensure that there is no congestion (no saving in terms of Keynes) in the cash flow of the e-system, and hence - the full recovery of money in the trade electronic bills (TEB) and after deduction of electronic tax, also full recovery in the summation- emission center (SEC).*

*The lack of congestion in electronic money circulation means that the system functions as a Keynesian model of economy, in this case in absolute terms, i.e. - with a full return on investment, which in this case is equal to a  $(1-R)$  part of the central subsidy  $E$  (equal to the tax base). The corresponding mathematical proof is presented in Appendix II.*

This rule 4 directly determines the implementation of function (b), and in particular - the complete use (i.e. – without savings) of the UBI funds.

5. At the end of the last day of each week, the SEC collects electronic tax from all TEBs using the formulas (1.1-2) of the paragraph 1.

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*This rule 5 ensures the completion of electronic taxation and the full recovery of universal base income  $B = (1 - P) E$  at the Summation-Emission Center (SEC).*

***The rule 5 directly determines the implementation of function (c).***

To the conditions (1-5) describing the activities of the SEC, they are added the following 7 conditions that determine the rights and obligations of electronic bills holders:

6. For an unlimited period of time, each TEB recharges, at the beginning of each week, the respective (i.e., the same holder) MEB, with all electronic money, contained in the TEB, provided that the balance of the MEB is not positive. Otherwise, i.e., if the balance of MEB is positive, the latter shall be subject to the electronic tax, referred to in item 5.

*This rule 6 contributes (together with the above rules 3, 4 and 5) to the full recovery of the e-subsidy in the TEB, as it treats the case of traders who have not shown serious interest in participating in the e-system. If such a lack of interest (or commercial inability) persists in time for a company, the latter simply remains without electronic money in its TEB and MEB, since all their availability will be withheld in the form of taxes by the SEC.*

***This rule 6 directly determines the realization of functions (b) and (c).***

7. Any holder of a CEB or MEB is entitled to credit when the corresponding bill has a positive balance (stock). The size of the credit is determined by agreement with the seller but cannot be less than double the value of current bill availability.

*A loan is settled, which is the buyer's right (both for the consumer and the company) and the seller's obligation. The "no less than double" condition ensures that the respective CEB or MEB is emptied (making the balance non-positive).*

*This rule 7 also contributes (together with the above rules 3, 4, 5 and 6) to the full repayment of the e-subsidy in the TEB, as it treats a specific (often expected) case of a sale where the buyer wants to empty your account for it to be charged according to rules 3 or 4.*

***The rule 7 directly determines the realization of function (b).***

8. For an unlimited period of time, each CEB and MEB owner, by the end of each week may (and has an interest) cancel its availability (positive balance) or borrow (generate negative balance) through credit by making purchases from TEB.

*It is noteworthy that if for some reason the consumer is not interested in spending the CEB availability, this will not affect the ability of SEC to charge the other accounts. This is because the corresponding blank card simply will not be loaded under Rule 4. This is not the case with MEBs. The latter are not recharged during the year by the SEC and their eventual non-discharge affects the e-tax collection. This, in turn, affects the ability of the SEC to load the CEB with the same UBI as the previous week. It is in this connection that the above rule 6 is introduced.*

***This rule 8 directly determines the realization of function (b).***

9. The cash flows (transactions) between the SEC and the electronic accounts are closed in the system and are one-way directed, namely:

- from the SEC to the MEB and CEB by loading (ie without buying and selling);
- from MEB and CEB to TEB through purchases, ie, TEBs sell without buying;
- from TEB to MEB, which can buy without selling;
- from TEB to SEC by paying taxes (without fully emptying TEB in favor of SEC);
- there are no transactions between the MEB and CEB, and between TEBs.

*This rule 9 determines the direction of cash flows in the e-system depicted by the arrows (blue and red) in Figure 1. It ensures realization of one-way cash flow and no "leakage" of money outside the e-system, as well as so that no cash retention occurs in electronic bills.*

**Rule 9 directly determines the implementation of function (a).**

10. Electronic money cannot be converted into real (fiat) money.

*This rule ensures the closeness of money circulation in the e-system in accordance with the basic requirement in the Keynes model of economy.*

**Rule 10 directly determines the realization of function (a).**

11. Only goods for the purposes of production may be purchased through the MEB without paying salaries for human labor. Otherwise, e-money spent by the MEB is seized from the SEC by software. Control of this point is exercised through the IoT (Internet of Things) (Gokhale, Bhat & Bhat, 2018).

*This rule prohibits the payment of human labor by electronic money since, under rule 10, they are non-convertible into fiat money (i.e. with limited exchangeability) and this circumstance may be a condition for the emergence of a new kind of inequality between worker and employer. Moreover, in today's society, human labor is a particular commodity that is linked to the fiat money social security system, which is directly not affected by the current e-system. Finally: the e-system is generally social security one.*

12. In the case of sales, TEB holders may not refuse to accept electronic money.

*This rule determines the implementation of function (c).*

It follows from conditions 7 and 8 that CEB and MEB holders cannot purchase on credit which are greater than their doubled bill holdings at the time of purchase. Two further conditions are imposed in this regard:

13. The electronic money remaining in each CEB or MEB after a sequential charge is equal to the difference between the charge value (to the SEC and MEB respectively) and the value of the credit to the respective TEB (or the weekly credit payment as agreed by the seller and buyer according to the maximum money availability of CEB and MEB).

*This is a pure technological rule specifying the functioning of the e-system.*

14. By mutual agreement, the buyer and seller may also transact on the ordinary long- term leasing.

*This is a rule that provides greater opportunities for sales within the proposed e-system.*

From condition 7, it can be concluded that credit debt is only possible to one TEB, i.e. - no more, as the contrary is related to a breach of the positive balance requirement of the CEB or MEB under rules 3 or 4, respectively. This means that rule 13 provides a full return on leasing debt for the entire e-payment system at the end of each week. In this sense, the credit of e-system is too specific as it has a limited technical purpose to ensure only the complete emptying of electronic bills, in the absence of long-term and large debts to TEB holders. The latter are not forced to wait long for the repayment of large debts, unless they themselves wish to do so by agreement with the buyer under the usual leasing practice in accordance with rule 14. This timely debt repayment, coupled with guaranteed consumer demand and the ability to develop production with regional (state) funds, should encourage entrepreneurs to participate in the proposed e-payment system (see also rule 1 above).

As a result of the fulfillment of the rules (1-14), at the end of the first week of the year, the following distribution of money in the platform is achieved: The amount of electronic money in the SEC is equal to its amount  $B = ET$  at the beginning of the week; zero or near-zero availability at KEK (the word “near” is due to eventual non-empty CEB, that are not filling up, in order to restore availability  $B = ET$  at the CEB); corresponding availability  $A = E (1-T)$  of electronic money in TEB; zero or near-zero money at AEK (the word “near” is due to eventual non-empty MEB, but taxable with a view to restoring availability at the SEC).

## Appendix II Mathematical description of the unlimited multiplier effect of the model

The unlimited multiplier effect of the proposed e-payment platform is best understood through the following thought experiment:

Let's imagine that the SEC in the block diagram of the platform depicted in **Figure 1** ceases to issue weekly UBI quantities  $B = ER$  while still collecting those same amounts  $B$  from the TEB in the form of tax contributions. Then, after each trade turnover shown in the same **Figure 1**, e-money investments in production will begin to decrease on a weekly basis in geometric progression by a factor  $(1-R)$ , i.e.

$$(AII.1) E (1-R), E (1-R)^2 E (1-R)^3$$

The sum  $S$  of all the investments made (for a sufficiently large number of weeks) in this progression is given by the formula

$$(AII.2) S = \frac{E (1-R)}{1-(1-R)} = \frac{E(1-R)}{R} = \frac{1}{R}$$

Here  $I = E (1-R)$  is an initial investment that can be invested in the absence of taxation and consumer savings. Then we get formula (1.1) from the Introduction, and the expression  $1/R$  (after the second and third equality sign in (AII.2)) has the meaning of the so-called Keynes multiplier (Keynes, 2003). In the proposed e-system, however, the situation is the opposite - the presence of taxation and lack of consumer savings. In addition, the beneficial economic effect is the same. Since the tax rate is always less than one ( $R < 1$ ), the amount of current investment for production is also always greater than the initial investment  $I = E(1-R)$  for this purpose.

This achieves the multiplier effect of the subsidy once embedded in the electronic system.

As tax contributions are recovered weekly at the TEB through also weekly CEB recharges and discharges at the TEB, the result is a constant investment of one and the same e-money quantity  $E(1-R)$  every week in the automated production. Thus, instead of decreasing progression (A.1) by a factor  $(1-R)$ , we obtain a non-decreasing progression by a factor of one. Formally, it can be represented as,

$$(AII.3) \ E(1-R), E(1-R).1, E(1-R).12, \dots \text{ etc.}$$

The last progression has an unlimited sum  $S = n \cdot E(1-R)$ , for an unlimited number ( $n \rightarrow \infty$ ) of weeks. The progression for the tax collection and the corresponding UBI costs of SEC has also a multiplier of 1:

$$(AII.4) \ ER.1, ER.1, ER.1, \dots \text{ etc.}$$

In this sense, the costs of UBI consumption and production investment provide one common tax base, which is also self-recovering for unlimited number of times. In such a mutually agreed manner of circulation of basic income, production costs and their sum (tax base), the proposed e-system plays the role of some kind a kinetic accumulator of money.

### Appendix III Mathematical essence of the model

As can be seen from the flowchart in **Figure 1**, the electronic money earmarked for basic income and production, circulate in two different circuits - consumable and productive, respectively. The E-money has been administratively regarded as equivalent to the fiat (real) money out of the system, i.e.- in the free market. The production part I and the consumable part B of the regional electronic subsidy E are related to each other in a way, determined by the electronic tax (e-tax) rate R through the system of algebraic equations

$$(AIII.1) \quad B + I = E,$$

$$(AIII.2) \quad B = ER.$$

As it was said in section 2.2., the values  $B, E, I$  and  $R$  have total (i.e. - for all relevant participants in the e-payment system) sense and represent sums of the respective individual values of the participants. That is why, for the above two equalities (1.1-2) to be valid, the participants need to comply with certain requirements, which were addressed in the Appendix I.

In **Figure 1** it is shown with a blue arrow and blue letter, that the total owner (i.e. all owners as a whole) makes a profit  $F = F + F$  in fiat money, where  $F \neq F'$ , because in the free market, profits vary over the weeks. It is important to note, that only fiat profit can be realized, since the block diagram shows that in electronic money circulation, the total income of the TEB and MEB holders, is equal to the total expense given also from (1.3).

Profits in electronic money are not possible in the framework of the proposed e-payment system being closed and non-saving. Moreover, the flowchart in **Figure 1** shows that the total subsidy (e-tax base given from (AIII.3) too is fully repaid in both the SEC and TEB blocks, after it has been used to produce goods and services according to the relevant formula for the production-trade cycle:

$$(AIII.3) \quad 2E = E + E = (B + I) + (B + I) = 2B + 2I = 2(B + I)$$

$$(AIII.4) \quad E + E \rightarrow \text{Sells of goods and services} \rightarrow E + E + \Phi + F$$