REVIEW ARTICLE

Macroeconomical production and consumption systems

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ABSTRACT

The common wealth of states can be measured from side of goods production, in this article we present the production prognosis and optimization according to the requirements of market on which these goods are to be consumed. The common multi-dimensional model is used as a base model to represent the factors (input and output as well). It's known that these dimensions relatively to some measurement function or estimation formulae can correlate, this fact will be also discussed. The main problem is to create the model for effective production and consumption when price of goods remains stable. The modeling process remains similar to the network flow model where the whole process is simulated according to algorithmic steps. We base our research upon the fact that Ford-Fulkerson network flow and its algorithm can be successfully applied to the theoretical models of macroeconomics as a general case of simulating the entities flow described in this article.

Keywords: Macroeconomics; Network; Flow; Optimization; System; Regression; Market

INTRODUCTION

While macroeconomics remains an open entity which is widely discussed and considered in many publications, just to name a few, this article is forwarded towards this question, as it could be said: the macroeconomics is a set of operations over market consisting of micro economics concepts required to support the functional state of the ensemble as whole. Thus, this article focuses on production systems along with consumption elements, which are better known as parties [1]. Those parties could be divided into producers and consumers. Mathematically, the properties of these entities can be expressed as:

{Production: Input+(Resources), Output+(Goods)}

{Consumption: Input+(Goods), Output (-Goods, +Revenue)}

In the real situations, without doubt, these parameters are more aggregated, however this doesn't limit "the rapids", when the whole system can be seen as a flow network, which can be, for instance, optimized using known flow optimization algorithms like Ford Fulkerson. This fact can be addressed to the multifactor cases when we have to deal with composite networks of the practical examples of the market model. These flows can be also asymmetric as we have to define another entity called "noise", which plays role in mapping the situation to the model variables and parameters. These variables define some point in which we can see the state of the market and other entities involved in dynamic process [2]. The goal entities like market, system (productive or consumptive), agents and goods are to be discussed further.

LITERATURE REVIEW

Market: The market is a centrist rule or, in other words, a central apparatus which integrates active or passive agents (like trader or robotic system which automates trading process) along with substances like goods [3]. These agents' role can be divided into productive and consumptive:

{Agent: +/-}

The main role for wise production play the resources which are to be transformed into the logically and practically adaptive entities (called goods). It's to be noted that like Penrose's pentaminos these goods can form the adaptive systems which, in turn, can form the physical parts of production or any other systems [4]. For example, the components of the engine which can be sold on market (and actually they are) form the part of the productive system. Thus, the good can be characterized by its amortized cost for which the durability exists on the prolonged time span:

{Good: Amortized cost<time shift>}

Markets form starting points in a network flow graph and are thus source of goods production [5]. It can be seen that this system has an instability occasion when one of the elements becomes unavailable.

Agents: Agents which form passive network entity from the view of active simulation as it can be seen for real market are to remain positive or negative. During time the measure of activity of any agent can drop down with minus sign which means that this agent cannot be active anymore further:

{Agent: Activity<0, activity>0}

When "minus-zero" balance occurs, the agent cannot be active during the time limit while the activity substitution will occur. This is mainly due to the limited weight of resources which lose its weight when market agent needs recreation for further activity. This can be called as a "vital" amortized cost as the agent can re-run its activity till being fully reestablished [6].

The agents "swarm" behaves chaotically in physical sense, in this case, it's possible only to define the model of interaction which can be seen as a set of abstract objects where steps or value transferring occur [7].

Goods: The main property of goods such as durability can be set as a factor in the model presented below.

The goods form, in general, the network of the operations required to "apply" them for consumptive agent:

{Good: Apply->Agent/-}

This network can be characterized as a flow graph with binary edges (with values like "0" and "1"), when zero means that good is consumed and one for validity of this good. This network always restructures itself along the time as goods are either produced, or consumed. This time is a discrete as we have to measure only interval of event or to know the time when this event occurs:

{Time space (discrete): Interval, event time}

Model: Thus, our model consists of regression factors, as we have to know the correlation values for monitoring of market activity. These factors are:

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durability of good element, velocity of production and consumption and of course the time marks (as it was stated before that the time is discrete):

Dimensions: (Durability, velocity, time marks)

Practically this model can be more overridden as the specific market and its model can be considered. On the sight, the modern business and inventory systems like SAP use dimension OLAP model for factor estimation and evaluation. The better approach is to model the market by itself as a network flow graph with binary edges, having one more mark like good type and its cost:

Good's edge={(0,1), (type), (cost)}

Thus, the model forms multi network flow graph with all parameters written on the edge description. This model gives more degrees of modeling variations which are required in order to simulate the model against the invariant input parameters. These variations can be modeled using flow network optimization algorithms with multiplexing of all three factors [8].

Price or values: The price which is paid for any service or type of good stabilizes as the consumption and production curves begin to converge. During the process before stabilization the congruent noise appears which will stagnate as the process becomes meaningful for positive or negative parties (agents).

About the one price or value problem. The common production and consumption problem can be read from. In this problem the goods are marked with variable value. The effective method to solve and generalize this problem is also presented. This can be addressed to the case when model is to be evaluated computationally along the large amount of data. In practice this is known as a big data trend.

The problem "Debt" statement refers to almost NP complete problem of finding the distribution of artificial crystals across three domains. Obviously, this problem can be solved using noise theory due to the classification of problem as resource dependent, because the crystal estimation as one or two still forms the limited sum not exceeding the value of:

2^*N

If the noise theory would be applied then the problem can be decomposed in forming the estimation cost table T and an artificial flow in order to distribute the entities maximal estimations (in the problem these are crystals). The problem referring to the entities distribution, thus, can be solved using any flow optimization algorithm. The upper bound of two, which in sense is discrete for the problem in overall, is selected, thus giving a simple and trivial solution.

This can be summarized as an application of the following steps, presented in the following notation:

Problem=Entities*relations

The solution is as follows, then:

Solution (problem)=2*problem=Problem(1)*flow (problem(2))

DISCUSSION

This paradigm adheres to the fact that noise can be of flow nature while the mixing operation is present. This type of noise will be denoted as flowing noise. The flowing noise typically is present when the multi choice invariant is introduced. This invariant typically can be referred to the graph structure used in flow construction, in other words, when model is converted to structural type (in this problem this is a flow graph). To be noted that the invariant can appear according to the property of structure element of having more than one and, in general, infinite number of relations to other entities of this structure. However, in sense of model integrity, the order of invariant (or simply magnitude) is limited to the number of the entities and cannot exceed the value of:

N=|Entities|

This can be discussed in more words about flowing noise, that not only choice invariant plays important role in forming the model:

Model=Entities*flow (entities)*invariant (choice)

This relation can be extended with number magnitude as either flow order of graph element (or simply vertex) or cost assigned to the flow graph edge can be a structure of different type. This naturally appears to solve more types of problems. In problem "Debt" the edge cost is simply discrete set:

{1, 2}

Thus, the above relation is to be extended, in more common sense, as:

Model=...*complexity (relation)

The relation in the example problem is a relation in flow graph structure used in the model.

Thus, the new type of noise can be devised by structural property, this noise is called flowing. In common sense, the flowing noise is a product of noise in general and invariance of complexity:

Flowing noise=Noise ...*invariance (complexity)

Thus, the flow problem applied to economical networking on the example of the application of this algorithm on other suitable cases.

CONCLUSION

The main factors and entities were devised in order to create the modeling environment for specific cases, while the common case was considered. Thus, the durability, velocity of consumption and production, as well as, time marks were found. It was also concluded that the time always remains discrete in the model, as in common, it's an event driven model. The further studying is an application of these methods for some definitive case.

Thus, we have proposed the minimal and stable model to simulate macroeconomical processes using the method by Ford Fulkerson like network optimization.

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