

Why established macroeconomics is problematic and how this situation can be overcome

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Abstract

Past writings about theoretical macroeconomics are criticized as being illogical, incomprehensible and incoherent. This difficulty is solved by structural-modeling. A general model of the national macro-economy is derived from first principles, using analytic logic for obtaining the minimum size. Two vital features for portraying our society are: its representation as a system and its modeling by using a diagram. This structural presentation enables us to properly understand how macroeconomics works seamlessly—both for explanation and analysis. Two basic assumptions reduce the complexity to a manageable model size. The system connects particular traded exchanges of goods, services, access-rights, legal documents, etc., and they pass between discrete pairs of unique role-playing agents (entities). These diverse but similar exchange activities are idealized as aggregates, within the system's paths. Only a limited number of paths are needed, and an even smaller number of entities suffice to cover the whole system. Derived from the general nature of society, there are 10 necessarily kinds of trading exchanges. These are sub-divided in a table of 19 flows of money, being mutually exchanged for different kinds of goods, services, etc. These flows pass between only 6 entities. From the resulting tabulated list, a block-and-flow diagram or model is drawn. Since the minimum number of activities is logically determined using the least number of individual necessary entities, it is concluded that this model of our social system, is the simplest and best possible--yet still being sufficiently complete, in the most ideal, scientific, and logical manner for further practical use.

Keywords: macroeconomic theory, methodology of macroeconomics, methodological individualism, alternative macroeconomic modelling

JEL classification: E00, E40, E60

PART ONE — THE PROBLEM

Introduction

This writer, having been an engineering student, was concurrently interested in economics (which logically follows, since engineering usually comprises the solving of problems in the most efficient way). Having qualified with a master's degree and during his long career, he separately chose to make an intensive study of our social system. During this investigation of various texts and papers and as a result of his training, he was surprised to discover that today's macroeconomics theories are very poorly explained. He was more than disappointed to find in this 250-year-old subject that the logical format as first described by Adam Smith (1776) [1], later became badly expressed and confused.

After the limited work by David Ricardo (1817) [2], a well-reasoned theory could then have been developed and for it to have led to some sensible and properly-derived scientific analytic results. After the partially reasoned but long-winded writings of Karl Marx [3], a summary of the significant findings would have been useful--instead the subject became politically motivated due to challenges against the exploitation by landlords and monopolists (which actually went back to the Land Enclosure Acts in England, dating from the 16th century but continuing well into the 19th century [4]). The subsequent developments in explanations, by John B. Clark (1899) [5] and his followers, was deliberately introduced as a confusing trend away from what Henry George (1879) [6] had clearly shown. In his seminal book George explained the cause of poverty and the means for its eradication. In particular and even today, the influence of land monopolists as speculators and their support through the banks is why our economic progress continues to be so slow.

However, the present writer finds in recent text books and research papers that the confusion introduced between the theoretical activities of landlords and capitalists, by John Bates Clark [5], caused a cessation in the logical progress of the development of satisfactory macroeconomics theories. The "Big Picture" was set aside and more detailed subjects, particularly relating to production, Leon Walrus (1874) [7]; trade, W.W. Leontief (1916) [8]; and money J.M. Keynes (1936) [9]; all received greater attention. Instead, there are many varied and differently expressed ideas, some of which contradict and contain much disagreement. These works contain limited logical development of a formal nature. It is as if each formulated independent opinion claims to be correct and that the many others do not deserve serious recognition. In some cases, where the development of a previous theory was supported and provided, it was consigned to being of a particular school of thought. At best, it is seen that

several schools exist, but none of them were directed at nor could provide a complete explanation of our social system (indeed the concept of it being a formal system, became current only recently, see the author D.H. Chester (2015) [10].)

By now, a satisfactory theory should have been established, to properly explain about the functioning of our social system, but this has not yet happened. Unfortunately, the diverse and competing ideas available have hindered the growth and establishment of a satisfactory structural theory. The implication is that there must be a good reason for these difficulties and their resulting confusion. With the many schools of thought available for providing theories about specific aspects, there are serious problems in the provision of a proper seamless description of the whole of our social system--of what it comprises and how it works. This situation is worsened because some of these failures in envisioning the structure were deliberately introduced, (see above). The purpose of this part of the paper is to explain where these difficulties lay and what they are. The second part of the paper "The Solution" is aimed at providing a more satisfactory, concise, initiating theory; the development of which is of a more practical kind.

Description

The reasons for the past failure to provide a satisfactory overall theory for our social system are presented below. They enable us to better understand the cause of these difficulties with regard to our subject, rather than to describe the subject itself.

Influence of Politics

Almost from the beginning of the classical descriptions of our social system, which is now recognized as being macroeconomics, the early writers chose to introduce political considerations. Indeed, initially the subject was not even called "economics" but was "political-science" instead. It was tacitly assumed that economics was a subject having many detailed aspects, many of which require a political approach, in order to make sense of what these various parts were doing and aiming at. However in practice, none of these political agendas were the same. They also required definition and description before their presentation, although many did attempt to more generally explain how a nation can benefit by having a good and ideal administration of a specific kind. But when it came to the challenge of monopolist behavior, the subject was deliberately confused, see above.

The Nature of the Subject

Having examined the several past ways of providing a clear explanation, the present writer has to accept that the subject of macroeconomics is a difficult one. It was thought to be a complex problem. Previous analyses contain many aspects which were loosely connected, but do have some significant inter-relationships. Because of the different internal characteristics of each part, it is hard to generalize about them all, especially when the ill-defined variables are the sole means for doing this. As will be seen in the second part of this paper, this situation should not lead to such great difficulties, but for many writers it did and still does. This is due to the problems of connecting the variables together and by the emphasis being placed on their differences rather than on their similarities.

The Confusion Between Micro- and Macro-Economics

When writing about the political-science, the economics of the society itself were not well defined, if at all. They tended to wander between what today we regard as either microeconomics or macroeconomics, without the differences between them being properly appreciated, explained, or understood. We ourselves are closely and personally connected with microeconomics actions, so it is hard for us to be truly objective in our viewing the whole situation and to adopt sufficiently distant a perspective for properly examining the macroeconomics situation. In fact this mixed situation was current up to about the 1930's. It only changed sufficiently, when J.M. Keynes [9] properly explained about the government being able to act independently, as a purely macroeconomics agent. Classically and previously, this role-playing entity was not expected to try to introduce or make any control changes. Occasionally and more recently, this confusion is still present and sometimes its expression is part of a deliberate gambit.

Even today, this subject is complicated by the unsubstantiated claim that macro- is the same as micro- but on a greater scale. Micro- is a very subjective matter, where the personal attitudes of the individual can easily affect the expression about what is being dealt with. On the other hand, Macro- by its very nature must be treated objectively, and any relationships with individuals or their aspects are irrelevant.

Lack of Scientific Attitude and Motivation

In the papers from the humanities side of our academic world, there is a strong tendency for the absence of a sufficient amount of suitable logic. This can be confusing, due to the lack of analytic development, which comes from a lost motivation for order and consistent flow of

ideas. These writings often jump too early to the next aspect of the subject being currently discussed, and cease to formally or fully answer or explain the present one. This happens before the reader has properly clarified in his mind the present aspect of the subject or has fully assimilated it.

Need for Formality (as is common in scientific inquiry)

There is also a degree of confusion when different writers used different names to describe or explain the same thing. Unlike the scientists and engineers, who define their terms before using them, economists generally do not bother. This failing persists even today. For a formal theoretical science to be developed in a proper way, there are a number of preliminary steps which should be taken. These are:

- (i) A statement of the axioms (which are regarded as self-evident, truths about the basic nature of the subject). Normally the axioms are regarded as being fixed general facts which are unlikely to change, unlike many of the subsequent assumptions. The author regards these axioms as fundamental to all of the logical work to follow. Many of the axioms in economics are often unstated without serious loss, like the rules of arithmetic. But those axioms which are directly related to the subject are of great significance and they cannot be ignored. In first place among them, is the reason why our subject of economics actually needs to be properly studied and applied.
- (ii) A statement and explanation of the assumptions. Unlike axioms, these are not necessarily permanent, but with their acceptance they do provide the researcher with a base on which his/her theory can be supported. At this point in the discussion it is reasonable to regard the argument to follow as an hypothetical proposal, which is subject to adjustment, as development towards a better understanding eventually occurs. In the past there has been a great tendency to ignore the need to state the axioms and even the assumptions, which are taken to be true without having them listed. This has allowed all kinds of contradictions to creep in, unnoticed by both writer and reader.
- (iii) Some definitions of the variables, must first be determined by considering the relevant aspects of each detailed subject. Without sufficient or properly defined variables, it would be impossible to proceed with the concept of change over a period of time. The variables are not assumptions and can be supplemented as it becomes useful (or necessary) to expand on previous concepts. This development may require the use of a number of schools of thinking, because at the start these variables are neither obvious nor necessarily clearly expressed. This matter is complicated in macroeconomics because more than one definition is possible and indeed may be applicable,

even though in practice they subsequently both amount to the same quantity (as in demand and supply).

The resulting theory then combines the variables in what seems to be a common-sense way. Subsequently, it may not be seen to be absolutely true, and a better hypothesis may well be needed. But to begin without having any definition of what is being combined and manipulated, is unlikely to produce logical and consistent results.

It is these failures in past analytic descriptions, which is why there is so much present confusion in our subject. Many of our experts are still living in the past, and in view of the development of scientific thinking (from Victorian times, when popular-science was mostly about lists of subjects and their classification), this unhappy degree of intellectual dishonesty persists.

Love of Philosophy

The early classical writers in political-science had a great tendency to express their opinions in a philosophical manner too, as if the basis for their subject rests not on our social relationships but on the more basic nature of mankind. Although this may well be true in the deepest sense, it is a bit too profound for use in the more practical understanding about how our social system is connected and works. Much of this philosophy includes the semi-religious aspects of doing the correct, right, or ethical things, which an ideal situation requires and entails. However, these thoughts, interesting as they are, can be a serious distraction from the need for clear and precise explanations about ourselves within our community and the way by which we interact. Papers today are much less philosophical but their unstated and intuitive implications are still there, being attitudes to the subject under discussion.

The Language of Economics

Many writers in economics choose to use words in English which are not so commonly known, and in so doing they create difficulty for a student to mentally connect with his/her prior ideas on the same subject-matter. This comes about, being partly due to the classical education of these writers, where a wide range of vocabulary is available, and there is a tendency to explain matters using some less commonly adopted language. (For example, J.M. Keynes [9] writes about the “propensity to save”, instead of simply about its rate.) This matter is further complicated since many words are introduced for specific meanings into our subject, which otherwise in more general use have slightly different meanings. (Words like “interest” and “profit” being good examples of this. Also the position of a capitalist in our society may be explained by either who he/she is, or what he/she does, or even left to the reader’s imagination.)

Maintaining the Self-Standing of Doctorate-Holders

Due to the human relationships and internal politics within the teaching institutions, the average proposer and holder of doctoral theses, find that there is a compelling need to frequently produce new papers for use at conferences, etc., where he/her can receive (deserved) attention. Unfortunately, this need for staying in the fore-front of the field has resulted in much trivial or partly replicated material being provided. Some of it has only small changes--of a less significant kind than had the more basic issues and matters for development been better covered. What was already confusing is further tangled, by much additional discussion of a trifling, less meaningful and hurried kind.

Discussion

The greater freedom of expression of the humanities' writers, compared to that of the engineers and scientists, has enabled the authors of political-science related texts, to have introduced a great deal of variation in their treatments. These have evolved within the field of macroeconomics and they are associated with, but different from the above-listed points. The effect of this writing freedom is provided here.

Effect of Classical Writing Freedom

(i) a rich choice for words having slightly different meanings, which when applied to the more technical aspects creates an inability on the reader's part to connect the subjects, (ii) a lack of formal definition, of significant quantities (as variables), (iii) the absent, implied or vague basic axioms and assumptions. (iv) a shortage of logic among the arguments being used, and (v) failure to recognize the students' need, for study material to be brief, clear and precise.

Plagiarism and Academic Dishonesty

There is no constraint on the presentation of what apparently is new, but actually is not. This happens when different theories, being older ones, are dressed in new clothes, before being re-staged. For example, C.O. Roche's recent Modern Money Theory [11], is a re-run of part of the Keynesian Theory of Money [9], which was previously reworked in both Post-Keynesian and Neo-Keynesian dissertations too. Each theory has a number of aspects, some of which are not new, but when presented with more modern ideas they appear to be. These theories are similar,

although for the purpose of variation and to introduce a degree of improvement, they contain some significant small changes. However, in order to help develop the theory, it is acceptable when past details are given.

It is particularly on the political aspects of developing a related theory that this writer feels the need to be most critical. Within the history of the general development of our subject, there has clearly been some deliberate tampering of the theory, with the aim of sowing seeds of confusion. The resulting random harvest is not consistent, nor is it pleasing for the would-be gleaners of knowledge (our students). On this matter, the author is particular aware of the use of the term “capitalist” to cover not only the functionaries of stock-market operations but also those related to land ownership. The way that dynamic changes to the variables occur means that these two participants should not be taken together. Yet about 1899 the eminent economists John Bates Clark and Frank A. Fetter (1900) [5] along with others, deliberately chose to ignore this fact. This bias was with the encouragement if not the financial backing, of the big organizations of the monopolistic land-owners and producers. Their action created a confusing explanatory theory which has persisted until quite recently. It is where the investment activities of capitalists are falsely joined with those of land owners, as Professor Mason Gaffney and Fred Harrison (1994) [12] have clearly explained. Historically, this falsification was how the original proposal of Henry George [6], to introduce the Single Tax on Land Values, was fraudulently dismissed.

Avoidance of Diagrams

Another aspect of the past theoretical constructions is the failure to express the results in a clear modeling format. This may seem to be trivial to the humanists, but as scientists and engineers it is a vital matter, which can create or lead to a far better understanding and to permit analysis. In fact, a dynamic model which does not include all of the variables is unlikely to properly represent the reasons and ways for the anticipated time-dependent changes. On the subject of modeling, where work has been done, it has not been treated in a consistent way, due to the traditional nature of the humanist’s kind of intuitive thinking. There are few past or recent attempts for a model being developed which is sufficiently general, so as to be able to be modified as required, and to have the (seamless) capacity to cover any desired situation in the whole social system. Had this been achieved there would surely have resulted a far greater degree of consistency between the various theories.

The aim of presenting information about this subject in model form is three-fold. Firstly, it helps to explain general concepts, such as the circulation of money. Secondly, the model presentation provides the viewer with a good picture about how the structure of the system is arranged and connected. (This is a natural result of the development of our civilization with

regard to the exchanges for money of goods, services, access rights, hire-fees, etc.) Thirdly, it allows some quantitative values to be introduced, so that a numerical analysis is possible. When this approach is used, we are able to better appreciate the limitation in past assumptions, due their less practical inclusion in the model in terms of the money-flows, the role-playing activities of agents, etc.

Concluding remarks for part one

Having reviewed the way that current macroeconomics theory often is badly presented and explained, it is proposed here that we begin to express it again, so that the above difficulties, problems and failures are no longer repeated. Of course we must not cut too deeply into some of the past theory or nothing of value will remain. However, having torn-down some of the past ways by which macroeconomic theory was erected, it is morally right and proper for the present writer to provide a better and suitable alternative, which does not contain the same problems, troubles and difficulties (or at least avoids most of them). Described below in considerable detail, is how this methodology should be presented. (Its practical application and use were given in a separate analytic study by D.H. Chester (2015) [10]).

PART TWO — THE SOLUTION — MODELING FOR A BETTER THEORY

Introducing the macroeconomic problem

A suitable macroeconomics model is needed, for the resolution of the general problem into a practical formulation that is fitting for subsequent analysis. Such a model is seen here to consist of a system, which has a number of individual elements that are interconnected. These two pre-conditions for understanding our society, the concept of it existing as a system, and for the ability of it to be modeled, are absolutely essential with regard to the philosophy and logical method of this presentation.

We need to represent a nation of several million families, having very many diverse attitudes and policies, which perform a variety of self-centered activities--each providing for his and her specific economic needs and livelihoods. Previously this variegated macroeconomics situation was partly treated as a simplified yet scaled-up version of what you or I might do, had we to fulfill a more general role, but one which still relates to our own performance and behavior. This approach does not allow for what many others would do, nor does it properly account for

how their separate activities influence each other. Since the individual only plays a very small part, we find ourselves subjectively confined in a very limited situation, which fails to show how society at large acts and how it is arranged. Only by modeling the whole of society as a system, does it become possible to take a sufficiently less personal and more objective viewpoint.

Progress toward modeling system's structure

Envisaging the System

Within what was once a natural environment, the operation of our society has gradually, subtly and suitably, evolved to at least partly satisfy human needs. Were our concept of it to continue to appear as a collection of different individuals about which no general aspect is unique, it would become much too complex. Then we would be unable to understand how this motley mixture might work. We could only manage to make some general Platonic statements about it, but when we try to get at the facts, the subject would become vague and confusing, due to its complexity. At best, we would need to examine each person in society, and look at the various contributions he/she makes with respect to many of the others. Fortunately, this complicated presentation can be sorted into a number of separate kinds of specific activities.

A rather obvious general assumption is that our society has different parts that interact along specific paths. This is in the form of a mechanical system. Without losing completeness, the introduction some associated discrete elements is both possible and necessary, for us to increase our knowledge about it. This assumption of it being a system is the first essential step enabling us to understand how our society works.

Envisaging the Model

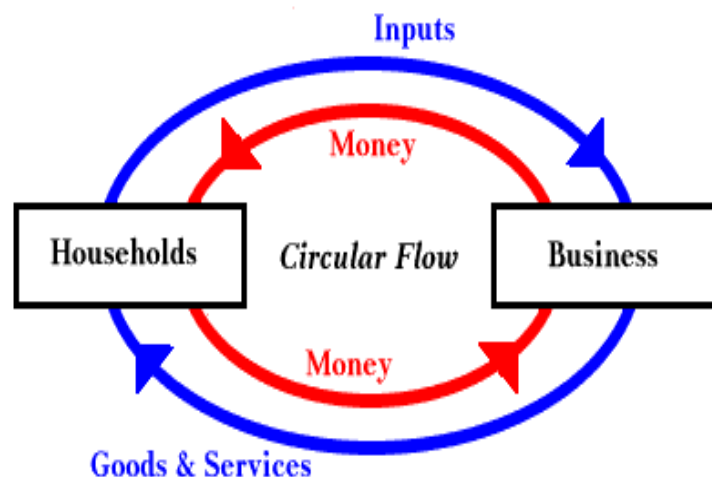
However, such a system and its connections still are too difficult to retain unaltered in our minds. Some of the details will change every time we mention another of its features! So we need to describe it in the form of a definite and particular diagram that is visible before us. The model for representing our social system here is derived essentially by using an organized, logical, process. It presents the arrangement of it in a most complete yet concise form, which meets Einstein's 1936 criterion [14], for a good scientific theory. This was that: "everything should be made as simple as possible, but without being over-simple". This approach begins from taking certain detailed existing ideas about our more-closely connected social relationships. The engineering method of systems analysis is appropriate here. Our society is a man-made system, which has evolved, engineered and developed (however badly), so as to sustain us all.

As a system, it works through a number of independent agencies (or entities), each having its own properties and connecting activities, to seamlessly represent our entire social system of national macroeconomics. Thus the complexity of the individuals is replaced by a more astute and exact method of definition and thought. (This model enables us to better analyze and understand how our social system works, see D.H. Chester [10].)

The development of a practical model of our social system

The Traditional Two-Sector Model and its Implications

Firstly we consider the simplest kind of situation, as described in past elementary economics text-books where a “two-sector system” is presented, as in the diagram below. This picture was originally shown by Frank H. Knight (1933) [15], where he named it “The Wheel of Wealth”. It will be extended later, to cover the whole system.



The circular flow

This model consists only of Households and Business sectors. The Business sector is of producers who are farmers, transporters, industrialists, manufacturers, service-providers, etc. Workers from the Households sector are employed by the Business sector to provide laborious “Inputs” in the diagram--to grow, gather, refine, carry, fabricate, assemble and otherwise produce and supply all kinds of useful “Goods and Services”--whilst the Business sector manages the means and methods for these coordinated economic activities to take place. Borrowing on the values that the new goods have just acquired, the Business sector (or producer) then remunerates the workers, paying wages for their efforts in making these output

items. As soon as the goods are sold and paid for, this loan can be returned whilst starting another cycle of operation. (In practice this is a continuous process, with the simultaneous participation of many firms, investments and banks.)

The Households sector consists of a large number of families, who support and encourage their work-forces and spend their earnings on a range of durable and consumable goods and services, with which to provision, provide for and maintain themselves and their homes. Individual workers may each produce only a few kinds of goods (as output), but as Households they consume a greater variety, although each kind is used in much smaller quantities than what comes from their own specialized labor. Our prior knowledge of their combined efforts explains about how this simplified system interacts and works.

In this diagram, the circulation of the 2 money-flows (in red) is seen to oppose the flow of labor and of produce (in blue), so this model presents us with a general picture of the most basic kinds of economic functions. Here, all of the working activities are shown to produce all of the goods and services. Were it needed to show everybody's separate activity, the model would become very complex and impractical. However, with the additional assumption of aggregate activities, the total amounts of labor and produce are taken instead. Although each individual's contribution varies in quantity, quality, strength, etc., they are lumped together here, as being of a particular or idealized kind. These two assumptions, of the idealized participation and of the aggregate quantity, allow us to greatly simplify the representation.

What is not usually mentioned about this model is that by describing the situation in this way, these agents or entities have ceased to be real people who are actively contributing to our society. They have been transformed into *representations of the functions they perform*. So when more entities are added (see below), their treatment (as role-players) applies to their functions too, which perform idealized simplified aggregate activities. To emphasize this matter, the notation to be used for these entities below is set in CAPITAL LETTERS. Real people combine these roles and activities in mixed and variable amounts, so the same words with lower-case letters still apply to this more general situation.

Trading Exchanges and Multi-Sector Extension, to Represent the Whole Society

We will expand on the 2-sector illustration, to include in its most simple yet complete form all of the major aggregated macroeconomics activities, to better represent our whole society or Big Picture of the national economy. Our society has a natural and familiar form, from which these activities are hereby classified, according to all of the different *kinds of trading exchanges* that occur between the entities. Due to use of the two assumptions of idealized entities and aggregate money/goods flows, it is seen that only a limited number of these entities are needed to further

describe the complete system. The statements of these two vital assumptions set off our thinking process along somewhat different lines to those of the past. It is surprising to the author that prior to this approach, nobody else seems to have taken it into consideration for our society at large, when viewed from this greater distance.

This discovery of a limited number of kinds of macroeconomics exchanges passing between what is found to be a comparatively small number of entities, logical as it now seems, has not been previously applied, although it is implied, in wanting to broaden the two-sector model. Indeed, one famous writer's work about the economy even claimed that some "withdrawals and injections" from the two-sector model are present, see R.G. Lipsey's "An Introduction to Positive Economics" (1963) [16], but for him to envisage additional sectors proved to be just too much!

The 10 Kinds of Macroeconomics Transactions

We now examine all of *the different kinds of macroeconomics trading exchanges* that actually occur within our system. This allows us to include the assumption of the aggregated functional activities, which have discrete natures. They are initiated and propagate from the various idealized entities (which may also be also expressed as role-players, having the ability to control one or more of their incoming and outgoing macro-economic flows and their related functions). All of the specific kinds of activities that occur in our social system are presented below. They fall into a comparatively small number of classes. Using algebraic notation, a bold-faced capital letter is used below, to indicate the flow of money for each category, along with brief descriptions of it. Suffices are added later, when the sub-divisions of these flows follow (in a table in section 7.5, below).

- a) 4 Kinds of Taxes (T), obligatory periodic sums, which are paid to the GOVERNMENT. These are from earnings, purchases, capital gains combined with property, and site ownership. The various kinds of taxes that apply in practice, all fall into these 4 (or 5) categories.
- b) 2 Kinds of Ground-Rents (R), are regularly conveyed to the LANDLORD, for the right of access to useful sites of land or other natural resources, (such as the electro-magnetic wave spectrum, for purposes of communication, etc).
- c) 2 Kinds of Hire-Fees (H), are systematically remitted to the CAPITALIST for the right of access and use of certain durable (production) capital buildings, machinery, tools, vehicles, half-made goods, etc., to cover their investment cost, maintenance expenses and obsolescence. This includes that of home occupation, so an actual home-owner functions as both the house-holder within the HOUSEHOLDS entity and as a CAPITALIST.

- d) A Money Transfer (HI), normally passes as a social “understanding”. Such social understandings exist for example, between workers and consumers within a family, but are not shown here. However, in the case of the transfer between the LANDLORD and the CAPITALIST, which have other very different macro-economic properties (see below), this transfer activity is separated. (In certain earlier methods of teaching economic theory, it was wrongly claimed that they are the same, as by John Bates Clark and Frank Fetter [5], whilst this deliberate confusion has been properly clarified and explained by Professor Mason Gaffney and Fred Harrison [12]. Hopefully this past confusion is now ended.)
- e) Wages (W), earnings which are continuously remunerated to the workers within the HOUSEHOLDS, for their labor.
- f) 3 Kinds of Purchases (C), are particular and frequent payments when trading between the HOUSEHOLDS, the CAPITALIST and the GOVERNMENT.
- g) 2 Capital Outlays (I) and (M), as discrete money investments. They are in shares of limited-liability companies, in mortgages, and in national bonds from the Treasury, respectively. The non-redeemable shares subsequently may be sold as second-hand items, whilst the sums covering the mortgages and bonds (and sometimes certain preference shares too) are returned to their sources, after specified time intervals.
- h) Savings (S), are contractual time-limited returnable loans, borrowed by the FINANCE INSTITUTION.
- i) 3 Kinds of Returning Interest $r_i\Sigma(I)$, $r\Sigma(M)$, $r_s\Sigma(S)$, at different rates, are based on the specific kinds of investments, in company shares (**I**), bonds (**M**) and savings (**S**) respectively. In the case of company shares, the interest is usually called dividends, although in practice it is the same thing. In some preference share investments, the dividend is created by issuing additional shares, instead of annually releasing discrete sums.
- j) Landed Prospect Sales and Acquisitions (Lsp), is an activity between different pairs of landlords, when land ownership changes hands (with help from the banks). The buyer’s money is supplied to the buyer as a loan. After the sale and purchase, the sum is almost immediately returned by the seller to the same or another bank as a loan. Thus, on aggregate in this respect, the banks are no more than temporary lenders. The new landlords are often in debt, but they collect the ground-rent and speculate in the rising value of their prospects. Land is not regarded here in this model as being an item of durable capital goods, because it was not having been produced by using labor. Consequently its transaction and business require a separate classification. Activities that are contained within an entity, such as the exchange of partly made goods (as working-capital within the PRODUCER entity), do not constitute a significant macro-economic function here. The scale of the model does not allow for this. This concept is illustrated and

also applies to the last item j) above, where landlords buy and sell their sites between themselves, (with temporary bridging loans from the FINANCE INSTITUTION), with only the title deeds passing between the owners. So on aggregate for all 6 entities, in terms of trade, there is no significant action that involves pairs of the same kind of entity. Here it is contained solely within the LANDLORD. For this model the buildings and other more movable items are taken as being durable capital, and they do not fall into this category.

Throughout our social system, these various exchanges are continuous so that whilst certain loans are being returned others are being advanced elsewhere. Increases and reductions in the total money in the system can occur, with it accumulating in within the HOUSEHOLDS, for use in purchases. Money can be newly issued by the GOVERNMENT, or even being destroyed by them. What actually is being categorized here is a rate-of-flow of money and a corresponding return-rate of the values of the goods, services, access rights, valuable documents, etc., along regular paths. To properly explain all of these various types of macro-economic activities or functions, no other kinds of flows need to be listed.

The 6 Entities

Having covered all the trade-exchanges, the entities are identified as the pairs of role-players, between which the money-flows, goods, etc., are steadily passing. These functional entities are written here in capital letters, and each first (bold-face) letter being used to identify it in the 3rd and 4th columns of the table to follow, where they directly relate to the various kinds of macro-economic activities. The six entities are:

Landlord, households, capitalist, producer, government and finance-institution.

Each entity plays at least one unique, idealized and characteristic action, which has both in-flowing and out-flowing quantities. They are all needed to properly describe their role-playing functions and to cover all of the various exchange activities.

The above explanation about the form of these macro-economic exchanges of money and goods etc., runs parallel to the derivation of the entities themselves. This is a kind of chicken-and-egg situation, because the entities seem to arise naturally and simultaneously with the more exact determination of the numerous social goods and money-transfer activities.

The “Business sector” of the previous diagram is now called the PRODUCER entity. What first seemed to be an impossibly complex set of transactions is reduced to these 10 categories: a) to j) above. In the following table, some rearrangement and sub-division of them is introduced, resulting in 20 kinds of exchange, as listed on their particular rows. The money flows on the left correspond and oppose the right-hand column flows of the various utilities of goods, private and public services, access rights, infrastructures and loans.

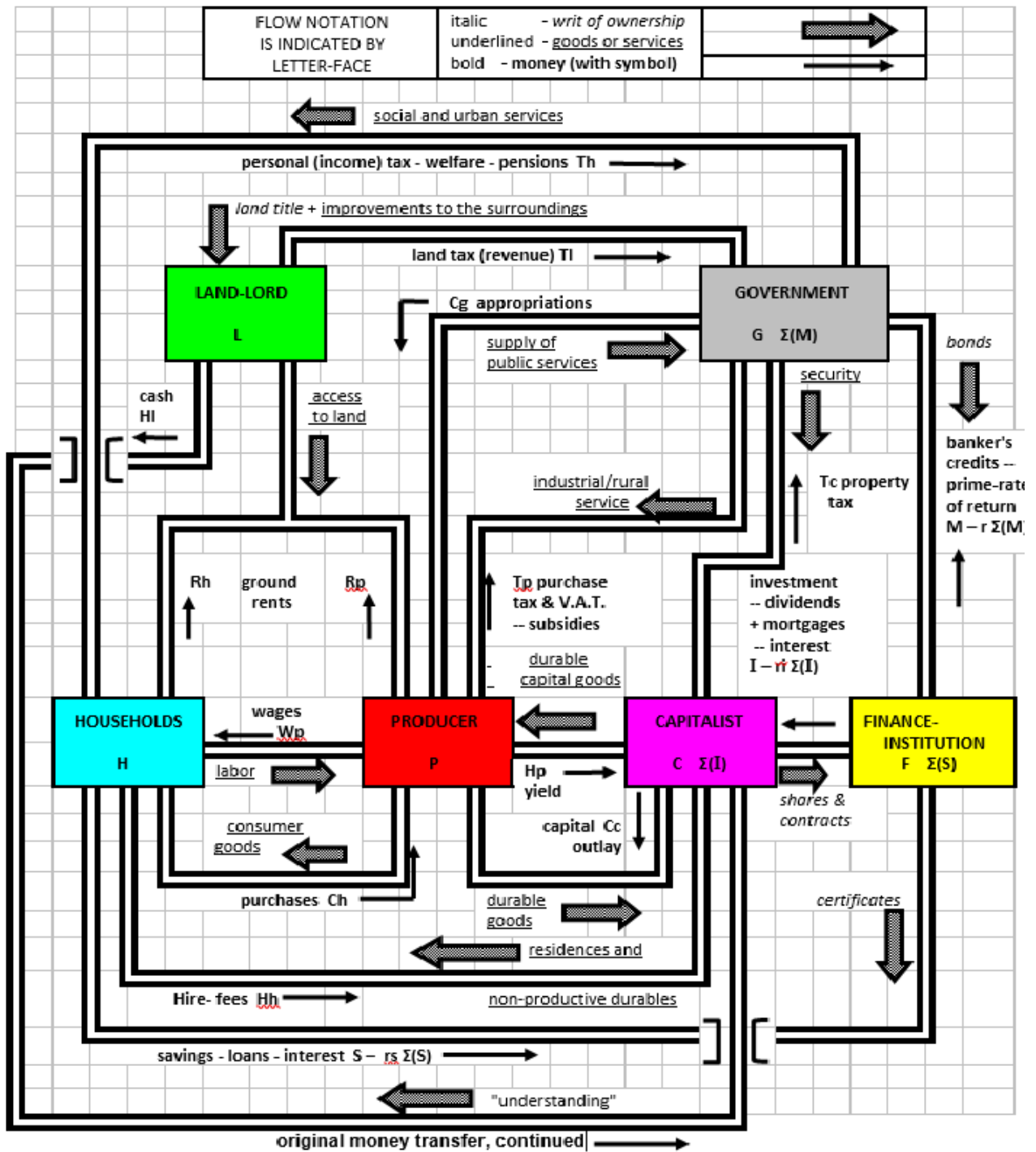
The Tabulated Various Flows, and the Diagram as a Model of our Social System

SUMMARY OF THE SUB-DIVIDED 20 KINDS OF MONEY-FLOW RATES AND UTILITIES				
DESCRIPTION OF MONEY-FLOW RATE AND ITS ALGEBRAIC SYMBOL	ENTITIES FROM/TO			RECIPROCAL FLOW-RATE OF WEALTH OR UTILITY
1.a) Tax on Personal Income	Th*	H	G	Social and National Security
2.a) Tax on Land-Value (Revenue)	Tl*	L	G	Improvements to Surroundings
3.a) Tax on Purchases (V.A.T.)	Tp*	P	G	Industrial/Rural Services
4.a) Tax on Property (Durable Goods)	Tc*	C	G	Social and Urban Services
5.b) Ground-Rent (on Residential Land)	Rhϕ	H	L	Access to Land for Living on
6.b) Ground-Rent (on Productive Land)	Rpϕ	P	L	Access to Land for Working on
7.c) Yield, within the Productive Process	Hpϕ	P	C	Use of Durable Capital Goods
8.c) Hire-Fees (Domestic)	Hhϕ	H	C	Use of Residences and "Non-Productive" Durable Goods
9.d) Organized Money-Transfer	HI*	L	C	"Understanding" Between C & L
10.e) Wages (Gross Earnings)	Wp	P	H	For Labor (Service)
11.f) Purchases (Consumption)	Ch	H	P	For Consumer Goods/Services
12.f) Capital Outlay (True investments)	Cc	C	P	For Durable Capital Goods
13.f) National Appropriations	Cg	G	P	For Supply of Public Services, Goods and for Emergencies
14.g) Investments and Mortgages Loans	I	F	C	Shares and Contracts (Credits)
15.g) Bank Loans for Re-Circulation	M	F	G	National Bonds (Credits)
16.h) Savings (and Outgoing Loans)	S	H	F	Bank Certificates (Credits)
17.i) Dividend/Interest on Investments	ri $\Sigma(I)$	C	F	For the Use of Total Credit $\Sigma(I)$
18.i) Interest in National Bonds	r $\Sigma(M)$	G	F	For the Use of Total Credit $\Sigma(M)$
19.i) Interest on Savings	rs $\Sigma(S)$	F	H	For the Use of Total Credit $\Sigma(S)$
20.j) Land Sale and Purchase	Lsp	L	L	Within the same entity, not used
<p>* Non-contractual, socially obligatory money-flow.</p> <p>$\Sigma()$ accumulated quantity.</p> <p>ϕ The return, for access rights to a site, as a hire-fee or the use of durable capital goods. In this latter case it covers their investment cost and interest, wear, maintenance, obsolescence, etc.</p> <p>The small bracketed letters a) through to j), after each numbered line, correspond to the list of macroeconomics transactions in paragraph 7.3.</p> <p>Item j) L to L is not used, but is given here for purposes of description in the text.</p>				

Money-flow rates and utilities

From this data one can draw the complete diagram or model of our macroeconomics social system, which is shown here. In the diagram, the money-flows are indicated by algebraic symbols and the thin black arrows. The goods, services, valuable legal documents, money being saved/loaned, access rights to natural resources or to the durable capital goods, etc., are

indicated by the words and fat filled-in arrows. This diagram represents the structure of our macroeconomics or social system and completely models it. This model is a unique way for the presentation of the whole of our social system using the minimum complexity. It is intended for teaching and for research into the exact scientific application of theoretical macroeconomics and more widespread use.



Flow chart - and alternative model

Conclusions

This study provides an easily understood yet fully comprehensive seamless working-model, expressed as a diagram, for describing our social system. In this derivation, the smallest number and simplest, least kinds of features and details have been properly and formally assembled. This presentation accords with Einstein's criterion for a good scientific explanation or theory [10]. Consequently this model contains vital information of the minimum kind, suitable for mathematical analysis and theoretical scientific research.

In the past, similar assumptions have been made, often with only part of the system being considered and without any formal explanation about what is implied. It is hoped that by writing about them in the manner presented here, the reader can see not only where the past work misled many students, but can also appreciate the way that a more sensible and logical approach must inevitably take us and will help to better guide them. These few assumptions are impossible to avoid, if we wish to make sense out of the whole complicated array of our society, by the use of aggregated idealized role-playing entities (which began by implication, in 1933 by Frank Knight or even earlier). Often, the previous assumptions are unstated, which makes the older representation harder to comprehend.

Once this attitude is taken and the assumptions formally stated, the rest follows, as if we are logically being directed along it, by a guiding hand. In this approach, having decided to try to understand the whole thing, we are led into taking certain inevitable steps and proceeding in a specific manner. These activities mean that we find the money passing in one direction, on a reciprocal path and in exchange for the physical consumer-goods, durable capital goods, private and public services, valuable legal documents, savings and loans, access rights to natural resources or to the use of durable capital goods, etc.

This idealized solution, makes macroeconomics a true theoretical science, as compared to earlier methods and their resulting specifically chosen but more detailed models. Having first prepared the basis and later the new model, our results better explain both the nature and working of our existing social system. It greatly improves upon the past ways of describing it--about of what it consists, which previously and regrettably was a pseudo-science. Although the past explanations of theoretical macroeconomics have been much criticized for their failure to be sufficiently systematic and precise (and to attain an exact-science status), this achievement of a good scientific explanation was not reached until now

References

- Smith, Adam. (1776) *An Inquiry Into The Nature and Causes of the Wealth of Nations*, reprinted 1994 in: Modern Library, Random House, New York, NY, USA.
- Ricardo, David. (1817) *The Principles of Political Economy and Taxation*, John Murry, Abermle Street, London, UK.
- Marx, Karl. (1867-1894) *Das Kapital--Kritik der politischen Ökonomie, Vols. I – III* Verlag von Otto Meisner, Hamburg, Germany.
- Cooke, George Wingrove (1846). *The Act for the Enclosure of Commons in England and Wales*, Owen Richards, Bookseller, London, UK.
- Fetter, Frank A. (1899) [Capital, Interest, and Rent.](#) Edited in 1977 by Murray N. Rothbard, Sheed, Andrews, and McMeel, Inc., Kansas City: MO, USA..
- George, Henry. (1879) **Progress and Poverty -- An Inquiry into the Cause of Industrial Depressions and Increase of Want, With Increase of Wealth -- the Remedy*, Reprinted in 1979 by Robert Schalkenbach Foundation , New York, NY. USA.,
- Walrus, Leon. (1874) *Éléments d'économie politique pure, ou théorie de la richesse sociale (Elements of Pure Economics, or the theory of social wealth*, translated by W. Jaffé), (1899, 4th. edition.; 1926, revised., 1954); see also *Essays on Walras.*(1993), Cambridge University Press, England. UK.
- Leontief, Wassley. *Input-Output Economics*. 2nd edition 1986, Oxford University Press, New York, USA.
- Keynes, Alfred Maynard. (1936), *Theory of Employment, Interest and Money*. Reprinted 2007: Macmillan Book Co., London, UK.
- Chester, David H. (2015) *Consequential Macroeconomics—Rationalizing About How Our Social System Works*. Lambert Academic Publishing, Saarbüchen, Germany,
- Roche C.O. (2012), *Understanding the Modern Monetary System*, Orcam Financial Group, LLC, P.O. Box 91098, San Diego, CA. USA.,
- Gaffney, Mason and Harrison, Fred. (1994), *The Corruption of Economics* Reprinted 2010: Shephard Walwin Ltd., London, UK.
- Chester, David H. (2017) *Einstein's Criterion Applied to Logical Macro-Economics' Modeling* SSRN 2865571 (Internet).
- Einstein, Professor Albert (10 June 1933) *On the Method of Theoretical Physics*. Paraphrased from his Herbert Spencer Lecture, Oxford, *Philosophy of Science*, Vol. 1, No. 2 pp.163-169, April 1934.

Knight, Frank H. *Readings* (1932), Social Science Course, and *The Economic Organization*.

University of Chicago, IL, USA. 1933

Lipsey, Richard G. (1963), *An Introduction to Positive Economics*

4th Edition 1975, Weidenfeld and Nicolson, London, UK.