REFLECTIONS ON LINKING MONETARY AND VALUE THEORIES IN NEW CLASSICAL ECONOMICS AND SOME PREDECESSORS

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056 084

Major paper presented to the

Department of Economics of the University of Ottawa

in partial fulfilment of the requirements of the M.A. Degree

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Ottawa, Ontario

November 1991

"... Socrates and the economist had got to the end of their conversation where Socrates, by his usual method of questioning, had demonstrated, that the economist did not have the first notion what money is or whether it makes any sense. Nevertheless, at the very end Socrates asked : 'Well, how does this system work ?' And the economist's parting reply was : 'Very well, thank you.' That may have been overly optimistic, but it seems to capture the flavour of a good part of our subject."

Leonid Hurwicz
In discussion at the Conference on Models of Monetary Economics, 1978

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PREFACE

This is a study of the evolution of theoretical issues involved in the linking monetary and value theories. The topic was chosen because of its increasing importance in view of new classical economics, which is, in fact, "shrinking" around this point. The problem of providing adequate microfoundations for macroeconomic theory, which is one of the goals of new classical economics, is actually mirrored in an uneasy relationship between monetary and value theories.

An historical trace of this issue leads us back to the pioneers of economic theory - Smith, Ricardo, Hume et al. However, the significance of the topic was acknowledged relatively recently, in the works of Hicks. Thus, this paper begins its discussion here and continues through the contributions of the 1950s and 1960s, up to the new classical economics.

I would like acknowledge first Professor André Plourde, who has read through all of the recent drafts of the paper and made numerous suggestions for improvement.

Another acknowledgement is more special: my interest in microeconomics-based macroeconomics was first kindled by lectures in microeconomic theory by Professor Julio Silva-Echenique in the fall of 1990.

I have finally to express my gratitude to Louise Slobodian, who - as a professional journalist - read the paper and corrected the "uneasy linguistics".

1. INTRODUCTION

Monetary theory, traditionally understood as the theory concerned with general level of prices,[1] and **value theory** - perceived as the theory of relative prices - were developed as rather independent concepts for a long time. The first cross fertilization of the two appeared in the early 1930s as a feasible means of economic progress. And - as stated by Hicks (1967, p.61): "... I have come to be interested in money only because I found that I could not keep it out of my non-monetary problems" - it was not only feasible, but inevitable as well.

The working hypothesis of this paper is that by linking monetary and value theories, one can come closer to the resolution of problems in economic theory that otherwise remain unexplained or are explained inconsistently with the present level of knowledge. **The framework** of the problem of this linkage was first developed by Hicks (1935, reprinted in 1967). The entire framework which creates the basic structure of the paper is discussed in section 2.

This paper is primarily aimed at showing the evolution of the linkage of monetary and value theories, and its importance for economic theory. However, the paper does not intend to solve the problems associated with this linkage, it rather outlines the importance of the issues and potential areas of application.

Subsequent work on the linking of monetary and value theories was done in the 1950s and 1960s by Patinkin, Hahn, Gurley and Shaw,

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[1] This understanding of the monetary theory was perceived by macroeconomists in the early 1930s.

and Pesek and Saving. They responded to the Hicksian challenge by filling his framework box with theoretical results, as well as quantitative and institutional observations. However, section 3 of this paper is devoted only to the theoretical contributions (applying value theory analysis to money, preference analysis, analysis of the marginal utility of money, etc.) of Hicks' followers. The quantitative and institutional observations of these economists are not included because, in the light of further developments in new classical economics, these results are rather weak.

The theory of Pesek and Saving forged the bridge between the Hicksian challenge and the banking and finance theories of the new classical economics. Their analysis of money leads consequently to the new approach to the theory of banks and other financial intermediaries. This can be considered as one of the by-products of integrating monetary and value theories and research work on this topic continues in the works of Black and Fama.

The second line of research connecting Hicks to new classical economics, mostly through the works of Patinkin and Hahn, concludes in the "new microfoundations of money" theory - the second by-product of the linking of the theories. In this field there are some interesting recent contributions, especially those by Lucas and Stokey.

The concluding section summarizes the results obtained from this analysis of the contributions into the linking of monetary and value theories and shows the relevance of the working hypothesis of the paper - that our understanding of theoretical issues of money,

price level determinacy, preference relations and other macroeconomic issues can be enhanced by linking monetary and value theories. There are, however, some issues in which the linkage of the two theories is not a solution of the problems.

2. JOHN HICKS - THE BEGINNING

This section focuses on the basic theoretical framework for integrating monetary and value theories provided by Hicks. The first part is devoted to the background and approach to the proposed integration. The second part discusses the entire framework and Hicks' contributions to it. The third part, called "The Hicksian Challenge", evaluates Hicks' contributions, and specifies the items in the framework that required further research.

2.1 FROM VALUE THEORY TO MONETARY THEORY

John Hicks was one of the first modern economists to realize the importance of connecting value and monetary theories as branches of economic theory. In doing so, he emphasized the idea that these two branches should complement and provide adequate foundations for each other.

Hicks (1935, reprinted in 1967) commences his analysis from the viewpoint of value theory. He focuses on two issues in monetary theory that are startling when approaching monetary theory from his value theory foundations :

- **preoccupation with the transaction equation;**
- **absence of the concept of marginal utility in monetary theory.**

The transaction equation is criticized because theorists who acknowledged this equation tend to build their entire monetary theory around this rather tautological concept. On the other hand, the concept of marginal utility, which has made sense in value theory, is missing in monetary theory. Understanding marginal utility analysis as a general theory of choice, money (as a concept capable of quantitative expression) can be examined by this analysis, according to Hicks. Casual empiricism supports the

hypothesis that money has marginal utility because people do choose to hold money rather than other assets.

Based on the above criticism, Hicks proposes a framework of analysis, which incorporates monetary theory into value theory.

2.2 BASIC FRAMEWORK OF ANALYSIS LINKING MONETARY AND VALUE THEORIES

Hicks' framework for the integration of monetary and value theories is very straightforward: he extends the ordinary methods of value theory and looks for appropriate corresponding features in monetary theory. In any analysis in value theory we consider an individual's income and expenditure account, we analyze which items in these accounts are under the control of that individual, and then examine the ways in which he will tune up these items to get himself to the most preferred situation (a similar analysis is provided for the firm's behaviour - taking into account loss and profit accounts). Hicks suggests that monetary theory should be based upon the same principles of analysis. Instead of examining income accounts he proposes to base his analysis on capital accounts, thus using a balance sheet approach. He proposes to use a rather generalized form of balance sheet suitable to all individuals and firms. One should then analyze the forces driving assets and liabilities and evaluate their impact on the items in the generalized balance sheet.

Hicks' suggestion for such a generalized balance sheet looks as follows (Hicks 1935, reprinted in 1967, p.75) :

ASSETS	LIABILITIES
Consumption goods - perishable	
Consumption goods - durable	
Money	
Bank deposits	
Short term debts	Short term debts
Long term debts	Long term debts
Stocks and shares	
Productive equipment (including goods in process)	

After specifying this balance sheet, Hicks outlines the problem in two levels:

1. how much assets/liabilities should be held;

2. distribution of assets and liabilities.

The problem is then to find an equilibrium solution for the twofold problem described above.

The older views of equilibrium, applied to this generalized balance sheet, Hicks finds very vague.[2] He refers to the following set-up (Hicks 1935, reprinted in 1967, p. 78):

> **"... a diminished demand for money on the part of some people would raise the prices of capital goods and securities, and this would raise the demand for money on the part of the owners of those securities. Similarly, an increased demand for money would lower prices, and this would lower the demand for money elsewhere. The whole thing will work out like an ordinary demand and supply diagram. But it is fairly safe to say that we do not find this straightforward stability in practice."**

The main counter argument (Hicks, 1967, p. 81) against this, indeed, very elegant approach, is the fact that in every society monetary wealth is partly in the hands of people who are "insensitive" to changes in expectations about the future yield of

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[2] "...Let us hope and pray that it is sometimes true...", Hicks (1935, reprinted in 1967, page 78).

the investments. The primary reason for this insensitivity is that, for these people, the cost of transferring assets from one form to another is relatively high to the volume of assets owned. Thus they will not respond to the market signals indicating the changes in the future yield of investments and simple equilibrium based on demand and supply curves for money end securities will not be feasible any longer.

Looking for the particular form of equilibrium in his model, Hicks analyses the application of an individual equilibrium in his set-up. Nevertheless, he does not clearly specify how this equilibrium would look, indicating only that the equilibrium in such a system is very unstable. Instead, he concentrates on the factors, leading the system towards equilibrium.

In doing so, Hicks takes a simple formulation of the problem: he inquires what determines the precise quantity of money that a representative individual will desire to hold. He lists the factors with two common denominators : yields of investments and risks. These two factors would play the same role as prices in value theory. Even if these are not as objective as prices, Hicks claims that there has to be a way of separating the objective data and subjective trends in anticipations of yields of investments, and thus obtaining more objective measures for equilibrium conditions in the system. This resembles the "inauguration" of the rational expectation theory, developed later by Muth, Lucas and others.[3]

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[3] Hicks assumes that individuals will have - what we now call rational expectations - about objective trends in the yields of investments.

The problem of using anticipations instead of prices brings its consequences into one of the fundamental questions of monetary economics - how the individual's demand for money will respond to a change in that person's total wealth. Monetary theorists (those before Hicks) tended to accept the simplest assumption - that the demand for money will increase by the same proportion total net assets have increased. This is a very arbitrary assumption and Hicks proves that it is invalid within his system of anticipations.[4] He thus concentrates on the case when the demand for money is independent of change in wealth. In this world some kind of equilibrium is feasible, but it will be a rather unstable one. The reasoning behind this is quite straightforward: if any individual tries to increase his money holdings (i.e., demand for money rises), and the supply of money is not increased, prices would all eventually fall to zero. In the opposite case, prices would become infinite.[5]

This directs the research towards the analysis of the shocks, factors influencing the system on its transition towards

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[4] Hicks (1935, reprinted in 1967, p.78) explains the argument as follows: "...The assumption of increased wealth leading to a proportionately increased demand for money is only plausible so long as the value of assets has increased, but other things have remained equal. Now, as we have seen, the other things which are relevant to this case are not prices (as in the theory of value) but anticipations, of the yield of investment and so on. And since these anticipations must be based upon objective facts, and an unexpected increase in wealth implies a change in objective facts, of a sort very likely to be relevant to the anticipations, it is fairly safe to assume that very many of the changes in wealth with which we are concerned will be accompanied by a change in anticipations. If this is so, the assumption of proportionate change in the demand for money loses most of its plausibility."

[5] This reasoning resembles the criticism of Keynes, and the analysis of this issue can be found at Hicks (1967, pp. 126-143).

equilibrium.

2.3 THE HICKSIAN CHALLENGE

Hicks began a new field in economic research on the edge of monetary and value theories, which aimed to create a bridge between the two. He created a framework for linking the two theories and called for research in the issues emanating from this framework. These issues can be summarized as follows:

- internal issues (within the balance sheet):
  - analysis of assets and liabilities (especially the analysis of money);
  - evaluation of the relevancy of the marginal utility concept in connection with monetary theory;
- external issues:
  - specification of the frictions (factors) that influence assets and liabilities;
- equilibrium of the system:
  - definition of equilibrium;
  - specification of the forces that lead the system towards equilibrium.

Hicks did a fair amount of work in the area of external issues. He specified the factors that make people want to hold non interest-bearing money rather than other interest-bearing assets. A preference for holding money instead of spending it on consumption goods does not present serious difficulty because it is simply the case of preferences for future consumption over present. The critical question arises when considering the preference for

holding money rather than capital goods. That is the place where the analysis of factors causing this preference comes into the play.

The other field of Hicks' contribution is equilibrium: its definition, and necessary conditions for obtaining a stable equilibrium. In defining an equilibrium, Hicks tries two possible approaches. First he tries to apply the concept of an individual equilibrium (one known from value theory) into the generalized balance sheet. This approach, however interesting, does not lead to a stable equilibrium, because there are individuals who are assumed to be insensitive to the possible changes in wealth (the reasons for possible insensitivity have been discussed in previous subsection). Therefore a group of individuals do not optimize their holdings, thus influencing demand for money and assets in the economy, which leads only to a very unstable equilibrium.

The second approach consists of defining and evaluating the factors leading the system towards equilibrium. Hicks was successful in performing the first step of this approach, but more detailed analysis is expected from his followers.

Hicks thus outlined a path of economic research that, forty years later, is considered a cornerstone for new classical macroeconomic theory.

3. DEVELOPMENTS IN HICKS' APPROACH IN THE 1950S AND 1960S

This section focuses on further developments of the Hicksian framework. It starts with Patinkin and his utility of money and other assets (including the concept of marginal utility), and continues with the criticism of Patinkin by Hahn, Gurley and Shaw, and Pesek and Saving. In addition to the criticism, the specific contributions to the integration of monetary and value theories by each of the authors are discussed.

3.1 PATINKIN - BASIS FOR FURTHER DEVELOPMENT AND CRITICISM

Patinkin's contribution to economics covers many issues in the integration of monetary and value theories. He continues in the tradition of Hicks, accepting the framework that Hicks created, and concentrates particularly on the analysis of the assets in the Hicksian balance sheet. His main attempt was to integrate money into a Walrasian system. His most important fields of study in the linking of monetary and value theories are as follows:

- **utility theory of money and other assets;**
- **marginal utility concept and money.**

3.1.1 A UTILITY THEORY OF MONEY, ASSETS AND SAVINGS

In discussing the utility theory of money, it is essential to focus first on what kind of money is used for the analysis, and secondly on the sense in which the term "utility of money" is used. In his analysis, Patinkin (1989, p.15) only works with outside money. The most elegant definition of this type of money was given by Blanchard and Fischer (1988, pp. 193-194), as: " ... outside money is any money that is a net asset of the private economy (for example, currency and bank reserves). On the other hand, inside money is simultaneously an asset and liability of the private sector (for example, bank deposits)." This specification of money

influences the solution of equilibrium issues in Patinkin's theory, and criticism of this approach is discussed in more detail in the subsection concerned with the contributions of Gurley and Shaw.

The sense of the utility of money in Patinkin's work is understood as the utility of holding money, not the utility of spending money (Patinkin 1989, pp. 78-115). It is not intended to denote the marginal utility of goods for which money can be exchanged. The concept used by Patinkin is implicit, for example, in cash-balance approaches to the quantity theory of money, and Patinkin implicitly follows it throughout his theory.

In his model, Patinkin (1978, in Fisher, p.62) relies on the insertion of money (and the price level) into the utility function. That is captured by the so-called Samuelson - Patinkin utility function of the form :

$$u = U(S_1,\ldots,S_{n-1},M,P_1,\ldots P_n) \qquad (1)$$

where

$S_1, \ldots S_{n-1}$ → vector of commodities;

M → initial nominal money balance;

$P_1, \ldots P_n$ → vector of money prices.[6]

In equation (1), both the nominal quantity of money and the list of money prices are in the domain of the utility function. This represents the idea that money has its own utility, which is different from the utility of the goods or assets that this money can buy. This version of the Patinkin-Samuelson utility function,

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[6] To obtain the clearest version of this utility function, the vector of money prices should be replaced by equilibrium price level, calculated as a weighted average of money prices.

as based on equation (1), treats money just as other goods.

The theory as described above is believed to represent an integration of monetary and value theory. Patinkin gives two arguments to support this interpretation :

- → the demand for real money balances is now respecting the same rules of utility as the demand for any other good;
- → the level of absolute prices is determined jointly with all relative prices, so that it is sufficient to set a price of one good as constant (e.g., the monetary unit), and all the other prices will be set as a sort of derivative of this price.

This approach of Patinkin's clearly indicates his commitment to the Hicksian challenge. He accepted the framework developed by Hicks and his main challenge was that of applying the analytical instruments of value theory to monetary theory.

3.1.2 MARGINAL UTILITY CONCEPT AND MONEY

One of the first shortcomings noticeable in the Hicksian era was the lack of a marginal utility concept in monetary theory (see earlier criticism of Hicks, section 2).

Patinkin developed a very interesting framework for illustrating the marginal utility of money. He takes an individual with a given collection of goods (for the purposes of generalization, this collection is not the optimum one) and increases his holding of money balances at the end of the specified time period by one dollar, while keeping constant all the other components of his collection, as well as the price level. He then

examines the increase in an individual's utility resulting from the increased liquidity thus made possible. This presents the concept of marginal utility of money balances.[7]

The other interesting entry to the Hicksian challenge is Patinkin's theory of the influence of expectations (of prices and yields on investments) on the real-balance effect and on the demand for money. He uses the methodology of Hicks' analysis about the influences of anticipations of yields on investments, and develops the theory further towards examining the changes in real wealth. Results of this analysis are very interesting in terms of the functions of money and its substitutes: even the existence of certain anticipations of price increases will not cause an absolute flight from cash. These will simply cause the individual to adjust his holdings of real cash balances so that the marginal utility of the liquidity they provide compensates him for the opportunity cost of holding the balances.

Patinkin's contribution to the linking of monetary and value theories can thus be summarized as follows: he accepts Hicks' framework - generalized balance sheet (as described in the previous section), using it to create the utility theory for money and other assets and incorporating the marginal concept into it. Giving a part of historical background in marginal utility of money

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[7] It resembles the relationship to Marshall's marginal utility of money concept: he takes an individual with a collection of goods that is the optimum one for the given price level, interest rate, and wealth. He increases the wealth of an individual by one dollar, permits him to spend it in an optimum way, and examines the total utility from the new optimum collection as compared with that from the original one. According Patinkin (1989, pp. 78-145), this is considered a **marginal utility of money wealth** rather than a marginal utility of money.

(Marshall's analysis[8]), he fulfils Hicks' call for the introduction of marginal utility analysis in monetary theory.

His other important contribution was an examination of the influence of expectations (of prices, yields on investments) on the real-balance effects and on the demand for money. His research is the creative basis for the developments, as well as criticism, that are presented in the following sections.

Further issues include early steps in the theory of banks and other financial intermediaries. Patinkin focused only on the influence of specific set-ups of banking industries on the general price level. These issues were predecessors of banking and finance models of new classical economics, and will be discussed in more detail in the subsection on new classical economics.

3.2 HAHN - A CRITICISM OF PATINKIN'S FRAMEWORK

A fair amount of criticism of Patinkin's theory is presented by Hahn (1965). His criticism follows from comparing Patinkin's theory to the strict Hicksian framework, stressing that the successful integration of monetary and value theories must formally specify in what way money is indispensable to the exchange or enjoyment of the commodities that are the source of direct utility. Hahn also calls for specifying the frictions which influence money and other assets, as well as the exact processes which influence a

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[8] The core of Marshall's analysis of marginal utility of money lies in the concept of "marginal utility of money income", or, even better, "of money wealth". It is different from the "marginal utility of money balances" concept used by Patinkin.

general equilibrium in the system that is connected with these frictions.

Hahn emphasizes the transaction function of money and approaches Patinkin's work on this basis. Patinkin claims that the utility of money is understood as the utility of holding money. However, in Patinkin's formal system (see equation (1) in subsection 3.1.1), the value of money depends on what it will buy. Hahn, on the other hand, requires that it should be based on what money can do itself.

In regard to the equilibrium issues, the criticism of Patinkin's theory offered by Hahn arises from the unavoidable question of whether (or rather, under what conditions) a system incorporating real-balance effects will converge to equilibrium if it begins (for any reason) from a position away from equilibrium.

Hahn (1965) first of all expresses doubts about the formalization of Patinkin's model. He argues that Patinkin does not (in the consequences of his theory) differentiate between monetary and barter economies. From this follows the argument that the role of money as a necessary condition for consuming other goods is not acknowledged by Patinkin. Hahn shows that upon the condition that money is not absolutely necessary for consumption, there exist two equilibria: monetary (one where money has positive value) and non-monetary (where money is worthless), both of them still being compatible with the Walrasian system.

Nevertheless, a problem arises when one tries to prove the existence of equilibrium in general. Hahn considers this a second weak point in Patinkin's theory. For Patinkin, the entire problem

did not exist because, for reasons of simplification, he did not take into account distributional effects. Hoover (1988, p.91) explains: "... that a rearrangement in the endowments of cash balances or other goods does not affect the price and output solution to the Walrasian system". This is a very strong assumption as it implies that agents in the system have identical tastes and consume the same proportions of each commodity in the market.

Hahn thus provides direct criticism of Patinkin's system. His contributions to the linking of monetary and value theories can be summarized in two main points :

- a theoretical sketch of the external issues of the Hicksian balance sheet - specifying the frictions that money overcomes;
- a theory of equilibrium in the system described by Patinkin.

3.3 GURLEY AND SHAW - SPECIFICATION OF MONEY

Further critical remarks to Patinkin's theory come from Gurley and Shaw (1960). As was mentioned in subsection 3.1, Patinkin in his asset analysis concentrates on money (in the sense of fiat money) and other elements in the Hicksian balance sheet remain relatively untouched. Gurley and Shaw go further in analyzing these other assets (within Patinkin's formulation of the problem), which leads to interesting consequences.

For Gurley and Shaw, an important assumption in Patinkin's system is that money is purely outside money. They then worked on the problems formulated by Patinkin in an inside money economy (by

defining all money to be private debt). They examined the situation where private-sector balance sheets are consolidated (an individual's asset exactly cancel another's debt), and thus inside money disappears. They call this procedure the "net money doctrine". Gurley and Shaw criticize Patinkin for using the net money doctrine. They, on the other hand, believe in the necessity of the "gross money doctrine", arguing that while private debtors are, in general, indifferent as to who holds their bonds, private creditors are not indifferent to the structure of their portfolio (i.e., its division between bonds and money).

In their Money in the Theory of Finance, Gurley and Shaw give the basics of the so-called "new view of money", a term based on their new specification of money. This leads to interesting conclusions in equilibrium analysis, and in the analysis of external factors influencing the assets in the Hicksian generalized balance sheet.[9] Money and other financial assets are considered very similar; money's uniqueness almost disappears in the gross money doctrine accepted by Gurley and Shaw.

Thus, an examination of the external factors influencing the demand for assets and their behaviour reduces down to a consideration of the bundle of inside assets, demand for which is directed by an attempt to reach the optimal portfolio. Rigorous

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[9] One of the outcomes of this analysis is also the assessment of neutrality questions. Gurley and Shaw conclude that the neutrality of money could be preserved in a purely inside money economy, but that in a mixed inside - outside economy (such as the real world), the neutrality result does not hold. The reasoning behind this argument can be found in Hoover (1988, p. 93), where he claims that in an mixed economy, money affects portfolio balance differently depending on whether it was created against private debt or not, thus producing non-neutralities in the system.

treatment of the demand for assets is performed through an indifference map method. In order to determine the changes in the demand for assets, this method uses the graphical interpretation of a utility function and constraints. In contrast, Gurley and Shaw's work in an inside money economy brings different results in equilibrium analysis. They divide equilibrium analysis into two parts: first the commodity sector equilibrium is examined and second the characteristics of pure monetary equilibrium (in terms of equilibrium in the balance sheet) are evaluated. In their theoretical discussion Gurley and Shaw follow the stream of economic thought initiated by Hicks and contribute to the Hicksian framework of a generalized balance sheet (as previously described).

Thus, the contributions of Gurley and Shaw to the linking of monetary and value theories can be summarized into three main categories relevant to the Hicksian framework:

- "new view" on money and its functions;
- analysis of other assets in the balance sheet;
- questions of equilibrium and factors influencing it.

Besides the mainstream research following the Hicksian framework, Gurley and Shaw were also interested in the theory of banking. Their contribution was largely made in the field of implications of laissez-faire banking on the general price level. Gurley and Shaw's work was also recognized later by Patinkin himself (in the second, abridged edition of his Money, Interest and Prices, 1989), referring to it as "... pathbreaking work" (Patinkin 1989, p. 295).

3.4 PESEK AND SAVING - "ECONOMIC THEORY"

Pesek and Saving (1967) provide a fair amount of theoretical work in linking monetary and value theories, which, in their interpretation, means linking the monetary and real sectors of the economy. They claim that there is one theory only - economic theory. They have accepted the Hicksian precept of the usefulness of value theory for monetary theory, and further developed the concept. They reached the conclusion that the dichotomy between monetary and value theory is not based on differences in theory but solely on "technical properties" of the analyzed items in both theories.

These technical properties are explained as follows. A subject of the general value theory is usually a unit of nonmonetary capital goods, which yields physical, real income that is independent of the price of that unit. On the other hand, a unit of monetary capital goods yields real income that is directly proportional to the price of this unit. This is due to the nature of the service yielded by money - as an exchange medium. Thus if there is a change in the price of money, it changes the value of the transaction that this unit of money is able to facilitate. This characteristic of money is called the "technical property".[10] Thus, there will definitely be a difference in applying value theory to items that yield constant real output regardless of the price of the resources, and items like monetary capital goods analyzed

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[10] An illustrative explanation of this characteristic is in Pesek and Saving (1967, p. 246) where they show that an apple tree would have this property if it were to yield X% more apples whenever the price of apple trees increased by X%.

above.

There are some important analytical implications when "economic theory" is applied to money using the technical property. Using the fact that any commodity that yields a positive income to the owner and no negative income to the nonowner is considered a part of the net wealth of the community, it is thus assumed that money meets this criterion. Money is then included in the community's net wealth and yields a stream of real income that changes proportionately with its real price.

Furthermore, it was shown that once the theory of value is applied, there is no analytical difficulty in distinguishing between money and other forms of assets. This brings a substantial extension of the Hicksian balance sheet approach, where all assets can be commonly called monetary wealth and examined under the assumptions of characteristics of monetary wealth instead of examining the items separately.

Based on this theoretical approach to the linking of monetary and value theories, Pesek and Saving developed a relatively new approach to the theory of banks and other financial intermediaries. This theory is more closely discussed in the subsection 4.1 on banking and finance models.

Summarizing the contribution of Pesek and Saving to the integration of monetary and value theories, the following points can be emphasised:

- explicit linking of monetary and value theories through economic theory and the "technical property";
- detailed analysis of money and other financial assets;

- theory of banks and other financial intermediaries. (This part of Pesek and Saving's contributions will be discussed in the section focusing on banking and finance theories).

3.5 CONCLUSIONS

The developments in the linking of monetary and value theories in 1950s and 1960s are recapitulated in the following table:

TABLE I

The developments in the linking of monetary and value theories in 1950's and 1960's

ISSUE/ AUTHOR	PATINKIN	HAHN	GURLEY & SHAW	PESEK & SAVING
Internal issues	♦ utility theory of money ♦ marginal utility concept		♦ inside / outside money ♦ analysis of other assets in balance sheet	♦ money and net wealth analysis
External issues		♦ frictions influencing money		
Equilibrium issues		♦ existence of equilibrium	♦neutrality results	
Other issues	♦ theory of banks in unregula-ted environ-ment		♦ laissez - faire banking theory	♦ economic theory ♦ general theory of banks and other financial inter-mediaries

The evaluation of contributions to the notion of linking monetary and value theories is performed according to contributions to individual issues following from the Hicksian framework, as it was specified in subsection 2.3. Hicks' challenge was accepted and all of its aspects were covered by substantial research efforts in the 1950s and 1960s.

Concerning the so-called "internal issues", the basics were given in the work of Patinkin, especially through his analysis of the marginal utility concept in connection with monetary theory. This concept was further expanded by Gurley and Shaw, by examining it in an inside/outside money economy. Pesek and Saving skip this discussion on the substance of money and analyze instead money and other assets using the special device of the technical property. This leads to polemics about the existence of two separate theories - monetary and value. Through their analysis of money they came to the conclusion that one theory - economic theory - is the theory that matters.

Contributions to the external issues were in line with Hicks' research vision. Authors concentrated on the frictions influencing the asset part of the generalized balance sheet, primarily regarding the frictions that money has to overcome. This area of research provided good background for equilibrium analysis. Here two basic approaches can be noted: some of the authors (e.g., Patinkin) assumed the existence of equilibrium (defined as a set of individual equilibria for each and every good in a market, obtained through the equilibrium set of prices; for a precise definition of equilibrium, see, for example, Patinkin (1989, p. 35)) and defined the problem as that of finding the factors that would lead a system towards equilibrium. A second approach doubted the assumption of the existence of equilibrium and examined whether or not equilibrium exists at all in the system proposed by Hicks (for example, see the works of Hahn). The results of equilibrium analysis were quite profound - equilibrium was defined and

existence was proved in some specific set-ups.

Another issue of importance to the linkage of monetary and value theories that was discussed in 1950s and 1960s was the theory of banks and other financial intermediaries. This theory was partially introduced by Patinkin (1956) in the form of studies of the influence of specific banking industry set-ups on the general price level. In the works of Gurley and Shaw, laissez-faire banking and its implications are discussed in detail. These initial efforts led to the general theory of banks and other financial intermediaries outlined by Pesek and Saving. Banking and finance issues, however, have not been introduced in this section; they will be brought into focus in the subsection discussing banking and finance models of new classical economics.

Generally it can be said that the 1950s and 1960s provided a good background for the appearance of new classical economic theory, which is basically built on the principles of Hicks. Many issues discussed in this period were explicitly accepted by new classical economic theory, especially issues discussing money and theoretical issues in equilibrium analysis.

4. NEW CLASSICAL CONTRIBUTIONS TO LINKING MONETARY AND VALUE THEORIES

In this section the Hicksian challenge will be evaluated from the point of view of new classical economics. Out of the several streams of economic thought within new classical economic theory, only the topics with relevance to the linking of monetary and value theories will be taken into account. Thus this section discusses the contributions of banking and finance models and "new microfoundations of money" models, and tries to find support for the working hypothesis of this paper, i.e. that linking monetary and value theories can point the way to a better understanding of macroeconomic problems otherwise unexplained or explained inconsistently with the present level of knowledge.

When it was introduced, new classical economics sought to challenge the existing schools' vision of macroeconomics. Early works in this field sought to modify existing (mainly Keynesian) aggregate macroeconomic models, and explore their weaknesses. At its basis, new classical economics relied heavily on the fundamental assumptions of market clearing and rational expectations. The basic working hypothesis accepted by new classical theorists was that macroeconomic aggregates must be the consequences of well-formulated optimization problems. They challenged the idea that, in macroeconomic theory, the intuition and reasoning could be firm without working out the complete microfoundations of the theory. Thus, their goal was to provide adequate microfoundations for macroeconomics, and in particular for monetary theory. This, in fact, reflects an effort to incorporate the principles of value theory into monetary theory, which matches the Hicksian challenge.

This section will omit a general discussion of new classical economics, instead concentrating on the most obvious illuminations of the linkage of monetary and value theories. This

indeed matches the so-called new monetary economics, which is the application of new classical economics' principles to monetary economics.

Basically there are three categories of models that broach this topic. The first is a branch of banking and finance models, including the outstanding model of Eugene Fama. Secondly, there are models focusing on the new microfoundations of money. The third category includes more formal monetary models - overlapping generation models by Sargent (1979), Wallace (1980) and others.

Fama (1980) and Black (1970), belonging to the first category of banking and finance models, applied general value theory principles of firm analysis to the banking industry. They re-examined the theory of the banking firm, providing an abstract view of its role as portfolio manager and operator of the accounting system. While these two models will be closely examined here, there were other developments in the field. In the question of the management of a banking system, King (1983) assessed theoretical issues in a historical perspective, analyzing the 19th century question of whether the competitive banking system with free entry would be viable. Jacklin (1986) describes and extends subsequent developments in this field.

Covered under the heading of "New microfoundations of money" is fundamental work focusing on the explanation of the need and use of money - issues debated earlier in the work of Hahn, Gurley and Shaw, and others. In the models developed by Brunner and Meltzer (1971), Kurz (1974), Starr (1974), Lucas (1980) and Townsend (1980), where the lack of a double coincidence of wants

requires the use of an exchange medium, the reasoning for using money was developed in terms of the Hicksian challenge. The modern trend has been to impose the use of money on the model, rather than to allow it to emerge from within the model.

4.1 BANKING AND FINANCE BRANCH OF MODELS

The core of the new classical models known as banking and finance models lies in the implicit incorporation of monetary and value theories. These models focus on the banking industry and apply the theory of value on banks, taking them as a type of firm.

In order to survey the actual contributions to the linking of monetary and value theory in a Hicksian perspective, it is necessary to focus on the following issues:

- formulation of the theory of the banking industry;
- analysis of banking industry instruments (money and other assets, i.e., analysis of the asset part of the balance sheet, as proposed by Hicks);
- implications of banking industry set-up to the specific monetary issues (general price level determinacy, etc.)

Unsatisfied with the performance of the instruments in the banking industry, Vickrey (1955) was the first to develop a framework of the world without money. The basic argument for this rather pertinent proposal is that current monetary theory, and in consequence, banking theory as well, are heavily restricted by institutional forms. He did not use the analytical tools of value theory in banking industry analysis, but he predicted that in the

process of inevitable institutional changes current monetary theory would become invalid.

This led many researchers after Vickrey to analyze the banking sector and the implications of the particular banking industry structure on monetary performance of the economy (Gurley and Shaw (1960), Pesek and Saving (1967), and others). Special attention was devoted to the determinacy of the general price level under a certain structure of the banking sector. The most common issue in generating a set-up of the banking industry was the paradigm of regulated versus unregulated banking and its consequences.

A return to Patinkin (1989, pp. 295-310) shows that he works only on the consequences of certain set-ups of the banking industry, without the precise construction of actual structures. He claims that the price level is indeterminate when banks are not regulated. Gurley and Shaw (1960, pp. 253-254) observed that with laissez-faire banking, the price level is not determinate, and the system suffers from "aimless drift" of nominal money, nominal bonds and the price level. Tobin (1963, pp. 408-419) emphasizes the similarity between commercial banks and other financial intermediaries, saying that the differences tend to vanish in the unregulated competitive financial world, which means that the volume of liabilities of any financial institution nowadays is determined more by the depositors' preferences than by government and central bank actions. Furthermore, in other works, Tobin (1969, pp. 15-29) gets even deeper into the implications of uncontrolled banking, claiming that there would be no room for

monetary policy to affect aggregate demand.

These older approaches to banking theory were summarized by Lerner (quoted in Pesek and Saving, 1967), where he concludes the discussion with the tautological proposition of the "unregulated versus regulated banking" issues, saying that "banks are regulated because they create money; and they create money because they are regulated" (in Pesek and Saving, 1967, p. 135). However, this should not be taken as a paradox; the banking industry is considered to have zero cost of production and thus Lerner's statement should be true (as it is true for every industry with this characteristic - a more detailed explanation is given by Lerner (1963)).

One of the first serious efforts to find the cornerstones of modern banking theory using the achievements of value theory, was performed by Pesek and Saving (1967). They provide a comprehensive summary of the recent issues in banking theory and incorporate them into the framework of the theory of value. In their Theory of Banks and Financial Intermediaries (1967, p. 127) they classify the possible set-ups of the banking industry, with their most probable economic consequences.

They divide the issues into two categories, using different combinations in order to get the various set-ups of the banking industry. The first category is the differentiation of the money used in the system (dominant or non-dominant money in the system, where dominant money is considered fiat money, monopolistically produced by the government), and the second is the structure of the banking system (restricted, imperfectly

restricted, unrestricted banking). Further, they specify some of the quantitative and qualitative constraints in the banking system. Their conclusion is that while these constraints, especially quantitative ones (such as minimum reserve requirements, etc.) prevent the industry from reaching equilibrium, this does not deprive the government of its ability to regulate the size of the money supply and the general price level.

On the other hand, observations made by Black (1970) concerning the research of Friedman and Schwartz (1963), as well as Johnson (1969), indicate that the immediate cause of uncontrolled banking would be an uncontrolled increase in prices. The reasoning behind this is the one referred to by Gurley and Shaw (1960). They explain that such a banking system implies "...an aimless drift of nominal money, nominal bonds and the price level" (Gurley and Shaw 1960, pp.253-254).

Thus questions of management of the banking sector as well as implications of certain set-ups bring very controversial answers. In the following subsections, two representative banking and finance models will be discussed further and should bring forward some of the modern issues for discussion.

4.1.1 FISCHER BLACK - A REAL STEP INTO A WORLD WITHOUT MONEY

Black (1970) remains in his theory on the positions of Vickrey, Tobin, Gurley and Shaw, and Patinkin. He claims that in a world without controls on banking, the real sector will be independent of the financial sector and the price level would be indeterminate. Thus he refutes traditional monetary theories as

inapplicable and gets closer to defining the banking industry to be the same as all other industries. Nevertheless, he never applies value theory analysis to the banking sector.

The appealing title of his article - "Banking and Interest Rates in a World Without Money" - brings an interesting approach to a world without money where commercial banks and other financial institutions offer accounts, pay interest on demand deposits, and do other regular banking business. The payment mechanism in such a world would be very efficient, but money in the usual sense would disappear, thus the quantity theory of money, as well as the liquidity preference theory of money would not be applicable.

The important fact in Black's theoretical background is that he refuses to consider unregulated, competitively produced bank deposits as money. This separates him from the mainstream of theorists, beginning with Patinkin and continued by his followers in 1950s and 1960s, as described in previous sections. Treating these deposits as a "unit of account" implies changes in the economy as a whole, where macroeconomic problems, like price level determinacy reduce to a stable general equilibrium in a non-monetary system. In regard to interest rates in his model, Black assumes that in a world without money banks would be very close to other financial intermediaries and their products would also be very similar. Thus there would be a choice of "deposits" against risky or riskless portfolios, resulting in different interest rates for various deposit products.

While Black's article is definitely a contribution to the linking of the monetary and value theories, he did not apply value

theory analysis to the banking industry. The successful extension of these ideas was performed in the works of Eugene Fama.

4.1.2 EUGENE FAMA - FINANCE AND ECONOMICS

The basics of Fama's theory were published in 1980 in his famous paper "Banking in the Theory of Finance". Even though Fama is considered to be a financial specialist rather than a macroeconomist, his paper presents ideas that are very close to the mainstream of the new classical school.

His paper studies commercial banking from the viewpoint of the theory of finance. The thesis of this paper is that when banking is competitive, portfolio management activities of banks are the type of pure financing decisions covered by the Modigliani-Miller theorem (first published in 1958). Strong results following from this argument imply that there is no need to control either deposit creation or the security purchasing activities of the banks in order to obtain a stable general equilibrium with respect to prices and general activity.

This implies that the banking industry should be considered as other industries, and that traditional firm analysis (common in value theory) is applicable. Banks are thus considered as firms selling transaction services in order to maximize their profits.

4.1.2.1 Overview of Fama's paper

Fama begins his paper with an examination of the nature of banking. He defines two principal functions of banks as

transactions intermediaries and portfolio managers. First he studies the unregulated banking system. This gives him a deeper comprehension of the characteristics of the accounting system of exchange and of the concept of money in the system. With this basic result, Fama later turns his study into one of the nature of the regulated banking with special attention is given to the two most frequent types of regulation: reserve requirements and the limitation of direct interest payments on deposits.[11]

Another field of interest for him is the implication of the banking industry set-up on general price level determinacy. Fama's argument is that the banking industry does not have any special role in the determination of prices.

Fama works in the world of "deposits". The "deposit" in Fama's theory is the unit of an account, the basic working unit in the banking industry. He considers a non-monetary economy, and thus reduce his set-up to the problem of finding a stable solution to the general equilibrium system without money.

4.1.2.2 Theoretical background

Fama's analysis relies on the theoretical underpinnings of money and other assets given by Patinkin and Gurley and Shaw. An analysis of money and other assets is developed only in the sense of the "unit of account" and their uniqueness is not accepted.

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[11] Limitation of direct interest payments on deposits had been an issue of discussion in the United States prior to the publication of Fama's article. Legislation has since removed this limitation from the U.S commercial banking system.

There are two basic questions that have to be asked when examining the theoretical background of Fama's model. First of all, what determines the value of money (or any other good that could become specialized as the ultimate good of conversion), and secondly, we have to ask whether the value of money could be separated from the actual structure of financial portfolios (what is usually called a "separation theorem").

Fama leaves the first question untouched during an analysis of the unregulated versus regulated banking sector. He purposely keeps anything resembling money out of banking, so that the entire banking sector analysis has nothing to say about how banks get involved in the process by which a pure nominal commodity or a unit of account is made to play the role of numeraire in the real world.

Fama incorporates the concept of money (eventually its substitutes) later in his analysis. His response is based on the study of Patinkin (1961), where :

> "...the problem is to ensure that the nominal commodity, currency in the present case, is subject to sufficiently well-defined demand and supply functions to give the unit in which it is measured determinate prices in terms of other goods."

When defining a demand function for currency, it is specified as dependent on the real services done by the good (i.e., currency). He introduces three factors on which aggregate demand for real currency depends:

- the opportunity cost of currency;
- some measure of real transaction activity of the

type in which currency has a competitive advantage;

→ the minimum real costs of executing these transactions through methods other than currency.

Though he specifies the factors, Fama fails to define what the real services done by currency actually are. This analysis is, however, very close to that started by Hicks - a definition of the factors (frictions) that makes money (or currency in Fama's world) desirable.

Concerning the role of numeraire in the economy and its influence on real economic activity, Fama takes an example from advanced economies. He tries to illustrate that taking, for example, a spaceship as a numeraire, one will get the same results concerning the independence of the portfolios on the actual numeraire. This is all due to the argument that banks as a specific industry are subject to the Modigliani-Miller theorem (the assumptions and results of this theorem will be discussed later in this section). Fama also gives another example of goods that can serve as numeraire. However, he leaves unexplained the actual functioning of these new types of numeraire in transaction business.

4.1.2.3 Price level determinacy

Fama devotes a lot of attention to the interrelation of deposits, prices and real activity. He starts with an analysis of Johnson, Pesek and Saving, Gurley and Shaw, finding one common flaw

in their arguments - in all these analytical works the problem of price level determinacy arises from treating unregulated deposits as "money" and then trying to force this money to act as a numeraire.

Fama's analysis is based on the assumption of the validity of the strong form of the Modigliani-Miller theorem (Modigliani and Miller, 1958). This theorem claims that if some given assumptions about the firm and the entire economy are valid, then the financing of the firm's real activities has no effect on its own market value or on the production and consumption decisions of other agents in the economic system. The assumptions of the Modigliani-Miller theorem used by Fama are the so-called "strong form" ones which suppose the following (using the background discussion in Hoover, 1988, pp. 97-100):

1. perfect capital markets (no taxes, transaction costs, etc.);
2. rational expectations (informational efficiency);
3. risk and return matter only insofar as they affect wealth;
4. firm's investment decisions are made independently of how the investment is financed;
5. agents have equal access to capital markets.

Fama thus claims that the amount and composition of liabilities of banks per se affect nothing, including prices and real activity. Furthermore, the price level, according to Fama, is not affected by the chosen numeraire.

Differentiating between unregulated and regulated banking environments, Fama observed differences in terms of the determinacy of the price level. Fama concludes that controlling the supply of currency alone is sufficient to render the price level determinate. If "outside money" is interpreted as currency and "inside money" as unregulated deposits, then this conclusion supports earlier works by Patinkin about the outside money economy.

4.1.2.4 Criticism of Fama's approach

Serious counter-arguments against Fama's framework have been raised by Hoover (1988). He claims that in an economy with an ultimate good of conversion - money - the "separation theorem" (indeterminacy of price level by structure and volume of actual portfolios) is false. The reasoning behind this assertion is as follows: an ultimate good of conversion exists because it has to settle the transactions. A supporting theoretical argument is that Walrasian auction (which is assumed to happen in Fama's model) is not going to happen in the real world, and thus an ultimate good of conversion is a real-world necessity.

Another critique concerns the use of the Modigliani-Miller theorem in its strong form. Hoover (1988, p. 106) proves that the fourth assumption (on the firm's investment decisions) is invalid under certain circumstances. The method used in the proof is a "common-sense" one, showing that banks, in order to attract business, must choose a portfolio that will attract customers - thus rendering the fourth assumption of the Modigliani-Miller theorem invalid.

4.1.2.5 Concluding remarks on Fama's approach

Important as it is, Fama's analysis is not typical of work in monetary economics. Applying value theory principles - preference analysis - in monetary theory, Fama has posed the question of preferences of the agents in a rather crude form. He did not respect any specific individual's preferences. Nevertheless, it helped him to create a "shortcut" and made his model more tractable.

This model is a very interesting piece of analysis, especially concerning the integration of monetary and value theories. Fama contributed to the entire framework of banking and finance models (as described in subsection 4.1) - he formulated a theory of the banking industry, analyzed the instruments (currency, its role, and questions of uniqueness), as well as the implications of the structure of the banking industry on real economic issues (price level determinacy, etc.). Fama's work can be considered as a successful step towards the integration of monetary and value theories, reflecting the Hicksian challenge from the very specific point of view of banking and finance theory.

4.2 "NEW MICROFOUNDATIONS OF MONEY" MODELS

Models in this category focus on internal issues (in terms of the Hicksian balance sheet approach) and equilibrium issues in the linking of monetary and value theories.

The main branch of these models can be commonly characterized by their incorporation of the technical device - the cash-in-advance constraint, a device that was popularized by Robert

Clower (1967, and quite extensively discussed in Hoover, 1988, pp. 127-128). These models, including the finance constraint,[12] are usually discrete-time models where money is used for all transactions and money itself creates a constraint on consumption and production decisions. This property guarantees the use of money in exchange.

Looking back on banking and finance models, Fama's analysis, though persuasive in many of its arguments, has failed to explain one of the basic functions of money - money as a medium of exchange. Fama never explicitly explained this function; however, in many parts of his work it is implicitly assumed. His analysis could therefore end up losing the properties of money as a medium of exchange, and money could easily become worthless. Thus, the discussion would eventually get back to a world without money, the set-up discussed in the previous subsection.

Finance-constraint models pay attention to the function of money as a medium of exchange. They analyze the asset part of the Hicksian balance sheet, with particular emphasis on money, and with this set-up they examine the questions of equilibrium in the system.

In the following subsection, three representative models of this category will be discussed: Lucas' model (1980) of equilibrium in a pure currency economy, Townsend's group of models (1980), and the more recent contributions of Lucas and Stokey

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[12] The terms "finance constraint","cash-in-advance constraint", and "Clower constraint" are treated here as synonyms, and thus refer to the same property.

(1987) on money and interest in a cash-in-advance economy.

4.2.1 LUCAS AND EQUILIBRIUM ISSUES IN A PURE CURRENCY ECONOMY

A very advanced approach to the question of using the finance constraint was introduced by Lucas (1980). He studies the determination of equilibrium in a stationary economy where all exchange involves the trade of fiat money for goods. The use of money in exchange is guaranteed by the imposition of the Clower (or finance) constraint. This paper can be seen as a study of the transaction demand for money in a simple general equilibrium setting.

In spite of being close to Hicks' call for studying the factors influencing the demand for money, Lucas provides a methodologically different link between monetary and value theories. His definition of formal monetary equilibrium with constant money supply - the set-up that he created - is developed by means of the optimal value function[13] method. This brings him closer to the preference analysis and maximization approach of value theory. A connection with the Hicksian framework is more visible when looking at the aims of the analysis, rather than at the methods and approaches.

Known for his interesting stories that create the background of his models, Lucas sets up the stage again, with his

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[13] Optimal value function : $V(m) = MAX \{U(c) + \beta V(m')\}$ is interpreted as the value of the objective function $\Sigma\ \beta t\ U(ct)$; where $0 < \beta < 1$ and $U(ct)$ is the utility of consumption sequences for a consumer who begins the current period with nominal balances m and behaves optimally.

earner and shopper household. One person of the household spends each day shopping, while the other person works. Each day, the worker goes to work at the same store, while the shopper moves from store to store purchasing a mix dictated by current drawings of variable £, which indicates the weight of commodities to the consumption bundle (vector of commodities). Equilibrium dictates that the value of the worker's labour should equal the total expenditures of the shopper. The Clower, or cash-in-advance, constraint in the system means that a shopper cannot spend the money before the worker brings it home, so that the shopper is limited in purchase by the remaining balance from the previous day. The utility function in this system is formulated as the utility of the two individuals in a household. Budget constraints are formulated in a slightly different way (compared to the usual optimization models), incorporating money as a transaction medium into them. One of these constraints is thus the Clower constraint. Incorporating this constraint into the model brings more stability in terms of monetary equilibrium. As well, the constraint makes it impossible for money to become worthless (because it is required at all times for trade).

In his model, Lucas devotes a fair amount of attention to the discussion of the internal issues in the Hicksian balance sheet, especially to the theoretical issues of money. Upon evaluating money in the economic system, Lucas (1980, p.144) states the following:

> "... there is a clear sense in which money is a second rated asset. It serves a role and commands resources only insofar as it enables

> the economy to economize on some sort of record keeping or other transaction costs. At best, then, money is viewed as a means of approximating some idealized real resource allocation."

For Lucas, this theoretical second rateness of money seems a virtue of models in which its use is motivated by the Clower constraint.

Concerning the notion of equilibrium, Lucas discusses two main issues:

- institutional and economic factors;
- information factors determining equilibrium.

Institutional and economic factors reflect themselves mostly in the demand for money and depend on the set-up in the Lucas model.[14] However, information factors play a much more important role. Studying the economy under conditions of certainty, equilibrium in the Lucas model is always efficient. With individual uncertainty introduced, the question of efficiency becomes very complicated. Nevertheless, Lucas (1980, pp. 135-146) proved that accelerating inflationary equilibria are not possible in a framework with a finance constraint. Even if the trend towards those equilibria exists, the fact that the finance constraint is binding and the rational expectations of the agents will prevent this path from being feasible.

Lucas' paper thus formulates a model in which the role of money is endogenous and explicit. The immediate reason for

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[14] Institutional factors can be, for example, the length of the working day in the model, etc.

developing this type of a model stems from Lucas' argument that one cannot analyze the effects of policy changes when one does not explicitly formulate its variables. Thus it was clear that there must be an approach where the use of and the demand for money arises endogenously and explicitly from the postulated preferences of the agents, the information structure and the available technology of production and exchange.

Critics of Lucas' paper (i.e., Milton Harris, Leonid Hurwicz, Frank Hahn - all published in Kareken and Wallace, 1980) pointed out the shortcomings of the model from the point of view of policy analysis. First of all, money supply is fixed in the model, so the model is inapplicable for policy purposes when money supply changes over time. Secondly, the Lucas model excludes all financial assets except money. This is certainly a shortcoming, because money creates only a very small percentage of the assets currently involved in economic life. But giving credit to Lucas, he himself pointed that the paper is just a basis for further work in the field, and thus that important refinements are obviously to be expected.

Looking at the contributions of Lucas in terms of the Hicksian framework, Lucas offers the analysis of money and equilibrium issues. The former misses the analysis of other assets; however the latter offers the comprehensive study of the information factors influencing equilibrium.

4.2.2 TOWNSEND'S TRIANGLE OF MODELS

Townsend presents his contribution to the integration of

monetary and value theories in a form of three models[15] that examine money in a specific set-up of spatially separated agents (which resembles Lucas' island story from 1972, or later version from 1976, described, for example, in Sargent, 1979), using the principles of value theory. All three models have a common feature: they can be characterized as **communication models**, because the concept of valuable information plays the most important role in the set-up of each model. Looking at this triangle of models in the Hicksian framework, they analyze money and equilibrium issues in specific environments.

In each of the models, money is intrinsically useless (as it enters directly neither the utility function nor the production function), inconvertible (as no one stands ready to convert money into anything else). Moreover, money does not directly enter any of the models by way of legal restriction or by way of the Clower constraint. Money is explained through the following scheme: first, an environment is completely specified by agents of the models, their preferences and endowments, and by communication channels between them. Then it is established that there exists a monetary equilibrium. This creates the basis for the integration of value theory into monetary analysis.

In the <u>turnpike model of exchange</u>, each of a countably infinite number of agents is placed into one of the spatially

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[15] The three models discussed are:
1. A Turnpike Model of Exchange;
2. A Generalized Overlapping Generations Model;
3. The Lucas Version of the Cass-Yaari Model.

distinct markets in each period of his life. The exogenous allocation procedure is such that any two agents are paired at most once during their lifetimes, and they do not have any third person in their trading. The important assumption is that all agents are born at the same period. Agents face a sequence of endowments during their infinite lives. Each agent is supposed to travel on a turnpike, in one of the possible two directions, and participates in each market on the way. In an economy with these characteristics, any equilibrium with non-binding non-negativity constraints on money balances on each agent in each period supports an optimal allocation but requires some intervention.[16] The monetary equilibrium is considered as a sequence of finite positive prices and sequences of consumptions and money balances for each agent, such that he gets the maximum attainable utility.

In a generalized overlapping generation model (for further reference see, for example, Wallace, 1980, pp. 49-82), important difference from the previous model is that agents are paired at different ages. This age structure appears to be crucial in determining the preferences, and equilibrium as well.

The Lucas version of the Cass-Yaari model focuses on a similar set of agents and preferences as the turnpike model, but with one substantial difference: money here plays a role in achieving intratemporal efficiency as well. The result is that the optimal allocation of consumption sequences cannot be supported in a non-interventionist monetary equilibrium.

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[16] For a proof and more detailed discussion, see Townsend (1980), pp. 272-274.

The initial point in the discussion of equilibrium in these models was that money cannot be explained in a standard general equilibrium model (for example, in Walrasian equilibrium, money cannot facilitate exchange since the non-monetary equilibria are Pareto efficient). Thus, money is put into models through the operation of markets. Then looking for an equilibrium, in two of the models (the turnpike model of exchange and Lucas' version of the Cass-Yaari model) there exists a competitive monetary equilibrium with valued money. So it is claimed that these models "explain" money. Unlike the overlapping generations model, however, the monetary equilibria in these models with spatially separated agents are non-optimal and are associated with binding non-negativity constraints on the holding of money balances.

The main contributions of Townsend's characterizations of the triangle of models into the integration of monetary and value theories were the following:

- a different approach to money. Townsend acknowledges the results of Hahn's analysis (1965) that money cannot be explained fully in a standard equilibrium model. Thus he examines money in a special type of communication models and tries to find its characteristics in these specific set-ups;
- the evaluation of the feasible equilibrium possibilities in a special economic environment.

4.2.3 MORE RECENT CONTRIBUTIONS

Further work using the Clower constraint has been done by

Lucas and Stokey, and was presented in their 1987 paper "Money and Interest in a Cash-in-advance Economy."

In this model, the use of money is motivated by the Clower, or cash-in-advance, constraint applied to purchases of a subset of consumption goods.[17] The model assumes the existence of both real and monetary shocks, which are economy-wide. The purpose of the model is to develop methods for verifying the existence of, characterizing, and explicitly calculating equilibria in such a system. It explicitly includes the preferences of the individual into the system and shows how further restrictions on consumer preferences yield additional information about the multiplicity of equilibria and algorithms for identifying them.

The model starts with an analysis of a representative agent (consumer). Solving the model for an equilibrium, Lucas and Stokey claim that it is equivalent to finding a solution to a special functional equation, developed on the basis of the agents' preferences. Being mathematically rigorous, they go on proving the existence of equilibrium[18] (even though only under special assumptions on preferences and the requirement of additional restrictions on the distribution of the shocks).

In previous work, Lucas concentrated primarily on the analysis of money. Currency was considered to be the only security held by the consumer, and all trade involved either goods for

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[17] There is differentiation between "cash goods", which are subject to a Clower (cash-in-advance) constraint and "credit goods", which are not.

[18] The proof of the existence of equilibrium uses the Schauder fixed point theorem.

currency or goods for promises to pay currency one period later. In order to operate in a more general economic environment, securities trading is incorporated into this model. At first, the focus is on the situation where one asset is traded. Explicit calculation of the equilibrium reveals that the addition of securities does not alter its characteristics.

Including securities into the model permits to consider the consequences of adding short-term interest rates to the list of variables in the model. This fact considerably extends the equilibrium analysis.

This model contributes to the linkage of monetary and value theories particularly in equilibrium issues. Lucas and Stokey generated a very precise set-up, based on preference theory, and proved the existence and showed the characteristics of equilibrium in such a system.

Lucas and Stokey's model is set up differently from the other models in the "new microfoundations of money" category. It includes individuals with rational expectations, gives them infinite lives, and maximizes their utility over an infinite time horizon. In addition, the financial constraint was used to assure the use of money in the system. This brings very good analytical insight into the linkage of monetary and value theories.

4.3 CONCLUSIONS

The contributions of new classical economics to the linking of monetary and value theories can be summarized in the

following table, which includes only the new classical authors with the most important contributions to the linking of monetary and value theories. The relevance of the contributions of the other authors mentioned in this section is thus rather marginal to the linking of the two theories.

TABLE II

The contributions of new classical economics to the linking of monetary and value theories

ISSUE/ AUTHOR	BLACK	FAMA	LUCAS, LUCAS & STOKEY	TOWNSEND
Internal issues		♦discussion of money as a unit of account	♦ Clower constraint & the asset part of the balance sheet	
External issues				
Equilibrium issues		♦ separation theorem	♦ institu - tional, information and economic factors influencing equilibrium ♦ equilibrium in general set-up (with securities)	♦ impossibility of the explanation of money in standard economic set-up ♦ existence of equilibrium
Theory of banks and other financial inter - mediaries	♦ first real step into the world without money	♦ comprehensive theory of banking industry ♦ discussion of the world without money		

Black and Fama worked on banking and finance theories and tried to apply value theory tools to them. Analytically, Fama went

further in applying the principles of value theory to the banking industry. The part of his work that has important policy implications is his detailed analysis of regulated and unregulated banking industry, where Fama takes the fruits of his predecessors and summarizes the topic.

The "new microfoundations of money" school of new classical economics has concentrated on the explanation of money as a medium of exchange, and on an equilibrium issues, which follow from specifically defined environments. Most of these models used the Clower constraint, a device used to ensure that money is used in exchange. Mathematically very elegant, and logically very tight models were presented by Lucas. He focused mostly on equilibrium issues in the economic system, and started a whole new line of models based on the theory of information. Concerning the linkage of monetary and value theories, he can be considered a follower of Hicks, spicing his framework with precise analytical tools. Townsend continued in this line, focusing on three models based on communication - or information theory. This can be considered as rather specific modelling of economic environment, nevertheless, it brings good results in equilibrium analysis.

5. WORKING HYPOTHESIS - TRUE OR FALSE?

The paper brings a historical perspective to the integration of monetary and value theories. The analysis starts at the point where the issue started to be relevant (i.e., with the works of John Hicks) and leads through the contribution of the 1950s and 1960s, to the contributions of the new classical economics.

The criterion for viewing the actual contributions was the framework developed by Hicks. Looking through this "window", there could have been some missed points that Hicks did not include in his set-up. Nevertheless, Hicks' framework proved to be the only well defined criterion, in light of which the contributions could be evaluated.

The 1950s and 1960s brought an amount of controversial contributions both to the theory of money and to value theory. This paper traces back the authors who tried to find the bridge between the two. Patinkin gives the first contribution to the Hicksian framework, and his work created the basis for critical contributions by Hahn, Gurley and Shaw, Pesek and Saving. They accepted the Hicksian framework, filled it with the conclusions of Patinkin, and approached it in a critical manner. Thus the theory of money and other assets, the "friction theory" (the theory of factors influencing money), and equilibrium theory blended.

On these bases, new classical economics started to develop. It was one of the goals of new classical economics to put the results of value theory analysis into the context of monetary theory, and there were several approaches to the task. This paper

focuses on the two approaches that were considered as the most relevant and influential. Banking and finance models brought about a new look on the banking industry and its instruments - money and other assets. "New microfoundations of money" models focused on the different views on money and examined equilibrium issues under various assumptions about money.

The working hypothesis of the paper was, as stated in section 1, to prove that by various ways of linking monetary and value theories one can come closer to the solution of problems of economic theory otherwise unexplained or explained inconsistently with the present level of knowledge.

The analysis has shown that the linkage of the two theories explains the following issues:

- equilibrium in the economy, its existence, characteristics, and factors leading the system towards it;
- explanation of characteristics of money and other assets, and their role in the economy.

Thus the working hypothesis is confirmed and the Hicksian challenge shows its validity. The linking of monetary and value theories brought the issues, once divided from each other by the barriers of incompatibility, together to move economic research ahead.

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