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THE MICROECONOMICS OF MONEY AND FINANCE: A SURVEY

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1. THE MICROFOUNDATIONS OF A MONEY ECONOMY

IN THE FIRST SECTION OF THIS PAPER we discuss the main features of the Walrasian analysis, contributions that less successfully tried to address the deficiencies inherent in the general equilibrium approach, and search theory which, unlike the Walrasian analysis, focuses on bilateral exchange.

(a) The Walrasian Tradition

One of the most fundamental problems in monetary theory is to discover the microfoundations for the use of money. That means we have to discover the reasons for using money and to determine the fundamental differences between a money using economy and a barter economy. Introductory textbooks offer a simple answer to these questions, viz. money is useful because it reduces the transaction costs of trade. Money enables economic agents to separate the exchange of goods and services into two activities, viz. a purchase and a sale. It is therefore much easier to conclude a trading

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transaction, because it is no longer confined to one and the same person as in a barter economy. In a money economy it is possible to abandon W.St. Jevons's 'double coincidence' (Jevons, 1876 pp. 3-5). This story can already be found in the *Wealth of Nations* (Book I Ch. IV, Smith, 1964 [1776] pp. 19 ff.), yet in the abstract world of economic theory it appears to be extremely difficult to incorporate these fundamental principles within a coherent framework. Mathematical general equilibrium models in particular have proven to leave little place for these ideas. Still, it is surprising to see how many of the greatest names in economics were content to contrast a money economy with a frictionless barter economy, where transaction costs play no role, instead of confronting the use of money with costly barter trade. This may well be a legacy of Walras, who in his *Éléments* introduced a demand for money by simply postulating that payments for goods and services must be made in money at fixed dates (Walras, 1965 par. 273, p. 316). The buying and selling of goods is concluded through the intermediation of the Walrasian auctioneer and money enters the scene only after the agreements to buy and to sell have been made. The relationship between the monetary sector and the goods and services sectors is very tenuous indeed, especially so in the case of fiduciary money, as Walras himself readily conceded: "the equation of monetary circulation, when money is not a commodity, comes very close, in reality, to falling outside the system of equations of [general] equilibrium" (Walras, 1965 par. 278, p. 327[1]).

In the late 1930s the Walrasian tradition received new impetus through the publication of Hicks's *Value and Capital* (Hicks, 1965). Again, money is introduced after the exchange of goods has been analysed and, again, money is needed to settle purchases and sales that have been agreed upon before, without the intervention of money. This means that the process of buying and selling of goods and services, the transaction technology, is not affected by the use of money. The use of money does not translate into higher efficiency.

[1] Words between square brackets added by translator. See also Patinkin 1965 Note C.

The money dimension in *Value and Capital* is directly related to Hicks's article 'A Suggestion for Simplifying the Theory of Money' (Hicks, 1967 [1935]), which aimed at an integration of monetary and value theory. In this exposition the demand for money is analysed as a demand for an asset within a portfolio theory approach. This article not only foreshadowed the inventory theoretic approach as formalised in the 1950s by Baumol (1952) and Tobin (1956), but also Tobin's discussion of the relationship between money demand and risk in his article 'Liquidity Preference as Behavior towards Risk' (Tobin, 1958). These were important theoretical developments. Still, they were not successful in analysing the specific functions of money in an economy. The frictions in an economy which Hicks (1967 [1935]) identified as the reasons for using money are no more than the costs of exchanging one asset in an agent's portfolio for another. The fact that there are information costs associated with the exchange of goods and services was neglected. The effect of money on the transaction technology thus escaped the attention.

The Walrasian tradition culminated in Patinkin's exposition in *Money, Interest, and Prices* (Patinkin, 1965). Patinkin too made a comparison between a monetary economy and a frictionless barter economy, but he ran into insurmountable difficulties. The discussion regarding the neo-classical dichotomy clearly demonstrated that in a general equilibrium model the price level can only be determined if the excess demand functions for goods contain money as an argument (Becker and Baumol, 1962 [1952]; Patinkin, 1965 pp. 75, 175). Obviously the excess demand functions of a model describing a barter economy do not include money as a separate variable and consequently Patinkin's valiant attempt to "conceive of a barter economy as the limiting position of a money economy whose nominal quantity of money is made smaller and smaller" (Patinkin, 1965 p. 75) was doomed to failure. The only result of a falling money supply in Patinkin's model is a falling price level. The real money supply remains unchanged. Apart from the modelling problem that a system where money figures as an argument in the excess-demand

functions cannot be reduced to a system representing a barter economy, the approach suffers from the fundamental flaw that, if barter is frictionless, no rationale can be found for using money as a means of payment.

(b) Overlapping Generations Models

It would appear that Walrasian general-equilibrium models and their multi-period Arrow-Debreu extensions have failed in providing a useful framework for studying the microfoundations of money. Economists in the Federal Reserve Bank of Minneapolis have tried to remedy this defect with the help of overlapping generations models (Kareken and Wallace, 1980). In these models the young generation produces goods and services and sells part of these to the older, retired generation in exchange for money. When the young generation reaches retirement age, they in their turn use the money earned during their working life to buy goods from the new young generation. However, within the framework of these models economic agents will be willing to hold (fiduciary) money only if other assets do not offer a better yield. There is no reason why other financial assets, such as title deeds or shares, would not be preferred. Moreover, overlapping generations models are only concerned with transactions between generations. Transactions between members of the same generation are excluded from the analysis. These transactions are presumably concluded without frictions through the intervention of the Walrasian auctioneer. The role of money in this framework is not very interesting because it has been degenerated to that of a voucher, representing a claim on a particular set of goods (see for a fuller discussion Visser, 1991 pp. 67-8). It is a sad testimony to the stranglehold in which high theory is still held by the Walrasian auctioneer that even the leading macroeconomics textbook by Blanchard and Fischer (1989 Ch. 4) fails to note this.

(c) Cash-in-Advance Models and Related Solutions

Walras and Hicks introduced money into the analysis by the mere requirement that goods and services be paid for by money. A post-war variation on this theme was the cash-in-advance constraint, also known as the 'Clower constraint' (Clower, 1969). Clower maintained that "money buys goods and goods buy money; but goods do not buy goods" (Clower, 1969 pp. 207-8). In this exposition economic agents should be in the possession of cash balances prior to the actual exchange of goods and services. Although the stringent condition of requiring economic agents to possess cash at the beginning of the period to pay for all purchases during that particular period could be relaxed through trade credit (Lucas, 1987 Ch. 6), it is important to emphasise that in these models money has become a constraint. It thus is an *impediment* to the process of exchanging goods and services rather than a means to improve the transaction technology. As in the expositions by Walras and Hicks these models do not take cognisance of any friction associated with the process of exchange, because all transactions are effectively co-ordinated by the Walrasian auctioneer. There have been attempts to incorporate frictions into cash-in-advance models. For instance, Diamond and Yellin (1990) have developed a cash-in-advance model with search costs. In this model the outcome is that, as the speed of the search process approaches infinity, the equilibrium values of the real variables converge on a Walrasian solution. The end result is not much different from the typical frictionless Walrasian environment and the model exhibits the same flaw as Walras's approach in that the cash-in-advance constraint is imposed on the model and does not follow from the logic of the model.

An alternative procedure has been followed by Patinkin and Levhari (1972 [1968]) and Blanchard and Fischer (1989, pp. 188-93) viz. to introduce real money balances as a variable into agents' utility functions. This can hardly be seen as an advancement on the cash-in-advance approach because it is assumed that the transaction

technology remains unchanged, it was already perfect to start with. Thus, it remains nebulous what utility there can be in holding money. It could be argued that, as another alternative, the inclusion of real balances in a macroeconomic production function could serve as a useful 'short cut' approach in introducing money into the analysis (see Patinkin and Levhari 1972 [1968]). At least this would imply that money does affect the transaction technology. Still, this approach is unsatisfactory since such a macroeconomic production function depicts a one-good economy which essentially abstracts from the problems associated with the exchange of goods and services. The true role of money escapes the analysis.

(d) Beyond the Walrasian Tradition: Bilateral Exchange

We can only discover the microfoundations of money by abandoning the Walrasian analytical framework with its emphasis on multilateral barter trade (Ostroy 1989). Unlike the sophisticated models discussed above, money and banking textbooks have always emphasised the importance of money in exchange in the sense that it reduces transaction costs in a world where economic agents spend time and resources to find a trading partner. Trade is primarily a bilateral as opposed to a multilateral activity (Hellwig, 1993 p. 232; Stiglitz, 1993). The transaction costs in such a non-Walrasian world are mainly costs incurred in obtaining and processing information, which can no longer be done at zero cost. These costs are related to the efforts spent on discovering a trading partner, the costs related to the inspection of goods and services, quality descriptions and documental evidence regarding the compliance with minimum standards, as well as the costs of keeping accounts (Niehans, 1969 p. 709). Apart from these information costs, transaction costs include the costs of transport.

Non-centralised bilateral exchange could be formalised by assuming that certain economic agents are in possession of a good i which they would like to exchange for a good j. We assume that p_i is

the probability that a randomly encountered agent desires good i. p_j denotes the probability that a randomly encountered agent would supply good j. The probability of a double coincidence of wants is then $p_i p_j$. The expected number of encounters needed to exchange good i for good j is $1/p_i p_j$. Good i may, however, also be exchanged for good j in a two-stage indirect trading procedure consisting of trading i for a good n and subsequently trading n for j. The probability of encountering an agent who demands i and supplies n is $p_i p_n$ and the probability of meeting someone supplying j while willing to accept n is $p_n p_j$. The expected number of encounters to exchange good i for good j through such a process of indirect trading is $1/p_i p_n + 1/p_n p_j$ (note that the model assumes sampling with replacement). If the costs of information could be expressed as a linear homogeneous function of the number of encounters, it follows that indirect exchange becomes a preferable procedure if $1/p_i p_n + 1/p_n p_j < 1/p_i p_j$ or, (after multiplying both sides of the inequality by $p_i p_j p_n$), $p_i + p_j < p_n$.

In this search model, developed by Jones (1976) and extended by Oh (1989), direct and indirect exchange may occur side by side. This is so because the above condition may be satisfied for certain combinations of goods as well as certain groups of economic agents but not for others. Prices do not feature in the models developed by Jones and Oh, but Hellwig (1993, pp. 232-4), Kiyotaki and Wright (1993) as well as Trejos and Wright (1993) developed search-theoretic models where the price level was introduced as an endogenous variable even if relative prices were exogenous. Unlike the Jones-Oh approach, however, these models leave no place for the learning behaviour that is essential in any explanation of the phenomenon of a generally accepted means of payment (cf Gravelle, 1996).

The importance of this learning behaviour becomes apparent when we ask which goods are likely to act as intermediary goods such as n above. Brunner and Meltzer (1971) have specified the costs of information in the exchange process as the costs of identifying the characteristics of a product. If, in the course of time, it so happens that certain intermediate products and certain transaction chains are

repeatedly used, the marginal cost of gaining information declines for the intermediary goods involved as information obtained in the past can be used again. In terms of the Jones model, this would imply that the information costs are no longer only a function of the expected number of encounters in the search for an appropriate trading partner. The costs will differ from product to product. In this sense it becomes evident that certain goods could be used repeatedly and in this process they become associated with low marginal information costs. These goods are likely to be used increasingly as intermediary goods and p_n will be rising at an increasing rate. The intermediary good becomes a generally accepted medium of exchange (for an extension of the Brunner and Meltzer approach see King and Plosser, 1986). Low marginal information cost is tantamount to a high degree of trust (especially the trust that the good will remain acceptable in payment to others). One could even envisage a situation where an intrinsically worthless product could command a high degree of trust and therefore becomes a widely accepted medium of exchange. If such products are generally accepted as a means of payment and account they could be considered as (fiduciary) money. A transition from commodity money to fiduciary money, i.e. intrinsically worthless pieces of paper, cannot, however, occur spontaneously. It requires the backing of government and its encouragement to use such claims by supporting them through credible promises and behaviour patterns which restrict the use of the printing press and limit seigniorage (Ritter 1995). Fiduciary money created by a commercial bank is different because it is backed by the banks' assets. Furthermore, its production is subject to increasing marginal cost and decreasing marginal revenue (Put differently, if a bank's lending activities increase faster than the average for all banks, it has to spend more in making its deposits attractive and prevent net outflows to other banks. Moreover, the risk-return profile of its assets is likely to deteriorate).

We here see another limitation of the Walras-Arrow-Debreu general-equilibrium approach in monetary theory. Economic agents

will only accept a particular means of payment or medium of exchange that is not at the same time a consumption good or production good if they are confident that it can be used over and over again in making payments. Within the framework of timeless Walrasian models or multi-period Arrow-Debreu type models where all decisions are made at the beginning of the time specified by the model, nobody would be prepared to end up with intrinsically worthless pieces of paper money at the end of the trading process. This implies that within the framework of a one-period model or an Arrow-Debreu type model, money holdings of economic agents must be zero at the end of the decision making process, i.e. at the end of the period specified in the model. In this instance fiduciary money can only take the form of credit money and all credits are to be honoured at the end of the period (Ostroy, 1973). Provided that money could be usefully analysed within the compass of a general-equilibrium model, only models with sequential decision making could accommodate fiduciary money in any meaningful sense (cf. Ostroy and Starr, 1990 pp. 13-5).

A universally accepted medium of exchange enables economic agents to buy goods and services without selling exactly the same amount (in terms of the unit of account) during the same period. This would also be possible through buying on credit. The question arises why the exchange process cannot be fully financed through credit, i.e. by promises to pay at a later date. The answer is, of course, that there is no reason for economic agents to trust such promises without any reservation. Buying on credit in a world without money would imply that, during the present period, goods and services are exchanged against an undertaking (a promise) to supply certain goods and services at a later date. Agents accepting these undertakings face two types of risk. Firstly, the undertaking may not materialise because of illness or death. Economic agents could of course insure themselves against such events, but it stands to reason that these insurance policies add to the costs of trading. The second type of risk, for which insurance would be hard to find, could be described as a moral hazard

risk. People are not always as good as their word and even if the supply of goods and services as stipulated in the loan contract does materialise, one can never be sure that they will comply with the quality implied in the undertaking (Hahn, 1988 p. 971). Economic agents are therefore likely to prefer a universally accepted means of payment to an undertaking (or debt instrument) by another economic agent to comply with certain conditions of an exchange transaction in the future. Put differently, economic agents are likely to prefer money rather than debt instruments. It is evident that the information costs that are typical of a money economy are directly related to the risks described above, i.e. to the fact that people cannot unconditionally trust their fellow human beings (see Gale, 1982 pp. 186, 197, 235, 245; Illing, 1985; Visser, 1991 Ch. 4). In this regard it is interesting to note that in some countries networks of Local Exchange and Trade Systems (LETS) exist where participants exchange goods and services against promises of future delivery. In these systems social pressure is an important element in securing performance regarding commitments following from those promises. LETS networks are bound to remain small in order to preserve this type of control which is based on the fact that the participants know each other well.

2. THE MICROECONOMICS OF FINANCIAL INSTITUTIONS AND MARKETS

This section first discusses the shortcomings of general equilibrium models in the field of finance and then recent developments in finance theory, based on the idea of asymmetric information. Special attention will be paid to the role of financial institutions, transformation of financial instruments and business finance and corporate governance.

(a) Imperfect Information, Moral Hazard, Agency Problems and Financial Institutions

Walrasian general-equilibrium models may not only contain money but also other financial assets, particularly debt instruments. Debt could even figure in the absence of money. In multi-period models debt instruments are important in the sense that expenditures and receipts need no longer be synchronised. Introductory textbooks emphasise that this lack of synchronisation could encourage investment. As with the role of money in improving the transaction technology, we see that on the higher level of abstraction of general equilibrium models this basic insight is neglected. Pesendorfer (1995), for instance, took cognisance of financial innovations in a general equilibrium model without linking them to the real sector. Apparently these models suffer from too many technical difficulties successfully to address an active interaction between the monetary and real sectors within a microeconomic framework. This explains why, as Morishima (1991) notes, bankers are virtually absent from general equilibrium models (as are entrepreneurs). Even in recent general equilibrium macroeconomic models which do contain a financial sector, there is no evidence of independent effects from the financial sector on the real sector. In his own dynamic general equilibrium analysis Morishima by contrast accommodates a Schumpeterian investment theory, with entrepreneurs only in a position to innovate if they can secure financing from outside. In his exposition, banks and financial markets are important in the development of the economy. What his model gains in terms of relevance, though, it loses in terms of elegance: it can no longer be described by a compact, consistent set of equations (Morishima, 1991 Ch. 6).

At an earlier stage, Gurley and Shaw (1960) introduced a complex financial structure, comprising money and bonds as well as forms of indirect finance (see also Chevallier-Farat, 1992 p. 635). Despite these innovations, Gurley and Shaw remained true to the typical neoclassical general equilibrium analysis with fully flexible prices and

clearing markets (Gurley and Shaw, 1960 p. 5). Again, the financial system does not affect the transaction technology. The existence of financial intermediaries is explained by their ability to facilitate risk and by economies of scale. Unfortunately the economies of scale are still independent of the costs of information. The analysis still lacked a meaningful microeconomic foundation. The latter became possible following Akerlof's 'lemon' paper in 1970 (Akerlof 1984 [1970]). He demonstrated that imperfect and asymmetric information in the market for second-hand cars could lead to a situation where only lemons were traded. Asymmetric information results in moral hazard problems, i.e. a market participant with particular information not available to others could act to the detriment of others. These market participants are therefore confronted with the necessity of discovering additional information. This contribution has sparked off extensive research into financial markets and institutions in terms of assumptions which take the analysis beyond the restrictive framework of general equilibrium analysis. Another influential contribution in this direction was made by Stiglitz and Weiss (1981). Their analysis demonstrated convincingly that the presence of imperfect information fundamentally undermines the neoclassical notion of continuous market clearing (for a survey including both financial and non-financial markets see Stiglitz, 1987 as well as Stiglitz, 1993).

Financial institutions in their function of intermediaries between lenders and borrowers, or rather suppliers of funds and demanders of funds, could reduce information costs in a similar way as money. Every credit transaction is divided into two elements and consequently there is, again, no need for a double coincidence. Financial intermediaries are responsible for a transformation of term, risk and size of debt instruments. The recent literature has been developing a microeconomic explanation of these phenomena by assuming imperfect and asymmetric information. Within this framework the existence of financial intermediaries is explained as follows. The ultimate lender or surplus unit has no guarantee that the ultimate borrower or deficit unit will act in his, the surplus unit's,

interest. This is a moral hazard problem. One could also look upon the supplier of funds as a principal and the end user as an agent, so that the moral hazard problem translates into an agency problem. The challenge here is that the principal has to ensure that the agent acts in his interest or that the agent, while pursuing his own interests, does not act in a way that could be detrimental to the principal. Moral hazard and agency problems are costly to resolve. Firstly, we distinguish the screening costs, i.e. the costs associated with identifying a suitable project while preventing adverse selection. Secondly, we distinguish the monitoring costs, which are incurred to find out whether the parties comply with the conditions stipulated in the contract. Finally, there may be the costs of disciplining or enforcement, which are incurred in order to make the deficit unit mend its ways if the surplus unit's interests are injured. Financial intermediaries play an important role by taking responsibility for screening, monitoring and disciplining, thanks to their ability to save on information costs.

(b) Information Costs and Financial Institutions

An important question to address is how financial institutions could contribute towards reducing information costs. In addressing this issue we first elaborate on the role of brokers, i.e. market participants who do not transform financial assets. The collection and processing of information by such brokers could be subject to economies of scale because the same information could be used more than once (Bhattacharya and Thakor, 1993 pp. 7-8). Information with regard to a particular economic agent or event at time t often is not yet fully obsolete at time $t + 1$ and could be updated at little cost. Similarly, information regarding agent A could be relevant in assessing the position of B, e.g. in the case of assessing the financial position of firms in the same industry. Furthermore, we could distinguish dynamic economies of scale (learning by doing) in the sense that financial institutions gain experience and efficiency in the collection

and processing of information through time. Smaller investors are therefore likely to gain by not collecting and processing the information themselves but relying on the expertise of financial institutions instead (Leland and Pyle, 1977 p. 383). This will be beneficial to society at large because the collection and processing of information by individual investors (lenders) would result in substantial duplication of effort and an accumulation of costs which could inhibit certain investments (Diamond, 1984 p. 393). Thanks to the screening performed by financial institutions, a greater number of potentially profitable investment projects will be realised, at a higher average rate of return (Chan, 1983).

Investment funds and money market funds provide more services than brokers. They do not only reduce information costs but offer their clients opportunities for risk spreading as well (Diamond, 1984). These services are of particular importance to the small investor, who may, because of indivisibilities and transaction fees, face considerable difficulties in building up a diversified portfolio.

Investment and money market funds invest primarily in financial assets which are quoted on a stock exchange. Borrowers are, however, not always in the position of offering marketable securities in exchange for cash. Small firms usually find it difficult to comply with the stringent requirements of stock exchanges. In addition, even if they issue marketable financial instruments, these may be unattractive to investors, including investment funds, because the market for such instruments is likely to be thin and consequently price risk is high. There may even be no continuous price quotations. It could be maintained that banks have a particular comparative advantage in financing such small borrowers, thanks to their expertise in screening and monitoring borrowers and the scale of their activities (cf. Goodhart, 1995 [1987]). This comparative advantage explains, in a model developed by Greenbaum and Thakor (1987), why high-quality bank loans are securitised and sold to investors and lower-quality loans remain in the banks' loan portfolio (cf. Boot and Van Goor 1994). Another unique service provided by banks is that they are in a

position to provide overdraft facilities which reduce uncertainty regarding financing in the immediate future (Boot, Thakor and Udell, 1991).

(c) Transformation of Financial Instruments

Many financial intermediaries offer financial instruments to lenders in financial markets that are different from the instruments that they buy from borrowers. Surplus units often prefer instruments which carry a fixed nominal value coupled with a fixed nominal return to a share in the asset portfolio of a financial intermediary such as an investment fund. These units prefer a more liquid position, i.e. they would like to be able to sell their financial assets at any time without running a serious risk of large losses. In this instance, the risk of fluctuating asset prices is carried by the financial institution (Allen and Gale, 1995 pp. 189-91).

The analysis of the lending activity of financial intermediaries can be usefully based on the premise of asymmetric information regarding borrowers and their projects. It is often in the interest of borrowers not to share their information fully with the lenders. Investments with low monitoring costs coupled with easily calculable returns are attractive to investment funds. These are typical examples of financial instruments which are traded on stock exchanges and enjoy continuous price quotations. In Goodhart's view, this emphasises the crucial characteristic separating non-bank financial institutions from banks (Goodhart 1995 [1987]). Banks are not unique in combining portfolio management services with payment facilities. The latter can also be provided by other institutions such as credit card companies. What sets banks apart in the eyes of Goodhart is that they hold largely non-marketable assets.

Because of the fact that borrowers are not always prepared to share their information fully with the intermediary, the latter is likely to settle for a fixed nominal return instead of a share of the yield of the project which is financed by the intermediary. In such a profit-

sharing arrangement the intermediary would incur high costs in order to find out the exact return on the projects financed. In addition the parties should see eye to eye on the accounting methods applied. All this would be very costly and troublesome (which, by the way, appears to be the fundamental problem facing Islamic banking, cf. Tourani Rad, 1989 p. 304). With a fixed nominal return, the remaining moral hazard can be minimised by requiring the borrower to finance a project partly from own funds. This means that the Modigliani-Miller neutrality of the financial structure of firms does not hold, even if one abstracts from the influence of taxes (Leland and Pyle, 1977 pp. 371-2; Chevallier-Farat, 1992 p. 650).

(d) The Financing of Business Firms and Corporate Governance

Information costs could explain why particular borrowers have to rely on a particular form of finance or a specific financial institution. Chan, Siegel and Thakor (1990) have, for instance, demonstrated the importance of venture capital financing in the case of entrepreneurs without established managerial skills. Venture capital firms provide close monitoring (see for an empirical study Lerner 1995). Other demanders of funds, whose managerial skills are less in doubt but who have not yet been able to build up a well-established financial reputation, will have to turn to banks for external finance. Such borrowers require careful screening as well as monitoring. Larger firms with an established managerial expertise and a consistently successful financial performance could borrow via the capital market. Diamond (1991) reported similar results. His model predicts that borrowers would start off by approaching banks for financial assistance. The support and financial discipline following from bank monitoring could lead to a more reputable financial position that could enable the firm to sell commercial paper. Lenders are inclined to apply less monitoring in the case of borrowers with an established financial reputation. The potential loss of profit by not adhering to their commitments and then losing their reputation is relatively large

for such borrowers. For one thing, their borrowing cost would increase rapidly, if indeed they would be able to find funds at all. The danger of moral hazard is thus reduced. A firm's equity can be made more attractive for investors if investment banks underwrite share issues. Investment banks would damage their reputation if they did not seriously screen issuing firms (Chemmanur and Fulghieri 1994).

Firms are not only confronted with a choice between different providers of finance but also between different forms of finance, such as debt instruments and equity issues. Boot and Thakor (1993) demonstrated that, in certain circumstances, it could be advantageous to opt for both forms of financing at the same time. Debt instruments could, for instance, be sold to investors with limited information (and consequently a preference for a fixed nominal return) while equity could be placed with well-informed investors.

Deficit units or demanders of funds are constrained in their choice of financiers and financial instruments because of asymmetric information, or more generally agency problems, which make some surplus units unwilling to buy financial instruments from some deficit units. Surplus units understandably want to make sure that the money they provide is used in their best interest. One interesting question is how indirect external finance, through financial intermediaries, compares with direct external finance in this respect or, what system of corporate governance is best. It is for example argued by some that developed capital markets provide for constant monitoring of listed companies. This monitoring implies that firms showing a poor performance are threatened by actions to replace the current management, including hostile take-overs. Managers are constantly under pressure to produce good results. A highly efficient use is thus made of capital resources and management skills (Feldman and Kumar, 1994 p. 14). In this way the problem of moral hazard associated with asymmetric information between investors and management could be addressed effectively. On the other hand, it appears that monitoring activity by small investors is limited because of the time and resources involved. Large investors are needed for

effective monitoring and disciplining (Jensen, 1993 p. 867; Shleifer and Vishny, 1997 p. 755). The empirical evidence is somewhat conflicting. Denis and Denis (1995) report that in the United States in 1985-1988 extended periods of poor operating performance led to the forced resignation of top managers. Large improvements of performance usually followed. On the other hand, Franks and Mayer (1996) could find little evidence of managerial failure before hostile take-overs followed by resignation of board members in the United Kingdom in 1985 and 1986. They conclude that hostile take-overs did not perform a disciplining function. Others note that disciplining through spectacular hostile take-overs and leveraged buy-outs as in the 1980s tends to be replaced in the 1990s by more diplomatic action on the part of large shareholders, particularly institutional investors (Miller, 1994 p. 38; Moerland, 1997 p. 83). This may be as well for other stakeholders in a firm, in particular employees and suppliers, as new owners and managers after a takeover may feel free to break implicit contracts and transfer wealth from those stakeholders to themselves (Levine, 1997 p. 698). Where there are no large shareholders, and monitoring by shareholders is thus weaker, boards are not quick in taking action against managers after poor performance (Shleifer and Vishny, 1997 pp. 751, 755).

It has been argued that banks with extensive financial exposure to a particular firm, possibly represented in its Board of Directors, will take monitoring much more seriously than the stock market (Benston, 1994, p. 129). Thakor (1993, p. 115) maintained that other shareholders consider a close involvement of banks with other firms, to the extent that they do not only provide credit but are shareholders as well, as beneficiary. Such so-called universal banks have positive externalities because they monitor firms to the benefit of other shareholders. This well-known German-Japanese model requires large banks that are able to spread their risks even with sizeable individual investments or credits. One wonders, however, whether there is really such a difference between the involvement of banks and the involvement of large shareholders such as the institutional investors

just mentioned.

In this area many questions still require further exploration. For instance, it has been argued that the German-Japanese system has the advantage that banks develop a long-term commitment and relationship with companies. They will therefore be inclined to assist the reorganisation of a company in the event of difficulties or failure. Anglo-Saxon banks by contrast, who do their monitoring more from a distance and tend to have a more short-term relationship, can be expected to prefer the liquidation of troubled firms or a take-over by another firm (Mayer, 1988; Hellwig, 1991 p. 52; Allen, 1993; Deloof, 1995 p. 304). There are also arguments in favour of the Anglo-Saxon system. The privileged position of German-Japanese style universal banks with regard to access to information on a company could inhibit the levelling of the playing field between suppliers of funds. Moreover, the particular shareholding of a bank may contradict the interests of depositors. Furthermore, insider trading could become an important problem in this instance (Goodhart, 1995 [1993]; Benston, 1994; Steinherr and Huveneers, 1994; Moerland, 1995 p. 250). These problems become more complicated when the banks are part of a bigger conglomerate. In that case banks could be required to serve the interest of the non-financial firms in the conglomerate as opposed to their own. Small, outside shareholders are in this way robbed by the main shareholder, as are taxpayers if such banks fail and the central bank has to come to the rescue. This was evident in Chile around 1980 and we have seen instances in the recent past in Indonesia as well (Le-Fort, 1994; Wardhana, 1995).

3. CONCLUSION

In the Introduction to the *General Theory* Keynes wrote that the writing of his book amounted to "a long struggle of escape (...) from habitual modes of thought and expression" (Keynes, 1961 p. viii). Apparently such a struggle is still prevalent in the field of the microeconomic foundations of a money economy. For decades many

authors have attempted to incorporate money into formal general equilibrium models. So far, the results have been unconvincing. Although the technical problems are, no doubt, formidable, it is remarkable that so many eminent economists have limited their exposition on money by grafting it onto a model characterised by direct multilateral barter trade. It would appear that, too often, mathematical elegance takes precedence over economic significance, not only in the field of monetary economics but also in other fields of our discipline (Morishima, 1992 p. ix; Van Zijp and Visser, 1995). The use of money presupposes frictions in the form of information costs and the process of exchange in a money economy cannot be described as a costless centralised multilateral process (with the Walrasian auctioneer in charge). The effective analysis of decentralised, costly exchange within a formal general-equilibrium model remains a difficult challenge. Satisfying results may never materialise. Search-theoretic models with bilateral exchange appear to be much more successful in discovering the essentials of a money economy.

The theory of financial intermediation, which is not burdened by the self-imposed ideal of elegant, transparent general equilibrium models which are easy to manipulate mathematically, has made useful contributions to our understanding of reality by applying the assumption of asymmetric and costly information. Much work has still to be done. It is, for example, not yet clear why financial systems differ over time (cf. Allen 1993; p. 81; Mullin, 1993 p. 74; World Bank, 1993 p. 175) or between countries (Shleifer and Vishny 1997). There is every reason to believe that much progress can and will be made in this direction by research based on the idea of costly and asymmetric information.

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