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Financial Liberalization: A Theoretical Perspective

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1 Introduction

Despite some controversy (Diaz-Alejandro, 1985) and no clear empirical evidence (see Collier and Mayer[1], 1989), financial liberalization, with prudential regulation, remains a major component of most policy advice to poor countries. The argument is the standard one that private, profit-motivated decisionmaking (the market) will produce a better allocation of resources than that obtained with government intervention. There may also be the pragmatic presumption that government failure does more harm than market failure. I will argue that the theoretical case for financial liberalization is weak. More importantly, the tendency to regard liberalization as a panacea diverts attention from understanding the inefficiencies inherent in financial and other markets and locating the second best solutions which may be available.

The original proponents of financial liberalization were McKinnon (1973) and Shaw (1973). They viewed financial intermediaries as playing a crucial role in resource allocation, a role that is especially important in LDCs where information is imperfect, agents are heterogeneous and markets are incomplete. Intermediaries' specialization in the production of information allows them to set prices reflecting and signalling opportunity costs. The high in-

[1]Collier and Mayer point out that the positive correlation between real interest rates and growth adduced in the 1989 *World Development Report* as evidence for the benefits of liberalization may equally well reflect other relationships

terest rates reflecting low capital availability attract savings to banks who can allocate them efficiently as a result of their information. Removal of repression, where repression includes all governmental measures which tax or otherwise distort domestic capital markets[2], is seen as the key to allowing financial intermediaries to fulfill their role. Government's role should be confined to maintaining noninflationary monetary growth and neutral fiscal policy.

This paper makes three points. The first is positive. In economies with the fundamentals described by McKinnon and Shaw — asymmetric information, heterogeneity and incomplete markets — the Arrow-Debreu (AD) competitive equilibrium (CE) is not the appropriate equilibrium concept. The second point, also positive, concerns McKinnon's and Shaw's contributions. Recognizing that the processes assumed by neoclassical monetary growth theory models did not apply to lagging economies, McKinnon and Shaw argued that the monetary system and financial intermediation in these economies played an irreplaceable role in transmitting information and completing markets. This assessment previewed both recent theories of general equilibrium with asymmetric information and money, and models of financial intermediation. But these points would be of historical interest only if it were not for my third, normative, point.

Given these functions of the monetary system, McKinnon and Shaw urged that government intervention be minimized to allow financial intermediation to determine the prices required for information transmission and market completion. The economic rationale for minimal government intervention is the duality between AD CE and Pareto efficiency which assures us that in a CE with the AD conditions there is no government action which can make everyone better off. In other words, the AD CE specifies the conditions required for Adam Smith's "invisible hand" to work. But we have already argued that the AD CE is not the appropriate equilibrium concept in the economies described by McKinnon and Shaw. That is, the fundamentals they described are inconsistent with both the existence and the Pareto efficiency of the AD CE. The welfare conclusions of the AD CE cannot therefore be applied in their economies. The appropriate equilibrium concept in such economies is now generally taken to be a financial assets competitive equilibrium or an expectational equilibrium such as the rational expectations equilibrium (REE). However, the REE is not constrained Pareto efficient and nor, in general, is any equilibrium with incomplete markets. That is, a central planner with no more information or markets than given by the CE could effect asset allocations or tax policies which make everyone better off. The existing structures are not efficiently used. McKinnon's and Shaw's insights with regard to the informational and trade expansion roles of the monetary system were correct but these financial mechanisms do not ensure that agents' marginal rates of substitution are equated. This indicates that there are government policies, in addition to macroeconomic stabilization, income redistribution and public good provision, that could in theory improve on the allocation of resources.

The original McKinnon-Shaw (MS) policy recommendations were therefore incomplete and so is most current advice on financial reform. This paper explains this assertion by describing the general theory which rationalizes MS's views and the results of models which explicitly incorporate the features they described. Section 2 summarizes the MS hypotheses

[2]This summary description is given by McKinnon (1988).

from a microeconomic viewpoint, highlighting the environmental and behavioural background of their arguments, rather than the macroeconomic interpretation usually stressed. The following sections organize the discussion around three main themes emerging from our interpretation of their analyses. Section 3 considers the informational role of financial asset prices. In the McKinnon-Shaw theories it is the ability of interest rates to signal information about relative scarcities which permits an improved allocation of resources following liberalization. Section 4 discusses the literature on equilibrium when markets are incomplete, information is asymmetric and there is money, as in the McKinnon-Shaw economies. Section 5 surveys some of the recent literature which explains the functions and existence of financial intermediaries. Section 6 illustrates how specific models of markets of the type described by MS contradicts three propositions from McKinnon's and Shaw's financial liberalization hypotheses:

- Financial liberalization does not ensure that banks set deposit rates reflecting the opportunity cost of capital;
- Liberal charter policy is not sufficient for competition-enhancing entry and
- Banks' comparative informational advantage does not permit them to allocate credit efficiently.

The discussion will also, I hope, contribute to an appreciation of what I believe to be the key insight provided by McKinnon and Shaw: the financial system produces and transmits information which expands trading possibilities and efficient government policy must allow for this role.

2 The McKinnon and Shaw economies

It is argued here that McKinnon and Shaw (MS) viewed financial intermediation as a mechanism, that is, as an organizational arrangement by which agents exchange information and make coordinated economic decisions. As such, financial intermediaries help complete markets and thus reduce the effects of uncertainty: by expanding trading opportunities they permit individuals to insure against future uncertain events. Their determination of relative prices allows individuals to equate marginal rates of substitution in expectation terms. Financial intermediaries are able to play this role because they somehow have a comparative advantage in the production of information: one can view them as an analogue to the informed traders in the Grossman analysis (see Section 3 below). The financial system should therefore be liberalized to do its job, government pursuing only macroeconomic stabilization policy, public good provision and current budget surpluses on the fiscal front, while maintaining steady nominal money growth, setting a rediscount rate, ensuring easy entry and providing deposit insurance in the monetary sector[3].

In evaluating this proposition one may pose two questions. The first is whether the removal of existing repressive measures is sufficient to bring about an improvement in Pareto efficiency. This can only be answered on a country-specific basis since the answer depends on the regulations and institutions in place and the results hypothesized to follow their removal or reform. The second is whether, from a situation where government is

[3]The full package of measures for an unrepressed regime includes trade liberalization, tax-neutral fiscal policy, devaluation/slow depreciation to a free market exchange rate.

confined to the stance described above, there exists, at least in theory, government interventions which can bring about a Pareto improvement. This answer is affirmative. Two possible interventions possible in particular partial equilibrium situations are discussed in Section 6. The answer is of current interest. Governments liberalizing their financial markets[4] may not obtain the expected expansion of savings, investment and employment even if financial intermediaries address some basic inefficiencies in the underlying market.

Our interpretation of McKinnon and Shaw may be questioned. Although these connections have not previously[5] been made, as far as we are aware, in the LDC policy context, other analysts argue that market completion in the presence of imperfect information is the basic insight of McKinnon and Shaw-type financial analysis. For example, Bernanke and Gertler (1987) see recent financial intermediation theory as reviving the Gurley-Shaw view of financial systems and it is the earlier Gurley-Shaw views which MS extended and applied in LDCs (see the discussion in Ghatak, 1981). In addition, comparison of MS's work with contemporary analysis of distortion in the capital markets of LDCs highlights their focus on bank behaviour. Myint (1971), for example, attributed misallocation in capital markets to the financial dualism arising from the modern and traditional sectors' unequal access to resources. The unequal access itself, he argued, was due to underdeveloped economic organization aggravated by government controls. He analyzed empirical outcomes similar to those addressed by MS: artificially low interest rates, chronic excess demand for loans and the resulting rationing of credit, and proposed increasing the official rate of interest in organized capital markets to reflect the shortage of capital funds (Myint, op. cit., p.331). Imperfect information, the signalling role of prices and the informational role of financial intermediaries play no part in his analysis.

More recently, Bencivenga and Smith (1991) cite McKinnon and Shaw when they use Diamond and Dybvig's (1983) analysis of banks as insurers (see Section 5) to argue that intermediaries have an important role in promoting growth where capital investment is illiquid, since intermediaries reduce the need to hold liquid assets. Their model provides a formal justification for McKinnon's stress on banks as an escape from the confines of self-finance.

There are differences in the analyses of McKinnon and Shaw. McKinnon argued that the monetary sector reduced market imperfections due to heterogeneity, indivisibilities and imperfect information because money allows banks to pool savings for investment and allocate these to high return uses. He therefore described money and capital as complementary. The heterogenous information and uncertainty prevailing in LDC economies prevents those with indivisible investment opportunities from borrowing on the external market. They are therefore dependent on their own endowments. Governments reacted to historical finance constraints by circumventing the domestic capital market through measures such as cheap credit and tariff protection. Such measures have distorted the allocative role of prices, with the result that the economy is fragmented: different agents face different prices which therefore fail to reflect/signal the opportunity cost of resources. Full liberalization permits banks to attract savings and channel

[4]This ignores the problems that formed expectations and credibility are likely to create in such a situation.

[5]The thesis in which this paper originated was completed in 1990.

funds to all investors who can earn a high return, thus breaking the confines of self-finance. In order to extend credit banks' loan officers must acquire information the costs of which must be covered by loan rates.

Shaw's description of the lagging economy placed greater explicit stress on the informational role of prices and the place of banks (financial intermediaries) in implementing the market. Liberalization would "substitute a pricing mechanism and decentralized judgement" for the "rationing mechanism of repressed finance" (Shaw, 1973, p.133). Shaw's description of the LDC environment, his debt-intermediation view (DIV), was set up to contrast with what he described as the wealth view (WV) of money and finance. The WV model which, Shaw stresses, is inappropriate for analysis of LDCs, exhibits many of the features expected in a Walrasian economy: trade is costless, there is perfect foresight and no uncertainty, agents and goods are homogeneous, commodities are divisible, information is costless and markets are complete. WV ignores the role of money and finance (see, for example, p.102). The DIV is the antithesis of WV. Segmented markets, dispersed prices, heterogeneous and indivisible capital mean that savers and investors assess risks differently (p.50) and prices do not reflect social valuations. Extension of the monetary system and financial intermediation play a crucial role in compensating for these 'imperfections'.

Both McKinnon and Shaw described economies with imperfect costly information, heterogeneous agents and goods and incomplete markets. Repression prevents the monetary system from fulfilling its pricing function. As a result, prices are dispersed and do not reflect social costs, resources are misallocated and growth impeded.

Despite the role they assigned to money and finance neither McKinnon nor Shaw investigated precisely how banks acquire information and make their pricing decisions, nor how they are able to pool savings efficiently. Their analyses subsume behaviour and mechanisms under market forces and information transmission by prices. While it is admitted that market forces may be impeded by failure to compete, the assumption is that competitive behaviour is ensured by freedom of entry. Conditions for the superiority of market pricing are given by the fundamental welfare theorems. However, the fundamental market features and monetary arrangements which MS analyzed are not consistent with those in the economy of the welfare theorems. The processes they postulated are in part explained by analysis of the informational role of prices, and the role of money and financial institutions in the environmental conditions they described are derived in general equilibrium models with sequential trades (money) and in models of financial intermediation. But if we adopt these models we can no longer assume that official intervention is always inefficient. To indicate why this is so, the next three sections attempt to show how recent models can explain the general market mechanisms postulated by MS. The correspondence between these analyses and those of MS is obviously inexact. None of them for example take account of indivisible technology nor treat the case of large agents[6].

Many of the distortions described by McKinnon and Shaw, and attributed by them to official failure to allow the market system, especially finance, to fulfill its functions, are implied by the strategic reaction of agents to the fundamentals they described. That is, in economies with imperfect information distortions such as price dispersion, monopoly power etc, would

[6]That is, individual agents who are sufficiently large relative to the market to affect aggregates.

occur in the complete absence of government. Full liberalization would not therefore bring about an efficient allocation of resources. However, existing government interventions are almost certainly not those the central planner referred to above would implement. In effect, the systems before and after liberalization may not be Pareto comparable[7]. Liberalization may not bring about the expansion of savings, investment and employment suggested by the McKinnon-Shaw analysis. The lesson for policy is that liberalization is not sufficient. Existing ill-planned government intervention should be removed but policymakers then have the harder task of looking for appropriate taxes, subsidies and transfers to correct the distortions inherent in real economic systems.

3 The Informational Role of Prices

We have argued above that the MS financial deepening argument rests on the informational role of freely determined interest rates. This reflects a widely-held view of the competitive price system discussed by Hayek (1945) but only rigorously examined by Grossman (1976, 1977) in the context of futures markets and stock markets. In the Arrow-Debreu (AD) economy with complete markets and state-dependent contingent contracts, prices have no role in transmitting and aggregating information (they do act to make actions consistent), since the uncertainty is aggregate: information is symmetric between agents.

To capture the notion of the competitive price system as an economical mechanism for information transmission, Grossman found it necessary to replace Walrasian equilibrium (WE) prices by REE prices. In WE not only do agents ignore the information contained in prices[8], but observation of Walrasian market-clearing prices gives agents who make inferences from prices an incentive to recontract at WE prices[9], making it an inappropriate equilibrium concept (see Grossman, 1981).

Prices transmit information among insignificantly small agents if some invest in information collection; their information is reflected in their trades which influence price, transmitting the information to others (Grossman, 1977). Current price also aggregates information when agents have invested in different information since this information is reflected in their individual demands (Grossman, 1976). This transmission and aggregation is justified as the long run static equilibrium of a trading process: after repetition traders learn the joint distribution of the current price and the random future price. They are then able to condition their beliefs about future price on the current price and markets only clear at the current price which reflects all information, the REE price.

The paradoxical nature of this equilibrium has been pointed out by Grossman, op.cit., and Grossman and Stiglitz (1980). Once agents learn that the current price reflects all information (the REE is fully revealing), if investment in information is costly they have no incentive to acquire their own information since all necessary information can be costlessly learnt from observation of the current price. Since each agent considers his trading in-

[7] Although observation suggests that the market must be able to improve on the pervasive but haphazard government regulations in many LDCs.

[8] Given the WE price an agent determining his trades looks only at his own preferences and budget constraint.

[9] Sophisticated traders learn that price provides information, on observing the equilibrium price therefore they will update their beliefs and wish to recontract.

significant relative to the market, each will withdraw from information acquisition and the market price conveys no information. This paradox is most usually resolved by the assumption that prices are only partially revealing. This occurs if the current price is also affected by "noise", e.g. current supply or demand is also affected by random factors, so that all information cannot be inferred from the current price. More generally, as long as the number of relative prices is less than the number of random variables which affect agents' payoffs, REE prices will be partially revealing.

Partially revealing prices create incentives for market formation that could explain the process by which financial intermediaries generate new trades following MS liberalization. If there is noise in current prices so that informed and uninformed agents have different expectations of future prices, there are incentives for trade between the informed and the uninformed. There is therefore a tendency for markets to develop endogenously until the gains to be made from the difference in information between the informed and the uninformed are just sufficient to provide the necessary incentive for costly information collection (see Grossman and Stiglitz, 1980).

If we place financial intermediaries in the role of informed traders, the removal of restrictions on interest rates can be viewed as allowing a return to arbitrage sufficient to provide intermediaries with the incentive to acquire information and trade on that basis with the uninformed isolated agents in MS's framework. Financial intermediaries learn that capital investment will command a high return (or the uses in which that high return is available) and therefore bid on the current market for savings. The higher deposit rate informs all traders that capital held in the form of money will command a higher future return so that they economize on its current use. Price would be bid up until the marginal cost of capital to an intermediary is just equated to the gain from better information.

However, in the MS framework something else is required to complete the story of endogenous development. Although small individual traders learn from price that real money has a high future return, capital indivisibility means that they are unable to amass sufficient capital (in the form of savings) to realize that return. Only financial intermediaries who are "large" relative to other traders will have the ability to utilize the information by pooling the savings of the small units, and such agents are explicitly excluded in REE models.

Even assuming negligibly small agents, REE does not have the prescriptive properties of the AD competitive equilibrium (CE). Under incomplete information Pareto efficiency must take account both of the information which an individual has at the point in time when welfare is measured, and of truth-telling constraints. A particular market arrangement may not be implementable if it depends on private information the individual does not wish to reveal (see Holmstrom and Myerson, 1983). Viewing the REE as an arrangement to extract private information, Laffont (1985) has explored its welfare properties. Laffont shows that partially revealing REE are not generally Pareto efficient among incentive compatible mechanisms[10] in even the weakest sense of the term. (*Ex post* Pareto efficiency when all information is public knowledge so that no insurance opportunities exist). The reason for this is similar to that described by Grossman: because prices are not fully revealing, the private acquisition of information has a positive

[10] In these second best situations, one asks whether the equilibrium is Pareto efficient among existing possibilities.

externality on the degree of information conveyed by price. Thus the social value of information exceeds the private value and by subsidizing or taxing information acquisition, public intervention may internalize the externality.

REE prices may thus explain how non-regulated interest rates transmit and aggregate information, and it may be just because interest rates only reveal partial information that financial intermediaries have an incentive to collect information and expand trades. However, REE are not constrained Pareto efficient. Further, REE can only provide a very limited guide to the MS process because it is only sensible when agents are small.

4 GE of an uncertain world with incomplete markets, asymmetric information and money

4.1 Preliminaries

We may describe the lagging economies in the MS analyses as subject to significant nonconvexities in production, asymmetric information and a shortage of markets in which individuals can shed risk. Neither McKinnon nor Shaw viewed these features as solely the result of government intervention. Shaw, for example, argued that "in the WV regime with perfect mobility, price flexibility, foresight and competition, a financial system serves no purpose" (p.78) and that intervention was only one reason for segmented markets (p.125). However, intervention prevented the emergence of more viable processes. If interventions are removed, banks' information collection and actions can act to inform the price system, allowing prices to transfer and aggregate information so that they signal relative scarcities. Their operations permit trading opportunities to be established and relative prices to be determined where none had existed before, that is, they help to complete markets. In order to examine the policy implications of this prediction of the liberalization hypothesis, we must move to a general equilibrium context. The AD GE economy is the only logical link we have between decentralized economic activity and efficiency. MS may therefore be interpreted as suggesting that the more closely approximated are the complete prices and markets of the AD mechanism, the nearer will an economy move to AD efficiency properties. Indeed, Shaw (p.47) says that "The classic conclusions of the WV (can be called upon) to explain the advantages of the shift in development strategy from repression to liberalization".

This section examines the welfare implications of extending the general equilibrium model to incorporate the features described in MS. Extensions have served mainly to incorporate more 'realistic' informational features, and to allow for incomplete markets (prices are not determined for every finely defined commodity), so that there is a rationale for active markets at every date. Money is also considered. The prices MS focussed on were rates of return on money holding, but the neoclassical model which is the rationale for liberalization not only does not include money but makes money redundant. It is not a coincidence that allowance for observed institutional features provides a role for money in the general equilibrium system. This is almost the insight of MS: when economies do not conform to the idealization of the AD world, money becomes important. The irony is that one at the same time loses the clear prescriptive insights of AD.

4.2 Incomplete markets with asymmetric information

The AD model deals with uncertainty by making very fine distinctions among "commodities": the same physical good is a different commodity according to its location and date of availability or use, and the state of the world in which it is made available or used (the well-known state-contingent commodity). The price ratios between each of these finely defined commodities are determined in the single 'market-place' which takes place at the beginning of the economic system. Agents, taking these prices as given, are therefore not subject to uncertainty about the present value of producer plans or about consumer budget constraints. Producers are unaffected by uncertainty or risk because all possible inputs and outputs of the production system have a firm price. Given their probability distributions over possible states of nature and their risk attitudes, consumers' buying and selling of the dated state-contingent commodities serve an insurance function[11].

This seems the key to one idea behind Shaw's view of financial intermediaries. Complete markets remove risk by providing prices over events/dates; liberalized financial intermediaries also remove part of the risk borne by producers by making price judgements on the basis of better information (Shaw, 1973, p.127). Recent models of general equilibrium with incomplete markets[12] replace the system of contingent markets with a more realistic system of real spot markets and financial markets which allow agents to redistribute income across states (Magill and Shafer, 1991). When markets are complete this equilibrium coincides almost everywhere, under certain conditions, with the AD GE. With incomplete (decentralized) markets, Geanakoplos and Polemarchakis (1986) showed that, generically, equilibria of pure exchange economies are not constrained PE[13]. Later work (with others) confirms this result when production is incorporated. Quinzii (1988) provides an intuitive explanation. Imprecisely, a relative price change will affect welfare since marginal rates of substitution are not equated in incomplete markets. The planner has an advantage over the market because he realizes this. By marginal changes in allocations and production decisions, the planner can change relative prices. Interestingly, also, in these economies financial instruments and money are not neutral: with nominal assets a change in spot

[11] Complete asset markets at the initial period and spot markets thereafter serve the same purpose.

[12] A satisfactory model of GE with incomplete markets in a production economy is not yet available

[13] For constrained Pareto efficiency (PEy) one asks whether the allocation reached is PE relative to allocations that can be achieved through the existing set of incomplete markets.

prices in some state changes purchasing power and hence the equilibrium allocation. Further, agents require information on the future purchasing power of the unit of account to anticipate equilibrium prices, this introduces a role for money as a medium of exchange.

The MS environment and information structure cannot be accommodated in the AD model. The AD model does not allow for the differential information[14] among agents which MS stressed as a crucial component of the risk faced by agents in LDCs. Radner (see 1982a) has extended the AD model to allow for differential information among agents. If the feasible plans of the agents with incomplete information are restricted to those in the full information set (i.e. in the set of plans available if an agent had full information) which are compatible with the given information, the existence and efficiency of the extended model, relative to the given information structure, can be shown. In addition to the usual convexity and continuity assumptions, three conditions must hold for this result (Radner, 1982b): the information available to an agent must be independent of his.or any other agent's actions, there must be no moral hazard, and agents must not use equilibrium prices to make inferences about other agents' behaviour. Price-taking agents, complete markets, and a single pre-history determination of prices continue to be assumed. Thus, while allowing for asymmetric information, most of the features associated with its existence are excluded in order for the extended AD model (Radner's 1982a terminology) to give AD-type results. It is also evident that the extension can be of no use in justifying the MS arguments because its existence and efficiency proofs depend on the absence of those features which they stressed; namely, bank acquisition and use of information with resource expenditure, and the use of prices to signal information about capital scarcity.

The single opening of markets in the AD framework has its explanation in the presence of complete markets and the absence of transactions costs since there is no advantage to be gained by re-opening markets. The institutional features in MS have no place in the framework. If all prices are determined and accounts are settled at the beginning of time, agents have no need to economize on "search and bargain" by holding money, nor would money be held as a store of value. Consumers who know their net present values need not hold shares so no stock market would exist. In addition, while the extended AD provided a means of dealing with asymmetric information, it could do so only by restricting their feasible plans.

To incorporate these real financial features and provide a more satisfactory characterisation of asymmetric information[15], general equilibrium theory has adopted an approach which looks for REE in a sequence of incomplete markets. With agents using equilibrium prices to make inferences about the environment, an REE[16] is a set of current prices, common price expectations and consistent plans such that, given current prices and price

[14] In fact, the AD equilibrium requires that at the opening market agents have common forecasts of equilibrium spot prices in the future for every event.

[15] The recognition of asymmetric information is sufficient to necessitate a sequence of markets (Arrow and Hahn, 1971). When commodity availability or use depends on the state of nature and a market participant is aware that some traders have information which he lacks, he will be unwilling to enter into conditional contracts. Future prices which depend on the information will be treated like a random variable. As a result it becomes appropriate to consider markets as opening in sequence as information becomes available. Similarly, the individual may invest in securities to insure against future uncertainties.

[16] Which originated in Radner (1972) and Lucas (1972)

expectations, each agent's plan is optimal for him, given his sequence of budget constraints.

The sequence economies with incomplete markets is about as far as formal neoclassical theory has gone in allowing for the type of environment and conditions in which liberalization is to be effected. The incomplete nature of the theory is indicated by the difficulties encountered in proving RE equilibrium. Existence problems imply the tentative nature of results but the welfare analyses of REE in incomplete markets produce two points relevant to a prescriptive assessment of a liberalized system. Hart (1975) showed, firstly, that REE are not generally optimal in economies where the market structure is incomplete and, secondly, that, unless all other markets are available, the opening of an additional market need not produce a Pareto improvement. Hart gave an example where a Pareto-dominated equilibrium may be the only one attainable because the move to a Pareto superior allocation would require a change in prices and expectations which could only occur through trade. However, that trade is not possible because markets are incomplete (in Hart's three-period model there is no borrowing and lending and no futures market). The equilibrium reached then depends on the prices at which the economy starts: there is insufficient trade to provide the 'market forces' which would lead the economy to a PE allocation in the existing set of markets. This could be the MS argument: the equilibrium achieved in the repressed economy is inefficient because the repression of prices does not permit market forces to reach the growth-promoting allocation. MS therefore postulate that expanding borrowing and lending possibilities through financial intermediation can improve efficiency.

The second point made by Hart refutes this conclusion by considering the introduction of a new security in the incomplete market structure at the first date and finding that its introduction in fact makes everyone worse off. If utility from consumption is not constant across dates, the time at which trade takes place becomes important (recall that Hart is analyzing an exchange economy). In Hart's example, price-taking consumers trade at the opening of the additional market until all gains from trade are eliminated, without recognizing the interdependence of gains from trade at different periods. Utilities from consumption in later periods are sufficiently reduced, relative to the situation without the additional market, to make all consumers worse off.

Although it is stretching credibility to apply this very specific abstract result to an empirical situation, we can attempt to relate it to an argument put forward by Caribbean economists when urged to raise deposit rates in order to provide banks with liquidity for the finance of real investment. The argument says that "there is no necessary correspondence between real and financial saving" (Worrell, 1985, p.60) — an increase in financial saving may be translated into loans for consumption rather than investment purposes. In terms of the theory and MS's framework, one can recast the argument as follows. In a repressed regime encouragement of the deposit market is equivalent to adding a market — providing consumers with an additional security (deposits) in which they can trade. But individual consumers do not perceive their future consumption possibilities from general investment (the connection between earlier and later trades), and given the opportunity to trade they will exhaust the gains from trade at later periods: current financial saving is borrowed for later consumption (say at date 2), rather than invested in real assets at date 2 for consumption of the return at date 3.

And banks are concerned only with their individual profits, not with lending to improve investment. As Hart points out, an economy with incomplete markets is in a second best position. Only if all markets are opened can an overall improvement be expected. (In our incredible example venture capital opportunities may be a possibility).

As emphasized before, these sequence economy models are significantly different from the MS characterization. The former assume that agents' information structures are exogenously fixed. This is an unattractive assumption from the 'reality' viewpoint but it has not been relaxed because, in general, the technology of the acquisition and use of information does not satisfy the assumptions required for theorems proving existence and efficiency. Both McKinnon and Shaw stressed that acquiring and using information involved the expenditure of resources. Similarly, Radner (1982a) notes that a production plan which requires more information must include increased inputs. Radner and Stiglitz (1984) show that information acquisition has a fixed set-up cost which introduces a non-convexity into the production possibility set. As usual, this implies that there is a discontinuity in the demand for information, hence the difficulty with standard existence and optimality proofs. Specialization may therefore be common in areas where information is important. Radner (1982a, p.974) also points out that a producer may have different information structures available, each with a production set, his total production set being the union of the different sets, and that union may not be convex. These results pose a further problem for a neoclassical rationale for liberalization. As described, MS posit an economy with nonconvex production possibilities but appear to believe that these can be mitigated by information-gathering banks. However, the Radner-Stiglitz theorem implies that the solution is itself likely to introduce further nonconvexities.

4.2.1 More on Money

In MS freely operating financial markets are seen as the corrective for resulting imperfections. As discussed above, the replacement of contingent markets with incomplete financial markets gives a role to money that the classical AD model does not have. Here we ask whether detailed consideration of money supports their intuition that financial markets can correct for imperfections. We conclude that it does in important positive respects, though not from a policy perspective.

Two features of the AD model preclude a role for money (see Ostroy, 1989): the completeness of the markets and the single budgetary constraint of its agents. Since markets are complete, the equilibrium which coordinates the actions of all agents is completed at the first date and markets need never re-open, although actual delivery and production may take place sequentially over time. There is obviously no need to maintain a store of value or medium of exchange (or any other financial assets/institutions) since complete (and implicitly binding) agreement has been reached on the precise commodities to be exchanged over all time and in all eventualities. Suppose markets were not complete, but re-opened every period for trade (i.e. there are a sequence of markets). As long as agents satisfy only a single multiperiod budget constraint so that trades in any period need not balance, an asset with no intrinsic value would still have no place. Agents would be concerned only with equalising their overall inputs and outputs and, with rational expectations, they know that these will be consistent. With a sequence of

single period constraints, however, the need to meet a budget constraint each period would frustrate some trades so adding money would be like completing markets.

Gale (1982) views money's role as based on even more fundamental features of the AD market. An AD equilibrium can be reached at date zero only because agents have sufficient trust in each other to be confident that arranged deliveries will take place (or because there is some implicit enforcer operating). In reality, of course, individuals are not that trustworthy. Specifically, in the final period of the market game, the individual who has previously received, and now has to make a delivery, has an incentive to retain the agreed commodity. A sequence of budget constraints can act to ensure sequential delivery since it requires balanced trades every period: there is, so to speak, a check on agents' contributions. But this requires that agents borrow and lend between periods and have some means of transferring wealth between markets. Certain trade patterns could not be accomplished if budgets had to be balanced at every date. Bonds could not serve the purpose of storing wealth because they require trust in the issuer. Money would facilitate trade because its use could act as a guarantor of forward delivery if, as in Gale's example (op. cit., p.239), agents were issued with fiat money which had to be returned to the issuer at the end of the economy, but could be freely exchanged among agents in the interim. The agent making the forward delivery would have to fulfil his contract in order to retrieve the money he had previously paid for commodities received. However, money can only serve this purpose because the arrangement is enforceable by the fiat money issuer. And if this power of enforcement exists, it could also be used to enforce commodity deliveries. But in the latter case the number of contracts the authority would have to monitor and enforce would be very great. When treated as if it had a uniform value and used to balance budgets, money acts as a store of information because it allows the issuer to keep track of what agents have obtained from the economy. The use of money is therefore less costly than the monitoring required in its absence: money has the advantage of being a decentralized method of facilitating trade. As such, Gale characterises the monetary arrangement (which includes both the positive value attached to a paper asset of no intrinsic value and the enforcement power) as a social institution which acts to complete markets, i.e. it permits more trades.

Gale shows that when there is a complete set of paper assets (one for each state of nature) the equilibrium of the monetary economy is in the sequential core. But if the set of paper assets is incomplete (and this requirement is as unattainable as that of complete markets for securities), the equilibrium allocation is almost always Pareto inefficient and, as a result, the sequential core is normally empty. With incomplete assets agents have different marginal rates of substitution between consumption in different states, giving coalitions an incentive to form to change the allocation.

Incomplete markets are constrained Pareto inefficient. Money helps complete markets but unless there is complete money the equilibrium is not PE: we already knew that adding markets does not necessarily make everyone better off. We go on to consider whether financial intermediaries help.

5 Financial Intermediation Mechanisms

Gale's account of the role of money dealt only with fiat money: government is required to enforce the tax payments which act as a decentralized guarantor of future delivery. However, outside money is dominated by inside money in most monetary systems, and the financial liberalization argument is primarily concerned with the benefits to be gained from intermediation. It is the actions of financial intermediaries, rather than money *per se*, which act to convey information. This section describes some of the literature which derives financial intermediaries and their contracts as endogenous market responses to private information in markets where producers must obtain outside financing. In all of these, as in MS, the *raison d'etre* of the financial intermediary lies in some form of scale economies which serve to make it the least cost means of overcoming the agency problem resulting from differential information.

These models provide formal justification of MS's insights but they also show that, while financial intermediation is the least cost means of providing additional markets in a situation with asymmetric information, it results in agency conflicts whose resolution may require an exogenous mechanism. That is, the equilibrium with the financial intermediary mechanism may be constrained Pareto inefficient. However, the behaviour described by these models also make it clear that the conventions, contracts and processes observed in financial intermediation can be viewed as facilitating exchange and production in an incentive-consistent fashion. Ill-conceived official intervention may interfere with these mechanisms.

The earliest of these information-based treatments of financial institutions, Leland and Pyle (1977), recognize, like MS, that financial markets are particularly afflicted by problems of asymmetric information and are unlikely to allocate finance efficiently unless information is reliably conveyed. Unlike MS, they also recognized that asymmetric information about project returns could produce adverse selection problems. Information flows are improved if specialized financial intermediaries emerge to exploit economies of scale in the collection and sale of information. Leland and Pyle did not settle the next question regarding the quality of the financial intermediary's information. Nor do they address how financial intermediaries obtain information.

Diamond (1984) shows how incentive compatible contracts can answer both these requirements. His analysis proceeds by addressing the levels at which asymmetric information becomes a problem. When the realized outcome of a project with a random return is private information to a borrower the standard debt contract (fixed repayment, bankruptcy penalty when insolvent, with lender keeping the residual) is the optimal arrangement between a borrower and lender[17]. However, the optimal contract is costly because it entails a positive probability of bankruptcy. While conditional bankruptcy could be avoided by monitoring project realization, the privacy of project realization implies that each security holder (lender) would have to monitor, resulting in effort duplication or a free-rider problem. The solution is to delegate the monitoring to a single agent: this in turn generates an

[17] A fixed repayment (independent of the realized state) removes the incentive to misrepresent a favourable state of nature. The bankruptcy penalty and principal-take-all clause ensures that the borrower will only declare insolvency if this is in fact the case (i.e. there is a deterrent in the shape of a cost of declaring insolvency).

agency problem which can be solved by a standard debt contract between the delegators and the monitor (depositors and bank). The financial intermediary mechanism works here because its net costs are lower. Although provision of the correct incentives for delegated monitoring is still accomplished through a costly bankruptcy threat (a nonpecuniary cost borne by the borrower with positive probability), if the intermediary contracts with many firms with independent, identically distributed (i.i.d) risks, the probability of bearing the bankruptcy costs because of a single firm's failure tends to zero. Average delegated monitoring costs decline with numbers monitored so that financial intermediation works because these economies of scale compensate for the costs of incentive provision.

Diamond (and Leland and Pyle) thus give operational content to the MS view of the informational role of financial intermediaries. The intermediary is the least cost method of information production because, with diversified assets, it is able to collect and monitor information in an incentive compatible (reliable) manner. Leland and Pyle assumed economies of scale in information collection: some such assumption must be made to explain why it is advantageous for agents to trade via intermediaries rather than directly. But if the viability of financial institutions depends on their size, we should expect them to behave strategically.

Several models based on Diamond and Dybvig (1983) have considered the demand deposit contract separately, concentrating on the financial intermediary as asset transformer and hence insurer rather than information collector and monitor. By providing liquidity, banks are able to insure agents who learn their preferred consumption profile privately. But, because the deposit contract provides liquidity by enabling banks to supply deposits at a pace that is out of step with production, there is an equilibrium where all depositors try to withdraw early, resulting in a panic run on the bank. Either a suspension of convertibility or deposit insurance could stifle the panic, by assuring would-be withdrawers that funds will be available. Later models using the Diamond and Dybvig framework[18] derive runs from basic bank characteristics such as depositors' limited information about banks' assets. Bank runs are undesirable because the intertemporal allocation of investment resources is suboptimal (production is interrupted) when depositors withdraw early. We see again that the decentralised bank arrangement may be improved upon by a planner.

One analysis without this result is that of Williamson (1988) where bank 'failures' are only associated with particular states of nature, the allocation remains optimal and there is no role for government intervention. Williamson's failures[19] do not have the 'flavour' we would normally associate with bankruptcy in financial institutions: rather than being an otherwise undesirable response to adverse circumstances, they occur by *ex ante* agreement among members of banking coalitions in states of the world in which capital market trades are preferable to complex banking structures. It may be more fruitful to view Williamson's bank and no-bank equilibria as delineating the conditions (given his model) under which banking coalitions are optimal mechanisms (when assets are illiquid because of asymmetric information).

The role of deposit insurance as a means of avoiding bank runs, as well

[18] See, for example, Postlewaite and Vives (1987), Jacklin and Bhattacharya (1988)

[19] Williamson addresses this issue himself, though not entirely satisfactorily, through appeal to stylized facts of bank failure.

as the incentive problems it creates, are well-recognized in the liberalization literature (see Shaw, 1973, pp.64-66 and The World Bank, 1989, p.76). The models sketched above provide a formal description of quite widespread notions. They also show that in averting runs deposit insurance may actually be Pareto improving . It is because private incentives on the market create externalities (in the Diamond and Dybvig model early withdrawers do not take account of the social costs of destroyed risk-sharing and interrupted production) that interventions such as deposit insurance may have a role. This externality feature is not recognized outside of the formal literature. The 1989 *World Development Report* suggests (p. 79) that runs are appropriate discipline rather than the costly result of random disturbances, and their possible costs are not set against the expected costs of insurance.

As more 'realistic' assumptions about the distribution of information are added on to the Diamond-Dybvig model, reserve requirements also acquire an explanation in terms of the internalizing of an externality. Simplifying their analysis, Bhattacharya and Gale (1987) showed that, although banks may have an incentive to create an interbank market in which they may share liquidity risks, if their investment and the proportion of early withdrawers is not publicly observable, individual banks will reduce their investment in liquid assets and rely on the interbank market. Hidden action creates a free rider problem. A legal reserve requirement on which the full rate of interest is not paid, together with a discount window at a subsidized rate of interest, solves the second-best risk sharing problem: the financial intermediaries who learn that they are subject to a larger proportion of withdrawals can take advantage of the arrangement.

It should be pointed out that there are more general models concerned with the endogenous derivation of financial intermediaries which find less of a role for government intervention. Thus Boyd and Prescott (1986) show that financial intermediaries are a constrained Pareto efficient mechanism in an economy where investment opportunities are *ex ante* private information, a signal of which can be acquired at a cost. Individual endowments are insufficient to both undertake investment and evaluate investment projects. Agents with 'bad' and 'good' projects self-select for coalition membership or project evaluation and the resulting core equilibrium is supported by coalitions which must be large in order to ensure available financing for the good projects. Again we have the size requirement for intermediaries — here the possibility of monopoly power is avoided by the formal framework: the economy and each intermediary have a countable infinity of member agents.

6 Partial equilibrium models of Caribbean Banking Markets

This long, although still incomplete, survey of the formal literature on the welfare properties of real markets and financial intermediation mechanisms is an attempt to stress how well-established, and general, is the result that uncertainty, imperfect information, incomplete markets provide an endogenous explanation for financial intermediation *and* a rationale for official intervention. This section brings this home by describing three models which, using stylised facts from the Commonwealth Caribbean, examine the (often) counterfactual case of banks operating without intervention in conditions of private information.

Banks' special knowledge of some customers and the favourable treat-

ment the customers receive as a result has often been commented on in the Caribbean banking literature (see Barnett, 1982, Bourne, 1984, and Worrell, 1985). Collusive behaviour among banks is also assumed (see the three previous references and Ramsaran, 1984). The implications of such attachments between firm and customer has been extensively investigated by Klemperer (1987a-c, 1989) using the modelling device of switching costs. The assumption is that customers must incur a cost to change suppliers. The price elasticity of demand is reduced because, in effect, a competing supplier must pay the customer's cost of switching in order to induce the customer to switch suppliers. Zephirin (1990) applies this device of sticky market share in two models of the banking market, where it captures the notion of a long-term relationship between bank and customer.

The depositor can be considered as an agent saving in financial form both for future consumption and for the services provided by banks. Having found a bank with satisfactory current service, it is shown that in the long-run of the market, the depositor is reluctant to switch banks if bank service improves over time. Bank service would be expected to improve for good customers, as banks learn about their reliability. But if customers tend to stay with a bank for improved service in the future, it becomes difficult for other banks to attract them with higher deposit rates: customers have switching costs which reduce banks' incentive to compete[20] because increases large enough to cover swithching costs are required.

Collusion is usually assumed to be non-sustainable because every party to an 'agreement' has a strong incentive to lower price (raise deposit rate) and benefit from the resulting increase in demand. Switching costs make collusive agreements easier to police since sticky market share allows customer movement to be monitored. If banks value future monopoly profits, simply serving their own customers will maintain the collusive agreement. The implication is that liberalized banking markets, far from raising the deposit rate to attract new financial savings, as hypothesized by MS, may price monopsonistically. In these conditions, a deposit rate floor is the correct policy response.

MS stressed free entry as the means to ensure competitive behaviour among banks. It can be shown that switching costs reduce the incentive for new entry (see Klemperer, 1987b) and can induce exit (see Zephirin, op.cit). This is consistent with the observation of entry-followed-by-exit in the Barbados banking market in the 1970s and 1980s. Consider a market with two sets of potential customers. If new entrants are unable to attract the more lucrative set who, because of their favoured status have high switching costs, they may be unable to cover the opportunity cost of operations and exit. Anticipated losses by potential entrants are interpreted as the cost of acquiring information on a particular market. In this case, entry is not sufficient to enforce competition.

An important component of the liberalization thesis is the assumption that banks would allocate their deposits to best use in the credit market. Credit market models have shown that banks' inability to observe their customers' characteristics (the adverse selection problem) and actions (moral hazard) will influence credit allocation. It has usually been assumed that banks' use of collateral and loan size, for example, to help them distinguish among borrowers and provide appropriate incentives, would enable

[20] Banks will not compete for the customers who don't have switching costs because these are the customers who have been judged incapable of handling better service.

the banks to achieve the best outcome possible, given available information. However, general equilibrium analysis (Greenwald and Stiglitz, 1986, Zephirin, 1992) shows that a Pareto improvement is possible with government intervention. Use of loan size to sort customers can result in the low risk borrower receiving a less than optimal loan because his acceptance of that loan allows the bank to fix risk appropriate interest rates. Subsidy of the high interest rates, which encourages the high risk to take a larger loan. also permits the low risk borrower to take a larger loan, thus improving the risk mix for society. Only the 'planner' who has the ability to redistribute income across states (through taxes and transfers) can effect this improvement.

7 Concluding remarks

We have approached this discussion as if liberalization would start from a clean slate, that is, as if considering an economy with incomplete markets, uncertainty and asymmetric information in which money and financial intermediaries are incorporated at the start of history and where there is no government intervention (except in so far as this is implied by the introduction of money). In reality, liberalization would usually follow a long history of regulation: institutions and expectations will have formed. In practice, therefore, all the results above would need to be reinterpreted in the context of the particular economy and era in which reforms are introduced. Neoclassical theory indicates only that we cannot expect constrained Pareto efficiency in a liberalized regime, given the environment which it has been argued necessitates liberalization.

These models show that many of the imperfections MS attributed to repression could just as readily be explained by the environments of asymmetric information, indivisibilities etc. Nor are the results unusual. Industrial organization theory has produced a range of results that suggest that imperfections are the norm. Price dispersion is consistent with an unregulated market where information is costly — the cost of acquiring information reduces the net benefit of searching for the lowest price (see Stiglitz (1977) and Salop and Stiglitz (1982)). Market power can result from imperfect information and search costs: credit rationing may be explained by decentralized banks dealing with asymmetric information; entry may be frustrated or impeded by imperfect information. This makes policy prescription difficult. Unfortunately, the focus on high interest rates and, later, the benefits of the "invisible hand" has masked most of the more subtle arguments underlying the MS recommendations. Disappointment with the results of earlier experiments with liberalization has now led to some stress on prudential regulation of the banking system. Both the general theory of incomplete markets and partial equilibrium models of strategic behaviour and imperfect information strongly suggest that the 'planner' could usefully go beyond purely prudential controls on financial intermediaries. But, I believe, the important lesson from these analyses is that government failure will occur if regulations do not take account of the bank arrangements whose outcomes they correct and the incentives which they affect.

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