

Why do Banks Fail?

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ABSTRACT Banks advance loans in the absence of precise knowledge in relation to the outcome of borrowers' projects. Consequently, uncertainty in relation to loan repayment emerges. Thus, banks introduce the 'credit standard' as insurance against loans, so that should borrowers' projects fail, borrowers have an alternative means of honouring their debt obligations. It is argued in this paper that in the competitive atmosphere under which this sector operates, it is not possible to secure the entire loan portfolio by introducing the credit standard, and in recent years this difficulty has been further exacerbated by financial liberalisation, which may have caused bank failures.

1. Introduction

Bank failures are not uncommon, nor limited to a few countries.¹ The cost of bank failure can be high, and if this causes instability in the financial system, which in turn affects the nation's growth rate, then it consequently causes governments or the central bank to intervene in order to organise a rescue package for the failing banks. The cost of these rescue packages is high and such packages are difficult to organise, specially in a competitive environment.² Although bank failures are more commonly observed in those countries that have deregulated or liberalised their financial market, they are not uncommon where banks have made bad loans and carried a high proportion of non-performing loans in those countries where the financial markets were once highly regulated and only survived due to government subsidies. Thus, the question is: why do banks fail?

Following the experience of the Great Depression, it has been commonly argued that the banking crisis, or bank failures, principally arose due to depositors' panic, which caused a run on the banks. The source of this panic may emerge from speculative attacks on the numeraire (Wigmore, 1987), illiquidity shocks (Diamond & Dyvbig, 1983; Donaldson, 1993), or shocks to the banks' asset value (Calomiris & Gorton, 1991). But the root cause of this panic is information asymmetry between banks and depositors. As a result, depositors cannot discern whether an individual bank is solvent or insolvent, but can observe the impact of the shock on the banks' portfolios, and this in turn initiates a run on all banks, leading to bank failure (Calomiris & Kahn, 1991; Bhattacharya & Thakor, 1993). Thus, the

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explanation of the banking crisis ultimately boils down to the contagion effect. Recent empirical investigation by Calomiris & Mason (1997) into the Chicago bank panic, suggests that while panic may have caused a run on the banks, those which failed were mostly weak banks. Similarly, it is now clear that the Asian financial crisis occurred not necessarily as a result of the contagion effect, but followed from banks making a large number of bad loans and carrying a high proportion of non-performing loans (Arestis & Glickman, 2002; Basu, 2002a, 2002b; Stiglitz, 2000; Lauridsen, 1998; Chang, 1998; Robinson & Rosser, 1998; Wade, 1998). In other words, most of them became insolvent.

Thus, the issue is not whether the information asymmetry between banks and borrowers or the panic caused a run on the banks, but the question is what factor or factors ultimately contribute to bank insolvency.

In order to investigate this important topic, it is first necessary to recognise that there are two important elements entering into the operation of the banking sector. These are the 'credit standard' and 'credit risk.'

It will be argued in this paper that in the absence of knowledge in relation to the future outcome of the borrowers' projects, banks cannot calculate the precise magnitude of the default risk in advance. Therefore, uncertainty in relation to loan repayment emerges. Consequently, prior to advancing loans, bankers ask for collateral or some form of security, as an alternative means of payment should the borrower's project fail. This alternative means of payment is referred to as the credit standard. Credit risk refers to that risk that arises when banks cannot secure the entire loan by the credit standard. The portion of the loan that is not secured by the credit standard will not be recouped from the sale of collateral should the borrower default on the loan. Credit risk therefore measures the portion of the loan that is exposed to default risk (Basu, 1997, 2002a).

It will be argued in this paper that in the competitive atmosphere under which banks operate, it is not possible for banks to secure their entire loan portfolio by the credit standard. Thus, an element of fragility always remains within this sector. In recent years, however, this fragility has increased as a result of financial liberalisation. Financial liberalisation has increased the intensity of the competitive atmosphere within the financial sector, which in turn has often caused banks to undermine the importance of the credit standard in order either to maintain their existing market share or to increase it. In the process it has exposed banks' loan capital to high credit risk. This may have been the principal contributing factor to much of the bank failure that has been observed in the last two decades.

This paper is divided into three sections. In the first section we briefly investigate why banks introduce the credit standard as a determining factor for the allocation of loans rather than interest rate or price. In the second section we investigate why banks cannot maintain this credit standard and the additional measures they take with the intention of protecting their loanable funds, should the borrowers default on loans. In the third section we investigate why banks fail.

2. Credit Standard: a measure against risk and uncertainty

Loan contracts between bankers and borrowers take place on the basis of future rates of return, where both borrowers and bankers expect that borrowers' future rates of return (assuming the borrower is an investor who borrows in order to finance the purchase of capital equipment and/or working capital requirements) will be sufficient to pay back the principal plus interest.³

In other words, both parties enter into a contractual agreement on the basis of the expectation that the borrower's future rate of return from the project for which the loan was advanced will be sufficient to pay back the principal plus the interest rate. The issue of expectation principally arises here, as neither the borrower nor the lender knows with certainty what the future outcome will be. This is because there is a probability distribution of various possible outcomes of the project. That is, the project's future rate of return may be greater than the contractual repayment rate, may be equal to it, or may fall below it. None of these outcomes is known with a precise magnitude, either to the borrower or to the lender in advance. The lender will be concerned with whether the project's future rate of return will fall below the contractual repayment rate. In short this problem principally arises here as neither the borrower nor the lender knows the future demand price of the project,⁴ for which the loan was issued. This means the contractual agreement occurs on the basis of information about the project's current and/or past performance. However, the problem is that one cannot totally depend upon such an expectation, as this means elimination of the distinction between past and future, so that the information asymmetry can be eliminated, (assuming there exists no information asymmetry relating to the past).⁵ Elimination of this information asymmetry is only possible, providing we assume that time can move backwards and forwards, which is necessary to predict the future demand on the basis of past information about those variables that have played a role in the project's outcome. But the problem here is that time only moves forward, and therefore it is possible that the project's past performances may not be repeated.⁶ A similar problem also remains with the risk analysis that is used so often for projection purposes.⁷

The risk analysis, which primarily involves estimating the probability of change, and the magnitude of change, on those variables that influence demand, relies on past and current information. This raises some serious issues in relation to the reliability of risk analysis.

The fundamental problem is that, (a) if the future movement of those variables falls beyond the observed variation, then the calculation will be liable to error, where the magnitude of the error will be determined by the scale of the movement, (b) if the probability values themselves alter or their frequency changes, then the expected value that has been calculated with the previously observed probability value, will be liable to error.⁸ This therefore suggests that in the absence of knowledge in relation to the future probability distribution (otherwise referred to as factual content), calculations will be liable to misleading information. This means, once we introduce time, uncertainty emerges in relation to the future rates of return. Uncertainty principally emerges here because the future position of the variables that have in the past produced a favourable outcome for the project is not known and there remains a possibility that their position may change, which in turn may break the continuity.

Contrarily, in conventional economics, the issue of uncertainty has been addressed within the framework of asymmetric information, where uncertainty principally arises owing to the presence of some hidden variable. For example, in the case of the loan market, uncertainty mainly arises because the lender does not know the borrower's attitude towards risk. However, the lender then assumes that the borrower's attitude towards risk is inversely related to his/her pecuniary position. Thus, the argument is, if the latter is known, then it is possible to predict the direction of the former, and consequently uncertainty has been replaced with the certainty equivalence assumption.

The problem with this approach is not whether the borrower's attitude towards risk plays any role in determining the fate of the loan capital, or whether there exists any relationship between attitude towards risk and his/her pecuniary position. The problem arises from the assumption that the pecuniary position acts as a proxy for, or as a possible determinant of, the direction of attitude towards risk. It is similar to predicting whether Schrödinger's cat is dead or alive, prior to opening the box. Let us elaborate on this issue; usually it is assumed that, in an investment project, if a borrower's own wealth constitutes a small fraction of the total investment, then that borrower is likely to take a greater risk, since that borrower has less to lose in the event of a project failure. Thus, the argument here is that although an individual's attitude towards risk is not known, if we know his/her pecuniary position, then the direction of the attitude towards risk can be predicted. The problem with this approach is that once we incorporate further information or re-arrange the information set within the frame of the hidden variable analysis, our result will change. For example, suppose there is a poor investor whose share of capital constitutes a very small fraction of the total investment, but whose entire livelihood depends upon the return from this share. On this occasion can we hold the same inverse relationship between attitude towards risk and pecuniary position of the person concerned? Similarly, it can be shown that a wealthy investor is more likely to take a greater risk, independent of the share of his/her own capital in the investment project, if that share constitutes an insignificant fraction of his/her total wealth. The above example highlights the problem, i.e. as we change our information set our result continues to change, and this raises the question of whether the uncertainty is associated with the hidden variable or arises from missing information. In reality of course, we know neither what governs an individual's attitude towards risk nor the impact of external variables, such as the pecuniary position, upon an internal variable such as the attitude towards risk. A further complication of the problem also arises from the fact that an individual's attitude towards risk changes over time and space, independent of his/her pecuniary position. Therefore, whatever our subjective opinion may be about the individual's attitude towards risk, it cannot be predicted accurately from the individual's pecuniary position, although we cannot ignore the importance of the latter factor in the consideration of the loan equation. The problem of uncertainty is not associated with some hidden variable as appears to be the case in the asymmetric information literature. Whether we follow the Copenhagen (i.e. Bohr, Heisenberg, Schrödinger etc) or Keynes's, interpretation of uncertainty, in both cases the explanation of uncertainty rests on the assumption of missing information or what we call incomplete information, and it is associated with space and time. Even von Neumann, whose work has been extensively used in the asymmetric information literature, ruled out the possibility of the hidden variable interpretation as a possible explanation for uncertainty.⁹

The analysis that has been presented here indicates that, in the presence of incomplete information, risk analysis does not eliminate uncertain outcomes. This is because uncertainty mainly arises due to incomplete information, while risk analysis relies on factual content. Thus, the latter is an inadequate tool to address the former.¹⁰

This has consequences for estimating the return that is derived from the difference between the revenue and the cost of production, as in the absence of knowledge of future demand it is not possible to estimate the approximate level of revenue. Thus, it is unlikely that the current evaluation of prospective yields will bear any real relationship to the true objective value of capital assets.¹¹

Given the above analysis, it is now possible to establish that bankers, attempting to maximise their own utility functions, cannot make a decision either to advance or not to advance a loan solely on the basis of such a calculation. This is because, in the presence of uncertain outcomes in relation to the borrower's project, there remains a possibility that the actual interest rate that a borrower pays, referred to as the effective interest rate, will deviate from the bank's quoted interest rate. Furthermore, bankers cannot calculate in advance the margin of this deviation with precision. In other words, we cannot determine in advance the actual interest rate that a borrower will pay.

In this circumstance, bankers can only advance loans providing they can secure the return of the loan by making a provision that the borrower has an alternative means to repay the loan, should the borrower's project fail. Accordingly, bankers ask for collateral, whose value should be unconnected with the value of the project for which the loan is being advanced. This alternative means of payment that a bank demands prior to advancing loans is referred to as the credit standard.¹²

The above argument therefore suggests that the interest rate alone cannot determine or constitute demand, or what Wolfson (1996) may call effective demand.

We need to distinguish between borrowers' wishes or desire for loans and the 'demand' for loans. The demand for loans depends not only on the interest rate, but also on the amount of collateral, alternatively referred to as the 'credit standard', that is required against the size of the loan demanded by borrowers.

Thus, the desire for a loan by a non-monopolistic potential borrower who does not meet the bank's credit standard,¹⁴ will never result in a loan.

3. Measures Over and Above the Credit Standard

Theoretically, any item that has a ready market and relatively stable value can be used as collateral.¹⁵ However, the value of any of this collateral that is accepted by the banks as the credit standard is, in general, subject to fluctuation as the state of the economy changes and the individual's own financial circumstances change. Bankers are only concerned about a fall, and they know that it is not possible to predict either a fall or the precise magnitude of a fall in the value of the collateral, in the absence of knowledge about the future state of the economy. Consequently, bankers take a very cautious approach to any future estimation; they accept an asset as collateral on the basis of its current market value and attempt to lend a little less than the current value of the asset.¹⁶

An important point to note here is that, as the value of collateral is normally estimated on the basis of its current market value, uncertainty in relation to the future value of an asset also emerges. That is, the future value of the current asset may be greater or less than the current evaluation of its market value. This leads to the possibility that the collateral may not be able to secure the entire loan, i.e. principal plus the interest rate. Thus, in the event of a worse outcome for the borrower's investment project, the borrower may not only fail to maintain his promise, but may not even be in a position to return the principal to the lender. This problem is further accentuated by other factors, such as the circumstances when collateral may be a disincentive to borrow, because securing the entire loan (i.e. principal plus interest rate) by collateral will force borrowers to bear the burden of the entire uncertainty, while the fruits of the profits that accrue under the influence of uncertainty will be shared between both borrowers and lenders. Under this

circumstance, many borrowers, especially the large ones (i.e. investors) will be inclined to raise finance by issuing shares rather than resorting to a loan (assuming such facilities are readily available and depending on the state of the equity market). Furthermore, due to the competitive structure of the lending institutions, it is equally unlikely that a lender can secure the entire loan by collateral only. In many cases, lenders are not even able to secure the entire portion of the principal by collateral. That is, part of the loan remains unsecured, especially the interest rate payments. This means the portion of the loan that is not secured cannot be recouped from the sale of collateral. This portion is referred to as the 'credit risk.'¹⁷ Credit risk, therefore is inversely related to the credit standard. Every bank always has to carry some degree of credit risk. Credit risk therefore measures the portion of the loan that is exposed to default risk, i.e. the difference between the size of the loan and the market value of the asset against which the loan was advanced. This means bankers know the approximate amount they are likely to lose in the event of borrowers defaulting on loans. This depends upon the difference between the loan advanced and the proportion of the unsecured loan the borrower still owes to the bank at the time he/she defaults. Thus, the issue is how bankers manage this credit risk so as to prevent the adverse consequence that may follow as a result of taking such a credit risk. Principally, banks are required to make provisions against this credit risk in order to remove the possibility of making a loss in the event of some borrowers defaulting on their loans. One way to prevent such a loss that may arise from non-performing loans is to incorporate the credit risk as a cost in advance into the calculation of the interest rate. This cost is often referred to as the risk premium, which often provides a windfall profit to banks.

However, the problem is that the credit risk imputed into the calculation of the interest rate on each loan may raise the interest rate to such a high level that it will itself increase the number of possible defaults on loans. Therefore, it may no longer be able to compensate for the possible loss that may emerge from the default. In other words, in this situation, the risk-adjusted interest rate increases the possibility of default to such a high level that the expected gain is no longer capable of compensating for the expected loss that arises from these risk-adjusted interest rates. Thus, bankers are required to decide the number of possible defaults multiplied by the credit risk in order to decide the total loss that they may incur. It is this possible loss divided by the number of non-defaulters that determines the risk premium, which is incorporated into bankers' calculation of the interest rate.

A number of problems remain with such an adjustment. To begin with, the credit risk-adjusted interest rate itself further exposes the bank's loan capital to a higher level of credit risk, given the value of the collateral. This suggests that it is an inadequate method of adjustment. More importantly, the credit risk-adjusted interest rate in reality can save a bank's loan capital only if a small fraction of the borrowers default on loans, and assuming there is a small difference between the size of the loan and the value of the collateral. But the problem is that this difference between the size of the loan and the value of the collateral depends upon the competitive structure under which the lending institutions operate, while the number of possible defaulters has to be decided in the absence of information about the future. In other words, whatever the number of possible defaulters banks decide, there always remains the possibility that the actual number of possible defaulters may exceed the expected number. This problem is further complicated by the fact that the difference between the size of the loan and the value of the collateral depends upon the value of the collateral that is actually realised at the time

borrowers default on loans, which depends upon the state of the economy and the state of the defaulters' financial circumstances. Thus, there remains uncertainty not only in relation to the number of possible defaulters, but also in relation to the value of the collateral that is realised at the time borrowers default.

The above analysis therefore suggests that bankers are required to be cautious when undertaking assessment of credit risk.

4. Why do Banks Fail?

The level of credit risk that banks take does not, in general, reflect their taste and preference for incurring risk and uncertainty, but largely depends upon the competitive structure under which they operate. The competitive structure commonly refers to the level of competition, whose intensity mainly depends upon the number of players operating in the market, i.e. in this case how many banks and NBFIs are operating in this market. The usual assumption here is that the greater the number of players in this market, the greater the competition among these institutions to attract a greater number of depositors and borrowers. In short, these institutions fiercely compete with each other either to retain or to extend their share of the market. In this situation, it is reasonable to claim that a well-functioning stock market can increase the intensity of this competition, as it provides an alternative avenue to investors (i.e. borrowers) to raise finance by issuing shares. It is assumed that, in the process, the borrowers' access to the loan market will improve. We are only concerned here with the borrowers.

However, the competitive structure has an additional factor, which is not entirely determined by the number of lending institutions (which include all NBFIs) that operate in the loan market, but is determined by the rate of return on loans that lenders expect from different groups of borrowers. It is the latter factor that causes a variation in the level of competition that an individual lender or bank faces from its competitors, when competing for various groups of borrowers in the capital market. Most of the results of competitive policies are derived by either ignoring this factor, which causes a change in the structure of competition, or by assuming that the sheer number of players can eliminate the variation in the level of competition. It is not realised that this variation in the level of competition for different groups of borrowers, which arises from different groups of borrowers offering different levels of expected profitability, cannot be overcome by increasing the number of lending institutions. In fact, this is where the limitation on the benefits of competition emerges.

The variation in the level of competition mainly emerges from the fact that various groups of borrowers with their differential size of operation and asset backing, offer different levels of expected rates of return on loans. The demand for those who offer higher expected rates of return compared with others, will be high in the loan market. This higher demand, in turn, provides a choice to these borrowers. These choices include borrowing from banks, raising finance via NBFIs, or raising finance by issuing equity in the stock market. These choices mean these borrowers are less dependent upon banks as the only alternative source of raising external funds. It is this range of options that is open to these borrowers that forces banks to compete with other parts of the capital market when wanting to lend to those who offer higher expected rates of return. We argue that, consequently, banks have little choice other than to make concessions to their credit standard requirements, in order to capture this end of the market. As the borrowers' ability

to offer higher expected rates of return contracts following their decreasing size of operation and asset backing, so too do borrowers' choices in raising funds from alternative sources, resulting in lower competition between banks for such borrowers. This also causes a reduction in the competition between banks and the other parts of the capital market. In turn, the loan market is segmented.

As a result, it is not necessary for banks to make unwarranted concessions to their credit standard requirements, when operating with the pool of smaller borrowers as loan applicants. A significant point to note here is that the competition a bank faces does not entirely hinge on how many banks and other lending institutions are operating in the loan market, but is also contingent upon the expected rates of return and assets that an individual borrower can offer. Consequently, competition between banks and other lending institutions varies from one group of borrowers to another. Thus, when competition is high, meaning there is a lot of rivalry, banks relax their credit standards in order to attract borrowers, and when competition is low banks are not required to take such action. As a result, we observe that different borrowing groups have to meet different credit standards, which in turn causes a variation in the borrowers' access to the loan market.¹⁸ In short, while some loans carry a high credit risk, others may carry zero credit risk.

The borrower's or firm's size of operation and its asset backing play a crucial role in the formation of expectations in relation to whether the firm's rate of return will be high or low. This is because the borrower's or firm's size of operation in relation to the total size of the market and in relation to its own competitors' size, has a substantial bearing on determining the firm's own power in the market. This in turn may influence not only the firm's own rate of return but also the probability of achieving such a rate of return. The significance of the size of operation mainly arises from the fact that variations in size represent varying rates of return with a different probability of achieving such rates of return.

This analysis is based on two assumptions: (i) the greater the scale of operation, the lower the unit cost of production, which arises from economies of scale. (ii) The greater the market share, the stronger the power to determine price. For the firm with a smaller size of operation, these two factors not only increase the possibility of reducing per unit profit margins but also lessen the possibility of obtaining a lower rate of return per unit of investment. As opposed to this, a firm with a greater market share has a greater possibility of obtaining higher rates of return, with a lower possibility of vulnerability compared to its smaller counterparts, where any changes in the economy are assumed to be due to adverse shocks, or to changes in the aggregate supply in relation to demand or to changes in the demand conditions (Basu, 1989). This indicates that the firm's probability of success or failure and its expected return may represent a non-linear relationship within the industry.

The possibility of a deviation from the firm's expected rate of profitability mainly arises for two reasons, one of which is associated with the competitive atmosphere under which it operates, and the other with possible fluctuations in the macro-economic variables, e.g. in the aggregate demand, assuming other things being equal. In either situation, it is argued below, a deviation from the expected rate of profitability is more likely to adversely affect smaller firms than large ones.

One possible deviation from the expected value in a competitive atmosphere principally arises because all firms aggressively compete with each other in order to increase their share of the market. Thus, in a market of a given size, an increase in the share of the market for one firm, implies a loss for another firm. An important

point to note here, is that whether a firm, or group of firms, is able or unable to increase its market share, this form of competition can lead to a situation where the aggregate supply of a commodity or commodities can exceed the demand. This is because, if firms want to increase their market share then these firms first have to increase their potential output beyond their own market requirements. Now if all other firms produce according to the needs of their own market, then a decision by a few firms to increase their share beyond their own market can lead to a situation where supply exceeds demand.

From the above analysis we can deduce that this competition itself is likely to affect adversely some firms' profitability in relation to other firms, and often can adversely affect all firms within the same industry if no one firm is able to improve its relative position in the market. However, the adverse impact of competition is likely to be borne more heavily by smaller firms than by their larger counterparts, not only due to their smaller size of operation but also because they have limited alternative means to subsidise the loss that may arise as a result of the deviation from the expected rates of return. Thus, the competitive atmosphere itself introduces a possibility of deviation from the expected rates of return, which does not flow from possible fluctuations in the aggregate demand (or effective aggregate demand).¹⁹

The other likely deviation, which arises as a result of possible fluctuations in aggregate demand, may also have a greater adverse impact on small and medium sized firms. This therefore suggests that the size of operation in relation to the size of the total market itself presents a greater (for smaller firms) or lesser (for larger firms) possibility of an adverse consequence, which will remain, irrespective of the type of industry with which a firm is affiliated.

Industry affiliation may simply heighten or lower the likelihood of an adverse consequence in relation to a similar sized firm operating in another industry.

An interesting point to note here is that, in the presence of uncertainty,²⁰ the above analysis leaves the lending institutions with an alternative option, which is to use the firm's size of operation in order to form an opinion in relation to the firm's expected rate of profitability and its possible vulnerability, that arises from either the competitive atmosphere in which it operates and/or from possible fluctuations in the aggregate demand and from its own asset backing. Accordingly, this contributes to the lending institutions forming an opinion in relation to the expected return on loans that they advance to any firm. Thus, the lending institutions' expectations that are formed on the basis of the firm's size of operation and its asset backing, cause a variation in the level of competition within the financial market for clients. The demand for clients about whom these lending institutions, including banks, have already formed a lower opinion in relation to the profitability of the loan, will be low and vice versa. This, in turn, causes a variation in the level of competition between the lending institutions, and this competition often even ceases between banks and the other parts of the capital market. Consequently, this allows banks to set different credit standards for different groups of borrowers. In the case of extremely poor borrowers, banks do not even recognise the assets they can offer as collateral, and as a result they cannot meet banks' minimum credit standards, and therefore these borrowers resort to the informal credit market (Basu, 1997). In the case of small and medium sized firms, banks are often the only remaining avenue to raise external finance apart from friends and relatives while, in the case of large firms, banks are not the only providers of external funds. In the case of large firms, their larger size of operation with their greater asset backing allows them to demand larger loans, which in turn reduce the banks' transaction costs, compared to the firms' smaller

counterparts. The combined impact of this lower transaction cost with the lower possibility of default, increases banks' expected profitability to a much higher level than that which they expect from small loans. This therefore indicates that, if there is a necessity for banks not only to relax their credit standards but also to offer concessionary rates in order to attract large clients, banks will have the incentive to do so. Furthermore, the existence of alternative sources of loans allows these borrowers to enjoy a power to bargain when dealing with banks, a situation which banks do not face when dealing with their other clients. Consequently, we observe that as the borrowers' reliance on banks as their only alternative source of raising funds falls, so too does the cost of their debt.²¹

This analysis suggests that an element of fragility within the financial system always remains owing to the uncertainty factor and this fragility is further enhanced by the very nature of the uneven competitive structure. Given this problem, financial liberalisation, or what is often referred to as deregulation, may increase competition among the lending institutions, but the intensity of this competition is more likely to be concentrated in the large borrowers' loan market, thereby leaving little spillover effect to be felt in the smaller and medium sized borrowers' loan market.²² This means the greater flow of credit that is normally associated with liberalisation will mainly benefit large borrowers.²⁴ In order to attract large borrowers as clients, bankers will be required to relax their credit standard even further. An important point to note here is that the credit standard is introduced in order to unlock the fate of the bank's loan capital from the fate of the borrowers' projects, for which the loan is advanced. However, under the liberalised system, banks often may not be able to unlock the fate of their loan capital from the outcome of the borrowers' projects, especially when dealing with large clients. This is mainly because the assets that are purchased with the help of the loan capital will often be entering as collateral as part of the relaxed credit standard requirements. In other words, banks' loan capital will be exposed to a higher level of credit risk under the liberalised system, without often recognising the level of exposure.

Fragmented information that is available suggests that although large borrowers use this loan capital for the expansion of their productive facilities, they do not necessarily use it to install newly created productive facilities. Instead, they tend to use this loan capital for the acquisition of existing productive facilities.²⁴ There are some good reasons for a firm to behave this way. Expansion of productive facilities by installing new plant and equipment means the firm now has to go beyond its own market requirements; essentially this means they have to capture a new market or else have to capture a share of other firms' market. But there is no guarantee that they will be able to do so. Thus, the failure to capture a new market or other firms' market means the firm's additional expenditure that is incurred as a result of the decision to undertake expansion activity now will be added to the firm's total cost, without necessarily adding to additional revenue. In other words, in the event of a failure to capture an adequate share of the market, the difference between total revenue and total cost will shrink. Given this possibility, it is reasonable to assume a firm prefers to take over other firms, as a means of expanding its own market share. This form of expansion appears to reduce uncertainty for the firm compared with the alternative method of expansion.

In the presence of increasing competition, when loan capital has to carry a high credit risk, especially when its appropriate level cannot be recognised, it is natural for bankers to prefer to offer loans to those firms who attempt to expand their market share by taking over other firms, rather than to those firms who prefer to

install new productive facilities in order to capture a greater share of the market. This is because the latter method brings the firm into direct competition with other firms in the market, and raises doubts as to whether the borrowing firm will be able to capture an adequate share of the market. Given the high level of credit risk that the loan capital carries, if the firm fails to capture an adequate share of the market, bankers know that they will have difficulty in recouping their loan capital. In the presence of information about an unsuccessful venture, if a bank also has to resort to selling the plant and equipment, then the bank may have to sell it in the second-hand market, thereby facing the possibility of irreversible cost. The first method of expansion does not pose such uncertainty, as it involves acquiring other firms' market share by means of purchasing those firms. Furthermore, bankers know that should the borrower have any difficulty in meeting a debt obligation in the case of the first method of expansion, banks can also resort to the assets (i.e. shares) of the newly possessed firm to recoup the remainder of the loan capital. This gives the impression that the uncertainty that arises from takeover activity is less than the uncertainty that emerges from undertaking expansion activity by installing new productive facilities.

But what is often overlooked when comparing the two strategies of expansion is the fact that there is a substantial cost difference between the two. For example, when a firm decides to expand its market share by installing new plant and equipment, its expenditure is only confined to the overall cost of the installation of plant and equipment and additional input costs. Contrarily, when a firm is taking over another firm in order to expand its own market share, effectively this means it is not only buying the other firm's productive facilities, but it is also buying that firm's market share. Therefore, the acquired firm's assets are no longer evaluated by the replacement cost; the firm's existing market share also enters into the evaluation process. This causes the difference in the cost of expansion between the two strategies. Furthermore, as the evaluator knows neither the precise position of the firm in the market nor its future position, the evaluation procedure tends to rely upon the market participants' perception about the firm's position and its future, assuming the firm is listed in the share market. This will cause a general movement in the share price with a tendency for it to rise, and thereby will cause the return from equity to fall. In the process it attracts other market participants to enter into this market in order to purchase a share of these firms, with the intention of making a gain from the expected changes in the price of the shares. This, in turn, will cause the share price to deviate from its fundamentals even further; in other words, the margin between market valuation of its shares and the market valuation of the firm's real assets will deviate substantially.

The above analysis suggests that the expansion of market share by taking over another firm is much more costly compared with the attempt to expand market share by installing new productive facilities. Therefore, takeover activity will require larger loans, assuming banks' terms and conditions of loans are so favourable that firms will choose not to finance takeovers by issuing shares. This means a sizeable portion of the banks' loan capital now will be locked into takeover activity. In the process, as the share price rises, the return from the equity will fall, thereby narrowing the gap between the return from the equity and the interest rate.

Given this analysis, the firms that are shown to be much safer, due to their larger economies of scale of operation and greater share of the market compared with their smaller counterparts, now may become financially vulnerable. This is mainly because the high price that a firm pays by borrowing from banks in order to

engage in takeover activity, itself reduces the gap between the return from the new acquisition and the contractual payment obligations. In this situation, if the interest rate increases (or there is a change in the aggregate demand condition), then the borrowing firm may have to resort to other assets to meet the shortfall that may arise as a result of a rise in the contractual payment (or due to a fall in the revenue). If the return from the other assets is not sufficient to meet this shortfall, then the firm will have difficulty in meeting its contractual obligations. This will create a problem for the banks. If a firm with a large loan has a problem in meeting its periodical debt obligation, then the bank will have a liquidity problem. The bank has two options to overcome this liquidity problem. One is to borrow from competing banks, which is referred to as a rescue operation. Information reveals that, under the liberalised system, competing banks are reluctant to rescue troubled banks (Goodhart, 1995). This leaves the other option, which is to offload the borrowing firm's assets in order to overcome the liquidity problem. In the absence of appropriate credit standards, banks now also have to rely upon the shares that are owned by the borrowing firm that are listed in the stock market. The value of these shares is not entirely determined by the value of the land, plant and equipment that the firm possesses, but is largely determined by the perception of the market participants about the current, and expected, future growth of this firm in the market. In other words, the assets' price reflects neither the replacement cost of the productive assets nor the value of goods and services it produces, but rather reflects the perception of the market participants. As these perceptions are not particularly based on any factual information, but rather are based on a vague notion of its position and expectations of the future price of its shares, any bad news such as the company's sales being down, or the company having financial difficulties, will quickly alter these perceptions. In our example, once the company's financial position is revealed to the public its asset price will collapse. Therefore it is unlikely that the lending bank will be able to recover its own liquidity position by relying on offloading the firm's assets that are listed in the share market. Once the news will spread that the bank is highly exposed to this firm, a run on the bank will start, which in turn may cause a bank failure. But the fundamental problem that arises here is that the bank did not maintain its credit standard.

5. Conclusions

The analysis that has been presented here suggests that the possibility of bank failure principally arises from the fact that a bank is either unable to, or does not, pay adequate attention to the credit standard requirements. The financial sector operates in the presence of uncertainty and under non-uniform (or asymmetric) competitive conditions. The presence of uncertainty suggests that lenders always have to introduce the credit standard in order to ensure that should the borrower default on a loan there remains an alternative means to recoup the loan capital. But in the non-uniform competitive conditions under which the financial sector operates, it is not always possible in all circumstances for bankers or lenders to introduce a uniform credit standard in order to protect their entire loan capital portfolio. This means, one spectrum of the loan portfolio will carry zero credit risk, while the other spectrum of the loan portfolio will carry high credit risk. Thus, elements of fragility always remain within the system. In this situation, liberalisation of the financial system means increasing the fragility of this sector. This is because the competition that is brought into the system via liberalisation is more likely to

concentrate on the end of the market mainly composed of large borrowers. This end of the market normally carries substantial credit risk even under the regulated system. In the absence of regulation, as the competition increases, bankers' ability to maintain a minimum credit standard often erodes. This minimum credit standard is the prerequisite for the bankers to survive should these borrowers default on their loans. In other words, under the liberalised system, bankers have to carry a higher level of credit risk than they do under the non-liberalised system. This initially may increase banks' profitability, but it is this high exposure to credit risk that causes banks to collapse when these borrowers default on loans. Thus, the issue here is not whether the loan capital is locked into speculative activity in the share market, or whether it is locked into the firms' aggressive expansion activity via installation of additional productive facilities, as in the case of South Korea; failure in either to be realised will cause banks to lose their loan capital. This is mainly because banks' loan capital is highly exposed to credit risk. The philosophy behind the credit standard is to unlock the fate of the loan capital from the fate of the project for which the loan is advanced. Higher credit risk means the fate of the loan capital is locked in with the outcome of the project for which the loan is advanced; in this situation if the project fails, the loan capital will not be returned.

This does not necessarily mean the contagion effect has no role to play, but what is important here is to recognise that the contagion effect only emerges from bad news, i.e. some banks are highly exposed to credit risk, which in turn causes a run on banks, and the banks that are most likely to fail in these circumstances are the weak ones. Therefore the contagion effect cannot be the primary reason for bank failures.

This means that there is a need to reach an international agreement in relation to the minimum level of credit standard that any borrower has to meet in order to obtain a loan, so that should the borrower default, a large portion of the banks' capital can be recouped from the sale of collateral. A minimum credit standard can be implemented by following the BIS norm of the capital adequacy requirement, i.e. if the current capital adequacy requirement is 8% as a provision for the banks' loan losses, then for every borrower, irrespective of their size of operation, 92% of the loan must be secured by the credit standard. This will not discriminate against small businesses, as in the absence of government guarantees, their total loans are entirely secured by the credit standard.

Credit standard requirements are a better vehicle to protect banks, and thereby, depositors, should the borrowers' projects fail, than are deposit insurance schemes. This is because any form of risk premium requires us to adequately price the riskiness of a bank's loan portfolio. In the presence of ever-changing riskiness of the loan portfolio, as time passes, it is not possible to calculate such risk in advance in the absence of information about the future. This means the provision of insurance via premiums may not be appropriately related to risk. This, in turn, may provide a greater incentive to banks to engage in more risky ventures by relaxing credit standard requirements. Thus, deposit insurance does not provide any mechanism that can potentially prevent banks from becoming insolvent. Depositors' insurance can only solve banks' short term illiquidity problems (Diamond & Dyvbig; 1983). Besides that, private deposit insurance does not have sufficient resources to meet the losses that occur in the face of a large scale run on the banks, as the experience of the USA's savings and loan associations suggests, which means the loss has to be paid for by the public (Goodhart, 1995). As an alternative to that, as mentioned above, if the BIS norm of capital adequacy of 8% of risk-weighted assets (which is

introduced as a provision for loan losses) could be used to provide a guide for an acceptable level of credit risk to be taken by banks, then this course of action could further reduce the possibility of banks becoming insolvent.²⁵ Needless to say, this course of action—that is, the maintenance of a minimum credit standard—may in fact protect the economy from the possibility of over-investment, a situation that often arises from a higher than expected growth rate. Maintenance of a minimum credit standard therefore, in turn, may protect the economy from the possibility of financial crisis.

Notes

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1. Between 1976 and 1993 there were 104 incidences of large bank failures in 24 developed nations, 73 of which were rescued, and 31 of which were liquidated (Goodhart, 1995). In the USA, altogether 1150 commercial and savings banks failed between 1983 and the mid 1990s, which is almost double the total number of failures that had taken place since the introduction of the Federal Deposit Insurance Corporation (FDIC) in 1934, i.e. between 1934 and 1983. Furthermore, between 1983 and 1990, 900 savings and loan associations (S&Ls) were closed or merged with the assistance of the Federal Savings and Loan Insurance Corporation (FSLIC) (Benston & Kaufman, 1997). Recently, Asian nations also faced financial crisis.
2. The most common form of rescue is to arrange for the bank to be taken over by another bank, and this is carried out either with the assistance or the encouragement of the regulatory authorities. In other cases, the assistance is provided either by the central bank in conjunction with some other chosen commercial banks or government or by deposit insurance, which in the USA and Spain played a large role in rescuing failed banks. If the internal financial system cannot finance the rescue package then the country seeks IMF assistance, as is the case in many developing nations. Recently, the issue of IMF assistance to rescue the financial system also arose in Thailand, Indonesia and South Korea.
3. Although in this section our analysis follows from the assumption that borrowing mainly takes place to finance production activities, it could however take place in order to finance speculation in financial assets.
4. In fact, it is this problem that led Bhaduri (1990) to argue that the cost factor plays a decisive role in the determination (or formation) of price. This is mainly because entrepreneurs not only have some control over the cost but, more importantly, as Bhaduri argues, they also have more hard information about the cost. This lends support to Kalecki's (1971) argument that the prices of the finished product are cost-determined.
5. For the sake of simplicity we made this assumption, although we know that our individual knowledge of the past differs, and this is mainly because we do not have precise knowledge of the initial state (Poincare, 1952). I am indebted to Malcolm Sawyer for making this point.
6. See Coveney & Highfield (1991) for more on the irreversibility of time, and also Kregel (1978).
7. However, in order to carry out the above analysis it is necessary to distinguish between risk and uncertainty. A risky event refers to a situation where there is sufficient information to assign probability. Uncertainty refers to a situation where there is not enough information (i.e. incomplete information) to assign probabilities to different outcomes. This distinction was clearly identified by Keynes (1973, pp. 113–114), as he wrote,

By 'uncertainty' knowledge, let me explain I do not mean merely to distinguish what is known for certain from what is only probable. The game of roulette is not subject, in this sense, to uncertainty, nor is the prospect of a victory bond being drawn. The sense in which I am using the term is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest twenty years hence, or the obsolescence of a new invention, or the position of private wealth owners in the social system in 1970. About these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know.

In other words, as Lawson (1985, p. 915) put it, ‘For example if I purchase one out of a million lottery tickets, then the hypothesis that my ticket will be “drawn” has many rivals, but given the evidence available to me (one million lottery tickets and a “fair” draw) the hypothesis that I shall win, though improbable, is not uncertain. (However, if I do not know the number of lottery tickets and I have no information about this number, then the hypothesis that I shall win is uncertain).’ See also Gerrard (1995) and Runde (1995) on this issue.

8. See Basu (1994, 2002a) for a formal analysis of this issue.
9. See Heisenberg (1958), Pais (1991), Gribbin (1999) and Davies (1995) for the Copenhagen interpretation of the uncertainty principle.
10. Meltzer (1988, pp. 145–146) in his book raises the concern that statisticians and economists in general have ignored the Keynes–Knight distinction between risk and uncertainty. Accordingly he wrote,

A main reason is that these terms do not have independent meaning in modern theories of statistical decision making. I believe the Keynes–Knight notion is dismissed too readily. The distinction between risk and uncertainty can be treated as a difference in the (subjective) probability distribution and the information that people use when making decisions. Uncertainty can be represented by a very diffuse prior probability distribution assigned to the returns that will be earned and the states in which they will be earned in the distant future. Risk can refer to near-term prospects where the probability distribution is much less diffuse. As Keynes said in the preceding passage, the only near-term risk is that the news will change, and he added that the change is ‘unlikely to be very large.’ Much less is known, according to Keynes, about long-term prospects. Since people must make decisions, they act as if they know the probabilities or the distribution of returns when, in truth, the (subjective) prior probability assigned to any particular outcome in the distant future is small and the probability distribution is diffuse. Diffuse uncertainty about long-term events would be non-diversifiable and therefore non-insurable by the owners of a firm. Hence it fits the criterion for uncertainty in the Keynes–Knight terminology.

While Knight’s (1921) notion of uncertainty and for that matter Meltzer’s (1988) and Hicks’s (1979, p. 69) distinction between risk and uncertainty, i.e. ‘Increased dispersion means increased uncertainty’ is questionable, the important point to note here is that they acknowledge the issue of uncertainty. See also Boulding (1962), Georgescu-Roegen (1971) and Machina (1987); in particular the former two authors’ work addresses the ‘uncertainty principle’ that was proven by Heisenberg (1930, 1958).

11. As Keynes wrote (1981, first edition 1936, pp. 162–163), ‘. . . human decision affecting the future, whether personal or political or economic, cannot depend on strict mathematical expectation, since the basis for making such calculation does not exist, and that it is our innate urge to activity which makes the wheels go round, our rational selves choosing between the alternatives as best we are able, calculating where we can, but often falling back for our motive on whim or sentiment or chance.’
12. See Basu (2002a) for further details on this subject.
13. See also Azzi & Cox (1976) on this issue.
14. For example, the unemployed person, who has no income other than social security for his/her survival, may wish to have a credit card, but is unlikely to receive one. Jappelli (1990) found that in the USA the lowest income group has the lowest access to the loan market, largely because of their lower asset backing. However, by security, we mean a borrower must provide an assurance that he/she has other sources to repay the loan should there be a failure in the project. Therefore, this may take the form of a third party guarantor, or else the borrower must have other sources of income to resort to in the event of the worst outcome for the project for which he/she sought the loan. In many circumstances, when collateral is not available, banks demand some form of security. However, for the sake of simplicity, in the remainder of the paper we use the term collateral to include all forms of security. This is because, just as the value of collateral is subject to fluctuation, so too is the guarantor’s financial situation, or any other alternative sources of income for the borrower.
15. For example, in Australia, houses and land are commonly held as collateral. Houses and land have been used for first, second and third mortgages. Other forms of collateral include bills of sale, motor vehicles, guarantees, fixed deposits, treasury bills, superannuation and life insurance.
16. For example, in Australia, banks normally lend 80 to 95% of the current market value of the house, depending upon which lending institution one is dealing with and that institution’s confidence about the state of the economy. The convention behind this policy is that no one knows what the value of such property will be in 10 or 20 years time; however, past observations reveal that the value of the property is unlikely to fall by 5 to 20% in the near future, say within the next 2 to 3 years. However,

if the price falls by that margin, banks can still recoup the principal by selling such property. Furthermore, if a borrower defaults on a loan, say 10 years from today (assuming the borrower has not accumulated any appreciable further debt), then it is unlikely that the borrower will owe any appreciable amount of principal that cannot be repaid by selling the property. Contrary to the above expectation, recent experience in the case of Australian agriculture shows that, at times, the current market value of a property can fall to such a level that the sale of the property is unlikely to cover, to any appreciable extent, the principal these borrowers owe to banks.

17. See Basu (2002a) for further details on this subject.
18. A similar argument to that presented in this section can be used to show why borrowers' access to the loan market differs. See Basu (2002a).
19. The above analysis follows from the Smithian notion of competition which Coase (1977, p. 318) described, '... as rivalry, as a process, rather than as a condition defined by a high elasticity of demand, as would be true for most modern economists.'
20. The problem here is that the lending institutions do not know whether the competitive atmosphere is likely to lead to a situation where supply may exceed demand, and if it does they do not know how such an event is likely to affect their own client firms, in the absence of knowledge about the capability of these firms to combat such a situation. Similarly, in the case of domestic aggregate demand, lending institutions do not know the probability distribution of the future movements of those variables such as tax, interest rates and the world economic situation etc, that influence the demand. In addition, they do not know if there are any changes in these variables that may affect the demand, how they may affect their client firms in the absence of knowledge about their future capability to combat such a situation. Consequently, it becomes impossible for the lending institutions to ascertain how changes in the above two scenarios are likely to affect their own client firms, and hence the uncertainty in relation to firms' profitability always remains.
21. Gertler & Gilchrist (1994) reveal that a firm's reliance on bank finance as an external source of funds falls as the firm's asset size grows larger. For example, for a firm with an asset size of less than \$50 million, 68% of the total debt is comprised of bank loans, while it is only 17% for the firm with an asset size of \$1000 million.
22. One of the key elements of the policy of financial liberalisation is that under the free market mechanism all borrowers' access to the loan market will be improved, irrespective of their age and their size of operation. Thus, government assistance would not be required. Contrary to this claim, throughout the 1980s in the USA about 25% of all loans were either originated by government agencies or carried government guarantees. The government organised these loans in order to assist students, small business, housing, exports, and for a host of other worthy causes (Stiglitz, 1993). In fact, where the government did not provide such assistance, small business access to the loan market was reduced, as was the case for Ecuador. See Jaramillo *et al.* (1996).
23. See Diaz-Alejandro (1985) for Chile and Basu (1994) for Australia, where the authors observed that the distribution of loans, in general, favoured large borrowers.
24. Although there exists no direct evidence as to what proportion of the loan capital has been used for the purchase of existing production facilities as opposed to the installation of new production facilities, the fragmented information that does exist in the case of Chile suggests that despite a surge in credit growth during the period of financial liberalisation, expenditure on fixed investment actually declined (Diaz-Alejandro, 1985). For India see Nagaraj (1996) and also Singh (1997). It is reasonable to assume from this evidence that a firm prefers to increase its market share by taking over another firm rather than by installing new productive facilities in the hope of increasing its market share.
25. See also Hellmann *et al.* (2000) who suggest that a ceiling on the deposit rate may be a vehicle to deter gambling, which in turn may reduce the possibility of bank failure.

References

- Arestis, P. & Glickman, M. (2002) Financial crisis in South East Asia: dispelling illusion the Minskyan way, *Cambridge Journal of Economics*, 26, pp. 237–260.
- Azzi, C.R. & Cox, J.C. (1976) A theory and test of credit rationing: comment, *American Economic Review*, 66, pp. 911–917.
- Basu, S. (1989) Deregulation: small business access to the capital market – theoretical issues with special reference to Australian bank finance, *Australian Economic Papers*, 28, pp. 141–159.
- Basu, S. (1994) Deregulation of the Australian banking sector: a theoretical perspective, *Australian Economic Papers*, 33, pp. 272–285.

- Basu, S. (1997) Why institutional credit agencies are reluctant to lend to the rural poor: a theoretical analysis of the Indian rural credit market, *World Development*, 25, pp. 267–280.
- Basu, S. (2002a) *Financial Liberalisation and Intervention: A New Analysis of Credit Rationing* (Cheltenham, Edward Elgar).
- Basu, S. (2002b) Financial fragility: is it rooted in the development process? An examination with special reference to the South Korean experience, *International Papers in Political Economy* (forthcoming).
- Benston, G.J. & Kaufman, G.G. (1997) FDICIA after five years, *Journal of Economic Perspectives*, 11, pp. 139–158.
- Bhaduri, A. (1990) *Macro-Economics: The Dynamics of Commodity Production*, (Revised Indian Edition, Delhi, Macmillan), first published in 1986.
- Bhattacharya, S. & Thakor, A.V. (1993) Contemporary banking theory, *Journal of Financial Intermediation*, 3, pp. 2–50.
- Boulding, K.E. (1962) *Conflict and Defence A General Theory* (Harper Torch Books).
- Calomiris, C.W. & Gorton, G.B. (1991) The origins of banking panics: models, facts and regulation, in: R. G. Hubbard (Ed.) *Financial Markets and Financial Crises*, pp. 109–173 (Chicago, Chicago University Press).
- Calomiris, C.W. & Khan, C.M. (1991) The role of demandable debt in structuring optimal banking arrangements, *American Economic Review*, 81, pp. 497–513.
- Calomiris, C.W. and Mason, J.R. (1997) Contagion and bank failures during the great depression: the June 1932 Chicago banking panic, *American Economic Review*, 87, pp. 863–883.
- Chang, H.-J. (1998) Korea: the misunderstood crisis, *World Development*, 26, pp. 1555–1561.
- Coase, R. (1977) The wealth of nations, *Economic Inquiry*, 15, pp. 309–325.
- Coveney, P. & Highfield, R. (1991) *The Arrow of Time: The Quest to Solve Science's Greatest Mystery* (London, Flamingo).
- Davies, P. (1995) *The Cosmic Blueprint: Order and Complexity at the Edge of Chaos* (London, Penguin Books).
- Diamond, D.W. & Dybvig, P.H. (1983) Bank runs, deposit insurance, and liquidity, *Journal of Political Economy*, 91, pp. 401–419.
- Diaz-Alejandro, C. (1985) Good-bye financial repression, hello financial crash, *Journal of Development Economics*, 19, pp. 1–24.
- Donaldson, R.G. (1993) Financing banking crises: lessons from the panic of 1907, *Journal of Monetary Economics*, 31, pp. 69–95.
- Georgescu-Roegen, N. (1971) *The Entropy Law and the Economic Process* (Cambridge, MA, Harvard University Press).
- Gerrard, B. (1995) Probability, uncertainty and behaviour: a Keynesian perspective, in: S. Dow & J. Hillard (Eds), *Keynes, Knowledge and Uncertainty*, pp. 177–196 (Aldershot, Edward Elgar).
- Gertler, M.L. & Gilchrist, S. G. (1994) Monetary policy, business cycles, and the behavior of small manufacturing firms, *Quarterly Journal of Economics*, 109, pp. 309–340.
- Goodhart, C.A.E. (1995) *The Central Bank and The Financial System* (London, Macmillan).
- Gribbin, J. (1999) *Schrödinger's Kittens and the Search for Reality* (London: Phoenix), first published in 1995.
- Heisenberg, W. (1930) *The Physical Principles of the Quantum Theory*, Translated by C. Eckart & F. C. Hoyt (Chicago, Chicago University Press).
- Heisenberg, W. (1958) *Physics and Philosophy: The Revolution in Modern Science* (New York, Harper).
- Hellmann, T.F, Murdoch, K.C. & Stiglitz, J.E. (2000) Liberalization, moral hazard in banking, and prudential regulation: are capital requirements enough? *American Economic Review*, 90, pp. 147–165.
- Hicks, J.R. (1979) *Critical Essays in Monetary Theory* (Oxford, Clarendon Press).
- Hicks, J.R. (1989) *A Market Theory of Money* (Oxford, Clarendon Press).
- Jappelli, T. (1990) Who is credit constrained in the U.S. economy? *Quarterly Journal of Economics*, 105, pp. 219–234.
- Jaramillo, F., Schiantarelli, F. & Weiss, A. (1996) Capital market imperfection before and after financial liberalization: an Euler equation approach to panel data for Ecuadorian firms, *Journal of Development Economics*, 51, pp. 367–386.
- Kalecki, M. (1971) *Selected Essays on the Dynamics of the Capitalist Economy* (Cambridge, Cambridge University Press).
- Keynes, J.M. (1973) *The General Theory and After, Part II, Defence and Development, Collected Writings of J.M. Keynes*, Vol. XIV (London, Macmillan Press).
- Keynes, J.M. (1981) *General Theory of Employment Interest and Money* (Macmillan, Cambridge University Press), for the Royal Economic Society, reprinted, first edition 1936.

- Knight, F.J. (1921) *Risk, Uncertainty and Profit* (Boston and New York, Houghton, Mifflin Company).
- Kregel, J.A. (1978) *The Reconstruction of Political Economy: An Introduction to Post-Keynesian Economics*, 2nd edn (London, The Macmillan Press) reprinted 1975,.
- Lauridsen, L.S. (1998) The financial crisis in Thailand: causes, conduct and consequences? *World Development*, 26, pp. 1575–1591.
- Lawson, T. (1985) Uncertainty and economic analysis, *Economic Journal*, 95, pp. 909–27.
- Machina, M.J. (1987) Choice under uncertainty: problems solved and unsolved, *The Journal of Economic Perspectives*, 1, pp. 121–154.
- Meltzer, A.H. (1988) *Keynes' Monetary Theory: A Different Interpretation* (Cambridge, Cambridge University Press).
- Nagaraj, R. (1996) India's capital market growth: trends, explanations and evidence (New Delhi, Indira Gandhi Institute of Development Research).
- Pais, A. (1991) *Neils Bohr's Times, in Physics, Philosophy and Polity* (Oxford, Clarendon Press).
- Poincare, H. (1952) *Science and Hypothesis* (Dover Publications).
- Robinson, R. & Rosser, A. (1998) Contesting reform: Indonesia's new order and the IMF, *World Development*, 26, pp. 1593–1609.
- Runde, J. (1995) Risk, uncertainty and Bayesian decision theory: a Keynesian view, in: S. Dow & J. Hillard (Eds), *Keynes, Knowledge and Uncertainty*, pp. 197–210 (Aldershot, Edward Elgar).
- Singh, A. (1997) Financial liberalisation, stockmarkets and economic development, *Economic Journal*, 107, pp. 771–782.
- Stiglitz, J.E. (1993) The role of the state in financial markets, *World Bank Economic Review* (Proceedings of the Annual Conference on Development Economics) pp. 19–52.
- Stiglitz, J.E. (2000) Capital market liberalization, economic growth, and instability, *World Development*, 28, pp. 1075–1086.
- Wade, R. (1998) The Asian debt-and-development crisis of 1997-?: causes and consequences, *World Development*, 26, pp. 1535–1553.
- Wigmore, B.A. (1987) Was the bank holiday of 1933 caused by a run on the dollar? *Journal of Economic History*, 47, pp. 739–756.
- Wolfson, M.H. (1996) A Post Keynesian theory of credit rationing, *Journal of Post Keynesian Economics*, 18, pp. 443–470.

