

THE NORTHERN ROCK CRISIS: A MULTI-DIMENSIONAL PROBLEM WAITING TO HAPPEN

David T Llewellyn¹

BACKGROUND

For three days in August 2007, the UK experienced its first run on a bank since Overend and Gurney, the London wholesale discount bank in 1866. Around £3 billion of deposits were withdrawn (around 11 percent of the bank's total retail deposits) from a medium sized bank – Northern Rock (NR). The unedifying spectacle of widely-publicised long queues outside the bank's branches testified to the bank's serious problems. The NR crisis was the first time the Bank of England (BOE), the UK's central bank, had operated its new money market regime in conditions of acute stress in financial markets, and it was the first time it had acted as a lender-of-last-resort for many years.

Northern Rock (previously a UK mutual building society) converted to bank status in 1997. Without the previous constraints on its operating permissions, it acquired legal powers to conduct the full range of banking business. However, it remained focussed predominantly on the residential mortgage market. From the outset, it adopted a securitisation and funding strategy which was increasingly based on secured wholesale money (by issuing mortgage-backed securities) and other capital market funding.

Before considering the nature of the NR crisis, several points of perspective are noted at the outset: the bank remained legally solvent (the nominal value of assets exceeding liabilities), only months earlier the bank had reported record profits, the quality of its assets was never in question, its loan-loss record was good by industry standards, and for many years the bank was regarded as a star-performer in the financial markets.

Two problems emerged during the summer months of 2007: there was a generalised lack of confidence in a particular asset class (mortgage bank securities) associated in large part with developments in the sub-prime mortgage market in the United States; and doubts emerged about the viability of the NR business model in particular.

In September 2007, NR was forced to seek substantial assistance from the BOE even after the regulatory authorities, the UK's Financial Services Authority (FSA) and the Treasury (the UK government's finance office), had given assurances that the bank was solvent, and all deposits at the bank would be guaranteed.

THE CONTEXT OF FINANCIAL MARKET TURMOIL

The NR episode needs to be set in the context of the global financial market turbulence experienced during the summer of 2007. Recent years have experienced an unprecedented wave of complex financial innovation with the creation of new financial instruments and vehicles. In the words of the BOE, this financial innovation had the effect of "creating often opaque and complex financial instruments with high embedded leverage" (BOE, 2007a). Two major instruments at the centre of the financial market turmoil were Securitisation and Collateralised Debt Obligations (CDOs – instruments created from a portfolio of asset-backed securities and then broken into tranches of varying default risk with resulting varied prices): in both cases issue volumes rose sharply in the years prior to the crisis. Figure 1 shows the sharp rise in European securitisations, and figure 2 indicates the volume of global CDO issues and particularly the sharp increase in 2006 and the first half of 2007, followed by an almost total collapse in the summer months of that year.

Securitisation involves a bank bringing together a large number of its loans (e.g. mortgages) into a single package and selling the portfolio into the capital market. The portfolio might be bought by other financial institutions or by specially created Special Purpose Vehicles, Structured Investment Vehicles (SIVs), or Conduits established by the securitising bank itself. The buyer issues securities (e.g. FRNs, asset-backed commercial

¹ Copyright David T Llewellyn

Northern Rock Case Study

paper, longer-term paper) which are rated by a rating agency according to the quality of the underlying assets in the portfolio. In effect, the bank passes the loans to others, and the strategy is often referred to as originate-and-distribute even though the purchaser might be a specially-created bankruptcy-remote subsidiary of the bank itself. The bank may offer a line of credit to the purchaser to be activated in the event that the buyer encounters difficulty in renewing its short-term securities.

Figure 1

European securitisation (1998 -2005; € billions)

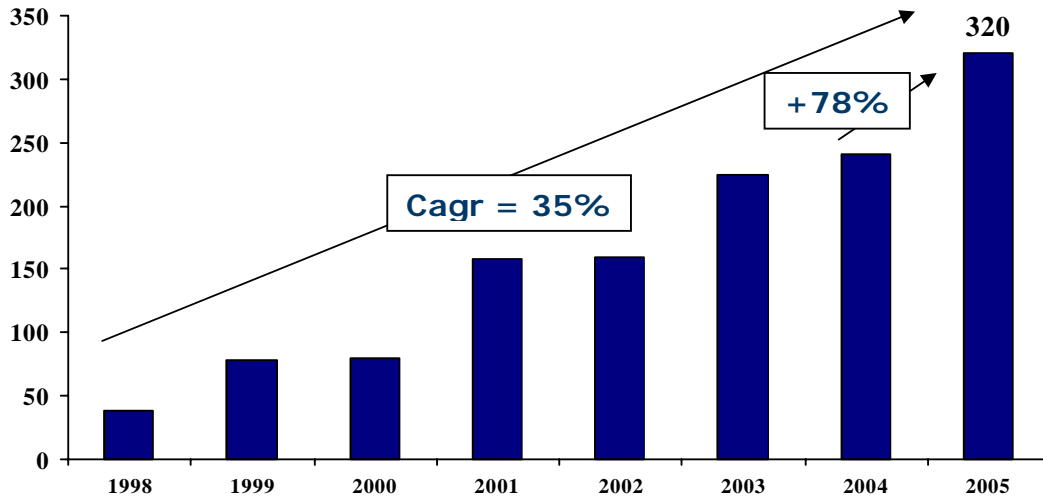
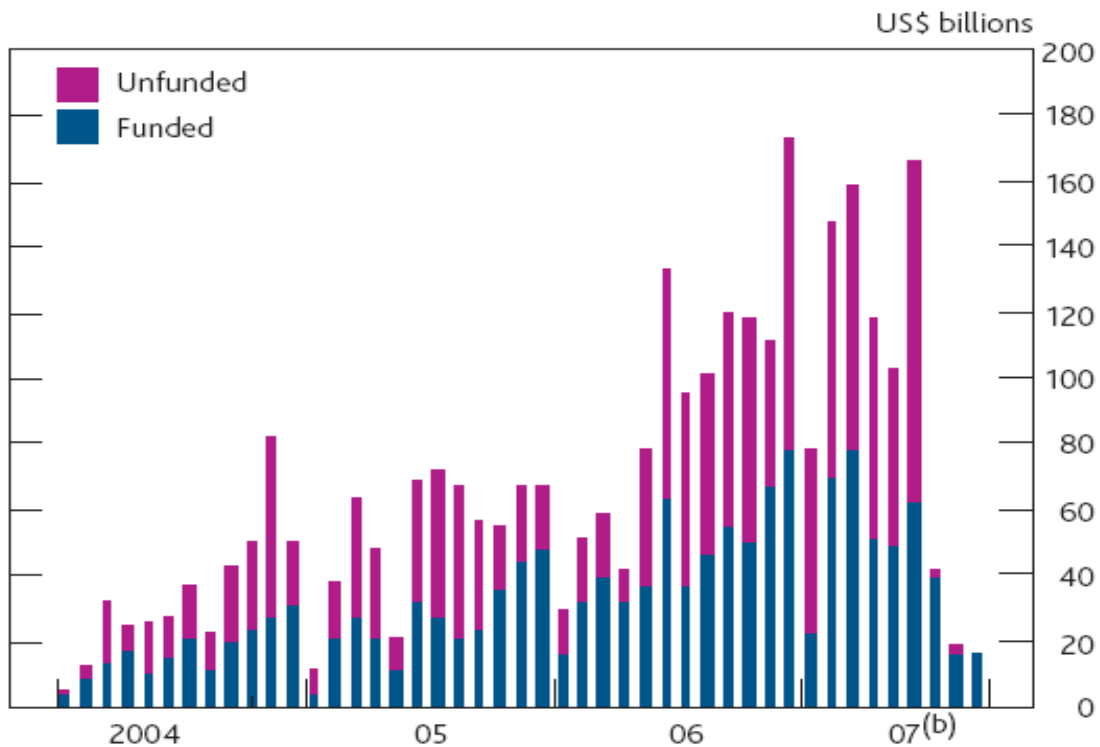


Figure 2

Global collateralised debt obligation issuance



Northern Rock Case Study

The global market financial turmoil during the summer of 2007 was triggered by developments in the rapidly growing sub-prime mortgage (SPM) market in the US. A high proportion of such mortgage loans were securitised and also combined into instruments such as CDOs. These in turn were rated by rating agencies although, in hindsight, in a misleading way in that a CDO would be given a high rating based on only the small proportion of loans within it that was low risk.

The mortgage-backed securities (MBS) and CDOs were purchased by banks around the world, hedge funds, and conduits established by banks either for themselves or clients. Such purchases were funded in the main by the issue of short term securities (e.g. asset-backed commercial paper) and in some cases received lines of credit from banks including banks initiating securitisation programmes.

Problems emerged at various times during 2007 as a result of a combination of factors: a decline in house prices in the US, the impact of the earlier rise in US interest rates, large-scale defaults on SPMs (during 2007 repossession in the US reached a thirty-seven year high), and a sharp decline in the prices of mortgage-backed securities.

Above all, both the primary and secondary markets in SPM securities effectively closed and concern developed over the exposure of some banks in the market. There was uncertainty, for instance, about which banks were holding MBSs and CDOs. In particular, some banks who were dependent on securitisation programmes encountered serious funding problems because of all these uncertainties. Issuing banks and their conduits faced both a liquidity constraint and a rise in the cost of funding as it became increasingly difficult to roll-over short-term debt issues. Liquidity in the inter-bank markets also weakened and a tiering of interest rates emerged during the summer.

Banks encountered funding difficulties because of their uncertain exposure to the weakening MBS market, or because of their commitment to provide lines of credit to MBS holders. There was also concern that some banks would be required to hold on their balance sheets mortgage assets they had originally intended to securitise and sell. Overall, there was a sharp movement away from the MBS market.

All of this created considerable market uncertainty in the summer months of 2007 which led to a sharp fall in many asset classes, considerable uncertainty as to the risk exposure of banks, credit markets dried up and most especially those focussed on asset backed securities, and liquidity dried up in the markets for MBSs and CDOs. Overall, there was considerable uncertainty regarding the true value of credit instruments (partly because the market had virtually ceased to function effectively) and the risk exposure of banks. As a result, a loss of confidence developed in the value of all asset-backed securities on a global basis. This was the general context of some banks (and notably NR) facing funding problems.

The liquidity problem became serious because securitisation vehicles such as conduits and SIVs were funding the acquisition of long-term mortgages (and other loans) by issuing short-term debt instruments such as asset-backed commercial paper. As liquidity dried up, banks could not finance their off-balance-sheet vehicles and were forced to take assets back on to the balance sheet or hold on to assets they were planning to securitise. This effectively amounts to a process of re-intermediation.

Although NR was not exposed to the US SPM market, it became caught up in all this because of its business model: securitisation as a central strategy, and reliance on short-term money market funding. It faced several related problems: it could not securitise and sell new mortgage assets and hence needed to keep assets on the balance sheet that it had intended to sell, and it faced a sharp rise in interest rates in the money market with the result that borrowing costs (even in the event that it could borrow at all) rose above the yield on its mortgage assets.

The most serious dimension from a systemic point of view was the run on deposits at NR. Clearly, statements to the effect that the bank was solvent did not convince

Northern Rock Case Study

depositors. In any case, a bank run can be rational if all depositors believe the bank is solvent but also believe that all other depositors believe it is not.

THE RESCUE OPERATION

A traditional role of a central bank is to act as a lender-of-last-resort (LLR) to illiquid solvent banks. In order to limit the moral hazard, this is done against good quality collateral and at a penalty rate of interest. In order not to aggravate a temporary liquidity problem of a bank by panicking depositors to withdraw funds, in the past in the UK this has been done on a covert basis and without publicity at the time. The BOE now judges (though this has been challenged by the European Commission) that current requirements of transparency mean that any such support must be public.

In the UK, the ultimate responsibility for authorisation of support operations by the BOE in a financial crisis rests with the Chancellor of the Exchequer (UK equivalent to the minister of finance). There are two reasons for this. Firstly, it is a political decision whether or not a bank is to be supported. Secondly, any such support exposes the tax payer to a potential risk in the event that the institution proves not to be solvent.

In the event, NR received six forms of official support:

- 1) The BOE's role of LLR was activated on September 14th 2007 at a penalty interest rate of 1.5 pp above Bank Rate,
- 2) The government subsequently offered to guarantee all existing NR deposits,
- 3) The LLR role was subsequently extended in that NR was given an additional unlimited facility at the BOE secured on the collateral of all NR assets,
- 4) On 9th October 2007 the government applied the guarantee not only to existing deposits but to all new retail deposits,
- 5) The guarantee applied not only to retail deposits but to most other creditors,
- 6) The loan facility would remain available to any buyer of the bank.

Combined, this was an unprecedented package of official support and the first time ever that any British government had guaranteed bank deposits. Although, at the time the liquidity support was announced both the FSA and the BOE announced that the bank was solvent, depositors began to withdraw funds on a large scale. This could have been prevented had the government announced its full guarantee of deposits at the time assistance was sought rather than (in response to the run on deposits) several days later.

The qualification of support was that: "this liquidity facility will be available to help NR to fund its operations during the current period of turbulence in financial markets while NR works to secure an orderly resolution of its current liquidity problems." At the time, the FSA judged that NR was solvent, exceeded its regulatory capital requirement, and had a good quality loan book.

NR was forced to seek such assistance because deposits had begun to be withdrawn, and it was unable to securitise its mortgage loans as had been planned because of funding problems in the wholesale markets and the virtual closure of the asset-backed commercial paper (ABCP) market. This meant that it unexpectedly needed to hold the assets on its own balance sheet. In effect, the BOE was taking mortgage loans as collateral from a bank that could not fund its operations in the market. Irrespective of any penalty in the interest rate, this amounted to a big subsidy.

One of the issues that has arisen, and related to the question of whether central bank support can be offered on a covert basis, is the question of any stigma attached to borrowing from the lender of last resort. There is clearly some merit in this argument in that for three days after the announcement of the support operation retail depositors withdrew funds from NR on a large scale: they were clearly not assuaged by the

statements (including from regulators) that the bank was solvent. It was only after the government announced a full guarantee of all deposits that the drain ended.

A MULTI-DIMENSIONAL RISK PROBLEM

The particularly significant aspect of the NR episode is that it was multi-dimensional in that several issues came together in a single case study. Several key dimensions are identified:

1. **The low-probability-high-impact (LPHI) risk.** As has been argued, the NR had a particular business model that exposed it to a low-probability risk (that liquidity would dry-up in the inter-bank and commercial paper market) but one that would have a high-impact (inability to continue to fund its business operations).
2. **The Business Model.** NR had a particularly hazardous business model which seems not to have been sufficiently monitored by the supervisory authority. Northern Rock was the only major UK bank to have securitisation as the centre-piece of its business strategy.
3. **Solvency v. Liquidity.** A distinction is conventionally made between the *solvency* and *liquidity* of a bank. This distinction is more difficult to make in practice than in theory. At the time of writing (October, 2007) NR remained legally solvent and yet was dependent on BOE funding because it could not fund its operations in the markets. However, there must be a question about this concept of solvency when applied to a bank which: (1) has serious funding problems in the open market, (2) where the cost of funding exceeds the average rate of interest on the bank's assets, and (3) when it is dependent on support from the BOE.
4. **Deposit Protection.** Major fault-lines were revealed in the British deposit protection scheme.
5. **Role of Government.** The government intervened in an *ad hoc* manner by arbitrarily guaranteeing all deposits held at NR (and, by implication, all banks in similar circumstances) which was contrary to the well-established deposit protection scheme. This raises issues of credibility regarding whatever deposit guarantee system is in place.
6. **Moral hazard.** Serious moral hazard issues have been created with respect to depositor protection and the role of the BOE's money market operations.
7. **Corporate Governance.** The NR episode raises important issues regarding corporate governance. In particular, did the Board of the bank exercise due care with respect to the risk profile of the bank? What is the responsibility of the Board of a bank in this crucially important dimension? This raises the question of the practical ability of a Board (most especially the non-executive directors) to monitor the risk-taking activities of the management of a bank and, by extension, the interests of the depositors.

The significance of the NR affair is, therefore, that it is multi-dimensional in nature. Virtually everything that could go wrong did go wrong. This is the ultimate significance of the NR case and why it is such an important case study.

We now consider each of these dimensions in turn.

RISK MATRIX: LPHI RISKS

Risk analysis always needs to consider the *probability* of an event occurring and the *impact* (or seriousness) in the event that it does occur. LPHI risks are amongst the most difficult to manage, and the history of banking crises around the world (both individual and systemic) indicates that a high proportion occur when a bank (banks) finds itself operating in this area of the matrix. This is partly because it tends to induce *disaster myopia* where low-probability risks (even if they have high impacts) are discounted

Northern Rock Case Study

altogether and behaviour is implicitly based on the assumption that the probability is zero. These are difficult risks to handle also because it is not realistic to price for them: this might, for instance, involve an attempt to price a risk that could destroy the bank! The only realistic option is to limit the bank's exposure to such risks.

Although the FSA adopts a similar methodology in its risk-based approach to supervision, supervisors can also be subject to the same disaster myopia in the case when LPHI risks emerge. It may also be difficult for a supervisor to intervene when detecting a LPHI risk most especially if, to date, the bank's behaviour has yielded good results, and no obvious problem has yet emerged.

Our central thesis is that NR's highly focussed business strategy involving a high and unusual dependency on securitisation and short-term wholesale market funding exposed it to such a LPHI risk. The drying up of liquidity in the relevant London and international markets was a very low probability event (it is difficult to recall when it last occurred) and yet would have a large impact and be serious for banks with business models that relied heavily on securitisation and short-term funding through these markets. It would also appear that, while some generalised warnings about liquidity risks had been made from time to time, supervisors did not take action in the case of NR which suggests that they may have been subject to disaster myopia.

THE NR BUSINESS MODEL

A central theme has been that the central problem for NR was its particular business model that exposed itself to a LPHI risk. The particular business model of NR was that it pursued a strategy of fast growth in mortgage lending based on a high proportion of wholesale market funding together with planned securitisations of its mortgages.

There were, however, two particular features of NR's business model: (1) the relative importance of wholesale funding compared with other banks, and (2) the fact that securitisation was an integral and dominant part of the bank's strategy and business model. Furthermore, it would appear that the bank did not take out any form of liquidity insurance through, for instance, agreed lines of credit with other banks. Table 1 shows the significantly higher proportion of wholesale funding in the case of NR (62 percent) compared with the average of 45 percent for other UK banks in the sample.

Table 1
Source of Funding (%)

	Retail Deposits	Wholesale Funding	Ratio
Alliance & Leicester	44	48	0.92
Barclays Bank	58	42	1.38
Bradford & Bingley	48	52	0.92
HBOS	50	50	1.00
LloydsTSB	61	39	1.56
Northern Rock	30	62	0.48
Royal Bank of Scotland	62	38	1.63

This model proved to be viable for several years as short-term funding could be rolled-over on normal terms. However, the LPHI risk in this strategy was a combination of three particular risks: (1) the bank or its conduits would be unable to roll-over maturing funding, (2) the cost of such funding would rise relative to the yield on mortgage loans

that it kept on the balance sheet and not securitised, i.e. it would be forced to pay some form of “penalty” interest rate, and (3) that it would be unable to securitise those mortgage assets that it intended to. The LPHI risk was, therefore, that it would be either unable to roll-over its short-term funding in the event of a serious liquidity squeeze or that the necessary roll-over funding could only be secured at high interest rates.

SOLVENCY V. LIQUIDITY

One central issue that arose in the NR affair was the question of *insolvency v. illiquidity*. The traditional view is well established: that it is the role of a central bank to lend to, and support, banks which are solvent (assets exceeding liabilities) but illiquid (not having the immediate liquidity to repay depositors on demand). The conditions for central bank support are well established and go back to Bagehot’s (1873) famous dictum: the bank should be solvent, the support should be at a penalty interest rate, it should be against good collateral, and it should be temporary. The danger of not offering support in these conditions is that a solvent but illiquid bank may be forced to sell assets in a fire-sale at a discount to the nominal value. Dependent on the size of the discount, this could turn an otherwise solvent bank into insolvency. Secondly, a forced insolvency of a solvent bank would involve unnecessary economic and social costs.

The question arises as to what the precise meaning of insolvency is for these purposes. This can be viewed at three levels:

1. **Legal insolvency:** the bank is insolvent in that the current value of its assets (measured at book value) is less than the value of liabilities. Thus, even if the bank were to liquidate all of its assets it would not be able to repay all depositors and other creditors.
2. **Forced insolvency:** the bank is legally solvent (as 1 above) but if, because it cannot fund its operations, it is forced to liquidate assets it could do so only at less than nominal values (fire-sale) and this would make it legally insolvent (value of assets falls below those of liabilities).
3. **Business insolvency:** the bank is legally solvent (as 1 above) but its current funding costs (which are likely to continue) exceed the average rate of return on its assets and hence it would soon become insolvent as it would be making losses and would eventually exhaust its equity capital.

The distinction between illiquidity and insolvency is, therefore, not always clear cut and, under some circumstances, illiquidity can force a solvent institution to become insolvent. Furthermore, if depositors know that the bank is illiquid, they may be induced to withdraw deposits which in turn forces the bank to sell assets at a discount in order to pay out depositors. Given that banks operate with a relatively low equity capital ratio, the fire-sale discount does not need to be very large to exhaust the bank’s capital and force it into legal insolvency.

In the case of NR, at the time the crisis emerged it was not legally insolvent. But it certainly faced an acute liquidity squeeze which forced it to borrow from the BOE as an alternative to asset sales. Furthermore, it was also “insolvent” (at least at the time) on a business basis in that its borrowing from the BOE (at the penalty rate of at least 6.36 percent) exceeded the bank’s average rate of interest on assets of around 6 percent. Northern Rock had operated on a very fine interest margin for some time which meant that, while it was successful in generating business in the short-term, it was vulnerable to either a liquidity squeeze or being forced to borrow at penalty rates either in the market or through the BOE. On the other hand, there was always a possibility that the liquidity squeeze would end and the bank could again be able to fund at normal market interest rates, most especially if the general level of interest rates were to decline.

DEPOSIT PROTECTION

The NR affair brought to the surface underlying weaknesses and inconsistencies in the UK’s deposit protection scheme (DPS) designed to compensate depositors in the event of

Northern Rock Case Study

a bank's insolvency. Deposit protection serves three main purposes: (1) to offer a degree of social protection to holders of small bank deposits, (2) to remove the incentive for contagious bank runs, and (3) to make it easier and, to some extent, less costly to allow banks to fail. The original purpose when it was first introduced in the US in the 1930s was to remove the incentive to withdraw deposits from solvent banks when other banks were failing: in this sense, it was designed more as an instrument of financial stability than consumer protection.

Two central issues, both of which emerged in the debate about NR's predicament, relate to coverage (what limit should be placed on the size of deposits protected, and whether, for instance, inter-bank deposits should be included), and the element of co-insurance (i.e. whether, as in most insurance, cover within the limit is to be less than total). Herein lies the central dilemma of deposit protection. If coverage is total (there is no co-insurance) a serious moral hazard risk arises in four respects. Firstly, depositors have no incentive to consider the risk characteristics of their banks. Secondly, they might have incentives (as was allegedly the case in the US Savings and Loans crisis) to deliberately seek out high-risk banks because, if the banks did not fail depositors would retain the generally higher interest rates being offered, whereas if they were to fail depositors would be fully compensated. This amounts to a one-way put option in favour of choosing high-risk banks. Thirdly, banks might also have incentives to adopt high-risk profiles because they know their depositors will be protected in the event of failure. Fourthly, if protection is total the pricing of risk is distorted as it is no longer necessary to offer depositors a risk premium in the rate of interest which effectively subsidises risk and causes it to be under-priced. The existence of deposit protection represents a powerful case for the regulation of banks: to avoid the moral hazard being exploited.

The other part of the dilemma, however, is that if coverage is less than complete, and there is an element of co-insurance, depositors will withdraw deposits in the event that doubts arise about the solvency of a bank. Depositors are likely to withdraw funds in the event that they are exposed to any risk of losing any amount (even small) of their deposits. In which case, partial insurance is likely to be ineffective. The dilemma, therefore, is that deposit protection is likely to be either ineffective if it is partial, or subject to moral hazard in the event that it is complete.

ROLE OF THE GOVERNMENT

A unique feature of the NR affair was the role of the government. When the supervisory authorities' announcement that the bank was solvent and safe failed to abate the run on deposits, the government took the unprecedented move of guaranteeing all deposits at NR irrespective of size. This latter requirement was also to be extended to all new deposits and customers although a fee would be charged to NR plus a percentage of any new deposit inflows. This was presumably to allow the bank to offer services to customers while at the same time preventing the bank (shareholders) benefiting from the BOE's support.

In effect, the tax-payer absorbed the risk of NR becoming insolvent. In this event, the government would effectively have claim over NR assets. It also implied that the tax-payer took the risk of a fall in house prices which, in the event of insolvency, could mean that, in the case of borrowers defaulting on high loan-value ratios, the value of some of the houses taken into government possession would be less than the defaulted mortgage. This difference would be a cost to the tax-payer.

There are substantial implications of this unprecedented intervention by the government. Firstly, it will have created a clear perception that depositors in any bank subject to a run of deposits will be protected in full. In effect, depositor risk has effectively been socialised and the DPS has been made redundant. Secondly, it undermines the credibility of the formal DPS. Thirdly, it is likely to undermine the credibility of any subsequent scheme that is likely to emerge. Fourthly, with *de facto* total protection cover, the standard moral hazard has been intensified. For all these reasons, the long-run implications of the unprecedented guarantee of the government are substantial.

Northern Rock Case Study

An important precedent has been created in that, under some unspecified circumstances, the government will step in to guarantee bank deposits over and above whatever the DPS specifies. What does this imply for *caveat emptor* ("let the buyer beware")? It must be an open question in depositors' minds what future circumstances will call forth such a guarantee. The moral hazard is that, once the principle of such guarantees has been established, it is difficult to limit its applicability in depositors' perceptions. Is it, for instance, reasonable to assume that such a guarantee would be forthcoming in all future "unusual circumstances"? Furthermore, what would define such circumstances? The government has uncovered a minefield of potential moral hazard because it is unknown what the circumstances would be where the government would not offer a similar guarantee to that in the NR case.

MONITORING AND CORPORATE GOVERNANCE

In the final analysis, all aspects of risk management in a financial firm are corporate governance issues in that the Board has ultimate responsibility for the fortunes of a company. The NR episode raises several questions regarding the role of the Board of NR, and most especially the role of the non-executive Directors. In particular, to what extent did the Board understand the implications of the bank's strategy, and especially the risk characteristics?

It is instructive to distinguish between *formal*, *informal* and *market* monitors of banks. *Formal* monitors are those agencies which are given explicit responsibility for supervision: in the case of the UK this includes the FSA, the BOE and bank Boards. *Informal* monitors, on the other hand, include the media, consumers' associations, academic analysts, etc. *Market* monitors include rating agencies, other banks, bank analysts, etc. While each group has a different focus, and may represent different interests, they all in their own way perform monitoring or supervisory roles.

The wider question is two-fold: (1) whether the various supervisors/monitors of the bank were conducting their formal or informal supervisory roles effectively, and (2) whether they had sufficient information about the risk characteristics of the bank to make informed judgements. The central point is that, while criticisms may focus on official agencies (the FSA in particular), it is evident that there was a generalised failure of monitoring and appreciation of the risks that NR was taking. In terms of the LPHI risk, there seems to have been a collective *disaster myopia*.

POSITIVE OUTCOMES

There are some positive features to the NR affair. Firstly, it demonstrated the importance of both banks and their supervisors considering the risk characteristics of business models and undertaking robust stress-tests. Some business models are clearly more vulnerable than others and most especially to some LPHI risks. Secondly, reform of the DPS was needed because of its internal inconsistencies, and the NR affair performed the useful role of bring this to the fore and to the public's consciousness. Thirdly, it has emphasised the importance of effective governance arrangements within financial firms.

Furthermore, the episode has brought two other central issues to the attention of the public: the role of government and the possible underwriting of risks by the tax-payer, and the general question of moral hazard.

CONCLUSIONS

Our central theme has been that the NR episode is a multi-dimensional problem, and reflects a complex set of inter-related problems. Bringing together some of the strands of the analysis, several lessons can be learned and need to be addressed:

- There needs to be a greater focus on liquidity management,
- Business models of banks need to be subject to more rigorous stress tests,
- There needs to be greater transparency in financial instruments,

Northern Rock Case Study

- Equally, there needs to be greater transparency with regard to banks' risk exposures including their off-balance-sheet vehicles,
- Deposit protection arrangements need to be reviewed and made more credible,
- A review is needed of the role and operation of rating agencies.
- LPHI risks need to be more explicitly considered and managed,
- Pricing of risk,
- Governance arrangements within banks need to be considered most especially with respect to the role of the Board in monitoring risk models.

Several important moral hazard issues have also been identified associated with the BOE's money market operations, its LLR role, and the deposit protection arrangements.

This paper is an abbreviated form of a longer paper which includes extended reference to the part played by the UK regulators and supervisors, the activities of the Central Bank and the government and the impact on the UK deposit protection scheme.

REFERENCES

Bagehot, W (1873), *Lombard Street: A Description of the Money Market*, Henry S King, London.

BOE, (2007), "Turmoil in Financial Markets: What Can Central Banks Do?" Evidence to House of Commons Treasury Committee, London, 12th September.

BOE, (2007a), *Financial Stability Report*, London, October.

British Bankers Association, (2007), *The Credit Crunch: Implications and Changes Required*, London, October

Carmichael, J, Alexander Fleming, and David T Llewellyn, (2004), *Aligning Financial Supervisory Structures with Country Needs*, World Bank Institute, Washington.

Financial Services Authority, (2007), Evidence on Northern Rock to the House of Commons Treasury Committee, October.

Goodhart, C A E (2007), "Liquidity Risk Management", unpublished.

Goodhart, C A E, Philip Hartmann, David Llewellyn, Liliana Rojas-Suarez, and Steven Leisured (1999), *Financial Regulation: Why, How and Where Now?* London, Routledge.

Healey, J (2001), "Financial Stability and the Central Bank: International Evidence", in Richard Brealey, et. al. eds, *Financial Stability and Central Banks*, London, Routledge.

H M Treasury, (2007), *Banking Reform- Protecting Depositors: A discussion paper*, London, October.

Llewellyn, D T (2004), "Institutional Structure of Financial Regulation and Supervision: The Basic Issues", chapter 2 in, eds. Carmichael, J, Alexander Fleming, and David Llewellyn, *Aligning Financial Supervisory Structures with Country Needs*, World Bank Institute, Washington.

Luna-Martinez. J and Thomas A Rose, (2003), "International Survey of Integrated Financial Services Supervisors", *Policy Research Working Paper*, 3096, World Bank, Washington, July.

Masciandaro, D (2003), "Central Banks and Single Authorities: A Delegation Puzzle", Bocconi University, Milan.

Oosterloo, S and Jacob de Haan, (2003), *A Survey of International Frameworks for Financial Stability, Occasional Studies*, Vol. 1, No., 3, Amsterdam, De Nederlandsche Bank

The Economist, (2007), "Credit Markets", August 4th