Lending to 'Lemons'

Adverse Selection and the Failure of New Bank Tokyo

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Abstract

Financial markets have been shown to be susceptible to the negative economic consequences of information asymmetry and adverse selection. In this dissertation, I show how the theory of adverse selection in bank lending is reflected clearly in a recent case of Japanese bank failure – New Bank Tokyo – and I identify a potential new rationale for the Akerlof process in bank lending that is not predicted by the literature. Moreover, by modelling the lending pattern of the bank, I demonstrate that it failed to achieve its stated objective of revitalizing the economy of Tokyo, and failed to make a substantial impact on the problematic 'middle-risk gap' in the Japanese interest rate structure. I conclude that the project was a suboptimal allocation of financial resources to an imprudent lending institution.

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I. Introduction

Adverse selection has long been associated with the financial markets. References to the phenomenon appeared in Royal Mint discourses at least five centuries ago[1] and there exists a broad body of literature on the subject ranging from the descriptive writings of early scholars through to the theoretical models of modern economists. However, it is unusual to come across a case of a financial institution that entered a market prone to adverse selection without implementing standard risk techniques, and then continued to pursue its business model even when faced with mounting losses. The circumstances of New Bank Tokyo[2], a failed Japanese lender, is such a case and presents an opportunity to observe the theory of adverse selection reflected in the real-world operations of a troubled financial institution. The case also introduces a potential new rationale for the Akerlof process[3] that is not predicted in the literature.

New Bank was established as a private bank with 100 billion yen of financial capital from the Tokyo Metropolitan Government and 20 billion yen from the private sector. It commenced business in April 2005 with the objective of revitalising the economy of Tokyo by providing finance to support struggling small and medium enterprises in the city[4]. The detailed prospectus for the bank described a new model for Japanese banking characterised by robustness, profitability and efficiency[5]; however, the bank was unable to match the expectations and within three years it had lost 102 billion yen and reported doubtful debts[6] significantly higher than those of its banking peers. It appealed to the Tokyo Government for an injection of new capital and, in March 2008, an additional 40 billion yen of public money was approved under a recovery plan that called for a drastic

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[1] Sir Thomas Gresham in a letter to Queen Elizabeth I on the debasing of currency (Gresham 1558).
[2] Translated from the Japanese, Shinginkō Tokyo. www.fsa.go.jp/en/news/2004.html
[3] The process by which adverse selection emerges, and which will be explained in detail in Section II.
[4] New Bank Master Plan, 6. http://newbanktokyo.wordpress.com
[5] Ibid., 71–72.
[6] Doubtful debts are those whose recovery is questionable but have not yet been classified as bad debts. What constitutes 'questionable' is determined by the relevant jurisdiction. For example, one classification of doubtful debts are those that are more than three months overdue (Shōkō Chūkin 2010, 16).

revision of the bank's business model, including senior management changes, staff cuts, branch closures and a comprehensive overhaul of systems and procedures (Nikkei Shinbun 2008j, 2010b). Underlying the bank's failure was its inability to implement successfully a unique business model that targeted borrowers in a specific area of Japanese lending: the middle-market. Borrowers in this market are of a credit quality that implies middle-risk, and who might, rationally, be expected to attract a commensurate interest rate: a middle-risk rate. However, in Japan, lending institutions make few loans at such a middle-risk rate; instead, loans are clustered around low rates or high rates with little in between. Schaede (2005) refers to this distortion in the interest rate structure as a 'middle-risk gap', and says it is a symptom of a poorly developed market for small-firm finance. She argues that the reasons for its existence are systemic, political and structural; moreover, she believes that it is an impediment to financial system reform.

In this dissertation, I use qualitative analysis to show how the theory of adverse selection is reflected clearly in the reality of New Bank and I identify a potential new rationale for the Akerlof process that is not predicted in the literature. Thereafter, I use quantitative analysis to model the bank's lending pattern and test whether its operations had any mitigating effect on the pronounced middle-risk gap identified by Schaede, and whether it achieved its stated objective of revitalising the local economy.

Before proceeding, in order to provide a suitable context within which to convey the predicament of New Bank, I will present the bank's doubtful-debt ratios in a comparative analysis with two of its peers: the first is Shōkō Kumiai Chūō Kinko (Shōkō Chūkin), the government-affiliated small business lender; the second is the average of New Bank's fellow Japanese regional banks. The figures, displayed in table 1, are calculated in accordance with the provisions of the Financial Reconstruction Act 1998, *kinyū saisei hō*[7], and show that New Bank's doubtful-debt ratio is extraordinary, reaching as high as ten times that of Shōkō Chūkin and more than six times that of the regional banks. New Bank claimed to have strong lending systems, qualified senior management and a technological advantage[8], yet its doubtful debts eclipsed those of its contemporaries.

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[7] In addition to the method presented here, Japanese banks also disclose doubtful debts in a second form governed by the banking laws and referred to as risk management loans, *risuku kanri saiken*.
[8] New Bank Master Plan. http://newbanktokyo.wordpress.com

Table 1. Doubtful debts for years ending 31 March

	2006	2007	2008	2009	2010
New Bank Tokyo	0.9%	6.4%	12.7%	16.8%	19.8%
Shōkō Chūkin	4.7%	4.1%	3.5%	2.4%	1.9%
Regional Bank Average	4.4%	3.9%	3.7%	3.3%	3.0%

Source: annual reports of New Bank Tokyo, Shōkō Chūkin and Chiginkyō, 2006 to 2010.

Table 1 demonstrates clearly the exceptional size of New Bank's doubtful-debt ratios; however, the analysis overlooks some potentially relevant factors. For one, I have compared New Bank's portfolio, consisting entirely of loans extended since 2005, with portfolios that are the result of many decades of lending activity. A more exhaustive analysis would, subject to the availability of data, compare New Bank's portfolio with the portfolio of *new loans* made by the other banks since 2005. Moreover, I have taken no account of the 2002 implementation by the Japanese government of the Financial Revival Program[9], known as the 'Takenaka Plan', which required banks to take a firmer stance in recognising and dealing with bad debts and, consequently, had a positive effect on the doubtful debts of existing banks (Hoshi and Kashyap 2010). At the same time, however, the Takenaka Plan threatened banks with a business improvement order if they did not respond adequately to the financing needs of small and medium enterprises[10], a stance that had the potential to increase doubtful debts. Thus, the Takenaka Plan could have affected the ratios of banks in both directions, and an extensive analysis would seek to account for this variable.

The remainder of this paper consists of a review of the literature on adverse selection and its mitigation techniques in Section II, and a discussion of the methodology of the study in Section III. Section IV explains New Bank's banking model and the technology on which it is based, while Sections V and VI bring together the qualitative evidence of adverse selection and present the statistical tests. Finally, conclusions and recommendations are offered in Section VII.

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[9] Financial Services Agency. www.fsa.go.jp/policy/kinsai/index.html
[10] Mizuho Holdings received such an order in January 2003. www.fsa.go.jp/news/newsj/14/ginkou/f-20030131-3.html

II. The Theory of Adverse Selection

Adverse selection is one of the possible consequences of asymmetric information. In financial markets it exists when one party to a transaction has information about the risks of the transaction that the other lacks, and uses that information when negotiating the deal (Cohen and Siegelman 2010, 39). However, adverse selection is not limited to financial markets: it is a phenomenon seen in many fields, including the labour market (Greenwald 1986), gambling (Chezum and Wimmer 2000), the mating rituals of toads and arachnids (Frank 1988; Zeh, Zeh, and Bermingham 1997), and, famously, used cars (Akerlof 1970).

In his seminal work on the subject, Akerlof explained adverse selection by reference to the used-car market showing that poor-quality cars, *lemons*, cause good-quality cars to be removed from the marketplace, leaving only the lemons: a condition of adverse selection. In Akerlof's model, the buyer of a second-hand car is unable to ascertain whether any given vehicle is good or bad, so he is willing to pay only the expected value of all second-hand cars. However, sellers of good cars are unwilling to sell them at the expected value because, by definition, it is lower than the true value of the vehicle they own. Thus, they remove their good cars from the market in an 'Akerlof process' (Evans 2008, 1013), the theoretical extreme result of which is a market consisting solely of poor-quality automobiles.

In the same way that a used-car buyer does not know the true quality of a car, nor does a lender know the true quality of a borrower, or that borrower's true propensity for using borrowed money to finance risky endeavours. If we project Akerlof's example onto the lending market, we can consider that a bank, not knowing the true risk profile of potential borrowers, will lend at an interest rate commensurate with the average risk profile of all borrowers. Low-risk borrowers will not take money at such an interest rate because it is higher than the rate their profile should justifiably command. High-risk borrowers, on the other hand, may perceive the average rate to be attractive and borrow willingly. The low-risk borrowers go elsewhere leaving only high-risk, Akerlof-type lemons.

Focussing on the role of the interest rate charged by the lender, we can explore the logic behind the Akerlof process by considering the model proposed by Stiglitz and Weiss (1981). A borrower will use a loan to generate income and will keep for himself any

surplus over and above that required to repay it. If there is insufficient income to repay it he will default, with his loss being limited to payments already made to the lender; his downside is limited. On the other hand, if the income generated is in excess of the loan amount then he will reap the whole of the surplus; his upside is theoretically limitless. High-risk borrowers tend to seek high payoff projects from which they expect a high surplus and, therefore, they can 'accept' a higher interest rate. Low-risk borrowers, on the other hand, seek more conservative low payoff projects and cannot accept high interest rates. Thus, higher interest rates deter low-risk borrowers but not those of high-risk. Fixing the interest rate on loans, then, is a problem for banks because the rate has a function other than that of determining a market-clearing equilibrium: it is an instrument that determines the quality of the borrower and, hence, the quality of the loan portfolio (Besley 1994, 35).

Banks generally understand the dual function of interest rates, and fear it. In the Stiglitz and Weiss model, when faced with an excess demand for loans a bank will resort to credit rationing rather than raise interest rates to a market-clearing equilibrium because it is wary of the phenomenon described above. The model shows the existence of an interest rate at which the expected return to the bank is maximised, above which the bank will not lend, considering loans made at a rate higher than the 'bank-optimal' rate to have a lower expected return than the current portfolio. It describes an equilibrium characterised by credit rationing in which some borrowers will be granted loans while other observationally identical borrowers will not, even though they might be willing to pay a higher interest rate.

Theoretical models of adverse selection, such as those referred to above, are clear about the existence of the phenomenon in markets that are characterised by persistent informational asymmetries. One such market is that targeted by New Bank, the middle-market, which has also been referred to as one in which a lender is 'apt to attract all the "lemons" and thereby make a loss' (Akerlof 1970, 499). Borrowers in this market are referred to as middle-market firms or small and medium enterprises (SME), although the set of such firms is indefinite, there being no generally-accepted definition of a middle-market firm[11]. Often they are described by reference to the volume of sales, or the assignation by banks of an internal credit rating (Berlin 1996, 5; Treacy and Carey 2000). It may be helpful, then, to comprehend the middle-market and its asymmetric problems by reference to a market that is less problematic. Consider the 10 largest corporations in any

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[11] Note that for capital ratio calculation purposes the BIS defines a small and medium enterprise as one having sales of less than $65 million (Altman and Sabato 2007, 353).

major industrialised nation. They will almost certainly be listed on a regulated stock-exchange, produce regular financial statements audited by a professional accountancy firm, and publish investor relations statements, all of which serve to transfer information to the investing community, abating asymmetry and bringing clarity to the firm's credit risk. Middle-market firms, on the other hand, are unlikely to be listed, might not be subject to strict financial statement requirements and might offer only incomplete financial data, resulting in an intensity of information asymmetry and an inability of investors to assess the firm's credit risk. Thus, there exists a continuum of credit risk running from low to high and, logically, there should be a similar continuum of interest rates that can be matched with each firm's risk. In Japan, this is not the case. Instead, most financing is clustered around low or high interest rates, creating a space in the middle that has been referred to as a 'missing area' (Hirata and Shimizu 2004, 6) and a 'middle-risk gap' (Schaede 2005, 149). By deliberately aiming for this missing area, New Bank was, in some respects, attempting to fill the gap and develop a new lending market in Japan. Such a business model might be risky but it is not inherently flawed because asymmetric information and the adverse selection problem that characterises the gap can be resolved, to some extent, by the transmission of information from the 'haves' to the 'have-nots' through screening and signalling.

In his pioneering work on signalling, Spence (1973) famously analysed the process of hiring as that of an investment decision under uncertainty, and argued that firms may consider an individual's level of education as a *signal* of productivity; the signal transmits information from the job-seeker to the employer. Studying the insurance market, Rothschild and Stiglitz (1976) found that insurance companies, by offering a variety of contracts at varying prices and with varying quantities of insurance, could obtain information about the accident probabilities of individuals, thus abating the information imbalance and reaching an equilibrium.

In the credit markets there are a variety of signalling and screening mechanisms that can reduce the effects of *ex ante* information gaps, including self-investment, collateral, personal guarantees, relationship building and knowledge gathering. Leland and Pyle (1977, 371) use the proverb 'actions speak louder than words' to describe the powerful signal of self-investment by an entrepreneur in a project for which he is borrowing funds. His willingness to invest serves as a signal of the true quality of the project, transferring information to the lender. Collateral is also widely used in credit markets because, like

self-investment, a willingness to pledge collateral similarly serves as a strong signal of the quality of a project. When lenders cannot directly observe the probability of repayment, a low-risk borrower who is prepared to pledge collateral can distinguish himself from riskier candidates who, being more likely to lose the assets pledged, prefer to pay a higher interest rate instead (Bester 1985, 1987). When there is a long-standing relationship, the mitigation devices may be less formal. Ward (1960) gives the example of small-scale fishermen and their fish dealer in 1950s Hong Kong. The fishermen, who were invariably in debt to the fish dealer from having borrowed money at some time to buy or repair gear, gave the fish dealer a lien over their future catches. The fish dealer did not require legally-defined collateral but was content with the implied security of future catches combined with the knowledge gathered through his long-standing relationship with the fishermen. Ward's example continues by describing a similar relationship among the fishermen, their groceries and a local shopkeeper who succinctly sums up the essence of *relationship* as a reducer of the risk inherent in asymmetric information (1960, 155):

> I give credit to anyone who anchors regularly in our own bay; but if it is someone
> I don't know well, then I think twice about it unless I can find out all about him.[12]

In Japan, banks have traditionally relied on guarantees, collateral and, importantly, ongoing monitoring as devices to mitigate asymmetric information; moreover, given the tendency to enter into long-term relationships, large banks carefully screen clients before a relationship is initiated (Corbett 1987, 36–46). For all banks, including Japanese banks, rigorous implementation of the mitigation techniques studied in the literature can reduce exposure to the effect of adverse selection, while their absence might indicate vulnerability to it.

Two broad themes are evident in this review of the theory of adverse selection with respect to bank lending: the relationship between interest rates and adverse selection, and the availability of adverse-selection mitigation devices. In Section V, I will show that New Bank's business model does not appear to acknowledge Besley's dual function of interest rates, contrasts strongly with the Stiglitz and Weiss model by appearing to offer finance to all comers, and explicitly abandons Corbett's traditional Japanese methods of mitigation without implementing an alternative. However, before I begin the analysis of the case, I will proceed to a discussion of the research design for this study.

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[12] Also quoted in Akerlof (1970, 499) but with a minor modification.

III. Methodology and Limitations

I have combined qualitative and quantitative techniques in a mixed-methods research design, as defined broadly by Tashakkori and Creswell (2007, 4). In this section, I will introduce the qualitative method of data collection, leaving a discussion of the quantitative methodology until Section VI, when I present the results of the statistical tests.

The objective of the qualitative study is to examine the bank's proposed and actual operations in the light of the theory of adverse selection. The original source of information regarding the bank's proposed operations is the New Bank Master Plan. Published in February 2004, it is a detailed, polished and lengthy Japanese language document in which the proposal for the new bank is delineated in its entirety. Until the bank's failure, the document could be downloaded from the bank's official website, but it has since been removed. However, I obtained a copy from a private source in Japan and have uploaded it in electronic form to a publicly-accessible web page[13]. In an iterative process, I progressively narrowed the analysis of the document from its totality to focus on components that can be associated with the theory of adverse selection such as objectives, products, interest rates, evaluation methods and risk control devices.

Regarding the bank's actual operations, I constructed a narrative by reference to a time series of event data obtained from the Japanese financial press. Utilising the electronic database Nikkei Telecom21 as the sampling frame, I employed a purposive sampling technique to sample articles from the *Nikkei Keizai* family of newspapers (*Nikkei*). The population is all articles in the *Nikkei* from 1975 to the present day; my initial sample construct was any article published between 2003 and 2010 that contained the Japanese word for New Bank Tokyo[14] in the headline and comprised more than 1,000 words[15]. The date condition, expressed as a database search criterion, ensured inclusion of articles prior to the establishment of the bank, through to the implementation of its recovery plans. The word-count condition ensured the selection of articles with a reasonable depth of information. Its implementation was, however, problematic, because the Nikkei Telecom21 database does not offer word count as a search criterion. To overcome this

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[13] http://newbanktokyo.wordpress.com
[14] The Japanese word is 新銀行東京.
[15] More precisely, the criterion was 1,000 Japanese characters.

obstacle I developed a Microsoft Excel spreadsheet to exploit a word-count text field that is attached to each article in the search results; by so doing, I was able to supplement the database search facility as explained in detail in Appendix II. I constructed a preliminary timeline of events from the 56 articles that were sampled by this method. Thereafter, I repeated the process using Boolean logic, without a word-count condition, to extract additional articles on particular aspects of the bank's operations that I felt were not adequately covered in the initial sample. For example, a search of the two terms 'New Bank Tokyo' and 'scoring'[16] would return a series of event data related to the bank's method of assessing potential borrowers. Using a similar sampling technique with the electronic database Asahi Kikuzo II as the sampling frame, I obtained an additional 39 articles from the *Asahi* family of newspapers and magazines. Appendix I contains a timeline of New Bank events.

Newspaper data suffer from a number of biases including selection bias and description bias; moreover, the method in which articles are obtained can lead to researcher bias (McCarthy, McPhail, and Smith 1996). 'Selection bias' describes whether an event is reported at all, and is determined by factors such as the media attention cycle, the impact of the event and the type of newspaper. It is apparent in the *Nikkei*. For example, my sample extended across eight years, yet 36 percent of the initially-sampled articles were published in the twelve-month period between June 2007 and May 2008, the same period in which New Bank reported large losses and appealed for more taxpayer money. However, as the objective was to gather factual information about events in the bank's history, and I complemented the initial sample with secondary, iterative samples, I do not consider the clustering of articles to be troubling.

'Description bias' refers to the manner in which an event is reported, and can be subdivided into three forms: omission of information, misrepresentation of information, and framing (Earl et al. 2004). To address the possibility of description bias, I conducted a data triangulation exercise, as proposed in Denzin (1970), in which I carried out an informal comparison between the *Nikkei* articles, the *Asahi* articles and the official financial reports of the bank. Although I identified one or two minor errors in the

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[16] The Japanese word is スコアリング.

newspaper reports of the bank's financial results[17], I did not discover any material difference in the reporting of events.

On the subject of researcher bias, I do not believe there was any partiality in the initial sample construct, although I acknowledge that the choice of 1,000 words as determining 'reasonable depth of information' is not statistically defined. In the second and subsequent search iterations, what constituted 'adequate coverage' was a subjective judgement; however, in being aware of the potential for researcher bias I believe I was able to take informal measures to minimise it.

Limitations of the Research

In this study, I examine the relationship between New Bank and adverse selection, and I also make enquiries into the bank's objectives and its effect on the middle-risk gap. However, there are many more parts to the puzzle that could be investigated. For example, there is the important question of why senior management continued to implement the prescribed plan even after suffering unexpectedly large losses. Perhaps it was due to political pressure, negligence, moral hazard or a simple lack of knowledge. Without direct access to the main actors it would be difficult to answer this question; it is worth noting that New Bank is suing its former senior management and answers may emerge during the proceedings (Asahi Shinbun 2010b).

Moreover, there are a number of alternative hypotheses, unrelated to adverse selection, that purport to explain the losses but which I have not examined. For example, a 'business conditions' hypothesis might argue that the bank's loan book adequately reflected a normally distributed borrower population and that it was an exogenous set of dire business circumstances that unexpectedly caused the bankruptcy of sound borrowers. Another hypothesis contends that New Bank started with a population of borrowers that was not normally distributed but consisted solely of poor-quality firms who were unable to build relationships with existing banks: in other words, the distribution was skewed. The bank's systems successfully captured the best borrowers from the population but the population was such that even the best were still of poor quality. The 'political interference' hypothesis reasons that political pressure caused the bank to lend irresponsibly and

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[17] For example, a Nikkei article reported the target loan balance for March 2006 as 258 billion yen when, in fact, it was 274 billion yen (New Bank Tokyo 2006; Nikkei Shinbun 2006e).

impaired the ability of senior management to react. In Court, the bank itself is arguing the case for yet another explanation: negligence (Asahi Shinbun 2010b). None of the hypotheses are implausible and a more detailed study might conclude that they all played a part.

Finally, I have mentioned only briefly the political implications of the bank's establishment and subsequent bail-out. It is clear that the bank was initiated by a political heavyweight: Tokyo Governor Ishihara Shintarō. Indeed, it was regularly referred to as Ishihara Bank in reference to its promoter (Yamada 2004; Nikkei Shinbun 2008k, 2009e). A fuller study might address the complex relationship between politicians and the bank.

I will now proceed to examine the details of the case, beginning with an analysis of the transaction banking business model designed by the Tokyo Government and described in the New Bank Master Plan.

IV. Transaction Banking and Credit Scoring

The Tokyo Government envisaged New Bank as a new class of bank in Japan: a regional transaction bank[18]. In this term, 'regional' refers to a specific geographical area of operations, in this case Tokyo, while 'transaction bank' describes a banking model that relies on *hard* quantitative data as the basis for decision making. It stands in contrast to relationship banking in which banks gather *soft* qualitative information about their borrowers, building relationships over time (Boot and Thakor 2000; Berger and Frame 2007). Figure 1 shows the Master Plan's vision of New Bank as a regional transaction bank.
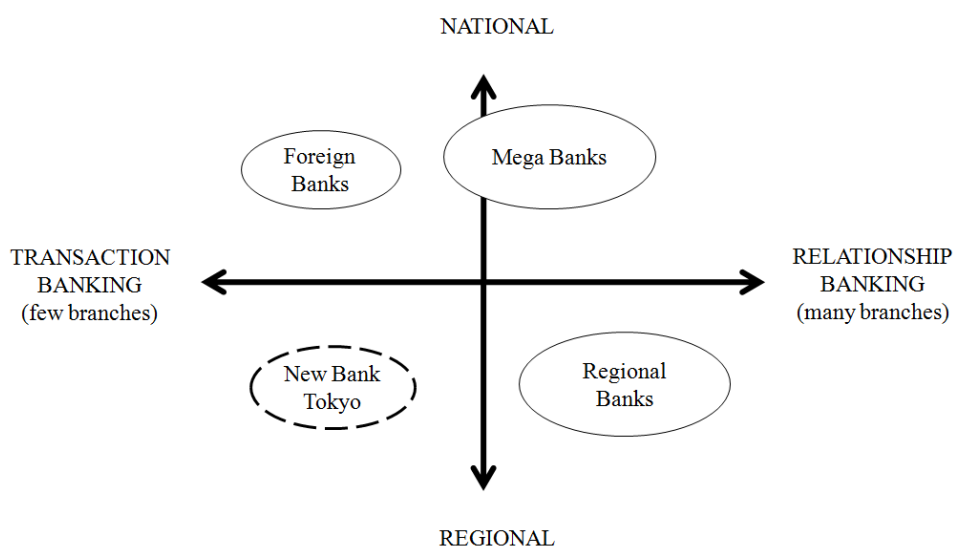
Figure 1. Positioning of New Bank Tokyo as a regional transaction bank (adapted and translated from the New Bank Master Plan, 9) [19].

The two banking models of transaction and relationship are not mutually exclusive and many banks combine the techniques of both. For example, Shōkō Chūkin, another Japanese lender to small and medium enterprises (SMEs), employs a variant of the Berger and Frame discretion model, using quantitative data for preliminary screening but basing

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[18] New Bank Master Plan, preface. http://newbanktokyo.wordpress.com
[19] A mega bank is a large bank with a national chain of branches such as Mizuho Bank and Mitsui Sumitomo Bank. A regional bank is one which operates in a specific geographical area such as Aomori Bank and Hiroshima Bank.

actual loan decisions on the qualitative judgement of loan officers (Shōkō Chūkin 2001, 12–15). In contrast, New Bank sought to implement a business model that was almost entirely transaction banking, making lending decisions on the basis of the output of a statistical scoring model that attempted to predict the probability that a credit applicant would default[20]. This form of technology-based statistical scoring, when used for SME lending purposes, is called small business credit scoring (SBCS).

Pioneered in the United States in the mid-1990s, SBCS involves analysing quantitative, personal consumer data about a firm's owner, along with often sketchy financial data about the firm itself, to produce a statistical credit score which is then used as the basis for a lending decision (Berger and Frame 2007). Relative to the labour-intensive and time consuming traditional model of relationship lending, SBCS is growing and has already proven successful in the United States (Berger 2010). The main advantages include cost and time savings, a reduction of opacity problems and greater accuracy of contract terms; there are also broader, macro-benefits such as an expansion in the overall quantity of small-firm lending and increased competition among lenders (Berger and Frame 2007). The accurate measurement of small business credit risk can also lead to lower capital requirements under the Basel Capital Accord (Altman and Sabato 2007). However, SBCS also has drawbacks such as higher default rates and control problems when scores are merely purchased from a third-party vendor (Berger and Frame 2007).

Japanese lending institutions began to adopt SBCS as a stand-alone framework for SME lending in the early 2000s. In 2001, Sumitomo Trust Bank launched a scoring-based lending facility called 'Businext'. It was followed in 2002 by Mitsui Sumitomo Bank with its 'Business Select Loan' program (Nikkei Shinbun 2005a) and Mitsubishi Tokyo Financial Group with a similar facility (Nikkei Shinbun 2004a). Each of these innovations involved the respective bank working closely with a large Japanese consumer finance lender. Business was brisk and the 2005 *Nikkei* article reports that collateral-free, scoring-based loans extended to SMEs by the big four Japanese banks[21] doubled in the year to December 2004. Further, a study by Hasumi and Hirata (2010, 2) reports that, as of 2006, around 5 percent of the loan books of major banks and regional banks comprised scoring-based loans. The authors identify three drivers of this increased use of *techno-lending* by Japanese banks: advances in information technology that have enabled the development of

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[20] New Bank Master Plan. http://newbanktokyo.wordpress.com
[21] Mitsubishi Sumitomo Financial Group, Mizuho Financial Group, Mitsui Sumitomo Financial Group, and Resona Holdings.

large SME databases; Financial Services Agency (FSA) encouragement of collateral-free lending; and the Basel Capital Accord advantages demonstrated by Altman and Sabato. Cost benefits do not appear in Hasumi and Hirata's aforementioned drivers, which is surprising given that an earlier Bank of Japan (BOJ) study[22] found that an overwhelming majority of Japanese bank users of SBCS do so in order to reduce the cost and time of making a loan. However, the main focus of the 2010 paper was to model the profitability of SBCS loans rather than to evaluate the benefits of the technique; independently, Hasumi concurs with the BOJ and Berger and Frame that cost and time savings are a driver[23].

Nevertheless, Japanese banks' adoption of SBCS as a stand-alone lending model does not appear to have been successful and, although it saw robust growth in the early years, from 2005 it declined as banks recorded actual default rates higher than those predicted by the models[24]. For example, the Businext venture did not show a profit in its first three years of operations despite the promising combination of consumer-lending knowledge and banking (Nikkei Shinbun 2005a), and in 2010 it was reported that both parties to the venture were looking to sell the business (Asahi Shinbun 2010a). A number of explanations have been proposed as to why the new technology has not been successful in Japan, including omitted variable bias in the scoring models and the unreliability of Japanese SME financial statements (Hasumi and Hirata 2010, 12–13). However, the main reason appears to be the lack of an input that is considered critical to the successful implementation of SBCS: reliable consumer credit data on the firm's owner (Berger and Frame 2007; Durkin and Elliehausen 2010). It is critical because consumer credit data are used to evaluate the risk profile of the borrowing firm's owner and, by association, the firm itself. It is the techno-lending model's adverse-selection mitigation device which replaces the foregone traditional mitigation devices of collateral and guarantees. In the United States the data come from large, publicly accessible credit bureaux such as Experian, which claims to have up-to-date credit information on more than 220 million American consumers[25]. By comparison, in 2007 the Bank of Japan[26] reported that there is no public access to consumer credit bureau information in Japan, rather it is limited to members of the same financial service category; for example, banks cannot access personal credit histories accumulated by credit card companies. As of 2010, Hasumi and

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[22] Bank of Japan Financial System Report 2007. www.boj.or.jp/en/research/brp/fsr/fsr07b.htm
[23] Personal communication, 12 August 2011.
[24] Bank of Japan Financial System Report 2007. www.boj.or.jp/en/research/brp/fsr/fsr07b.htm
[25] www.experian.com
[26] Bank of Japan Financial System Report 2007, 60. www.boj.or.jp/en/research/brp/fsr/fsr07b.htm

Hirata do not consider that the situation has materially improved. In the absence of US-style consumer credit information, Hasumi and Hirata and the BOJ both conclude that a business model which combines transaction and relationship banking is probably more suitable to the Japanese lending environment. Neither the BOJ nor Hasumi and Hirata refer to the Credit Risk Database (CRD), a Japanese association that was established in 2001 to collect and share SME financial and non-financial data[27]. It has 193 financial institution members and, according to its latest annual report, data on around three million enterprises. It is possible that the nature of the data, being firm level rather than individual, causes them to be less useful in credit scoring models than consumer credit data.

The large banks and consumer credit lenders that were in the vanguard of scoring-based lending in Japan were merely testing the new technology. They understood why Berger and Frame (2007, 18) refer to consumer credit data as 'a critical element' in the model: such data are the model's adverse-selection mitigation device. New Bank, on the other hand, committed itself wholly to the new technology without any such mitigation device.

In the next section I continue the analysis of the Master Plan and introduce observations from the sampled media reports to develop the case for adverse selection.

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[27] www.crd-office.net/CRD/index2.htm

V. The Qualitative Evidence for Adverse Selection

In Section II, I introduced literature that explains why a banking model that offers comparatively high interest rates but does not employ adequate mitigation devices is vulnerable to the negative effects of adverse selection. In this section I will show that the New Bank Master Plan confirms the intention to introduce comparatively high interest rates, to abandon traditional adverse-selection mitigation techniques and is almost silent on consumer credit data as a mitigation replacement. I will also introduce reports from the financial press that confirm the reality of the model in operation and its propensity to drive out good borrowers from the market in a classic Akerlof process; I will, moreover, identify a potential new rationale for the process that is not predicted in the literature.

New Bank proposed to lend to SMEs in three formats: portfolio loans, future prospects loans and syndicated loans. It also proposed to offer guarantees to *shinkin*[28] on their loans to SMEs. Table 2 summarises the bank's lending model and confirms that lending decisions were to be made according to the results a statistical scoring test. However, there is also a catch-all so that even firms in financial distress who failed the statistical test could get financing as long as they could show positive future cash flows; presumably such cash flows could be forecasts from new projects in which the firm intends to invest the borrowed money. This assessment method has the characteristics of a 'negative list' similar to that of the government-sponsored small business loan guarantee scheme under which all firms can apply other than those explicitly excluded (Miwa 2010, 76). In New Bank's model, excluded firms appear to be limited to large enterprises and criminal organisations. It should be noted that there is a provision for the qualitative assessment of the firm's management in order to reject those that are connected with criminal organisations, but the extent to which such checks were made is unclear and the bank did, in fact, make loans to criminally connected firms (Nikkei Shinbun 2008g).

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[28] *Shinkin* is an abbreviation of *shinyō kinkō*, a type of cooperative financial institution. www.shinkin-central-bank.jp/index_fin_e.html

Table 2. New Bank Tokyo's lending model

	Portfolio Loans	**Future Prospects Loans**	**Syndicated Loans**	**Guarantees**
Description	Financing based on a quantitative assessment of recent financial information, the absence of a negative opinion from an outside credit agency, and an acceptable qualitative assessment* of the firm's management.	Financing for firms that are currently in financial difficulties but have bright future prospects due to technological or other skills. A failure in the quantitative test will not prevent financing if future prospects are good.	Financing for firms in financial difficulties and which are being supported by their regional main bank. Quantitative assessment and restructuring plan required.	Part-guarantee, in return for a guarantee fee, of loans made by *shinkin* to SMEs.
	Catch-All In all cases, technically insolvent or heavily indebted firms are eligible to apply and will be judged on their cash flows.			
Interest Rate	2% to 8%	2% to 8%	1% to 12%	N/A
Size	50 million yen	100 million yen	Unspecified	50 million yen
Tenor	Max 5 years	Max 3 years	5 to 10 years	Max 5 years
Collateral	None	None	Case by case	None
Guarantee	None	None	Case by case	N/A

Source: adapted and translated from the New Bank Master Plan, 15–23.

* For example, background credit and anti-social behaviour checks on the firm's owner, actual interviews or on-the-spot investigations and other such qualitative methods.

The lending model as described in table 2 appears to disregard the possibility of adverse selection. That is, the bank intends to pursue a high interest rate strategy while explicitly abandoning the traditional adverse-selection mitigation techniques. According to the *Nikkei* (2006e), it successfully implemented the high interest rate strategy, achieving an average rate on loans to SMEs of over 6 percent in its first year of business. Considering, first, that the average interest rate on Japanese SBCS loans in 2005 was around 4.5 percent (Ono 2005) trending down to 3 percent by 2009[29], second, that rates offered by *shinkin* in the early 2000s were considerably lower still (Schaede 2005) and, third, that the government-sponsored guarantee scheme requires a fee of just 1 percent (Miwa 2010), New Bank's rates are comparatively high. Furthermore, the bank is explicitly abandoning collateral and personal guarantees, and does not appear to replace them with the modern technique of consumer credit data analysis. The terms of the portfolio loan do require the absence of a negative opinion from a credit agency, but that is not the same as requiring a positive result from the active analysis of detailed consumer credit data. Thus, the Master

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[29] RIETI Survey on Small Business Credit Scoring Loans, 2009, referenced in (Hasumi and Hirata 2010, 9).

Plan decrees a business model that is, according to the theory, likely to face an adverse-selection problem through the setting of high interest rates combined with a disregard of mitigation devices.

These findings are corroborated by the financial press, with media reports confirming the comparatively high interest rates and suggesting a lack of mitigation devices. As mentioned above, the *Nikkei* reported that the average interest rate on New Bank's loans to SMEs in the first year of business was over 6 percent. It also reported that the rate on some loans had been set at 10 percent, that the rates compared unfavourably to those offered by *shinkin* and that they caused surprise among applicants (Nikkei Shinbun 2006e). For example, according to Miyake Kazuo, president of a small firm called Epic Homes, the bank offered him funds at a rate of 7 percent, which he turned down, claiming the appropriate rate for the best SMEs to be just 1 percent, and for his own firm no more than 3 or 4 percent (Nikkei Shinbun 2008c).

The banking model itself received a negative reaction in the financial press, being identified as inherently unstable. Financial journalist Yamada Atsushi (2004) made the observation that 'firms with no financing will be swarming around the open window', while the *Nikkei* (2004d) commented that, in the absence of strong assessment skills, New Bank will attract nothing other than failing firms that have been turned away by existing banks. Toritani Reiko, a senior director of Fitch Ratings in Japan, was reported as saying that the bank 'is looking to take on board the risks that everyone else wants to avoid' (Nikkei Shinbun 2005a). Itabashi Kazuhiko, president of a small firm called Hexard Incorporated, compared New Bank unfavourably to the relationship-banking *shinkin* who visit his company every month, stressing that face-to-face meetings are indispensable for small-firm lending (Nikkei Shinbun 2008c). A New Bank employee is quoted as saying: 'The only borrowers that come to us are those with a high risk of default that have been turned away by other banks' (Fujii Akira 2008). Finally, Hasumi and Hirata (2010, 14) argued that the 'vast majority' of the bank's loan applicants were firms that had already been rejected by other banks, while the *Nikkei* claimed that the bank attracted pariah borrowers (Nikkei Shinbun 2007a).

It is a clear reflection of the theory that high interest rates cause good borrowers to be driven away leaving a market populated by bad ones. Moreover, we can also observe a potential new rationale for the flight of good borrowers that is independent of the

economic-loss rationale predicted in the literature. This new rationale is flight due to reputation risk. In March 2008, at the time New Bank was appealing for additional public capital, the National Conference of the Association of Small Business Entrepreneurs sent its members a questionnaire regarding the bank[30]. Of the respondents, 60 percent thought that the bank should be wound up, while 6 percent feared that borrowing from New Bank *would give them a bad image*. As I showed in Section II, the theory of adverse selection predicts a 'sorting of potential borrowers' in which good ones will avoid a lender who charges a high interest rate (Stiglitz and Weiss 1981, 393). In contrast, the questionnaire reveals that some borrowers in Japan avoided a lender because they feared reputation damage. Specifically, they perceived that taking money from New Bank would transmit a 'minus image'[31] to the market. Thus, in a 'sorting' that was not predicted by Stiglitz and Weiss, good borrowers, who care about their image, avoided the bank, leaving behind those who cared little. It is a contradiction of the positive signal normally associated with firms who receive new credit lines (James 1987) and renewed credit lines (Lummer and McConnell 1989), and it inverts the adverse-selection mitigating effect of reputation acquisition in the lender-borrower relationship (Diamond 1989; Martinelli 1997). On the other hand, it is similar to the refusal of some institutions to accept government capital injections during financial crises for fear of appearing weak and suffering reputation damage (Corbett and Mitchell 2000). This potential new rationale for adverse selection is bank specific and could represent an interesting development in the theory. It requires further investigation in a future study.

I have presented, above, substantial qualitative evidence that New Bank was vulnerable to the effects of adverse selection. I have also presented, in Section I, hard evidence that the bank suffered abnormally high bad debts, a type of loss that is closely associated with adverse selection. However, it is not the case that New Bank's losses were due solely to that phenomenon. In fact, New Bank incurred significant losses from its underlying banking operations *before* accounting for bad or doubtful debts. In table 3 I have analysed, reconstituted and restated in a simplified form the publicly-disclosed profit and loss accounts of the bank for the years ending March 2006 to March 2011. As the shaded row in the table shows, the results of business operations were negative before doubtful-debt reserves in all years and, as of 31 March 2011, a total of 47 percent of cumulative losses, including those written off against capital, were due to items other than reserves for

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[30] 'Urgent questionnaire regarding the 40 billion yen investment in New Bank Tokyo'. www.tokyo.doyu.jp/pdf/0326-2.pdf
[31] Ibid.

doubtful debts. The bank reported a net profit for 2010 and 2011 but, in both cases, it is due to a write-back of prior years' doubtful-debt provisions.

Table 3. New Bank Tokyo restated profit and loss accounts for years ending 31 March

	2006	2007	2008	2009	2010	2011
Operating income	3,648	11,631	10,323	9,431	6,730	6,717
Operating expenses before doubtful debts	-16,628	-24,003	-21,947	-12,452	-9,030	-7,418
Operating loss before doubtful debts	-12,980	-12,372	-11,624	-3,021	-2,300	-701
Charges for doubtful debts	-7,968	-27,807	-3,287	-9,058	-82	-13
Operating loss	-20,948	-40,179	-14,911	-12,079	-2,382	-714
Exceptional items	-16	-14,536	-1,820	1,514	‡ 3,932	‡ 1,800
Net profit / loss	-20,963	-54,715	-16,731	-10,565	1,550	1,086
Cumulative losses	* -30,201	-84,916	-101,648	† -112,213	-110,663	-109,577

Source: New Bank Tokyo annual reports 2006 to 2011.

Note: the annual reports contain rounding errors.
* The bank made of loss of 9,236 related to establishment costs for the year ending March 2005.
† In the official accounts, cumulative losses to the end of 2008 are absorbed in 2009 by a capital write down.
‡ Mainly income gained by the write-back of earlier provisions for bad debts.

It is outside the scope of this paper to investigate the full details and causes of operating losses before doubtful debts, but I will refer to the *Nikkei* for at least one contributing factor. The bank offered an attractive rate on deposits and exceeded substantially its target for deposit balances while equally failing in its target for lending balances (Nikkei Shinbun 2007g); it paid out more in interest than it received.

In this Section, I have brought together persuasive qualitative evidence that New Bank was operating in the presence of adverse selection. I have established that the banking model was designed without regard to theoretical knowledge and I have introduced media reports that chronicle a process predicted by the theory. In addition, I have identified a potential new rationale for the Akerlof process that is not predicted by the literature: reputation risk on the part of the good borrower. However, I have also shown that not all of the bank's losses can be attributed to adverse selection. In the next Section, I will use statistical techniques to consider questions related to the bank's lending pattern, the middle-risk gap and the revitalisation of Tokyo's economy.

VI. Statistical Analysis

Creswell (2007) suggests a holistic approach to the case-study method in which multiple perspectives are reported. Following this design, I have modelled New Bank's lending pattern to test whether its operations had any mitigating effect on the pronounced middle-risk gap identified by Schaede (2005), and whether it achieved its stated objective of revitalising the economy of Tokyo[32]. In the first investigation, I have tested for an association between New Bank's lending and total middle-risk lending in Japan. In the second, I have used the Tokyo Industrial Production Index as a proxy for 'revitalisation' and have tested for an association between the bank's lending pattern and changes in the Index. Both tests use a first-differenced dependent variable and three independent variables, two of which are dummy variables.

In the remainder of this section I will describe the time series and their sources and, following the recommendation of Cohen (1990), will offer a graphic representation of the data to illustrate their intuitive power. Thereafter, I will explain how I addressed the problem of non-stationarity and, finally, I will present and interpret the results of the tests.

The Data

I have used three time series: the volume of middle-risk lending by all banks (*MIDLEND*); the Tokyo Index of Industrial Production, (*INDEX*); and the volume of SME lending by New Bank, (*NEWLEND*). In order that Schaede's examination of the middle-risk gap might be extended, the start date of *MIDLEND* is January 2002 to coincide with the final year of her study. The start dates of *INDEX* and *NEWLEND* are the first dates for which the data are publicly available: January 2003 and March 2005, respectively. The end date for all series is March 2011. However, I conducted the statistical tests on data for the four-year period, March 2005 to March 2009, during which the bank was active in the lending market, first rapidly increasing and then rapidly decreasing its assets. Lending by New Bank since March 2009 is only 35 percent of its peak in March 2007.

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[32] New Bank Master Plan, 6. http://newbanktokyo.wordpress.com

Middle-risk lending by all banks, *MIDLEND,* is total bank lending at interest rates of 5–8 percent; the source of the data is the publicly-available time series database maintained by the Bank of Japan[33]. I communicated directly with the Financial Statistics Group at the Bank in order to comprehend their non-standardised system of time series labelling and confirm the suitability of the data for use in this test, as recommended by Denscombe (2010, 267). Figure 2 is a plot of *MIDLEND* and shows a persistent and extended diminution in middle-risk lending. Schaede argued that the middle-risk gap is an impediment to financial system reform, yet not only has it continued, it has become ever more acute[34]. The downward trend reversed prominently in 2006, but the reversal was temporary.

Figure 2. Middle-risk lending at 5–8 percent, January 2002 to March 2011 in units of 100 million yen. The time series exhibits a clear trend-shift between 2006 and 2007. If plotted as a proportion of total lending, the data exhibit a similar trend, having fallen by almost 70 percent since January 2002.

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[33] Series codes DL'DLIRK_DLIR2DBTL02 to DL'DLIRK_DLIR2DBTL62. www.stat-search.boj.or.jp/index.html
[34] *MIDLEND* represents only a part of the 5–15 percent middle-risk gap examined by Schaede. My reason for narrowing the analysis is that New Bank's actual lending policy did not extend to interest rates above 8 percent and, thus, I do not reasonably expect the bank's operations to have affected the middle-risk gap above that rate. The Master Plan did envisage financing at rates of up to 12 percent in syndicated loans, as shown in table 2; however, the bank does not appear to have engaged in a significant volume of such business and, by 2006, syndicated loans had disappeared from the product line-up (New Bank Tokyo 2006, 14–17).

The Tokyo Index of Industrial Production is a time series published by the Statistics Division of the Tokyo Metropolitan Government[35] and is reported in the Tokyo Statistical Yearbook, under the category of Manufacturing Industry and sub-category of Indices of Industrial Production. The latest available Yearbook is for 2009, so I obtained the data for 2010 and 2011 from the general website of the Statistics Division under the category of Main Statistical Information and sub-category of Industrial Indices[36]. In January 2007, the Index was restated so that the average for 2005 became 100 and, to provide a consistent annual time series, annual index averages for 2003 to 2006 were restated and published by the Statistics Division; restated monthly data was not published. However, using the relationships between the original monthly data and the original annual averages, I was able to restate monthly data for 2003 to 2006 with reference to the new base year. This generated a consistent monthly time series from 2003 to 2011. Figure 3 is a plot of *INDEX*.

Figure 3. The Tokyo Industrial Production Index from January 2003 to March 2011 showing a steep decline in 2008.

I have used industrial production, in the form of *INDEX*, as a proxy for revitalisation. But it could be argued that a better measure is the gross domestic product of Tokyo; however,

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[35] www.toukei.metro.tokyo.jp
[36] www.toukei.metro.tokyo.jp/otoukeisho/toukeisho.htm.

to conduct a test on that statistic would require an independent reckoning because, officially, it is calculated on an annual basis only[37].

I constructed the time series for New Bank's lending pattern, *NEWLEND*, through an analysis and recalibration of cross-sectional lending data taken from the 13 financial statements, including interim statements, published by New Bank between March 2005 and March 2011. The bank maintained two lending platforms: one to small and medium enterprises, and the other to stronger firms with better borrowing credentials. The Master Plan refers to this second quantity of lending as being at low interest rates to low-risk companies[38]. It is not SME lending nor is it middle-risk lending; therefore, I have excluded it from the data by applying the borrower category ratios disclosed in the financial statements. Figure 4 is a plot of *NEWLEND*.
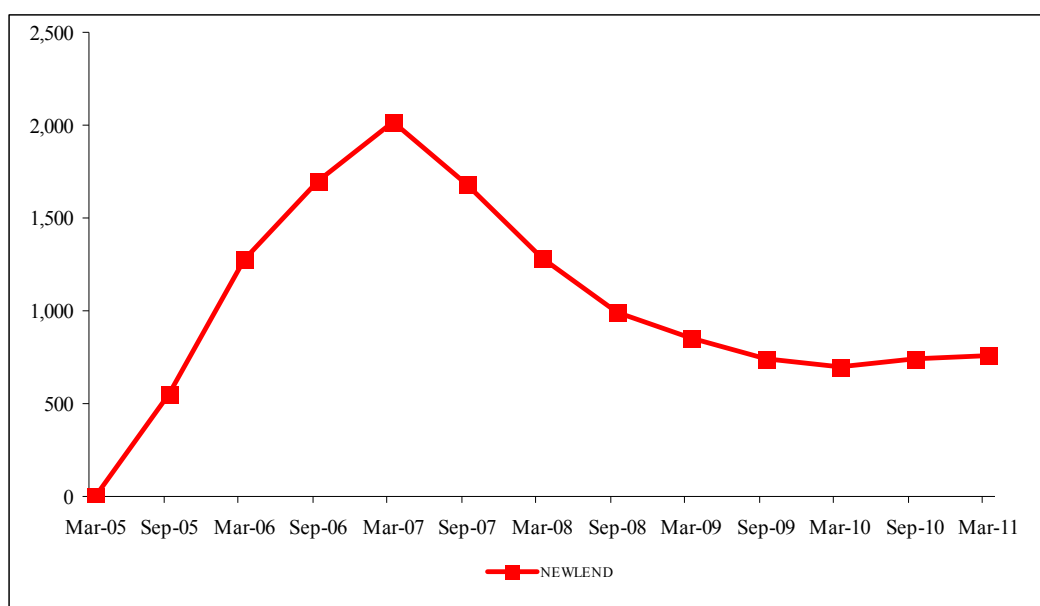
Figure 4. New Bank Tokyo SME lending from March 2005 to March 2011 in units of 100 million yen.

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[37] Personal communication with the Tokyo Government Statistics Division, 6 July 2011.
[38] New Bank Master Plan, 74. http://newbanktokyo.wordpress.com

Figure 4 shows that between March 2005 and March 2009, New Bank's lending balances rose and fell in a linear progression with respect to time, thereafter stabilising at a relatively low level. In fact, the periods March 2005 to March 2007, the 'ramp-up', and March 2007 to March 2009, the 'ramp-down', can be almost perfectly described by the linear function (1) in which α is the intercept, β is the coefficient on the explanatory variable time, t, and ε is the error term:

$$Y_t = \alpha + \beta\, t + \varepsilon_t \qquad\qquad (1)$$

This function describes 98 percent of the variation in *NEWLEND* during both ramp-up and ramp-down; that is, in each case, the regression gives the approximate result $R^2 = 0.98$. This is not surprising given the wealth of qualitative evidence that shows that the bank chased loans during the ramp-up (Nikkei Shinbun 2006b, 2006e; Suzuki 2007) and then rapidly withdrew during the ramp-down (Nikkei Shinbun 2007d). Thus, the hard, semi-annual data points are statistically linear, and the qualitative evidence shows that during the first four years of the bank's existence it vigorously increased loans and then similarly reduced them. Therefore, in order to construct a monthly time series, I calculated linear monthly data points between each semi-annual hard data point. Given the acute rise and fall of New Bank's loan book, and the almost perfectly linear function of the hard data points, I believe this to be a well-educated guess that gives an adequate representation of the underlying process, as advocated by Tabachnick and Fidell (2007, 66).

Figure 5 displays the normalised[39] time series *NEWLEND* and *MIDLEND* together, and Figure 6 displays the normalised time series *NEWLEND* and *INDEX*. Figure 5 is compelling, showing a clear, visual association between the emerging series of *NEWLEND* and the trend-reversal of *MIDLEND*. On the other hand, figure 6 is not visually exciting, displaying no obvious relationship between *NEWLEND* and *INDEX* other than a possible lagged association from July 2008. It might be surmised that the sharp fall in *INDEX* had more to do with the negative effect of the global financial crisis on Japan (OECD 2009) rather than New Bank's lending pattern. In any event, a visual examination of graphs is not a substitute for a statistical test (Koop 2009, 169) and, after providing descriptive statistics, I will proceed to explain how I resolved the problem of non-stationarity in the data.

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[39] Each observation divided by the maximum observation.
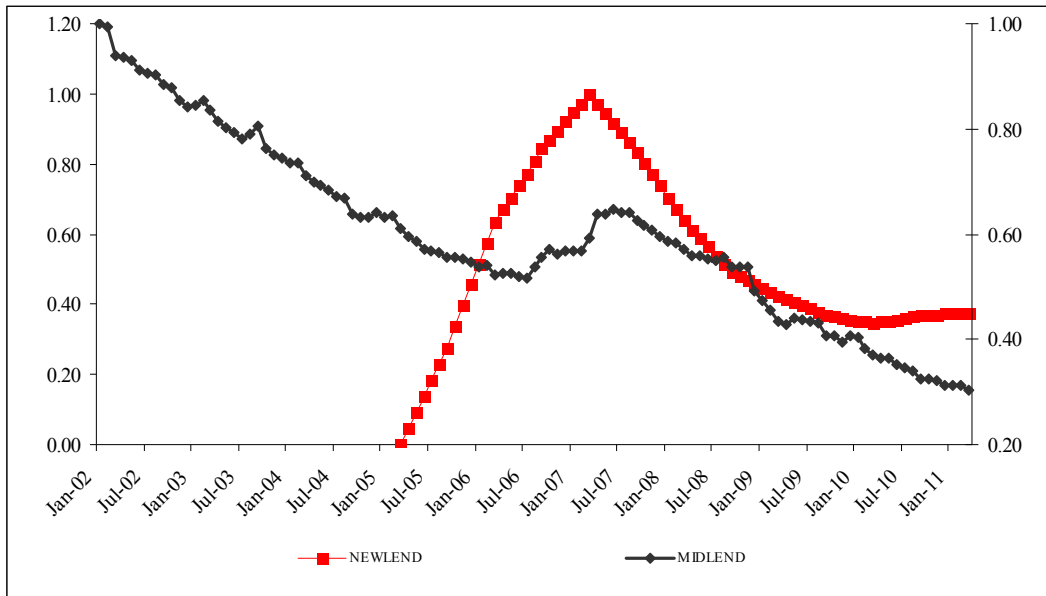
Figure 5. *NEWLEND* (left hand scale) and *MIDLEND* (right hand scale), normalised. There is a clear visual association between the emerging series of *NEWLEND* and the trend-shift in *MIDLEND*.
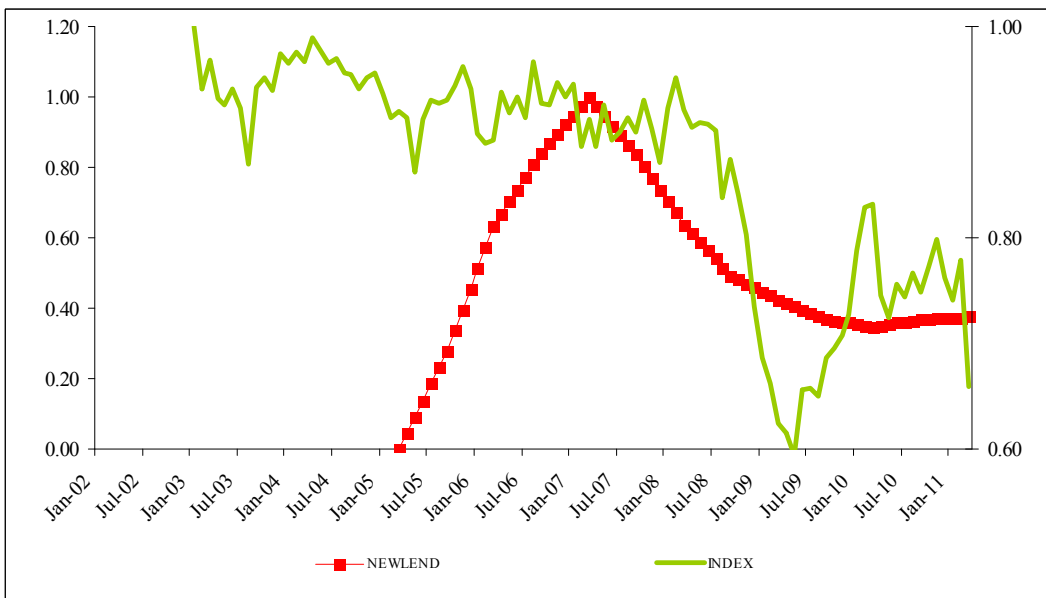
Figure 6. *NEWLEND* (left hand scale) and *INDEX* (right hand scale), normalised. There is no obvious visual relationship between the two time series.

The descriptive statistics of the time series for the period on which the tests will be conducted are shown in table 4.

Table 4. Descriptive statistics on time series: March 2005 to March 2009

	NEWLEND	MIDLEND	INDEX
Mean	1,224	19,206	96.41
Standard deviation	534	1,565	7.84
Minimum	1	14,784	67.60
Maximum	2,014	22,095	104.57
No. of observations	49	49	49

Note: units of ¥100m for *NEWLEND* and *MIDLEND.*

Hereafter, I will be working with the natural logs of the time series introduced above and will refer to them as *MIDLENDL*, *INDEXL* and *NEWLENDL*. There are a number of benefits of this transformation, including a closer relationship to the assumption of linearity that exists in the linear regression model, and increased simplicity in the interpretation of results in terms of elasticity (Koop 2009, 60-64).

The Problem of Non-Stationarity

The use of time series in regression analysis is complicated because of the existence of non-stationarity in some data sets. If a time series is non-stationary it can return spurious associations (Manuca and Savit 1996). It is necessary, first, to measure whether the data are non-stationary and, if they are found to be so, to convert them into a stationary form. The simplest way to identify non-stationarity is to view the data on a graph, because a time series that displays trend behaviour is often non-stationary. There are also formal tests such as the Dickey–Fuller test which tests a null hypothesis that the data are characterised by a particular kind of non-stationarity known as a unit root. If the Dickey–Fuller t-statistic is smaller than the critical value at a given confidence limit then the null hypothesis is

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rejected and a conclusion of stationarity is drawn. Table 4 shows the Dickey–Fuller test results for *MIDLENDL* and *INDEXL* for the period March 2005 to March 2009.

Table 5. Dickey–Fuller test for the period March 2005 to March 2009

	MIDLENDL	*INDEXL*
Test statistic	1.15	1.63
Critical value at 5% level	-2.92	-2.92

Note: test software courtesy of Kurt Annen. www.web-reg.de

The test statistic for both time series is larger than the critical value and, therefore, I cannot reject the null hypothesis that either time series has a unit root. *MIDLENDL* and *INDEXL* are found to be non-stationary and, if used in a regression analysis, could cause a spurious association. Time series that contain a unit root are said to be 'difference stationary' which means they can be 'differenced' to form stationary time series (Koop 2009, 147). Differencing involves subtracting from the observations, lags of themselves so that the time series Y_t becomes the time series ΔY_t as described by Equation 2:

$$\Delta Y_t = Y_t - Y_{t-1} \qquad (2)$$

I differenced the time series *MIDLENDL* and *INDEXL* to construct the stationary series Δ*MIDLENDL* and Δ*INDEXL*. To confirm stationarity, I repeated the Dickey–Fuller tests obtaining the test statistics -4.27 and -7.15, respectively, against the same critical values shown in table 5. I can reject the null hypothesis for both time series and find the data to be stationary.

So far I have excluded *NEWLENDL* from the test of non-stationarity even though it too has a visible trend. As I demonstrated above, *NEWLEND* is an almost perfect function of time and, as such, its trend is deterministic and the series 'trend stationary'. It can be used in its original form in a regression analysis when combined with an independent time variable to take into account the trend of the data over time (Koop 2009, 149-150).

The First Test: Middle-Risk Lending and New Bank Lending

I regressed $\Delta MIDLENDL$ on *NEWLENDL* and the time-trend variables in the model described by Equation 3. It comprises a first-differenced dependent variable, $\Delta MIDLENDL$; an independent variable, *NEWLENDL;* two independent time-trend dummy variables, *UP* and *DWN*; several β coefficients on the variables; an intercept, α; and an error term, ε. The null hypothesis is that the coefficients on the independent variables are zero.

$$\Delta MIDLENDL_t = \alpha + \beta_1\ NEWLENDL_t + \beta_2\ UP_t\ t + \beta_3\ DWN_t\ t + \varepsilon_t \qquad (3)$$

The two dummy variables represent the time trend of *NEWLEND* in the ramp-up and in the ramp-down. *UP* has a positive value for the two years of the ramp-up and zero thereafter while *DWN* has a positive value during the ramp-down and zero prior to that.

Table 6 shows the results of the ordinary least squares, multiple regression of Equation 3. *NEWLENDL* appears to be significant with a small P-value of 0.018.

Table 6. Regression of Equation 3: March 2005 to March 2009

	Coefficient	P-value
α	-0.058 (0.019)	0.005
NEWLENDL	0.009 (0.004)	0.018
UP t	<0.000 (0.001)	0.991
DWN t	<0.000 (0.000)	0.115
$R^2 = 0.255$		

Note: standard errors are reported in parentheses.

However, before interpreting the results, it is necessary to check the residuals for unit root non-stationarity and autocorrelation. I will use two methods: the Dickey–Fuller test and the Breusch–Godfrey test. The Dickey–Fuller t-statistic for the residuals is -5.73 against a critical value at the 5 percent level of -2.92; therefore, I reject the null hypothesis that the series has a unit root and conclude that the series is stationary. However, stationarity does not imply the absence of serial correlation. The second procedure, the Breusch–Godfrey test, is a test for autocorrelation in the residuals and is conducted as an auxiliary regression analysis of the residuals on lags of themselves. In this case, it is the regression of Equation 4 – a first-order autoregressive model (Ramsey and Schafer 2002, 436–455) – in which the residuals from a regression of Equation 3 become the autoregressive dependent variable ε_t and ε_{t-1} is a lagged dependent variable.

$$\varepsilon_t = \alpha + \beta_1\, \varepsilon_{t-1} + v_t \qquad (4)$$

The null hypothesis is that there is no autocorrelation. In the regression, the lagged variable has a P-value of 0.31; I cannot reject the null hypothesis and therefore conclude there to be no autocorrelation in the residuals. I am satisfied that the results are stationary and not characterised by autocorrelation; therefore, I will proceed with the interpretation.

The regression of Equation 3 returns a P-value of 0.018 for *NEWLENDL*, as shown in table 6. At the 5 percent confidence level I reject the null hypothesis that the coefficient on this variable is zero, and conclude that lending by New Bank did, indeed, have a statistically significant effect on middle-risk lending and, consequently, contributed to a mitigation of the distortion that exists in the credit structure of interest rates. However, the result lacks 'oomph' (Ziliak and McCloskey 2007). The coefficient on *NEWLENDL* is tiny and it is difficult to argue that it is substantially significant. It implies, roughly, that the variable would need to double for *MIDLENDL* to increase by just 1 percent, all other things being equal. Referring to table 4, this result is not surprising given that, even at its maximum, the lending volume of New Bank was less than 10 percent of total middle-risk lending. On balance, I do not consider the result to be substantive, but I reflect that had the bank approached the lending business with a comprehension of 'Akerlof's familiar paradigm' (Wilson 1980, 108) then its effect on the middle-risk gap might have become pronounced and enduring.

A final point on the interpretation of this test is that I cannot rule out the possibility of reverse causation; for example, perhaps it was the emergence of a middle-market that stimulated demand for funds from New Bank rather than the other way round.

While I am specifically interested in the effect of New Bank's lending on the middle-risk gap, I am intrigued by the puzzle of the missing factors that contributed to the obvious trend shift displayed in figure 2. My model predicts only 26 percent of the variation in the change of middle-risk lending, leaving 74 percent due to other factors, including omitted variables such as the lending patterns of other banks, base rates and government policy initiatives. A policymaker, who wished to tackle the impediment to banking reform represented by the middle-risk gap (Schaede 2005), might benefit from a deeper analysis of what McDowell (1980) terms a discrete intervention in the time series.

The Second Test: Industrial Production and New Bank Lending

In this test, I regressed $\Delta INDEXL$ on $NEWLENDL$ and the time-trend variables in the model described by Equation 5, with a null hypothesis that the coefficients on the independent variables are zero. It is similar in form and with similar coefficients to the first test described above.

$$\Delta INDEXL_t = \alpha + \beta_1\ NEWLENDL_t + \beta_2\ UP_t\ t + \beta_3\ DWN_t\ t + \varepsilon_t \qquad (5)$$

Table 7 shows the results of the regression with a high P-value for $NEWLENDL$. It appears that New Bank's operations had no significant effect on industrial production in Tokyo; however, observing methodological rigour, I checked the results for unit root non-stationarity and autocorrelation. The residuals of the regression of Equation 5 produce a Dickey–Fuller t-statistic of -8.64 compared to the 5 percent confidence level of -2.92 and so the null hypothesis of a unit root is rejected. Moreover, in a Breusch–Godfrey AR(1) test, the lagged dependent variable has no significance at the same confidence level.

Table 7. Regression of Equation 5: March 2005 to March 2009

	Coefficient	P-value
α	0.017 (0.031)	0.560
NEWLENDL	0.006 (0.005)	0.287
UP t	-0.002 (0.001)	0.192
DWN t	-0.001 (0.000)	0.027
$R^2 = 0.127$		

Note: standard errors are reported in parentheses.

To continue the interpretation of results, the regression of Equation 5 returns a P-value of 0.287 for *NEWLENDL*. At the 5 percent confidence level, I cannot reject the null hypothesis that the coefficient on this variable is zero. I therefore conclude that there is no association between *NEWLENDL* and *INDEXL*; in other words, the operations of New Bank had no significant effect on the Tokyo Industrial Production Index. Moreover, in the critical two-year period when New Bank was lending, the Tokyo Index was almost flat whereas the national index rose by 6 percent[40]. New Bank was established to revitalise the economy of Tokyo, yet its operations did not prevent the city from underperforming the rest of the nation.

In this quantitative analysis, I have assembled and prepared time series to test for two relationships: New Bank lending and middle-risk lending; and New Bank lending and industrial production. I conclude that New Bank had a statistically significant, but not necessarily substantial, effect on the level of middle-risk lending, contributing to a temporary reversal of the downward trend and mitigating, in part, the middle-risk gap. However, New Bank did not have a significant effect on the level of industrial production in Tokyo and, on the basis of my assumption that industrial production is a fair proxy for revitalisation, I conclude that New Bank failed to achieve its main, stated objective of revitalising the economy of Tokyo.

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[40] METI data shows that the national industrial production index rose from 99.9 in March 2005 to 105.9 in March 2007. www.meti.go.jp/english/statistics/tyo/iip/index.html

VIII. Conclusion and Recommendations

I have shown that the Tokyo Government established a bank in a manner that disregarded the theory of adverse selection, and that the bank's operations invoked a classic Akerlof adverse selection process in the population of borrowers. Moreover, I have identified a potential new rationale for the process that is particular to a single lending institution: reputation risk of the borrower. I have also demonstrated statistically that the bank failed to achieve its stated objective, and that the mitigating effect it had on the problematic middle-risk gap was marginal and temporary. In other words, not only did it fail financially but it also failed to achieve its socio-economic objectives.

But what, if anything, does it signify? In the introduction to this paper I stated that financial losses are relative and that it is necessary to present a contextual framework by which to comprehend them. When viewed in the context of Tokyo's annual budget, New Bank's losses are negligible, being less than 1 percent of the total[41]. Indeed, Professor Miwa Yoshiro of the University of Tokyo has described the bank as 'a tiny cottage built on a house of cards'[42]. However, there are other ways to contextualize the figures: the losses are twenty-two times the annual amount spent on single-mother families, and half that spent on hospitals[43]. Framed this way, it is reasonable to argue that the project was an unjustifiable allocation of scarce resources from the community to an imprudent financial institution and, from there, to a set of beneficiaries whose identity is not altogether clear. It is hoped, then, that a broader understanding by policymakers of the existence of asymmetric information and adverse selection can help to prevent a similar, inefficient allocation in the future.

The primary recommendation of this study is that the sponsors of a lending institution, particularly one financed by public funds, should be cognizant of adverse selection and the importance of implementing rigorous mitigation devices as documented in the literature. Failure to do so is likely to lead to suboptimal economic outcomes and a misallocation of resources as demonstrated by the case of New Bank Tokyo. The following three policy

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[41] The budget was 12.9 trillion yen in 2009. www.toukei.metro.tokyo.jp/tnenkan/2009/tn09q3e021.htm
[42] Personal communication on 4 August 2011.
[43] The amounts are 4.4 billion yen and196 billion yen, respectively. www.toukei.metro.tokyo.jp/tnenkan/2009/tn09q3e021.htm

recommendations should be considered a minimum requirement for any lending institution:

1. Adequate screening systems should be employed to ensure that borrowers satisfy internally approved credit policies.
2. Procedures should be implemented to recognise and act on signals of creditworthiness displayed by potential borrowers.
3. Proposals to engage in unfamiliar business on the basis of new technology should pay due care and attention to empirical data on the application of that technology.

The secondary recommendation of this study is that a government should not be afraid to substitute a socially-motivated 'private' project, in this case the establishment of a local bank, with a less-expensive welfare transfer payment. For example, if a social objective of the project was to support employment in small firms, or indirectly transfer welfare to the structurally unemployed, then it could probably have been done less expensively and more efficiently by direct subsidies. If a careful analysis of a project shows that the expected cost is higher than that of a welfare payment then the latter should be the rational economic choice, *ceteris paribus*.

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New Bank Tokyo: Timeline of Events

Year	Month	Event
2003	December	A new bank will be established by the Tokyo Government to revitalise the economy by providing finance to the city's SMEs. The project is promoted by Governor Ishihara and will be planned by Tokyo finance official Ōtsuka Toshirō, the brain behind the project and the official who requested that ex-Toyota audit chief Nishi Tsushima be appointed as CEO. Nishi holds a press conference in which he outlines the broad objectives of the proposed bank emphasising the importance of supporting Tokyo's SMEs and ensuring they have the funds to invest in plant and machinery (Nikkei Shinbun 2003).
2004	February	The Tokyo Government publishes the New Bank Master Plan. http://newbanktokyo.wordpress.com
	March	The Tokyo Government makes a formal decision to establish the new bank and invest capital of 100 billion yen. The bank will be formed through the shell of an existing bank to be purchased by Tokyo: BNP Trust Bank. Business will start from April 2005 and, by that time, the bank aims to have capital of 150 billion yen, 50 billion of which is expected to come from the private sector, 195 employees, a head office in Chiyoda-ku and nine branches, and, by 2007, is expected to have raised 1.2 trillion yen in deposits. The bank will not require guarantees nor collateral and lending decisions will be based on cash flow in the case of loss-making firms or firms with excess debts (Nikkei Shinbun 2004c).
	April	5,000 people apply for 100 jobs advertised by the bank (Nikkei Shinbun 2005b).
	September	The Japan Banker's Association expresses reluctance to admit the bank (Nikkei Shinbun 2005b). Author's comment: New Bank was never admitted to the official list of members[44].
	December	The bank receives ratings of A, A, AA- from S&P, Fitch, and JCR, respectively (Nikkei Shinbun 2004b).
2005	April	The bank officially opens for business (Nikkei Shinbun 2006e).
	October	Aioi Insurance, one of the private sector investors in the bank, contributing two billion yen, starts a joint venture in which it introduces its customers as potential borrowers (Nikkei Shinbun 2006f).
	December	The bank reports interim results for the six-months ending September 2005. The net loss for the period is 9.5 billion yen (Nikkei Shinbun 2005c).

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[44] Personal conversation with the Association on 12 July 2011.

2006	April	The roll call of investors in the bank is reported as Tokyo (84%), NTT Communications (2%), Hitachi (2%), Aioi Insurance (1.7%), Shinkin Central Bank (1%) and 33 other private-sector companies each with a holding of less than 1 percent. The bank has plans to seek a further 100 billion of capital from the private sector (Nikkei Shinbun 2006f).
	June	The bank reports results for the year ending March 2006. The net loss for the period is 21 billion yen, in line with the plan. (Nikkei Shinbun 2006e).
	October	In order to increase loan volumes, which are below target, all branches employ telephone-sales staff to cold-call small firms. CEO Nishi declares that he wants to lend more money to 'loss making firms that are healthy' (Nikkei Shinbun 2006a).
	December	The bank reports interim results for the six-months ending September 2006. The net loss for the period is 15 billion yen, higher than planned. Bad debts have increased above expectations and this is blamed by CEO Nishi on a lack of 'know-how' when the bank started (Nikkei Shinbun 2006d). Nishi implies that the bank has abandoned the three-year targets of the Master Plan (Nikkei Shinbun 2006c).
2007	January	Ishihara blames the problems of the bank on the lending patterns of other banks. He says the Tokyo government is holding confidential meetings about how to improve the situation by business rationalisation, such as getting rid of low-use ATMs, as opposed to reducing the volume of business. He want to increase the volume of lending (Nikkei Shinbun 2007h).
	June	The bank reports results for the year ending March 2007. The net loss for the period is 55 billion yen, significantly higher than planned. Accumulated losses are 85 billion yen (Nikkei Shinbun 2007d). CEO Nishi takes responsibility for the losses and resigns. He is replaced by Morita Tōru, a past executive of failed bank, Resona (Nikkei Shinbun 2007d). Ex-deputy governor Ōtsuka Toshirō, referred to above as the brain behind the idea, becomes Chairman of the Board and four other government executives are seconded to the bank along with various other top management changes (Nikkei Shinbun 2007j, 2007c). New CEO Morita implements a restructuring plan which includes reducing asset size by two-thirds, firing staff, closing branches, and cost-cutting. Staff, including temporary staff, will be reduced from 670 to around 200 within three years. Out of ten branches, two will be closed as will some of the little-used ATMs and other cost cutting measures (Nikkei Shinbun 2007d). Morita plans to add relationship banking techniques to the banking model (Nikkei Shinbun 2007c).
	August	All ATMs outside branches are shut down (Nikkei Shinbun 2008e).

	November	The bank reports interim results for the six-months ending September 2007. The net loss for the period is 9 billion yen. Accumulated losses are 94 billion yen. The doubtful debt ratio is over 10 percent (Nikkei Shinbun 2007f). CEO Morita steps down after just six-months due to health issues and is replaced by Tokyo Ports and Harbour chief, Tsushima Ryūichi (Nikkei Shinbun 2007i). Tsushima implies that the bank had been lending to poor-quality borrowers and did not pay attention to the risks of lending (Nikkei Shinbun 2007e). Ishihara says that Tokyo will not contribute additional capital to keep the bank alive (Nikkei Shinbun 2007i) and that the bank is not a charity and should not lend to the extent it goes bankrupt itself (Nikkei Shinbun 2007b).
2008	February	Ishihara reverses course and says he may propose that Tokyo gives an additional capital injection to the bank of between 30 and 40 billion yen. Ishihara blames the previous senior management for reckless lending, citing the example that if a borrower-firm survived for at least six-months it was considered a success (Nikkei Shinbun 2008h).
	March	The bank, under civil servant CEO Tsushima, issues a report blaming the losses on careless management by ex-CEO Nishi and other senior managers. The report is silent on responsibility of the original plan and Ishihara (Nikkei Shinbun 2008a). On 26 March, the Tokyo Government votes to give the bank an additional 40 billion yen in capital. The bank embarks on a second restructuring plan which involves a further reduction in business capacity (Nikkei Shinbun 2008i).
	June	The bank reports results for the year ending March 2008. The net loss for the period is 17 billion yen. Accumulated losses are 102 billion yen and the doubtful debt ratio is 12.7 percent (Nikkei Shinbun 2008d).
	October	The Financial Services Agency publishes the findings of a bank inspection. Items include a 10 billion yen under-provision of reserves for doubtful debts. The report says that the bank's losses were due mainly to careless lending and that the global financial crisis had no direct impact (Nikkei Shinbun 2008f). A former loan officer of the bank is arrested for the fraudulent lending of five billion yen (Nikkei Shinbun 2008g).
	November	The bank reports interim results for the six-months ending September 2008. The net loss for the period is seven billion yen. The doubtful-debt ratio is seven times the national average at 17 percent (Nikkei Shinbun 2008b).
2009	January	The bank presents the Financial Services Agency with a business improvement plan that focuses on improvements in internal supervision and lending systems (Nikkei Shinbun 2009c).
	February	The bank announces that it intends to sue ex-CEO Nishi and other senior executives for gross breach of duty (Nikkei Shinbun 2009a).
	May	The bank reports results for the year ending March 2009. The net loss for the period is 10 billion yen (Nikkei Shinbun 2009b).

	June	Terai Horotaka, a career banker, replaces civil servant Tsushima as CEO (Nikkei Shinbun 2011).
	November	The bank reports interim results for the six-months ending September 2009. The net profit for the period is one billion yen. However, at the operating level there is a loss of 900 million yen with the net profit being due to exceptional items (Nikkei Shinbun 2009d).
2010	May	The bank reports results for the year ending March 2010. The net profit for the period is 1.5 billion yen. However, at the operating level there is a loss of 2.4 billion yen with the net profit being due to exceptional items (Nikkei Shinbun 2010a).

Word-Count Application

The search facility of the Nikkei Telecom21 database does not permit word count as a search condition. To overcome this inconvenience, I designed a simple excel spreadsheet to apply an external word-count condition to the set of database search results. The search results are exported as a text list and copied directly into Excel resulting, in information for each retrieved item appearing in two rows: the first is the headline, and the second is an information text string related to the article. Figure 7 is a representation of the spreadsheet showing the first 2 headlines from the actual database sample of 406. Under the 1,000 word condition, 56 headlines were subsequently sampled using this spreadsheet.

	A	B	C	D	E
1		**SEARCH RESULTS (EXPORTED)**	**WORD COUNT**		**SAMPLED HEADLINE**
2			**TEXT**	**VALUE**	
3					
4	1	新銀行の名称、都、商標登録・・・			
5	2	2003/09/02 日経金融新聞 11ページ 490文字 PDF有	490	490	
6	3	トップは一般企業から・・・			
7	4	2003/12/10 日本経済新聞　夕刊 5ページ 絵写表有 1516文字 PDF有	1516	1516	トップは一般企業から・・・
8					
9					

Formula 1:

=A6+1

Formula 2:

=IF(ISODD(A7),"",LEFT(RIGHT(B7,13),5))

Formula 3:

=IF(C7="","",VALUE(C7))

Formula 4:

=IF(C7="","",IF(D7>999,B6,""))

Figure 7. Extract from the Excel word-count spreadsheet

The formulas, as shown in the call-out boxes, cause articles that have a word count greater than a user-specified number to be sampled automatically. Formula 1 determines whether or not the row contains a headline or an information field by reference to whether the row number is odd or even. Formula 2 extracts the word-count as a text string from the longer information text string. Formula 3 converts the text string to a value which can then be

used in formula 4 to determine whether the word-count condition is met, in this case more than 999 words. If met, the headline appears in column E. Formulas 1, 2, 3 and 4 are in all cells of columns A, C, D and E respectively.

I consider this method to be superior to the manual alternative of visual selection as it is faster, more efficient and eliminates the possibility of human error. It can be applied to any set of search results exported from either the Nikkei Telecom21 database or, with a slight modification, the Asahi Kikuzo II database and, probably, many other databases where the search result contains article word-count as a text field. It also provides a framework for conducting simple numerical analyses of sample results such as those introduced in Section III.