

## 146 Modélisation et prédiction des taux d'intérêt et d'inflation au Canada (SP #6)

(«chaos», «fuzzy», ...) et des travaux de chercheurs s'appuyant sur une vision différente des marchés financiers (e.g., Boyle pour vision stochastique de la structure des taux).

Le but de cette présentation n'était pas de critiquer le rapport de recherche de M. Deaves en soi, mais de tenter de situer les «techniques» retenues en regard du travail actuariel.

*(Editor's note: The remainder of this session was not taped.)*

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## ***Luncheon Speech: by ANDREW THOMPSON***

### ***Discours du déjeuner: par ANDREW THOMPSON***

**Topic: Techniques to Analyze Problems in U.S. Financial Institutions (i.e., Savings and Loans Industry)**

**Sujet: Les techniques utilisées pour analyser les problèmes dans les institutions financières américaines (c-à-d. l'industrie de l'épargne et du crédit)**

*Mr. Michael Cohen:* At this time, I would like to introduce our head table. Starting on my right, we have Keith Sharp; next is James Tilley, who will be speaking this afternoon; next is Harold Hugel, who is a councillor of the CIA and a speaker this afternoon; next is Dr. Thompson, who is our guest speaker and I'll introduce him more fully just before we listen to his speech; then myself, Michael Cohen; John Brophy, who is the chairperson of the Committee on Investment Practices; David Wilkie, whom you all heard this morning; Professor Edwin Neave, Richard Deaves; Michael Sze, who is also on the Investment Committee; and finally, Steve Reddy who will be in the workshop tomorrow morning. Thank you.

We will be listening to Professor Thompson while we are munching on our dessert and drinking our coffee.

I asked Professor Thompson to come and speak at lunch because I felt that he had some very interesting applications to tell us about. There is no question that this morning and this afternoon, we are getting a lot of theoretical information and that is great. But I think it is nice, as well, to see how some of these theories can be applied. Professor Thompson is professor and head of the Finance Department at the University of Northern Iowa. He has a Phd, majoring in finance with a strong concentration in actuarial science, from the University of Nebraska, College of Business. He has had research funded by lots of organizations with which some of us are familiar: Iowa State University, the Federal Home Loan Bank Loans, the Canadian Embassy (he's wearing a little Canadian flag today), and several others regarding financial institution risk. He is published in the *Journal of Financial Management*, *Transactions of the Society of Actuaries*, *Journal of Risk and Insurance*, and also, he has articles in the popular press.

I met Professor Thompson in Paris at the first AFIR meeting when he was a speaker at the session that I was moderating. He described some of the applications of his work to the savings and loan – dare I say it? – fiasco in the U.S., the Baldwin United problems, and so on.

I would like you all to listen to his presentation on this wonderful new technology and how some of these things can be put to use to clean up some of the messes, and more importantly, how to avoid future messes.

*Mr. Andrew Thompson:* I would just like to say that it is a pleasure to come here and talk to you a little bit about the research that I have been doing for the last 10 years.

Several years ago, I left the bright city lights of Cincinnati and moved to the northern lights of Cedar Falls. We live on an acreage out of town and we have about 1,000 trees and get to see all the stars at night. We also have a pond and the Canada geese nest there on their way down South. My daughter, aged nine, and I sit and try to figure out when the Canada geese are going to come down. My wife, who is an accountant - I'm the actuarial type; she's the accountant - records our predictions and their accuracy. I must say that my daughter has been a little more accurate this year than I have, but I do have some years on her and I've mentioned that there is this economic thing that if you are going to forecast, forecast often. I know that I will be right at least once.

The pastoral setting has given rise, at the University of Northern Iowa, to a lot of writers of fiction. When I first came there, Nancy Price's book, *Sleeping With the Enemy*, was on the Best Seller List, and there was a great deal of discussion in the Business School about the Dean who was thinking about doing some fictional writing also. In this particular case, Bob Waller, a colleague of ours, left to write novels and you may be familiar with *The Bridges of Madison County*, and the latest book, which is about a business school, called *The Slow Waltz in Cedar Bend*. In preparing my remarks today, I started thinking about the fact that I do enjoy good fiction and I have read a lot of it. Unfortunately, most of the fiction that I have read about the savings and loans industry is not all that good, but, nevertheless, I think it is insightful because what you have here is a set of financial institutions on which, originally, there was not a whole lot of data.

## I Introduction

The U.S. savings and loan crisis of the 1980's led to considerable research on bank management, examination of the causes of S&L bankruptcy, and financial failure prediction models for S&Ls. Over the last seven years, S&L bankruptcies spawned large volumes of academic publication in each of these areas. Faculty are particularly grateful for the crisis because it provided an opportunity to publish academic articles. Lawyers and accountants were equally pleased to offer fee-based services to S&Ls before, during and after failure. Presently, the Lexis/Nexus information retrieval system has a separate listing for S&L crisis publications.

Research on the S&L crisis may be classified into three general areas. An earlier set of research from 1982 to 1987 deals with the causes of S&L failure precipitated by governmental deregulation beginning with the Monetary Control and Garn-St. Germain Acts. A second group of studies from 1985 to 1992 provides a reappraisal of the regulation of financial institutions. The last set of investigations from 1981 to 1993 examines how financial institution risks may be managed using a variety of interest rate hedging instruments.

The literature is by no means mutually exclusive with contributions overlapping each area, and the sheer volume of work makes it hard to classify neatly. However, an understanding of prior research on S&L failures offers some insights into the financial institution risks now faced within the growing financial service industry.

The present investigation will examine those financial risk factors that are important to understanding S&L failures and claim settlement from 1980 to 1992. The purpose of this analysis is to incorporate a knowledge of past S&L failures in order to develop a better system of handling financial institution risks in the future. This study makes use of FSLIC data on 313 S&L failures that occurred between 1980 through 1986, and a larger RTC data set consisting of 640 S&L failures from 1989 to 1992.

## II. Financial Risk Factors

### • Globalization and Collateralization of Financial Instruments

Financial institutions face a variety of dynamic and fundamental risks due to changes in the structure of financial services. Globalization of country economies and the free exchange of world currencies offer expanded markets, but also create interdependencies between financial institutions and the governments that regulate them. Global trading terms, international accounting and actuarial principles need to be spelled out unambiguously for market participants. However, it is difficult to obtain universal agreement to trading principles even after negotiation. Past discussions over the Single European Market Act, the Maastricht Treaty, and NAFTA (Tucker, Medury and Chiang [1991]) serve as examples of the obstacles to approval of written trading agreements. Collateralization and securitization of financial instruments give financial institutions greater investment choices. CMOs, REMICs, IO/PO strips provide investment managers with capabilities to fit the risk/return characteristics of these instruments to the particular needs of each institution. However, derivative securities can increase financial risk and the likelihood of loss when used improperly. Solomon Brothers' recent \$173 million loss from prepayment experience with IO securities serves to illustrate the pitfalls of failing to assess all the risks associated with new financial instruments.

### • Innovations in Interest Rate Risk Management and New Technologies

The high interest rate period of the late 1970's and early 1980's led financial markets to create hedging instruments designed to transfer interest rate risk. These instruments are helpful for institutions seeking to manage asset/liability repricing and duration in rising and falling interest environments. However, each instrument has unique characteristics that can lead to increased risk and financial loss when used inappropriately. Experience with S&L failure over the last 10 years suggests that credit, collateral, appropriate hedge-ratio specification and timing, counterparty strength, and accounting treatment of trading activities are concerns that must be addressed before trading financial instruments, such as forwards, futures, interest rate swaps and repurchase agreements.

Computer and information technology is contributing to the consolidation of a financial service industry outside the scope of current regulation. Fiber optic technology coupled with computer data access systems, such as Prodigy, will allow consumers to complete banking and investment transactions at home. Traditional federal reserve concerns about the impact bank market concentration has on mergers may no longer apply. In addition, distinctions between bank versus investment related activi-

ties may no longer be relevant in defining institutions. Depositors may prefer to have savings and transactional balances placed with mutual funds, or insurers, rather than banks or savings and loans because of convenience and safety.

The evolution of financial instruments and information technology has led to uncertainty over the regulation of financial institutions and the securities they may purchase or sell. Within the last few years, conflicts between the Federal Reserve Board, the Comptroller of the Currency, the Federal Deposit Insurance Corporation, the Commodity Futures Trading Commission, the Securities and Exchange, State Insurance Commissioners and the federal government have related to the regulation of financial institutions. Actuaries and accountants who serve an attest function in reporting the condition of financial institutions have also become involved with sorting out these regulatory differences. The recent White House proposal to consolidate the functions of the Federal Reserve, the FDIC, the OTS, the Comptroller of the Currency and the RTC indicate the extent to which federal regulation of financial institutions has been disaggregated.

#### • Competition for Financial Services

Competition for financial services among financial institutions over the last 15 years has led to a restructuring of the banking and saving loan industry. Table 1 provides a listing of the types of financial services that were available in 1980 as opposed to 1992.

**Table 1**

#### Competition for Financial Services in the U.S.

Financial Service	Banks	S&Ls	Insurers
Savings/Time			
Deposit Accounts	1980,1992	1980,1992	1992
Checking Accounts	1980,1992	1992	1992
Credit Cards	1980,1992	1992	1992
Stocks/Mutual Funds	1992		1992
Mortgage Loans		1980,1992	1992
Insurance	1992	1992	1980,1992

Source: Kidwell, Peterson, and Blackwell (1993)

Banks and S&Ls have been given expanded authority to enter insurance markets. Insurers have been permitted to introduce traditional bank-related services associated with deposits and mortgage lending. The expansion of financial product offerings by various financial institutions has stimulated merger activity within the banking industry. In 1986, there were 14,200 commercial banks and 3,292 savings and loan associations operating in the U.S. By 1992, there were 11,450 banks and 2,148 savings and loan associations left in the industry. While bank assets expanded from a rate of 2.84% a year from 1988 to 1992, S&L assets declined over the same period at a rate of 11.5% a year. Return on equity for these financial institutions has been mixed. Bank returns range between 12.91% to 7.47% over the past four years. S&L returns have been negative for most years ranging from -49.96% to -6.7%. Only in the last

year did the S&L industry earn a small positive return on equity. During this period, banks enjoyed a higher net interest spread on loans. However, S&Ls have significantly reduced the amount of nonperforming loans in their asset portfolios. In 1992, nonperforming loans decreased by \$13.6 billion or 18% for banks, and \$6.7 billion or 30.2% for S&Ls. Several institution differences emerged from this data. Banks are more fully diversified in terms of their loan asset portfolios. Currently, real estate loans comprise 44.9% of the banking industry's aggregate loan portfolio, contrasted with 69.3% for S&Ls.

#### • S&L Financial Risks from 1980 to 1984

The composition of S&L loan portfolios is a significant factor in explaining institutional failures from 1980 to 1984. In the early 1980's, S&Ls were experiencing negative spreads caused by booking long-term, low-yielding, fixed-rate mortgages. The competitive interest rate environment for deposits brought on by the rise of money market mutual funds required S&Ls to pay rates on liabilities greater than what their assets could generate. Institutions that failed in this period were less costly to resolve because asset quality was not at issue. S&Ls that failed had assets with market value lower than book value because of repricing.

However, deregulation of the banking industry in 1980 and 1982 with the passage of the Monetary Control and Garn-St. Germain Acts opened the door to improper use of financial powers by S&Ls. In 1980, the FSLIC and FDIC had little or no experience evaluating the financial risks associated with forwards, futures, swaps, repurchase agreements and direct investments. Only after observing the beginnings of S&L loss experience in 1984 did the FSLIC develop auditing and regulatory guidelines for some of these financial instruments. Since S&Ls were already utilizing their new investment powers, the regulation of these activities became a political, more than a safety and soundness, issue.

#### • S&L Asset Quality Problems Beginning in 1984

The period of S&L failure starting in 1984 is marked by asset quality problems. From a deposit insurance standpoint, the federal government did not appreciate the underwriting function served through regulation and examination. Instead of evaluating the new financial instruments to determine their risk to the insurance fund, the federal government approved investment powers and waited for experience to follow. Consequently, when S&L failures began to mount in 1984, the FSLIC had no clue as to the extent of losses from S&L investment activities. Most studies of S&L failure focused on loss frequency rather than loss severity from the use of financial instruments.

From 1983 to 1986, resolution costs as a percentage of assets for failed S&Ls grew from 6.5% to 23.2%. By this time, estimated losses exceeded the \$5.9 billion in the FSLIC insurance reserve fund and congressmen were politically unwilling to add monies to resolve S&Ls in their districts. In the 1980's, it appears that the best investment the S&L industry made was in the U.S. Congress. However, from a taxpayer's perspective, the meter on losses was already running and the final tab was yet to be delivered. Not until the enactment of the Financial Institution Reform,

Recovery and Enforcement Act (FIRREA) in 1989 (Saft [1991]), did the federal government seek to resolve the case load of failed and warehoused S&Ls. Research on the causes of S&L failure prior to 1989 involved closed institutions that were resolved using the limited \$5.9 billion available from the FSLIC insurance reserve. For the largest, quality asset cases, loss estimates had to be used because final resolution costs were not available.

#### Summary Statistics on S&L Failures: 1989-92

In 1989, the federal government under FIRREA set up the Resolution Trust Corporation (RTC) to handle loss settlement for all failed S&Ls transferred from the FSLIC. During the three-year period from 1989 to 1992, the RTC settled 640 institutions at a total direct cost of \$76.7 billion. Resolution costs as a percentage of assets increased from 23.2% in 1986 to 48.8% in 1989. Loss severity was higher in this group of S&L failures because market asset values were well below recorded book figures. The bulk of the resolutions occurred in 1990 to 1991 when the RTC paid out \$65.4 billion in claim settlement costs. A major mission of the RTC was to contract outside appraisers and develop a bidding process that would maximize the sale value of S&L assets being sold out of failed institutions. Savings as a percentage of resolution costs ranged from 5.31% to 2.38% with the average being 3.7%.

Summary statistics on RTC claim settlement figures show how skewed losses are to institutions with asset quality problems. Out of the \$76.7 billion in resolved cases, the lowest costing 320 cases represent only 22% of total claim costs. The bulk of the claim costs, about 78%, lie with the largest 320 S&L failures. Reinforcing this position are the mean loss statistics and standard deviations. The entire data set has a mean loss of \$119 million per resolved institution with a standard deviation of \$282 million. The mean loss and standard deviation on the lowest cost set of S&L failures is \$53.24 and \$180.4 million respectively. The latter highest cost S&L failures have a mean loss and standard deviation of \$186 and \$344 million. In each of these cases, the standard deviations on the loss distribution are between two to three times their mean losses adding further evidence of a heavily skewed set of claims.

### III An Examination of Financial Risk Factors on RTC Cases 1989-1992

Prior studies of financial risk factors relate to the severity of S&L failure highlighted by differences in federal chartering, form of ownership, whether mutual or stock, and various credit quality variables (Avery and Hanweck [1984], Brickley and James [1986], Carroll, Kalambodikis, and Kise [1986], Masulis [1987], and Thompson [1990]). Earlier studies using data from 1980 to 1987 encountered two informational problems. Earlier S&L failures involved interest rate as opposed to asset quality problems that were less costly to resolve. There was only limited data available on the larger S&L failures in 1987 and, therefore, these studies relied on ex-ante estimates of loss. Since the federal government did not begin to address the resolution of large S&L failures until the 1989 Firrea Act, ex-post-claim settlement costs were not available until after 1992 when insurance payouts became known. Despite these informational impediments, investigations covering the 1980 to 1987 period were able to identify a number of significant factors contributing to loss severity in failed S&Ls.

State chartered S&Ls tended to have slightly higher loss experience than those with federal charters. Stock S&Ls had lower estimated resolution costs than their mutual counterparts. Institutions with a high proportion of brokered funds, direct investments in land, acquisition and development loans, and service corporations appeared to have an increased likelihood for severe losses due to asset quality problems.

Now that ex-post-resolution costs are available, does the claim settlement data reinforce or dispute these earlier findings? Tables 2 through 4 offer an analysis of RTC claim experience according to the presence of brokered funds, form of ownership and type of charter for failed S&Ls. Table 2 examines RTC resolution costs by high-versus low-cost brokered funds.

Table 2

#### Resolution Costs with High versus Low Brokered Funds in S&L Cases from 1989 to 1992

	Total 640 Cases	320 Low Cost Cases	320 High Cost Cases
Total Loss	\$76.7 B	\$6.1 B	\$70.6 B
Mean Loss	\$119.8 M	\$19.1 M	\$220.6 M
Std. Dev.	\$282 M	\$22.7 M	\$373.0 M
RTC Case Savings	\$2.84 B	\$334 M	\$2.5 B
Savings/Costs	3.7%	5.46%	3.55%

The top 320 S&L failures utilizing high-cost brokered funds had a mean loss of \$220.6 million compared to \$19.1 million for low brokered funds institutions. The largest total losses occurred in those institutions using brokered funds, and savings rates on loss settlements were lower for these S&Ls.

Table 3 provides summary statistics for the 640 RTC cases by mode of ownership.

Table 3

#### Resolution Costs for Mutual versus Stock Form of Ownership for the 640 RTC Cases 1989-92

	640 Cases	521 Mutual S&Ls	119 Stock S&Ls
Total Losses	\$76.6 B	\$61.7 B	\$15 B
Mean Loss	\$119 M	\$118 M	\$126 M
Std. Dev.	\$282 M	\$283 M	\$281 M

A significant proportion of RTC resolution costs were found in mutual S&Ls over the period from 1989 to 1992. However, mean losses for mutual versus stock S&Ls were quite similar. In addition, there appear to be no appreciable differences in the standard deviation on the various loss distributions. What makes an analysis of resolution costs by mode of ownership difficult for this later period are the regulatory changes that occurred after 1987. Historically, the S&L industry grew out of a building and loan association concept that encouraged a mutual form of ownership.

After 1980, when deregulation occurred, S&Ls were encouraged to convert from mutual to stock forms of ownership. However, after 1987, when new capital requirements and insurance premiums were instituted, S&Ls may have become reluctant to change ownership form. Consequently, the loss data appears to be dominated numerically by mutual S&Ls. However, significant losses in the high flying stock S&Ls from the 1980 to 1987 era may have led to similar mean loss experience between the two groups.

Table 4 examines the 640 resolution cases according to form of charter.

**Table 4**

	<b>640 Cases</b>	<b>556 Federal</b>	<b>84 State</b>
Total Losses	\$76.7 B	\$64.5 B	\$12.2 B
Mean Loss	\$119 M	\$116 M	\$145 M
Std. Dev.	\$282 M	\$ 280 M	\$300 M

Total losses for the 640 RTC cases is concentrated in federally chartered institutions. However, mean losses and the variance in losses are greater in state chartered institutions. While there is only a relative difference in these measures, the size of ex-post-resolution costs appears to be slightly higher in failed state chartered institutions.

Table 5 provides an unadjusted generalized linear model for examining resolution costs.

**Table 5**

**Unadjusted Generalized Linear Model for RTC Resolution Costs  
1989 to 1992**

<b>Parameters</b>	<b>Estimates</b>	<b>T-Statistics</b>	<b>Pr &gt; T</b>	<b>SEE</b>
Intercept	53042.023	2.530	0.0118	20993.75
Fed/State	-11195.877	-0.041	0.6788	27023.35
Mutual/Stock	3824.0656	0.16	0.8705	23443.30
Hi/Low Cost Funds	0.71781	29.35	0.0001	0.02446
Dependent Variable: Resolution Costs for 1989 to 1992 on the 640 Closed RTC Cases				
R-Square: .5758				

The unadjusted linear model provides some indication that high-cost brokerage funds and state charters may be significant in explaining resolution costs for the 640 RTC closed cases from 1989 to 1992. The federal versus state variable, Fed/State, and the mutual versus stock variable, Mutual/Stock, were qualitative variables where state and stock are omitted conditions. Therefore, the sign on the Fed/State coefficient shows the expected inverse relationship between state chartering and higher resolution cost. However, the size of the standard error of estimates and the beta coefficients lead to a consideration of an adjustment for institutional size in the general linear model.

Table 6 gives an adjusted general linear model for resolution-costs-based accounting for institutional size.

**Table 6**

**Adjusted Generalized Linear Model for  
RTC Resolution Costs 1989 to 1992**

<b>Parameters</b>	<b>Estimate</b>	<b>T-Statistic</b>	<b>Pr &gt; T</b>	<b>SSE</b>
Intercept	-0.36147	-4.73	0.0001	0.07647
Fed/State	0.11672	1.20	0.2320	0.09757
Mutual/Stock	0.07683	0.91	0.3650	0.08474
Hi Cost Funds/ Assets	1.82528	60.59	0.0001	0.03013
Dependent Variable: Resolution Costs/Assets				
R-Square: 0.8524				

Adjusting the generalized linear model for S&L asset size does reduce the problem with high standard errors of estimates. In addition, the use of high-cost brokerage funds remains as a significant explanatory variable for resolution costs in failed S&Ls over the 1989 to 1992 period. However, even though the federal versus state charter variable appears more important in this model configuration, the sign of the coefficient is reversed. This result may be an indication that federal versus state charter, while important, is not a significant variable in explaining resolution cost for the failed S&Ls from 1989 to 1992.

#### **IV Conclusions – Implications for Financial Institution Risk**

The S&L crisis may have been more of an deposit insurer crisis than one of financial institution failure. The deposit insurer needs to define what risks are being covered and underwrite only those risks on which experience is available. Lacking adequate experience, contracts should be written that seek to limit loss exposure until better data emerges. A clearly defined claim settlement process is required if the deposit insurer is to avoid selling off valuable assets at bargain basement prices. The summary statistics on the 640 RTC S&L failures indicate that losses are heavily skewed toward major cases. A claim settlement process should be developed that maximizes value to be gained from resolving high cost institutions. The development of any risk-based premium on deposit insurance should also include coinsurance provisions that prevent adverse selection within the insuring process. In addition, if federal regulation is going to set the underwriting standards for deposit insurance coverage, then a separate study of the impact that any new set of regulations has on the insurance fund should be completed prior to enacting changes.

*Mr. John J. Brophy:* It is my pleasure to thank Dr. Thompson on behalf of both the Canadian Institute of Actuaries and AFIR. It was interesting listening to him because I can see a lot of similarities between what has happened in the U.S. and what could potentially happen in Canada, particularly with respect to the deposit insurance.

We still have it here and I am not sure that we have addressed it. So, there are a lot of lessons to be learned. I am not sure if there are regulators in the room, but if there are, I think there are a lot of lessons for the regulators.

I think also that there are a lot of lessons for the actuaries – not just for asset/liability management, but also regarding how far should you go when your competition keeps on raising the rates that they are providing to consumers.

Also, there are lessons with respect to marketing. We've heard about the lawyers and the accountants making out like bandits, but I didn't hear anything about the actuaries getting anything. So, there is a lesson there! We have to market ourselves better!

I think also, with respect to the S&L industry, we can see some similarities in Canada with respect to the trust industry. On the other hand, the trust industry seems to be disappearing day by day, and so maybe that is a non-issue. I was thinking that maybe today, we could talk about the CIBC taking over Montreal Trust and seeing one less of them.

On behalf of the Canadian Institute of Actuaries and AFIR, I would like to thank you very much. You have continued the high calibre of presentations that we have had today. Like typical correlations, we have a present that is highly correlated in weight to the distance that you have to travel home. Thank you very much.

We are just a few minutes late, but the next session will start very quickly, back in the same room. Thank you.

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