SUPREME COURT OF THE STATE OF NEW YORK
COUNTY OF NEW YORK

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In the matter of the application of         )     Index No. 651786/2011
THE BANK OF NEW YORK MELLON (as   )
Trustee under various Pooling and Servicing   )     Assigned to: Kapnick, J.
Agreements and Indenture Trustee       )
under various Indentures), *et al.*        )
                                           )
        Petitioners,             )
                                           )
for an order, pursuant to C.P.L.R. § 7701, seeking  )
judicial instructions and approval of a proposed   )
settlement.                                  )
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## REPORT OF G. WILLIAM SCHWERT

### I.      QUALIFICATIONS

1.      I am the Distinguished University Professor of Finance and

Statistics at the William E. Simon Graduate School of Business Administration of the

University of Rochester, a position I have held since 1998. I have been a faculty member

at the University of Rochester since 1976. I teach courses and conduct research in

corporate finance, capital markets, and statistics. In 1975-76, I was an Assistant

Professor of Finance at the University of Chicago, and in 1982 I was the Center for

Research in Security Prices Distinguished Scholar and Visiting Associate Professor at the

University of Chicago. Doctoral students I have supervised are now tenured, chaired

faculty members at Harvard, Dartmouth, Chicago, Wharton, Northwestern, and

Michigan, among other schools.

2.     In addition to my teaching responsibilities, I have been a Research Associate of the National Bureau of Economic Research since 1988. I have been the Managing Editor of the Journal of Financial Economics since 1995, where I have been an Editor since 1979. I was an Associate Editor of the Journal of Finance from 1983-2000. I have also served as a Director of the American Finance Association from 1987-89 and as the Chair of the Business and Economics Section of the American Statistical Association in 1990.

3.     My curriculum vita, which is attached as Exhibit A, lists my publications and other professional accomplishments.

## II.     INTRODUCTION AND SUMMARY OF CONCLUSIONS

4.     I understand that The Bank of New York Mellon ("Trustee") is the trustee for 530 residential mortgage securitization trusts (the "Trusts") that obtained portfolios of residential mortgages created or acquired by Countrywide Home Loans Inc. and/or associated entities (collectively "Countrywide"). I further understand that the Trustee has requested that the court approve a settlement on behalf of Trust certificateholders that was negotiated by a certificate investor group represented by Gibbs & Bruns (the "Institutional Investors"), the Trustee, and Bank of America (which acquired Countrywide in July of 2008). I also understand that certain other Trust certificateholders (the "Objectors") oppose the settlement.

5.     I understand that Objector AIG has submitted the Expert Report of Charles D. Cowan, Ph.D. ("Cowan Report"). Dr. Cowan states that he was retained "to review and opine on Brian Lin's Opinion Concerning Contemplated Settlement Amount ('Lin Report'), and to consider issues raised by the Lin Report and other matters bearing

on the quantification of damages" to the Trusts.[1]  Regarding damages, he focuses on

"repurchase liability," which I understand is the amount that the Institutional Investors

and the Trustee would claim Countrywide owed the Trusts in litigation.  Dr. Cowan notes

that to analyze the contemplated settlement amount, Mr. Lin was provided with certain

data from the Institutional Investors and Bank of America, including information on three

rates:  (a) default rate ("the percentage of the aggregated loan balances in each

delinquency-status bucket for loans that are in default or are likely to go into default");

(b) severity rate ("the percentage of loan balance that will result in loss after loss

mitigation activities such as foreclosure"); and breach rate (which "represents the

percentage of loans that are estimated to be in breach of representations and warranties")

(collectively, the "Provided Data").[2]

      6.      Dr. Cowan claims that although Mr. Lin used the general approach

of the Institutional Investors (which applies the above rates as successive haircuts to the

loans' principal balances),[3] Mr. Lin adopted much of Bank of America's data and

ignored much of the Institutional Investors' data.[4]  Dr. Cowan further claims that "had

Mr. Lin pursued a scientifically sound approach to reconciling the two sets of data

available to him, he would have calculated a repurchase liability in line with the results of

my analysis."[5]  This analysis consists of a statistical "simulation study" of the Provided

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1.    Cowan Report at 1.
2.    *Id.* at 2 & 6-7.
3.    *Id.* at 6-8.  Mr. Lin also used "success rate" as an additional haircut in his analysis.
      *Id.* at 6.  I do not use this rate because Dr. Cowan did not use it.  *Id.* at 16.  I have no
      opinion regarding its use one way or the other.
4.    *Id.* at 2.
5.    *Id.*

Data that purportedly "calculates the repurchase liability using all possible settings and combinations of the default, severity, and breach rates" (the "Simulation Study").[6]

7.     Counsel for the Trustee has asked me to analyze Dr. Cowan's Simulation Study.[7] In performing this work, I have received assistance from members of the professional staff of Compass Lexecon. Exhibit B identifies the materials I relied on in forming my conclusions.

8.     In my opinion, Dr. Cowan's Simulation Study is nothing more than "smoke and mirrors" – it provides a false sense of precision regarding the potential repurchase liability but offers no methodological improvement over the simpler method used by the Institutional Investors and adopted by Mr. Lin. I base this conclusion on three primary considerations:

- The difference between the repurchase liability estimates using Mr. Lin's and Dr. Cowan's methods is due entirely to Dr. Cowan's changes to Mr. Lin's assumptions and Dr. Cowan's apparent calculation errors rather than any improvement to Mr. Lin's method.

- The average repurchase liability reported by Dr. Cowan could have been more easily and more accurately estimated using Mr. Lin's method.

- Dr. Cowan does not draw any conclusions from his ranges of likely outcomes, or confidence intervals, and so they are irrelevant to his opinions; moreover, these ranges are unrealistically small.

I elaborate on this opinion and its bases in the remainder of this report.

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6.    *Id.* at 16.
7.    I am being compensated at $800 per hour. I have no opinion regarding the appropriate amount of the purported repurchase liability or any other issue in this case. My compensation in no way depends on the content of my opinions or the outcome of this proceeding.

### III. DR. COWAN'S RESULTS ARE CAUSED BY CHANGES TO MR. LIN'S ASSUMPTIONS AND DR. COWAN'S APPARENT CALCULATION ERRORS, NOT BY IMPROVEMENTS TO MR. LIN'S METHODS

9.     Dr. Cowan's Simulation Study estimates an average repurchase liability of $56.3 billion, which he compares to a range estimated using Mr. Lin's method of $22.1 billion to $27.6 billion.[8] But Dr. Cowan's higher estimate is not due to a change in method; rather, it is entirely caused by his changes to Mr. Lin's assumptions and to apparent calculation errors by Dr. Cowan.

10.     In modifying Mr. Lin's default rate and severity rate, Dr. Cowan extends the upper bounds of his ranges past Mr. Lin's for every category of loan.[9] Dr. Cowan also assumes a range of breach rates from 36% to 65% which by itself increases his average repurchase liability estimate by 40% over any model of Mr. Lin's that was otherwise identical.[10] It is not surprising that Dr. Cowan finds higher repurchase liabilities when he increases the upper bound on all of Mr. Lin's default, severity, and breach rate assumptions.[11]

11.     In addition, the results of Dr. Cowan's Simulation Study likely are substantially overstated. A straightforward calculation of the average repurchase liability

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8.    *Id.* at 24. Dr. Cowan removes the "success rate" haircut from Mr. Lin's calculation to make an "apples-to-apples" comparison to the results of the Simulation Study.
9.    *Compare id.* at 6 *with id.* at 16-7. Dr. Cowan also separates the "60+ Delinquent Loans" category into "180+ Delinquent Loans" and "60 to 179 Delinquent Loans." *Id.* at 16. In doing so, Dr. Cowan effectively increases the overall default rate estimate for the "60+ Delinquent Loans" pool that Mr. Lin uses from 90% to 99% because Dr. Cowan reports that 86% of the balance in this pool is in the "180+ Delinquent Loans" category. *Id.* The other loan categories were assigned explicitly higher default rates. The maximum severity rate was increased from 60% to 66%.
10.   *Compare id.* at 6 *with id.* at 17.
11.   Dr. Cowan's higher estimate of repurchase liabilities is mitigated to a small degree by his use of lower principal balance and Liquidated Loan losses. *Id.* n. 33 (at 16) & Appendix E.

that results from Dr. Cowan's reported assumptions and his own formulae leads to an

estimate of approximately $39.8 billion.[12]  *See* Exhibit C.  Consequently, Dr. Cowan's

$56.3 billion estimate appears to be overstated by more than 40%.[13, 14]  The only

explanation is that Dr. Cowan erred either in his calculations or in his description of the

data he used in his calculations.[15]  One possible calculation error that can explain a

substantial portion of Dr. Cowan's overestimate is that he used the Liquidated Loans

*balance* of $45.8 billion (Cowan Report at 16) in his calculations rather than the

Liquidated Loans *losses* of $21.7 billion (*id.* Appendix E).  As his own formulae show,

unlike the other loan categories, repurchase liability for liquidated loans is estimated

using *losses*, not balance.[16]  The difference in the Liquidated Loans balance and losses

numbers Dr. Cowan reports, reduced by an average breach rate of 50.5%, accounts for

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12.  *See infra* § IV for the mathematical basis for this calculation, which is the same one Mr. Lin used and the same as the formulae Dr. Cowan presents in his report at 20-1. Moreover, as shown in Exhibit E, we replicated the Simulation Study and also found an average repurchase liability of $39.8 billion.

13.  Dr. Cowan's estimate of $56.34 billion is also contradicted by the graphs of his results found in his report, which clearly show an estimated mean and median of approximately $55.0 billion, with few or none of his simulations ever producing liability estimates as high as $56.34 billion (his stated mean).  Cowan Report Charts 3 (at 23) & 4 (at 24).  Further, in discussing how a success rate might be incorporated into his analysis, Dr. Cowan refers to a third estimated repurchase liability of $54.79 billion which is otherwise unsupported in his report.  *Id.* n. 36 (at 24).

14.  $39.8 billion is also substantially below the lower bounds of Dr. Cowan's supposed 95% confidence interval; the lower bound of his widest 95% confidence interval is $55.73 billion.  *Id.* at 22.  *See infra* § V for a critique of Dr. Cowan's confidence intervals.

15.  If Dr. Cowan's error is in his description and so his calculations are somehow correct, then the entire difference between the repurchase liability estimates using Mr. Lin's and Dr. Cowan's methods is due to Dr. Cowan's changes to Mr. Lin's assumptions rather than any improvement to Mr. Lin's method.

16.  Cowan Report at 20-1.

$12.2 billion of the $16.5 billion discrepancy between his reported liability estimate and my replication of it using his own methods.

## IV. DR. COWAN'S SIMULATION STUDY OFFERS NO IMPROVEMENT TO ESTIMATING REPURCHASE LIABILITIY OVER MR. LIN'S METHOD

12.     Dr. Cowan's Simulation Study is a relatively simple example of a family of models known as Monte Carlo simulations.  Monte Carlo simulations are commonly used to derive properties of certain unknown variables or statistical distributions that are too complex to permit a theoretical, exact calculation.[17]  Instead, a Monte Carlo simulation creates hundreds or thousands of randomly generated outcomes and these sample outcomes are used to describe features of the true distribution.  In this manner, the average of 1,000 randomly generated liability estimates may be used to approximate the mean (i.e., the average) of the theoretical range of the repurchase liability.

13.     However, Dr. Cowan's average repurchase liability estimate is easily calculated and does not require a statistical analysis such as his Simulation Study.  In other words, under Dr. Cowan's method, the statistical properties of his estimate (such as the mean) are not uncertain, but are directly calculable.  In fact, Dr. Cowan's estimate of the average liability can be calculated in exactly the same manner that Mr. Lin did.

14.     A basic law of probability holds that the expectation (mean value) of a sum is always the sum of the expectations of its parts; similarly, if a group of random variables are independent of one another, the expectation of their product is always the

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17.     *See,* e.g., William H. Greene, *Econometric Analysis* (6th edition, Pearson Prentice Hall, 2008), at 585 ("Monte Carlo methods are often used to study the behavior of test statistics when their true properties are uncertain.").

product of the individual expectations.[18] In this manner, the mean value of Dr. Cowan's analysis can be directly calculated in the same manner that Mr. Lin did, without a need for Monte Carlo simulations. *See* Exhibit D. In this case, using Mr. Lin's method to calculate the average repurchase liability is actually more precise than Dr. Cowan's use of the Simulation Study, which only approximates the true mean by averaging many randomly generated sample liabilities.

## V. DR. COWAN'S SIMULATION STUDY PRESENTS IRRELEVANT AND UNREALISTICALLY NARROW CONFIDENCE INTERVALS

15. Dr. Cowan criticizes Mr. Lin for not performing "a scientifically sound and statistically supported analysis."[19] Dr. Cowan purports to correct for this by running his Simulation Study "where ALL values [of default, severity, and breach rates] between the lowest and highest values are considered."[20] Dr. Cowan chooses his values according to either a uniform or a triangular distribution of random values, and claims that "use of either set of distributions allows computation of the 95% confidence range on the outcomes, something Mr. Lin did not provide."[21]

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18. *See,* e.g., William Feller, *An Introduction to Probability Theory and Its Applications, Vol. 1* (revised 3rd edition, John Wiley & Sons, 1970), at 222-3 ("If $X_1$, $X_2$, …, $X_n$ are random variables with expectations, then the expectation of their sum exists and is the sum of their expectations… If $X$ and $Y$ are mutually independent random variables with finite expectations, then their product is a random variable with finite expectation and $E(XY)=E(X)E(Y)$… By induction the same multiplication rule holds for any number of mutually independent random variables.").
19. Cowan Report at 16.
20. *Id.* at 17.
21. *Id.* at 20.

16.     While Dr. Cowan does calculate and report two 95% confidence intervals for the mean repurchase liability,[22] none of his conclusions rely on these ranges. Nor does Dr. Cowan ever discuss a use for the confidence intervals he provides, or explain which of his two confidence intervals is more reasonable than the other, or offer a reason for why knowing the intervals' endpoints should lend more credence to his results. For these reasons, the confidence intervals are irrelevant to Dr. Cowan's conclusions and their absence cannot be considered a relative weakness of the Lin Report.

17.     Even if I assume that his reported confidence intervals had some relevance to his conclusions, it is my opinion that these confidence intervals are unrealistically narrow. The wider of Dr. Cowan's two confidence intervals is a range of likely liability outcomes from $55.7 to $56.9 billion.[23] In Dr. Cowan's opinion, then, he can state with 95% confidence that, if the range of parameter inputs he used are correct, the ultimate repurchase liability will not be more than $0.6 billion from his mean estimate of $56.3 billion, a difference of just over 1%. Given that Dr. Cowan purports to model wide ranges of default rates, severity rates, and breach rates, it is astounding that he can be so precise and so certain of the resulting range of likely outcomes. As one example, it beggars belief that Dr. Cowan can place an upper bound on the breach rate of 65% – more than 80% higher than his lower bound of 36% – and still conclude that the upper bound of likely repurchase liabilities is only 1% higher than the lower bound.[24]

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22.   *Id.* at 22-3. Once again, Dr. Cowan's reported confidence intervals are contradicted by the graphs of his results (Charts 3 & 4), which show somewhat lower ranges of likely outcomes than those reported in his text.

23.   *Id.* at 22.

24.   Breach rate applies equally to every loan category and has a direct, one-to-one impact on the estimated repurchase liability, so an increase of 80% in this rate increases estimated repurchase liability by 80%.

18.     Dr. Cowan claims that this precision arises from his "trust level" analysis, in which repurchase liabilities for each of the 530 Trusts is modeled separately for each of over 1,000 iterations of his Simulation Study.[25]  The effect, however, is that the overall default rates, severity rates, and breach rates for the aggregate group of loans never deviate by more than one percent from the values midway between Dr. Cowan's two extremes in any of the 1,000 iterations.  This can readily be seen by replicating Dr. Cowan's Simulation Study and reporting the average severity rates and breach rates.  In 1,000 trials, the average severity rate was *never* less than 55.1% or more than 55.9% (compared to Dr. Cowan's stated range of 45% - 66%) and the average breach rate was *never* less than 50.0% or more than 51.1% (compared to Dr. Cowan's stated range of 36% - 65%).  *See* Exhibit E.

19.     These results stem from Dr. Cowan's unsupported, improbable, and extreme assumption that the Trust-level repurchase liabilities he models are independent in every respect and thus completely uncorrelated.  Specifically, he assumes that:  (a) the default, severity, and breach rates for each Trust are wholly uncorrelated with each other; and (b) the specific rates for each Trust are wholly uncorrelated with the same rates for every other Trust (e.g., the breach rate for Trust 1 is uncorrelated with the breach rates for Trusts 2 through 530).  If Dr. Cowan's randomly generated parameters were correlated across either of these two dimensions, his confidence intervals would be wider and less unrealistic.

20.     Even if, solely for the purposes of evaluating Dr. Cowan's Simulation Study, I adopt his assumption that the Trust-level liabilities he simulates are

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25.   *Id.* at 21-2.

fully independent and uncorrelated, his "trust level" analysis and the resulting confidence intervals remain fundamentally flawed. Dr. Cowan assigns each of the 530 Trusts a range of default, severity, and breach rates equal to the range suggested by the Provided Data.[26] For example, he generates a random severity rate for each of the 530 Trusts of between 45% (as suggested by the Bank of America data) and 66% (as suggested by the Institutional Investors' data).[27] But neither party estimated that *Trust-level* severities would be 45% or 66%, only that the average severity *across* the Trusts would be 45% or 66%. Dr. Cowan falsely equates two estimates of the *average* severity rate with one estimate of the range of *individual* severity rates. By using a minimum of 45%, he ignores the implication that Bank of America estimated that many Trusts had lower severity rates. Similarly, by using a maximum of 65%, he ignores the implication that the Institutional Investors estimated that many Trusts had higher severity rates. If Dr. Cowan had expanded his range of Trust-level severity rates (and/or default rates and/or breach rates) to be consistent with the Provided Data, his confidence intervals would have been wider and less unrealistic.

21.     For all of the reasons above, I conclude that the confidence intervals Dr. Cowan presents are fundamentally flawed and in no way improve or correct any aspect of the Lin Report.

G. William Schwert

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G. William Schwert

March 28, 2013

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26.  *Id.* at 22.
27.  *Id.* at 17.

# Exhibit A

# G. WILLIAM SCHWERT

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## CURRENT POSITION:

Distinguished University Professor of Finance and Statistics, University of Rochester, 1998-present. (Gleason Professor of Finance and Statistics, 1986-98, Professor, 1984-86; Associate Professor, 1979-84; Assistant Professor 1976-79).

Research Associate, National Bureau of Economic Research, Asset Pricing Group, 1988-present.

Senior Research Associate, Rochester Center for Economic Research, Department of Economics, University of Rochester, 1984-present.

## EDUCATION:

Ph.D., University of Chicago, (Economics, Finance, Econometrics), 1975.

M.B.A., University of Chicago, 1973.

A.B. with Honors (Economics), Trinity College (Hartford, Connecticut), 1971.

## TEACHING EXPERIENCE:

University of Rochester, Simon School, 1976-present.  Graduate courses in capital markets, corporate finance, corporate control, regression, econometrics, time series analysis, forecasting, and industrial organization.

University of Chicago, Graduate School of Business, Assistant Professor, 1975-1976.  Graduate courses in capital markets, time series analysis, and econometrics.

## RESEARCH GRANTS:

"Shifting Risk Premia," July 1982-June 1983, Batterymarch Financial Management.

"The Dynamic Behavior of Prices," June 1980-May 1982, National Science Foundation (SES 80-06413).

"The Dynamic Behavior of Prices," June 1978-May 1980, National Science Foundation (SOC 78-04278).

*HONORS:*

*Who's Who in America* (2000-present) [Marquis].

*Who's Who in Finance and Industry* (1989-present) [Marquis].

*Who's Who in the East* (1991-present) [Marquis].

*Who's Who in American Education* (1991-present) [Marquis].

*Who's Who in Economics* (2002-present) [Edward Elgar].

ISIHighlyCited.com (2002-present) [Thomson ISI].

Readers' Choice Award (selected by the readers of *European Financial Management*), 2011.

Financial Management Association, Fellow, 2009.

Graham and Dodd Plaque from the Association for Investment Management and Research for the best paper published in the *Financial Analysts Journal* in 1990.

Smith-Breeden Distinguished Paper Prize, *Journal of Finance*, 1990.

*The Annual Guide to Public Policy Experts*, edited by Robert Huberty and Barbara D. Hohbach, The Heritage Foundation, Washington, D.C. (1991-present).

University Mentor 1982-83, University of Rochester award for scholarship and teaching.

Center for Research in Security Prices Distinguished Research Scholar and visiting Associate Professor of Finance, University of Chicago, 1982.

Beta Gamma Sigma, 1975.

Walgreen Fellowship, 1973-74.

Earhart Fellowship, 1973-75.

Pi Gamma Mu, 1971.

Ferguson prize for best thesis in economics at Trinity, 1971.

*PUBLICATIONS:*

"Stock Volatility during the Recent Financial Crisis" *European Financial Management*, 17 (2011) 789-805 [NBER Working Paper No. W16976]. **Winner of Readers' Choice Award.**

"The Variability of IPO Initial Returns" with Michelle Lowry and Micah Officer, *Journal of Finance*, 65 (April 2010) 425-465 [previously Simon School Working Paper No. FR 06-06; NBER Working Paper No. W12295].

"Is the IPO Pricing Process Efficient?" with Michelle Lowry, *Journal of Financial Economics*, 71 (January 2004) 3-26 [previously available as "Biases in the IPO Pricing Process"; Simon School Working Paper No. FR 01-02; NBER Working Paper No. W8586].

"Anomalies and Market Efficiency," Chapter 15 in *Handbook of the Economics of Finance*, eds. George Constantinides, Milton Harris, and René Stulz, North-Holland (2003) 937-972 [Simon School Working Paper No. FR 02-13; NBER Working Paper No. W9277].

*Publications (continued)*

"IPO Market Cycles: Bubbles or Sequential Learning?" with Michelle Lowry, *Journal of Finance*, 57 (June 2002) 1171-1200 [Simon School Working Paper No. FR 00-21; NBER Working Paper No. W7935].

"Stock Volatility in the New Millennium: How Wacky Is Nasdaq?" *Journal of Monetary Economics*, 49 (January 2002) 3-26 [NBER Working Paper No. W8436].

"Hostility in Takeovers: In the Eyes of the Beholder?" *Journal of Finance*, 55 (December 2000) 2599-2640 [NBER Working Paper No. W7085].

"Stock Market Volatility: Ten Years After the Crash," *Brookings-Wharton Papers on Financial Services*, 1 (1998) 65-114 [NBER Working Paper No. W6381].

"Markup Pricing in Mergers and Acquisitions," *Journal of Financial Economics*, 41 (June 1996) 153-192. Summarized in *The C.F.A. Digest*, 25 (Winter 1995) 83-84. [Simon School Working Paper No. FR 94-01; NBER Working Paper No. W4863].

"Poison or Placebo? Evidence on the Deterrent Effect of Modern Antitakeover Measures," with Robert Comment, *Journal of Financial Economics*, 39 (September 1995) 3-43. Reprinted in the *Proceedings of the Seminar on the Analysis of Security Prices*, (November 1993). [Simon School Working Paper No. FR 93-04; NBER Working Paper No. W4316]. *JFE* **All Star Paper.**

"Securities Transaction Taxes: An Overview of Costs, Benefits and Unresolved Questions," with Paul J. Seguin, *Financial Analysts Journal*, 49 (September/October 1993) 27-35. Reprinted in *Securities Transaction Taxes: False Hopes and Unintended Consequences*, Suzanne Hammond, ed., (Chicago: Catalyst Institute, 1995), 1-26. [Simon School Working Paper No. FR 93-08].

"The *Journal of Financial Economics*: A Retrospective Evaluation, 1974-91," *Journal of Financial Economics*, 33 (June 1993) 369-424.

*Empirical Research in Capital Markets*, G. William Schwert and Clifford W. Smith, Jr., eds. (New York: McGraw-Hill, 1992).

"Heteroskedasticity in Stock Returns," *Journal of Finance*, 45 (September 1990) 1129-1155, with Paul J. Seguin [NBER Working Paper No. W2956].

"Stock Returns and Real Activity: A Century of Evidence," *Journal of Finance*, 45 (September 1990) 1237-1257 [NBER Working Paper No. W3296].

"Stock Market Volatility," *Financial Analysts Journal*, 46 (May-June 1990) 23-34. Reprinted in *Market Volatility and Investor Confidence*, New York Stock Exchange, (June 7, 1990) C1-C24. Summarized in *The C.F.A. Digest*, 21 (Winter 1991) 51-53. **Winner of the Graham and Dodd Plaque.** [Simon School Working Paper No. MERC 89-24].

"Alternative Models for Conditional Stock Volatility," *Journal of Econometrics*, 45 (July 1990) 267-290, with Adrian R. Pagan. *Journal of Econometrics* **All Star Paper.** [NBER Working Paper No. W2955].

"Indexes of United States Stock Prices from 1802 to 1987," *Journal of Business*, 63 (July 1990) 399-426. Correction: *Journal of Business*, 64 (July 1991) 442. Summarized in *The C.F.A. Digest*, 21 (Winter 1991) 3-5. [NBER Working Paper No. W2985].

*PUBLICATIONS:*

"Stock Volatility and the Crash of '87," *Review of Financial Studies*, 3 (1990) 77-102. [Simon School Working Paper No. 88-06; NBER Working Paper No. W2954].

"Why Does Stock Market Volatility Change Over Time?" *Journal of Finance*, 44 (December 1989) 1115-1153 (**Smith-Breeden Distinguished Paper Award**). Reprinted in *Empirical Research in Capital Markets*, G. William Schwert and Clifford W. Smith, Jr., eds. (New York: McGraw-Hill, 1992). [Simon School Working Paper No. 87-11; NBER Working Paper No. W2798].

"Business Cycles, Financial Crises and Stock Volatility," *Carnegie-Rochester Conference Series on Public Policy*, 31 (Autumn 1989) 83-125. Reprinted in the *Proceedings of the Seminar on the Analysis of Security Prices*, Vol. 33 No. 2 (November 1988) 207-243. Excerpted in the *Simon Research Review*, 1 (Fall 1989) 1-8. Reprinted in *Stock Market Crashes and Speculative Manias*, Eugene White, ed., (Cheltenham, UK: Edward Elgar, 1996). [Simon School Working Paper No. 88-02; NBER Working Paper No. W2957].

"Tests for Unit Roots: A Monte Carlo Investigation," *Journal of Business and Economic Statistics*, 7 (April 1989) 147-159. **Reprinted in the Twentieth Anniversary Commemorative issue of the *Journal of Business and Economic Statistics*, 20 (January 2002) 5-17.** [NBER Working Paper No. T73].

"Expected Stock Returns and Volatility," *Journal of Financial Economics*, 19 (September 1987) 3-29, with Kenneth R. French and Robert F. Stambaugh. Reprinted in the *Proceedings of the Seminar on the Analysis of Security Prices*, Vol. 31 No. 1 (May 1986) 119-148, in *Frontiers of Finance: The Batterymarch Fellowship Papers*, Deborah H. Miller and Stewart C. Myers, eds. (New York: Basil Blackwell, 1990) 190-215, and in *ARCH: Selected Readings*, Robert F. Engle, ed., (Oxford: Oxford University Press, 1995) 61-86. *JFE* **All Star Paper.** [Simon School Working Paper No. MERC 85-10].

"Effects of Model Specification on Tests for Unit Roots in Macroeconomic Data," *Journal of Monetary Economics*, 20 (July 1987) 73-103. [Simon School Working Paper No. 87-01].

"Information Aggregation, Inflation, and the Pricing of Indexed Bonds," *Journal of Political Economy*, 93 (February 1985) 92-114, with Gur Huberman.

"Size and Stock Returns, and Other Empirical Regularities," *Journal of Financial Economics*, 12 (May 1983) 3-12. Reprinted in *Empirical Research in Capital Markets*, G. William Schwert and Clifford W. Smith, Jr., eds. (New York: McGraw-Hill, 1992).

"Effects of Nominal Contracting on Stock Returns," *Journal of Political Economy*, 91 (February 1983) 70-96, with Kenneth R. French and Richard S. Ruback. Reprinted in *Proceedings of the Seminar on the Analysis of Security Prices*, Vol. 26, No. 2 (November 1981) 1-36. [Simon School Working Paper No. MERC 81-07].

"Differencing as a Test of Specification," *International Economic Review*, 23 (October 1982) 535-552, with Charles I. Plosser and Halbert White. Reprinted in *Advances in Econometric Theory: The Selected Works of Halbert White*, (Cheltenham, UK: Edward Elgar, 1996).

"Tests for Predictive Relationships Between Time Series Variables: A Monte Carlo Investigation," *Journal of the American Statistical Association*, 77 (March 1982) 11-18, with Charles R. Nelson. [Simon School Working Paper No. 79-05].

*Publications:*

"Using Financial Data To Measure Effects of Regulation," *Journal of Law and Economics*, 24 (April 1981) 121-158. Excerpted in *Economics of Corporation Law and Securities Regulation*, Richard Posner and Kenneth Scott, eds. (New York, Little, Brown, 1980) 185-191.

"The Adjustment of Stock Prices to Information About Inflation," *Journal of Finance*, 36 (March 1981) 15-29.

"Tests of Causality: The Message in the Innovations," *Carnegie-Rochester Conference Series on Public Policy* (Supplement to *Journal of Monetary Economics*), 10 (Spring 1979) 55-96. Reprinted in *Theory, Policy, Institutions: Papers from the Carnegie-Rochester Conferences on Public Policy*, Karl Brunner and Allan Meltzer, eds. (Amsterdam: North-Holland, 1983) 215-256. [Simon School Working Paper No. 78-07].

"Inflation, Interest, and Relative Prices," *Journal of Business*, 52 (April 1979) 183-209, with Eugene F. Fama. [Simon School Working Paper No. 78-10].

"Money, Income and Sunspots: Measuring Economic Relationships and the Effects of Differencing," *Journal of Monetary Economics*, 4 (November 1978) 637-660, with Charles I. Plosser.

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*PUBLICATIONS:*

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"Testing for Covariance Stationarity in Stock Market Data," *Economics Letters*, 33 (1990) 165-170, with Adrian R. Pagan.

"Margin Regulation and Stock Volatility," *Journal of Financial Services Research*, 3 (December 1989) 153-164.

"Business Cycles, Financial Crises and Stock Volatility: Reply to Shiller," *Carnegie-Rochester Conference Series on Public Policy*, 31 (Autumn 1989) 133-138.

"The Time Series Behavior of Real Interest Rates: A Comment," *Carnegie-Rochester Conference Series on Public Policy*, 24 (Spring 1986) 275-288.

"A Discussion of CEO Deaths and the Reaction of Stock Prices," *Journal of Accounting and Economics*, 7 (April 1985) 175-178.

"The Market for Corporate Control," panel discussion published in the *Midland Corporate Finance Journal*, Summer 1983, pp. 21-47; reprinted in *Six Roundtable Discussions with Joel Stern*, Donald H. Chew, Jr., ed. (New York: Quorum Books, 1986) 101-143.

"Potential GNP: Its Measurement and Significance -- A Dissenting Opinion," *Carnegie-Rochester Conference Series on Public Policy* (supplement to *Journal of Monetary Economics*), 10 (Spring 1979) 179-186, with Charles I. Plosser.

*CURRENT RESEARCH:*

"Short Sales, Damages and Class Certification in 10b-5 Actions," with Robert C. Apfel, John E. Parsons, and Geoffrey S. Stewart; [Simon School Working Paper No. FR 01-19; NBER Working Paper No. W8618.]

*Recent Oral Presentations:*

"Tutorial: Time-series Econometrics," Financial Management Association, Atlanta, GA, October 2012.

"Stock Volatility During the Recent Financial Crisis," European Financial Management Association, Keynote Address, Aarhus, Denmark, June 2010.

"Stock Market Volatility: Past, Present, and Future," Simon Alumni Council, October 2008; University of Rochester Alumni Meeting, New York, January 2009; Financial Management Association, Keynote Address, Reno, NV, October 2009.

"The Variability of IPO Initial Returns," UNC-Duke Corporate Finance Conference, September 2001; Pennsylvania State University, October 2006; Entrepreneurship, Venture Capital and Initial Public Offerings Conference, Harvard Business School, December 2006; Stern School, NYU, April 2008.

"Stock Volatility in the New Millennium:  How Wacky Is Nasdaq?" Carnegie-Rochester Conference on Public Policy, University of Rochester, April 2001.

"IPO Market Cycles: Bubbles or Sequential Learning?" University of Rochester, Brown Bag Lunch, February 2000; University of Rochester, Finance Seminar, May 2000; Australasian consortium of Universities videoconference, November 2000; MIT, Finance Seminar, February 2001.

"Stock Market Volatility: Ten Years After the Crash," Brookings-Wharton Conference on Financial Institutions, Washington, DC, October 1997.

"Hostility in Takeovers: In the Eyes of the Beholder?" Columbia University Finance Seminar, March 1997; Harvard Conference on Financial Decisions and Control, July 1997; NBER Summer Institute, August 1997; New York University, November 1997; Emory University, November 1997; Yale University, March 1999; University of Rochester, April 1999.

"Markup Pricing in the Market for Corporate Control?," American Finance Association meetings, Boston, MA, January 1994; Harvard Conference on Financial Decisions and Control, July 1994; V.P.I. Finance Workshop, September 1994; Michigan Finance & Accounting Conference, October 1994; University of Rochester, October 1994; Ohio State Finance Workshop, November 1994; University of Chicago, June 1995.

"Poison or Placebo?  Evidence on the Deterrent Effect of Modern Antitakeover Measures," Graduate School of Business, New York University, March 1993; University of Rochester, April 1993; NBER Summer Institute, August 1993; University of Michigan, September 1993; University of Southern California, October 1993, University of Chicago, October 1993, and CRSP Seminar on the Analysis of Security Prices, University of Chicago, November 1993.

"Stock Market Volatility," Q Group Conference, Tucson Arizona, October 1990; Rochester-Bradley Center Shadow SEC Conference, Washington, D.C., November 1990; Center for Economic Policy Studies Symposium, Princeton University, November 1990; International Financial Studies Research Center Conference, Massachusetts Institute of Technology, May 1991.

*DOCTORAL DISSERTATIONS SUPERVISED:*

Candace Jens, "Investment Around U.S. Gubernatorial Elections," September 2012.

*DOCTORAL DISSERTATIONS SUPERVISED (continued):*

Matthew Gustafson, "Four Essays on Capital Market Competition and Security Offering Methods and a Natural Experiment on How Wealth Shocks Affect Retirement," September 2012, (Assistant Professor of Finance, Smeal Business School, Pennsylvania State University).

Evan Dudley, "Essays on Capital Structure and Investment," October 2008, (Assistant Professor of Finance, University of Florida).

Alexander Barinov, "Idiosyncratic Volatility, Growth Options, and the Cross-Section of Returns," Chair of Committee, June 2008 (Assistant Professor of Finance, University of Georgia).

Gennaro Bernile, "The Rhetoric of M&A Deals: Analysis of Insiders' Forecasts during the Merger Wave of the 1990s," August 2006, (Assistant Professor of Finance, University of Miami).

Ivy Xiying Zhang, "Economic Consequences of Sarbanes-Oxley Act of 2002," December 2005, (Assistant Professor of Accounting, Carlson School of Management, University of Minnesota).

Lance Young, "Empirical Investigations of Rational and Behavioral Explanations for Capital Market Anomalies," August 2005, (Assistant Professor of Finance, University of Washington).

Tzachi Zach, "Inside the Accrual Anomaly," December 2003, (Assistant Professor of Accounting, Fisher College of Business, The Ohio State University).

Richmond D. Mathews, "Corporate Control, Cooperation, and Entry Deterrence in Direct Equity Sales," August 2003, (Associate Professor of Finance, Fuqua School of Business, Duke University).

Micah Officer, "Contractual Features of Merger Agreements," November 2001, Chair of Committee (Assistant Professor of Finance, Marshall Business School, University of Southern California).

Andreas Gintschel, "Quote Revisions in Related Assets," August 2001 (Department of Economics, Universitat Trier and Deutsche Asset Management).

Jonathon Lewellen, "On the Predictability of Stock Returns," April 2000 (Associate Professor of Finance, Amos Tuck School of Business Administration, Dartmouth College).

Michelle B. Lowry, "Intertemporal Variation in IPO Volume," December 1999, Chair of Committee (Associate Professor of Finance, Calderwood Faculty Fellow in Business, Smeal Business School, Pennsylvania State University).

Jarrad V. T. Harford, "Corporate Cash Reserves and Acquisitions," February 1998, Chair of Committee (Professor of Finance, Marion B. Ingersoll Chair in Finance, Business School, University of Washington).

Jang-Ku Kang, "Bond Mutual Fund Performance Evaluation: The Numeraire Portfolio Approach," April 1997, (Professor of Finance, Graduate School of Management, Korea Advanced Institute of Science & Technology).

Mark R. Huson, "Bid-Ask Spreads, Measured Returns, and Inferences in Financial Research," September 1995, Chair of Committee (Associate Professor of Finance, Pocklington Professor of Private Enterprise & Jarislowsky Fellow, University of Alberta).

*DOCTORAL DISSERTATIONS SUPERVISED (continued):*

Philip Kearns, "Volatility and the Pricing of Interest Rate Derivative Securities," June 1993, Chair of Committee (Managing Director, Head of Fixed Income, DE Shaw & Co).

Shing-Yang Hu, "Market Risk and Asset Returns," July 1992 (Professor, National Taiwan University).

Joy Begley, "The Determinants of Debt Covenant Use: An Empirical Investigation," December 1990 (Ronald L. Cliff Professor in Accounting, University of British Columbia).

Paul J. Seguin, "Consequences of Exchange Listing and Transactions Reporting: An Empirical Investigation of National Market System Reporting," May 1990, Chair of Committee (Associate Professor, Carlson School of Management, University of Minnesota).

Douglas J. Skinner, "Options Markets, Stock Return Volatility and the Information Content of Earnings Releases," July 1989 (John P. and Lillian A. Gould Professor of Accounting, Graduate School of Business, University of Chicago).

Susan E. Liberty, "Economic Determinants of Accounting Choice: A Study of Commercial Bank Accounting Practices," November 1988.

Vinod Singhal, "Risk Considerations in Operations Management," March 1988 (Dr. Alfred F. and Patricia L. Knoll Professor of Operations Management, Georgia Tech University).

Dean Crawford, "Factors that Influence the Form of Payment in Mergers," December 1987 (Professor of Accounting, SUNY Oswego).

Karen Wruck, "Management Financing Decisions and Firm Value: An Examination of Private Sales of Common Stock," September 1987, Chair of Committee (Associate Dean for MBA Programs, Dean's Distinguished Professor, Professor of Finance, Ohio State University).

William Blozan, "Retail Deals as Competition: Reducing Consumer Search Costs," September 1986, Co-Chair of Committee (CEO, Breeze Easy, Inc.).

H. Nejat Seyhun, "Analysis of Market Response to Insider Trading Information," April 1984, Chair of Committee (Jerome B. and Eilene M. York Professor of Business Administration, Graduate School of Business, University of Michigan).

Kenneth R. French, "The Pricing of Futures and Forward Contracts," July 1982, Chair of Committee (Carl E. and Catherine M. Heidt Professor of Finance, Amos Tuck School of Business Administration, Dartmouth College).

Thomas Lys, "Selection of Accounting Procedures and Implications of Changes in Generally Accepted Accounting Principles: A Case Study Using Oil and Gas Accounting," May 1982 (Eric L. Kohler Chair in Accounting, Professor of Accounting Information & Management, Kellogg School of Management, Northwestern University).

Björn Espen Eckbo, "Examining the Anti-Competitive Significance of Large Horizontal Mergers," July 1981 (Tuck Centennial Professor of Finance, Amos Tuck School of Business Administration, Dartmouth College).

*DOCTORAL DISSERTATIONS SUPERVISED (continued):*

Richard Ruback, "The Effects of Discretionary Price Control Decisions on Equity Values," July 1980 (Willard Prescott Smith Professor of Corporate Finance, Graduate School of Business Administration, Harvard University).

Peter Dodd, "The Market for Corporate Control and Stockholder Wealth," June 1980, Chair of Committee (Chief Financial Officer, North American Energy Partners; former Global Head of Corporate Finance Advisory, ABN-AMRO; former Dean, Australian Graduate School of Management).

Wayne H. Mikkelson, "Convertible Debt and Warrant Financing: A Study of the Agency Cost Motivation and Wealth Effects of Calls of Convertible Securities," April 1980 (Cameron Distinguished Chair in Finance, Lundquist College of Business, University of Oregon).

Richard Leftwich, "Private Determination of Accounting Methods in Corporate Bond Indentures," April 1980 (Fuji Bank and Heller Professor of Finance & Accounting and Deputy Dean for Faculty, Graduate School of Business, University of Chicago).

Robert W. Holthausen, "Theory and Evidence on the Effect of Bond Covenants and Management Compensation Contracts on the Choice of Accounting Techniques: The Case of the Depreciation Switch-Back," April 1980 (Nomura Securities Professor of Accounting & Finance, Wharton School, University of Pennsylvania).

Robert Kellogg, "An Empirical Study of Rule 10b-5 Buyers' Suits Based Upon Accounting Disclosures," November 1979.

*OTHER PROFESSIONAL ACTIVITIES:*

*Journal of Financial Economics*, Managing Editor, 1995-present; (Advisory Editor, 1986-89; Editor, 1979-86 and 1989-95; Associate Editor, 1977-78).
*Journal of Finance*, Associate Editor, 1983-2000.
*Journal of Monetary Economics*, Associate Editor, 1984-95; Advisory Editor, 1995-2008.
*Journal of Accounting and Economics*, Associate Editor, 1978-87.
*Abstracts of Working Papers in Economics*, Associate Editor, 1987-present.
*Journal of Financial Abstracts*, Associate Editor, 1994-98; Editor, Series C, Capital Markets, 1998-present; Co-editor, Series B, Banking and Financial Institutions, 1998-present.
Advisory Board, *Chase Financial Quarterly*, 1981-82; *Midland Corporate Finance Journal*, 1982-87; *Journal of Applied Corporate Finance*, 1988-present.

## Referee for:

*The American Economic Review, Journal of Political Economy, The Bell Journal of Economics, The Rand Journal of Economics, Journal of Law and Economics, Journal of Business, Journal of Financial and Quantitative Analysis, International Economic Review, Quarterly Journal of Economics, Journal of Money, Credit and Banking, Economica, Journal of Macroeconomics, Journal of International Money and Finance, Canadian Journal of Economics, Oxford Economic Papers, Econometrica, Journal of the American Statistical Association, Journal of Econometrics, Journal of Business and Economic Statistics, Stochastic Processes and Their Applications, Operations Research, Management Science, American Statistician*, National Science Foundation, Canadian National Science Foundation

Commissioner, Shadow Securities and Exchange Commission, 1995-1997.

Director, American Finance Association, 1987-89.

*OTHER PROFESSIONAL ACTIVITIES:*

Committee to Select the Winner of the Fischer Black Prize, American Finance Association, 2004-05, and 2012-13.

Chair, Business and Economics Section, American Statistical Association, 1990 (Chair-elect, 1989).

Academic Advisory Board, Modern Portfolio Theory Associates, Inc., 1980-85.

American Economic Association Committee to Review Financial Accounting Standards Board Statement No. 33 (on Inflation Accounting), 1983-85.

Member of NBER Working Group on "The Relation between the Structure of Security Markets and Real Economic Activity," 1985-89.

Advisory Committee of Economists to the Inter-University Consortium for Political and Social Research, 1990-present.

## Simon School Committees:

Committee on Promotion & Tenure, Simon School, 1983-86, 1990-present (Chair, 1994-present).
Remote Education Advisory Committee, Chair, 1999-2003.
Wide World Web Advisory Committee, 1995-97.
Policy Committee, 1986-94.
DBA Committee, Simon School, 1993.
Ph.D. Committee, Simon School, 1977-90, (Chair, 1986-90).
Dean's Advisory Council, Simon School, 1983-86.
Committee on Executive Programs, Simon School, 1982-83.
Committee on Educational Policy, Simon School, 1980-81.
Coordinator of Finance Group, Simon School, 1980-81.

## University of Rochester Committees:

Search Committee for Vice President for Investments, 2000.
Search Committee for Chief Information Officer (Chair), 1998-99.
Administrative Cost Review Task Force (Chair), 1994-95.
Faculty Senate, 1992-95.
Budget Committee, 1990-97 (Co-Chair, 1991-97).
Search Committee for Simon School Dean, 1982-83, 1990-91, and 1993.
Committee on Honorary Degrees, 1990-92.
Council on Graduate Studies, 1980-82 and 1986-90.
Ad hoc Committee on External Relations, 1987-88.
Committee to Evaluate Simon School Dean, 1987.
Committee to Select Graduate Dean's Fellowships, 1985.

*SOCIETAL AFFILIATIONS:*

American Economics Association, 1973-present.
American Finance Association, 1975-present (life member).
Econometric Society, 1973-95.
American Statistical Association, 1973-95.
Financial Management Association, 1989-2006.
Society for Financial Studies, 1989-present.

*S*ELECTED *C*ONSULTING *A*CTIVITIES:

Chase Manhattan Bank, 2012-2013. Expert testimony concerning calculation of damages to the Wehle Trusts. *(Wehle Trusts v. JP Morgan Chase Bank, N.A., No. 2006-1463 (Surrogate's Court, Monroe County NY)).*

Henry Nicholas, 2010-2011. Expert testimony concerning option backdating complaint filed in Broadcom Corp. derivative litigation. *(In RE Broadcom Corp. Derivative Litigation, No. C-06-3252R(CWx) (US District Court, CD, CA)).*

Mayer, Brown, Rowe & Maw LLP, 2010. Analysis of damages claims made by experts for Thomas H. Lee entities related to Refco bankruptcy. *(Thomas H. Lee Equity Fund V, L.P., etal. v. Mayer, Brown, Rowe & Maw LLP  etal., No. . 07 Civ. 6767 (JSR) (US District Court, SD, NY)).*

HSBC Bank, 2010. Expert testimony concerning calculation of damages to various Knox family trusts. *(Knox Trusts v. HSBC Bank, No.DO-0659 (Surrogate's Court, Erie County NY)).*

Chase Manhattan Bank, 2007-2009. Expert testimony concerning calculation of damages to the Blanche Hunter Trust. *(Hunter Trust v. Chase Manhattan Bank, No.1973-30A (Surrogate's Court, Westchester County NY)).*

Henry Nicholas, 2009. Analysis of option backdating complaint filed by Department of Justice related to Broadcom Corp.

Bank of New York, 2007. Expert report concerning plaintiffs' expert's damages analysis of alleged money laundering by clients of Bank of New York within Russia.

Caremark, 2007. Expert testimony concerning deal protection provisions in Caremark-CVS merger agreement. *(Express Scripts et al. v. Caremark, CVS, et al., Case No. CA 2663-N (Court of Chancery, New Castle County, Delaware)).*

Altria, 2007. Analysis of effects of potential spin-off.

Bluegreen Corp., 2006. Analysis of poison pill and 13-D filings in relation to purchases of Bluegreen stock by David Siegel. *(Bluegreen v. David A. Siegel, et al., Case No. 06-80718-CIV-HURLEY/HOPKINS (US District Court, West Palm Beach, Florida)).*

CSFB, 2004-2007. Expert testimony concerning plaintiffs' expert's damages analysis relating to CSFB in the Enron case. *(ENRON Corporation Securities Litigation: Newby et al. v. ENRON et al., Civil Action No. H-01-3624 (US District Court, Houston, Texas)).*

Bear Wagner, 2006. Analysis of specialist trading patterns related to SEC investigation.

Citigroup, 2004. Prepared report concerning effects of analysts' reports on WorldCom stock prices. *(The Retirement Systems of Alabama et al. v. J.P. Morgan Chase & Co. et al., Case No. CV 2002-1947-P (Circuit Court of Montgomery County, Alabama)).*

Chase Manhattan Bank, 2003-2004. Expert testimony concerning calculation of damages to the DuMont Trust. *(DuMont Trust v. Chase Manhattan Bank, No.1956 TT 00443 (Surrogate's Court, Monroe County NY)).*

*SELECTED CONSULTING ACTIVITIES (continued):*

PriceWaterhouseCoopers LLP (Canada), 2003-2004.  Prepared report concerning damages to Safety-Kleen due to alleged misstatements of Laidlaw Inc. financial statements. *(Safety-Kleen et al. v. PriceWaterhouseCoopers LLP and PriceWaterhouseCoopers LLP (Canada)., Case No. 01-CP-40-4213 (Court of Common Pleas for the 5th Circuit, Richland County, South Carolina)).*

Altreya Consulting LLC, 2002.  Prepared report, "Statistical Evidence on the Unusually Large Number of Temporary Assistance Cases in Monroe County and Implications for Reorganization of the Monroe County Department of Social Services."

U. S. Department of Justice, Commercial Litigation Division, 2001-2006.  Expert testimony about the damages suffered by Charter FSB following the passage of FIRREA in 1989 *(Charter v. United States, U.S. Court of Claims, CA 95-513C)*

U. S. Department of Justice, Commercial Litigation Division, 1999-2001.  Expert testimony about the availability of capital to thrift institutions following the passage of FIRREA in 1989 *(Coast v. United States, U.S. Court of Claims, CA 92-466C)*

Corning, 2000.  Analysis of the effects of disclosures of litigation risk on the stock prices of silicone breast implant manufacturers.

Chase Manhattan Bank, 2000.  Affidavit concerning calculation of damages to the Creighton Trust. *(Creighton Trust v. Chase Manhattan Bank, No. 30-1973 (Surrogate's Court, Westchester County NY)).*

Micrion Corp., 1998-99.  Expert testimony concerning the effects of alleged misinformation concerning a purchase order on the price of Micrion stock. *(Geffon, Jaslow, et al. v. Micrion Corp, et al., No. CA-96-11596-REK (MA 1996)).*

Computer Learning Centers, Inc., 1998-99.  Analysis of the effects of short-selling on the calculation of damages in securities class action litigation. *(Gaensh, L.L.C. et al. v. Computer Learning Centers, Inc., et al., No. CA-98-859-A (ED VA 1998)).*

U. S. Department of Justice, Antitrust Division, 1997-98.  Analysis of unsolicited bond ratings.

General Scanning Inc., 1998.  Expert testimony about the damages suffered by View when GSI acquired View Engineering Systems *(Robotic Vision Systems, Inc. v. General Scanning Inc., No. CV-96-3884(JG) (ED NY 1998)).*

Forensic Economics, 1998-present.  Consulted on several litigation situations.

Jeffrey Gilbert, 1998.  Expert report about the use of the CAPM to determine discount rates in discounted cash flow valuation models *(Jeffrey Gilbert v. MPM Enterprises, No. 14416 (Chancery Court, DE 1998)).*

Gordon Family, 1997.  Analysis of capital market conditions around the time of the acquisition of Gordon by Zale *(Jewel Recovery, L.P., V. Aron S. Gordon, et al., No.  3:94-CV-1052X (ND Tx 1997)).*

*SELECTED CONSULTING ACTIVITIES (continued):*

U. S. Department of Justice, Commercial Litigation Division, 1996-97.  Expert testimony about the availability of capital to thrift institutions following the passage of FIRREA in 1989 *(Glendale v. United States, U.S. Court of Claims, CA 90-772).*

Eastman Kodak, 1996.  Analysis of the uses of real options analysis to evaluate research and development expenditures.

Xerox, 1996.  Evaluation of benchmarking analysis for information technology expenditures.

U. S. Department of Justice, Antitrust Division, 1995-96.  Analysis of trading behavior of NASDAQ stocks related to allegations of collusion by market-makers to widen bid-ask spreads.

Wilmer, Cutler & Pickering, 1995.  Analysis of the effects of regulation and litigation risk on the value of tobacco companies' stocks. *(Philip Morris v. ABC, No. 760CL94X00816-00, Richmond, VA).*

Wharton, Aldhizer & Weaver, 1994.  Expert report about the effects of antitakeover devices on the market for corporate control. *(WLR Foods v. Tyson Foods, No.94-0012(H) (WD Va 1994)).*

Nixon, Hargrave, Devans & Doyle, 1994.  Analysis of the failure of First Executive Life Insurance Company *(Maureen Rose v. Xerox et al. No.5:92 CV 208).*

Kirkland & Ellis, 1994.  Analysis of damages from the acquisition of Fischbach.  *(Glosser, as Trustee, for PEC v. Victor Posner, et. al., 89 Civ. 3789).*

Mayer, Brown & Platt, 1993-94.  Expert testimony on the effects of pre-bid run-ups on the premiums paid in successful mergers and tender offers. (*Nestlé Holdings, Inc. v. Commissioner of the Internal Revenue Service, No. 21562-90*).

Cravath, Swaine & Moore, 1993.  Consulted on the effects of a securities analyst's report on the behavior of the stock prices of ICN Pharmaceuticals, Viratek and SPI Pharmaceuticals.

Catalyst Institute (formerly MIDAMERICA INSTITUTE), 1993.  Report summarizing theory and evidence on the effects of security transaction taxes on asset prices, trading volume, market liquidity and tax revenues (with Paul J. Seguin).

Miller, Shakman, Hamilton, Kurtzon & Schlifke, 1993.  Expert testimony on the valuation of Motels of America Mortgage Notes (*Xerox Financial, et al. v. Salomon Brothers*).

Phillips, Lytle, Hitchcock, Blaine & Huber, 1993.  Valuation analysis of the Protective Closures Corporation, Inc. (*D. Cunnick et al. v. Marine Midland Bank*).

Morris & Morris, 1992-94.  Analysis of manipulation of the Treasury note market from April - August, 1991 (*Salomon Brothers, et al. class action litigation*).

CDC Investment Management Group, 1992.  Consultation on various aspects of quantitative money management.

# Exhibit B

# Materials Relied On

1. Expert Report of Charles D. Cowan, Ph.D.

2. William H. Greene, *Econometric Analysis* (6<sup>th</sup> edition, Pearson Prentice Hall, 2008)

3. William Feller, *An Introduction to Probability Theory and Its Applications, Vol. 1* (Revised 3<sup>rd</sup> edition, John Wiley & Sons, 1970)

4. Dr. Cowan's "Reliance 3"  (BNYM_CW-00254178)

# Materials Relied On

1. Expert Report of Charles D. Cowan, Ph.D.

2. William H. Greene, *Econometric Analysis* (6th edition, Pearson Prentice Hall, 2008)

3. William Feller, *An Introduction to Probability Theory and Its Applications, Vol. 1* (Revised 3rd edition, John Wiley & Sons, 1970)

4. Dr. Cowan's "Reliance 3"  (BNYM_CW-00254178)

# Exhibit C

# Repurchase Liability Estimated Using Mr. Lin's Method

(All dollar amounts in billions)

## I. Mr. Lin's "High Range" Estimate as Reported by Dr. Cowan[1]

| Description[2] | Balance | Default Rate | Severity Rate | Losses | Breach Rate | Liability |
|---|---|---|---|---|---|---|
| | [A] | [B] | [C] | [D=A×B×C] | [E] | [F=D×E] |
| Liquidated Loans | | | | $25.0 | 36% | $9.0 |
| 60+ Delinquent Loans | $72.5 | 90% | 60% | $39.2 | 36% | $14.1 |
| Modified Current Loans/D30 | $12.8 | 40% | 60% | $3.1 | 36% | $1.1 |
| Non-Mod. Current Loans/D30 | $98.6 | 16% | 60% | $9.5 | 36% | $3.4 |
| Total | $183.9 | | | $76.7 | | $27.6 |

## II. Average Values for Dr. Cowan's Parameters Under the Uniform or Triangular Distribution[3]

| Parameter | Low | High | Average |
|---|---|---|---|
| Default Rates | | | |
|    180+ Delinquent Loans[4] | 100% | 100% | 100.0% |
|    60 to 179 Delinquent Loans | 90% | 90% | 90.0% |
|    Modified Current Loans/D30 | 35% | 90% | 62.5% |
|    Non-Mod Current Loans/D30 | 11% | 50% | 30.5% |
| Severity Rate | 45% | 66% | 55.5% |
| Breach Rate | 36% | 65% | 50.5% |

## III. Repurchase Liability Calculated Using Dr. Cowan's Average Parameters and Mr. Lin's Method[5]

| Description | Balance | Default Rate | Severity Rate | Losses | Breach Rate | Liability |
|---|---|---|---|---|---|---|
| | [A] | [B] | [C] | [D=A×B×C] | [E] | [F=D×E] |
| Liquidated Loans | | | | $21.7 | 50.5% | $11.0 |
| 180+ Delinquent Loans | $58.3 | 100.0% | 55.5% | $32.4 | 50.5% | $16.4 |
| 60 to 179 Delinquent Loans | $9.7 | 90.0% | 55.5% | $4.8 | 50.5% | $2.4 |
| Modified Current Loans/D30 | $12.0 | 62.5% | 55.5% | $4.2 | 50.5% | $2.1 |
| Non-Mod. Current Loans/D30 | $92.5 | 30.5% | 55.5% | $15.7 | 50.5% | $7.9 |
| Total | $172.6 | | | $78.7 | | $39.8 |

Notes:

1. Cowan Report at 6 & 24.

2. I understand that Mr. Lin divided the loan collateral into four categories: liquidated loans, loans that had been considered delinquent for at least 60 days, current or 30-59 days delinquent loans that had experienced a modification to the mortgage agreement, and current or 30-59 days delinquent loans that had never experienced a modification.

3. Id. at 16-7.  Under either the uniform or triangular distributions, the mean value is also the average of the two end points.

4. Dr. Cowan modified Mr. Lin's loan categories by splitting the pool of 60+ delinquent loans into two categories: one of loans that were at least 180 days delinquent, and another of loans that were 60-179 days delinquent.  Id. at 16.

5. Id. at 16 & Appendix E.

# Exhibit D

# Dr. Cowan's and Mr. Lin's Methods Are Mathematically Equivalent

### I.  Mr. Lin's Method of Estimating the Repurchase Liability

Let

$L_{Lin}$ = The repurchase liability using Mr. Lin's method

$i \in \{$Liquidated, 180+Del, 60+Del, Mod Current, Non-Mod Current$\}$ = All possible loan statuses [1]

$C_i$ = The collateral balance for the loans with status $i$ in the 530 trusts at issue [2]

$\bar{d}_i$ = The average default rate of loans with status $i$

$\bar{s}_i$ = The average severity rate of loans with status $i$

$\bar{b}_i$ = The average breach rate of loans with status $i$

Then,

$$L_{Lin} = \sum_i C_i \cdot \bar{d}_i \cdot \bar{s}_i \cdot \bar{b}_i$$

---

1. I understand that Mr. Lin divided the loan collateral into four categories: liquidated loans, loans that had been considered delinquent for at least 60 days, current or 30-59 days delinquent loans that had experienced a modification to the mortgage agreement, and current or 30-59 days delinquent loans that had never experienced a modification. Dr. Cowan modified Mr. Lin's categorization of the loan collateral by splitting the pool of 60+ delinquent loans into two categories: one of loans that were at least 180 days delinquent, and another of loans that were 60-179 days delinquent.
2. Because losses on liquidated loans are known, the repurchase liability formula for these loans is simply losses multiplied by breach rate. This formula is mathematically equivalent to the formula for the other loan categories by treating the losses as collateral balance and setting the default and severity rates to 100%.

# Dr. Cowan's and Mr. Lin's Methods Are Mathematically Equivalent

**II.      Dr. Cowan's Method of Estimating the Average Repurchase Liability**

Also let

$L_{Cowan}$ = The average repurchase liability using Dr. Cowan's method

$k \in \{1, 2, \dots, 1000\}$ = Each run (iteration) of Dr. Cowan's simulation

$L_k$ = The repurchase liability resulting from run $k$

$j \in \{1, 2, \dots, 530\}$ = All possible Trusts

$C_{i,j}$ = The collateral balance for the loans with status $i$ in Trust $j$

$D_{i,j,k}$ = The simulated default rate of loans with status $i$ in Trust $j$ for run $k$

$S_{i,j,k}$ = The simulated severity rate of loans with status $i$ in Trust $j$ for run $k$

$B_{i,j,k}$ = The simulated breach rate of loans with status $i$ in Trust $j$ for run $k$

Then,

$$
\begin{aligned}
L_{Cowan} &= E[L_k] \\
&= E\left[\sum_{j=1}^{530}\sum_i C_{i,j} \cdot D_{i,j,k} \cdot S_{i,j,k} \cdot B_{i,j,k}\right] \\
&= \sum_{j=1}^{530}\sum_i E\left[C_{i,j} \cdot D_{i,j,k} \cdot S_{i,j,k} \cdot B_{i,j,k}\right] \\
&= \sum_{j=1}^{530}\sum_i C_{i,j} \cdot E[D_{i,j,k}] \cdot E[S_{i,j,k}] \cdot E[B_{i,j,k}] \\
&= \sum_i \sum_{j=1}^{530} C_{i,j} \cdot E[D_{i,j,k}] \cdot E[S_{i,j,k}] \cdot E[B_{i,j,k}] \\
&= \sum_i C_i \cdot \bar{d}_i \cdot \bar{s}_i \cdot \bar{b}_i \\
&= L_{Lin}
\end{aligned}
$$

# Exhibit E

# Replication of Professor Cowan's Simulation Study

| Iteration | Liability Estimate | Average Severity Rate | Average Breach Rate |
|---|---|---|---|
| 1 | $40.00 | 55.3% | 50.5% |
| 2 | $40.00 | 55.4% | 50.5% |
| 3 | $39.69 | 55.5% | 50.5% |
| 4 | $39.67 | 55.5% | 50.5% |
| 5 | $39.27 | 55.5% | 50.4% |
| 6 | $39.27 | 55.3% | 50.3% |
| 7 | $39.83 | 55.4% | 50.6% |
| 8 | $40.28 | 55.3% | 50.4% |
| 9 | $40.65 | 55.6% | 50.8% |
| 10 | $39.97 | 55.6% | 50.7% |
| 11 | $39.74 | 55.5% | 50.3% |
| 12 | $39.73 | 55.2% | 50.7% |
| 13 | $39.47 | 55.8% | 50.6% |
| 14 | $39.77 | 55.4% | 50.7% |
| 15 | $39.66 | 55.6% | 50.8% |
| … | … | … | … |
| 986 | $39.86 | 55.4% | 50.7% |
| 987 | $39.68 | 55.4% | 50.3% |
| 988 | $39.92 | 55.4% | 50.6% |
| 989 | $39.58 | 55.6% | 50.5% |
| 990 | $39.82 | 55.3% | 50.4% |
| 991 | $39.35 | 55.3% | 50.3% |
| 992 | $39.68 | 55.6% | 50.5% |
| 993 | $39.44 | 55.7% | 50.6% |
| 994 | $39.33 | 55.5% | 50.3% |
| 995 | $39.65 | 55.3% | 50.3% |
| 996 | $40.01 | 55.4% | 50.6% |
| 997 | $39.75 | 55.4% | 50.5% |
| 998 | $40.03 | 55.3% | 50.4% |
| 999 | $39.85 | 55.4% | 50.6% |
| 1000 | $39.77 | 55.6% | 50.5% |
| **Average** | **$39.77** | **55.5%** | **50.5%** |
| **Minimum** | **$39.04** | **55.1%** | **50.0%** |
| **Maximum** | **$40.65** | **55.9%** | **51.1%** |