



Predictive Modeling Solutions Applied to Non-Traditional Products

CAS RPM – Philadelphia – March 20, 2012

Mark Hoffmann





Antitrust Notice

- **The Casualty Actuarial Society is committed to adhering strictly to the letter and spirit of the antitrust laws. Seminars conducted under the auspices of the CAS are designed solely to provide a forum for the expression of various points of view on topics described in the programs or agendas for such meetings.**
- **Under no circumstances shall CAS seminars be used as a means for competing companies or firms to reach any understanding – expressed or implied – that restricts competition or in any way impairs the ability of members to exercise independent business judgment regarding matters affecting competition.**
- **It is the responsibility of all seminar participants to be aware of antitrust regulations, to prevent any written or verbal discussions that appear to violate these laws, and to adhere in every respect to the CAS antitrust compliance policy.**

Contents

1. Introduction to financial protection products
2. GAO study
3. Predictive model approach
 - a. Motivation
 - b. Data
 - c. Model structure

Introduction to financial protection products



Introduction to financial protection products

Financial protection products cancel or suspend part or all of an outstanding balance in certain situations.

Focus on **credit cards** in this presentation.

The economic crisis left consumers with a strong need for protection of continuity of credit card payments.

- ▶ Avoid a drop in credit score and entries on credit report.
- ▶ Retain the ability to obtain new credit when needed.

Introduction to financial protection products

Cancellation benefits

- ▶ Forgive some or all of a cardholder's debt
 - ▶ Payment cancellation
 - ▶ Balance cancellation

Suspension benefits

- ▶ Skip the minimum monthly credit card payment without penalty and without accruing interest for a specified time period.
- ▶ Suspension does not reduce the cardholder's account balance.

Introduction to financial protection products

Credit Card Protection Plan is offered as an optional feature.

- ▶ Fee is a fixed rate per \$100 of outstanding card balance.
- ▶ The minimum monthly payment is waived while in protected event status.
- ▶ Benefits are triggered by:
 - ▶ Job Loss
 - ▶ Disability
 - ▶ Hospitalization
 - ▶ Death

- ▶ Additional benefits may be derived from life events such as:
 - ▶ Marriage or divorce
 - ▶ Child birth or adoption
 - ▶ Moving
 - ▶ Entering college or graduation
 - ▶ Retirement
 - ▶ National Disaster

Financial protection vs. credit insurance

Financial protection

- ▶ Two parties
- ▶ Customer pays a 'fee', not a 'premium'
- ▶ Financial institution provides a 'benefit', it does not pay a 'claim'
- ▶ From an actuarial perspective, it works like insurance – benefits (losses) are analyzed, which leads to development of fees (premiums). However, it is not considered an insurance product.

Credit insurance

- ▶ Three parties
- ▶ Third party receives premium and absorbs losses
- ▶ Financial institution is made whole

GAO study



GAO study

The 2011 **GAO** (Government Accountability Office) report*

- ▶ Responding to a mandate in the *Credit Card Accountability Responsibility and Disclosure Act of 2009*
- ▶ GAO report reviews credit card protection products' market share and characteristics, federal and state oversight, and advantages and disadvantages to consumers.

GAO analyzed data from

- ▶ Three major credit insurers
- ▶ Nine largest credit card issuers, representing 85% of the credit card market

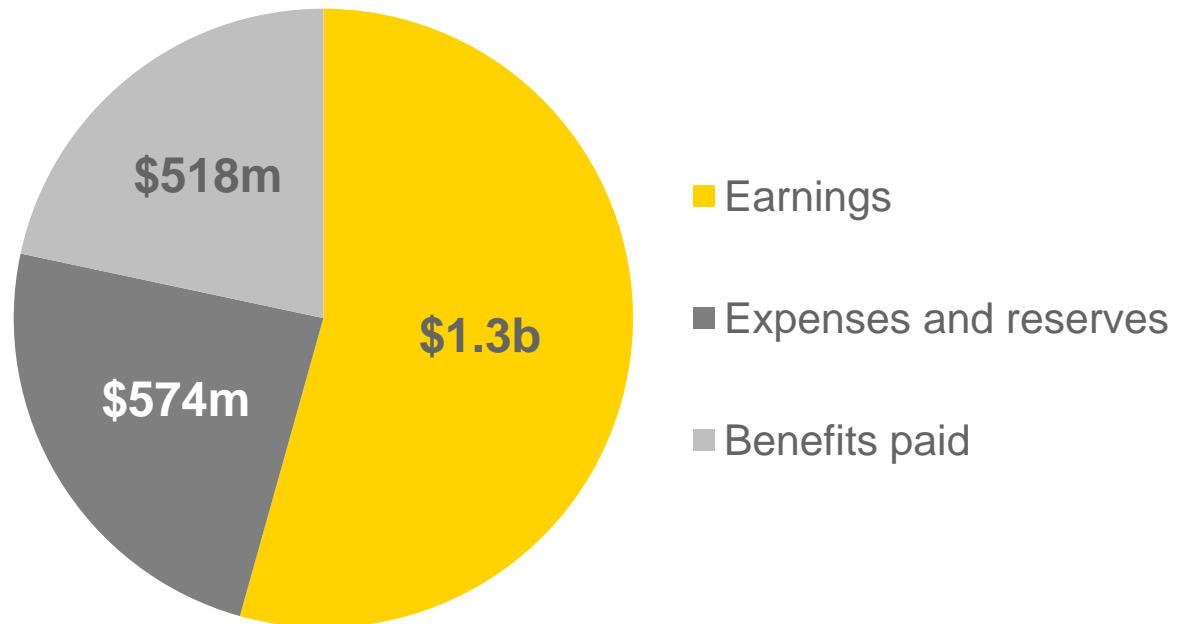
GAO also reviewed the products' terms and conditions, related marketing materials and applicable federal and state regulations.

*GAO 11-311 (March 2011)

GAO study

In 2009, consumers paid at least **\$2.4 billion** in fees for credit card protection products and \$186 million in premiums for credit insurance on at least 25 million cards.

2009 fees – credit card protection



Summary of GAO opinions

- ▶ Federal regulators have generally not addressed the reasonableness of the pricing of debt protection products in their examinations of such products.
- ▶ Only a relatively small portion of the fees paid by consumers for debt protection products is returned to them as a tangible financial benefit.
- ▶ The “**bundling**” of coverage for multiple events can result in consumers purchasing coverage that is not applicable to them (e.g., unemployment coverage for a self-employed individual who cannot make an unemployment claim).
- ▶ Existing sales practices often result in consumers not being provided full terms and conditions of debt protection products before making a purchase.

GAO study

GAO recommendations

- ▶ The Bureau of Consumer Financial Protection should:
 - a) Factor into its oversight of credit card protection products, including its rulemaking and examination process, a consideration of the financial benefits and costs to consumers
 - b) Incorporate into its financial education efforts ways to improve consumers' ability to understand and assess these products

- ▶ The bureau agreed with the GAO's recommendations.

GAO study

- ▶ The GAO report brought attention to debt protection products. It alerted both consumers and card issuers.
- ▶ In the light of GAO opinions, financial institutions are reviewing their sales practices and pricing methods to avoid regulatory intervention or legal actions by consumers.
- ▶ No further regulatory steps have been implemented so far.

Predictive model approach



Predictive model approach

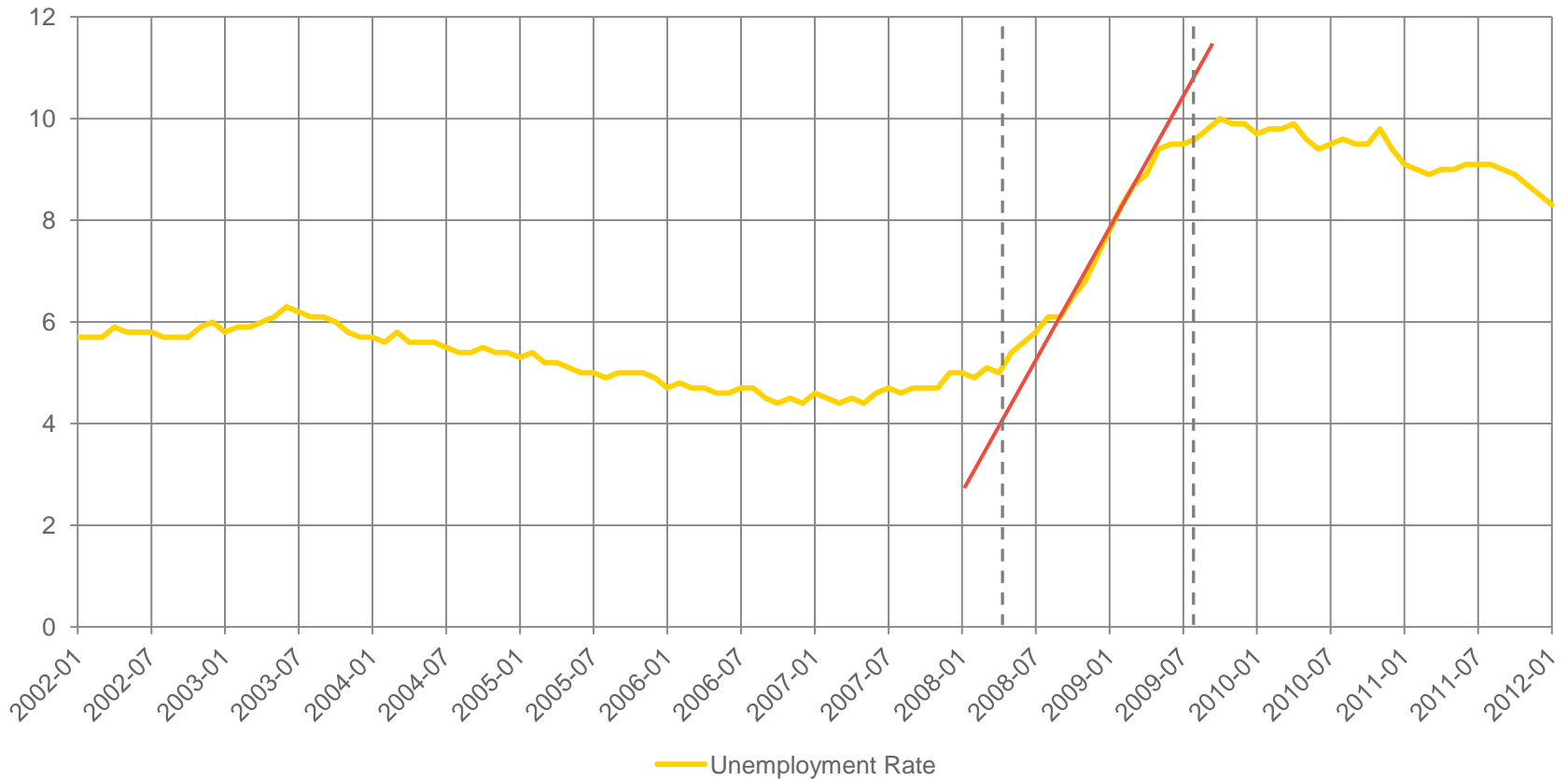
Motivation

- ▶ Financial protection products have historically been extremely profitable.
- ▶ The economic crisis produced high unemployment rates and, hence, rising benefits paid on involuntary unemployment coverage.
 - ▶ Contagion risk concerning frequency and severity
 - ▶ Financial institutions experienced results outside of their historical range
(see *unemployment rates on next slide*)
- ▶ **Predictive models** were called to estimate the ultimate value of active benefits and to estimate expected ultimate benefits paid on the existing portfolio under various economic scenarios.
 - ▶ **Frequency** = occurrence probabilities for each coverage type
 - ▶ **Severity** = (monthly payment) x (number of months in event status [“duration”])
 - ▶ Establish an in-depth understanding of the portfolio dynamics

Predictive model approach

Motivation

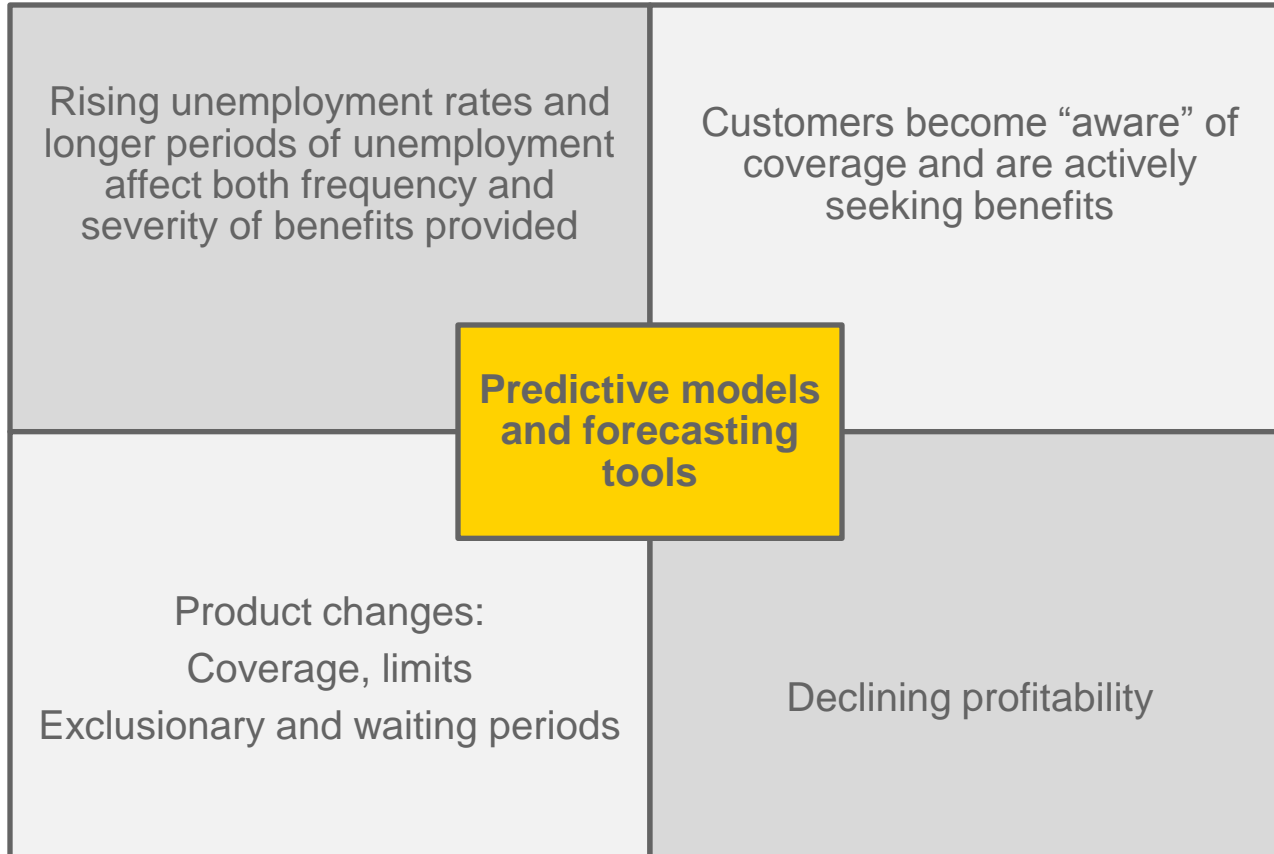
Unemployment rate



Bureau of Labor Statistics (<http://www.bls.gov>) - Series LNS14000000

Predictive model approach

Motivation



Data

Categories of explanatory variables

- ▶ *Card characteristics*: credit limit, origination year, utilization, spend, size of monthly payments, number of supplementary cards, card type
- ▶ *Protection features*: degree of exposure by type of protection
- ▶ *Borrower characteristics*: age, gender, credit score, geographic location, other relationships to the financial institution
- ▶ *Dynamic economic variables*: interest rates, unemployment rates, home values
- ▶ *Prior protected events*

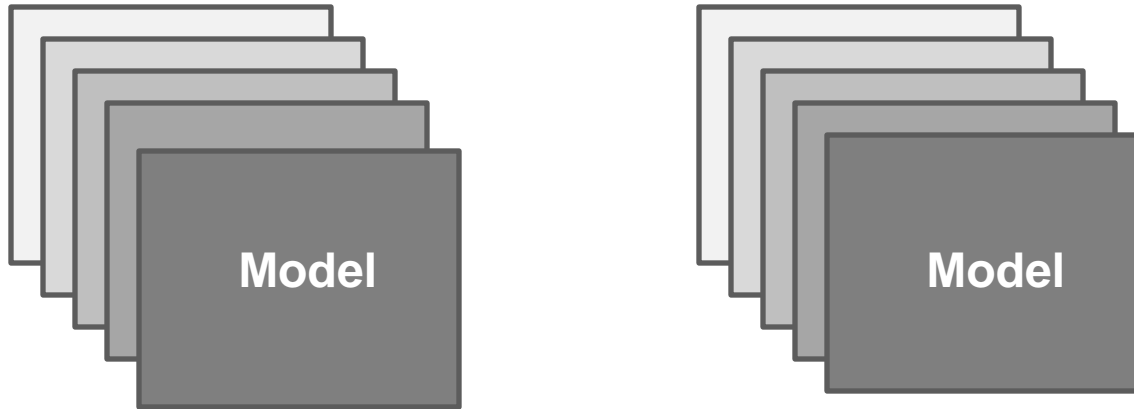
Data

Preparation

- ▶ Obtain monthly data snapshots
- ▶ Censoring
 - ▶ No direct switching of protected event types
 - ▶ No cancellations while in protected event status
- ▶ Multi-response reflecting coverage cancellations
 - ▶ Type of protected event
 - ▶ No protected event
 - ▶ Coverage cancellation

Predictive model approach

Structure



	No protected event	Job Loss	Disability	Hospitalization	Cancel coverage	Death
No protected event	a1	a2	a3	a4	a5	a6
Job loss	b1	b2				
Disability	c1		c3			
Hospitalization	d1			d4		

a1-a4: frequency model

a5: cancellation model

a6: life model

other: duration model

Predictive model approach

Structure

- ▶ Multinomial logistic regression model at the individual borrower level
 - ▶ Responsive to changes in the portfolio
 - ▶ Transparency
 - ▶ Perform stress and scenario testing
- ▶ Substitute a sequence of binomial logistic regressions*
 - ▶ Theoretically equivalent
 - ▶ Practical advantages
 - ▶ Capabilities of software packages
 - ▶ Customization of predictors
 - ▶ Run-time and memory usage

*Begg & Gray (1984)

Predictive model approach

Applications

- ▶ Pricing/reserving

- ▶ Estimate *a priori* ultimate ratios of benefits to fees
- ▶ Project ultimate amounts of active benefits

- ▶ Ability to identify best and worst risks

- ▶ Marketing
- ▶ Retention

- ▶ Forecasting

- ▶ Analyze portfolio profitability under various economic scenarios
- ▶ Stress testing, VaR calculations
- ▶ Impact of shifts in demographics
- ▶ Impact of program changes