



An Overview of Warranty Loss Reserving

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Agenda



- Background
- Industry Statistics
- What is different?
- Actuarial Considerations = What not to do
- Questions

Warranty Experience

- National Retailers
- Major Insurance Companies
- Major Electronics Internet Provider
- Major Electronics Manufacturer
- Major Household Service Provider
- Major Electrical Service Provider
- Plumbing Manufacturer (Warranty and Products Liability)

Warranty History



- Existed as early as the Babylonian and Assyrian Era
- Hammurabic Code (circa twentieth century B.C.)
 - Eye for an eye
 - If a house collapses and kills the owner, the builder can be killed
 - If a house collapses and kills slaves, the builder must replace the slaves and rebuild the house at his own expense.
- Subsequent Code
 - Slaves sold came with a month to 100 day warranty against illness

Historical Perspective on Warranty, Arvinder P. S. Loomba

Warranty--Today

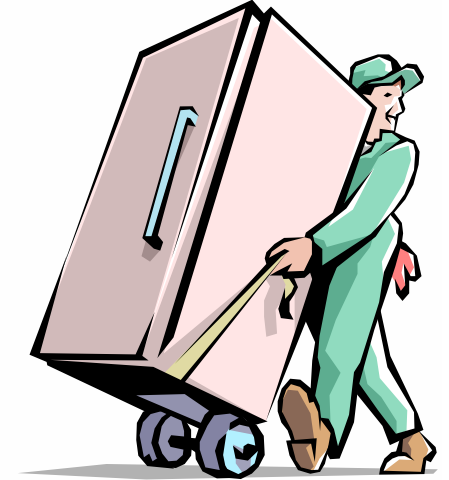
- Warranties offered on most products---Brown & White Goods

<u>Type</u>	<u>Channel</u>	<u>Cost</u>
Manufacturer's	Manufacturer	Implicit in product cost
Basic	Retailer	Implicit cost to consumer
Extended	Retailer	Explicit cost to consumer



White Goods

- Comprised of major household appliances
 - Freezers
 - Refrigerators
 - Dishwashers
 - Microwaves
 - Washers
 - Dryers



Brown Goods

- Typically small household electrical entertainment appliances
 - Televisions
 - Stereos
 - DVD Players
 - Cameras
 - Telephones
 - Computers
 - Video Game Consoles



Why Offer Warranties?

- Customer Satisfaction/Loyalty



- Competitive Advantages

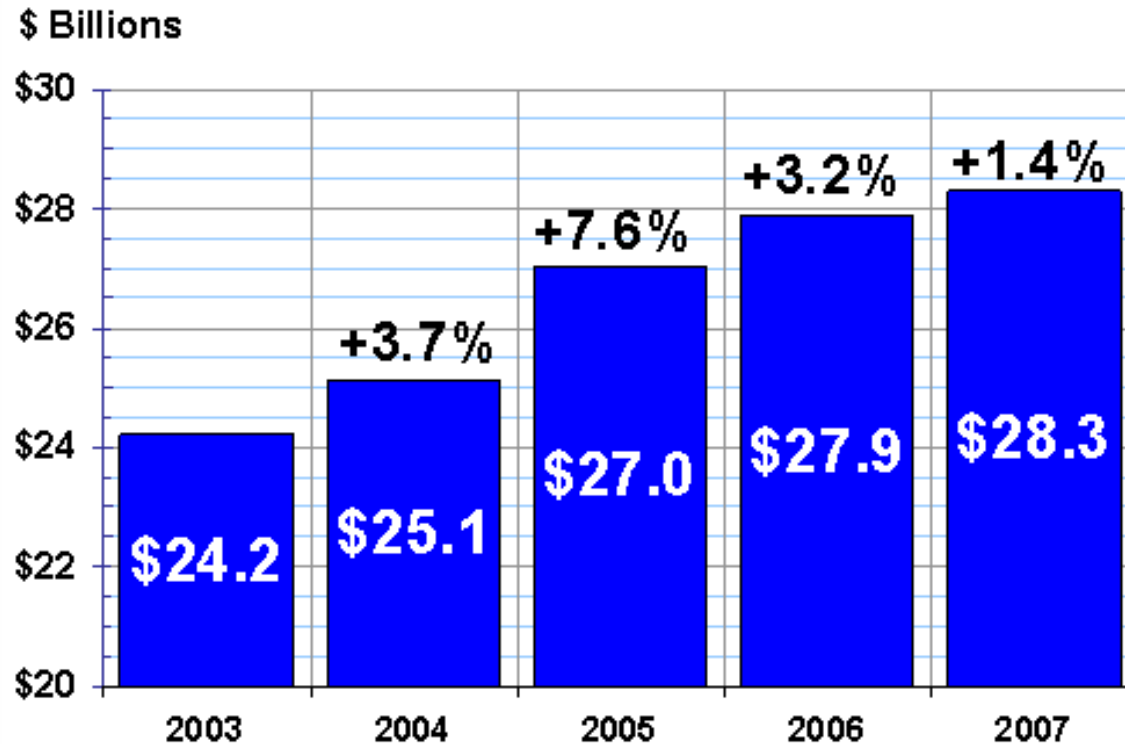


- Increase Profits



Warranty Industry Statistics

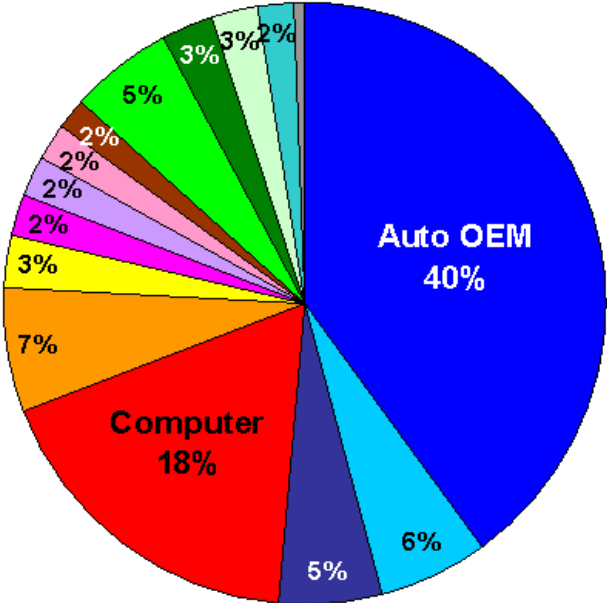
Worldwide Claims - All U.S. Warranty Providers



Source: Warranty Week from SEC data

Warranty Week, Top 100 Warranty Providers; March 26, 2008

All U.S. Manufacturers Claims

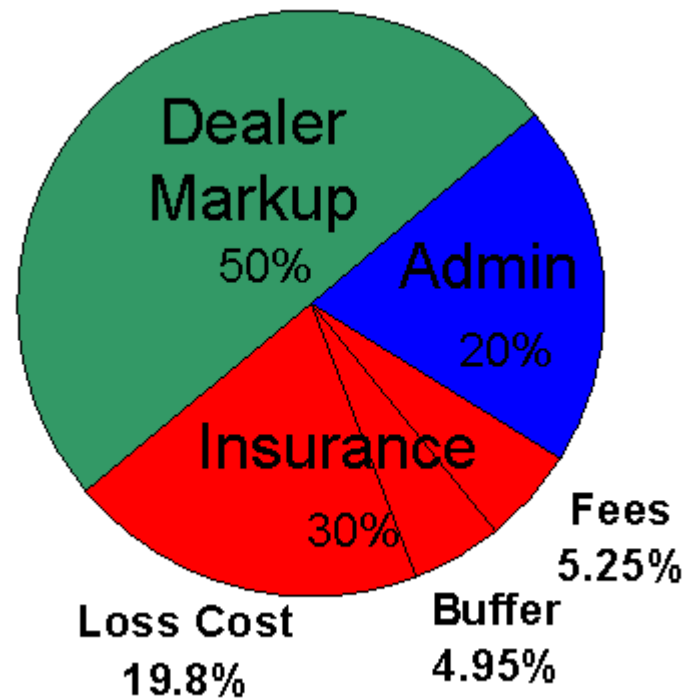


Source: Warranty Week from SEC data

- Auto OEM
- Computers
- Consumer Elec
- Peripherals
- Build Materials
- Auto Parts
- Telecom Equip
- Medical & Sci Eq
- Appl & HVAC
- Power Gen
- Aerospace
- Semi & PCB
- Data Storage
- Homebuilders
- Other

Warranty Week, Five-year Warranty Trends, Part Three; April 10, 2008

Extended Warranty Contracts Premium Distribution Breakdown

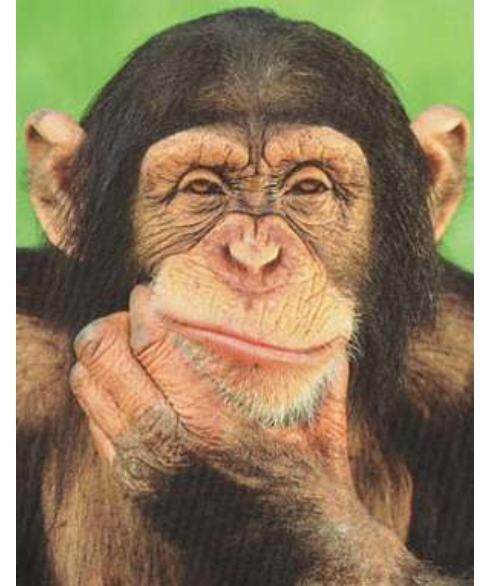


Warranty Week; *Extended Warranty Market, part One*; September 28, 2004

Actuarial Considerations

Actuarial Considerations

- Adverse Selection
- Goodwill – Out of Warranty Costs
- Product Mix
- Seasonality
- Loss Distributions
- Pipeline Claims
- Earnings Pattern
- Expenses
- Long Duration Contracts
- Unearned Premium Reserve vs. Loss Reserve
- Common Pitfalls



Adverse Selection

- Tendency of people with significant potential to file claims wanting to obtain insurance coverage.
- Need to be aware of adverse selection in pricing
- Can reduce adverse selection at point of sale



Goodwill

- Continued coverage after warranty has expired
- Very common
- 2 reasons goodwill exists:
 - Keep consumers happy
 - Unable to track warranty policy inception



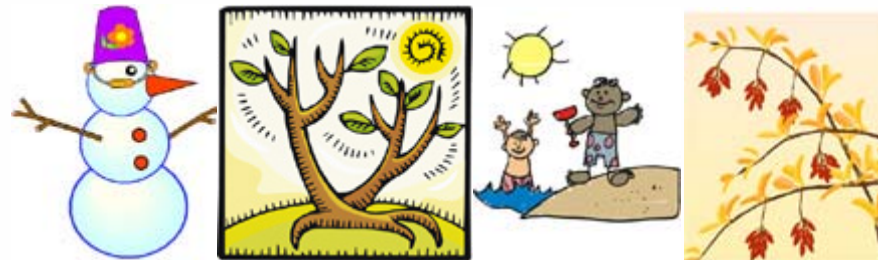
Product Mix and Underlying Warranty

- Triangular methods require consistency
- If product mix changes over time, development will change and triangles may not work
- There may be coverage overlap between the manufacturer and extended warranty
- Extended warranty may experience no losses for initial period



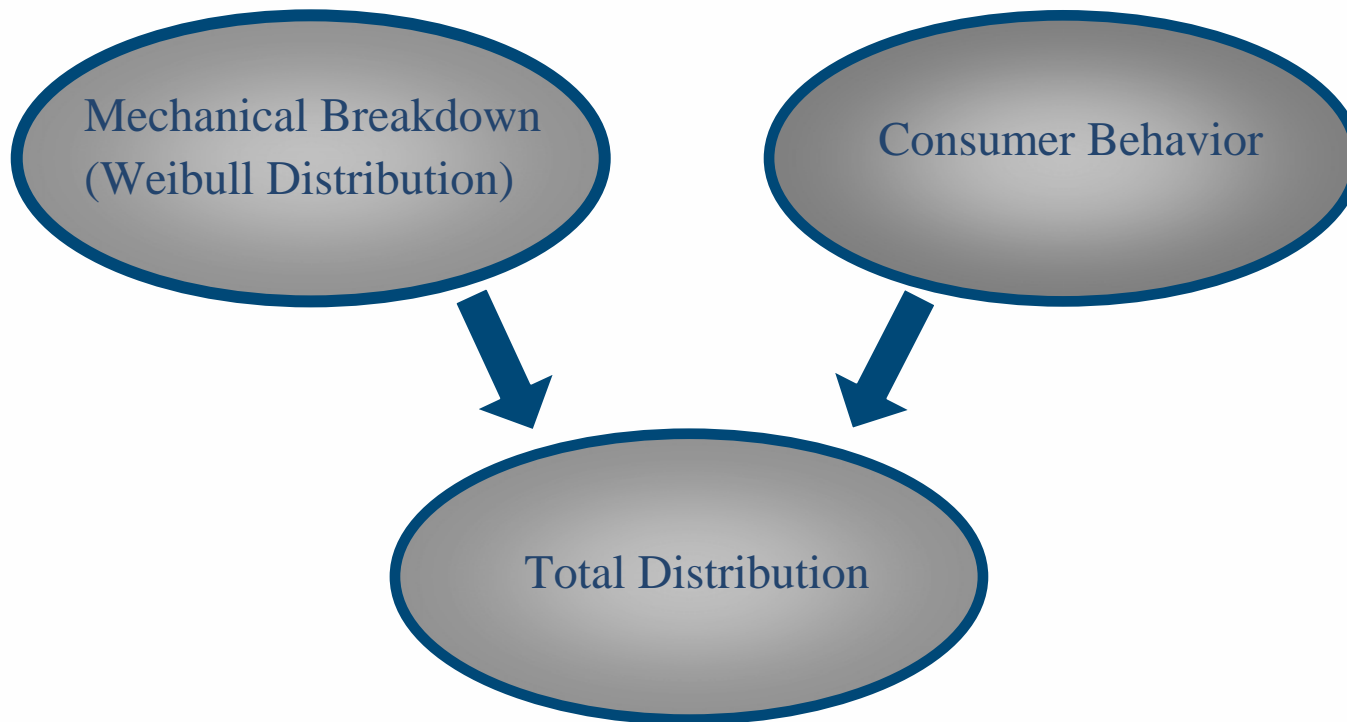
Seasonality

- Warranty is usually calculated monthly or quarterly
- Geography of exposure may cause complexity
- Must recognize seasonality



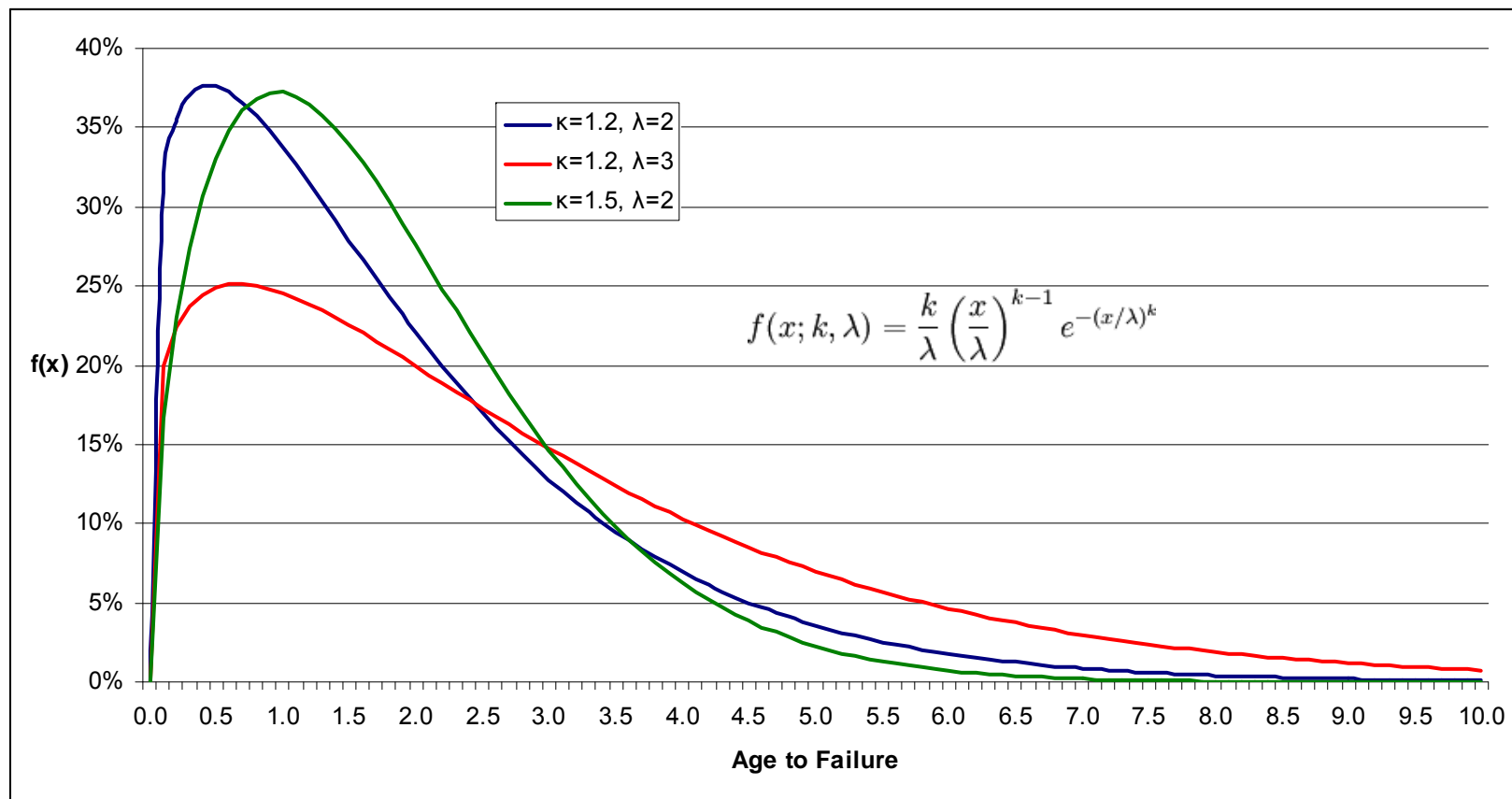
Warranty Loss Distribution

Mix of two distributions



Loss Distribution - Mechanical Breakdown

Weibull Distribution



Loss Distribution and Consumer Behavior

<u>Cause</u>	<u>Effect</u>
Consumer Awareness	Bump in development throughout warranty life
Length of Warranty	Bump in development at end of warranty coverage
Obsolescence	No development as product ages

- Very difficult to quantify!



Loss Development Example

Sales Quarter	Months of Development											
Beginning	3	6	9	12	15	18	21	24	27	30	33	36
1/1/2005	50	341	397	451	523	587	643	711	775	802	815	815
4/1/2005	50	340	436	494	516	558	654	704	746	809	820	
7/1/2005	52	340	425	466	531	592	655	741	763	783		
10/1/2005	55	319	427	481	558	558	660	709	769			
1/1/2006	50	332	397	493	533	560	623	732				
4/1/2006	50	332	388	477	552	597	631					
7/1/2006	49	331	440	484	507	591						
10/1/2006	50	348	388	489	563							
1/1/2007	49	327	411	480								
4/1/2007	51	346	390									
7/1/2007	50	326										
10/1/2007	51											

24 Months of Coverage

Sales Quarter	Age to Age Loss Development Factors										
Beginning	6/3	9/6	12/9	15/12	18/15	21/18	24/21	27/24	30/27	33/30	36/33
1/1/2005	6.887	1.163	1.137	1.158	1.123	1.095	1.107	1.090	1.035	1.016	1.000
4/1/2005	6.819	1.281	1.133	1.045	1.081	1.173	1.076	1.060	1.084	1.013	
7/1/2005	6.594	1.248	1.096	1.142	1.114	1.106	1.131	1.030	1.026		
10/1/2005	5.830	1.337	1.126	1.159	1.001	1.182	1.075	1.084			
1/1/2006	6.657	1.197	1.242	1.081	1.051	1.113	1.174				
4/1/2006	6.630	1.168	1.232	1.155	1.083	1.057					
7/1/2006	6.718	1.329	1.100	1.048	1.165						
10/1/2006	6.941	1.115	1.263	1.150							
1/1/2007	6.700	1.256	1.167								
4/1/2007	6.854	1.126									
7/1/2007	6.533										

	6/3	9/6	12/9	15/12	18/15	21/18	24/21	27/24	30/27	33/30	36/33
Wtd Avg	6.644	1.221	1.164	1.116	1.087	1.120	1.112	1.066	1.048	1.015	1.000

Pipeline Claims

- Lag between when a claim is reported, paid and inputted in system.
- The triangles must be adjusted for this lag
 - A claim is reported in the warranty period but not paid until after policy expiration
- Development would appear less for the most recent calendar quarters
- The triangles must be completed to show development on an apples to apples basis for each quarter



Earnings Pattern

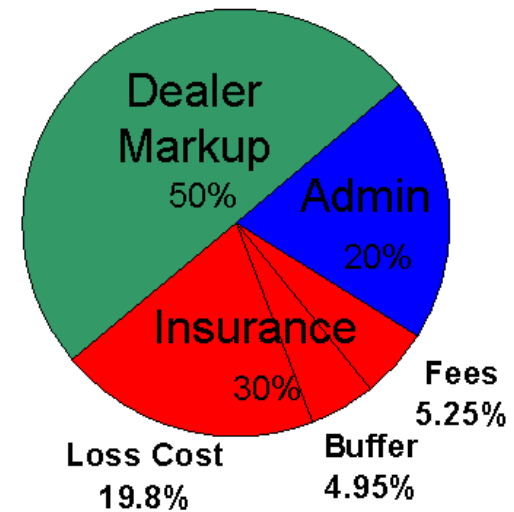
- Must be based on an incurred (not paid or reported) basis
- Once the triangles are adjusted for lag, the earnings pattern can be calculated from the development pattern
- For warranty, premium is earned in proportion to losses, cannot earn premium uniformly as in typical lines
 - Why is that? See below

	<u>Losses</u>	<u>Premium</u>	<u>Loss Ratio</u>
1 st Quarter	50	100	50%
2 nd Quarter	10	100	10%
3 rd Quarter	40	100	40%
4 th Quarter	<u>200</u>	<u>100</u>	200%
	300	400	75%

	<u>Losses</u>	<u>Premium</u>	<u>Loss Ratio</u>
1 st Quarter	50	67	75%
2 nd Quarter	10	13	75%
3 rd Quarter	40	53	75%
4 th Quarter	<u>200</u>	<u>267</u>	75%
	300	400	75%

Expenses

- Commissions
- Claims Administration
- Allocation of Expense



Warranty Week; *Extended Warranty Market, part One*; September 28, 2004

Long Duration Contracts

- Most P&C insurance products are less than 12 months of coverage
- Traditional Loss development decreases over time
- Warranty products can have > 13 months of coverage
- Warranty losses do not occur evenly
 - Seasonality
- Special accounting treatment



Unearned Premium Reserve vs. Loss Reserve

- Loss reserves are for claims that have already occurred
- Typical insurance products have a long lag between when a claim occurs and when it is paid
- Warranty claim is for when claim is reported not sold
- Warranty claims are paid quickly after the loss occurs
- Thus warranty liability is almost entirely an unearned premium reserve



Common Pitfalls

- Tail development is unique to warranty (bump in tail)
- Repeat breakdowns
- Non-defective returns
- Seasonality
- Trend



Questions?