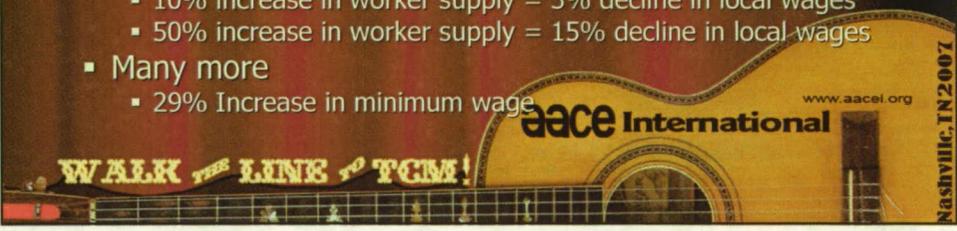


Escalation: How Much is Enough?

Glenn Butts CCC
NASA
Kennedy Space Center, Florida
2007 AACE International

Complex Subject

- Escalation is a very complex subject
 - Basic principle - Supply and Demand
- Many variables to consider
 - Economy overall health
 - Cost of Oil
 - Environmental regulations (global warming)
 - Illegal immigrant crackdown
 - ~25% of all construction workers illegal
 - 55% of all concrete workers foreign born Hispanics
 - 22% of all painters illegal
 - 10% increase in worker supply = 3% decline in local wages
 - 50% increase in worker supply = 15% decline in local wages
 - Many more
 - 29% Increase in minimum wage



Complex Subject

- Construction is large part of our economy
 - When economy is strong construction generally increases faster than overall economy
 - Inversely when economy weakens construction generally slows faster



WALK THE LINE TO TCM!

aace International

www.aacei.org

Nashville, TN 2007

New Twists

- Commodity Markets & Hedge Funds increase costs due to speculative bidding
- Many major U.S. projects will not stop as result of economic slowdown
 - Hurricane Recovery
 - Casinos, Homes, Infrastructure
 - Global Warming (Environmental)
 - Nuclear Power Plants
 - Airport Upgrades
 - World Trade Center

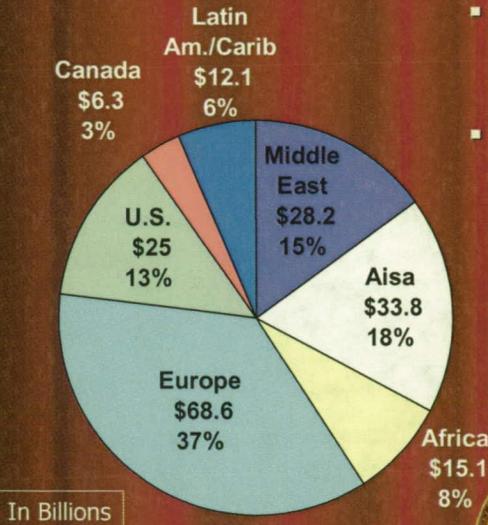
WALK THE LINE TO TCM!

aace International

www.aacei.org

Nashville, TN 2007

2005 Construction Billings by Market



- Historically U.S. construction costs primarily product of U.S. economy
- Global economy driving many increases
 - Emerging markets in massive construction boom
 - Beijing China has 1.7 Billion SF under construction @ 10,000 sites \$180+ Billion
 - Demand absorbed ships
 - Imports cost more

In Billions

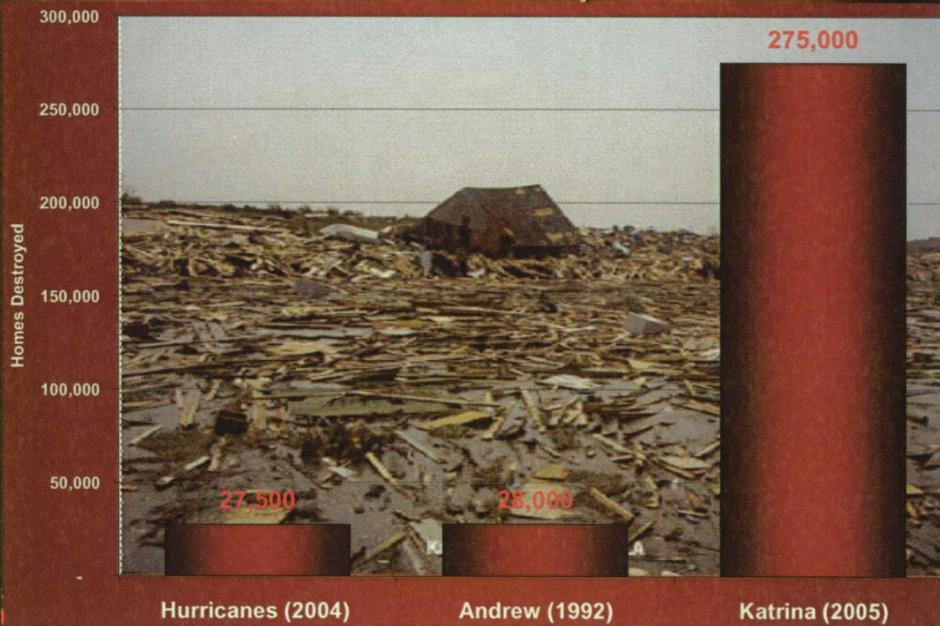
WALK THE LINE TO TCM!

aace International

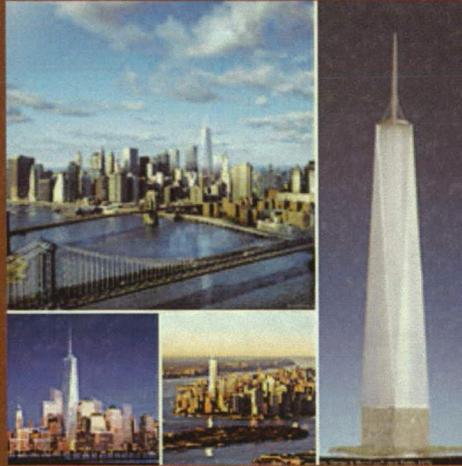
www.aacei.org

Nashville, TN 2007

Hurricane Recovery - Billions



World Trade Center – \$21 Billion



WALK THE LINE TO TCM!

www.aacei.org
aace International

Nashville, TN 2007

Nuclear Power

- New Nuclear Power Plants
 - 20-29 new units planned
 - Source ENR
 - 19+ new units in approval process
 - Source Nuclear Energy Institute 9-06 Report
 - \$300-\$500 Million Per Plant + Reactor Cost
 - All will not be approved

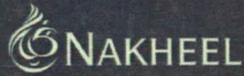
Company	Plant Sites	Application File
Dominion	Va.	2007
Duke and Southern	SC	2007
Entergy	La	2008
NuStart (Entergy)	Miss.	2007/2008
NuStart (TVA)	Ala.	2007
Progress Energy	Fl.	2007/2008
S.C. Electric & Gas/ Santee Cooper	S.C.	2007
Southern Co.	Ga.	2008
UniStar	N.Y.	2008
Amarillo Power	TX	2007
Texas Utilities	TX	2007
NRG Energy	TX	2007
FP&L	TBD	2009
Several More	Varies	Varies

WALK THE LINE TO TCM!

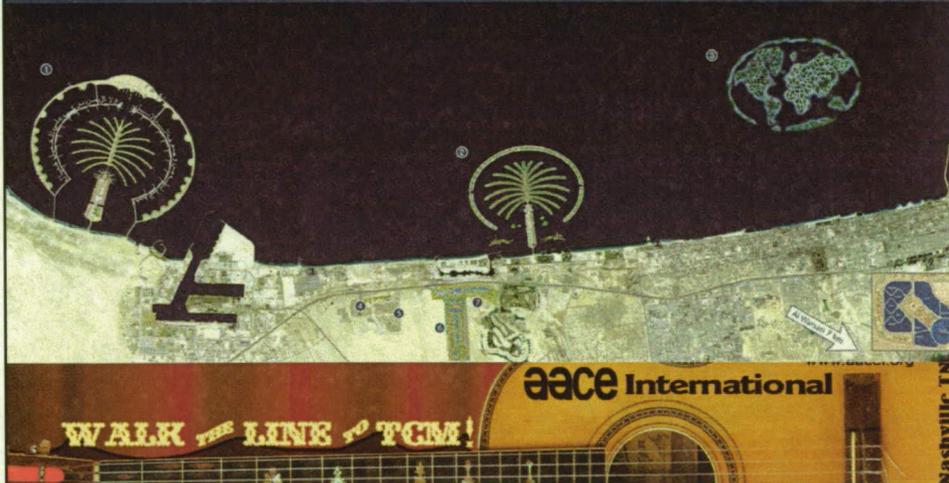
www.aacei.org
aace International

Nashville, TN 2007

Dubai \$100+ Billion Construction

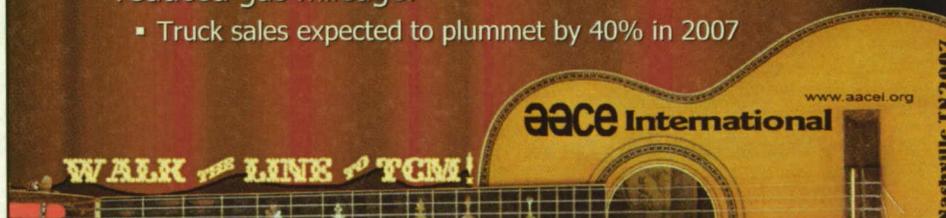


- 1 The Palm, Jebel Ali
- 2 The Palm, Jumeirah
- 3 The World
- 4 Gardens Shopping Mall
- 5 The Gardens
- 6 Jumeirah Islands
- 7 Jumeirah Lake Towers
- 8 Dubai International City



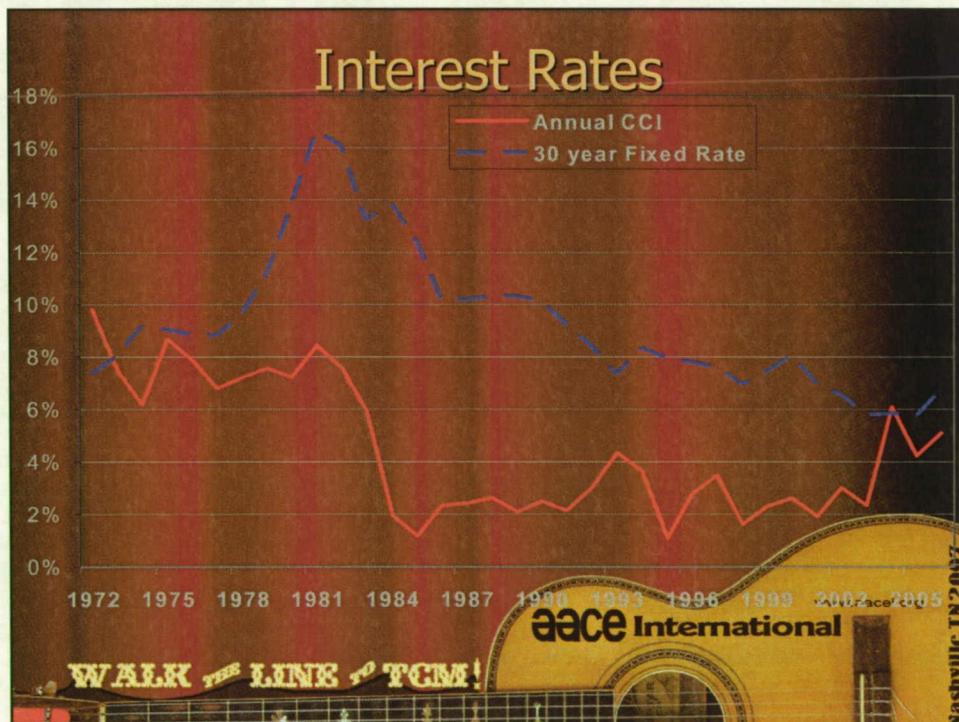
Global Warming

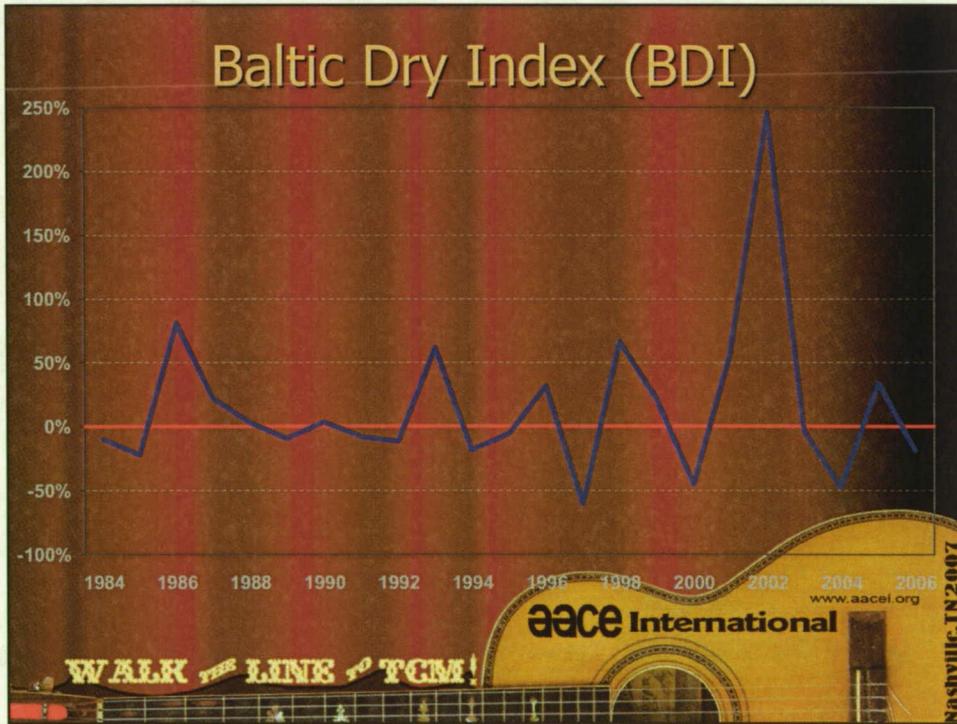
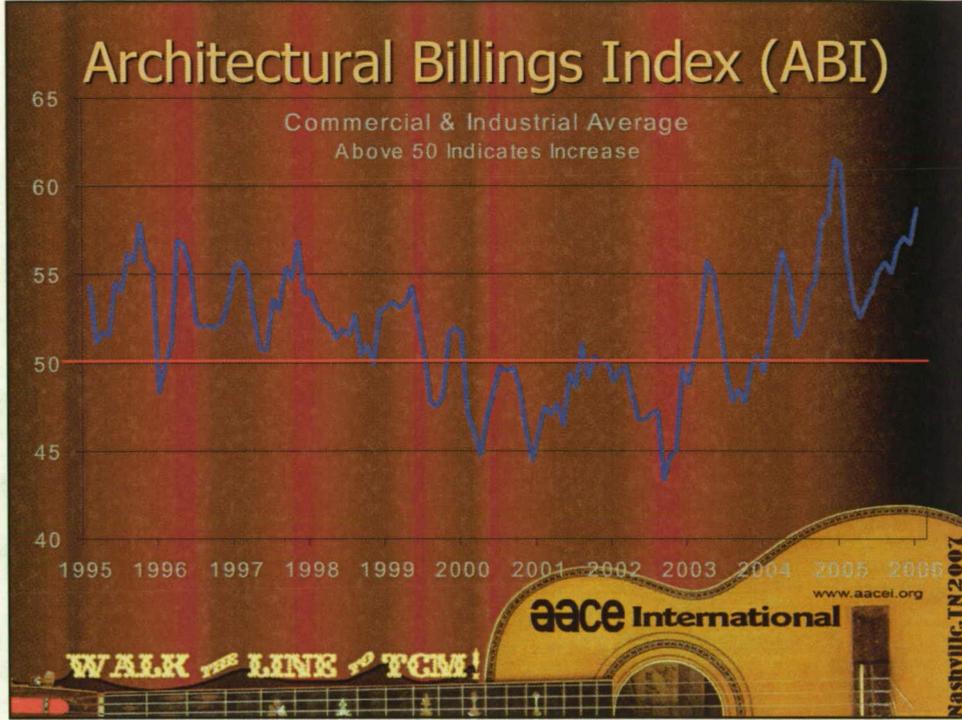
- "Global warming will cost the world up to seven trillion dollars in the next decade unless governments take drastic action soon."
 - "Failure to act quickly will trigger a global recession."
- Source: Sir Nicholas Stern's 700 Page British Government Report
- Driving changes
 - LEED
 - 2007 Regulations increase diesel truck costs by 10% and reduced gas mileage.
 - Truck sales expected to plummet by 40% in 2007



Many Short Term Indicators

- Engineering News Record (ENR)
 - Annual Forecast
 - 2007 Prediction Easing of Material Costs, Labor Costs Increases
- Interest Rates
 - Inverse relationship to construction costs
- Architectural Billings Index (ABI)
 - Tracks workload of 300 U.S. architectural firms
- Baltic Dry Index (BDI)
 - Tracks cost of transporting raw materials
- Prior 12 Months increase of cost indexes
 - Number of Bids submitted on recent projects
 - Many more
- **All require tracking, analysis & interpolation**





Few Long Term Indicators

- Federal Government OMB
 - Bears weight of political agendas
 - Free!
- McGraw-Hill Construction Market Forecasting Service (CMFS)
 - 1 & 5 Year Forecasts for specific areas
 - \$400 - \$1,700 Each
- Building Cost Information Service (BCIS)
 - 5 Year Forecasts for United Kingdom
 - £150 Each
- **Accuracy Unknown**



WALK THE LINE TO TCM!

aace International

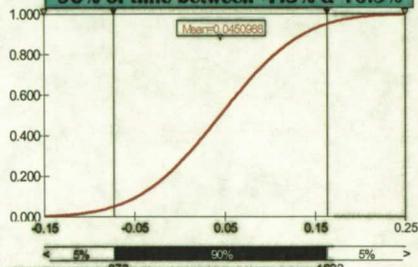
www.aacei.org

Nashville, TN 2007

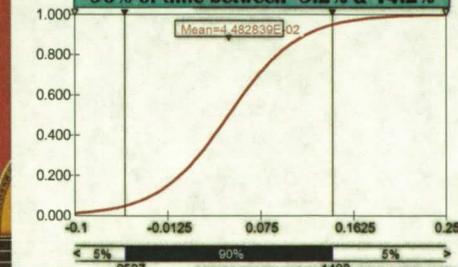
Contrary to Popular Opinion

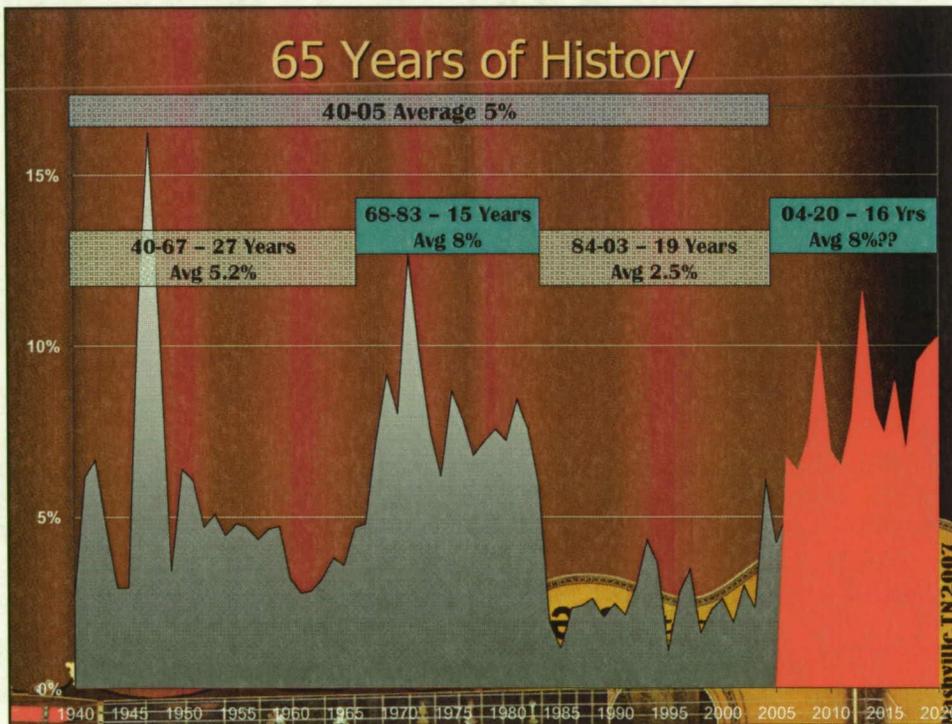
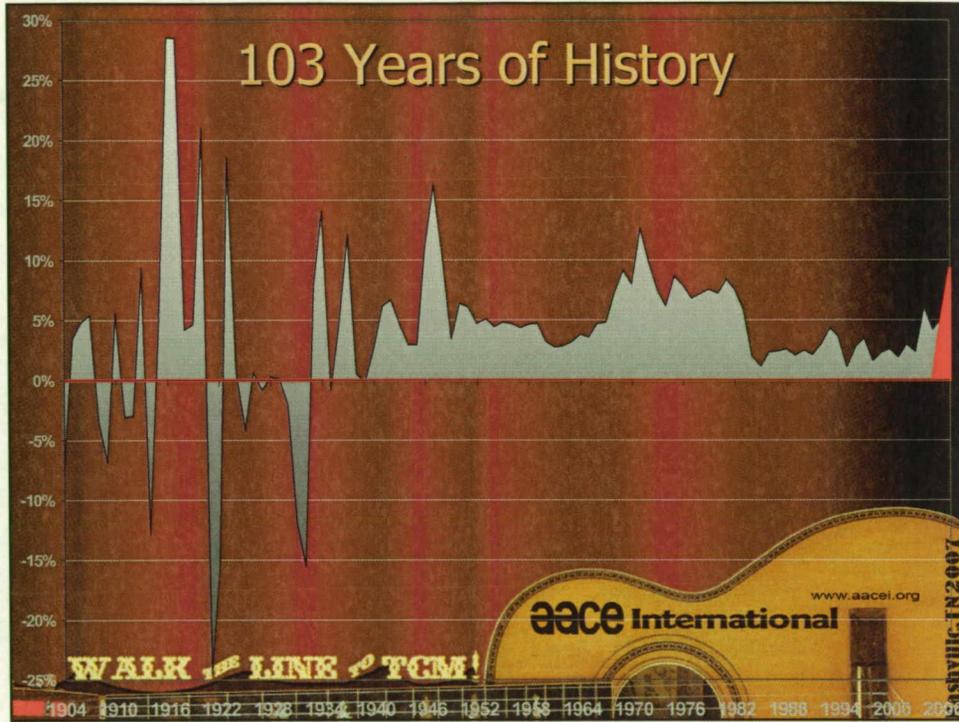
- Recent Inflation not that unusual
 - ENR CCI annual average increase past 103 years
 - Over 3% - 60%
 - Over 4% - 51%
 - Over 5% - 35%
 - Over 6% - 31%
 - Over 7% - 23%
 - Over 8% - 16%
 - Over 9% - 13%
 - Over 10% - 10%

1915-2005 Escalation Normal
90% of time between -7.3% & 16.3%



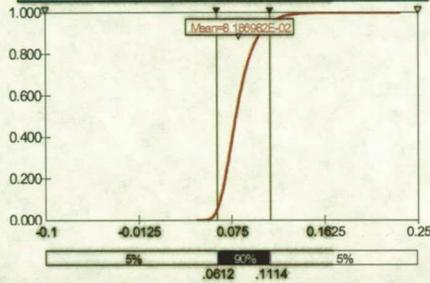
1915-2005 Escalation Logistic
90% of time between -5.2% & 14.2%



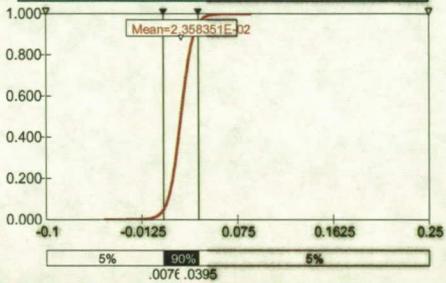


Distinct Cyclical Periods

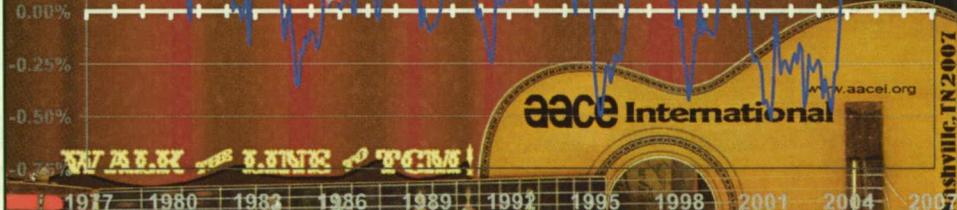
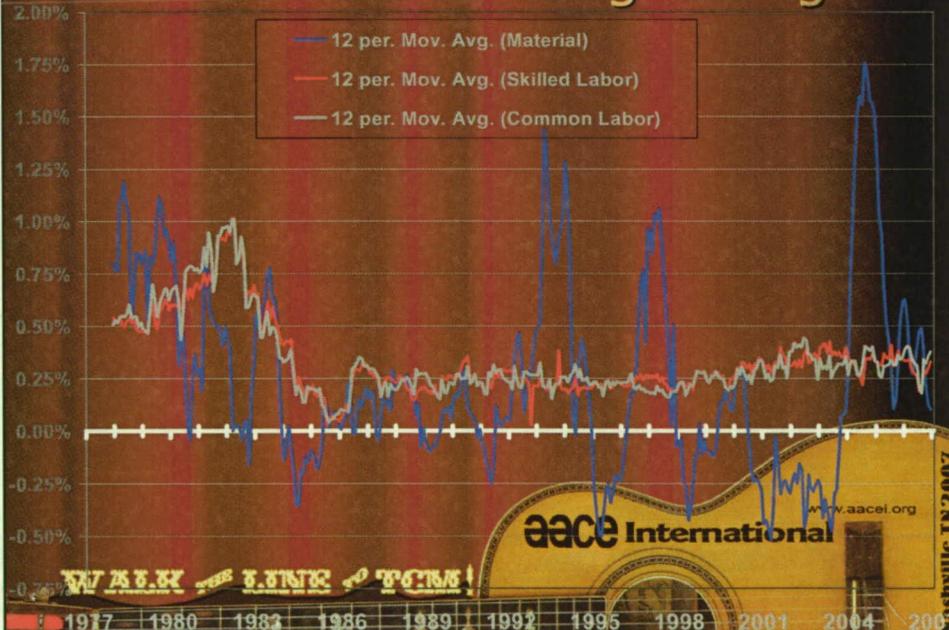
1968-1982 Escalation
90% of time between 6.1% & 11.4%



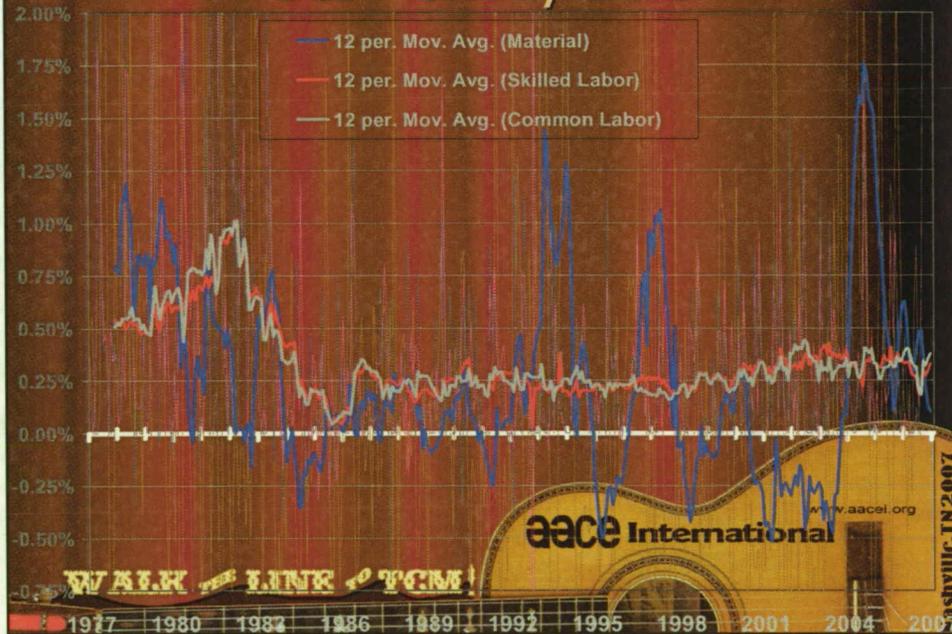
1983-2003 Escalation
90% of time between 0.8% & 4%



CCI 12 Month Moving Average



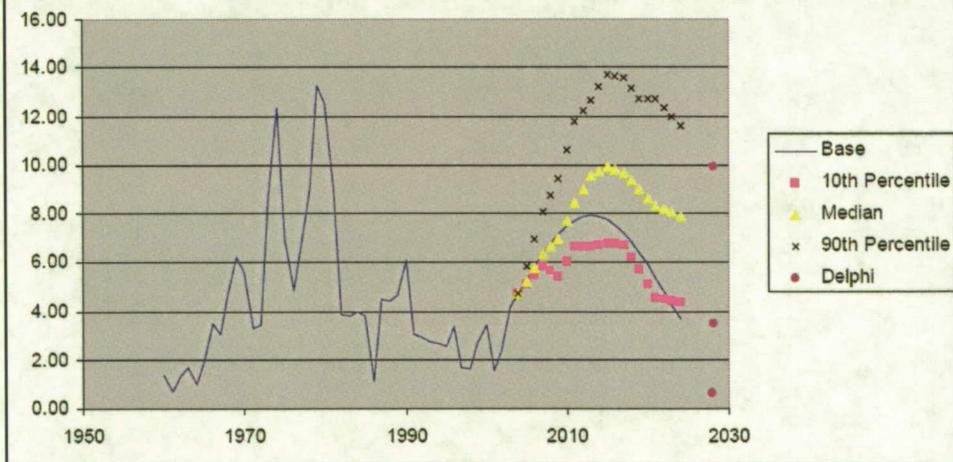
CCI Monthly Data



Society of Actuaries – Delphi Study

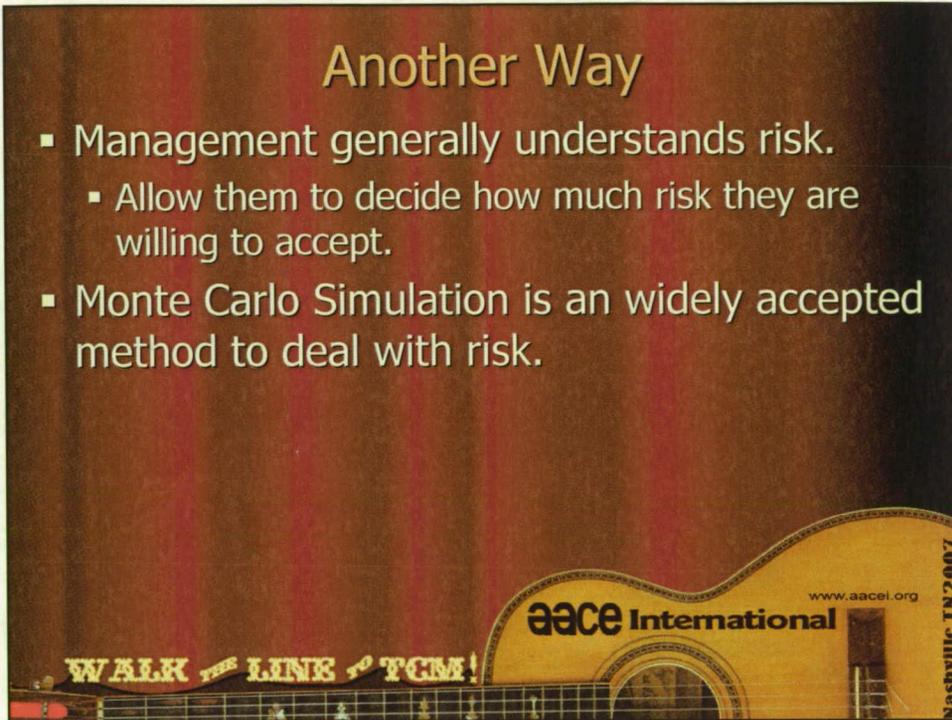
- CPI Underruns CCI 68% of the time

CPI Annual Change (%)

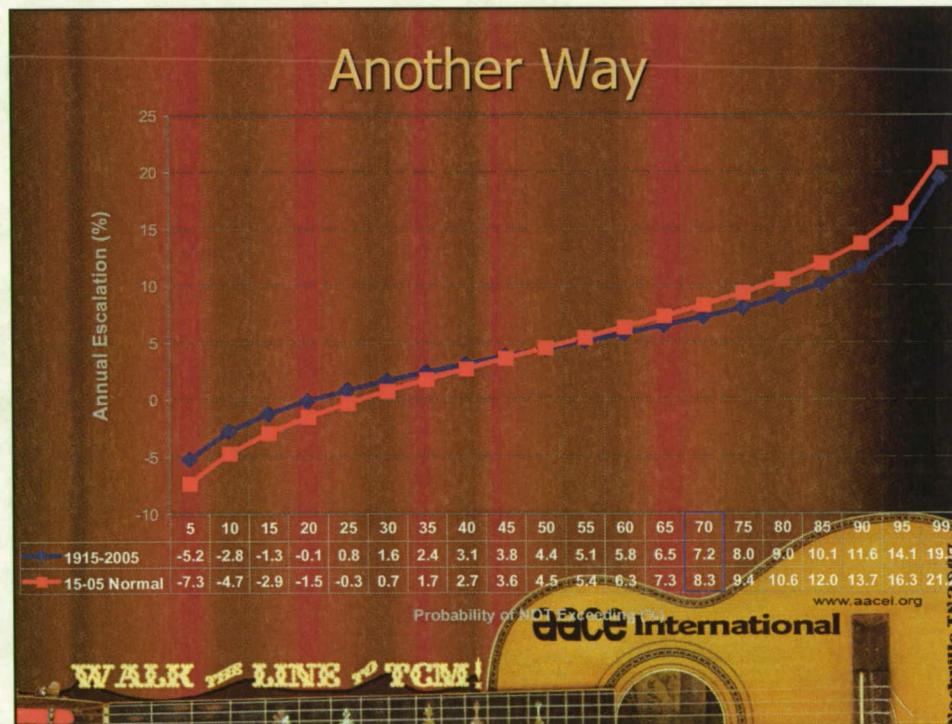
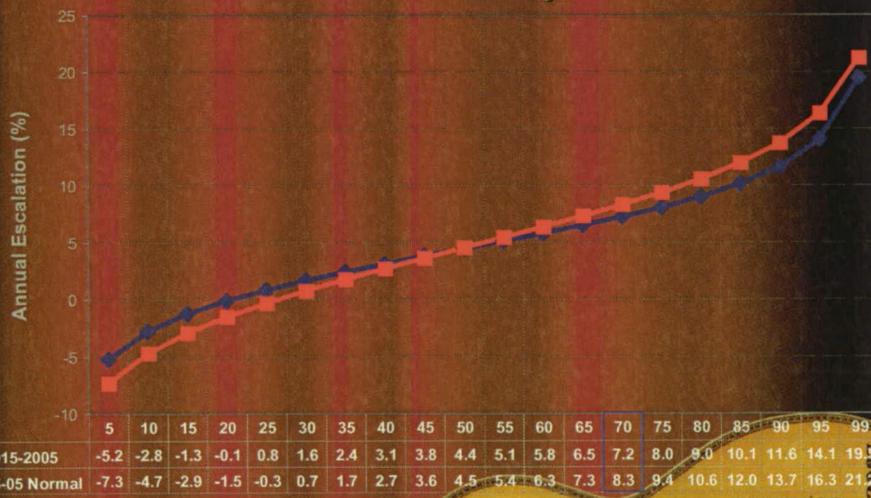


Another Way

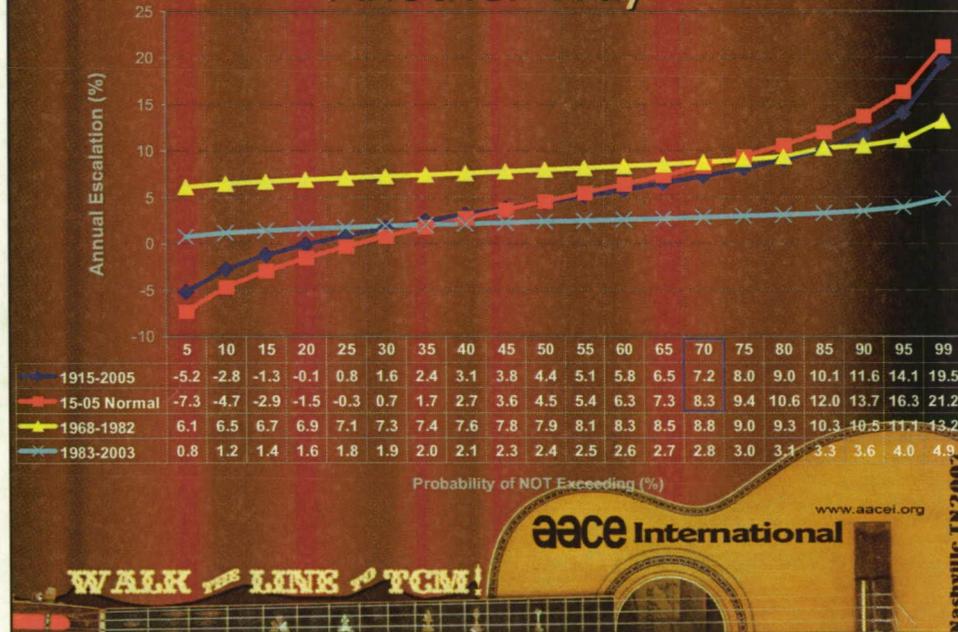
- Management generally understands risk.
 - Allow them to decide how much risk they are willing to accept.
- Monte Carlo Simulation is an widely accepted method to deal with risk.



Another Way



Another Way



Conclusion

- Predicting escalation is difficult, if not impossible.
- Escalation has been abnormally mild in recent history
- Analysis excludes market factor increases that occur after disasters or during boom periods.
- Material prices have been the primary driver in recent cost increases.
- Cost increases have been underrunning historical averages.
- Anecdotal evidence is indicating substantial pressure on wages.
 - The current trend of high costs and low wages can not continue.
 - Either material costs will decline or labor costs will increase.
- Federal Reserve study suggests best indicator of next year's inflation is last year's inflation rate.
 - Perhaps a 12-month moving average of the rate of change for the estimator's favorite index will prove a valid indicator of the current trend.
- We appear to be entering a period of increased volatility.
- World economy is changing, emerging markets are increasingly affecting commodity prices.

WALK THE LINE TO TCM!

aace International www.aacei.org

Nashville, IN 2007



Questions and copy of presentation

Email – glenn.c.butts@nasa.gov

