



SOCIETY OF ACTUARIES

**Valuation Actuary Symposium  
September 24- 25, 2009**

**Session 24 IF: Advanced Embedded  
Value and MCEV**

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## Valuation Actuaries Symposium 2009 Anaheim, CA

Session 24IF:  
Advanced Embedded Value and MCEV

September 24, 2009 – 3:30-5:00 pm

Panelists:            Craig Buck  
                              Noel Harewood  
                              Chad Padgett

Moderator:           Michael Kaster

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## Agenda

- Current Status of MCEV
- Example: Market Consistent Valuation
- Performance in Extreme Markets
- Implementation Issues/Concerns

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- Current Status of MCEV
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## Latest from CFO Forum

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- On May 22, CFO Forum delayed mandatory implementation of MCEV until 2011
- Primary reasons
  - Liquidity premia
  - Volatilities
  - Definition of the reference rate
  - Nonhedgeable risks



## Liquidity premium

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- Required return to compensate for risk/cost of selling instrument prior to maturity
- Initial guidance provided no allowance for liquidity premium (G14.4)
- Conditions at YE 2008 raised concerns
  - Three companies reporting US business applied liquidity premia of between 100 bps to 300 bps
- CFO Forum currently sponsoring research project to help provide guidance on liquidity premia in valuation



## Volatilities

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- Volatilities required for calculation of TVOG
- Initial guidance required use of most recent observations for calibration of implied volatilities (G15.3)
- Unusually high volatilities at YE 2008 led companies to review calibrations
  - Many companies opted for alternative calibrations, including averaging and use of earlier dates



## Reference rates

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- Reference rates defined explicitly as swap rates (Principle 14)
- Unusual relationships between swap rates and government rates resulted in distortions
  - Some companies used the higher of swaps or government bonds in certain territories



## Nonhedgeable risk

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- Nonhedgeable risk remains an issue across companies
- Many companies have adopted a cost of capital approach
  - Other approaches are allowable
- The CFO Forum is currently reviewing guidance in this area

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## Modeling under Certainty Equivalent Approach: Simple Example (1 of 7)

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	<u>Asset 1</u>	<u>Asset 2</u>
Book Yield	5.0%	5.0%
Market Yield	6.0%	6.0%
Par Yield	5.0%	5.0%
Risk Free	4.0%	4.0%
Maturity	1 Year	2 Year
Par Value	500.00	500.00

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## Modeling under Certainty Equivalent Approach: Simple Example (2 of 7)

### Traditional Asset Valuation

	<u>0</u>	<u>1</u>	<u>2</u>
<u>Asset 1</u>			
Cash Flow		525.00	
MV=PV @ Market Rate	495.28		
<u>Asset 2</u>			
Cash Flow		25.00	525.00
MV=PV @ Market Rate	490.83		
Total Market Value	986.12		

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## Modeling under Certainty Equivalent Approach: Simple Example (3 of 7)

### 'Certainty Equivalent' Asset Valuation

	<u>0</u>	<u>1</u>	<u>2</u>
<u>Asset 1</u>			
Cash Flow		525.00	
Risk Adjustment*		(9.91)	
Risk Adjusted CF		515.09	
MV=PV @ Risk Free	495.28		
<u>Asset 2</u>			
Cash Flow		25.00	525.00
Risk Adjustment*		(0.47)	(19.62)
Risk Adjusted CF		24.53	505.38
MV=PV @ Risk Free	490.83		
Total Market Value	986.12		

\* Market Imp Default rate =  $1 - (1 + RFR) / (1 + MY) = 1.89\%$

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## Modeling under Certainty Equivalent Approach: Simple Example (4 of 7)

### Traditional EV (no defaults. RDR=8%)

	<u>0</u>	<u>1</u>	<u>2</u>
II		50.00	26.20
Defaults		-	-
Bens		515.00	530.45
In in Rv		(485.00)	(515.00)
DE		20.00	10.75
<b>PVDE</b>	<b>27.73</b>		
Assets	1,000.00	515.00	-
Liabs	1,000.00	515.00	-

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## Modeling under Certainty Equivalent Approach: Simple Example (5 of 7)

### Market Consistent Defaults, Risk Free Discounting

	<u>0</u>	<u>1</u>	<u>2</u>
II		49.06	25.04
Defaults		18.87	9.26
Bens		515.00	530.45
In in Rv		(485.00)	(515.00)
DE		0.19	0.34
<b>PVDE</b>	<b>0.49</b>		
Assets	1,000.00	515.00	-
Liabs	1,000.00	515.00	-

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## Modeling under Certainty Equivalent Approach: Simple Example (6 of 7)

	<u>0</u>	<u>1</u>	<u>2</u>
<b><u>Ex Assets</u></b>			
Coup		49.06	24.07
Mat		490.57	481.31
Existing Asset CF		539.62	505.38
MV Ex (PV CF @ Rf)	986.12	485.94	-
Par Value	1,000.00	490.57	-
Book Value	1,000.00	490.57	-
<b><u>New Assets</u></b>			
Purchased		24.43	-
II/Coupon		-	0.98
Mat		-	24.43
New Asset CF		(24.43)	25.41
PV New Assets @ Rf)	-		

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## Modeling under Certainty Equivalent Approach: Simple Example (7 of 7)

	<u>0</u>	<u>1</u>	<u>2</u>
<b><u>Liabs</u></b>			
Liabs (BOP)		1,000.00	510.00
Cred Int		30.00	15.30
Release on Benefit		520.00	525.30
Liabs (EOP)	1,000.00	510.00	-
Liab CF		515.00	530.45
PV Liab CF	985.62		
PV Asset CF = MV Assets	986.12		
<b>FV Equity = PVDE</b>	<b>0.49</b>		
ChkPVDE - FV Equity	(0.00)		

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## MCEV in Extreme Markets

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- Dramatically widening corporate bond spreads created large swings in MCEV results
- In part, this has been attributed to MCEV (as then defined) not recognizing a 'liquidity premium'
- Example:
  - Impact of widening credit spreads on MCEV
  - Liquidity premium impact

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## MCEV in Extreme Markets

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Book Yield	5.0%
Market Yield	7.0%
Par Yield	5.0%
Risk Free	3.0%
MC Default Rate	3.7%

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## MCEV in Extreme Markets

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### 'Certainly Equivalent' Asset Valuation

	<u>0</u>	<u>1</u>	<u>2</u>
<u>Asset 1</u>			
Cash Flow		525.00	
Risk Adjustment*		(19.63)	
Risk Adjusted CF		505.37	
MV=PV @ Risk Free	490.65		
<u>Asset 2</u>			
Cash Flow		25.00	525.00
Risk Adjustment*		(0.93)	(38.52)
Risk Adjusted CF		24.07	486.48
MV=PV @ Risk Free	481.92		
Total Market Value	972.57		

\* Net Default rate =  $1 - (1 + \text{RFR} - \text{Liq Prem}) / (1 + \text{MY}) = 3.74\%$

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## MCEV in Extreme Markets

### Market Consistent Defaults, Risk Free Discounting

	<u>0</u>	<u>1</u>	<u>2</u>
Investment Income		48.13	24.18
Defaults		37.38	17.99
Benefits		515.00	530.45
Increase in Reserve		(485.00)	(515.00)
Book Profits		(19.25)	(9.27)
<b>PVFP</b>	<b>(27.43)</b>		
Assets	1,000.00	515.00	-
Liabs	1,000.00	515.00	-

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## Volatility in MCEV

	<u>EV</u>	<u>MCEV(1)</u>	<u>MCEV(2)</u>
Market Yield		6.0%	7.0%
Risk Free		4.0%	3.0%
Corp Bond Spread		2.0%	4.0%
PVFP	27.73	0.49	(27.43)
MV Assets		986.12	972.57
PV Liab @ Rf		985.62	1,000.00

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## Liquidity Premium Issue

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- Being debated within CFO Forum
  - General consensus that a liquidity premium exists, but how to calculate? Based on liability characteristics? Consider assets?
  - Those already reporting MCEV would like a 'quick fix' to address market dislocation
  - Those who are not, prefer a more robust solution that works in all economic conditions
- Influence of Solvency II developments

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## Liquidity Premium (1)

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Book Yield	5.0%
Market Yield	7.0%
Par Yield	5.0%
Risk Free	3.0%
MC Default Rate	3.7%
Liquidity Premium	2.0%

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## Liquidity Premium (2)

### 'Certainly Equivalent' Asset Valuation with Liquidity Premium

	<u>0</u>	<u>1</u>	<u>2</u>
<u>Asset 1</u>			
Cash Flow		525.00	
Risk Adjustment*		(9.81)	
Risk Adjusted CF		515.19	
MV=PV @ Risk Free	490.65		
<u>Asset 2</u>			
Cash Flow		25.00	525.00
Risk Adjustment*		(0.47)	(19.44)
Risk Adjusted CF		24.53	505.56
MV=PV @ Risk Free	\$481.92		
Total Market Value	\$972.57		

\* Net Default rate =  $1 - (1 + RFR - Liq\ Prem) / (1 + MY) = 1.87\%$

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## Liquidity Premium (3)

### Market Consistent Defaults, Risk Free Discounting

	<u>0</u>	<u>1</u>	<u>2</u>
Investment Income		49.07	25.29
Defaults		18.69	9.17
Benefits		515.00	530.45
Increase in Reserve		(485.00)	(515.00)
Book Profits		0.37	0.67
<b>PVFP</b>	<b>\$0.96</b>		
Assets	1,000.00	515.00	-
Liabs	1,000.00	515.00	-

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## Liquidity Premium (4)

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	<u>EV</u>	<u>MCEV(1)</u>	<u>MCEV(2)</u>	<u>MCEV(3)</u>
Market Yield		6.0%	7.0%	7.0%
Risk Free		4.0%	3.0%	3.0%
Corp Bond Spread		2.0%	4.0%	4.0%
Liquidity Premium		0.0%	0.0%	2.0%
PVFP	27.73	0.49	(27.43)	0.96
MV Assets		986.12	972.57	972.57
PV Liab @ Rf		985.62	1,000.00	971.61

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## Future of MCEV

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- Basis for determining liquidity premium
- Non-performance risk
- VERY POLITICAL
  - Market Implications

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## EEV Definition

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- EEV = a roll-forward of current equity and PV of projected future earnings all on a real-world world basis using a defined discount rate
  - Started with current CFT and planning models
  - Added in pieces outside of the CFT models, like funding agreements, deferred tax assets, RBC adjustments, etc, which added about a dozen different adjustments

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## Implementation Timeline

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- Created an EEV balance sheet on 12/31/06
- First analysis of change in 2007
- Converted from TAS to ALFA in summer 2008
- Converted from EEV to MCEV in fall of 2008
- Converted YE06, YE07, HY08
- Conversion lasted into YE08

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## EEV Implementation Issues

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- Actual data is not tracked like model data (NB-vs- inforce, impact due to lapse variances etc), so many estimates made
- Model runs took a long time so we invested in a large grid of computers.
- Lots of documentation needed for Audit purposes

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## MCEV Definition

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- MCEV = a roll-forward of current equity and PV of projected future earnings on a real-neutral basis using a scenario-based discount rates
- Started with current EEV models and converted to risk neutral
- Required definitions around asset yield, management action, and policyholder behavior in risk-neutral environment

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## MCEV Implementation Issues

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- Asset system limitations around “risk free” assets, so we developed a complicated series of adjustments, based on mark to market and credited rates.
- Risk free results much more difficult to analyze and explain

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## MCEV Implementation Issues

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- Market crisis at YE08 led to deeper dive into results and late liquidity premium changes
- Finished up YE08 in spring of 2009
- More discloser, so more documentation and analysis needed
- Currently working on streamlining our processes and implementing FRCF

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## MCEV Implementation Issues

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- Worked closely with Auditors and Group in understanding results and impact on business, resulting in many definitional changes

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