

P&I | CONFERENCES

Pension Settlements Strategies Conference

San Francisco
September 9

Chicago
September 16

New York
September 18

De-risking the Plan The Pros and Cons of Hibernation and Annuity Buyouts

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Audience poll #1

For a typical 60/40 pension plan, how much market risk can be eliminated by changing asset allocations?

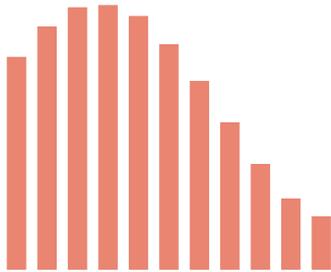
- A) 25%
- B) 50%
- C) 75%
- D) 100%

Audience poll #2

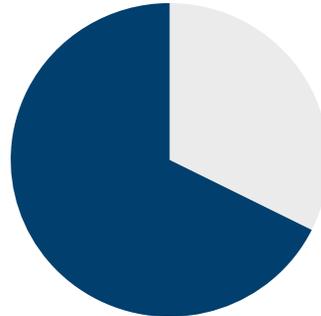
From which animal can we learn the most about liability-driven investing?

- A) Bear
- B) Bull
- C) Malagasy fat-tailed dwarf lemur
- D) Bond trader

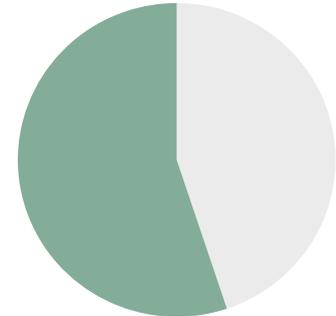
About NISA



Two decades of
experience with
liability-based
strategies



Over 2/3rds of
our AUM in long
credit and long
Treasuries



Over half our
derivatives
notional
managed in
LDI-related
engagements

Assets under management (AUM) data as of 6/30/2014.

Today's agenda

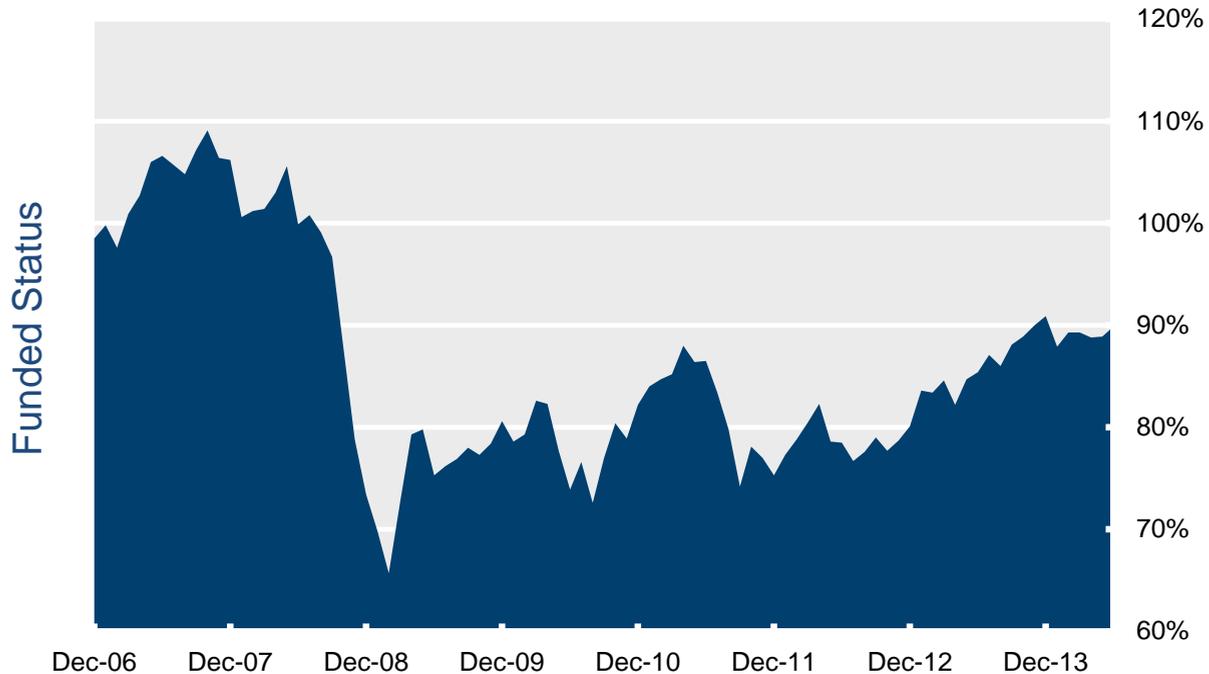


How is funded status volatility measured and managed?

How do different de-risking tools achieve different outcomes?

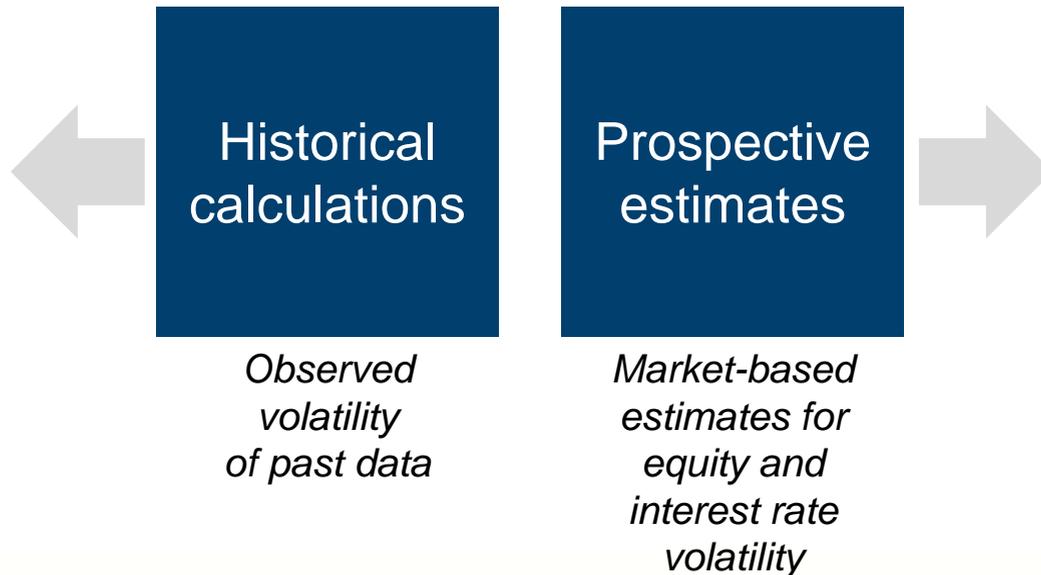
What goes on under the hood in hibernation?

How **volatile** is funded status?

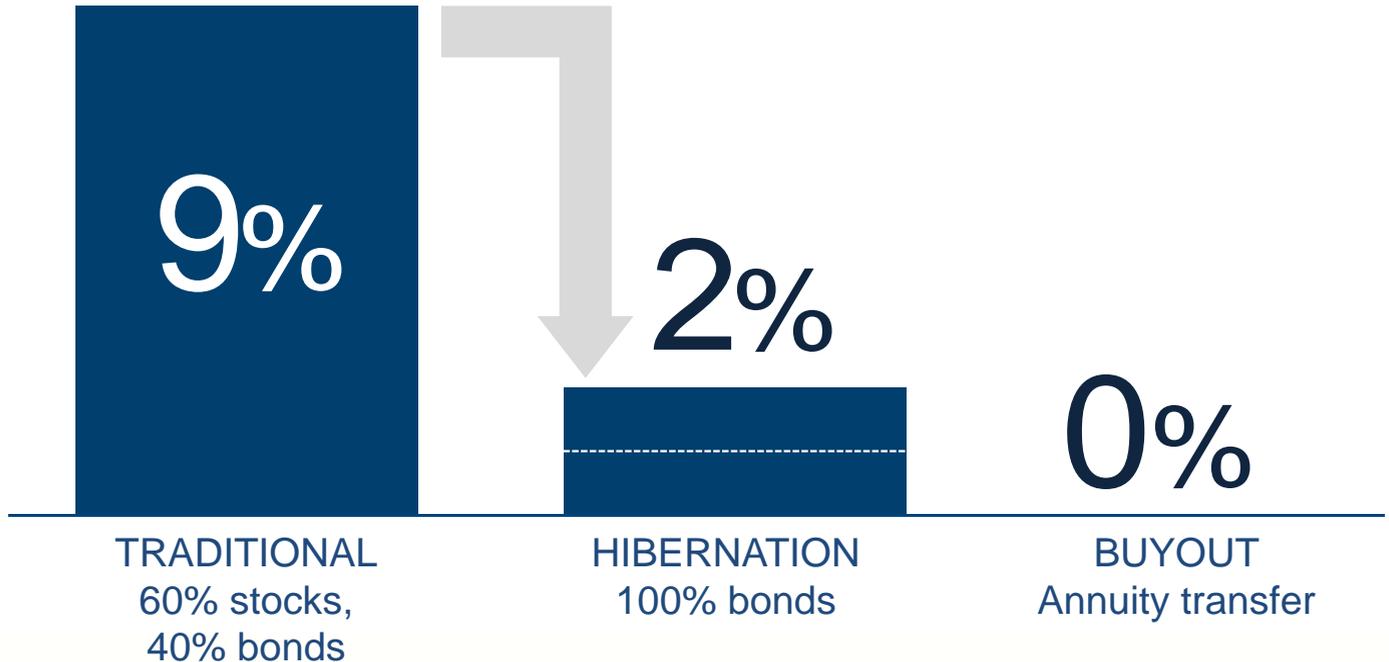


Source: NISA Pension Surplus Risk Index (PSRX™, patent pending). Funded status reflects average funded status of PSRX constituent plans, the 100 largest US corporate defined benefit plans as determined by NISA based on publicly available information. More information on the PSRX is available at www.nisa.com.

How can we measure funded status volatility?



How can we manage funded status volatility?



NISA calculations based on data from Bloomberg, Barclays, Citigroup, and JP Morgan as of 06/30/14. Funded status volatility represents an annualized one standard deviation range. Based on illustrative plans that are 90% funded on a Citi AA basis with a liability duration of 12 years. Traditional strategy based on 60% global equity and 40% long duration credit fixed income allocation. Hibernation strategy based on 100% fixed income allocation comprised of credit and Treasury bonds.

What else is in the de-risking toolkit?

Hibernation

Buyout

Longevity
swaps

Buy-ins

Lump
sums

Today's agenda

How is funded status volatility measured and managed?



How do different de-risking tools achieve different outcomes?

What goes on under the hood in hibernation?

Why do we want to de-risk?

Reduce pension volatility

Control contributions

Reduce enterprise risk

Manage longevity risk

How is **enterprise risk** affected by pension de-risking?

Enterprise risk *before* de-risking **X**

After **hibernation** **0.71x**

After **buyout** **0.70x**

Source: NISA calculations based on data from Bloomberg and Barclays as of 06/30/2014. Enterprise risk reflects annualized firm volatility for an illustrative firm with an operational volatility of 15%, a 1:1 debt to equity ratio, a defined benefit pension plan that is 90% funded on a Citi Aa basis and is two times larger than the firm's market capitalization. Pension liability and asset allocation details as described on earlier slide. Pension volatility and operational risk assumed to be correlated by a factor of 0.5. Analysis based on methodology described in our paper *The Credit Rating Impact of Pension De-Risking* available at www.nisa.com.

How can pension de-risking potentially impact credit rating?



Source: NISA calculations based on data from Bloomberg and Barclays as of 06/30/2014. Credit rating impact based on distance-to-default model using data for an illustrative firm as described on previous slide. Analysis based on methodology described in our paper *The Credit Rating Impact of Pension De-Risking* available at www.nisa.com.

Why do we want to de-risk?

Reduce pension volatility

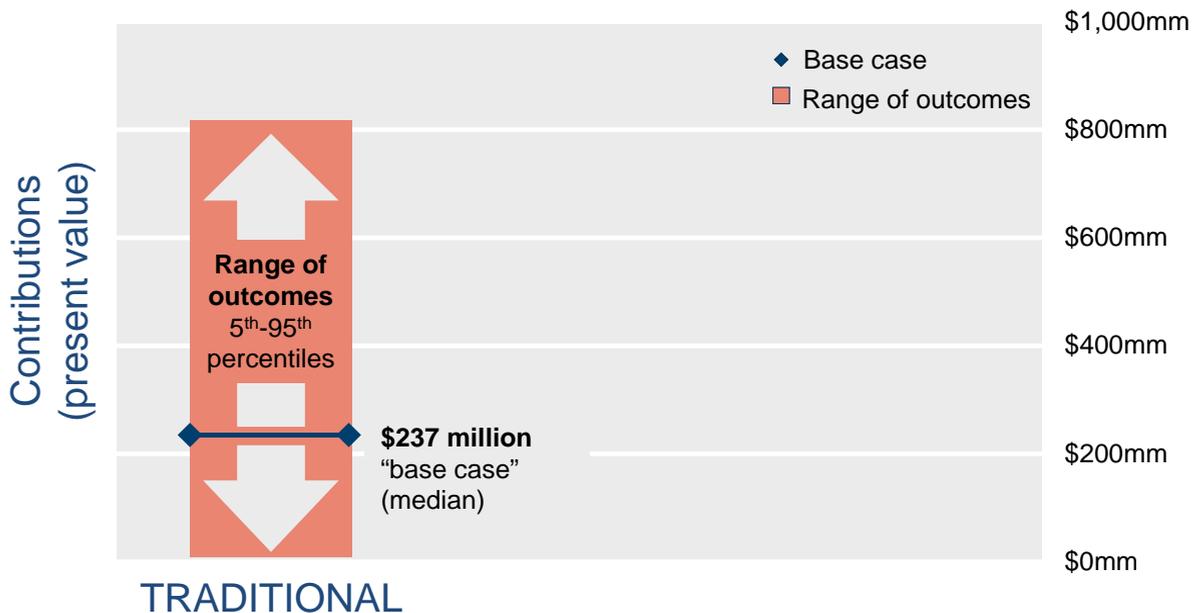
Control contributions

- *Amount*
- *Uncertainty*
- *Timing*

Reduce enterprise risk

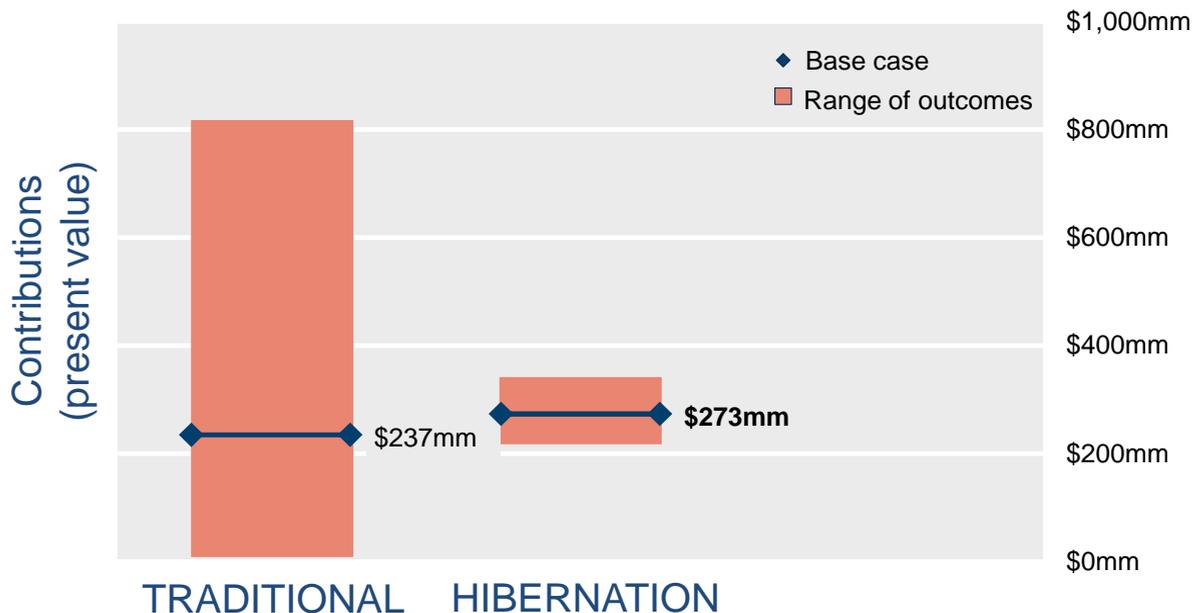
Manage longevity risk

What's the contribution profile of a traditional strategy?



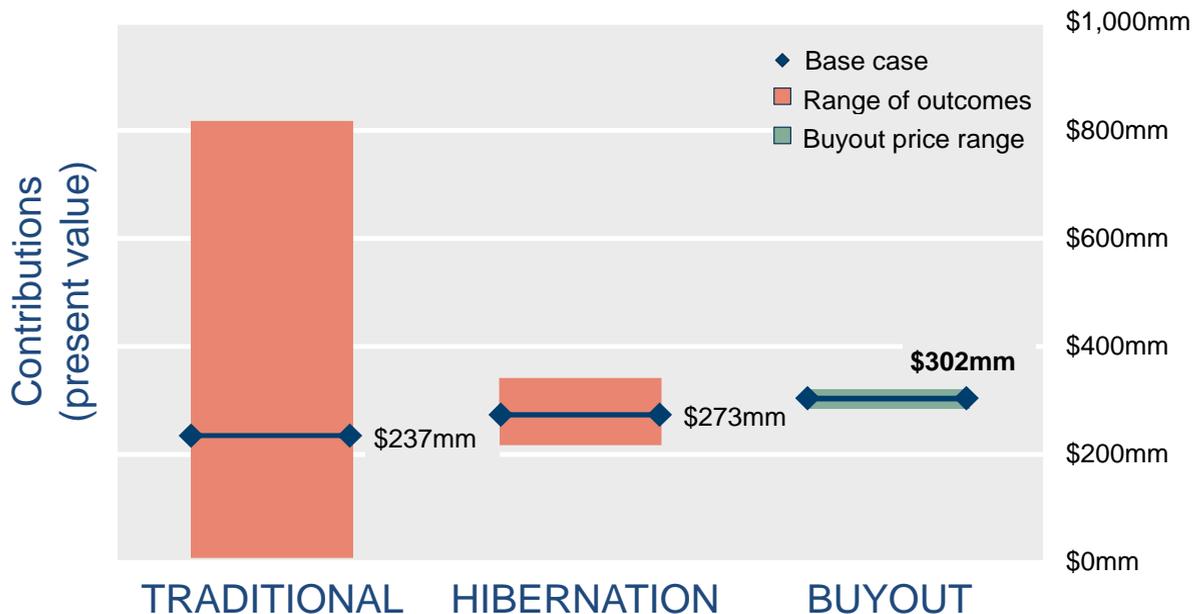
Source: NISA calculations based on data as of 09/30/13 to be consistent with our paper *Cash on the Barrelhead*. Based on simulation analysis for hypothetical pension plan that is 90% funded versus a \$1 billion PPA liability. Traditional strategy based on 60% equities and 40% fixed income. Based on our paper *Cash on the Barrelhead* available at www.nisa.com.

What's the contribution profile of a hibernation strategy?



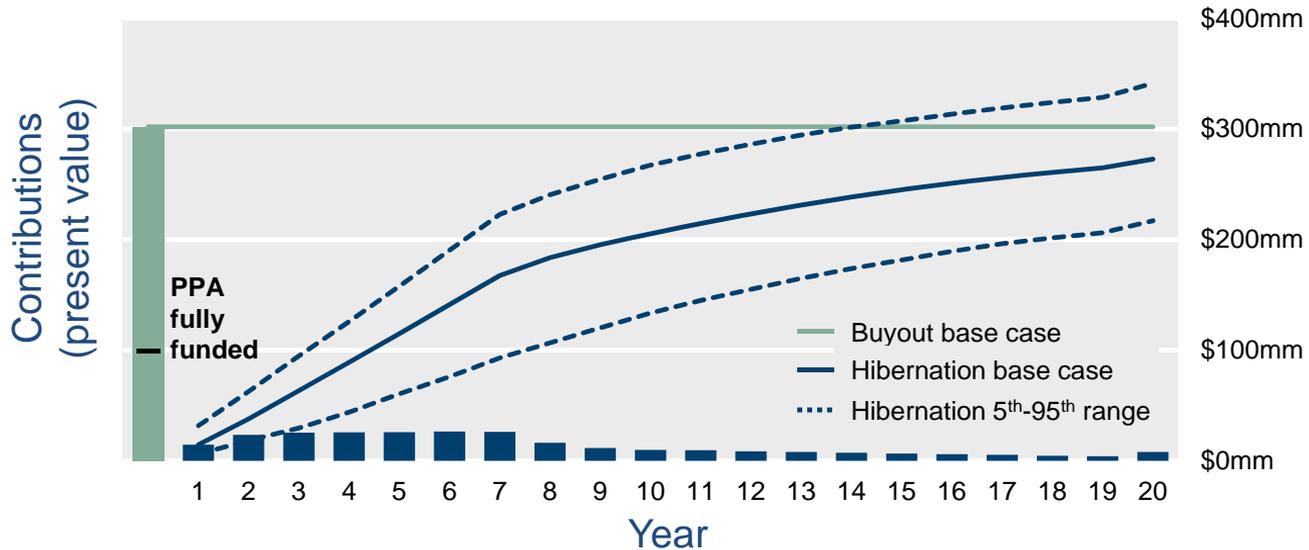
Source: NISA calculations based on data as of 09/30/13 to be consistent with our paper *Cash on the Barrelhead*. Hibernation strategy based on 100% long duration fixed income allocation and derivative-based interest rate hedge. Based on our paper *Cash on the Barrelhead* available at www.nisa.com.

What's the contribution profile of a **buyout** strategy?



Source: NISA calculations, including calculations based on data from Penbridge Advisors based on data as of 09/30/13 to be consistent with our paper *Cash on the Barrelhead*. Base case reflects median from simulation analysis for traditional and hibernation cases, and average of third-party annuity price quotes for buyout. Range of outcomes reflects 5th-95th percentiles for traditional and hibernation and one standard deviation range of prices for buyout. Based on our paper *Cash on the Barrelhead* available at www.nisa.com.

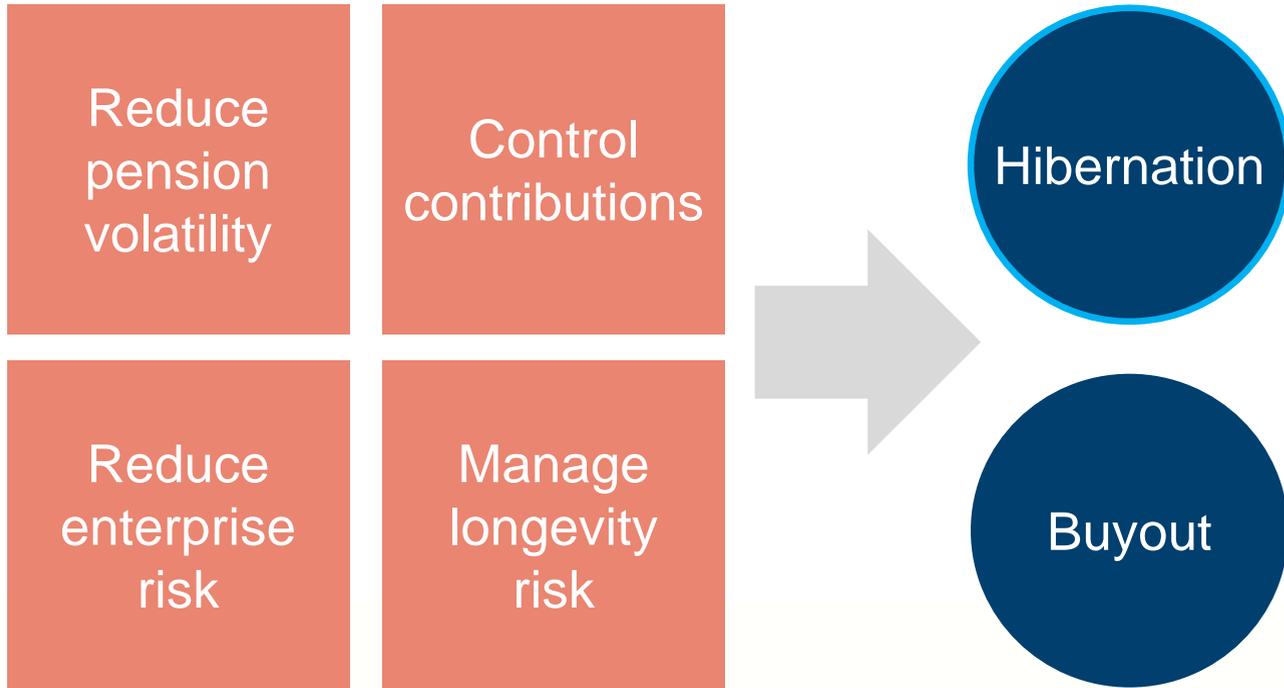
Pay now or pay later



Source: NISA calculations, including calculations based on data from Penbridge Advisors. Hibernation contributions reflect the median present value of required annual contributions plus any remaining PPA deficit in final year based on the simulation analysis. Bars reflect annual contributions, solid lines reflect cumulative contributions, and dashed lines reflect 5th-95th percentiles range. Based on our paper *Cash on the Barrelhead* available at www.nisa.com.

How do motivations...

...map to strategies?



Today's agenda

How is funded status volatility measured and managed?

How do different de-risking tools achieve different outcomes?



What goes on under the hood in hibernation?

Under the hood with a **hibernation** strategy

Design

- Characterize liability
- Understand objectives and constraints
- Design strategy

Implement

- Build hedge portfolios
- Manage to glidepath
- Coordinate with other managers

Monitor & Adjust

- Regular rebalancing
- Measure hedge effectiveness
- Adapt to changing market conditions



Malagasy fat-tailed dwarf lemur

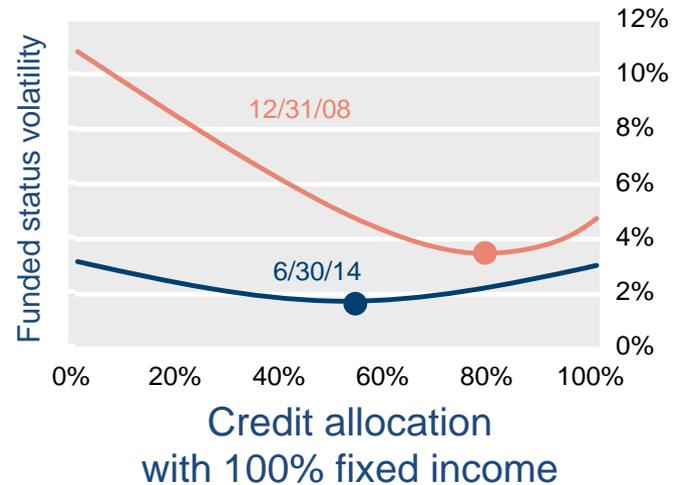


During hibernation...

- *External environment changes*
- *Body temperature adjusts*
- *Wide range, 50-85 degrees*

Source: Dausmann, K.H.; Glos, J.; Ganzhorn, J.U.; Heldmaier, G. (2005). "Hibernation in the tropics: lessons from a primate". *Comparative Physiology*

Hibernation responds to changing volatility environment



Source: NISA calculations based on data from Bloomberg, Barclays, Citigroup and JP Morgan as of 06/30/14. Analysis based on an illustrative liability with a duration of 12 years discounted on the Citi Aa pension discount curve. Funded status volatility reflects annualized funded status volatility for the illustrative plan that is 90% funded and invested in 100% fixed income (blends of credit and Treasuries) in addition to a derivative overlay when necessary to hedge remaining liability interest rate risk.

Today's agenda

How is funded status volatility measured and managed?

How do different de-risking tools achieve different outcomes?

What goes on under the hood in hibernation?



Q&A

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