



October 2010

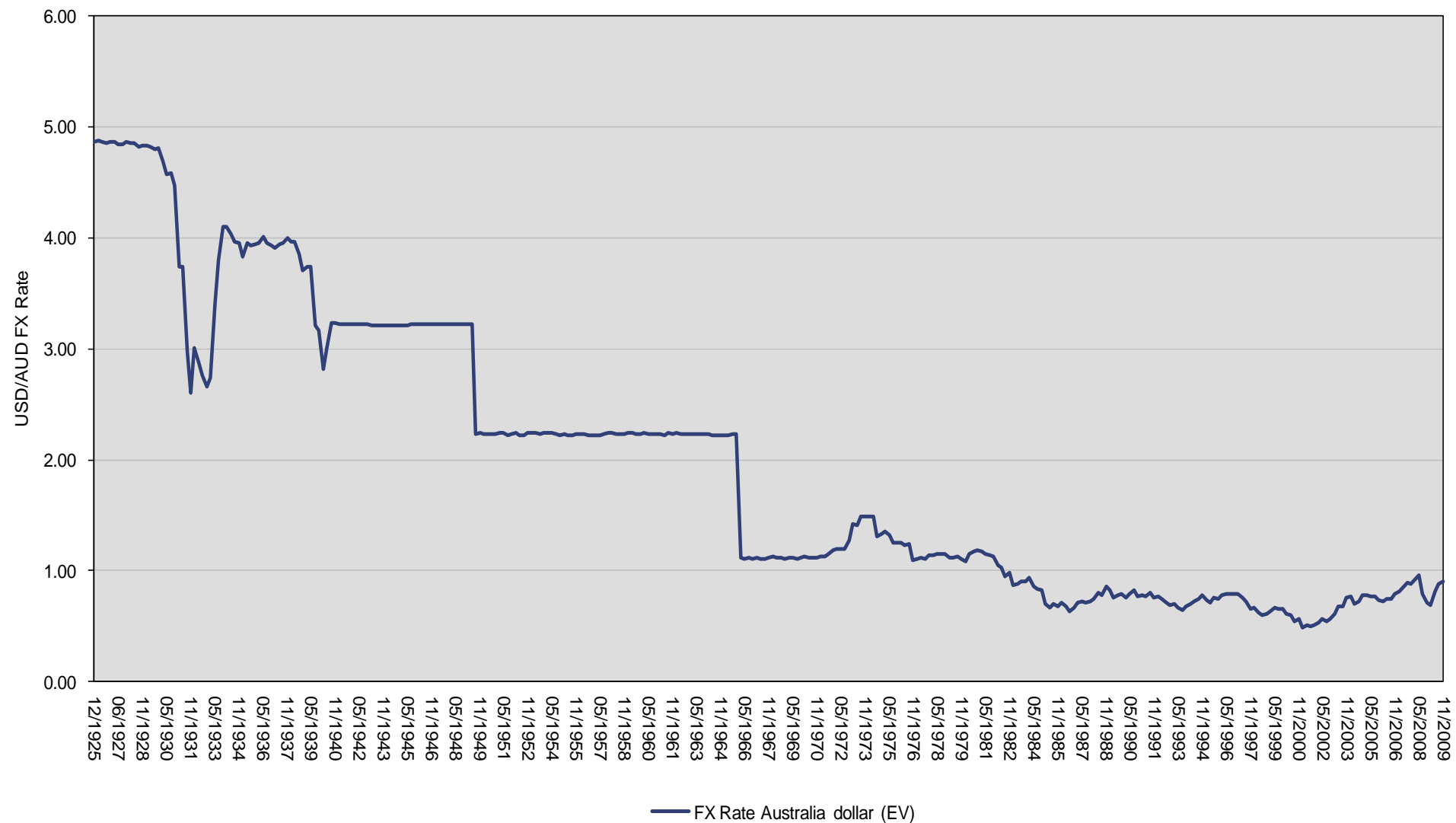
# Forecasting in a World of Uncertainty: The Equity Risk Premium

# Equity Risk Premium

- **Expected return** = Alpha return + 10YG bond yield +  $ERP_H$  or  $ERP_C$
- The **equity risk premium (ERP)** = expected excess return for equity market risk
  - **Historic ERP** ( $ERP_H$ ) = Equity market return – 10YG bond yield = 6.2%  
Australia: from 06/1884 to 12/2009 = 7.3% x 50%  
World: from 12/1926 to 12/2009 = 5.1% x 50%
  - **Current ERP** ( $ERP_C$ ) = VIX / 100 x Price per unit of risk = 22.9 x 40bps = 9.1%  
Price per unit of risk =  $ERP_H \div \text{Historic risk} = 6.2\% \div 15.6\% = 40\text{bps}$   
 $ERP_C$  persists for 2 years?
  - Seminal research: Doran, Ronn & Goldberg<sup>1</sup>; Ang, Hodrick, Xing & Zhang<sup>2</sup>; Bollerslev & Zhou<sup>3</sup>
    - <sup>1</sup> Doran, Ronn & Goldberg (2006) support the notion of allowing the short-term ERP to vary with VIX whilst holding the long-term ERP fixed.
    - <sup>2</sup> Ang, Hodrick, Xing & Zhang (2006) show that VIX innovations are significant factors for the cross section of equity returns.
    - <sup>3</sup> Bollerslev & Zhou (2007) show that the volatility risk premium (the difference between the VIX and realized volatility of the S&P500 index) forecasts equity returns better than other commonly used forecasting variables (such as the PE ratio or the term spread).

# 'The Lucky Country'

- Just how lucky has 'the lucky country' been?
  - USD/AUD FX rate from 12/1925 to 12/2009 (quarterly data)

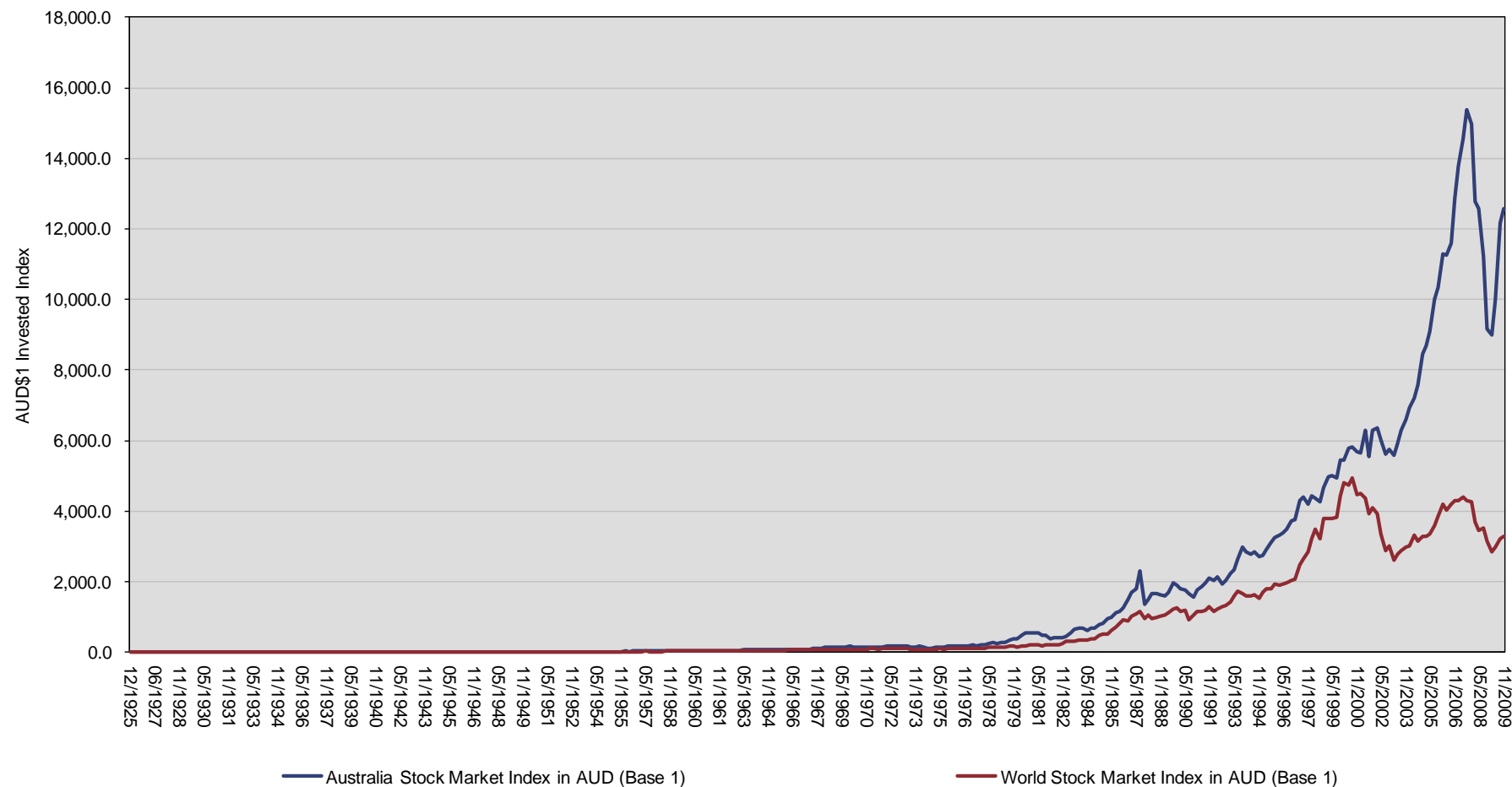


# 'The Lucky Country'

## ■ Just how lucky has 'the lucky country' been?

- Historic returns from Australian and World equity markets from 12/1925 to 12/2009 (quarterly data)

AUD\$1 invested in the Australian equity market on 31/12/1925 has grown to AUD\$12,584, versus one AUD\$1 invested in the World equity index which has grown to only AUD\$3,290.



# 'The Lucky Country'

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Optimal equity portfolio: 12/1925 to 12/2009 = 79% Aust. equities + 21% World equities

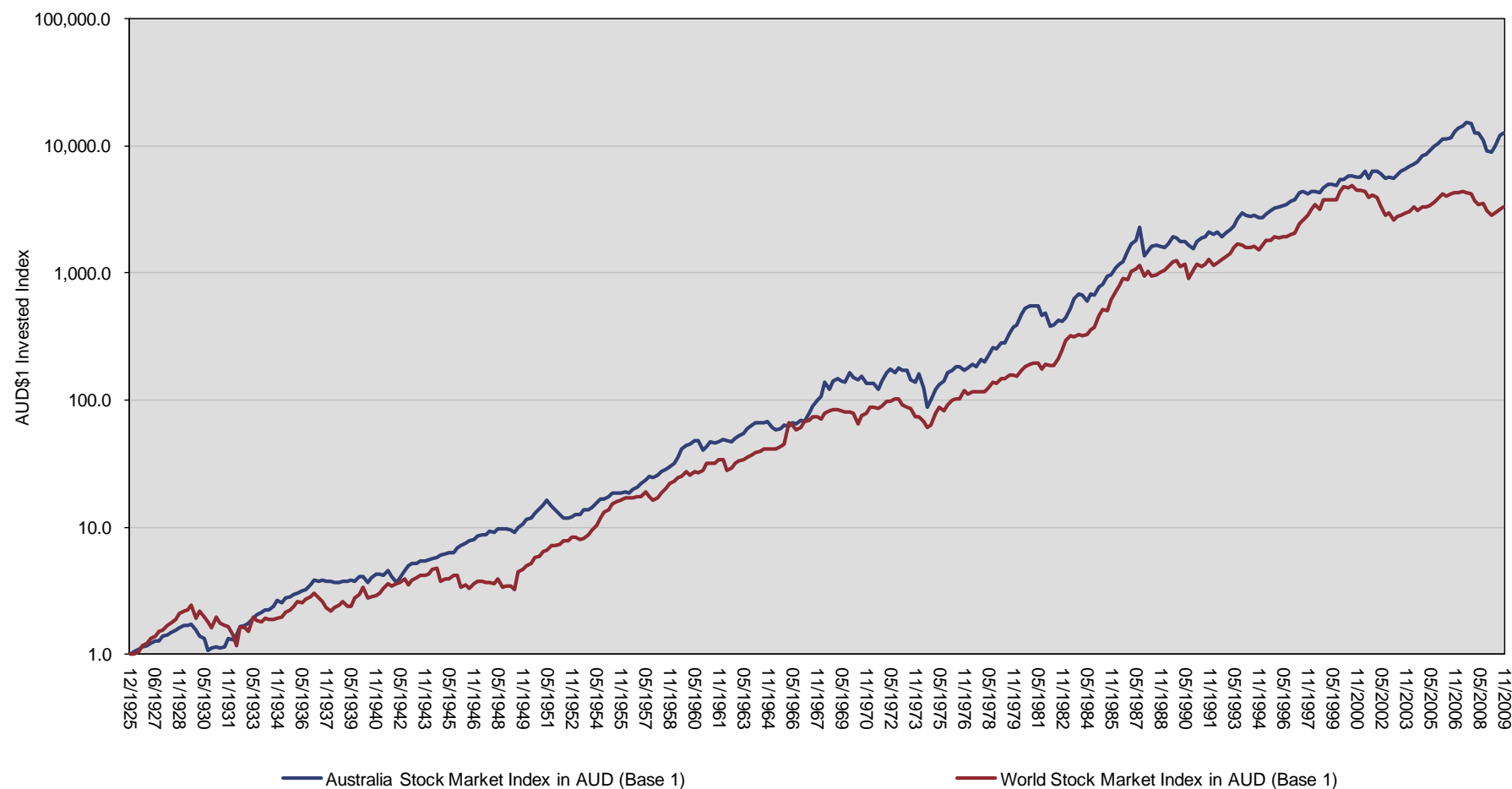
Time Frame		Portfolio Weights		Return		Risk		Sharpe Ratio	
From	To	Australian	World	AUD	USD	AUD	USD	AUD	USD
31/12/1926	31/12/2009	100%	0%	11.9%		16.3%		0.350x	
		0%	100%	10.1%	8.7%	17.3%	17.1%	0.270x	0.267x
		79%	21%	11.7%		15.2%		0.352x	
31/12/1945	31/12/2009	100%	0%	12.5%		17.4%		0.333x	
		0%	100%	11.0%	9.7%	16.4%	15.4%	0.275x	0.293x
		62%	38%	12.2%		15.3%		0.339x	
31/12/1969	31/12/2009	100%	0%	11.5%		19.5%		0.208x	
		0%	100%	9.7%	9.5%	16.4%	17.2%	0.117x	0.189x
		100%	0%	11.5%		19.5%		0.208x	

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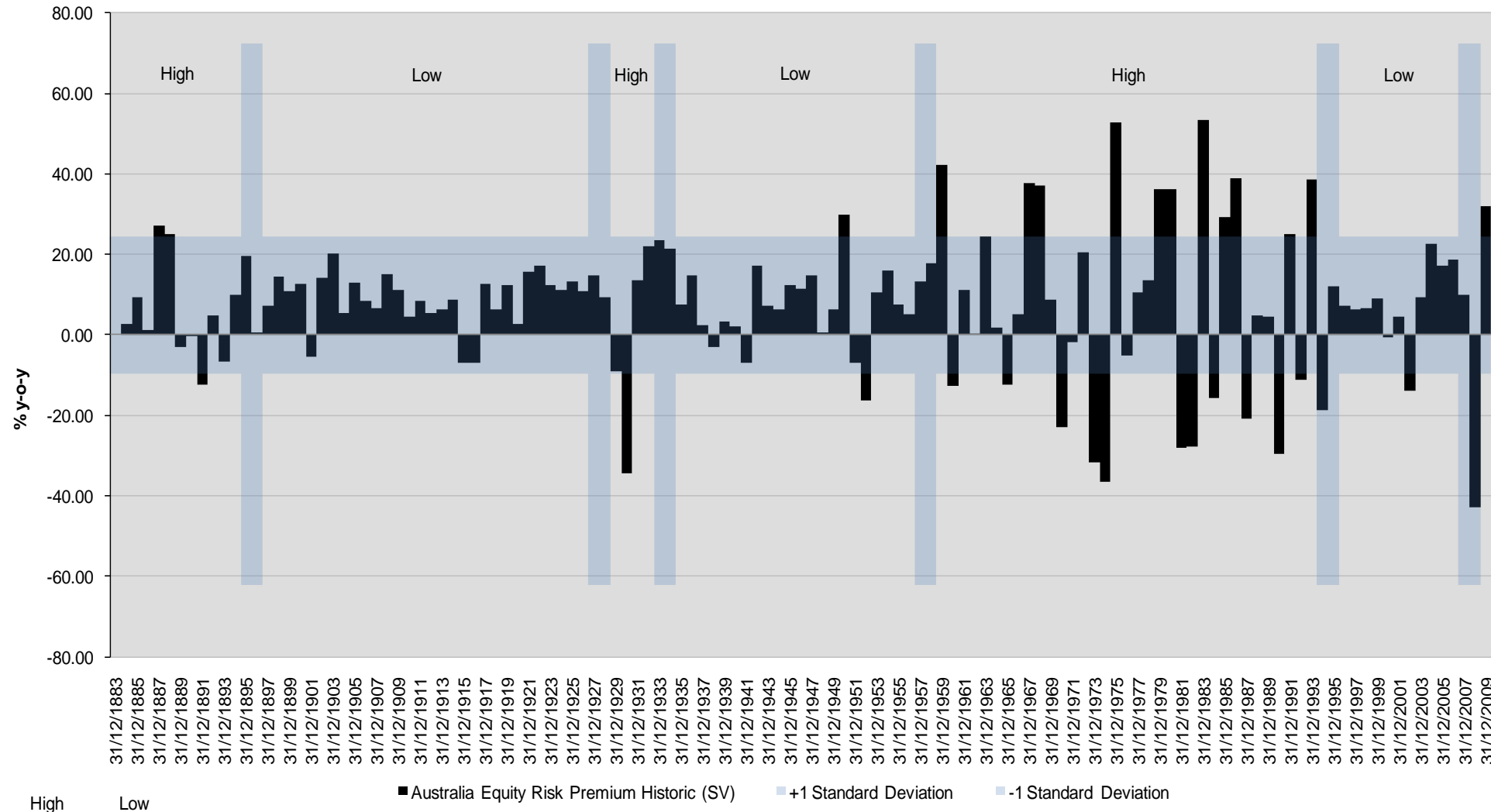


# Equity Risk Premium

## ■ Historic equity risk premium (Australia)

– Historic ERP calculated as the average over the period from 12/1884 to 12/2009 (yearly data)

Historic average ERP for the Australian equity market equals 7.3%, with a standard deviation of 14.0%

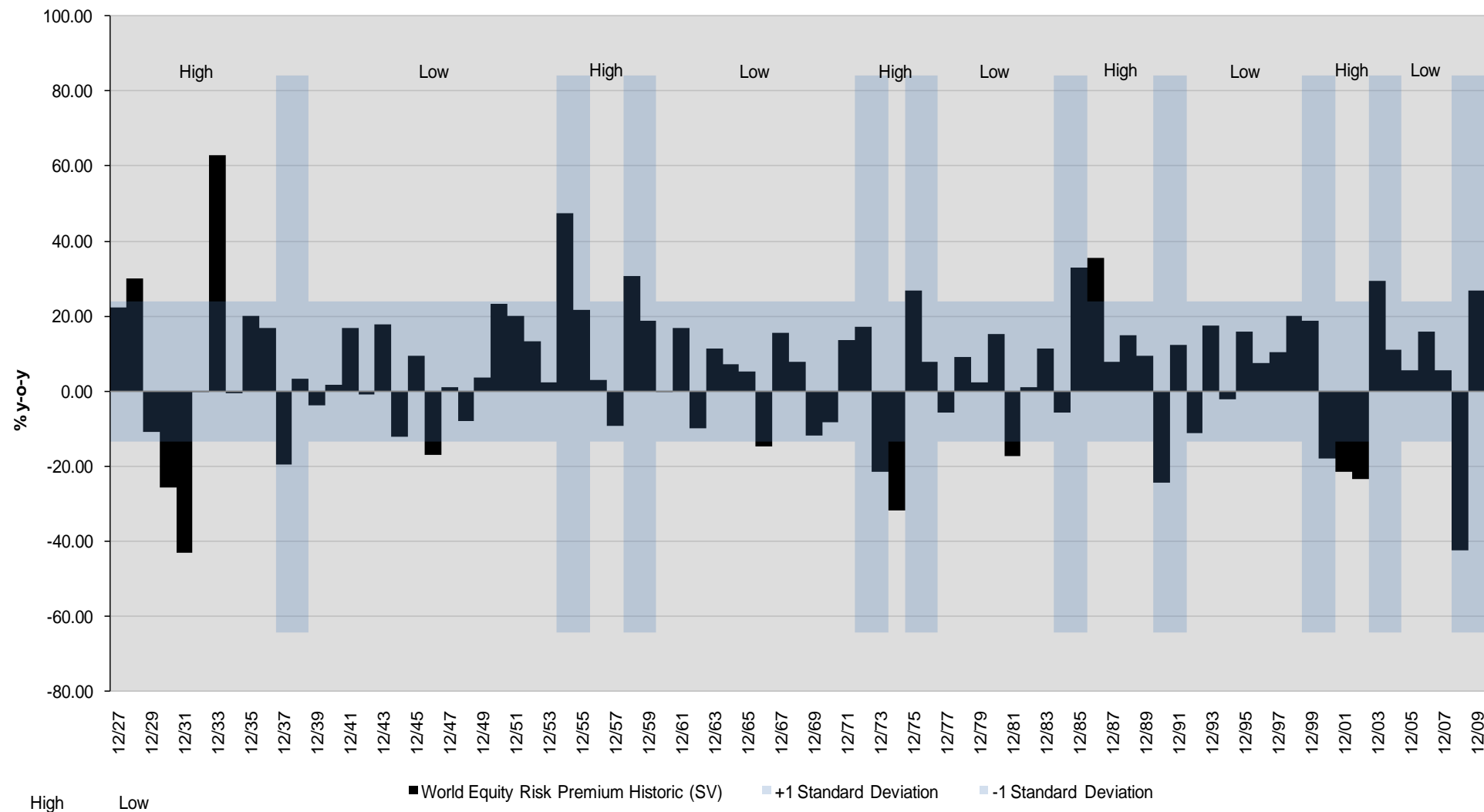


# Equity Risk Premium

## ■ Historic equity risk premium (World)

- Historic ERP calculated as the average over the period from 12/1926 to 12/2009 (yearly data)

Historic average ERP for the World equity market (USD) equals 5.2%, with a standard deviation of 17.1%

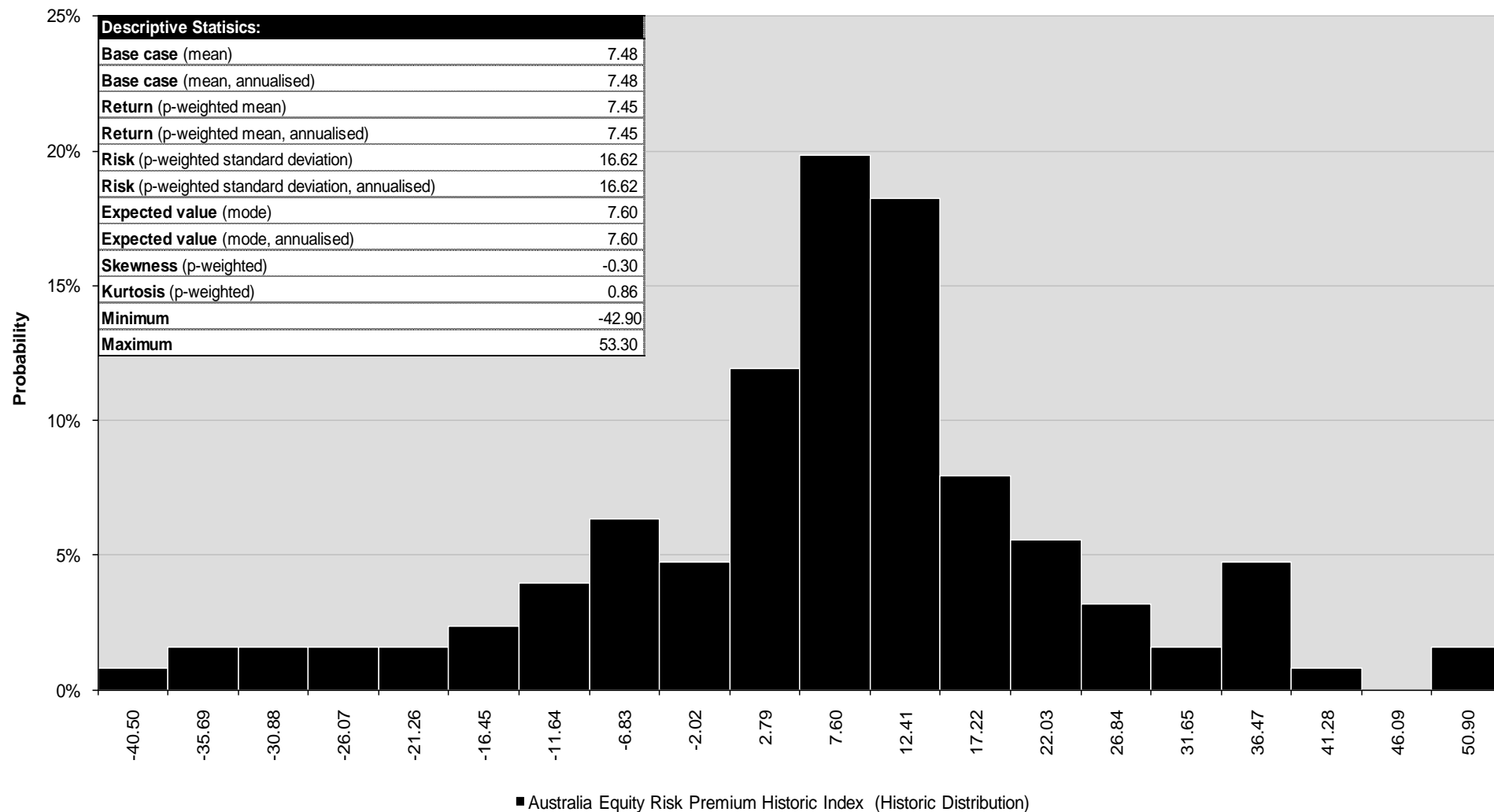


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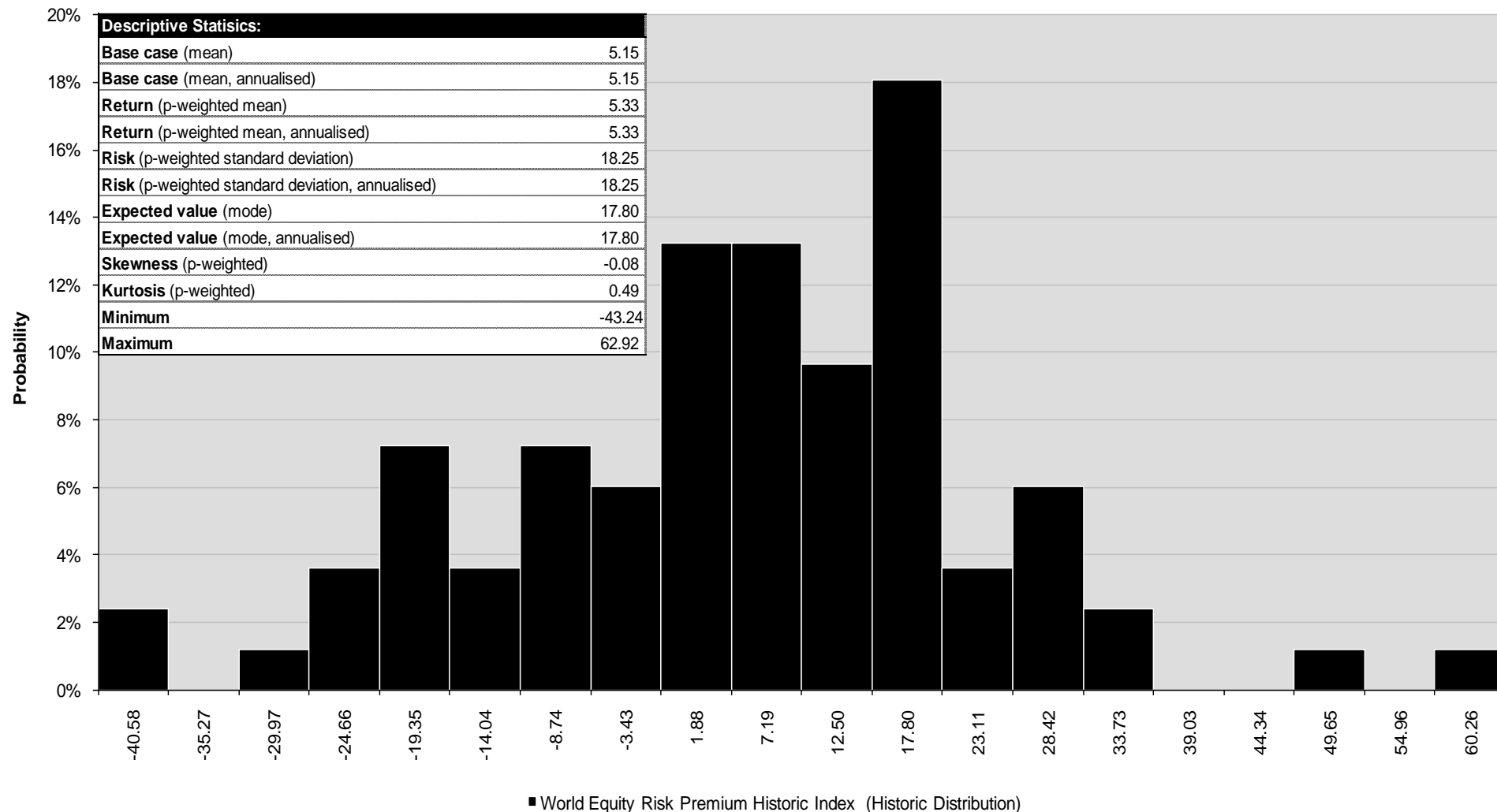


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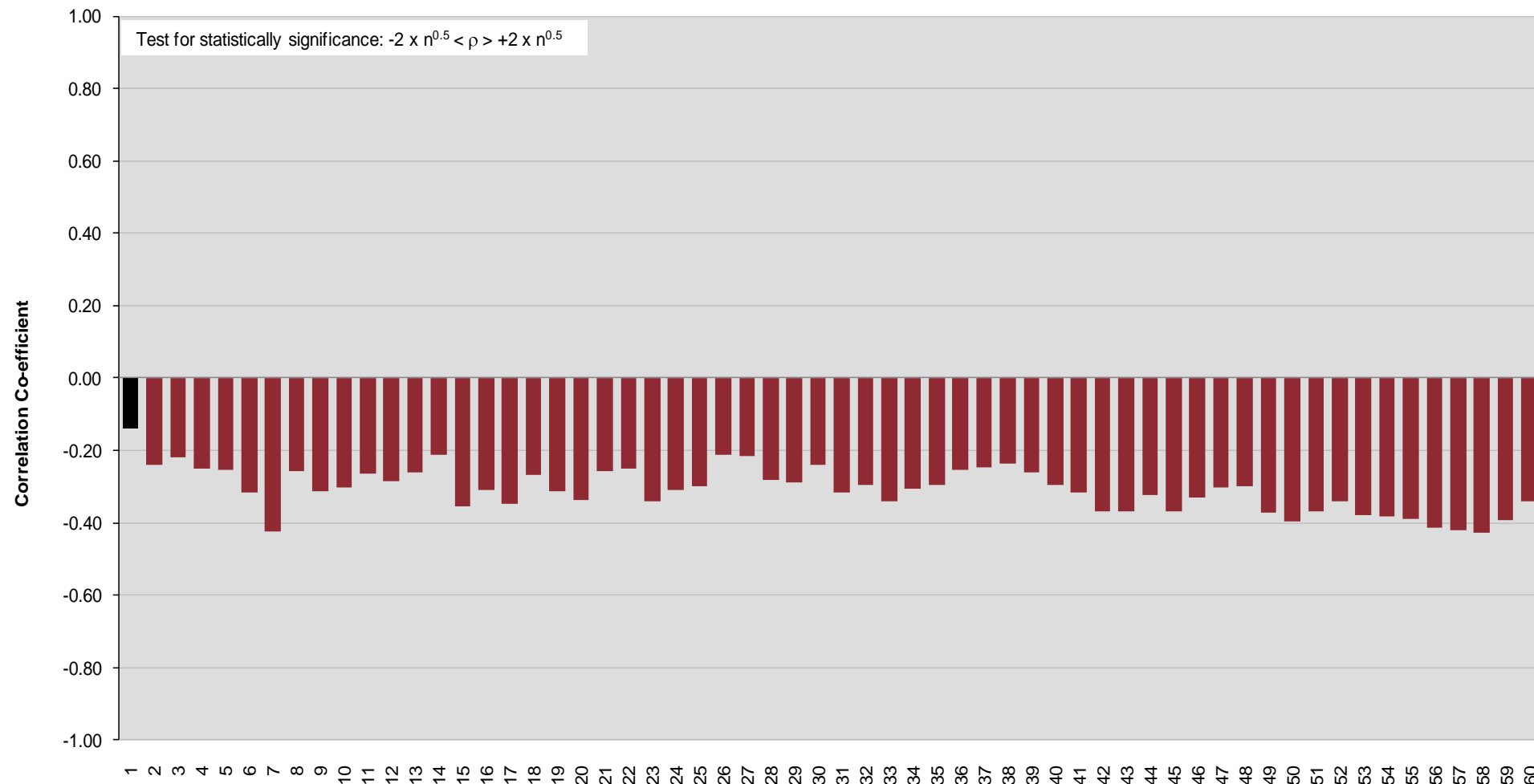


# Equity Risk Premium

- The impact of historic changes on forecasts (Australian ERP)

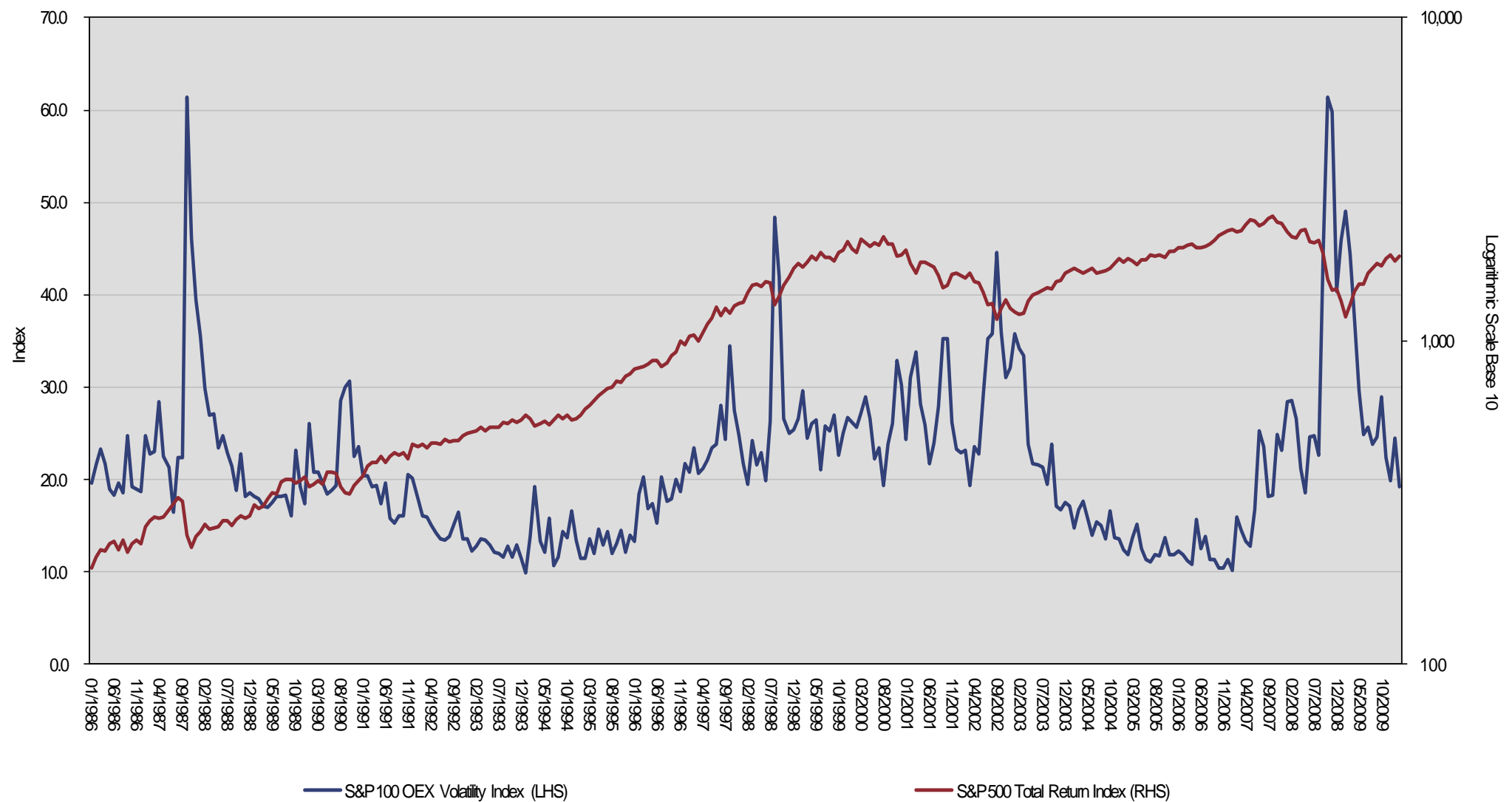
- Some time series values are auto-correlated (i.e. correlated with themselves)

All statistically significant correlations, except previous month and current month (chosen -0.42, 7yr ma)



# Equity Risk Premium

- Current equity risk premium (United States)
  - Current ERP calculated using VIX and historic price per unit of risk



# Equity Risk Premium

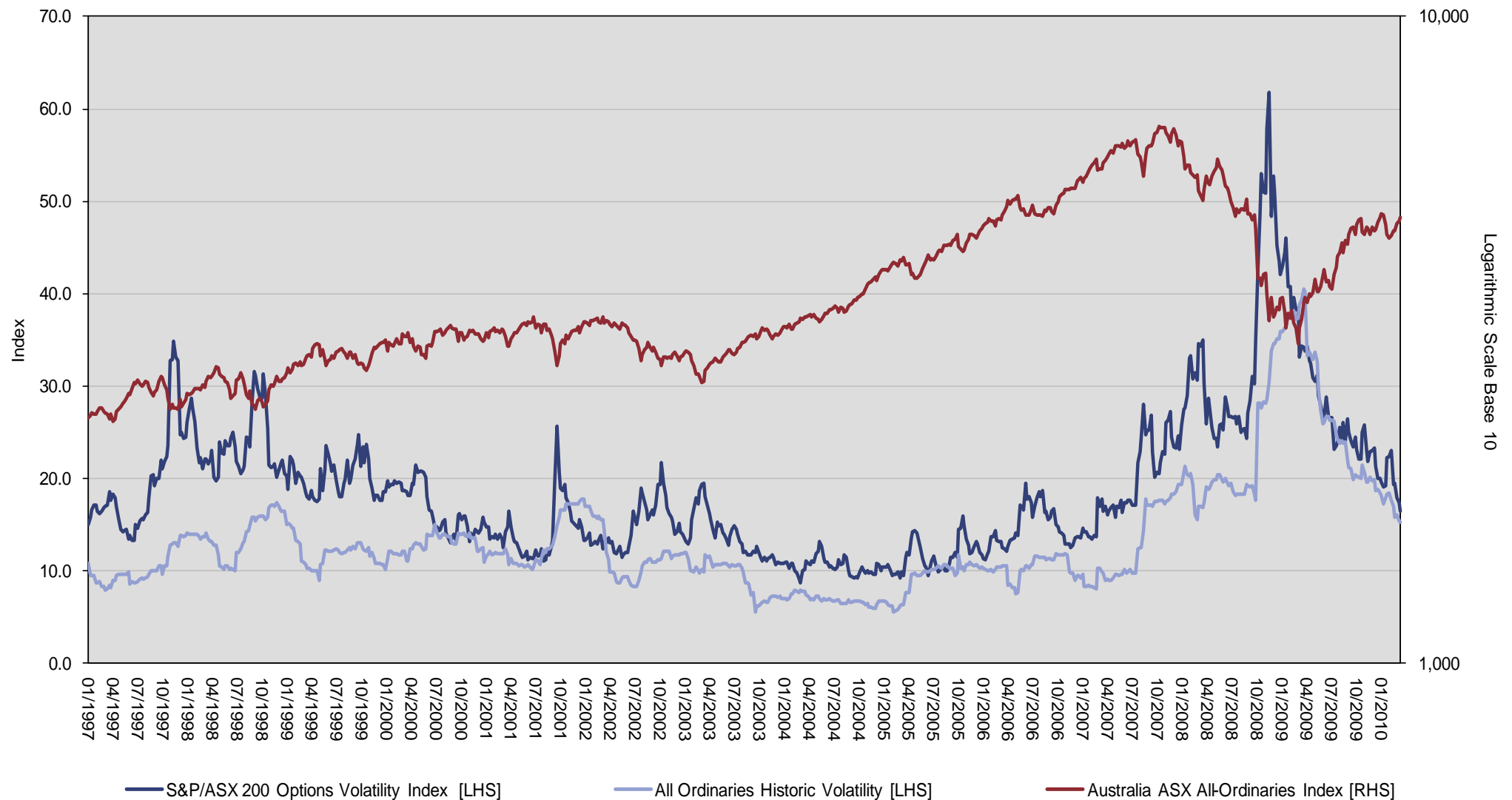
- Current equity risk premium (Australia)
  - Correlations between implied volatility, total return, and historic volatility

## Correlation Matrix

	S&P/ASX 200 Options Volatility Index Change	Australia ASX All- Ordinaries Total Return
S&P/ASX 200 Options Volatility Index Change	1.00	
Australia ASX All-Ordinaries Total Return	-0.68	1.00
All Ordinaries Historic Volatility Change	0.22	-0.18

# Equity Risk Premium

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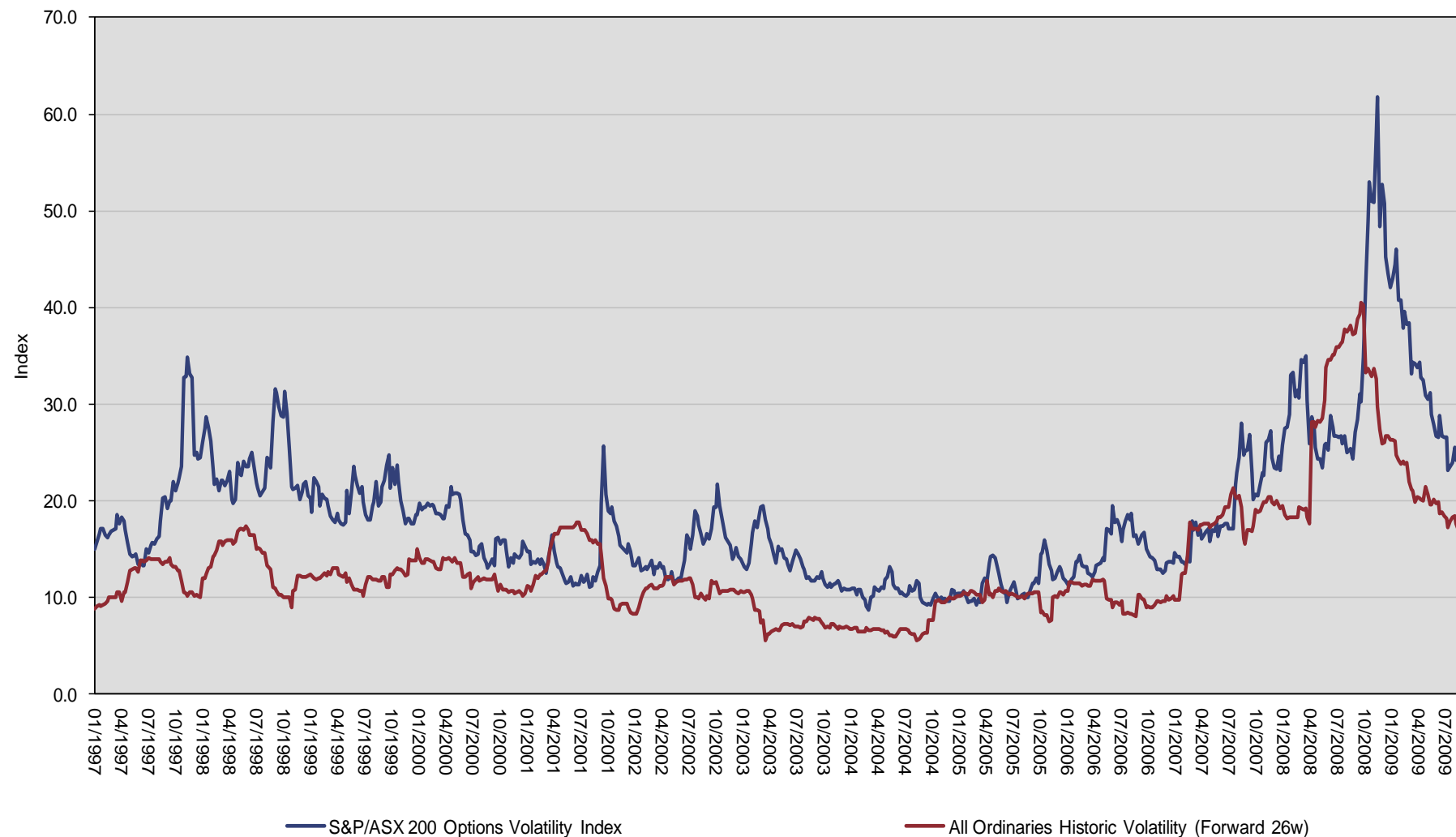


# Equity Risk Premium

- Current equity risk premium (Australia)

- Current ERP calculated using VIX and historic price per unit of risk

Correlations: Australian VIX v. Forward (26 week) volatility = +0.68

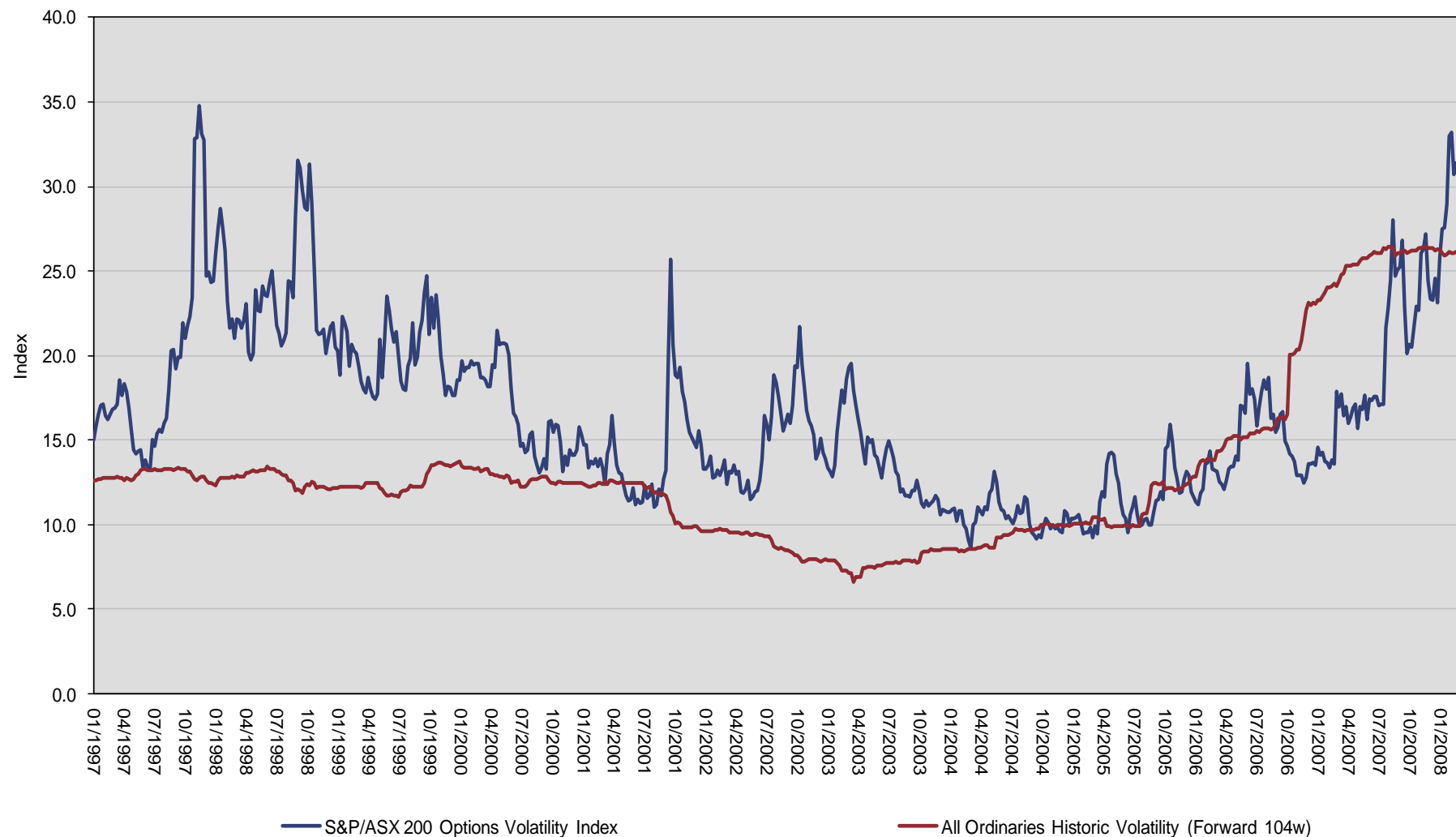


# Equity Risk Premium

## ■ Current equity risk premium (United States)

- Current ERP calculated using VIX and historic price per unit of risk

Correlations: US VIX v. Forward (104 week) volatility = +0.42

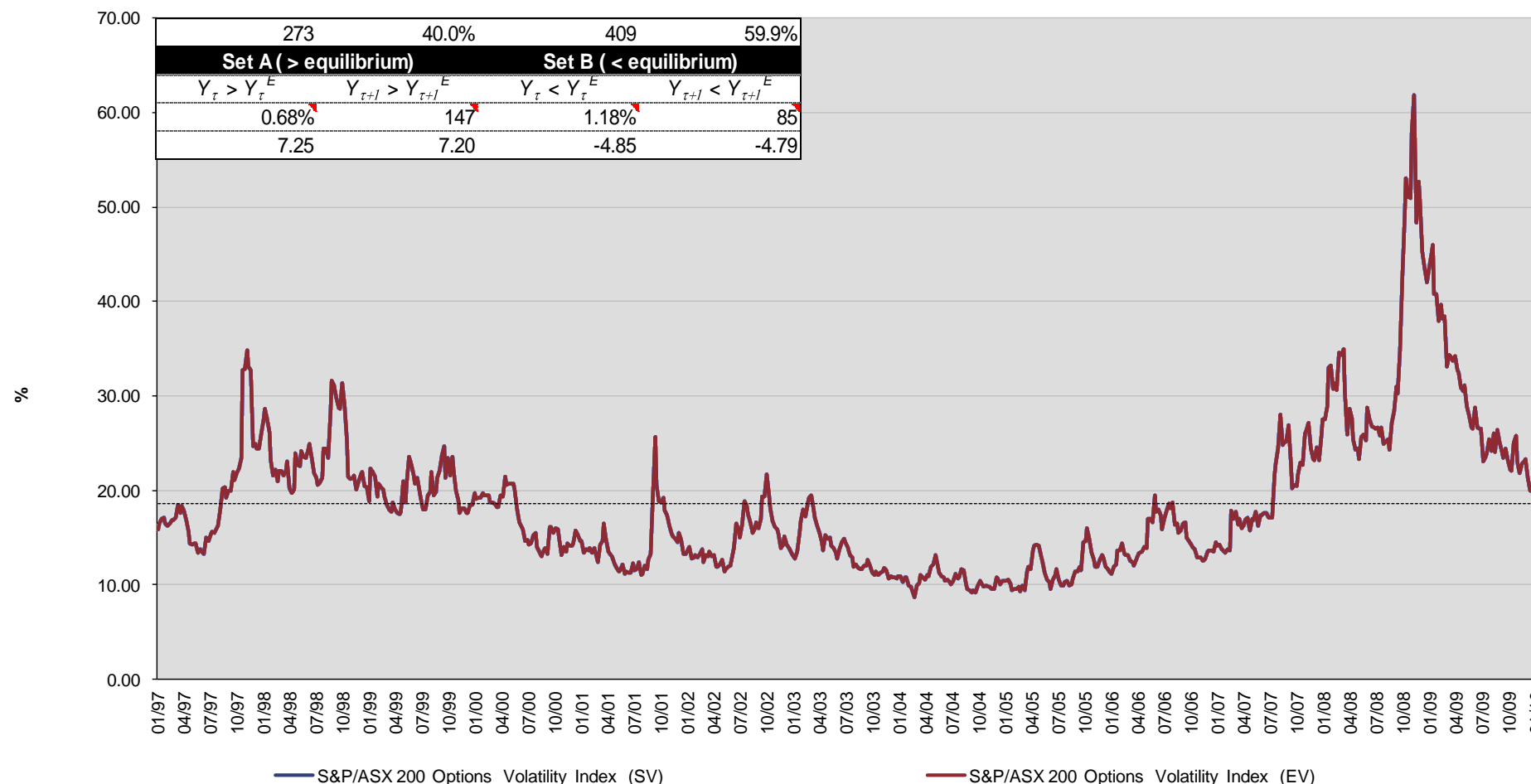


# Equity Risk Premium

## ■ Why an $ERP_C$ of 2 years (Australia)?

- Historic equilibrium defined as average over the period from 03/01/96 to 08/01/10 (weekly data)

VIX (on average) returns to equilibrium (trend) over 147 weeks when above trend, and 85 weeks when below trend.

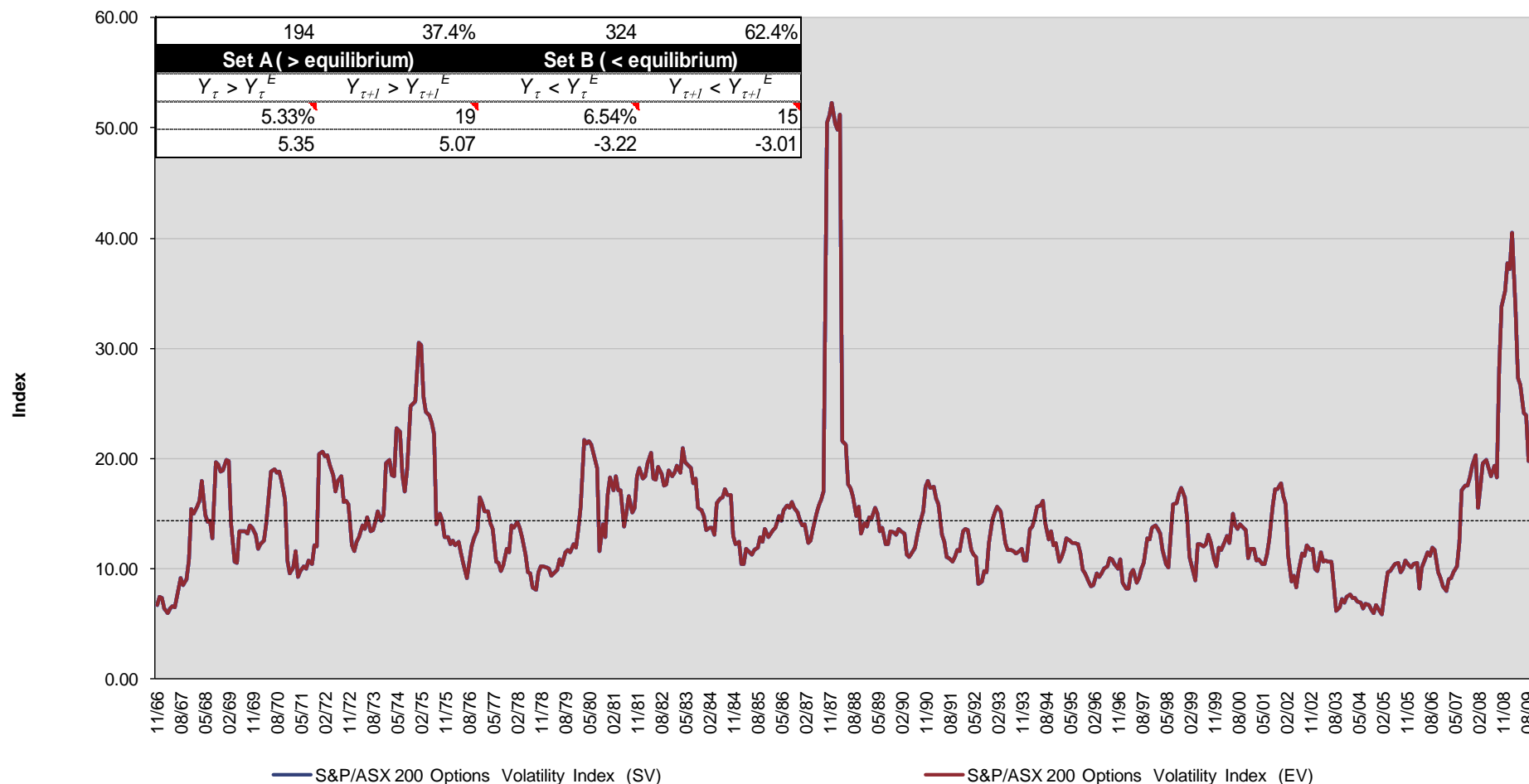


# Equity Risk Premium

## ■ Why an $ERP_C$ of 2 years (Australia)?

- Historic equilibrium defined as average over the period from 10/1966 to 10/2009 (monthly data)

Australian equity market historic volatility (on average) returns to equilibrium (trend) over 19 months when above trend, and 15 months when below trend.

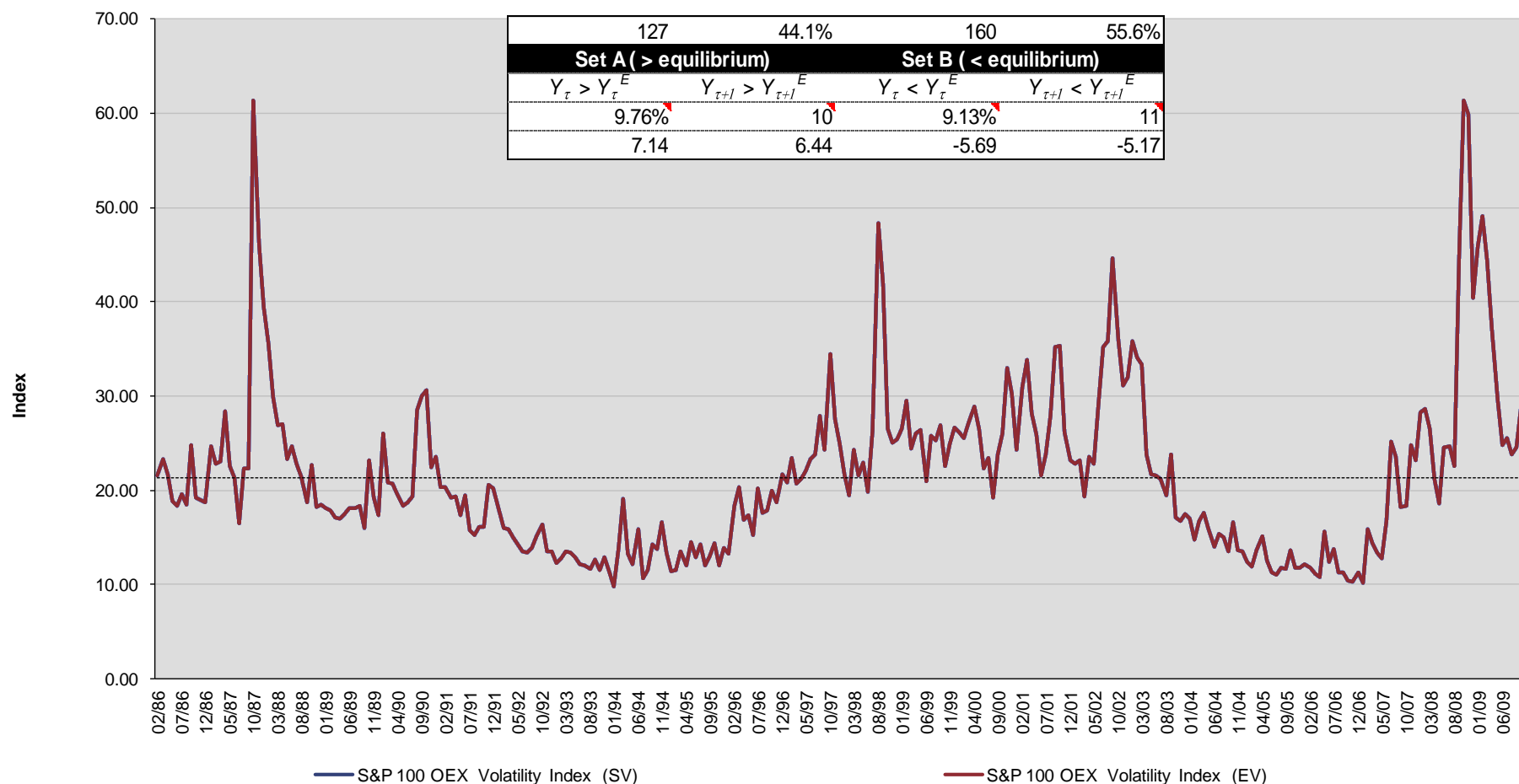


# Equity Risk Premium

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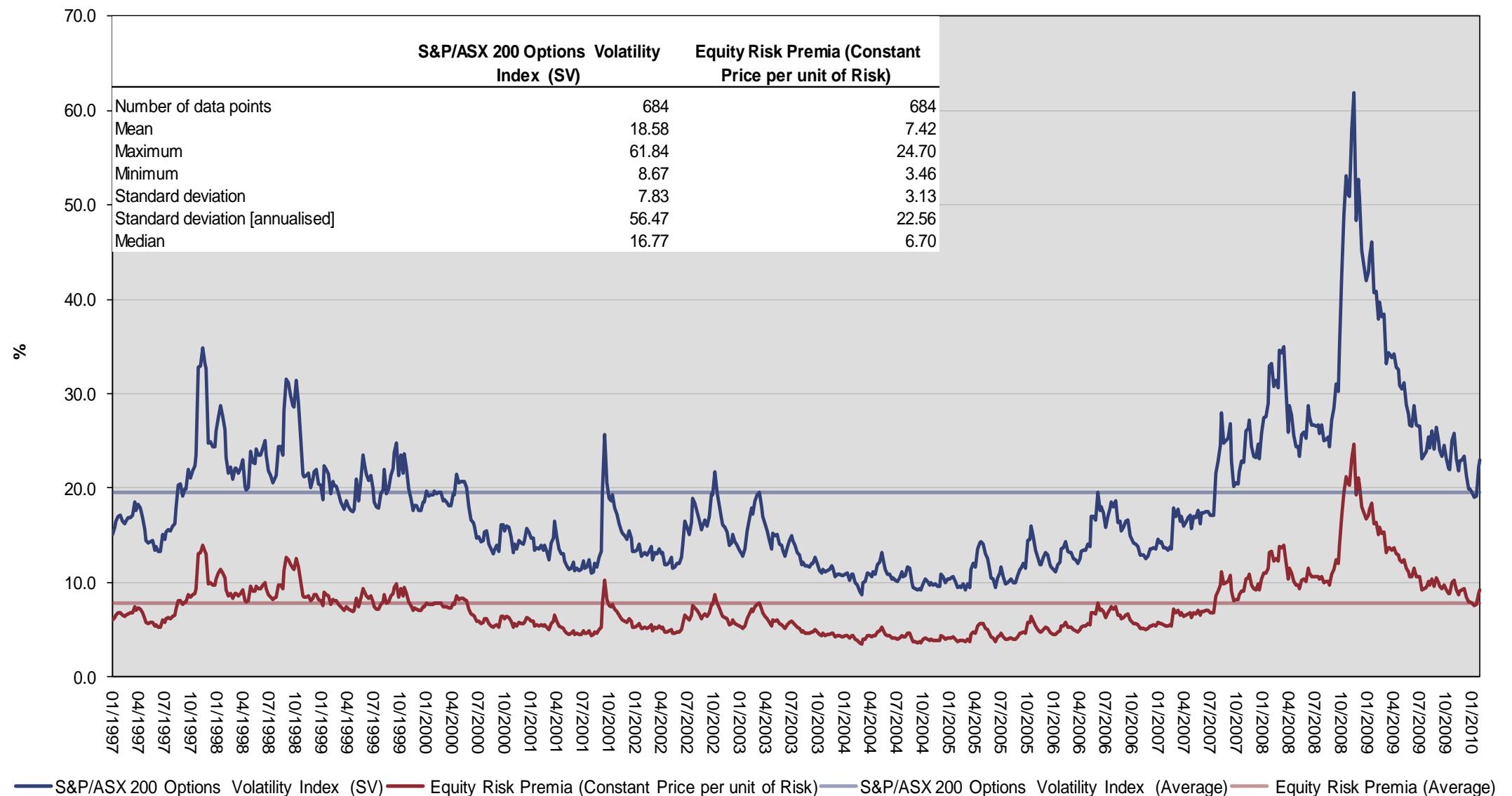
- Historic equilibrium defined as average over the period from 01/1986 to 01/2010 (monthly data)

S&P100 VIX (on average) returns to equilibrium (trend) over 10 months when above trend, and 11 months when below trend.



# Equity Risk Premium

## ■ Historic VIX and ERP assuming constant price per unit of risk



## Summary

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“In the long run we are all dead. Economists set themselves too easy, too useless a task if in the tempestuous seasons they can only tell us that when the storm is long past the ocean will be flat.”

- VIX is a useful risk forecasting tool to:
  - Estimate short-term required rates of return
  - Allocate between low and high equity beta investments
  
- High conviction investing means:
  - $\uparrow$  Excess return but also  $\uparrow$  Unsystematic risk + Alpha risk
  - Creating value =  $\uparrow$  Excess return  $>$   $\uparrow$  Unsystematic risk + Alpha risk
  
- **Uncertainty is a friend, for its bedfellow is opportunity!**

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