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Towards a better inflation forecast

Hugh Miller

Talk outline

1. Introduction
2. Potential market forecasts
   - Access Economics forecasts
3. Constant estimates
4. A more flexible model
   - Empirical evidence
   - Other considerations
5. Conclusions/discussion

Inflation forecasts

- Very important part of actuarial work
- Three key statistics
  - CPI
  - AWE
  - LPI

Desirable characteristics of a forecast

- Updated regularly and consistently
- Able to produce by state and calendar quarters
- Accurate
- Stable
  - Absolute stability
  - Stability relative to the forecast bond yield
- Easily understood
- Objective
- Easy to implement

2. Market forecasts

Potential market forecasts

Published Forecast	*Statistics*	*State?*	*Forecast Horizon*	*Forecast freq.*	*Regularly of Production*
Access Economics	CPI, LPI, AWE	Yes	10 years	Quarterly	Quarterly
State Budget Papers	CPI, LPI	Yes	Varies	Annual	Annual
Consensus Economics	CPI, LPI	No	10 years	Annual	½ Yearly
RBA	CPI	No	2 ½ years	½ Yearly	½ Yearly
Major Aust. Banks	CPI, LPI	No	2 years	Varies	Varies
Treasury (IGR)	CPI, AWE	No	40 years (constant)	Yearly	Varies

Access Economics Forecasts

- Look to be the most suitable
- Accuracy is an unsolved question
- We've examined forecasts over past 10 years, and compared with the constant estimates extracted from the 2002 IGR
- We have tabulated accuracy for different forecast dates (annually, June 99 – June 07) and future durations (0-2, 2-4 and 4-6 years).

Forecast error for AUS CPI

Forecast Date	*0-2 years*		*2-4 years*		*4-6 years*	
	Access	*Constant*	*Access*	*Constant*	*Access*	*Constant*
June 1999	-2.8%	-4.3%	-1.9%	-0.5%	-0.5%	0.0%
June 2000	-1.9%	-4.0%	-0.3%	-0.2%	-1.9%	-1.5%
June 2001	-0.9%	-0.5%	-0.9%	0.0%	-1.9%	-1.1%
June 2002	0.9%	-0.2%	-1.1%	-1.5%	-4.1%	-1.6%
June 2003	0.6%	0.0%	-1.5%	-1.1%	-3.0%	-1.0%
June 2004	-1.3%	-1.5%	-1.2%	-1.6%		
June 2005	-0.5%	-1.1%	-1.4%	-1.0%		
June 2006	-2.6%	-1.6%				
June 2007	-1.7%	-1.0%				

Forecast error for AUS AWE

Forecast Date	*0-2 years*		*2-4 years*		*4-6 years*	
	Access	*Constant*	*Access*	*Constant*	*Access*	*Constant*
June 1999	0.0%	0.4%	-0.8%	-0.7%	-0.6%	-0.1%
June 2000	-0.4%	0.7%	-1.2%	0.2%	-3.2%	-1.9%
June 2001	-2.6%	-0.7%	-2.3%	-0.1%	-2.0%	-0.8%
June 2002	0.1%	0.2%	-3.3%	-1.9%	-2.6%	0.8%
June 2003	-1.8%	-0.1%	-4.1%	-0.8%	-1.9%	1.7%
June 2004	-1.0%	-1.9%	-0.2%	0.8%		
June 2005	-0.5%	-0.8%	1.2%	1.7%		
June 2006	2.3%	0.8%				
June 2007	2.3%	1.7%				

Other comments on Access forecasts

- Stability between forecast estimates is sometimes inconsistent
- State differences often take the for of "fixed" differentials
- Results suggest projections have **limited use for long term forecasting**, but are **potentially useful for shorter time frames**

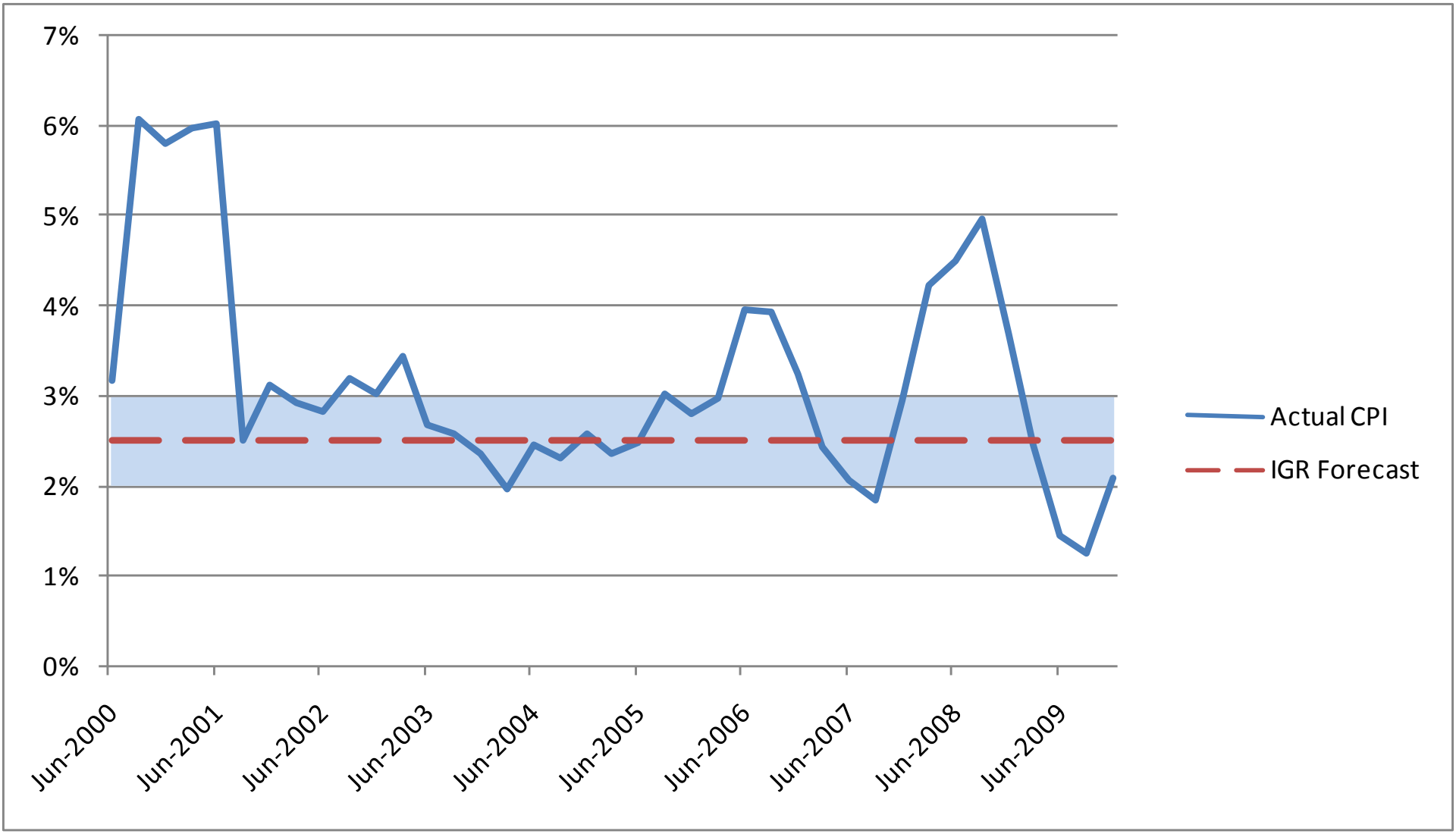
3. Constant estimates

What are suitable constant estimates?

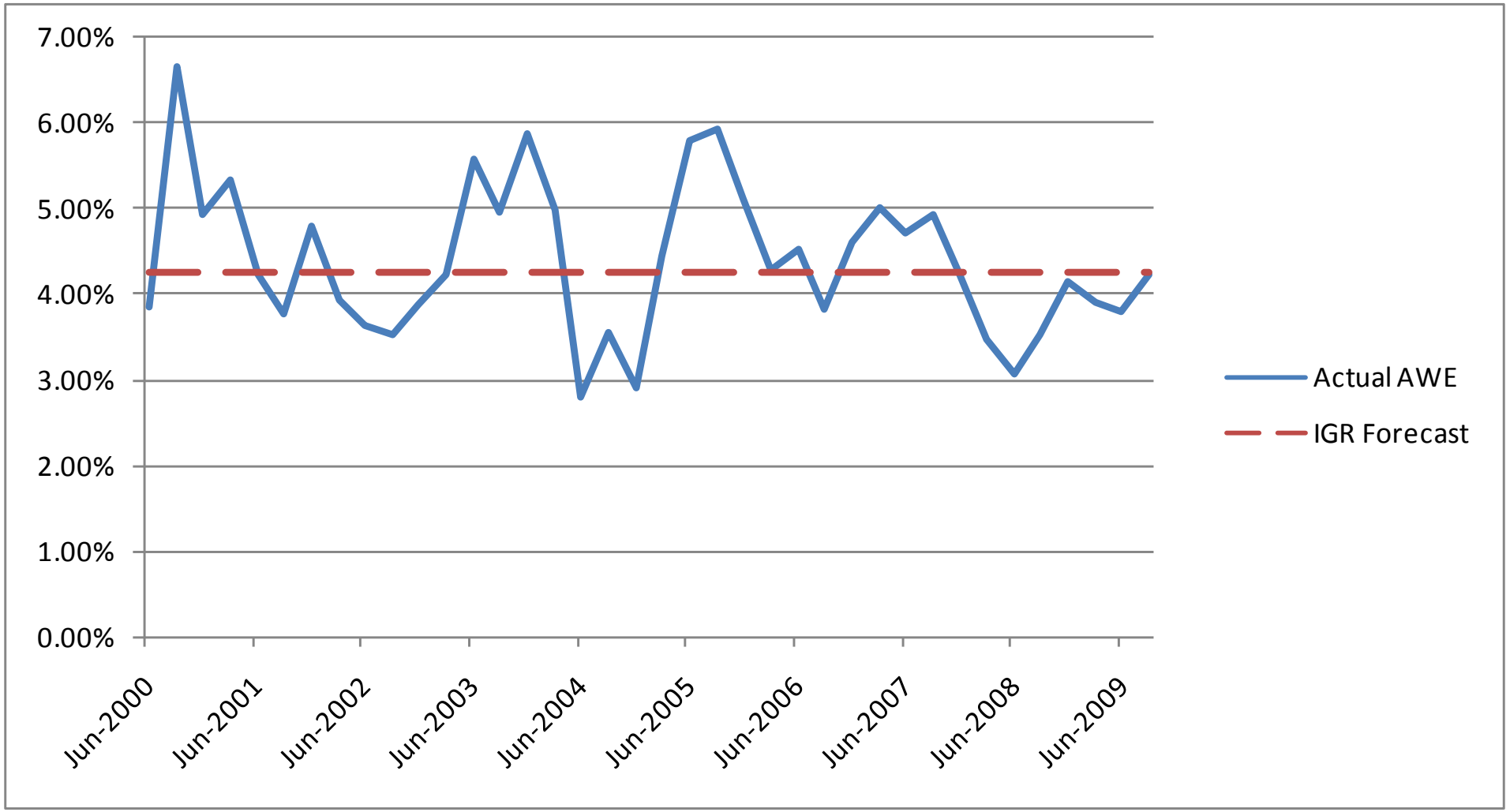
Treasury IGR report uses centre of RBA target band for CPI, and adds a historical productivity improvement factor to derive AWE

Measure	*IGR 2002*	*IGR 2007*	*IGR 2010*
CPI	2.5%	2.5%	2.5%
AWE	4.25%	4.25%	4.1%
LPI	N/A	N/A	N/A

Running annual CPI change, 2000-09



Running annual AWE changes, 2000-09



Constant estimates

- State differentials can be adopted by looking at past histories

- **Problem 1**: lack of responsiveness to economic changes
- **Problem 2**: Creates rolling volatility relative to adopted bond yield

4. A more flexible model

Modifying the constant

Suppose that the long term forecast at a given point in time is still constant, but depends on how the current long term bond yield (Y) compares to the average long term yield (Y_0):

$$r = r_0 + \theta(Y - Y_0)$$

Here r is the adopted rate, r_0 is the IGR benchmark rate and $0 \leq \theta \leq 1$.

$$r = r_0 + \theta(Y - Y_0)$$

- If $\theta = 0$ we recover our original constant model ("absolute fixed")
- If $\theta = 1$ we obtain a model where the gap between the inflation and bond rate is constant ("fixed differential)
- If $0 < \theta < 1$ we have properties between the two extremes.
- Notice the equation can be characterised as a linear regression problem.
- What is a good choice of θ?

We briefly look at 3 possible ways of determining θ:

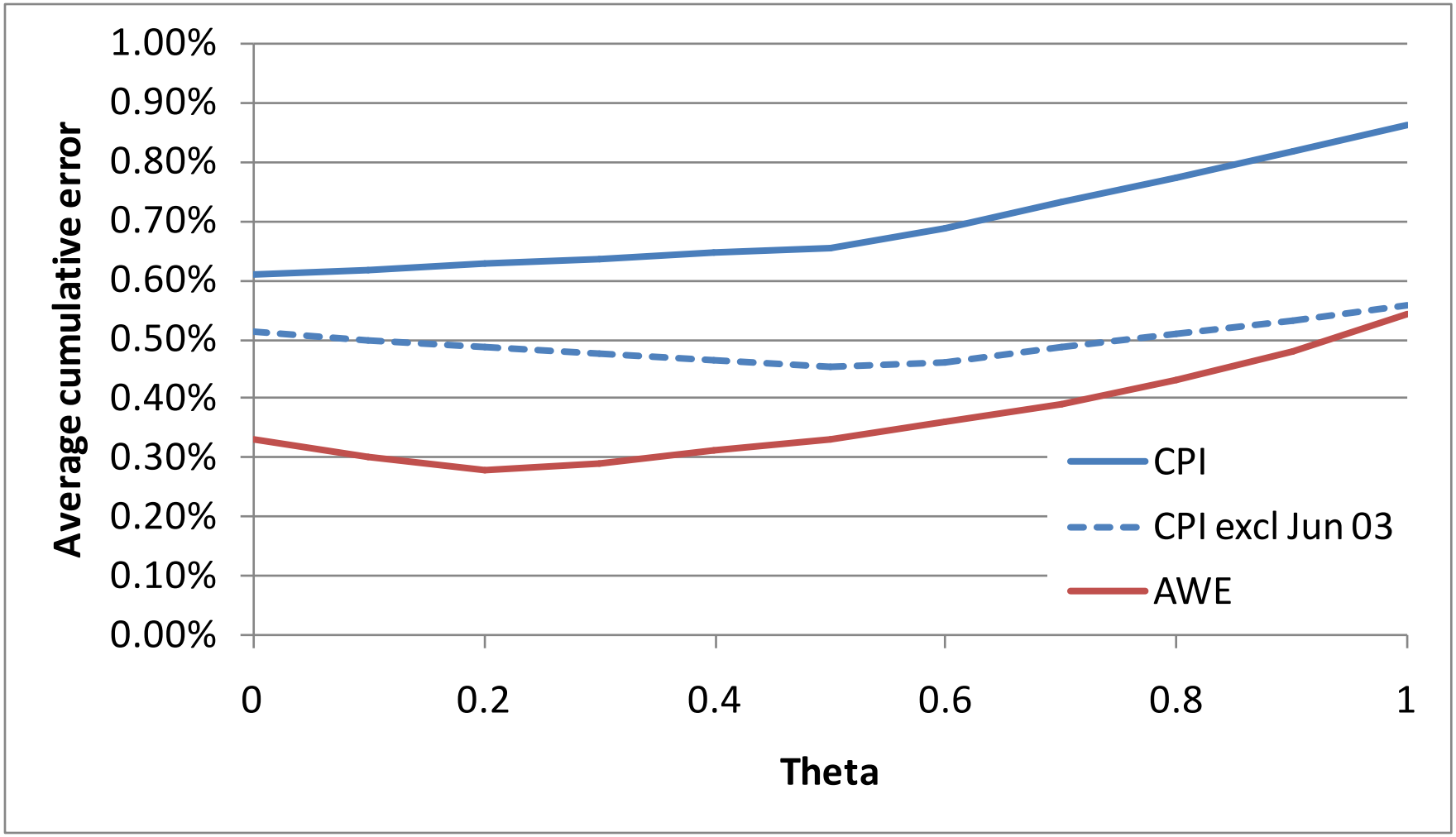
- Index linked government bonds
- Historic patterns
- Access economic forecasts

Index linked government bonds

- The is a small, relatively inefficient market in bonds whose cashflows grow with CPI
- The difference between this rate and the standard bond rate gives a “raw” CPI forecast.
- We extracted quarterly data and regressed the inflation forecast against bond yield.
- $\hat{\theta} = 0.4$

Historic patterns

It is possible to compare the accuracy of different choices of θ



Access Forecasts

- We can regress Access forecasts for inflation for another opinion of the relationship between inflation and bond rate.
- CPI: $\hat{\theta} = 0.33$
- AWE: $\hat{\theta} = 0.33$

Choosing θ, summary

- Estimates based on recent (10 years) history
- Any choice has some sujectivity
- Incremental accuracy improvement is modest
- Setting $\theta = 1$ does not appear justified
- **Our choice:** $\theta = 0.5$

Other considerations

- Moving between short and long term forecasts
- Auto-regression effects
- State differentials
  - Modifiers the match recent history well:
    - -0.25% for NSW, VIC, TAS
    - +0.5% for QLD, WA

5. Conclusions/discussion

A return to our desirable properties…

	Market Forecast	Constant Forecasts	Floating Forecasts ($\theta = 0.5$)
Easy to update consistently	A	A	A
Estimates by state and calendar qtr	A	A	A
Accuracy	D	B	B+
Absolute stability	D	A	B
Differential stability	C	D	B
Easily understood	?	A	C
Objectivity	A	B	D
Easy to implement	B	B	C

Some reliances & limiations

- Assumes RBA success in controlling inflation will continue
- Assumes reasonable continuity in economic climate seen over past decade

Thanks for listening!