Productivity of the Australian Broadacre and Dairy Industries

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Agriculture in Australia

• Agriculture Production - A$42b
  – 2.6 % of Australia’s GDP
  – Agricultural exports A$32b

Broadacre and dairy industries
  – 65 per cent of agricultural production
  – 54 700 farms in the broadacre industry
  – 7 500 farms in the dairy industry
Broadacre farms in Australia
Contribution of TFP to broadacre GVP
Productivity growth and Australia’s terms of trade

-1.6%  2.0%
Outline

• ABARE’s TFP estimation methods
  – Concept and methodology
  – Data Source

• TFP growth trends in Australia’s broadacre and dairy industries

• Interpretation of Australian broadacre and dairy TFP indexes
Fisher index methods

- TFP is defined as the ratio of output to input.

\[ TFP_t = \frac{Output}{Input} \times \frac{Index_t}{Index_t} \]

- Fisher index approach is adopted.

- Growth rate is calculated by a regression with a time trend.
Inputs and Outputs

• A similar framework for different industries
  – Easy for comparison
  – Consistency for aggregation
• Outputs (19 items)
  – Crops, Livestock, Wool and Other Outputs
• Inputs (29 items)
  – Land, labour, capital and materials & services
Agricultural productivity growth is slowing down...

![Graph showing total factor productivity and 6 year moving average with two marked changes: 1.8% increase and -1.3% decrease.]
Dairy productivity growth has the similar pattern...

Graph showing productivity growth with indices from 1988-89 to 2006-07. The growth rate is indicated as 1.2% from 1988-89 to 1994-95, with a decline to -1.6% from 2000-01 to 2006-07.
Three Questions to Answer

• What are main driving forces behind TFP growth?

• Why does the slowdown happen in recent years?

• How to deal with the problem?
The slowdown has been more obvious on cropping and dairy farms...

Long term trends in TFP growth

Note: Dairy trends begin from 1988-89 onwards
TFP growth is driven by both output and input movements...

Broadacre input, output and TFP indices

Long term growth rate

- Total factor productivity: 1.4%
- Total Outputs: 0.8%
- Total Inputs: -0.6%

index


innovation in economics  abare.gov.au
Poor Seasonal Condition and TFP Slowdown

DRIVERS

Drought?

Slashed output
Higher use of purchased inputs
Reduced confidence
Severe droughts in recent years
High Correlation between TFP and Soil Moisture Index

The graph illustrates the high correlation between Total Factor Productivity (TFP) and soil moisture index from 1988-89 to 2003-04. The TFP index and soil moisture index show a generally positive correlation, with periods of fluctuation and changes over time.
Public R&D Investment and TFP Growth

DRIVERS

Drought?
- Slashed output

R&D investment?
- Higher use of purchased inputs
- Reduced confidence
- Slowing growth in public R&D expenditure
Why might productivity growth be slowing?

**DRIVERS**

- **Drought?**
  - Fewer ‘big gain’ technologies
- **R&D investment?**
  - Knowledge constraints
  - Ageing farm population
- **Other factors?**
  - Fewer expansion opportunities
  - Changing research priorities
How to Improve TFP Growth?

1. **INNOVATE** - develop new technologies

2. **ADOPT** - increase uptake of existing technologies

3. **REFORM** - facilitate structural adjustment
Efficiency change reflected in farm-level TFP estimation

Transitive TFP Index

Efficiency change reflected in farm-level TFP estimation
ABARE’s Future Work

• Improve TFP estimation methodology

• Collect more data
  – Farm practices survey
  – Enterprise level input data

• Analytical projects
  – R&D and TFP
  – Pathways to productivity growth (frontier analysis)
  – International comparisons
Comments and Questions?
thankyou