

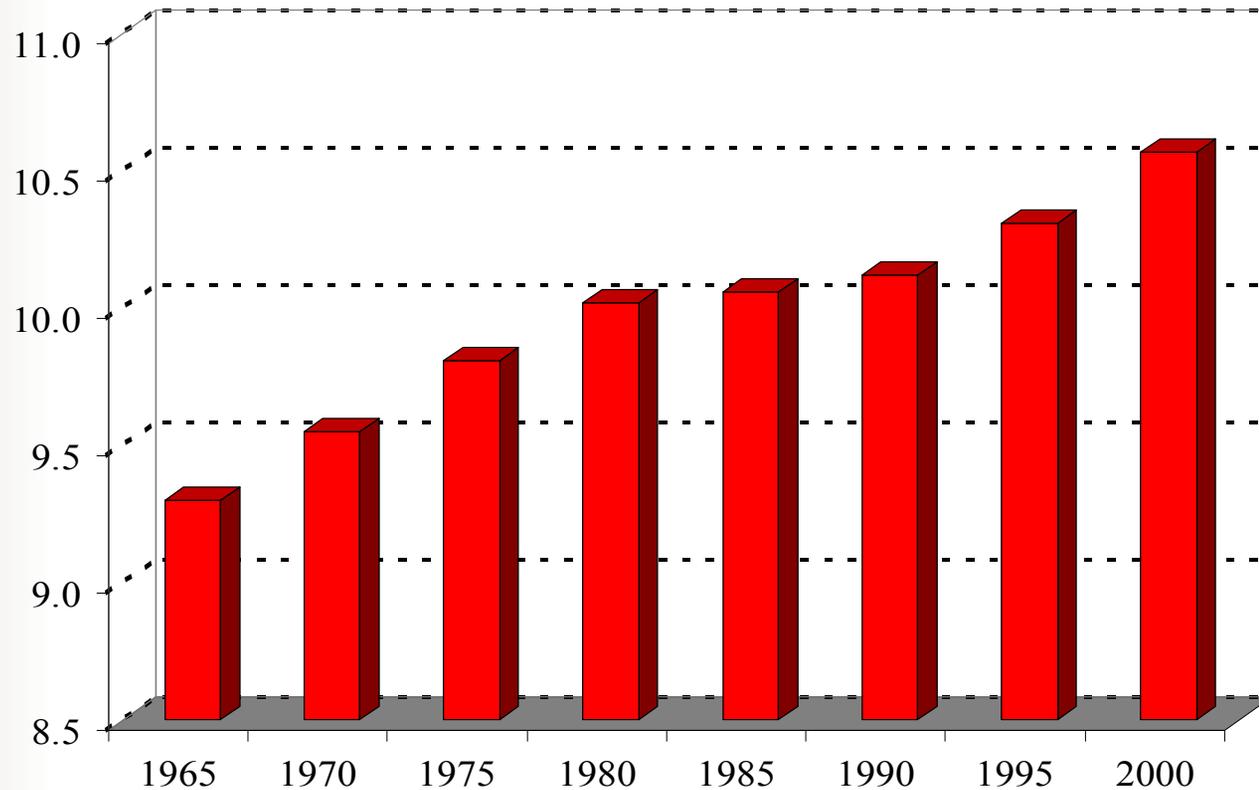
# GROWTH PROSPECTS FOR AUSTRALIA



The Knowledge Economy –  
the contribution of Education and R&D  
*Steve Dowrick, Australian National University*

# Average schooling of the work force rises by 1.2 years, 1965-2000

## Australia





# Embodied Human Capital

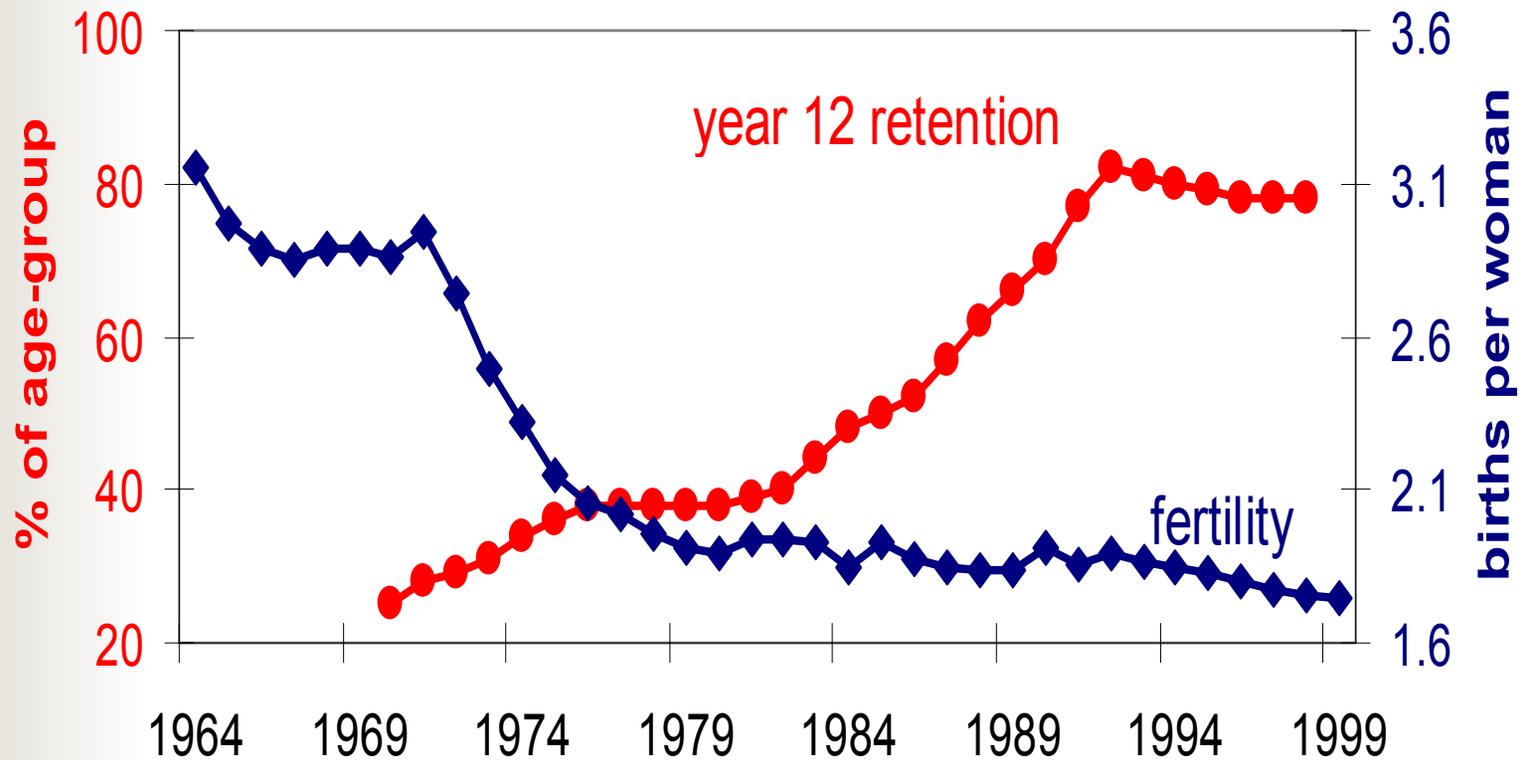
- A better educated workforce is more productive.  
*(the level effect of human capital)*
- Education raises earnings,  
raising the opportunity cost of child-rearing.
- Better educated parents choose less children –  
but better educated children.  
*(dynamic feedback)*



# A Revolution in Education over two Generations

	<b>Boys</b>	<b>Girls</b>
<b>Born 1925-39</b>	<b>50%</b> complete secondary	<b>33%</b> complete secondary
<b>Born 1975-80</b>	<b>72%</b> complete Year 12	<b>78%</b> complete Year 12

# Female education and fertility

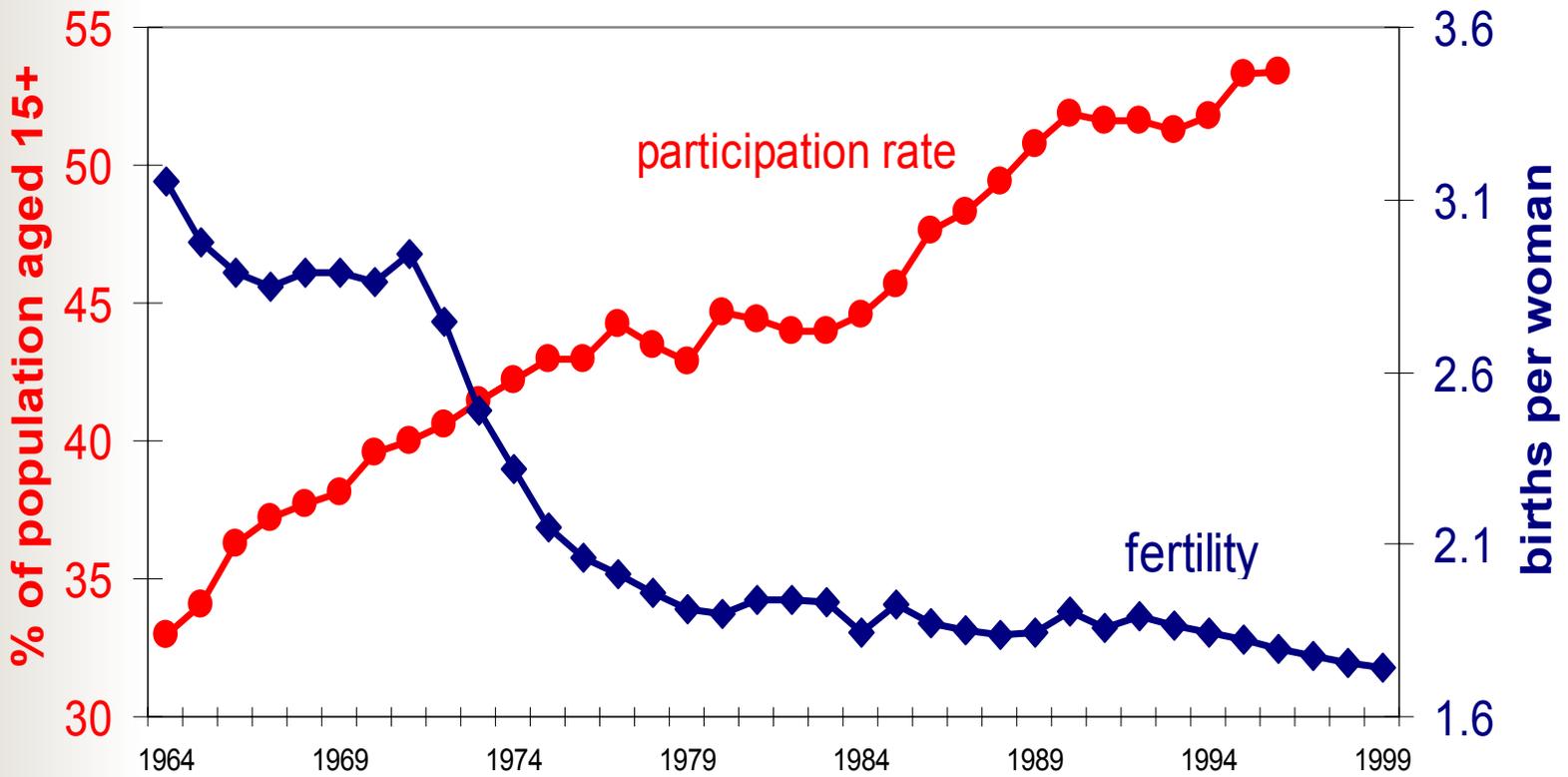




# Women move into the work force

- As education levels rise – particularly for women;
- and the marriage bar is removed;
- and legalised wage discrimination is reduced;
- and parents are choosing to have smaller families with better educated children;
- so women have chosen to work less in the home and more in paid employment.

# Female labour force participation and fertility





# Does education raise long-run growth?

- An additional year of education typically increases productivity and earnings of an individual by 8%.
- If schooling rises by one year, as the new cohorts move through the work-force, annual growth of GDP is 0.2% above trend.
- We have been getting this boost to growth over the past decade – and can expect it to continue.
- After forty years, as the new cohorts leave the work force, growth reverts to trend – with GDP 8% higher.



# The economic properties of ideas / technology

- Ideas are non-rival:
- an engineer can work on only one bridge at one time;
- but the idea of an arch can be used in the simultaneous construction of a hundred bridges.



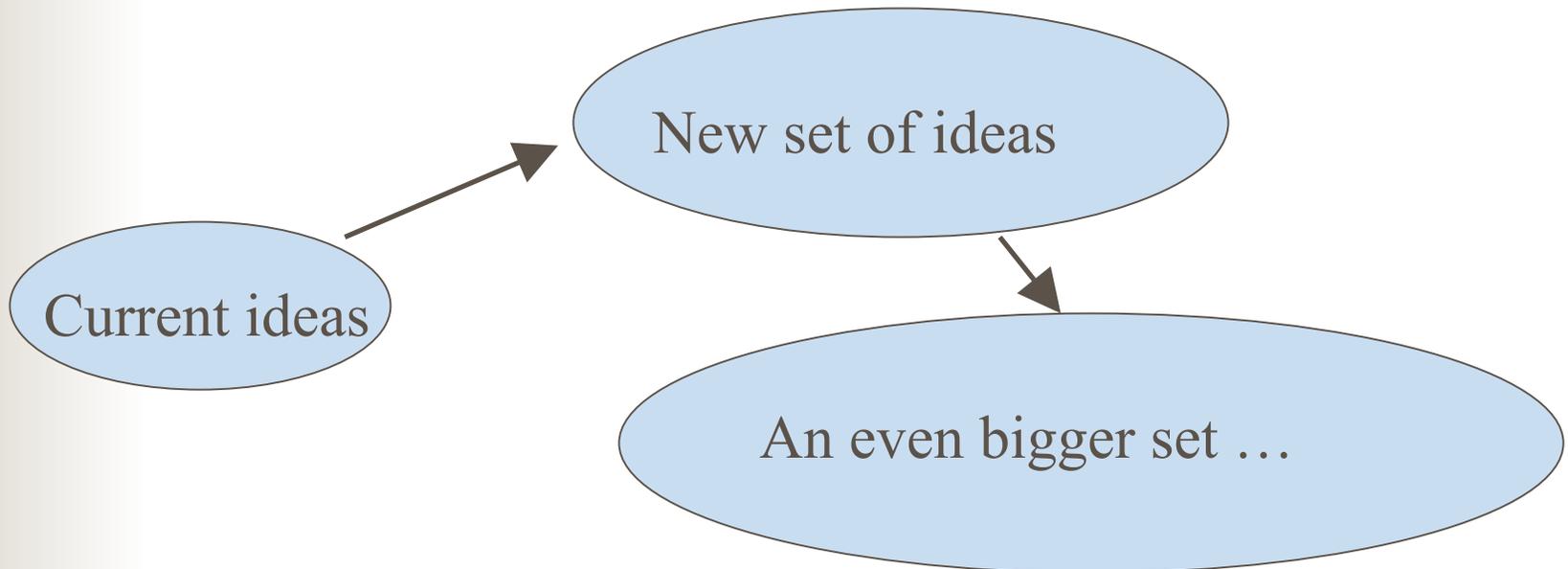
**Ideas are disembodied and  
they generate positive feedback**

- When an engineer retires, we have to train a new one;
- but an engineering idea lasts beyond its inventor;
- and it inspires new ideas in engineering.

# Dynamic Feedback in the accumulation of knowledge

*“If I have seen farther than others, it is because I was standing on the shoulders of giants.”*

Isaac Newton





# Implications of the properties of knowledge:

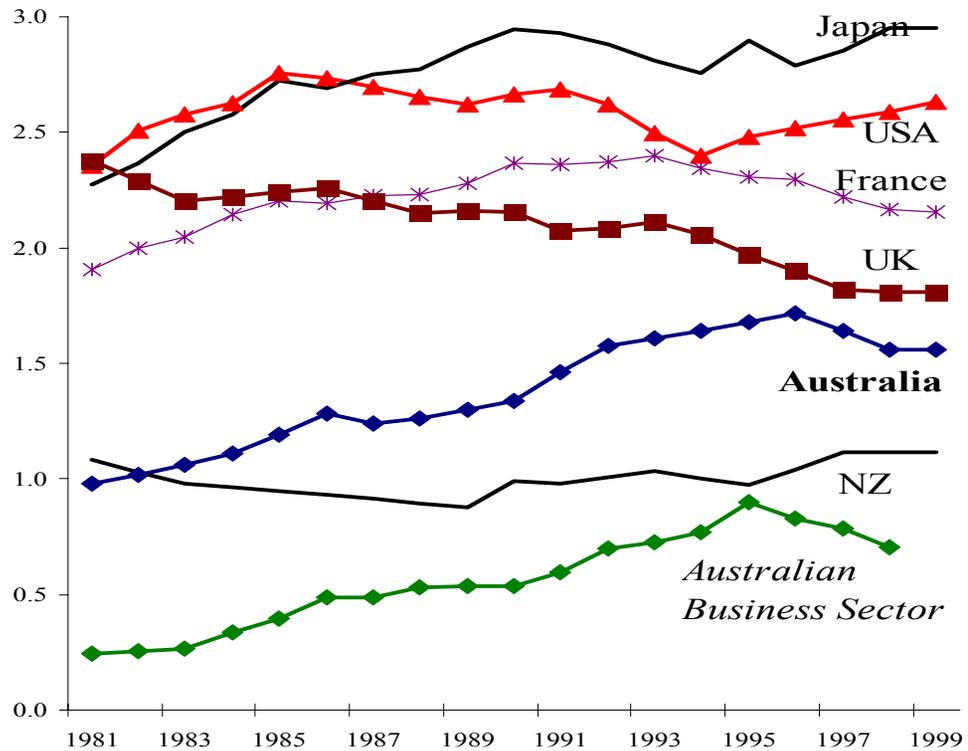
- Research can generate long-run growth, without running into diminishing returns.
- But the properties of non-rivalry and positive feedback imply that inventors don't capture all the economic benefits that they create.
- So public funding can boost research and growth.



# The interaction of education and research

- Foreign and domestic R&D are equally important for Australian productivity growth.
- The better educated the workforce, the more rapidly they can implement new technologies.
- We benefit from importing capital goods embodying new technologies.

## Gross Expenditure on R&D as % of GDP, 1981-99



Source: OECD R&D Database



# Growth Prospects

- The educational attainment of the workforce will continue to rise for the next three decades due to recent increases in school enrolments. Hence we can expect continued strong productivity growth, which will substantially offset the fiscal and economic problems of an ageing population.
- Growth will be enhanced if we can emulate the higher rates of investment in knowledge that we observe in the leading OECD economies.

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- A shrinking but increasingly well-educated workforce, operating in an economy that continues to be open to trade in goods and ideas, should be well placed to identify, introduce and manage the new technologies that will emerge over the next few decades.

# Average years of schooling in population aged 25+

