Water: Government Investment in the Rural Water Sector – managing competing priorities

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Why is public funding of irrigation infrastructure upgrades justifiable?

History and consequences

- Foundations of irrigation schemes not based on economics
- Soldier settlement schemes
- Issues now of sustainability and environmental damage
- Public funding necessary to redress environmental concerns and community restructuring

Priorities for such funding

- The most obvious examples of market failure
- Many farmers using an irrigation facility
- Externalities: one irrigator exiting raises costs for those who remain

Some problems as well

- We have already observed how state governments behave when Commonwealth money is being used
- One example: expressing concerns about the community impacts of less water at the same time as cutting TAFE funding in the basin

Beware overplaying the public funding hand

- If an investment can earn an economic return for an enterprise, the incentive for private investment exists
- Some justifications for public funding are spurious
- Finding ways of spending other people's money is easy

The perils of multiplier analysis – even in small regions

The context of Leontief's IO innovation

Impacts of mobilising resources for WWII

Leontief's remarkable feat

- Input-output analysis worked well in examining demand shifts (defence mobilisation or de-mobilisation)

Leontief's remarkable feat

- Input-output analysis worked well in examining demand shifts (defence mobilisation or de-mobilisation)
- Multipliers aligned with observed changes

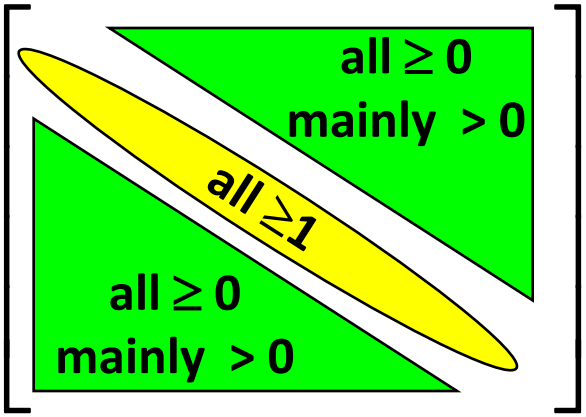
- Two numbers underline the problem of this methodology in other circumstances:

  19% 4.7%

Leontief versus Johansen: the effect on the output of *i* of a unit increase in exogenous demand for *j*

Leontief (I-O)

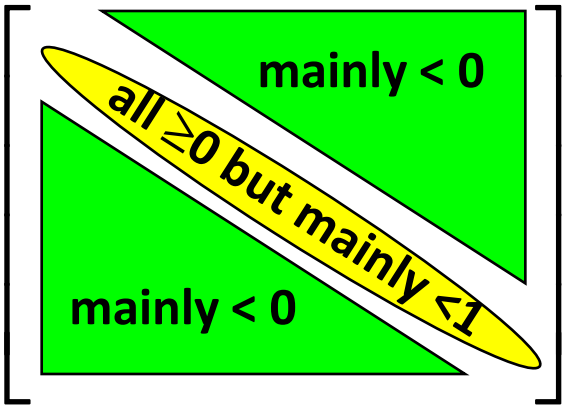
$$(\mathbf{I}-\mathbf{A})^{-1} =$$



In Leontief's world (the 1930s) there is high unemployment ⇒ no upward pressure on prices of primary factors from extra demand

Johansen (CGE)

$$\mathbf{T}_{X,Y} =$$



In Johansen's world (the 1950s) there is full employment ⇒ upward pressure on prices of primary factors from extra demand

How far can we go with an input-output methodology?

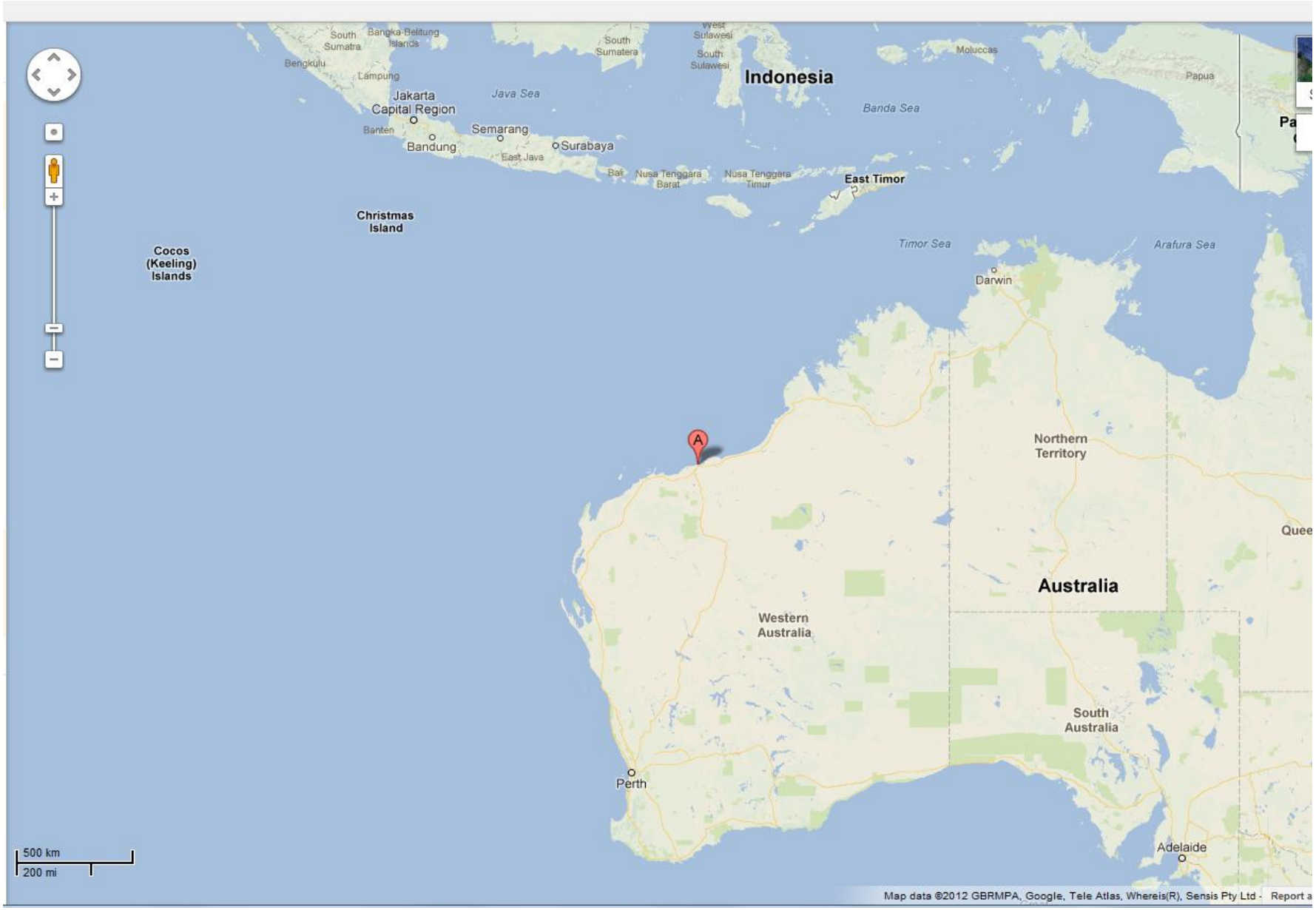
- IO is only suitable at the national level in extraordinary circumstances (Great Depression)
- But is IO defensible in small regions?
- After all, from a regional perspective, supplies are relatively elastic

The problem of perfectly elastic supplies

- These are the foundation on which multiplier analysis rests
- Any upward price movement in a region renders the usual multiplier analysis invalid

Port Hedland real estate: sale March 2013

Location, location, location

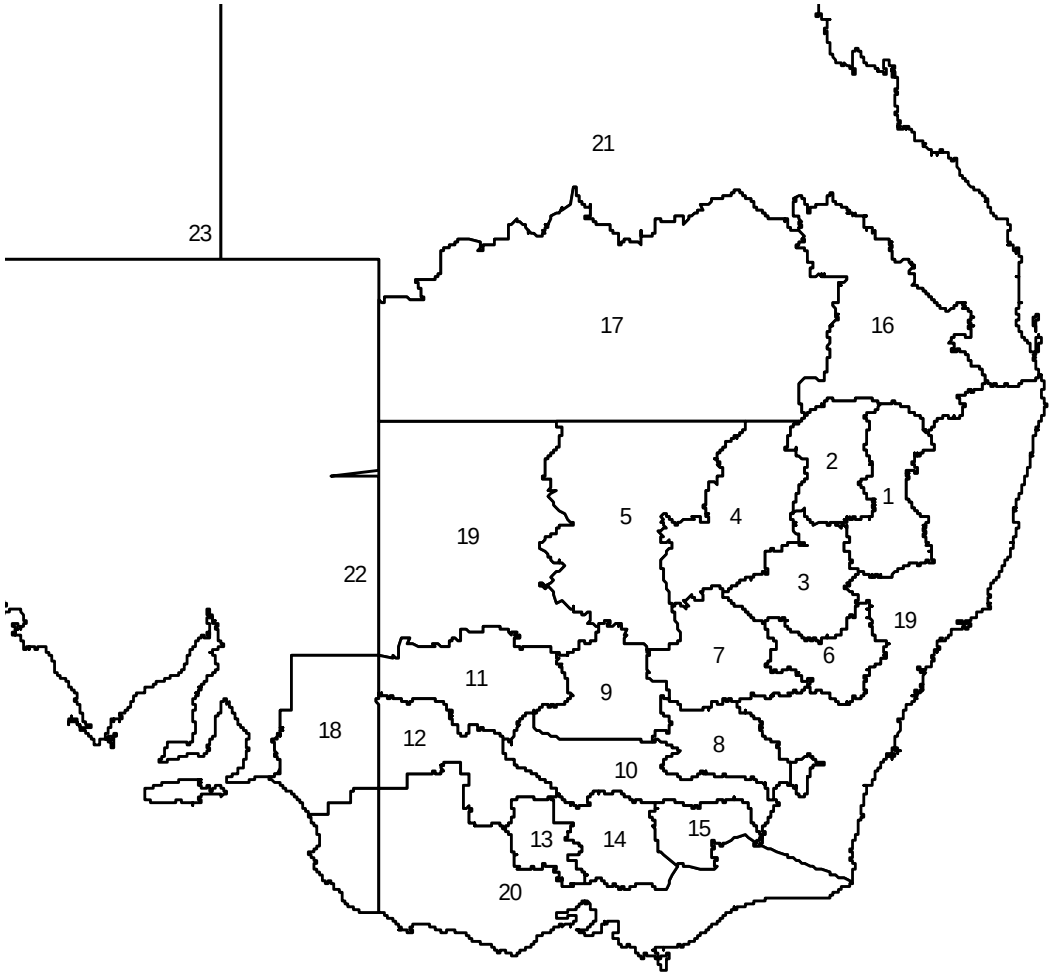


In an input-output multiplier world, what would this house be worth?

The real world sale price

$1,425,000

Dynamic computable general equilibrium (CGE) analysis using TERM-H2O



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How valuable is additional water?

- Context matters
- TERM-H2O can depict different future baselines that alter marginal outcomes in scenarios

Water savings

- Infrastructure upgrades reduce evaporation and leakage
- Improve timeliness of delivery
- Other sources might include biotechnological advances, better use of on-farm IT in irrigation equipment
- Better infrastructure will improve water tradability – keep the economists happy

A potentially misleading slide: water use in drought

% change in 2007-08 relative to 2005-06

	Output	Irrigation water used	Apparent index
Dairy	-26.5	-64.4	206
Rice	-98.2	-97.8	82

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Water traded for grain

Rainfall deficit raised irrigation requirements

What we learn from these numbers

- For irrigation, our model should include both irrigation water and rainfall
- We must include mobility of farm inputs between irrigated and dry-land farming
- Water trading enhances this mobility

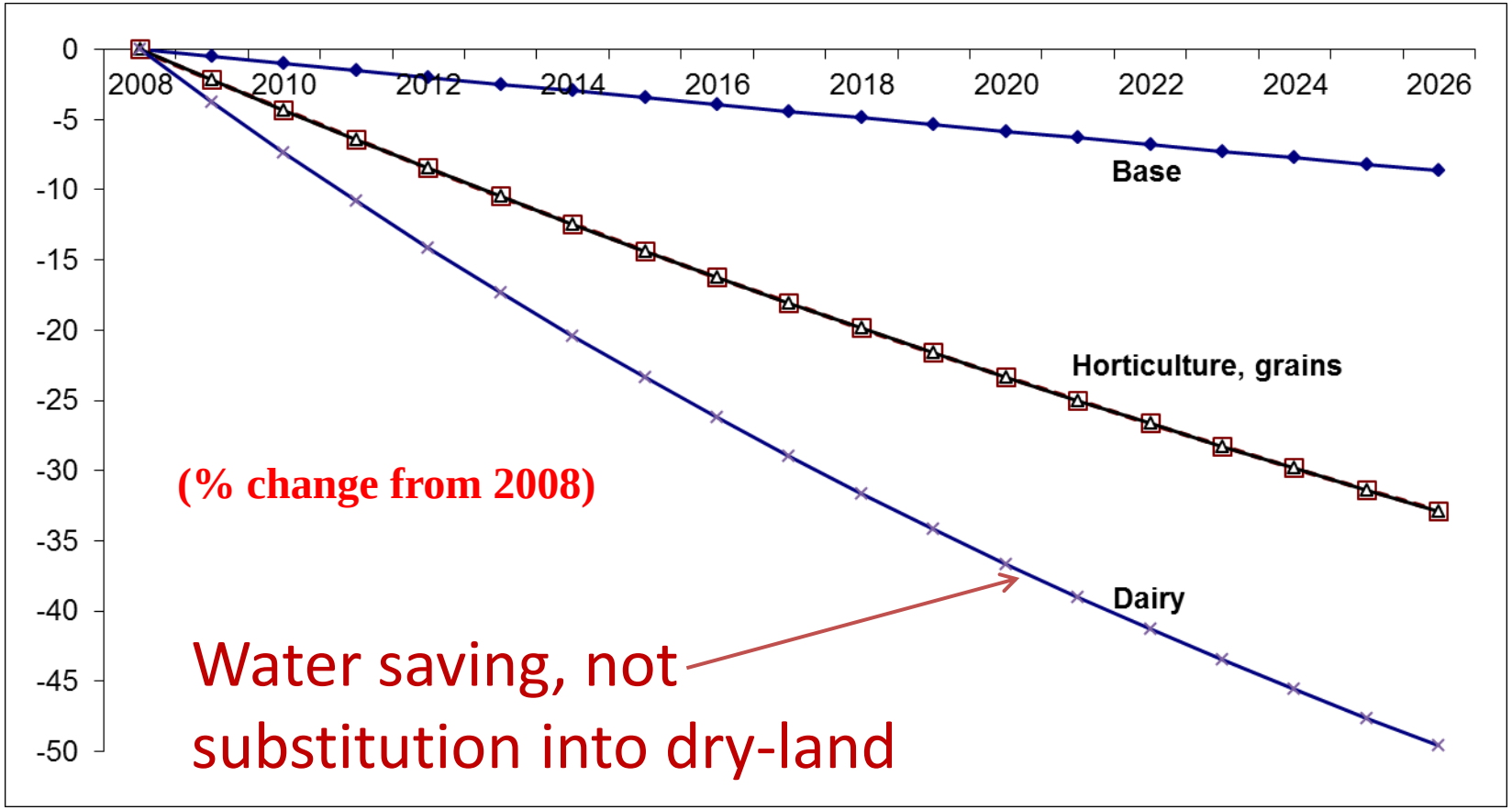
Our baseline

- We include one moderate three-year drought per decade
- This affects dry-land productivity without reducing irrigation water availability
- You will see in a moment what this means

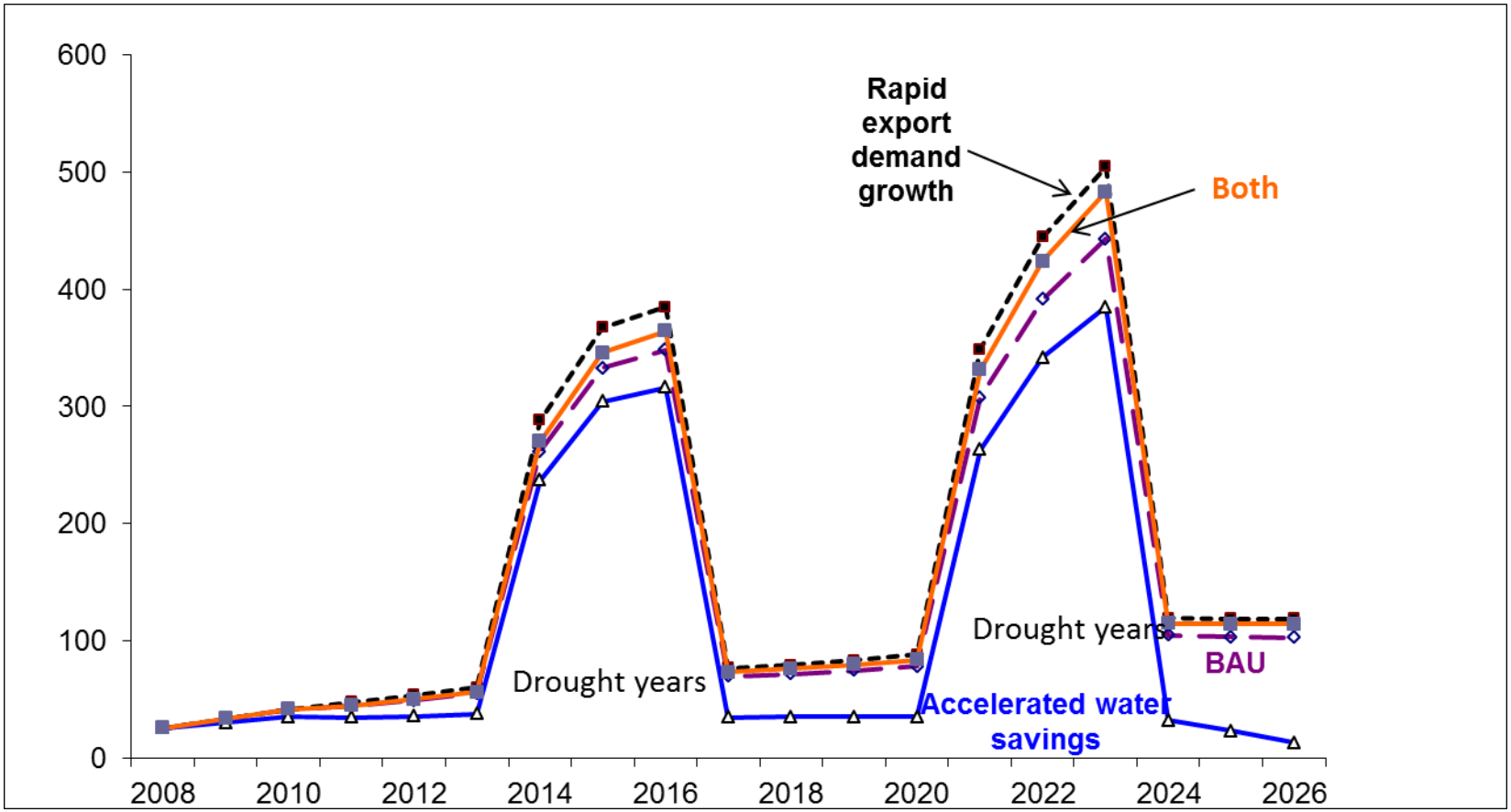
Our scenarios

- (1) Accelerated water savings
- (2) Rapid export demand growth for farm products
- (1) and (2) together

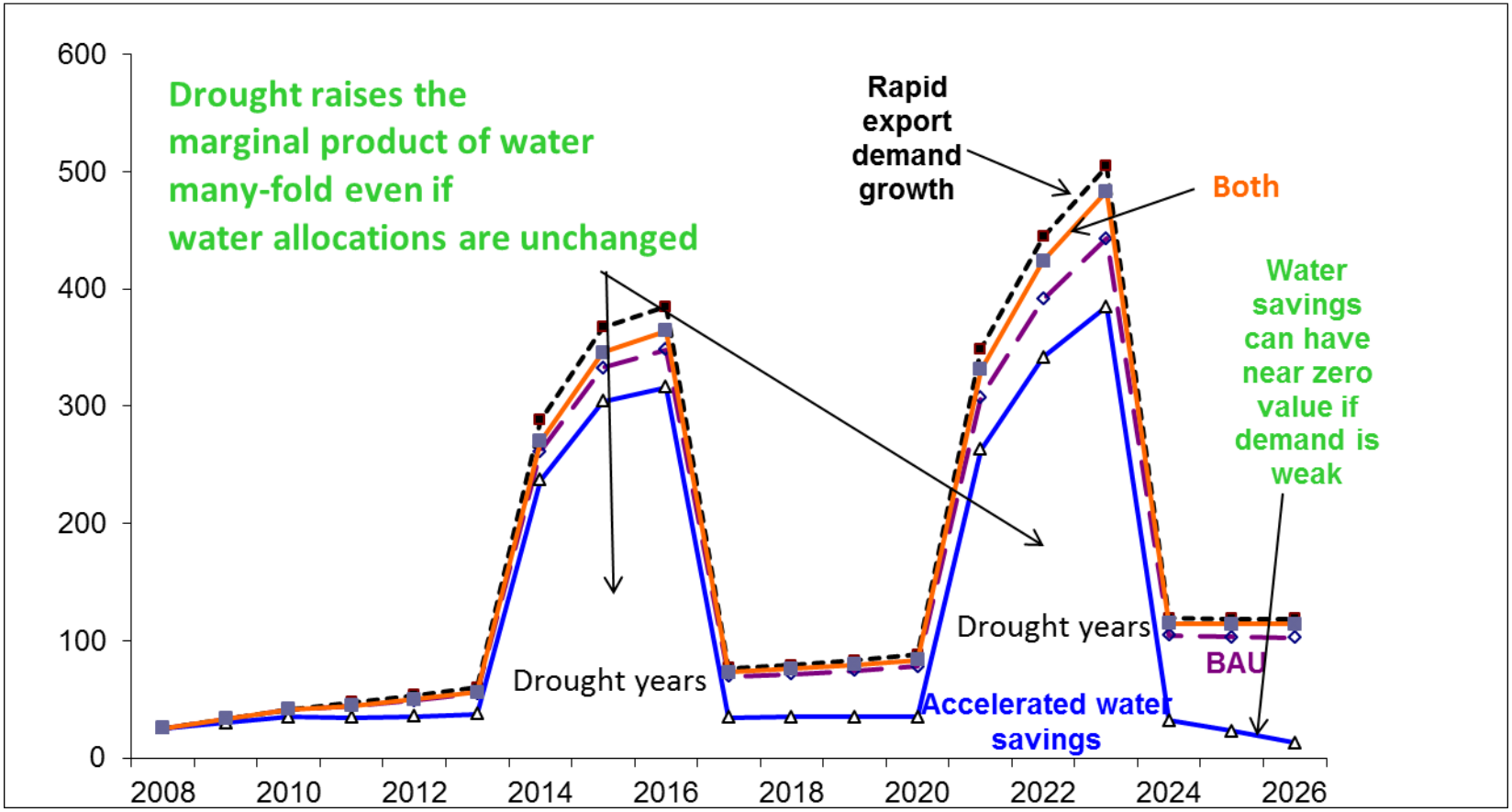
Water efficiency gains over time



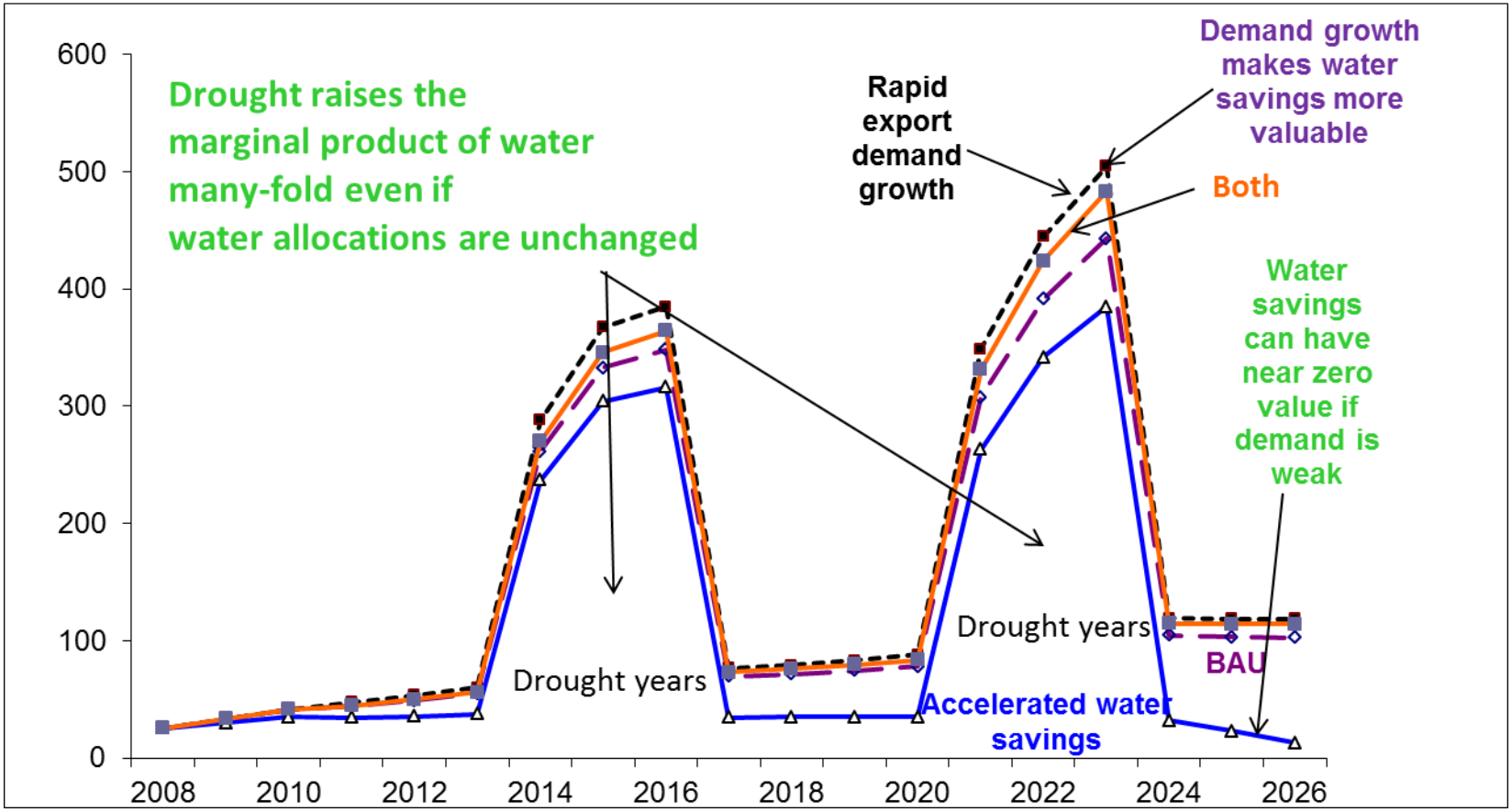
Water price levels best define our baseline & scenarios ($/ML)



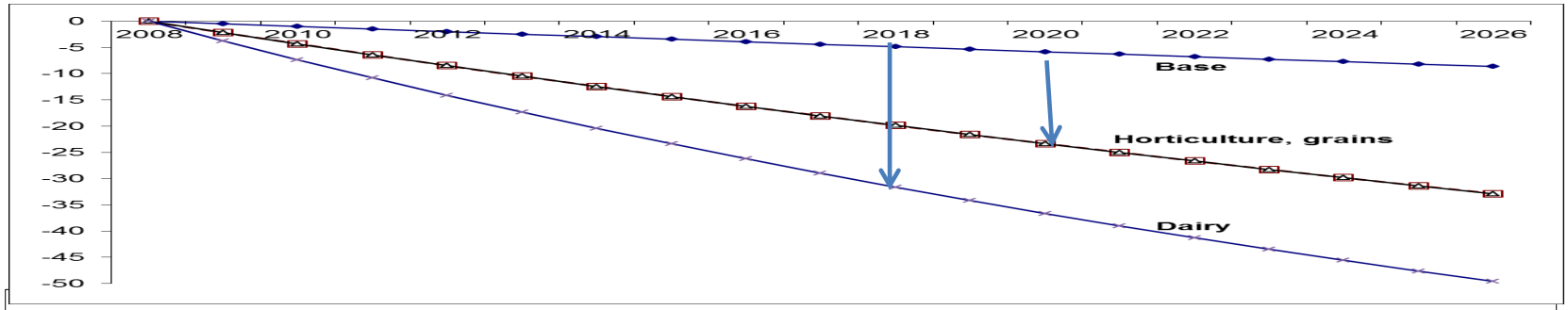
Water prices ($/ML)

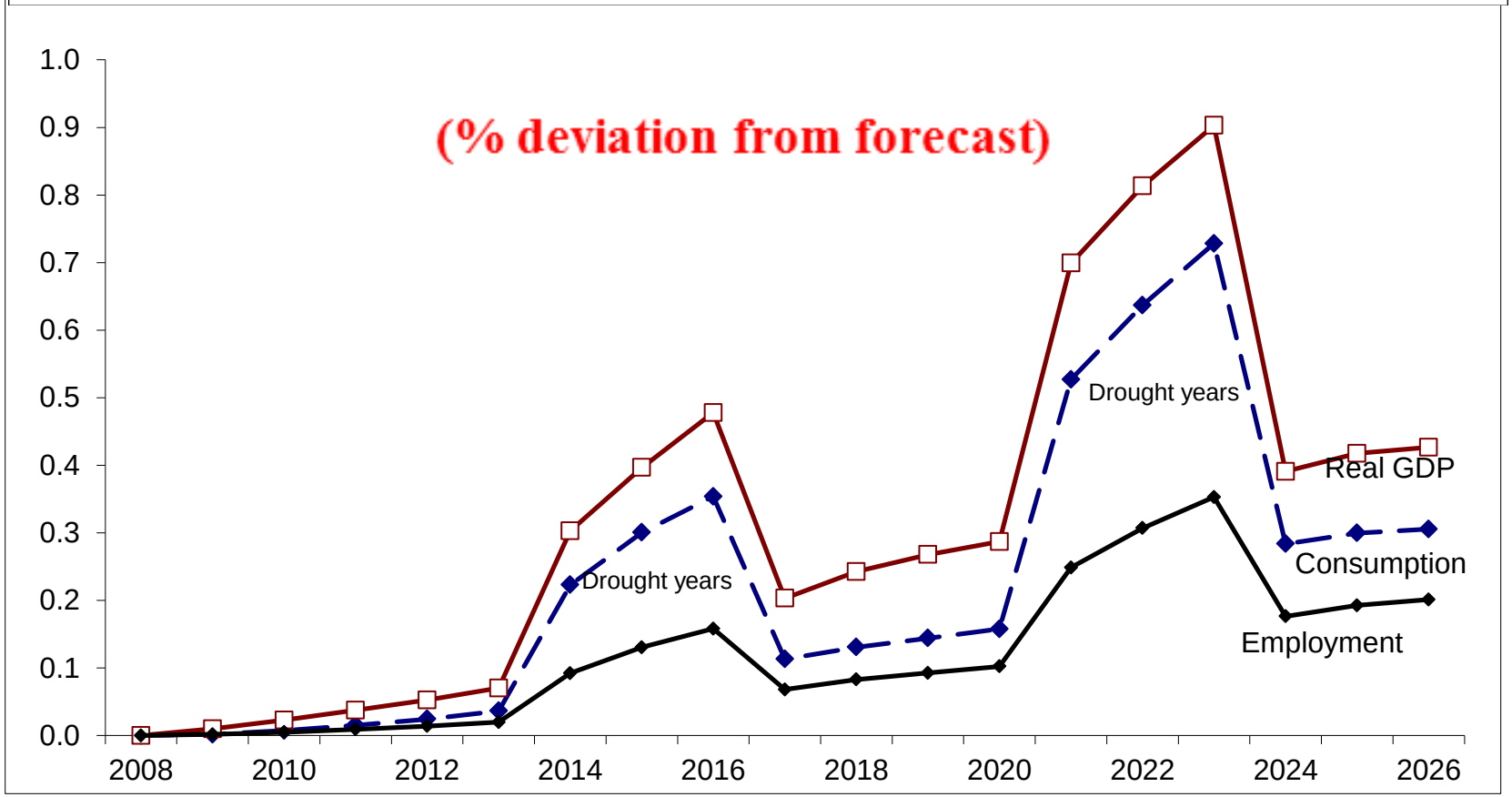


Water prices ($/ML)



Southern MDB: macro impacts of accelerated water savings, BAU demand growth

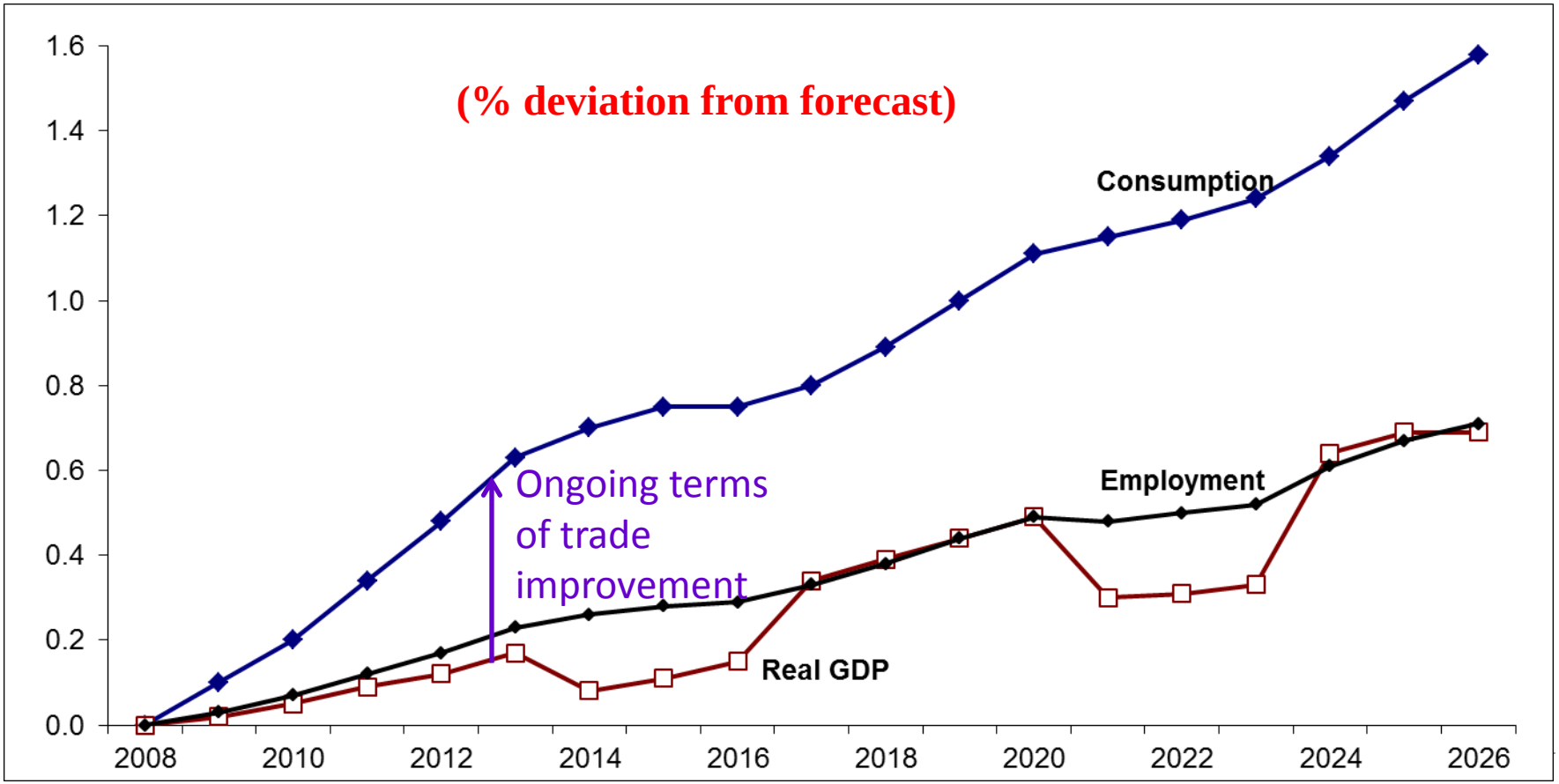




Southern MDB: macro impacts of accelerated demand growth, BAU water savings

Px/Pm↑

1. Since MP_L & MP_K fixed by assumption in medium term, adjustment to terms-of-trade is via inflows of L and investment, little action on real wages *(Q not P adj).*
2. Gap between P_c and P_g keeps growing, so gap between Y and C keeps growing



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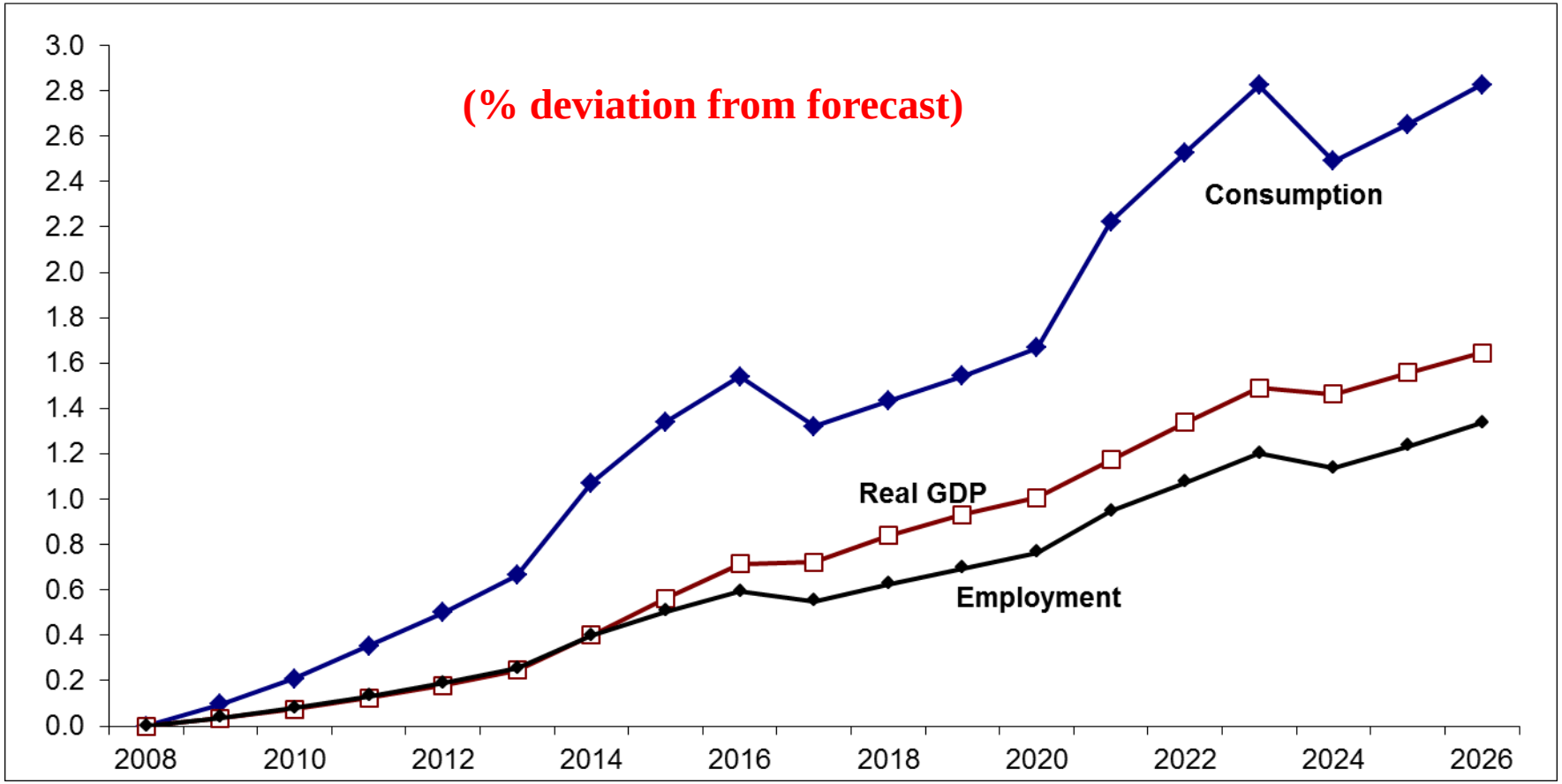
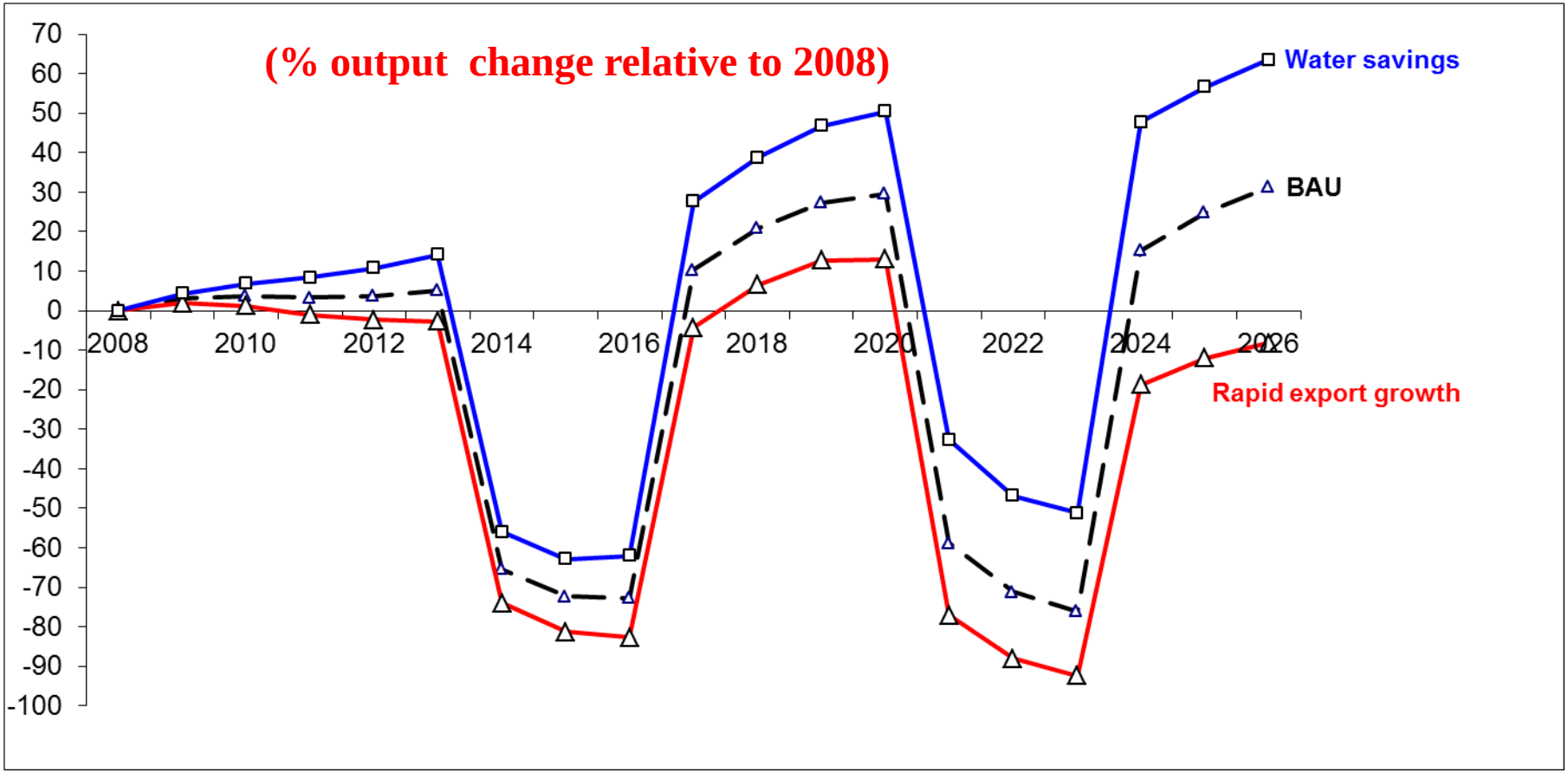


Change in composition: rice



Conclusions

- Some public funding of upgrades is necessary
- The case for large public irrigation upgrade investments improves as export demand growth accelerates
- Be wary of upgrades as an instrument of regional economic renewal: they come a distant second to public funding of essential services

But for the economists …

- Since we do know not the future with precision, we need to understand the conditionality of our conclusions on our view of the future