Productivity Perspectives 2004

Industry Productivity Trends

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Objectives

- Highlight proximate sources of changes in aggregate productivity trends (deviations from long-term trends)
- Investigate industry sources of changes in aggregate trends
  - *Do the same proximate sources show up at macro/industry levels?*
    - ⇒ Common set of influences (determined by macro factors?)
  - *Or, are industry-specific factors important contributors to shifts in aggregate trends?*
    - ⇒ Micro influences on macro productivity trends
  - *Do the industry contributions to aggregate changes conform to any pattern?*
    - ⇒ Are particular industries or industry groups the sources of change in aggregate trends?

Caveat – Measurement of industry productivity trends

- ‘Value added’ method of productivity estimation
  - *Not gross output*
- Data and indexing method consistent with aggregate estimates as published by ABS
- Accuracy of estimates more uncertain at industry than at aggregate level

Context — Deeper sources of productivity growth (beyond proximate sources)

- See Parham, 'Sources of Australia's Productivity Revival', *Economic Record*, June 2004
- Long-term sources
  - *Physical capital accumulation*
  - *Human capital accumulation*
- Sources of 1990s productivity revival
  - *Increased openness*
  - *Increased R&D*
  - *'Smart' use of ICTs*
  - *Underlying role for economic reforms*

Framework

Labour productivity growth $\left(\dot{LP}\right)$ = Capital deepening (KD) + Multifactor productivity growth $\left(\dot{MFP}\right)$

$$\dot{LP}_i - \dot{LP}_{LTA} = \left(KD_i - KD_{LTA}\right) + \left(\dot{MFP}_i - \dot{MFP}_{LTA}\right)$$

Furthermore, $$KD = S_k \left(\dot{K} - \dot{L}\right)$$

and $$\dot{MFP} = \dot{Y} - \dot{I}$$

$$= \dot{Y} - S_k \dot{K} - S_\ell \dot{L}$$

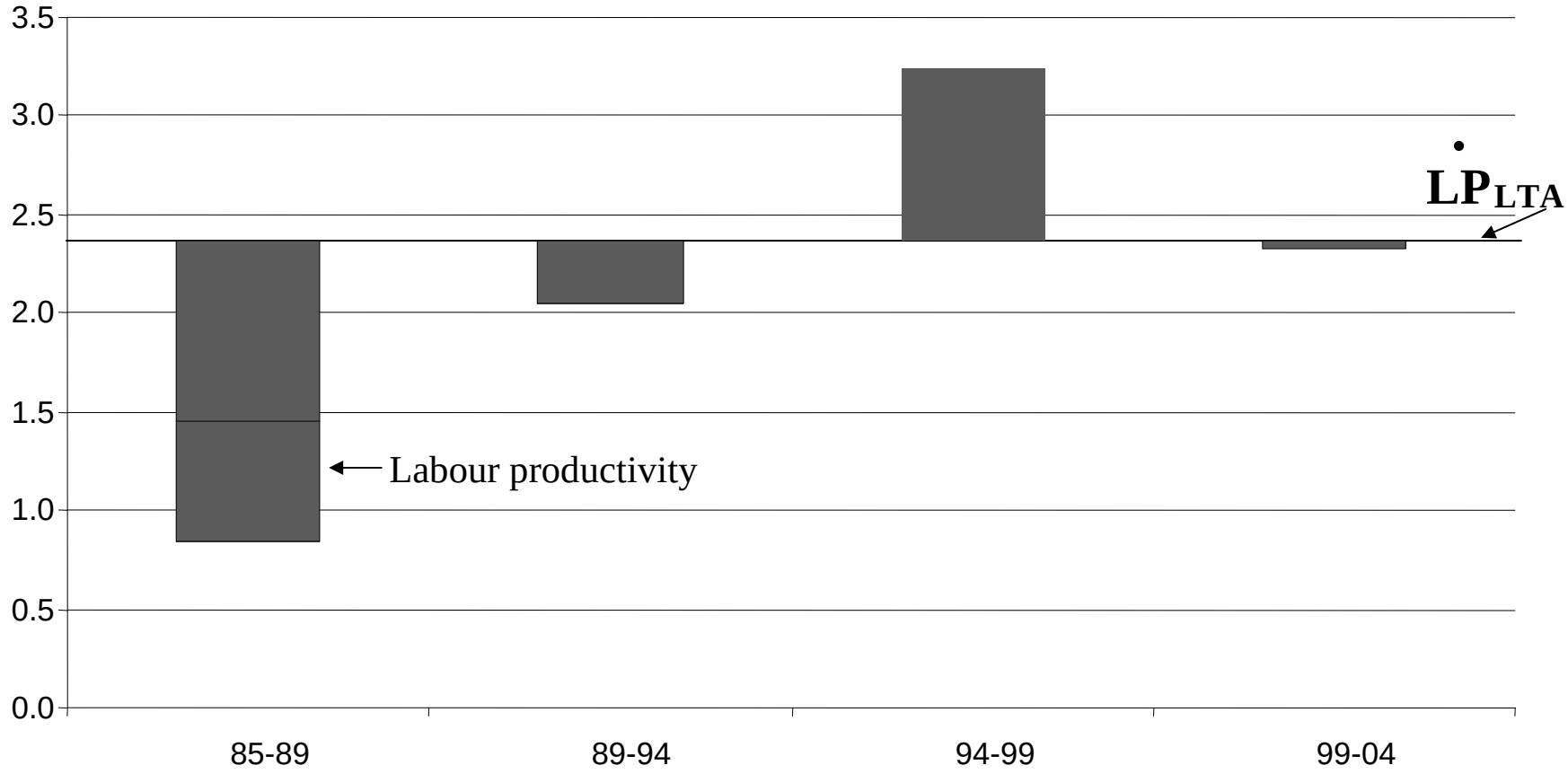
These can also be assessed in terms of deviations from their long-term average (LTA)

Note: 85-89 = 1984-85 to 1988-89

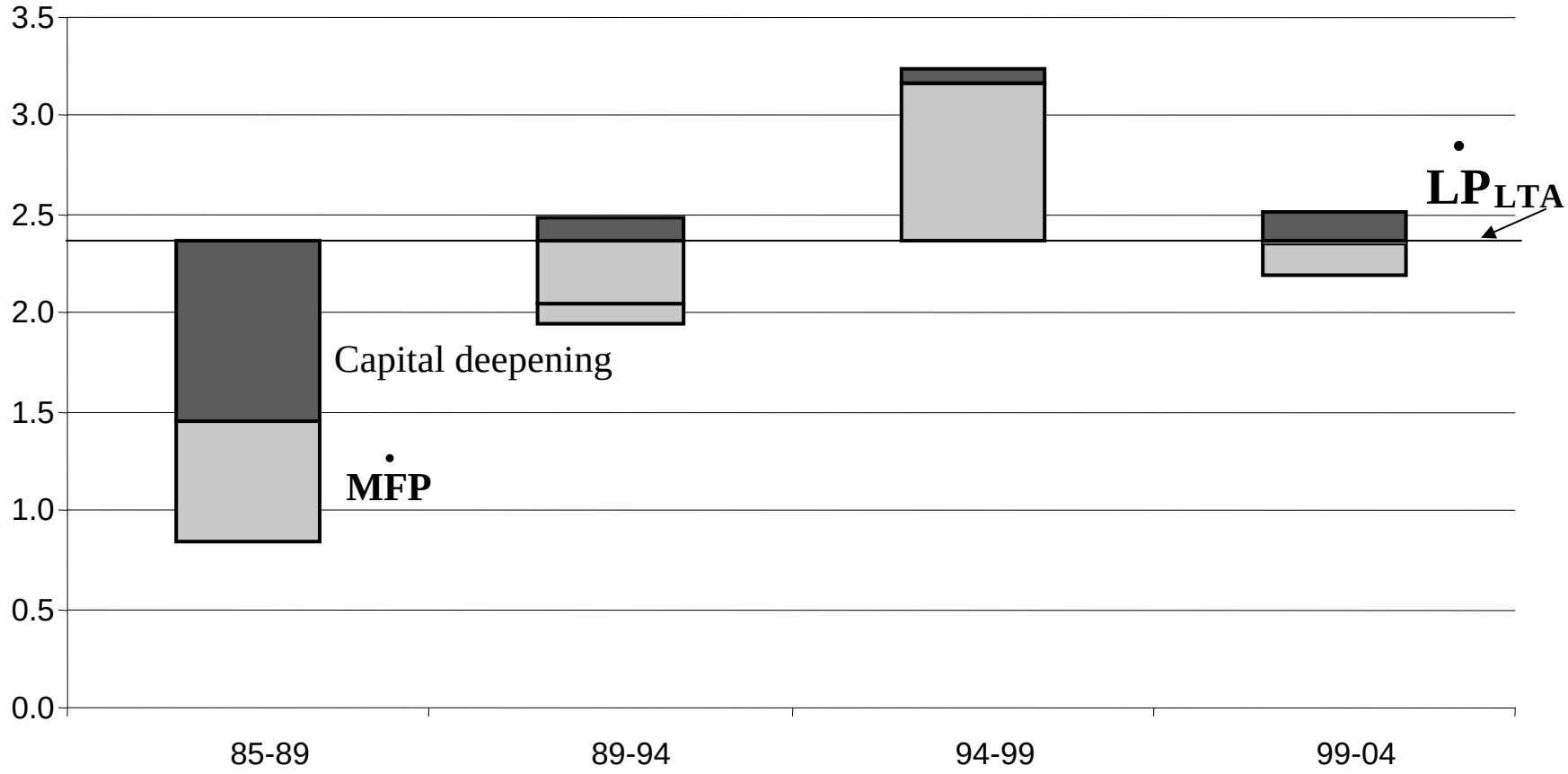
Step 1: Proximate sources of aggregate trends

- Identify deviations from long-term average labour productivity growth
  - *Long-term average (LTA) from 1965 to 2004*
  - *Deviations from LTA over productivity cycles as identified by ABS*
- Decompose deviations in LP growth into:
  - *KD and MFP growth*
  - *Y, K, L growth*

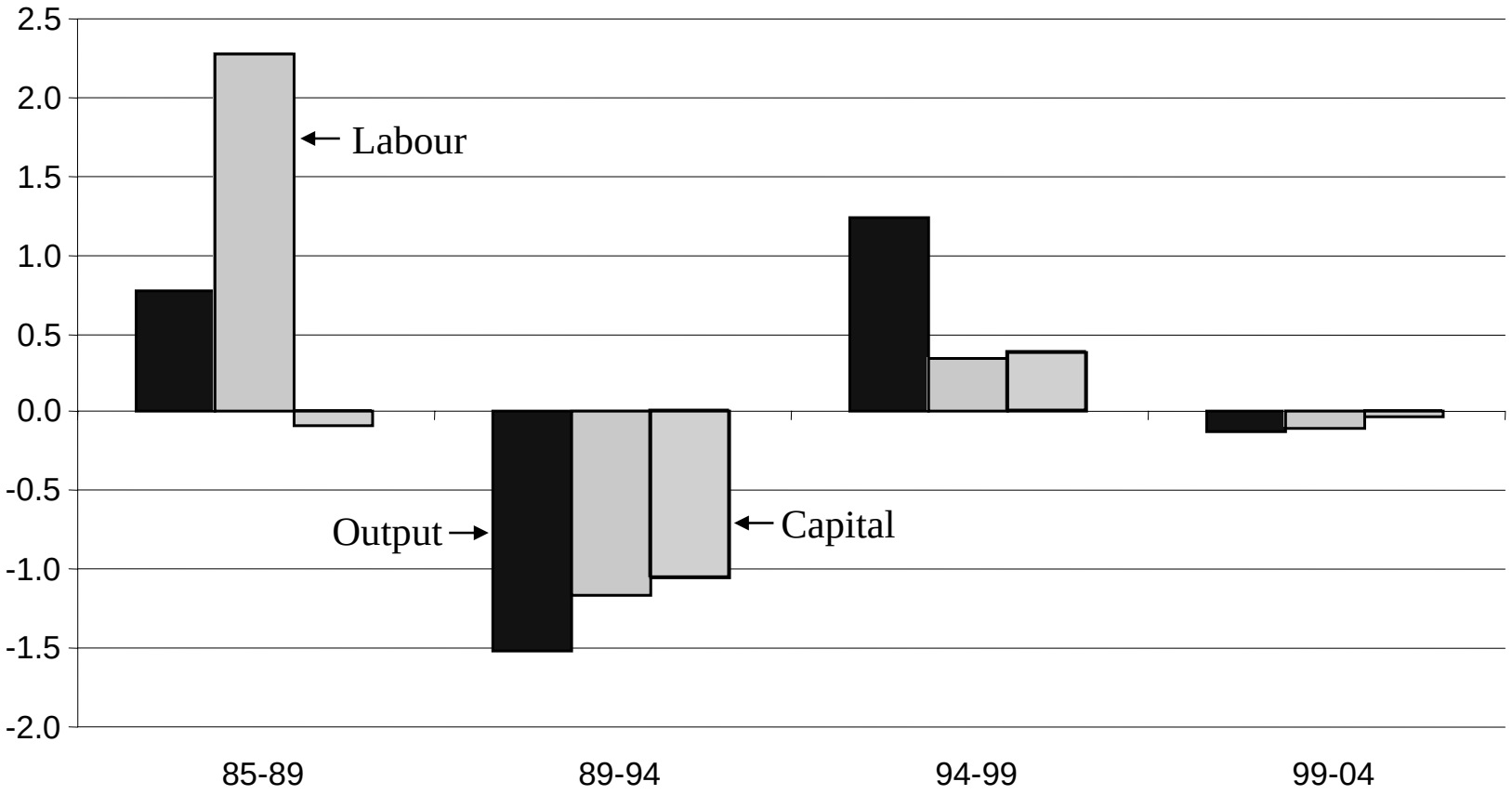
$\dot{LP}, \dot{KD}, \dot{MFP}$ – deviations from long term average (LTA)



$\dot{LP}, \dot{KD}, \dot{MFP}$ – deviations from long term average (LTA)



$\dot{Y}, \dot{K}, \dot{L}$ – deviations from LTA



Findings (1)

	Deviation in productivity growth	*Major proximate deviations*
85 - 89	Very weak	Labour expansion
89 - 94	Weak	Weak output (and input) growth
94 - 99	Very strong	Strong output growth
99 - 04	Close to LTA	All close to LTA

Step 2: Compare aggregate and industry trends over different cycles

- Take aggregate MFP growth and Y, K, and L growth in each productivity cycle
  - *Examine LP growth in late 1980s period, because more than MFP deviation in play in this period*
- Identify:
  - *Industries that show similar trends to aggregate*
  - *Industries that show similar trends in proximate sources, but different productivity movements from aggregate*
  - *Industries that make sizeable contribution to aggregate productivity deviation, but through different sources*

$\dot{LP}$: 85-89 — Two industries have similar deviations to aggregate, but other industry-specific deviations also feature

	Deviation in productivity growth/contribution	*Large(st) proximate deviation(s)*		
		$\dot{Y}$	$\dot{K}$	$\dot{L}$
Market sector	**-1.5**	**+0.8**		**2.3**
Agriculture	-0.3	-3.1		
Mining				
Manuf	-0.3			3.6
EGW	+0.2			-2.9
Construct				
W'sale				
Retail	-0.4			2.3
ACR				
Transp				
Commun				
Finance	+0.1	+6.0		4.8
CRS				

MFP : 89-94 – Three industries with similar trends to aggregate. Similar output, input deviations across industries.

	Deviation in productivity growth/contribution	*Large(st) proximate deviation(s)*		
		$\dot{Y}$	$\dot{K}$	$\dot{L}$
Market sector	**-0.4**	**-1.5**	**-1.1**	**-1.2**
Agriculture		(+)		(-)
Mining	+0.2	(+)	-1.1	-1.5
Manuf	+0.1	-1.7	-1.0	-2.5
EGW	+0.1		-1.8	-3.3
Construct	-0.2	-3.4	-1.2	-2.2
W'sale	-0.3	-2.7		(+)
Retail		(-)	(-)	-1.3
ACR		(-)	-1.1	
Transp	-0.1	-1.6	(-)	(-)
Commun	+0.1	+2.0		(-)
Finance		-2.5	-1.7	-3.8
CRS		(-)	-1.8	-1.4

$\dot{MFP}$: 94-99 – One industry similar to aggregate. Diversity in deviations in input use

	Deviation in productivity growth/contribution	*Large(st) proximate deviation(s)*		
		$\dot{Y}$	$\dot{K}$	$\dot{L}$
Market sector	**+0.8**	**+1.2**	**+0.4**	**+0.3**
Agriculture	+0.1	+1.5	(-)	+1.0
Mining			+1.0	-2.3
Manuf	-0.2		+1.8	+1.4
EGW		-1.3		-4.1
Construct	+0.1	+2.5	-1.2	+1.6
W'sale	+0.4	+3.8	-1.6	(-)
Retail	+0.1	+1.5	+1.3	(+)
ACR	+0.1	+2.0	+1.3	
Transp				+1.1
Commun		+3.6	+2.2	+2.5
Finance	+0.3	+1.1	-1.2	-1.1
CRS			+4.0	

$\dot{MFP}$: 99-04 – Much greater diversity at industry level than at aggregate level

	Deviation in productivity growth/contribution	*Large(st) proximate deviations*		
		$\dot{Y}$	$\dot{K}$	$\dot{L}$
Market sector	**-0.2**	**-0.1**	**-0.0**	**-0.1**
Agriculture	+0.1		-1.7	-2.1
Mining	-0.1	-2.0		+1.2
Manuf	-0.1		+1.8	
EGW	-0.2	-2.1		+4.4
Construct		+1.7	-2.6	+2.6
W'sale	+0.1	+1.2	+1.0	
Retail	+0.1	+1.6		
ACR	+0.1		-2.0	
Transp				
Commun	-0.2	-3.5		+1.0
Finance			-1.2	-1.0
CRS				-2.5

Findings (2)

- Deviations in productivity, output and input growth in some industries are similar to the aggregate deviations in some periods
- But by no means universal
  - *industry-specific explanations (independent of macro trends) also important*
- Evidence of 'tops-down' macro influences on industry trends appears weaker in last 2 periods than in earlier 2 periods
  - *Labour expansion and, especially, recession 'shakeout' had more common effect across industries*
  - *Much greater diversity in deviations across industries after 1994*

Step 3: Examine deviations in industry contributions over time

- Examine deviations from long-term industry contributions to aggregates over ABS productivity cycles
  - *LP, MFP, Y, K, L growth*
- Are there any patterns?
  - *Industries showing consistency with aggregate trends*
  - *Consistent deviations in contributions from particular industries over time*

Major deviations in industry contributions to LP

— Construction only consistent contributor to aggregate pattern

— Finance consistent 'new' contributor (ie above its LTA contribution)

	84-85	*89-94*	*94-99*	*99-04*
Market sector	**-1.5**	**-0.3**	**+0.9**	**-0.0**
Agriculture	-0.3	+0.1		+0.1
Mining		+0.2	+0.2	-0.3
Manuf	-0.3	+0.2	-0.2	+0.2
EGW	+0.2	+0.2	+0.1	-0.3
Construct	-0.1	-0.1	+0.1	-0.1
W'sale		-0.3	+0.4	+0.2
Retail	-0.4		+0.1	+0.1
ACR		-0.1	+0.1	
Transp	-0.1	-0.1		
Commun		+0.1		-0.2
Finance	+0.1	+0.2	+0.3	+0.1
CRS	-0.1			+0.1

Deviations in industry contributions to MFP

— Construction again a consistent contributor to aggregate pattern

— Agriculture and some services consistent 'new' contributors in 1990s

	85-89	*89-94*	*94-99*	*99-04*
Market sector	**-0.6**	**-0.4**	**+0.8**	**-0.2**
Agriculture	-0.3	+0.1	+0.1	+0.1
Mining	+0.2	+0.2		-0.1
Manuf		+0.1	-0.2	-0.1
EGW	+0.1	+0.1		-0.2
Construct	-0.1	-0.2	+0.1	
W'sale		-0.3	+0.4	+0.1
Retail	-0.3		+0.1	+0.1
ACR			+0.1	+0.1
Transp	-0.1	-0.1		
Commun		+0.1		-0.2
Finance	+0.2		+0.3	
CRS	-0.1			

Major deviations in industry contributors to $\dot{Y}$

— More industries are consistent contributors to aggregate pattern, eg Manufacturing, Construction, Wholesale, Finance

	85-89	*89-94*	*94-99*	*99-04*
Market sector	**+0.8**	**-1.5**	**+1.2**	**-0.1**
Agriculture	-0.2	+0.1	+0.1	
Mining	+0.2	+0.1		-0.2
Manuf	+0.5	-0.4	+0.1	+0.1
EGW			-0.1	-0.1
Construct	+0.2	-0.3	+0.2	+0.2
W'sale	+0.1	-0.2	+0.3	+0.1
Retail	-0.2	-0.1	+0.1	+0.1
ACR	+0.1		+0.1	
Transp		-0.1		
Commun		+0.1	+0.1	-0.2
Finance	+0.7	-0.3	+0.1	
CRS				

Major deviations in industry contributors to $\dot{K}$

— No industry strongly consistent with aggregate pattern
— Manufacturing very strong 'new' contributor after 1994
— Finance consistently under LTA contribution in 1990s

	84-85	*89-94*	*94-99*	*99-04*
Market sector	**-0.1**	**-1.1**	**0.4**	**-0.0**
Agriculture	+0.1			-0.1
Mining		-0.1	+0.1	-0.1
Manuf		-0.2	+0.4	+0.4
EGW	-0.1	-0.1		
Construct	+0.4	-0.1	-0.1	-0.3
W'sale	-0.1		-0.1	+0.1
Retail		-0.1	+0.1	
ACR	+0.2			-0.1
Transp				
Commun			+0.1	
Finance	+0.4	-0.2	-0.2	-0.2
CRS	+0.1	-0.1	+0.1	

Major deviations in industry contributions to L

— A number of industries consistent with aggregate pattern
eg Manufacturing, Construction, Retail and (mostly) Agriculture
— Elect, gas & water and Finance detractors (from LTA) over long periods

	85-89	*89-94*	*94-99*	*99-04*
Market sector	**+2.3**	**-1.2**	**+0.3**	**-0.1**
Agriculture	+0.2		+0.1	-0.2
Mining	+0.1			
Manuf	+1.0	-0.6	+0.3	-0.1
EGW	-0.1	-0.1	-0.1	+0.1
Construct	+0.3	-0.2	+0.2	+0.3
W'sale	+0.1	+0.1	-0.1	
Retail	+0.4	-0.2	+0.1	+0.1
ACR	+0.1			-0.1
Transp	+0.1		+0.1	
Commun			+0.1	
Finance	+0.3	-0.2	-0.1	-0.1
CRS	+0.1			-0.1

Findings (3)

- Across periods, more macro/industry commonality in deviations in output and input (labour) growth than in productivity growth
- No fixed set of industry contributors to changes in productivity trends
  - *Construction the only industry with 'marginal' contributions that fit the pattern of deviations in aggregate productivity growth*
  - *Services industries have become more prominent contributors*
- Mostly, different industries make 'new' or additional contributions at different times
  - *Industry foundations of changes in aggregate productivity trends come from a broad and somewhat unpredictable base*

Conclusion (?) and policy implications

- Both macro and industry-specific factors have influenced productivity growth
  - *Both macro and industry (micro) policies potentially important*
- Industry-specific factors have become relatively more important since the 1980s
  - *May reflect structural changes underway as a result of microeconomic policies and technological advances*
- No 'stable' industry vehicle to additional aggregate productivity growth
  - *May also be important, at least as a starting principle, to devise policies that have general, rather than industry-specific, application*