2017-8 Lecture Series:

Blueprint for Brexit Britain:
The Productivity Puzzle

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GRESHAM COLLEGE

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Main Arguments

Period	g(Y/L)	Contribution of g(K/L)	Contribution of g(A)
2000-2007	15.83%	5.88%	9.49%
2008-2015	-0.68%	2.31%	-2.96%

- Y (t)   = a K (t) + b L (t) + A (t)

- Ratio Output to Inputs = A (t) = Y (t) / a K (t) + b L (t)

- Limited growth in Real wages, Investment and Capital Stock

- Measurement vs Demand vs Public Fiscal Policy

- Consider Role of Financial Frictions

➔ Contribution to limited capital deepening or deceleration in TFP

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Figure 1. Output per Hour Worked
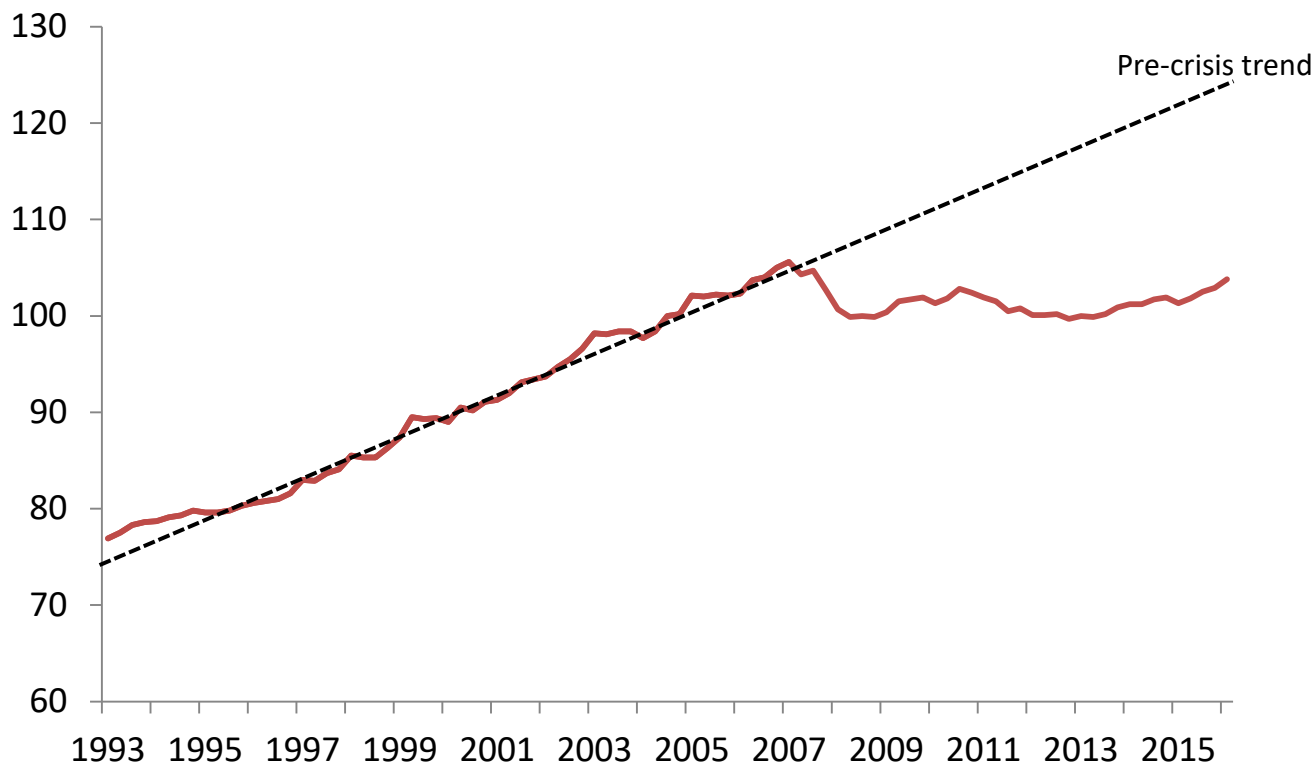
Note: Market Sector SA; Output is measured as nominal GVA; Index 2013=100
Source: ONS & NIESR

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Figure 2. Trend in output, employment and productivity after the crisis
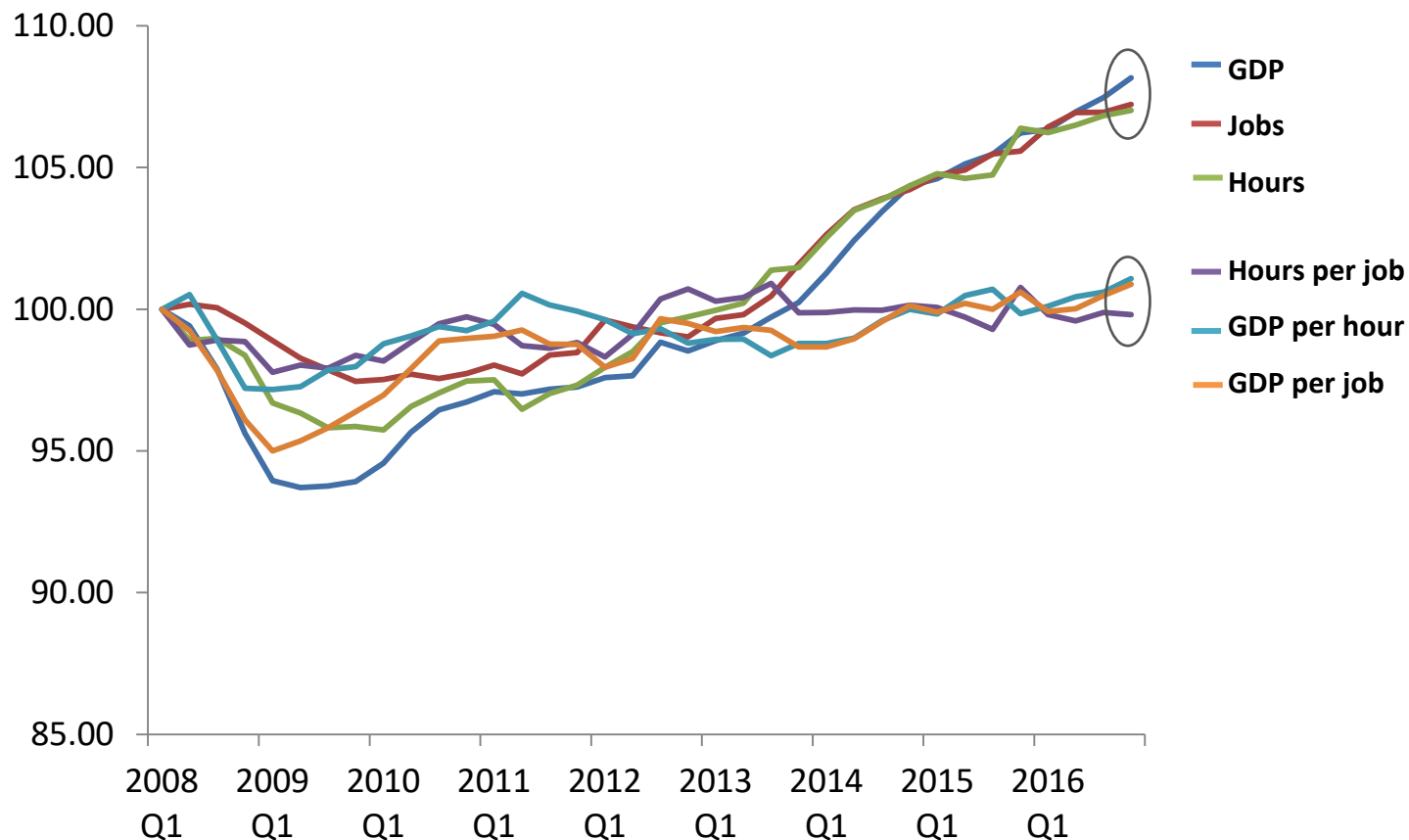
Note: Output is measured as real GVA
Source: ONS & NIESR

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Table 1. Growth accounting

	Annual Growth Rate of Y/L	Contribution of K/L (capital deepening)	Contribution of A	Contribution of K/L (capital deepening)	Contribution of A
1760-2015	1.33	0.48	0.85	36%	64%
1938-2015	2.38	0.90	1.48	38%	62%
1950-2015	2.46	1.02	1.44	41%	59%

	Average Annual Growth rate of Y	Average Contribution of Labour	Average Contribution of K	Average contribution of A	Average Contribution of Labour	Average Contribution of K	Average contribution of A
1760-2015	1.94	0.37	0.71	0.85	19%	37%	44%
1938-2015	2.42	0.03	0.91	1.48	1%	38%	61%
1950-2016	2.52	0.04	1.04	1.44	2%	41%	57%

Source: NIESR & BoE

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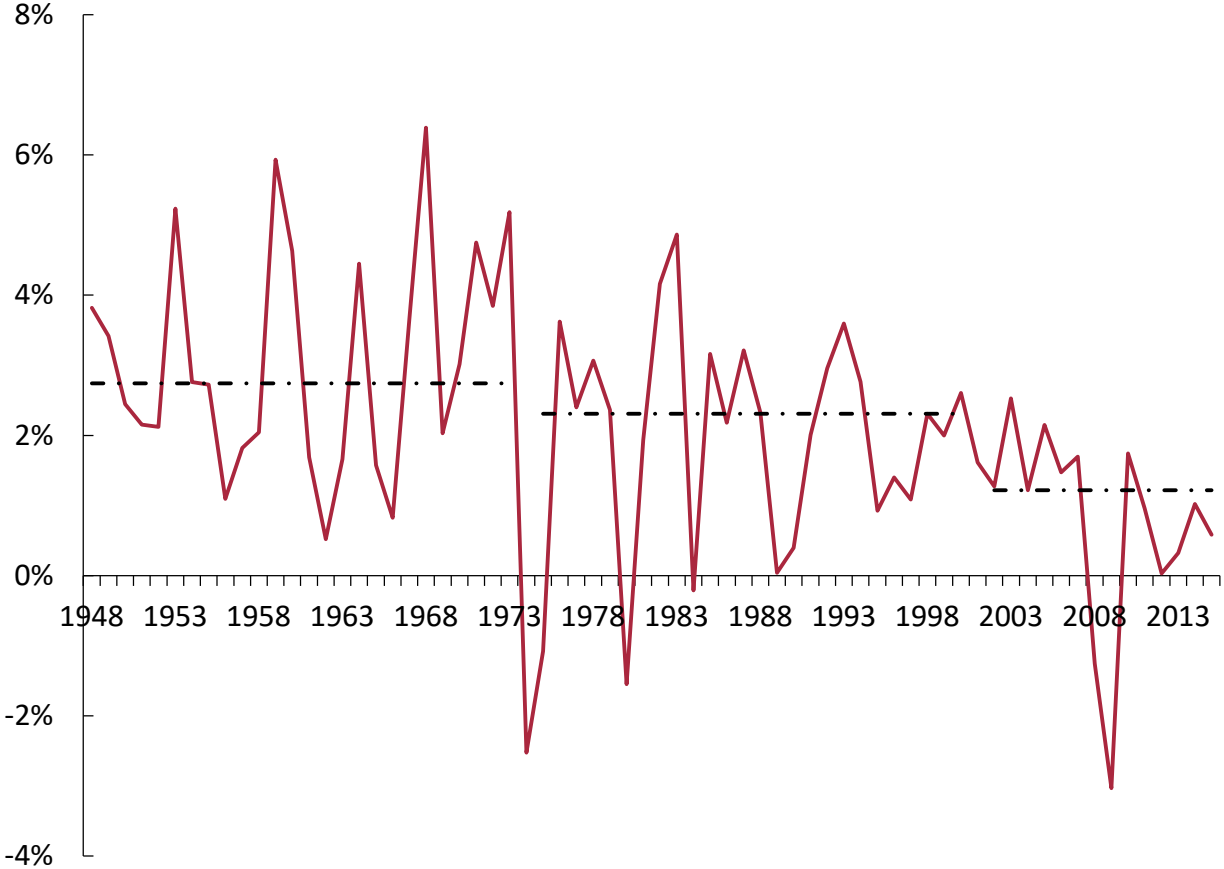
Figure 3. Total factor productivity growth 1948–2015
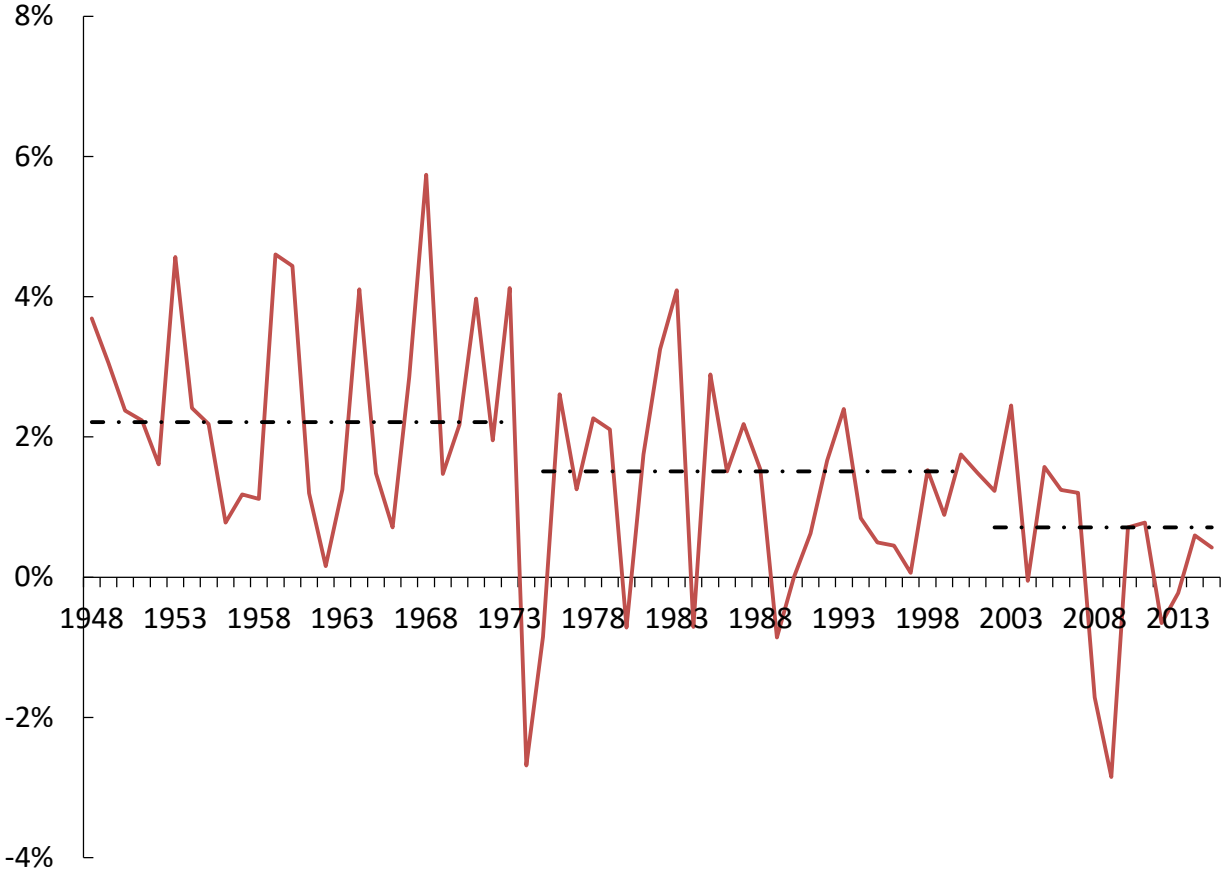
Note: Output is measured as Real GDP
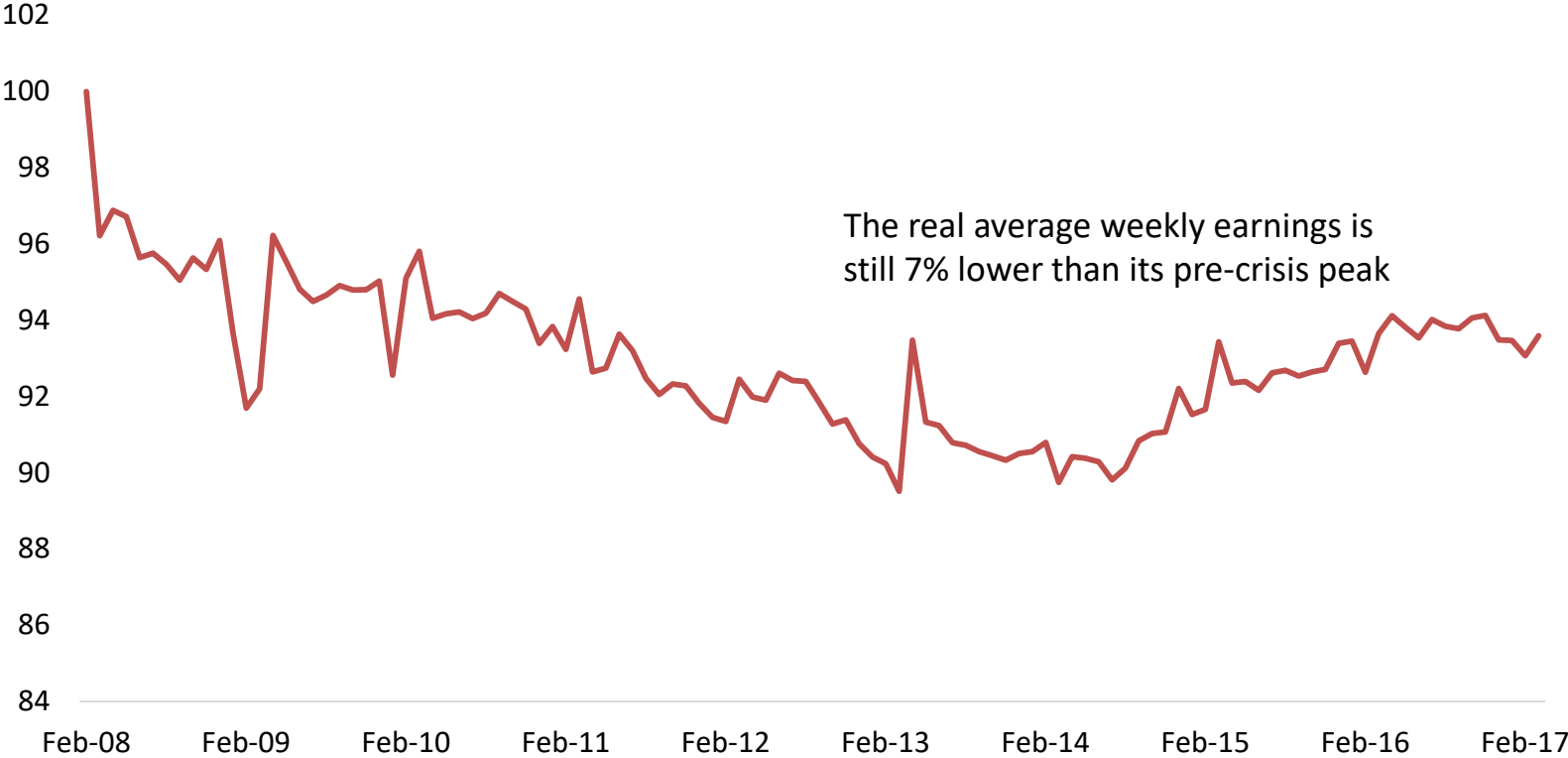Source: Bank of England, 3 centuries dataset

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Figure 4. Labour productivity per head 1948–2015

Note: Output is measured as Real GDP
Source: Bank of England, 3 centuries dataset

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Figure 5. Real Average Weekly Earnings (January 2008 – March 2017)

The real average weekly earnings is still 7% lower than its pre-crisis peak

Note: Feb 2008 = 100, SA
Source: ONS (EARN01)

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Figure 6. Real investment growth 1949–2016

Source: European Commission and NIESR.

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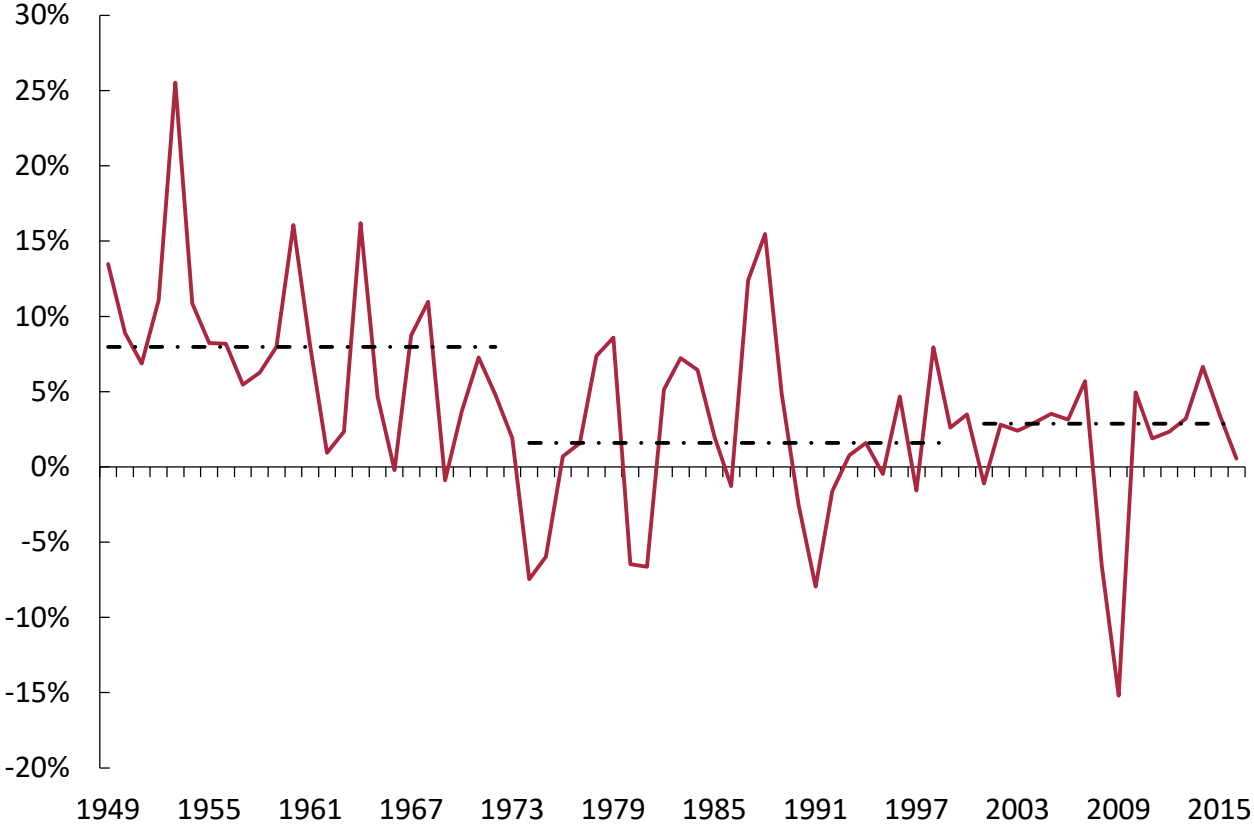
Figure 7. Sectoral balances (as % of GDP), 1987 – 2016

Source: ONS

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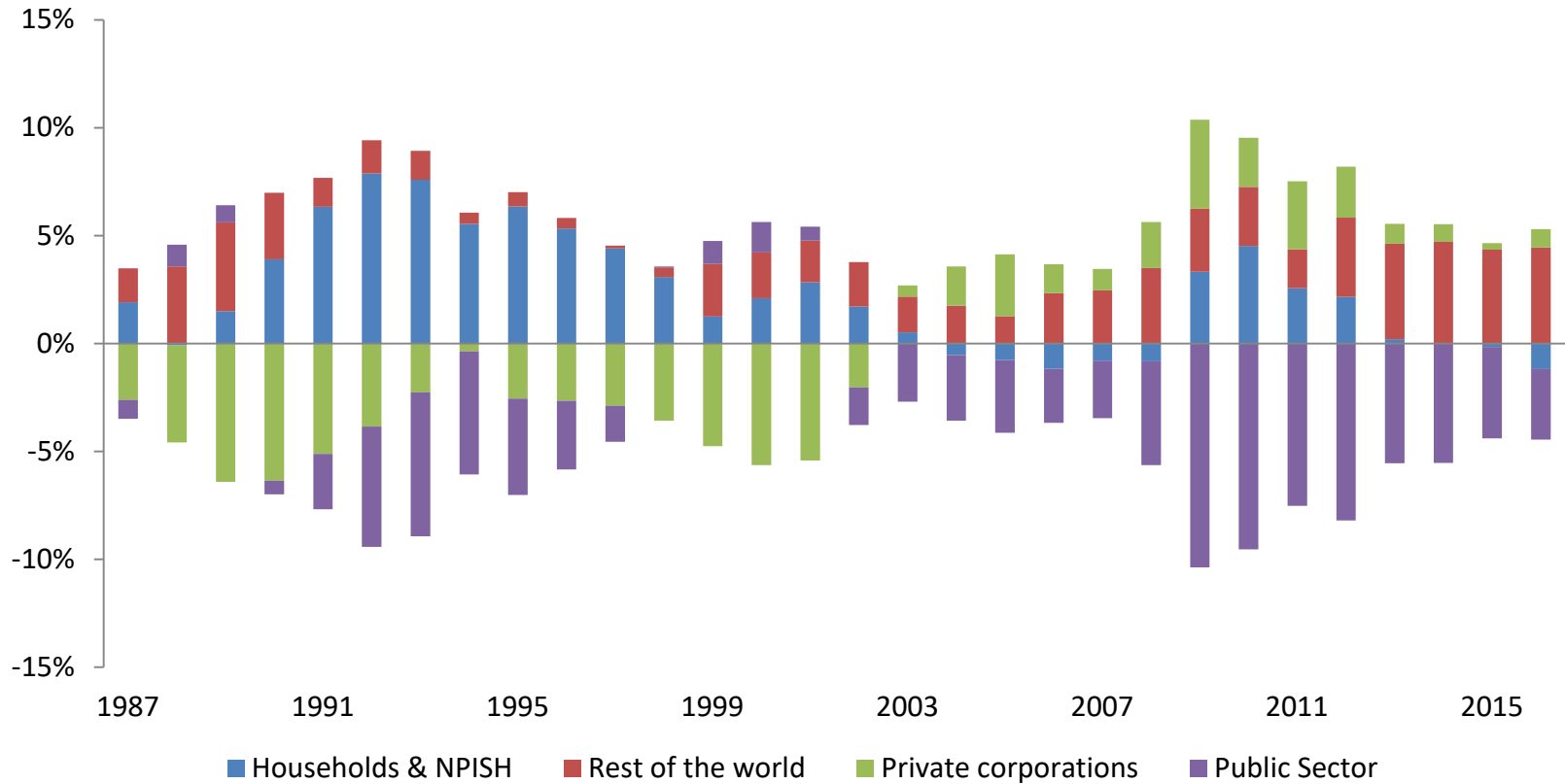
Table 2. Productivity growth

Panel 1

Average growth of Productivity by sector

	Whole Economy	Production	Manufacturing	Services
95-07	0.50	0.77	0.85	0.49
08-16	0.00	-0.07	0.16	0.06

Panel 2

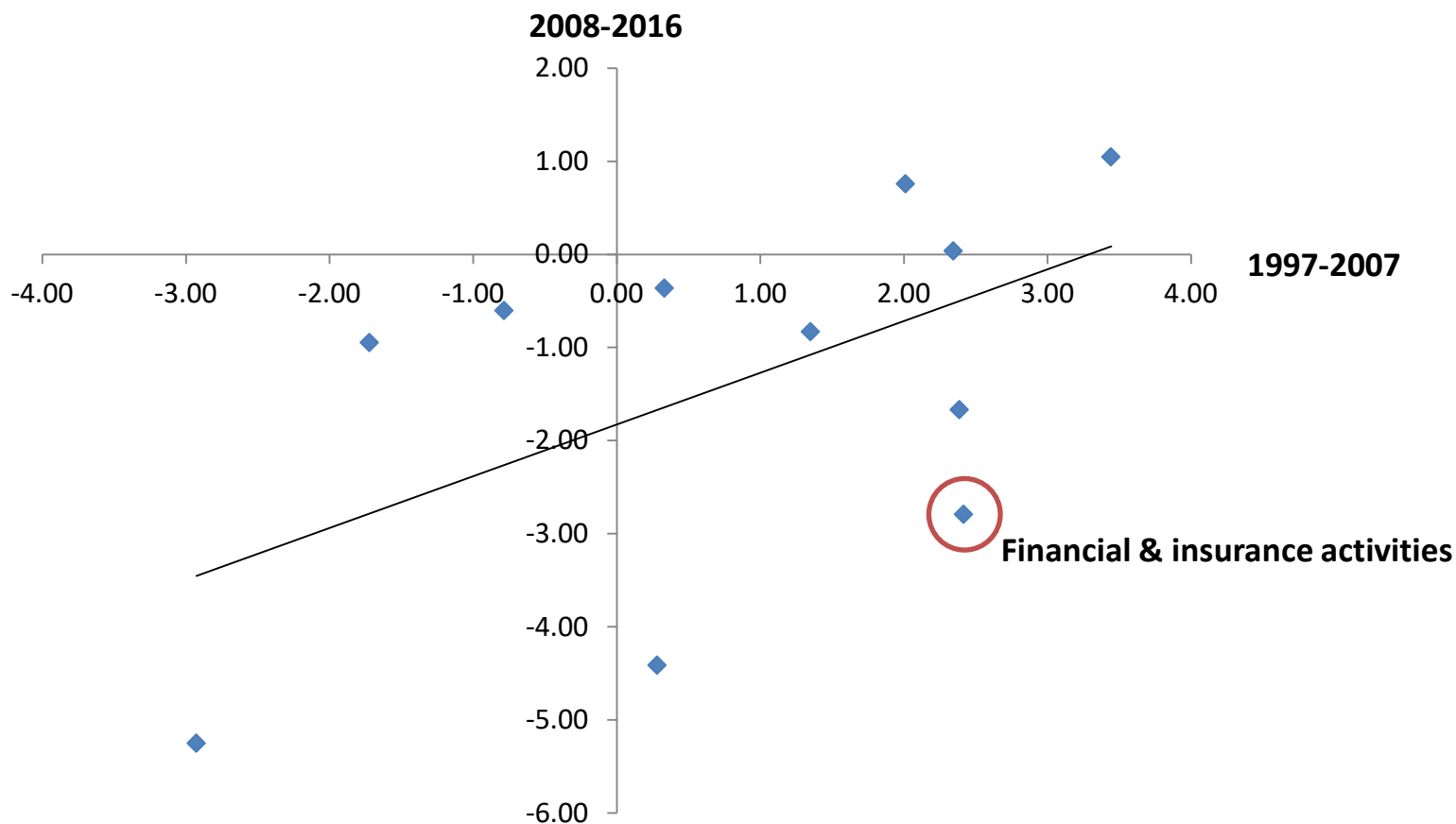**Average growth of Productivity for the service sector components**

	Info & comms	Wholesale & retail	Transport & storage	Professional services	**Finance & insurance services**	Real estate	Arts, ent & recreation
95-07	1.13	0.50	0.95	0.83	1.13	-0.26	0.08
08-16	0.33	0.35	-0.27	0.15	-0.19	-0.03	-0.29

Note: Output per hour: % change on Q, SA, UK
Source: ONS

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Figure 8. MFP contribution of GVA growth before and after the crisis

Source: ONS

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Table 3. MFP contribution to GVA growth, by industry and total economy

Average contribution of GVA growth		
	1997-2007	2008-2016
Agriculture; Forestry & fishing; Mining & quarrying; Utilities	0.28	-4.41
Manufacturing	2.35	0.03
Construction	-0.78	-0.60
Wholesale & retail trade; Accommodation & food services	0.33	-0.36
Transportation & Storage	2.39	-1.67
Information & communication	3.44	1.05
Financial & insurance activities	**2.42**	**-2.79**
Real estate activities; Professional & scientific activities; Administrative & support activities	2.01	0.76
Education; Health & social work	-2.93	-5.25
Arts & entertainment; Other services	-1.72	-0.95
Total Market Sector	1.35	-0.83

Source: ONS Multi-factor Productivity (experimental): Estimates

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Table 4. Sectoral breakdown of the UK economy in 2007&2015

		Share of GDP %		Share of employment %		Relative productivity, ratio	
		2007	2015	2007	2015	2007	2015
Agriculture, Forestry And Fishing	A	0,6	0,7	1,17	1,14	0,54	0,57
Mining And Quarrying	B	2,2	1,0	0,21	0,21	10,44	4,92
Manufacturing	C	10,1	9,8	9,24	7,75	1,10	1,26
Electricity, Gas, Steam And Air Conditioning Supply	D	1,2	1,5	0,27	0,40	4,44	3,75
Water Supply; Sewerage, Waste Management And Remediation Activities	E	1,1	1,0	0,49	0,58	2,30	1,73
Construction	F	6,9	6,1	7,25	6,35	0,95	0,96
Wholesale And Retail Trade; Repair Of Motor Vehicles And Motorcycles	G	11,1	11,0	15,73	14,80	0,70	0,74
Transportation And Storage	H	4,1	4,6	4,71	4,72	0,87	0,98
Accommodation And Food Service Activities	I	2,6	3,0	6,28	6,61	0,42	0,45
Information And Communication	J	6,1	6,5	3,87	4,06	1,58	1,60
Financial And Insurance Activities	K	8,6	7,2	3,67	3,26	2,34	2,21
Real Estate Activities	L	12,2	13,0	1,41	1,65	8,69	7,85
Professional, Scientific And Technical Activities	M	6,8	7,5	7,11	8,63	0,96	0,87
Administrative And Support Service Activities	N	4,2	4,8	7,98	8,54	0,53	0,57
Government, health and education	O,P,Q	18,5	18,4	24,85	25,54	0,74	0,72
Arts, Entertainment And Recreation	R	1,4	1,4	2,69	2,88	0,52	0,48
Other Service Activities	S-T	2,2	2,6	3,07	2,87	0,71	0,89

Source: ONS Blue book & LMS

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Table 4. GVA measurement methods

Sector			Measurement method
Non–market sector			• volume of service provided (2/3) – IC • real value of inputs (1/3) – IC
Market sector	Manufacturing		Sales – IC
	Services	Non-financial services	• sales or turnover – IC • Output (mail, air transport…) - IC
		Financial intermediation	See table 5
		Insurance and pension funds	• Premiums – claims • Consumer expenditure on life assurance deflated by consumers' expenditure deflators.

Source: ONS (2007).
Note: IC = intermediate consumption.

Table 5. Financial intermediaries output measure

Sector	Measurement method
Banking sector(a)	Fees and commissions receivable Net spread earnings Other operating income Financial Intermediation Services Indirectly Measured (FISIM)
Non-banking financial intermediaries	FISIM Value of funds under management for investment funds

Source: Burgess (2011).
Note: (a) Deflation made using AWE series for the financial services industry, excluding bonuses and adjusted for changes in productivity.

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Figure 9. Post crises recoveries in the level of real investment

Source: ONS

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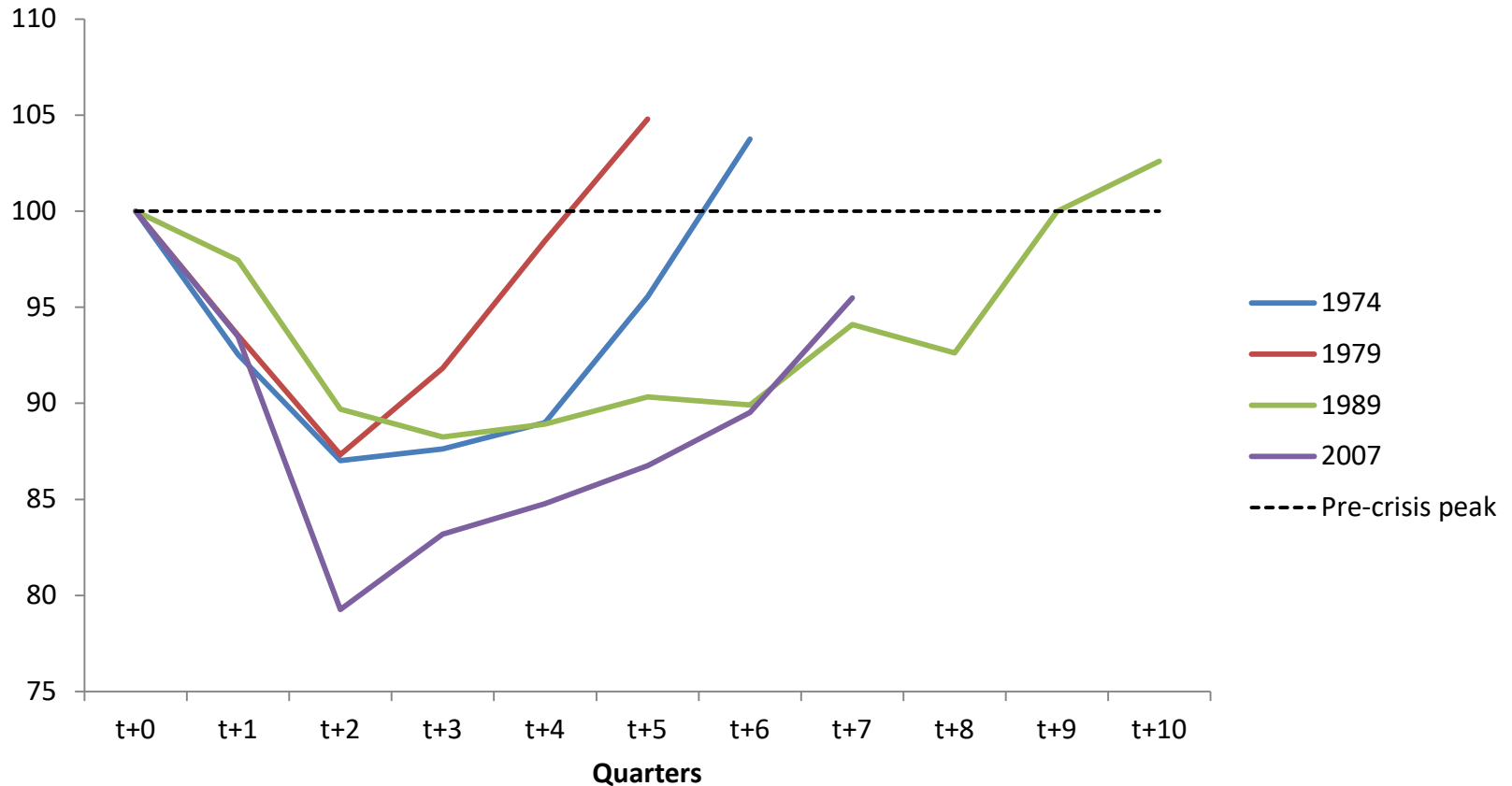
Figure 10. Real investment to GDP

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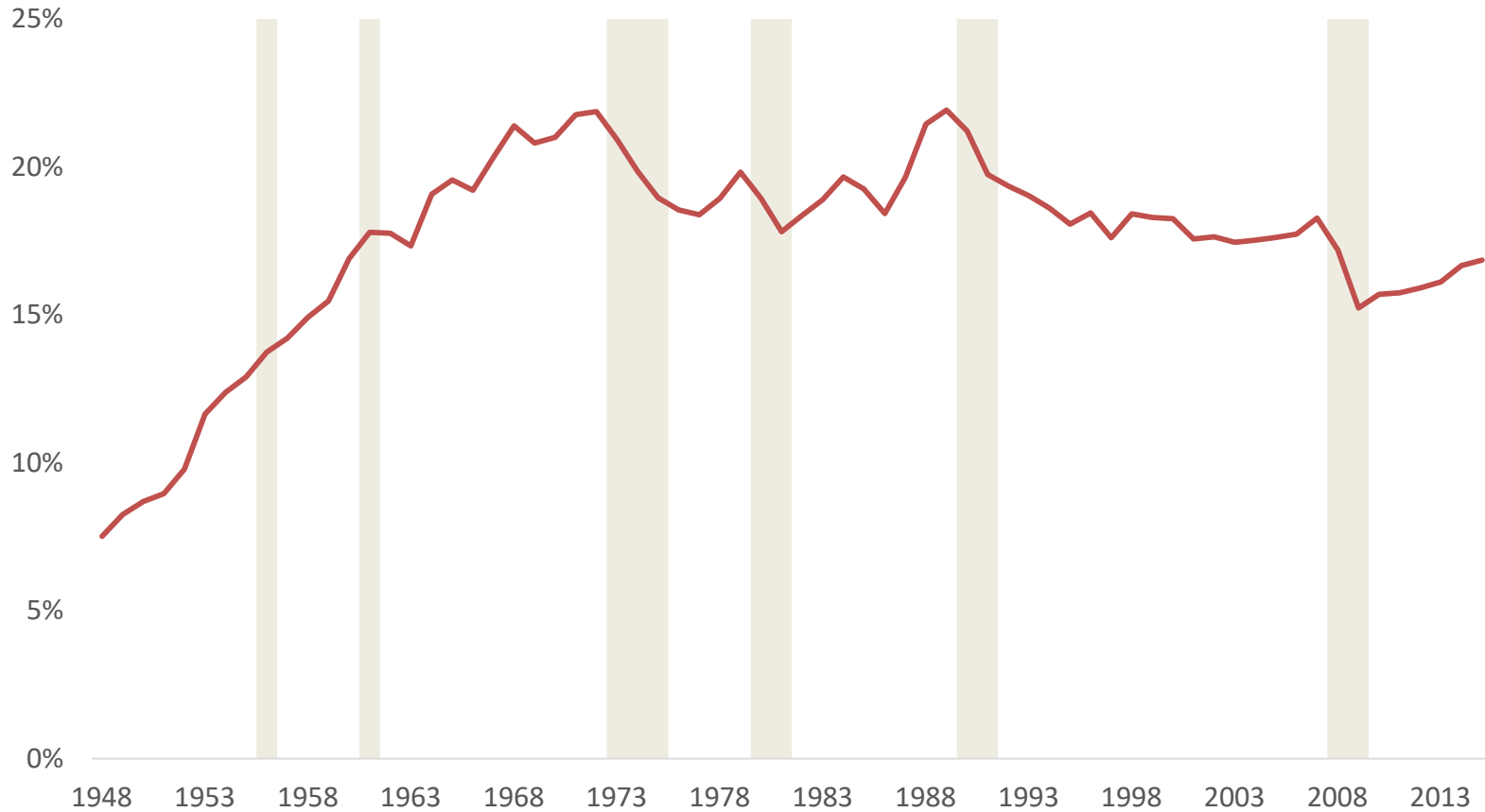
Figure 11. Share of new investment used for capital replacement
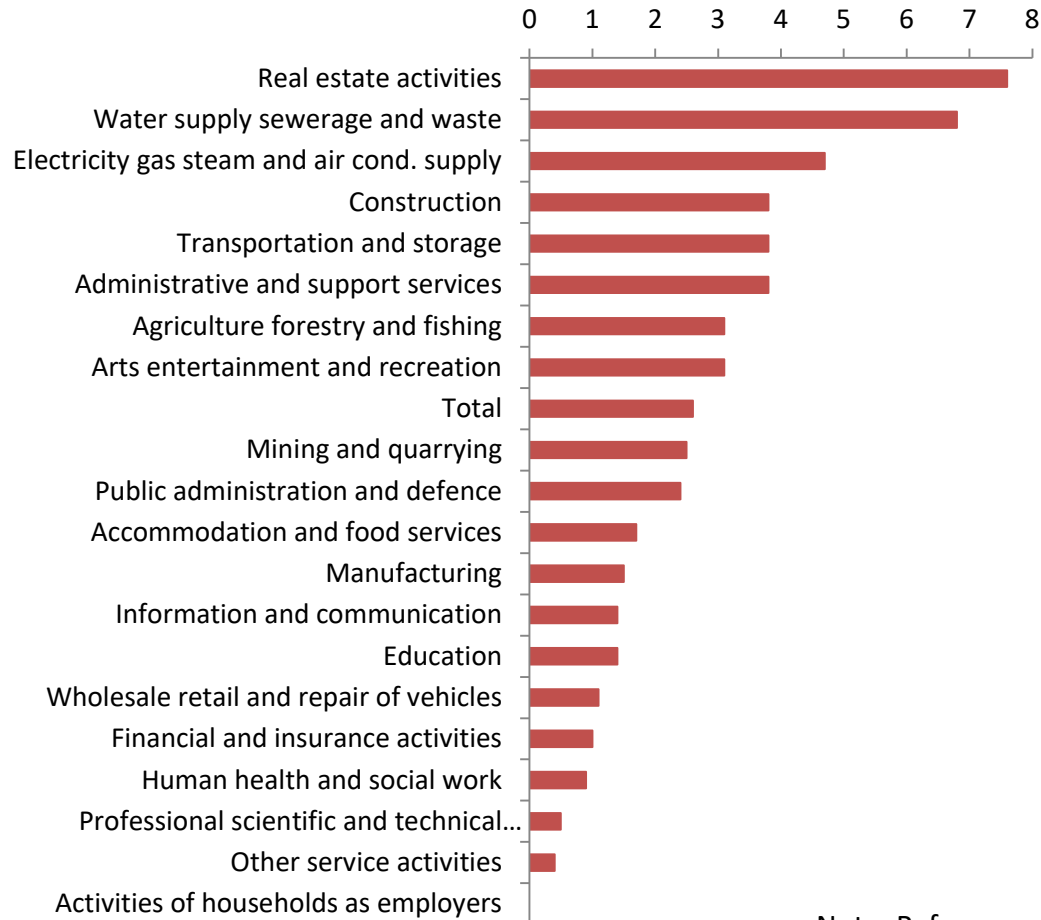
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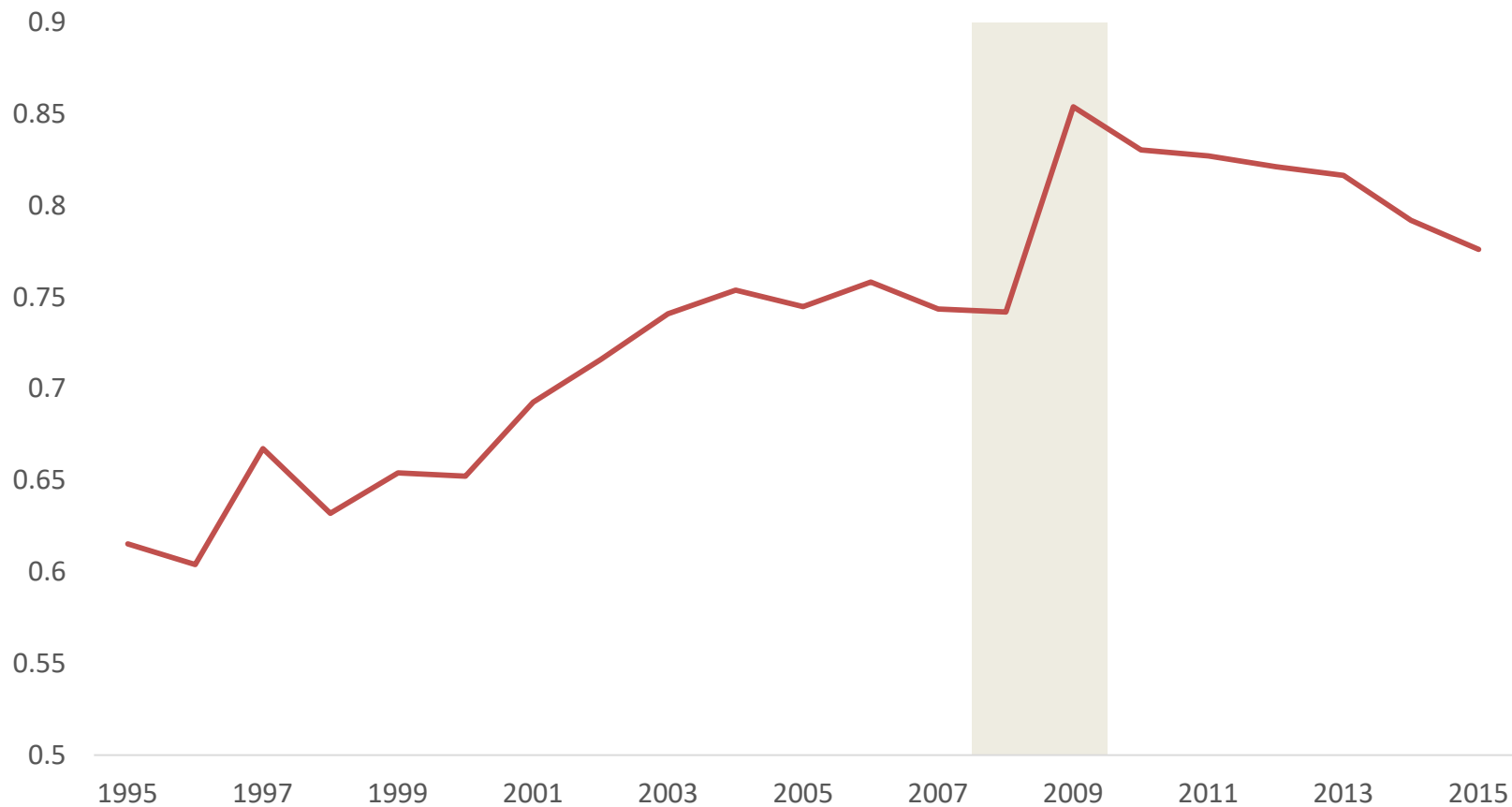
Figure 12. Net Capital–output ratio at constant prices 1960–2016

Source: European Commission and NIESR.

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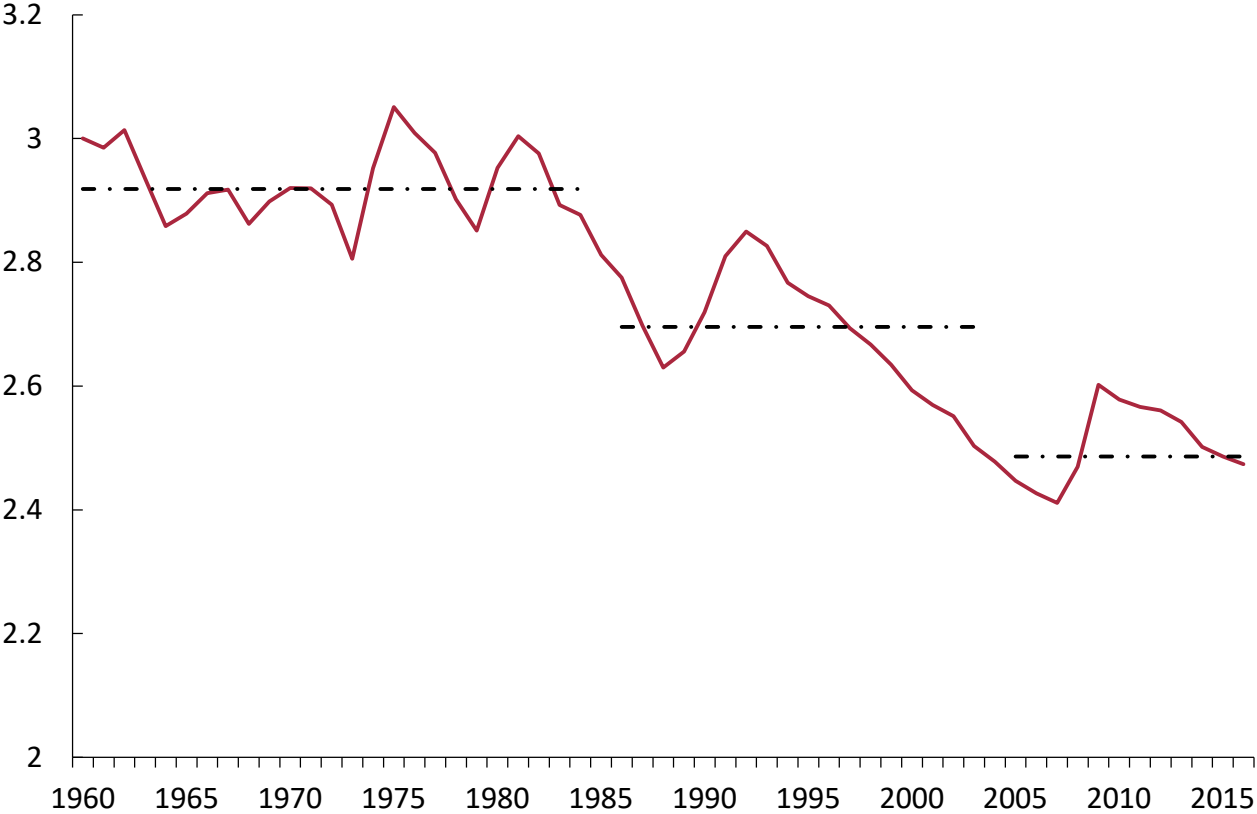
Figure 13. Capital intensity by industry sector, 2015

Note: Reference year: 2013
Source: ONS

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Figure 14. Net capital stock to output ratios by broad industry groups, 1997 to 2015

Source: ONS

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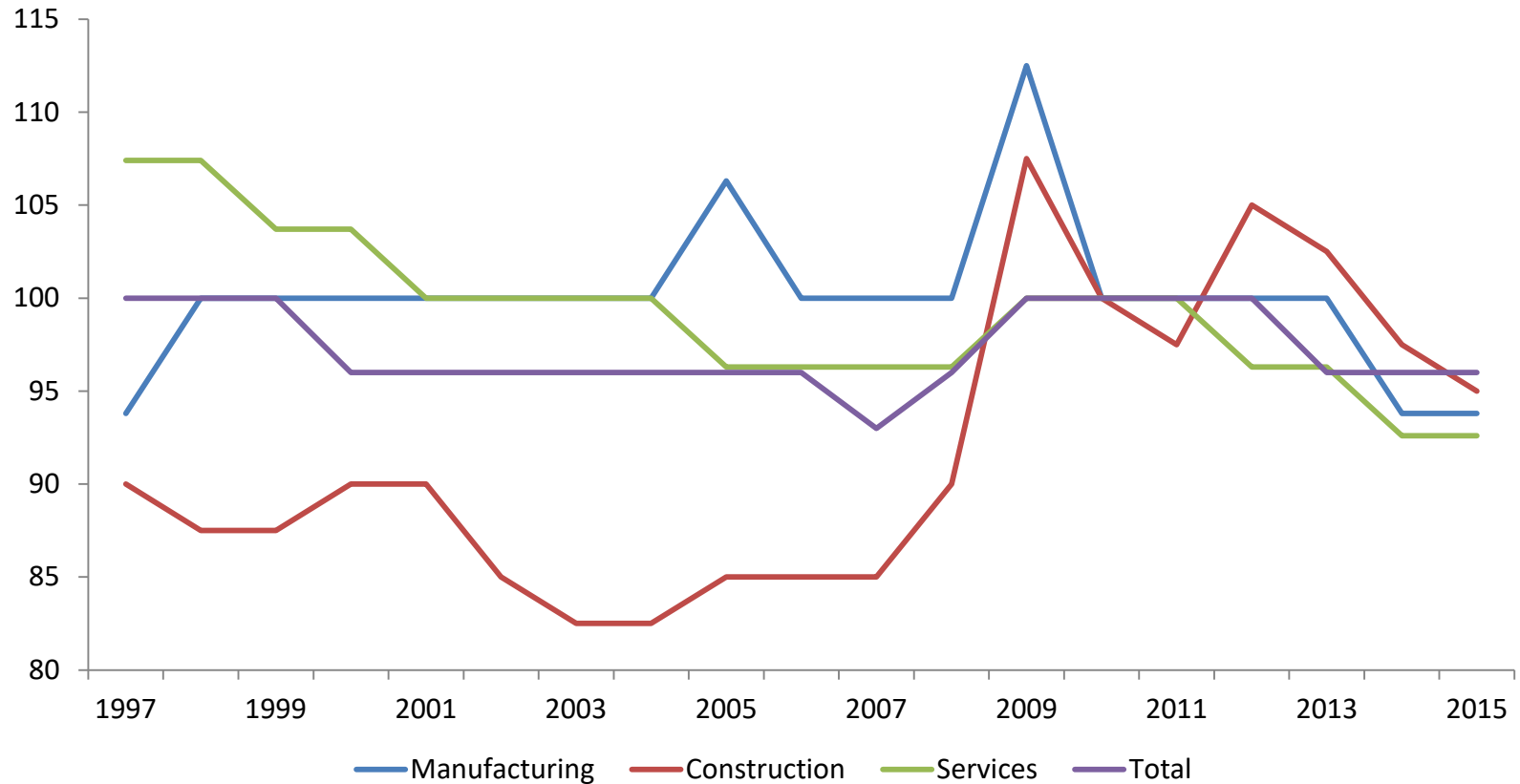
Figure 15. Growth in net capital stock per employee, 1998 to 2015

Note: Reference year: 2013
Source: ONS

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Figure 16. Public investment (as % of GDP), 1990 - 2016

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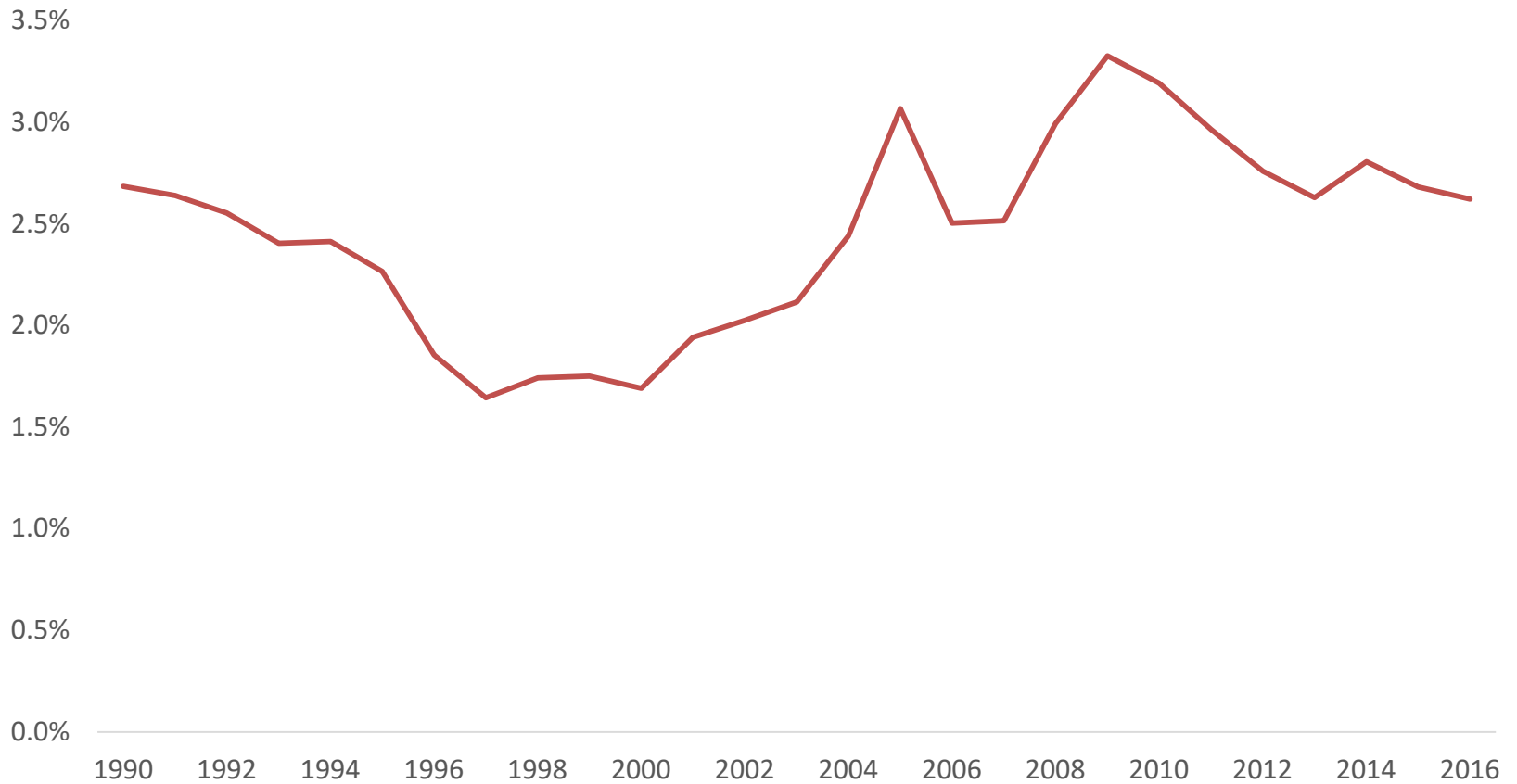
Figure 17. R&D expenditure to GDP ratio in the UK and rest of G7, 1981-2014

Source: OECD, NIESR

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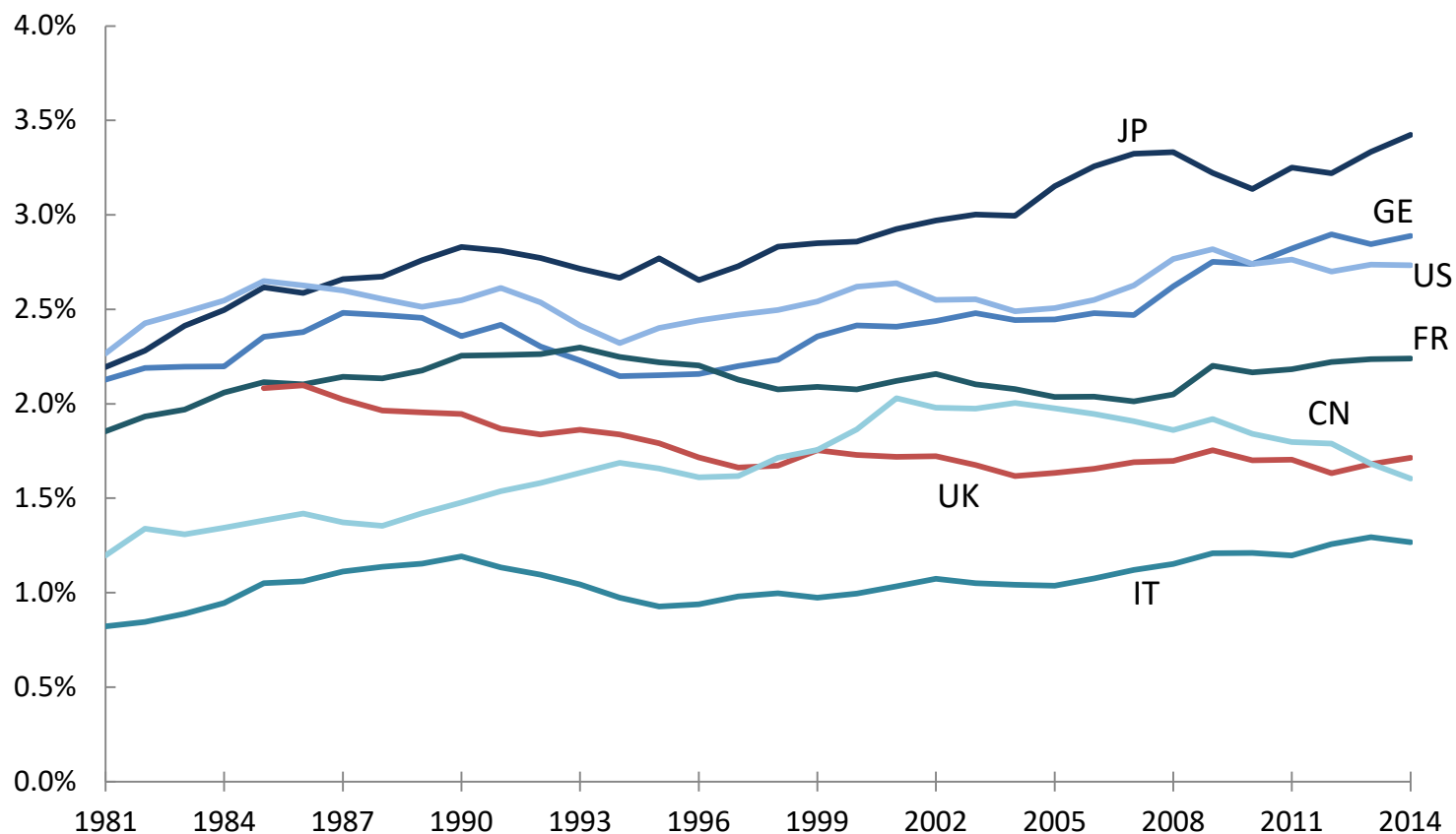
Figure 18. Decomposition of R&D expenditure in the UK, 1985-2014

Legend:
- Business enterprise
- Sub-total government
- Other National
- Higher education
- Private non-profit
- Funds from abroad

Source: OECD, NIESR

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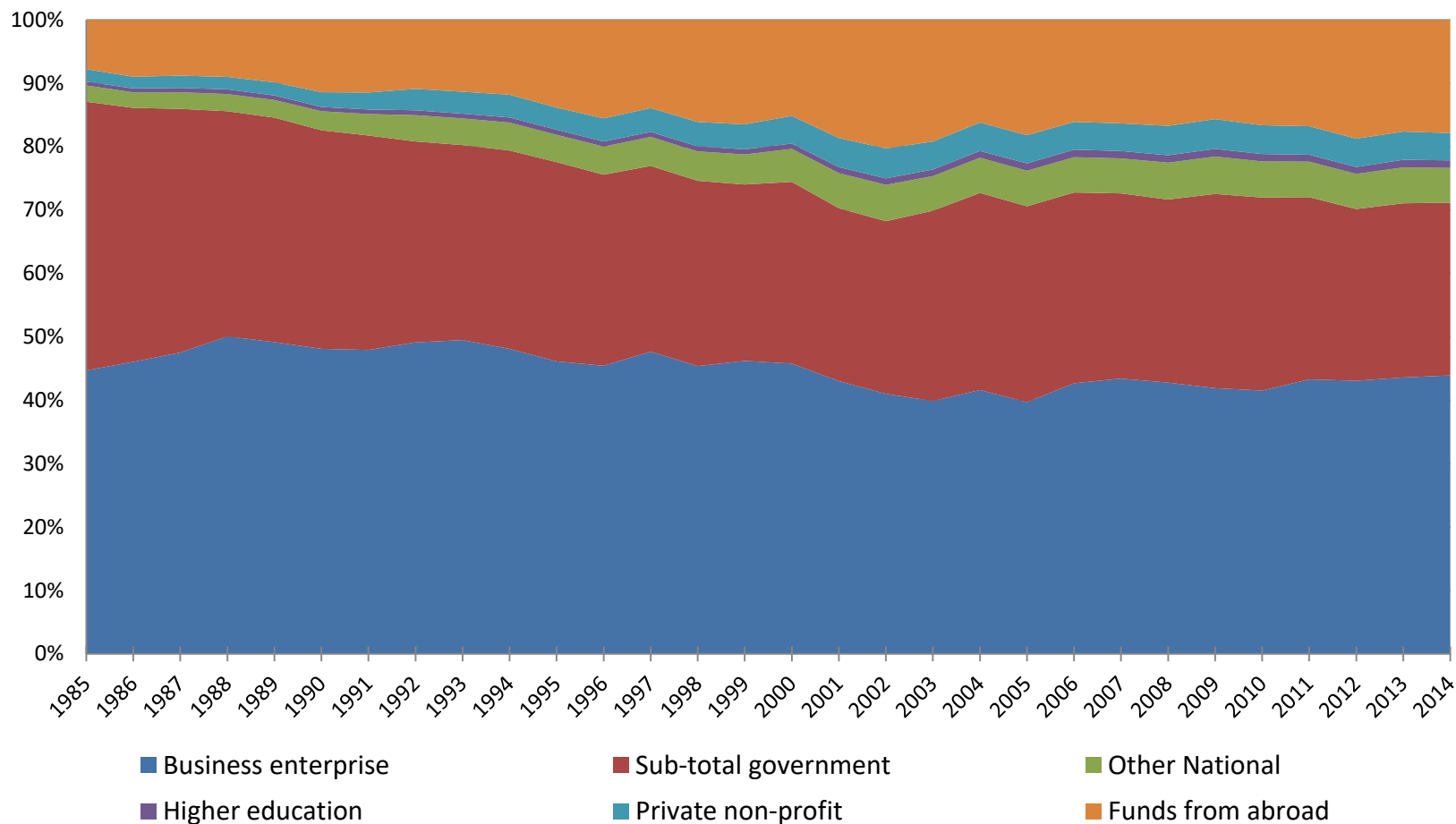
Modelling Financial Frictions I

- OLG model of firms which live for two periods, 1=N, 2=O

- There is a given or state-dependent rate of firm birth or death (at the start of period 2)

- Firms combine labour and capital inputs with a given technology [H, L]

- They transition to the other state with a known probability [p]

F^N		F^O	
		L	**H**
	L	[L,L]	[L,H]
	H	[H,L]	[H,H]

1. [1,1] and [2,2] correspond to the RA, exogenous TFP story
2. [1,2] implies old firms raise productivity levels
3. [2,1] implies new firms raise productivity levels

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Modelling Financial Frictions II

F^N	F^O		
		L	H
	L	[L,L]	[L,H]
	H	[H,L]	[H,H]

- Case 1 [L,H] a fall in firm births and deaths ➔ increase in prod
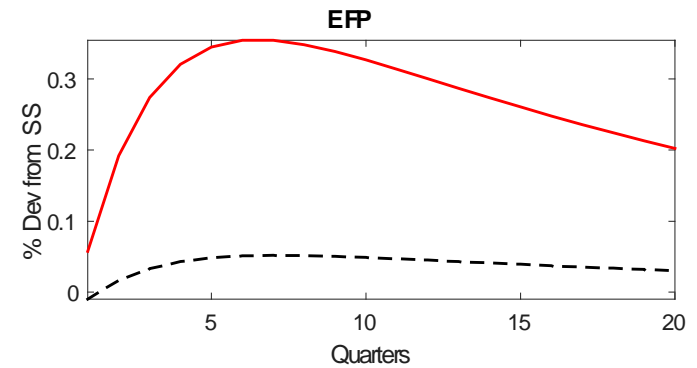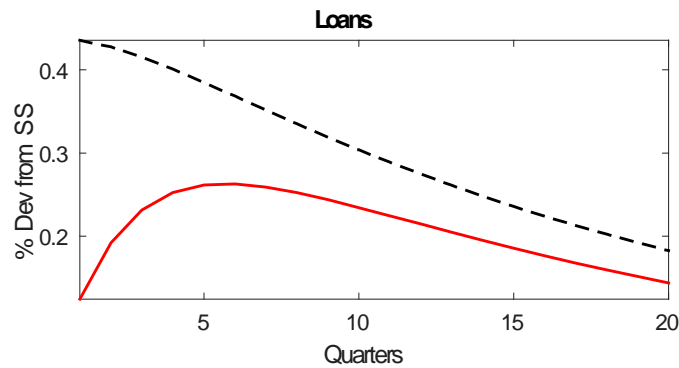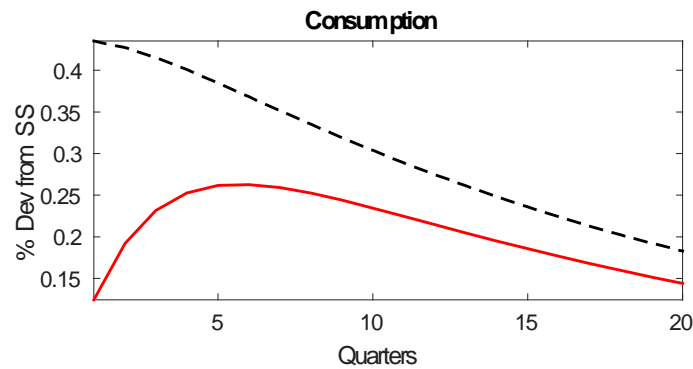- Case 2 [H,L] a fall in firm births and deaths ➔ fall in productivity

Financial Intermediaries

- Monitor and screen borrowers and ask for collateral
- Determine firm birth and deaths

Not clear that this operation efficiently matches capital

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Positive productivity shock with high persistence

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Positive productivity shock with low persistence

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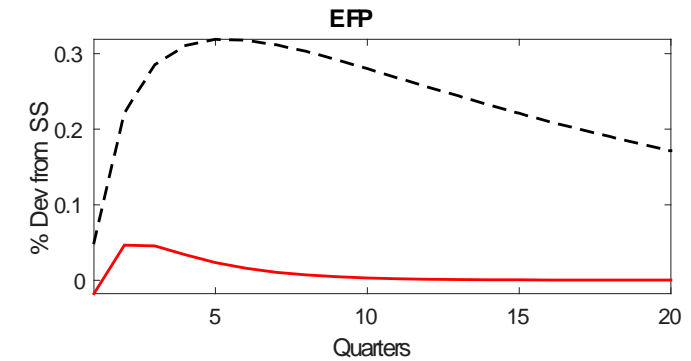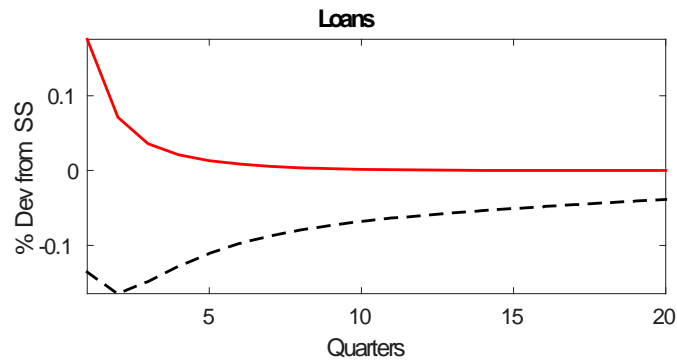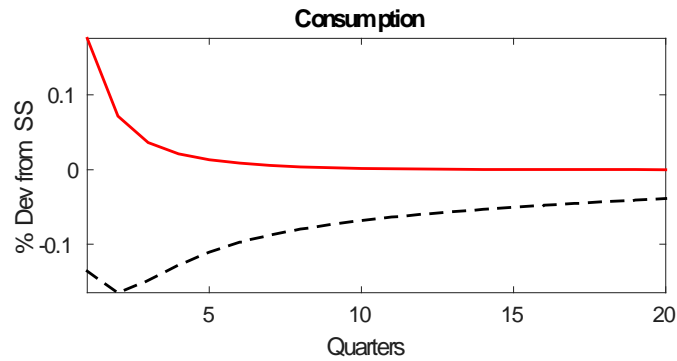
Concluding Remarks

- Real Wages and Investment below norm with limited capital deepening and TFP growth – spreads have tended upwards

- Households and Firms in Broad Balance on net flow of funds

- Downward productivity shift even across sectors

- Illustrative Model suggests channel: bank determined reduction in accrual of TFP because of reduction in efficiency that might relate to distortionary effects of collateral-based lending

- Show in now standard model how bank inefficiency can amplify a reduction in exogenous TFP

- But it might be measurement!

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