

Offshore Profit Shifting and Domestic Productivity Measurement

F. Guvenen, R.J. Mataloni Jr., D.G. Rassier, and K.J. Ruhl

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Profit shifting example: iPhone

- ▶ Developed in California, built by contract manufacturer in China
- ▶ Hypothetical numbers
 - ▶ Parts and assembly labor \$250
 - ▶ Sale price \$750
 - ▶ No further costs, all phone sold outside the U.S.
 - ▶ \$500 gross profit: return to design, software, etc. made in U.S.
- ▶ \$250 cogs is not U.S. GDP
- ▶ Is the \$500 profit part of U.S. GDP?
 - ▶ Depends on which part of Apple Inc. receives it. . .

MNE profit shifting

- ▶ Multinational enterprises (MNE)
 - ▶ Access to heterogeneous tax locations
- ▶ Creates an incentive to *profit shift*: Structure the firm (or transactions) to book profits in low-tax countries
- ▶ Many ways to shift profits; one popular method
 - ▶ MNE assigns assets to affiliates in low-tax countries
 - ▶ Profit accrues to those assets at low tax rates

 - ▶ Facilitated by intangible assets
 - ▶ Assignment does not necessarily reflect production

Assets in U.S.-owned foreign affiliates, 2012

	Ratio of U.S.-owned foreign affiliate total assets to		
	PPE	Compensation	Employment (mil. USD)
World	16.8	39.0	1.8
Canada	6.4	21.2	1.2
Ireland	20.0	142.7	10.9
Luxembourg	1,109.6	1,380.0	121.6
Netherlands	97.7	115.3	8.7
Switzerland	59.9	60.0	7.7
Barbados	41.8	1,444.7	43.3
Bermuda	130.8	1,475.5	155.8
U.K.I., Caribbean	101.2	3,330.2	199.8
Hong Kong	40.3	39.3	2.7
Singapore	18.6	50.3	3.1

Total assets are the sum of all financial (e.g., cash, receivables) and non-financial (e.g., property, plant, and equipment, inventories) assets on a historic cost basis.

The United Kingdom Islands (U.K.I.), Caribbean, are made up of the British Virgin Islands, Cayman Islands, Montserrat, and Turks and Caicos Islands.

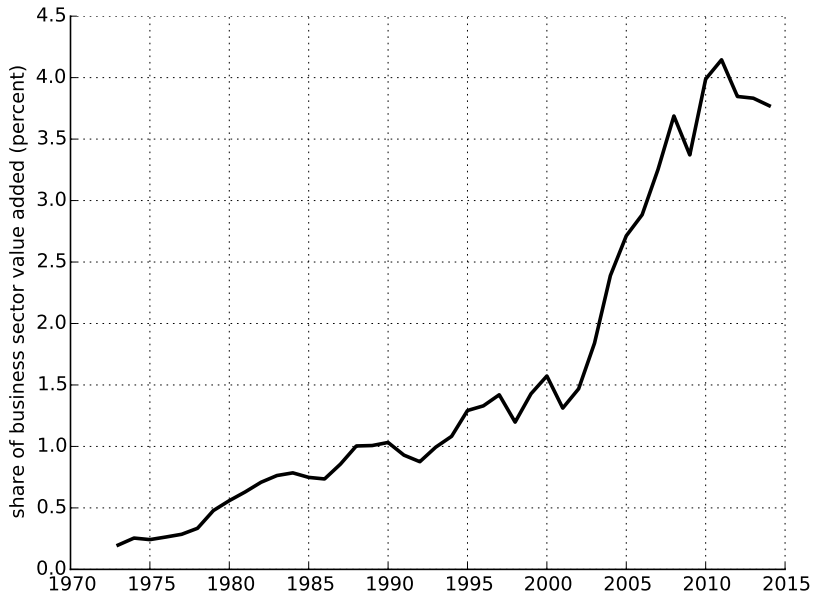
Profit shifting and mismeasurement

- ▶ If intangible capital (IC) is held by U.S. parent
 - ▶ Payment for IC booked in parent → +*GDP*
 - ▶ Export of services from United States
- ▶ If intangible capital is held by the affiliate
 - ▶ Payment for IC booked in affiliate → + income on USDIA
 - ▶ Income on USDIA is not a part of GDP

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 - ▶ Payment for IC booked in affiliate $\rightarrow +$ income on USDIA
 - ▶ Income on USDIA is not a part of GDP
- ▶ Profit shifting decreases GDP, increases USDIA income
$$GNP = GDP + \text{income on USDIA} - \text{income on FDIUS} + \dots$$
- ▶ Income on USDIA explodes in the 2000s

Income on U.S. direct investment abroad



Adjusting for profit shifting

- ▶ Reallocate income on USDIA across units of the MNE
- ▶ Reallocations to parent increase GDP

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- ▶ What part of income on USDIA is owed to the parent?

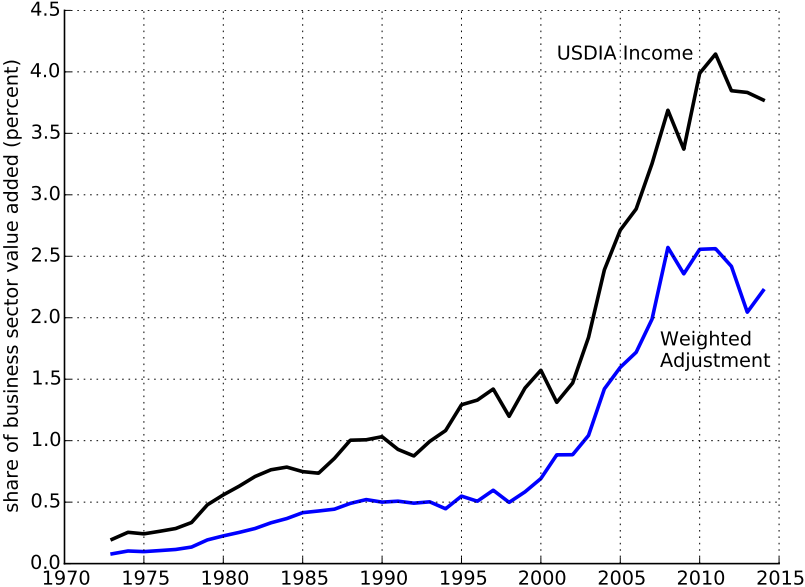
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- ▶ Our approach: formulary adjustment
 - ▶ Popular multi-jurisdictional tax adjustment
- ▶ Allocate income proportional to apportionment factors
 - ▶ Apportionment factors: compensation and sales
- ▶ For data reasons, we focus on U.S.-owned MNEs operating abroad
 - ▶ Affiliates of foreign-owned MNEs operating in U.S. in progress

Aggregate formulary adjustment



Overview of results

- ▶ In the aggregate, our adjustment adds
 - ▶ 1973–1994: ~ nothing
 - ▶ 1994–2014: ~ \$3.6 trillion to U.S. GDP
 - ▶ 1994–2014: 1.5 pps to cumulative productivity (VA/hour) growth

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 - ▶ 2008: adjustment is 8 percent of industry value added
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- ▶ Mismeasurement likely to continue (currently ~ 2.5 percent of VA)

Aggregate adjustments to productivity

Formulary adjustment method

- ▶ Data from BEA MNE surveys
- ▶ For each year (suppressing time subscript)
- ▶ $m = 1, \dots, M$ multinational enterprises
- ▶ Each MNE has one parent ($n = 1$) and $n = 2, \dots, N_m$ foreign affiliates
- ▶ *Apportionment weight* for member n in MNE m

$$\omega_{mn} = \frac{1}{2} \times \frac{w_{mn}l_{mn}}{\sum_{i=1}^{N_m} w_{mi}l_{mi}} + \frac{1}{2} \times \frac{p_{mn}y_{mn}}{\sum_{i=1}^{N_m} p_{mi}y_{mi}}$$

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- ▶ Allocate income across members of MNE

$$\pi_{mn}^{\omega} = \omega_{mn} \sum_{i=1}^{N_m} \pi_{mi} \quad n = 1, \dots, N_m$$

- ▶ And the *formulary adjustment* to each member is

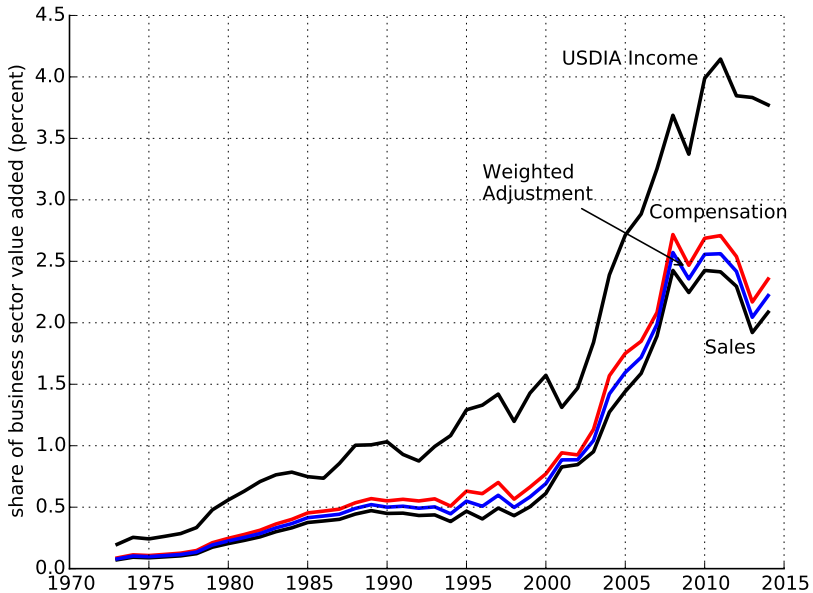
$$\epsilon_{mn} = \pi_{mn}^{\omega} - \pi_{mn} \quad n = 1, \dots, N_m$$

Adjusted value added

- ▶ Focus on business-sector value added
- ▶ Add the parents' adjustments to value added

$$\tilde{Y}^{\text{VA}} = Y^{\text{VA}} + \sum_{m \in M} \epsilon_{m1}$$

Aggregate formulary adjustment



Adjusted value added per hour

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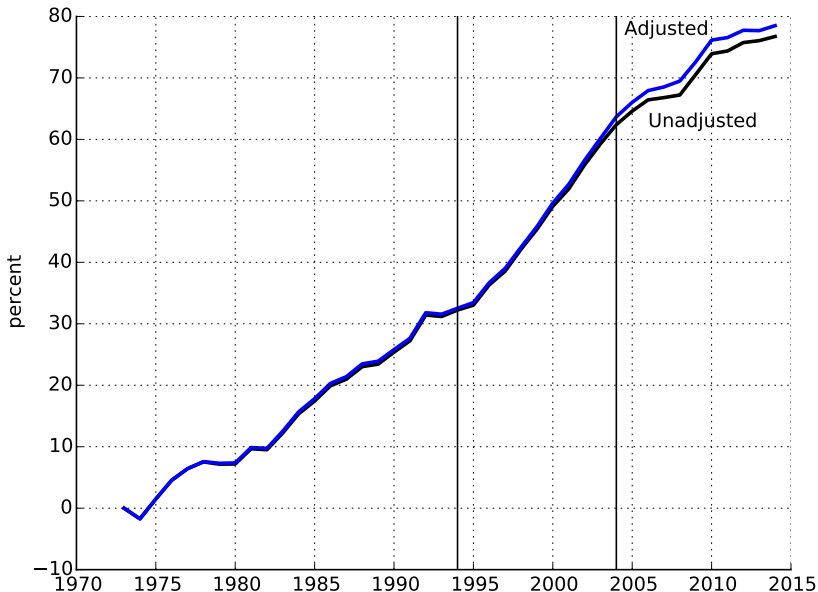
- ▶ Adjusted productivity is adjusted value added per hour

$$\tilde{A} = \frac{\tilde{Y}^{\text{VA}}}{L}$$

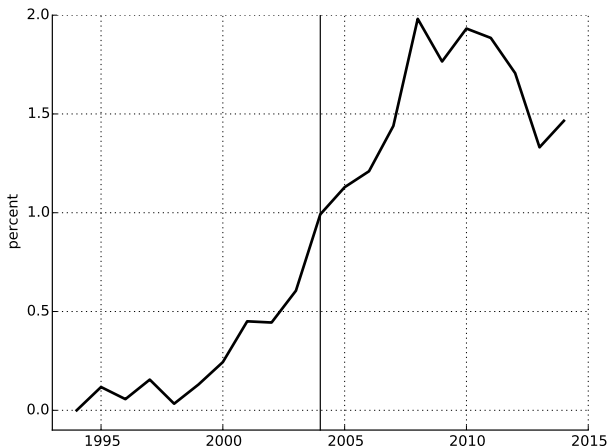
- ▶ Unadjusted productivity is adjusted value added per hour

$$A = \frac{Y^{\text{VA}}}{L}$$

Aggregate cumulative labor productivity growth



Increase in aggregate cumulative labor productivity growth



	Cumulative		Annual	
	Unadjusted	Adjusted	Unadjusted	Adjusted
1973–1994	32.2	32.5	1.53	1.55
1994–2014	44.5	46.0	2.23	2.30

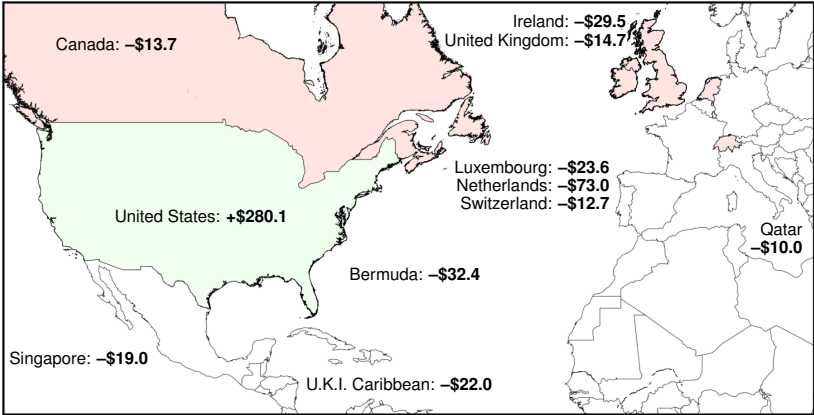
Adjustments in other countries, 2012

- ▶ **Positive adjustments:** Japan, France, Italy, Russia, Argentina, Greece, Turkey, Libya, Germany, and Kenya
 - ▶ Adjustments are too small to pass confidentiality checks
 - ▶ Japan, France, Italy, Greece, and Germany have tax rates that exceed the OECD average

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 - ▶ Japan, France, Italy, Greece, and Germany have tax rates that exceed the OECD average
- ▶ **Negative adjustments:** Netherlands, Bermuda, Ireland, Luxembourg, U.K.I. Caribbean, Singapore, U.K., Switzerland, Canada, Qatar
 - ▶ Tax havens: Netherlands, Bermuda, Ireland, Luxembourg, U.K.I. Caribbean, Singapore, Switzerland
 - ▶ Important locations of U.S. MNE production: Canada, U.K.

Reattribution of U.S. MNE earnings, 2012 (bil. USD)



Industry-level adjustments

Adjustment by industry, 2012

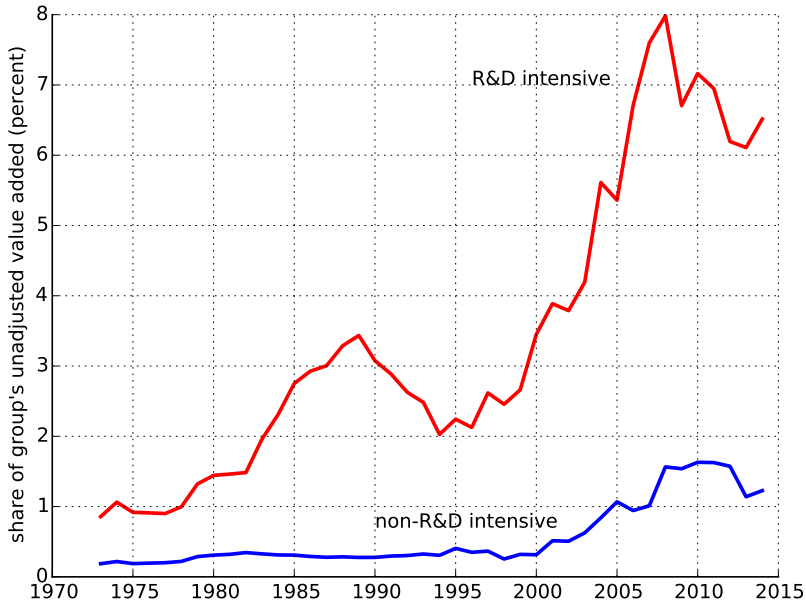
	Adjustment	
	share total adj.	share of VA
32 Wood, paper, petrol., chem., plastics	0.42	0.16
52 Finance and insurance	0.14	0.04
33 Manufacturing (computers, elec. equip., vehicles)	0.12	0.03
51 Information services (data processing)	0.07	0.03
54 Prof. and sci. services (computer sys. design)	0.05	0.01
31 Food, textiles, apparel	0.05	0.05
21 Mining	0.04	0.03
44 Retail trade	0.03	0.01
42 Wholesale trade	0.02	0.01
55 Management companies	0.02	0.02
53 Real estate and leasing	0.01	0.00
22 Utilities	0.01	0.00
48 Transportation and warehousing	0.01	0.00
70 Arts, recreation, accommodation	0.00	0.00
23 Construction	0.00	0.00
80 Other services, except government	0.00	0.00
56 Administrative and waste management services	0.00	0.00
11 Agriculture, forestry, fishing, and hunting	0.00	0.00
60 Education, health care, and social assistance	0.00	0.00

Industry-level adjustments by industry type

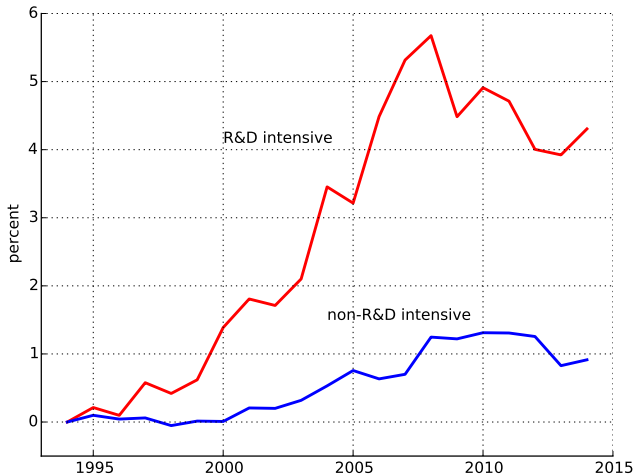
- ▶ Assign industries to groups based on
 - ▶ IT using, IT producing (Bloom et al 2012; Fernald 2014)
 - ▶ R&D intensity (75th percentile MNEs by R&D/Sales)
- ▶ As before, compute a formulary adjustment for each MNE
- ▶ Add the MNE's adjustment to the industry value added

$$\tilde{Y}^{RD} = \sum_{i \in I^{RD}} Y_i + \sum_{m \in M^{RD}} \epsilon_{m1}$$

Adjustment by R&D intensity



Increase in cumulative labor productivity growth: R&D intensity



	R&D intensive		non-R&D intensive	
	Unadjusted	Adjusted	Unadjusted	Adjusted
1973–1994	57.1	58.2	25.5	25.6
1994–2014	94.5	98.8	27.6	28.5

Summary

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- ▶ Increasing potential for misattribution of value added

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- ▶ Formulary apportionment shows
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- ▶ Formulary apportionment shows
 - ▶ Measurement error has increased since mid-1990s
 - ▶ Larger for R&D-intensive industries
- ▶ Other places this mismeasurement could matter
 - ▶ Capital's share of income
 - ▶ Importance of C- and S-corps in business income
 - ▶ The current account vs. the trade balance
 - ▶ U.S.-owned foreign assets and foreign-owned U.S. assets returns

Foreign MNEs operating in the United States

Adjusting for foreign-owned affiliates

- ▶ Survey: U.S.-owned affiliates operating abroad very good
- ▶ Survey: foreign parents operating affiliates in U.S. are incomplete
- ▶ U.S. tax rates create incentives to understate income earned in U.S. by affiliates of foreign multinationals (FDIUS)

$$GNP = GDP + \underbrace{\text{income on USDIA}}_{\text{overstated}} - \underbrace{\text{income on FDIUS}}_{\text{understated}} + \dots$$

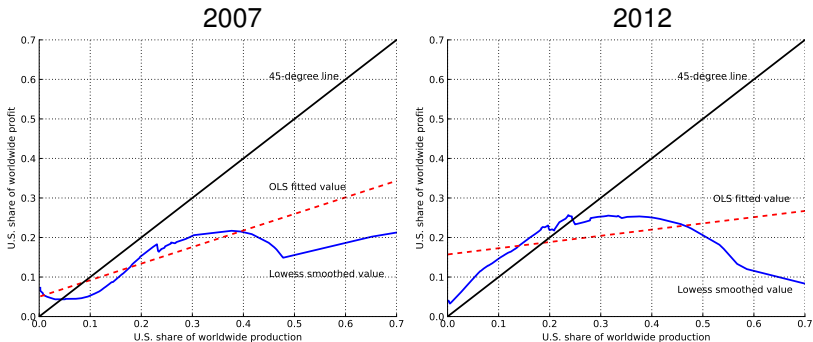
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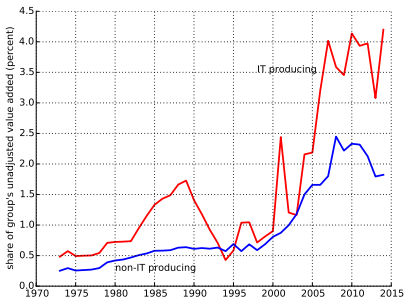
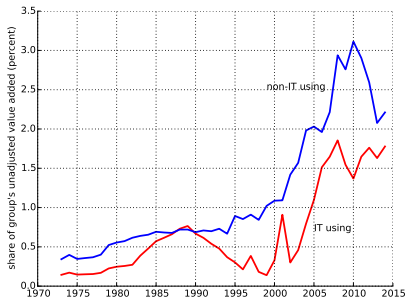
- ▶ Match BEA data on affiliates in the U.S. with data from Orbis on the foreign parent. No common identifier.
- ▶ Match about 100 technology intensive foreign-owned affiliates operating in U.S.

Profits and production of foreign MNEs

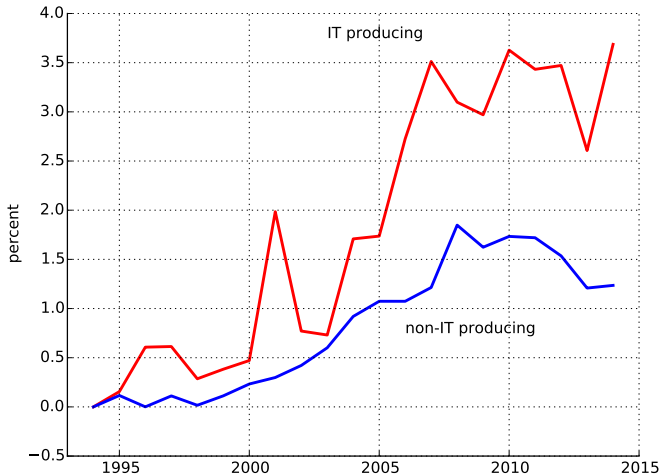


- ▶ MNEs with significant U.S. operations earn most of their profit outside of the United States

Adjustment by IT usage and production

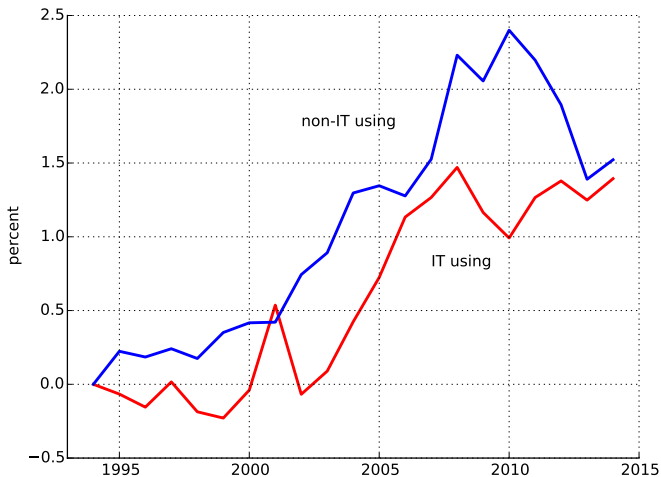


Increase in cumulative labor productivity growth: IT producing



	IT producing		non-IT producing	
	Unadjusted	Adjusted	Unadjusted	Adjusted
1973–1994	96.2	96.1	23.9	24.2
1994–2014	142.3	146.0	25.5	26.8

Increase in cumulative labor productivity growth: IT using



	IT using		non-IT using	
	Unadjusted	Adjusted	Unadjusted	Adjusted
1973–1994	52.4	52.7	28.9	29.2
1994–2014	72.5	73.9	27.5	29.0