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**Supplementary Tables and Figures for:**

**How Do You Measure a “Technological Revolution”? \***

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Discussant: Barbara Fraumeni. Chair: John Haltiwanger.

**Table A1.1 Nonfarm Business Fixed Investment rates<sup>1</sup>**

	1948-2007 (1)	1948-1972 (2)	1973-1994 (3)	1995-2007 (4)
1. Tangible	11.4	11.2	12.3	10.4
1a. ICT equipment	1.3	.6	1.6	2.0
1b. Non-ICT equipment	5.9	5.9	6.2	5.4
1c. Nonresidential structures <sup>2</sup>	3.2	3.2	3.5	2.6
1d. Residential capital	1.1	1.3	1.1	.8
2. Intangible	8.6	5.9	9.2	12.8
2a. Computerized information <sup>3</sup>	.6	.1	.6	1.6
2b. Innovative property	3.2	1.9	3.7	4.8
(1) R&D (NSF/BEA)	1.4	.9	1.6	2.1
(2) Other R&D, etc. <sup>4</sup>	1.2	.5	1.3	2.2
(3) Mineral exploration	.6	.5	.7	.5
2c. Economic competencies	4.8	3.9	4.9	6.4
(1) Brand equity	1.6	1.6	1.5	1.8
(2) Firm-specific resources	3.2	2.3	3.4	4.6

NOTE: All figures are averages for period shown.

SOURCE: Author calculations. Business intangible investments are as defined and estimated in Corrado, Hulten, and Sichel (2005). BEA's funder-based estimates are used for R&D.

1. Gross fixed investment as a percent of sector output adjusted to include new intangible investment.

2. Excludes mineral exploration.

3. Mainly software. Excludes the R&D double-count; see Robbins and Moylan (2007) for further details.

4. Finance and insurance and other social science R&D not included in NSF/BEA figures; other costs of creating new designs and artistic assets.

5. Marketing, branding, and other strategic investments in firms' organizational capital.

**Table A1.2 Shares of Nonfarm Business Capital Input<sup>1</sup>**

	1948-2007 (1)	1948-1972 (2)	1973-1994 (3)	1995-2007 (4)
1. Tangible	76.2	82.6	74.8	66.1
1a. ICT equipment	4.5	2.2	5.8	6.6
1b. Non-ICT equipment	24.3	25.3	24.9	21.1
1c. Nonresidential structures <sup>2</sup>	26.5	28.4	26.3	23.1
1d. Residential capital	8.7	9.8	8.4	7.1
1e. Inventories and land	13.0	16.9	10.5	9.8
2. Intangible	23.8	17.4	25.2	33.9
2a. Computerized information	1.4	0.2	1.5	3.9
2b. Innovative property	9.6	6.4	10.7	14.0
(1) R&D (NSF/BEA)	4.1	2.6	4.8	6.0
(2) Other R&D/design	4.2	2.2	4.6	7.1
(3) Mineral exploration	1.3	1.5	1.4	1.0
2c. Economic competencies	12.8	10.9	13.0	15.9
(1) Brand equity	3.8	3.9	3.6	3.9
(2) Firm-specific resources	9.0	7.0	9.5	12.1

NOTE: All figures are averages for period shown.

SOURCE: Author calculations. Business intangible capital estimates are as developed in Corrado, Hulten, and Sichel (2009). BEA's output-based deflator for R&D is used to obtain real R&D investment and capital.

1. Percent of total nonfarm business sector capital input adjusted to include intangible assets

2. Excludes mineral exploration.

**Table A2.1 Sources of Growth in Output per Hour (including intangibles)<sup>1</sup>**

	1948-2007 (1)	1948-1973 (2)	1973-1995 (3)	1995-2007 (4)
<b>1. <u>Output per hour</u></b>	2.41	2.99	1.56	2.76
<i>percentage point contribution:</i>				
<b>2. <u>Tangible capital</u></b>	.65	.76	.52	.64
2a. ICT equipment	.23	.11	.28	.36
2b. Non-ICT equipment and nonresidential structures <sup>2</sup>	.32	.47	.20	.21
2c. Other capital <sup>3</sup>	.10	.18	.04	.06
<b>3. <u>Intangible capital</u></b>	.42	.30	.39	.73
3a. Computerized information	.06	.01	.07	.15
3b. Innovative property	.19	.15	.16	.32
(1) R&D (NSF/BEA)	.10	.08	.07	.18
(2) Other R&D/design	.09	.07	.09	.14
(3) Mineral exploration	.03	.05	.01	.00
3c. Economic competencies	.17	.14	.15	.27
(1) Brand equity	.04	.04	.03	.05
(2) Firm-specific resources	.13	.10	.12	.21
<b>4. <u>Labor composition</u></b>	.20	.15	.26	.20
<b>5. <u>MFP</u></b>	1.14	1.78	.39	1.20

NOTE: Annual percent change for periods shown calculated from log differences. Components are independently rounded.

SOURCE: Author calculations.

1. Nonfarm business sector, with output and capital input adjusted to include business intangible investment.

2. Excludes mineral exploration.

3. Residential capital owned by business, land, and inventories.

**Table A2.2 Sources of Growth in Output per Hour (excluding intangibles)<sup>1</sup>**

	1948-2007 (1)	1948-1973 (2)	1973-1995 (3)	1995-2007 (4)
1. <u>Output per hour</u>	2.28	2.90	1.39	2.61
<i>percentage point contribution:</i>				
2. <u>Capital deepening</u>	.72	.82	.58	.76
2a. ICT equipment	.25	.12	.31	.42
2b. Other capital	.47	.70	.27	.35
4. <u>Labor composition</u>	.22	.16	.29	.22
5. <u>MFP</u>	1.34	1.92	.53	1.63

NOTE: Annual percent change for periods shown calculated from log differences. Components are independently rounded.

SOURCE: Author calculations.

1. Nonfarm business sector, with output and capital input adjusted to exclude published intangible assets (software and mineral exploration).

**Table A3. Difference in Sources of Growth Estimates (with and without intangibles)<sup>1</sup>**

	1948-2007 (1)	1948-1973 (2)	1973-1995 (3)	1995-2007 (4)
1. <u>Output per hour</u>	.13	.09	.17	.15
<i>percentage point contribution:</i>				
2. <u>Capital deepening</u>	.35	.24	.33	.61
2a. ICT capital <sup>2</sup>	.04	.01	.04	.09
2b. Other published assets	-.01	-.01	-.01	-.03
(1) Mineral exploration	.03	.05	.01	.00
(2) Other capital	-.04	-.06	-.02	-.03
2c. New intangible assets	.32	.24	.29	.56
4. <u>Labor composition</u>	-.02	-.01	-.03	-.02
5. <u>MFP</u>	-.20	-.14	-.14	-.37

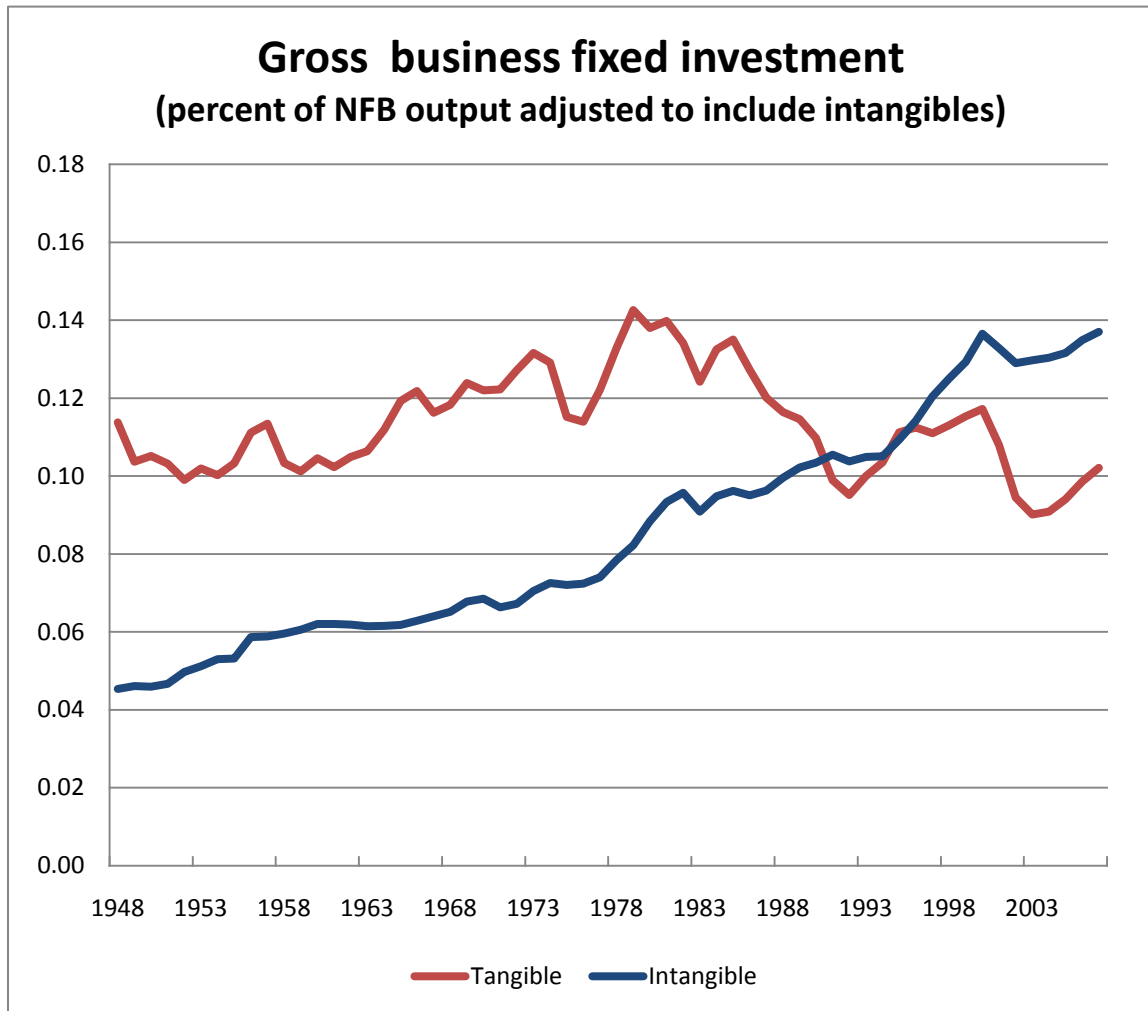
NOTE: Annual percent change for periods shown calculated from log differences. Components are independently rounded.

SOURCE: Tables A2.1 and A2.2

1. Output per hour (or contribution to output per hour) results for the nonfarm business sector including intangibles less corresponding results excluding published intangibles.

2. Equipment and software.

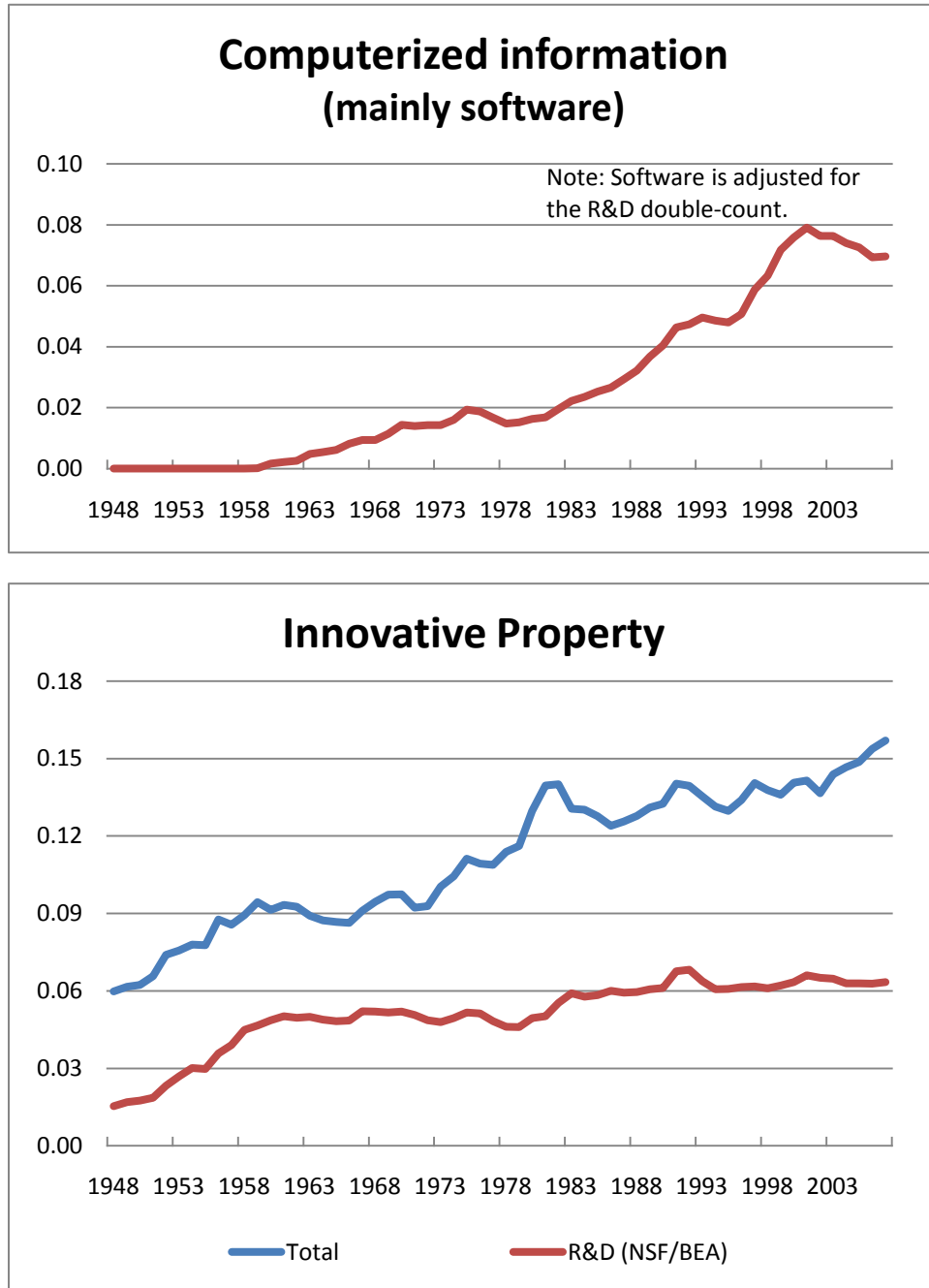
Figure 1.



Note. Last point plotted is 2007.

## Figure 2. Components of Business Intangible Investment

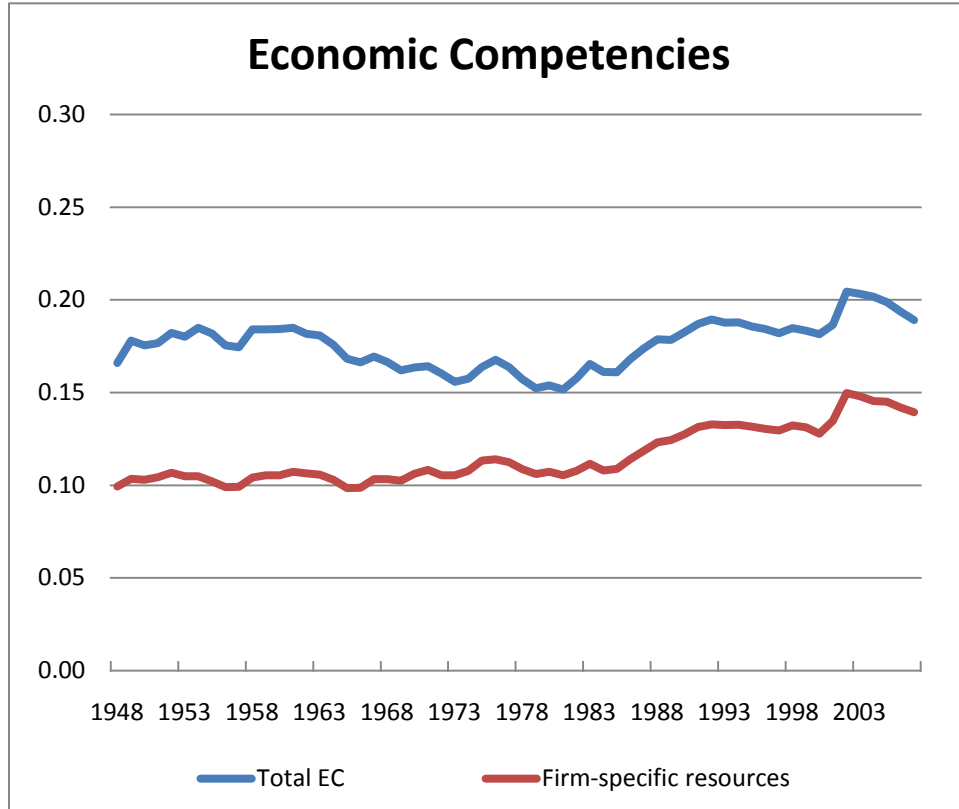
(share of component in total business fixed investment  
adjusted to include new CHS intangibles)



Last point plotted is 2007.



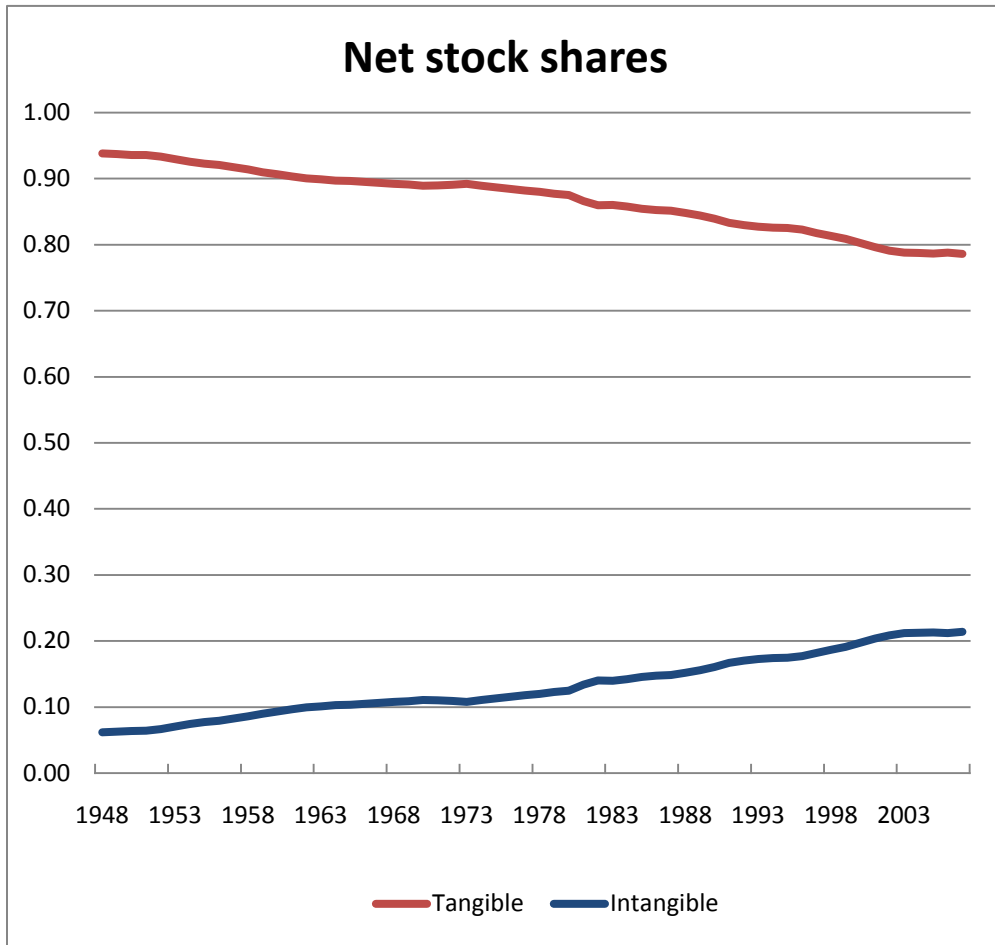
**Figure 2 (continued).**  
(share of component in total business fixed investment  
adjusted to include new CHS intangibles)



Last point plotted is 2007.

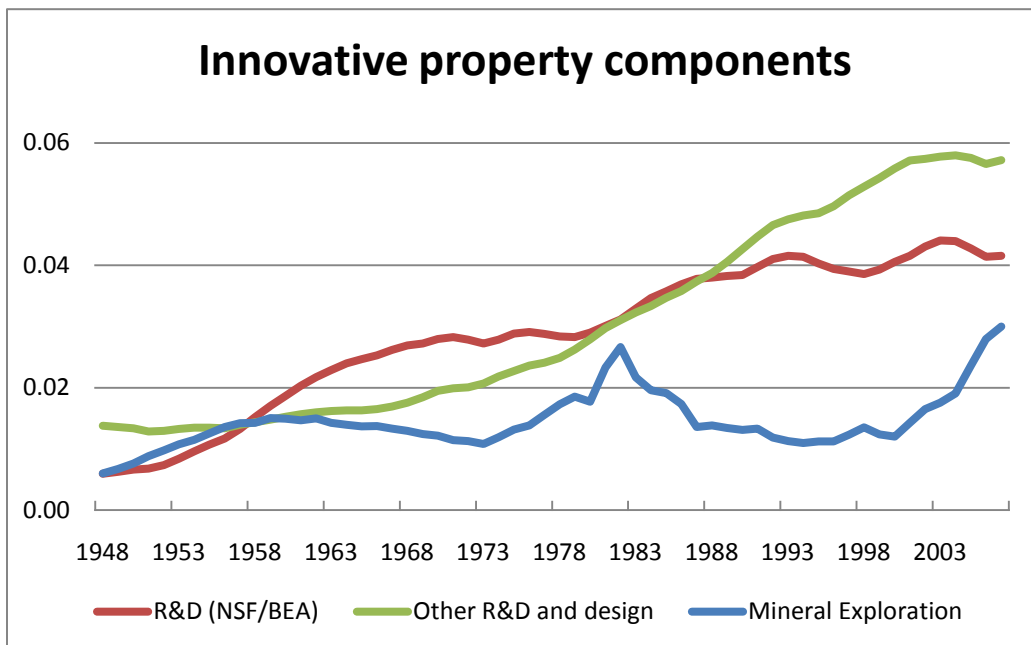
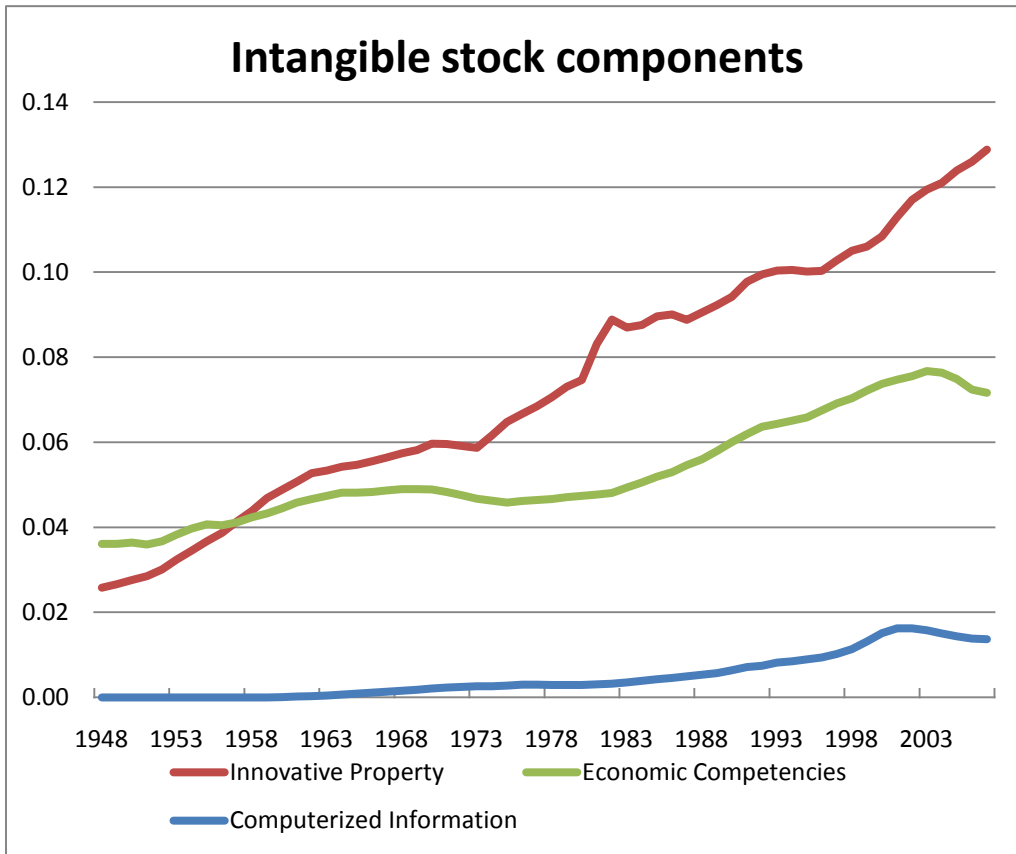
**Figure 3.**

(share of component in total nonfarm business net stocks including intangibles)



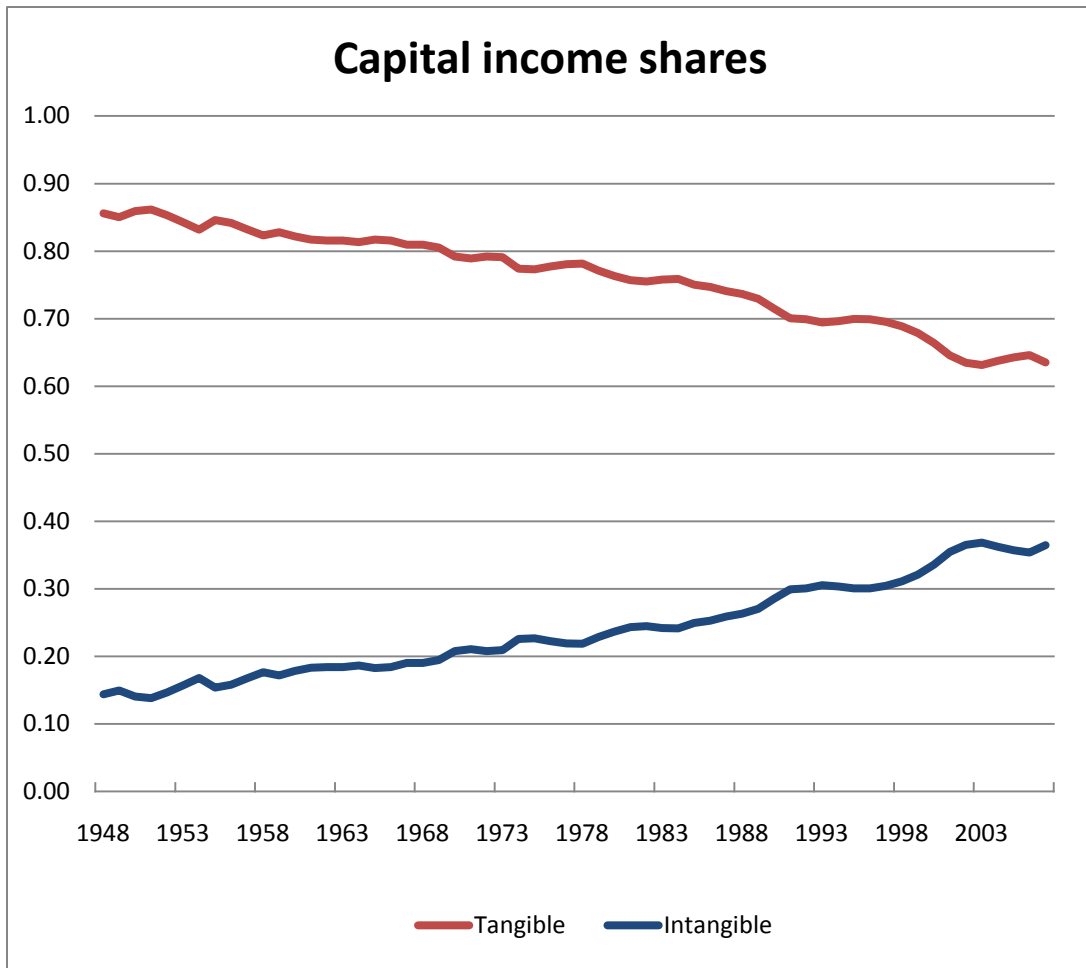
Last point plotted is 2007.

**Figure 3. Components of Intangible Net Stocks**  
 (share of component in total net stock including intangibles)



Last point plotted is 2007.

**Figure 4.**  
(share of component in total value of nonfarm business  
capital input including intangibles)



Last point plotted is 2007.