# Accounting for Innovation in Consumer Digital Services

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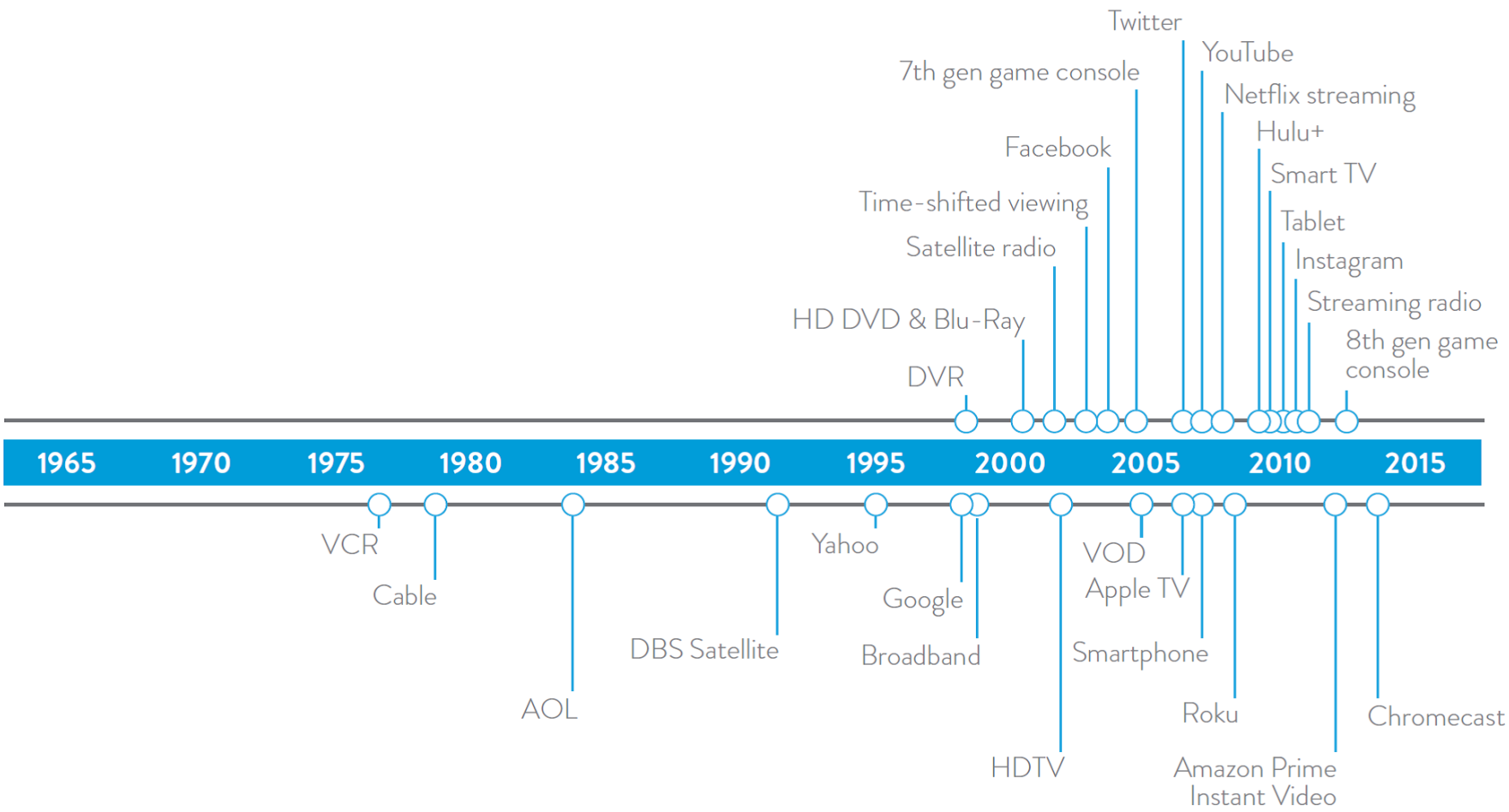
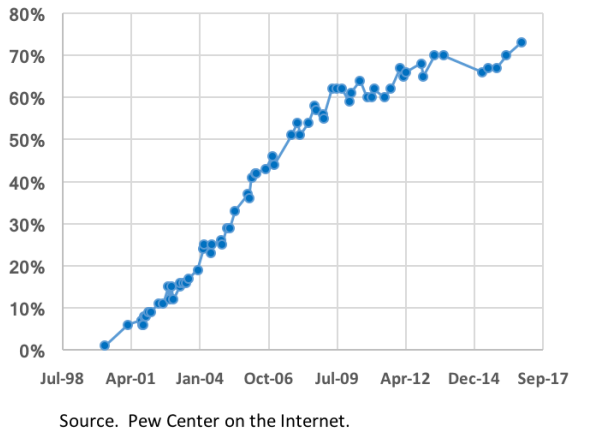
# Slow productivity a puzzle from consumer digital point of view . . .



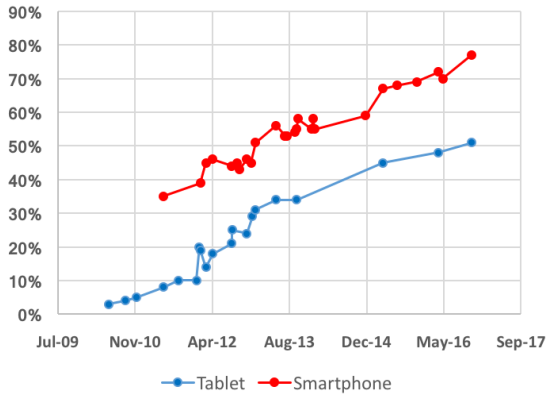

Source: Nielsen

# Household digital network use has increased dramatically since 2000



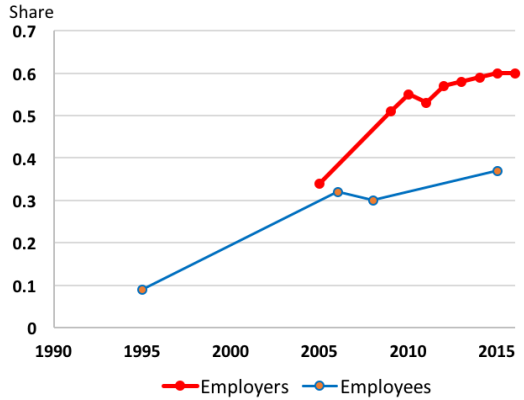

Source. Pew Center on the Internet.

(a) Broadband Use




Source. Pew Center on the Internet.

(b) Mobile Device Use




Source. Employers offering telework: Society of Human Resource Managers. Employees ever telecommuted: Gallup Polls.

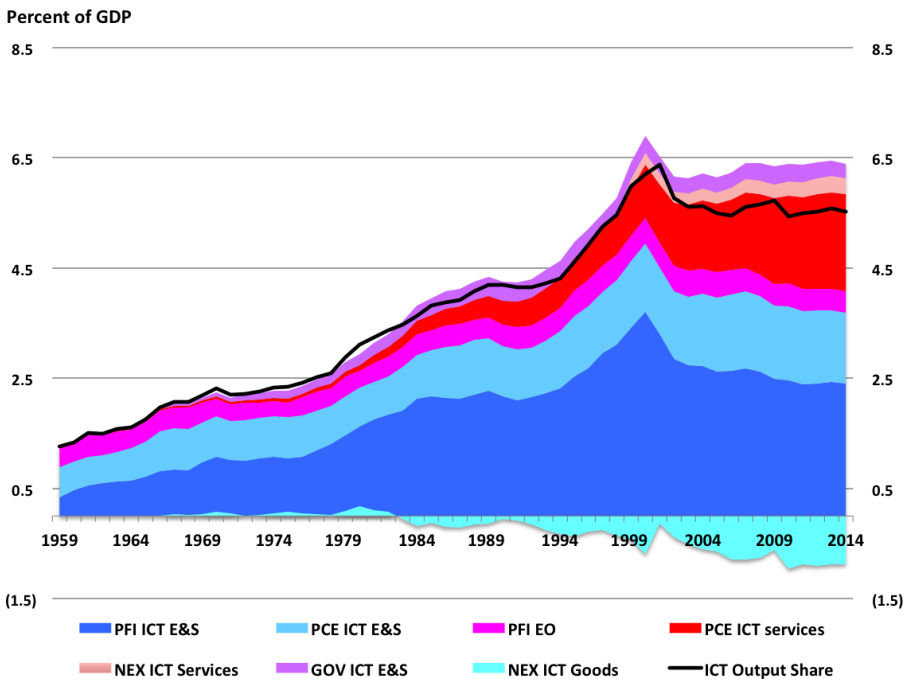
(c) Prevalence of Telework

# Research Question

Questions addressed in paper:

- Does capitalizing consumer ICT goods help to capture the ongoing digital transformation of the economy?
- Does accounting for their intensity of the use change the story?
- Can we capture quality improvements in digital ICT capital services consumed by households?

# Capitalization

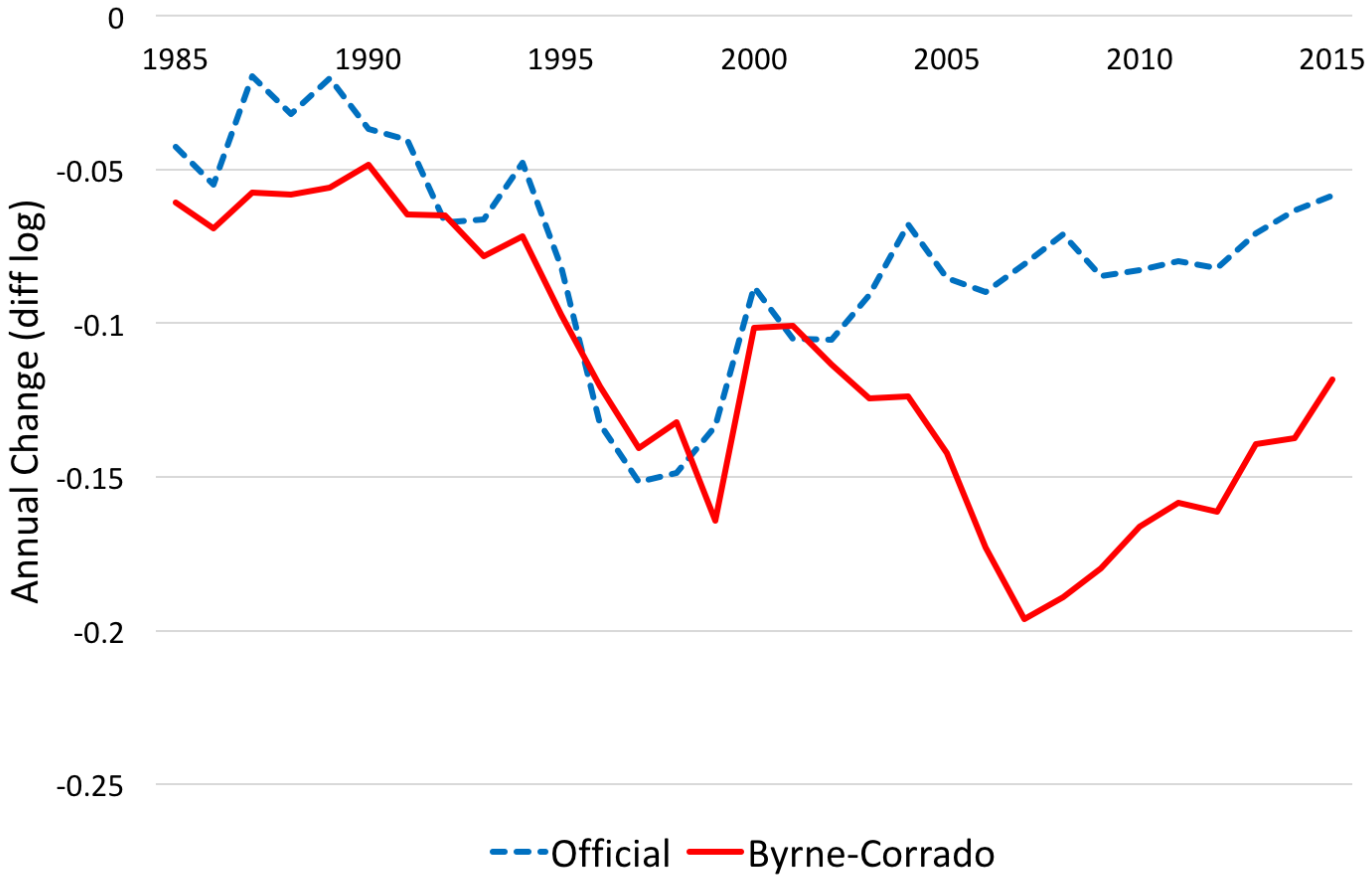



ICT Final Output Share

- Relabeling household consumption as investment doesn't change GDP
- But imputing service flows from that capital raises GDP, and its relatively big
- + there's an extra kick to productivity b/c ICT output experiences relative price declines

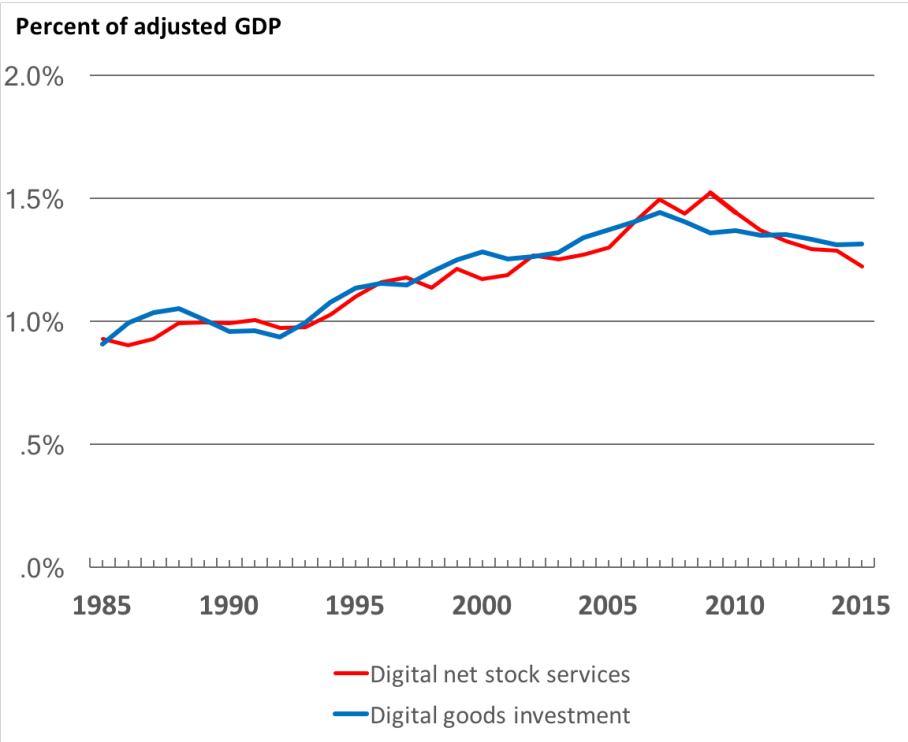
# Results: New research price index for PCE ICT investment goods

Declines in official digital goods asset prices are understated after 2000




Source. Bureau of Economic Analysis (official).

# Results: Nominal Services, no utilization adjustment

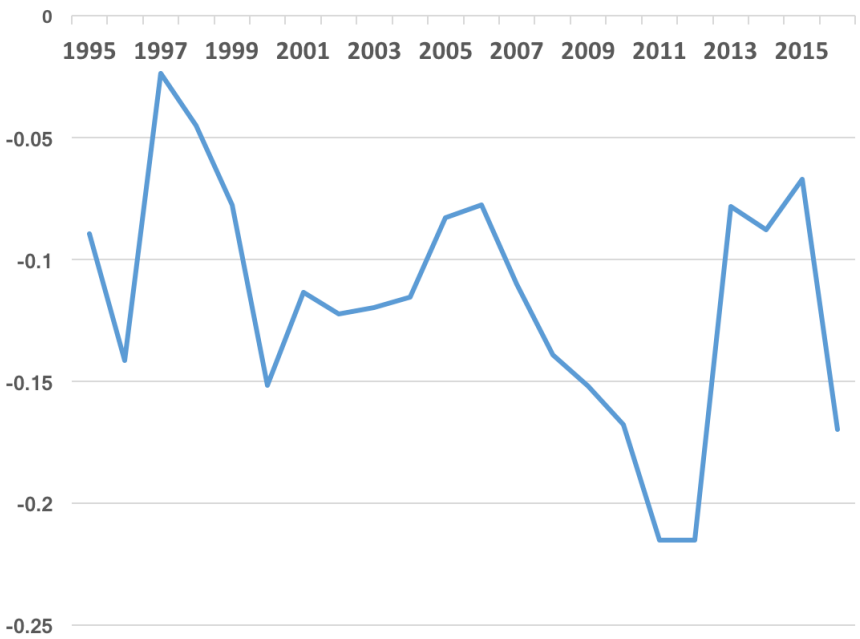



Consumer digital goods investment and capital services

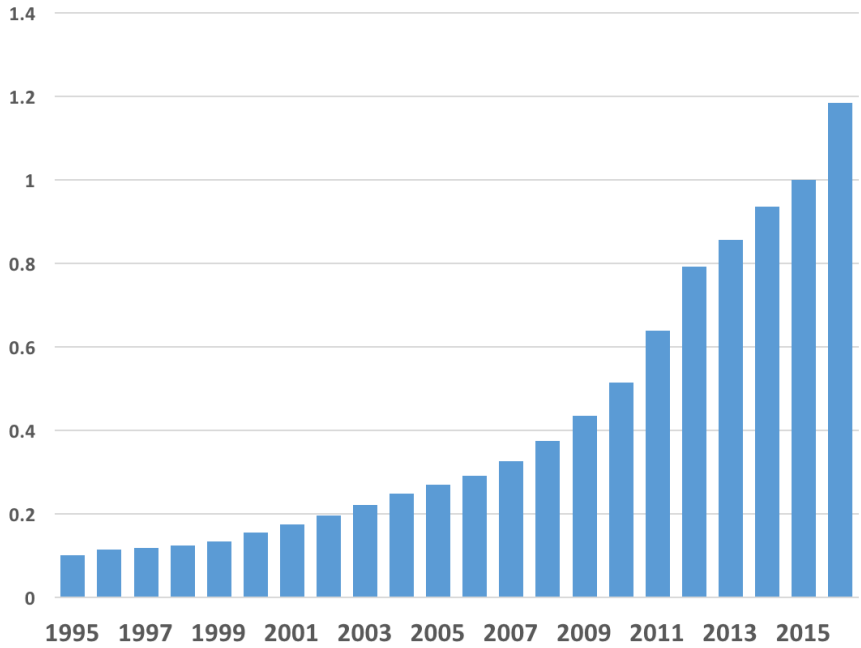
- Relative growth in capital services through 2009.
- Investment has leveled off.
- Combined with price index shown in previous chart, real services growth averages nearly 20 percent per year.

# Results: Utilization

Estimates based on decomposing payments for digital access services according price per users/households (average price) vs intensity of use (volume), e.g., IP traffic.

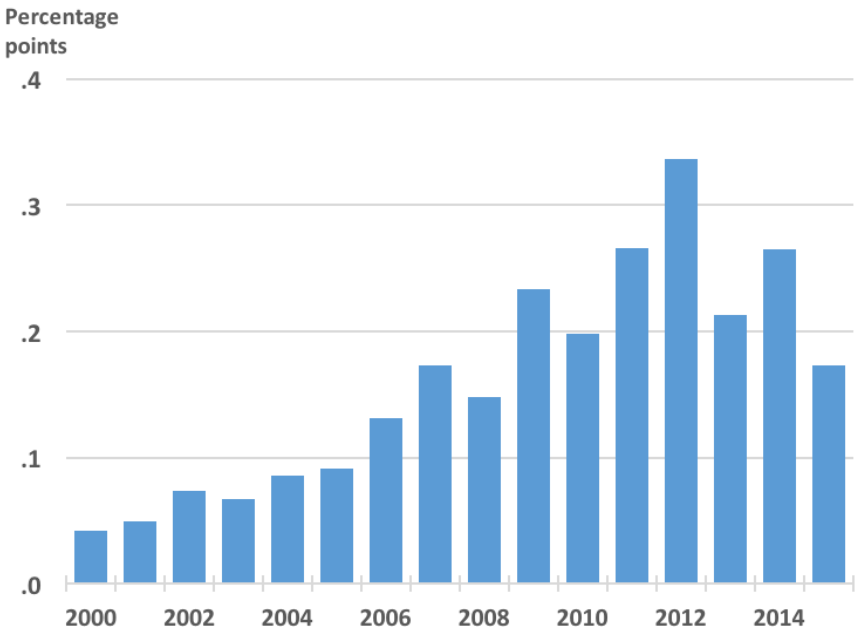



(a) Drop in underutilization (diff log)




(b) Implied utilization, 2015=1

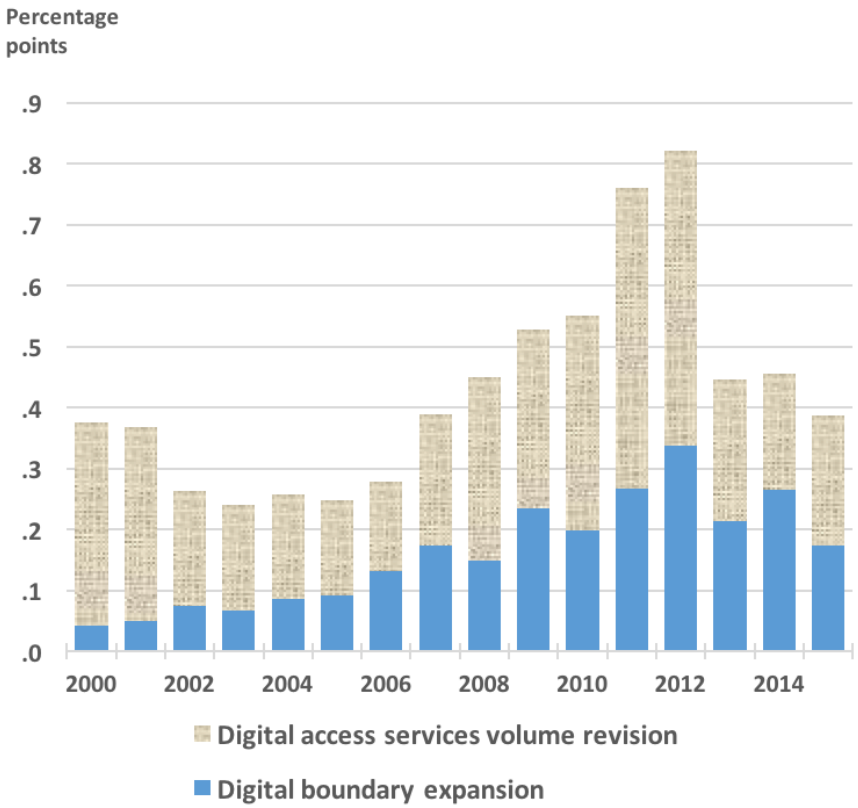
# Implications for GDP




Contribution to real GDP growth

- Contribution to GDP growth **accelerates** 1/4 percentage points over the 2000 to 2015 period.

# Implications for GDP–including implied volume of digital access services




Contribution to real GDP growth

- Contribution to GDP growth much larger over the 2000 to 2015 period.
- Contribution peaks in 2012.

# Conclusion

- Boundary expansion: The slowdown in labor productivity growth in the 2000's does not necessarily imply that growth in consumer living standards has deteriorated (one-for-one).
- Existing measures of digital goods and digital access services likely mismeasured.