ICT, Reallocation and Productivity

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OECD, Paris
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Overview

- Understanding Productivity: From macro to micro and back
- The role of ICT
- The role of Policy
The traditional growth accounting framework was of limited use in understanding the role of policy.

- Policy to boost R&D expenditures and policies towards supply conditions of production factors could have an affect.
- Competition policy, product and labor market regulations, trade policy did not fit into the framework.

Difficult to identify policy effects empirically using macro and industry data.
Departures from Representative Firm

- Baily, Hulten, Campbell (1994), Bartelsman and Dhrymes (1996)
- Booming literature in trade (Melitz)
From macro to micro and back

Micro choices
- Entry/Exit
- Innovation Strategy
- Factor inputs
- Product output

Market Selection
- Competition
- Policy Environment
- Tech. environment

Macro impact of innovation
Productivity Research Agenda

- Understanding the drivers of productivity from a firm-level point of view
  - Firm-level input choices
  - Firm-level choices of innovative strategy
  - Strategic interactions between firms in market

- Understanding the role of policy environment in boosting aggregate productivity
  - Traditional R&D policy and IP framework still important
  - but also, a role for reallocation across firms
  - and accommodating investment in intangible capital (KBC)
Setting up research infrastructure takes time.

Comparative Analysis of Firm-level Data

A low marginal cost approach

Eric Bartelsman

OECD, Nov. 26 2001
From Firm-level to Macro Indicators

Understanding Productivity
The Role of ICT
The Role of Policy

Longitudinal Micro Data
- Surveys, Business Registers
  - SC LMD
- \( \text{DMD} \)

National Accounts Industry Data
- Macro and Sectoral Timeseries
- EUKLEMS
  - Linked Indicators

Single country
- N.A.

Multiple countries
Distributed Micro Data Projects

- Eurostat
  - ICT-Linking, ESSLimit, ESSLait
  - NSIs of: AT, DE, DK, FI, FR, IE, IT, LU, NL, NO, PO, SE, SI, UK, (CZ, RO)
  - 2001-2010, Linked BusReg, ProdStat, ICT use, CIS (semi-annual)

- ECB CompNet

- OECD DynEmp, (MultiProd)
Moore’s Law continues to be a main driver of productivity growth
- Basic science, new materials
- Building on giants shoulders
- A continuing shift from marginal to fixed costs

Everything digital is essentially non-rival in use
ICT usage at firms continues to increase
### ICT usage varies across countries

<table>
<thead>
<tr>
<th>Country</th>
<th>broadband (%)</th>
<th>ICTi</th>
<th>Intens</th>
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Source: ESSLait, v41, Service Sector, 2009
ICT and knowledge based capital

- Investment varies widely across countries
- Productivity impact remains large
  - with ICT and KBC: 'Risk is Good'
  - a higher variance of firm-level outcomes together with market selection of the best improves aggregate productivity
- Large impact of ICT on firm-level riskiness and on reallocation
- Carrot and Stick needed to spur investment in ICT and KBC
Productivity and allocation: FI and SE

Source: ESSNet, Micro-moments database, v3.4, Manufacturing excl ICT.
Productivity and allocation: IT and UK

Source: ESSNet, Micro-moments database, v3.4, Manufacturing excl ICT.
## ICT use and dispersion: Industry-level evidence

**Table**: Std. Dev. of firm-level productivity distribution regressed on Broadband intensity

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<tr>
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<th>Levels</th>
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<tr>
<td>( \gamma )</td>
<td>0.47</td>
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<td>( R^2 )</td>
<td>0.52</td>
<td>0.03</td>
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<tr>
<td>D.F.</td>
<td>1180</td>
<td>1021</td>
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\[ \sigma_{c,i,t} = \alpha + \gamma BB\text{I}_{c,i,t} + FE + \varepsilon_{c,i,t} \]

*FE*: country, industry, time fixed effects

Source: ESSNet, Micro-moments database, v4.0
### Table: Output Growth Dispersion by ICT intensity

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Source: ESSnet, Micro-moments database v3.4
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Source: ESSnet, Micro-moments database v3.4
Boosting Aggregate Productivity

- Future growth will occur through continual disruption, job displacement, obsolescence, product cycles, firm entry/exit
  - Even for successful firms/products/workers, life will not be smooth
- This trajectory will require policy:
  - Input and output market flexibility
  - Insurance to cope with increased risk
  - Opening up (quasi) government sector
Human capital: attention to bottom and top of the distribution

- Reductions in policy-induced exit frictions
- Level playing field in input and output markets
- Credibility and predictability of long-run policy environment
- Opening up of future high-growth sectors
  - Health care
  - Education
Challenges for Workers

- Wage share declines as increasing share goes to quasi-rents
- Educational investment decisions more difficult owing to unpredictability of future ICT-labor substitution
- Higher incidence of job-displacement
Policy to accommodate risk

- Income distribution
  - Income sharing pools to mitigate uneven distribution of quasi rents
- Displaced workers
  - Churn may become too high to generate new jobs in a timely manner.
  - But policy to slow reallocation may reduce adoption of ICT and growth
Productivity Growth vs the Business Cycle

Nonfarm Business Sector: Output Per Hour of All Persons (OPHNFB)

Shaded areas indicate US recessions.
2012 research.stlouisfed.org