How to close the productivity gap between the EU and the US

by Röger, Varga & in ‘t Veld (ECFIN)

Comments by
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* this presentation is personal to the author and does not necessarily reflect the views of the European Commission
The strengths of the paper

- The paper calibrates a semi-endogeneous GE growth model à la Römer/Jones
- To explain the EU-US gap in productivity levels and R&D intensity
  - also jobs & skill premium
- The paper’s main findings:
  - For the R&D intensity gap: product-market-competition (mark-ups) and entry barriers in the intermediary goods sector are most important
  - For labour productivity (levels): product-market-competition in the final goods sector are most important
  - A neglected result: the importance of reducing the risk premia (financial constraints) for both R&D intensity and labour productivity
The model set-up

- The model is a variant of Römer model (variety model)
  - Cf alternative AK and Schumpeterian endogeneous growth models
  - Jones variant of Römer, avoiding scale effects;
  - Skill decomposition (low, medium, high)

- The submodel for innovation/R&D
  - R&D sector: with an exogeneous own and foreign stock of knowledge, new knowledge added by employing more skilled labour
    - Spillovers from foreign stock of knowledge
    - Results (patents) are bought by non-liquidity constrained households (medium and high-skilled)
    - MAKE: R&D expenditures (wage bill for skilled workers)
  - Intermediary sector (manufacturing): buys patents from the households, pay a fixed entry costs and sell new processes (monop.comp) to final goods sector
    - No MAKE,
    - only adoption of existing technologies: Disembodied BUY
    - Expenditures for acquiring patents from households
      - Technically not in BERD according to OECD Frascati manual
  - Final sector (services): buy the processes from the intermediary goods sector to produce and sell final products (services)
    - No MAKE, no Disembodied BUY
    - Only adopt process innovations from intermediary sector through Embodied BUY
      - Technically not in BERD according to OECD Frascati manual
The model set-up

- The submodel for R&D is more about the use/diffusion of innovations:
  - Effects of R&D more important than R&D gap:
    - on TFP/labour productivity (growth)

- The submodel for R&D is not very realistic

  - Final goods sectors = services; Intermediary goods sectors = manufacturing

    Versus

    - Manufacturing final goods producers
    - Intermediary service providers, some of which provide innovations for manufacturing (software companies, financial services, engineering..)

- process innovations, horizontal differentiation (variety), split between MAKE, DEMBbuy, EMBbuy, innovations only produced in specialized R&D sector, diffusion through patent trading, households holding patents...

    Versus
Some empirics...

- 11% of Belgian EPO patents are applied for by individual person (79% firms, 10% HEI/PROs)
- Only 11% of EPO patents are licensed (PATVAL)
- Firms which are innovation-active, do own R&D (64%) 59% buy equipment, 19% buy licenses (Flemish CISIV).
- Only 9% of innovation-active companies apply for a patent (EU-CISIV)
- 71% of Flemish Cies in “Immaterial Services” sector are innovation-active, 55% have permanent R&D activities
- 45% of Flemish Cies in “Material Services” sector are innovation-active, 36% have occasional R&D activities;
- 40% of innovations are aimed at improving quality of products/services (EU-CISIV)
- 17% of innovations are aimed at reducing labour costs, 7% reducing material/energy (EU-CISIV)
- 73% of Flemish innovation-active firms are product-innovators, 67% process-innovations
An unrealistic innovation/R&D model set-up

Does it matter for the results?
Effects of product-market competition/mark-ups

- The Schumpeterian growth models à la Aghion et al have made clear that the link between competition and innovation is complex
  - Countervailing forces playing differently depending on the technology gap
    - Competition is more likely to be stimulating innovation closer to frontier (neck-and-neck) competition

Does this model allow for non-linearities in the role of competition/mark-ups?

- Model results on competition are driven by model assumptions
  - Final product market competition (services) has effect on productivity levels, but no or little effect on R&D gap
  - Intermediary product market competition (manufacturing) has effect on R&D gap but little on productivity levels
    - By model assumption:
      - final R&D sector not R&D active, nor DEMB buying of technology; intermediary sector buys DEMB;
      - Entry process in intermediary goods sector, not in final goods sector

Sensitive policy implications on importance of further integration of services sector in EU on innovation, growth and jobs
Financial constraints

- Calibration results indicate importance of FC for R&D gap, productivity gap
- Survey evidence confirm importance of FC for innovation, esp for young, small innovators
  BUT in this model
- FC not in medium/high-skilled households which buy/sell licenses;

*How does FC affect R&D, productivity?*

*What drives the strong effects?*
Sectoral specialisation

- A major issue in the literature on explaining the US-EU R&D deficit is the sectoral mix
  - EU’s specialisation in medium tech sectors

- This model has no sectoral decomposition, and can therefore not contribute to this discussion

- Nevertheless, size of the R&D sector, intermediary sector, final sector should matter, but not in reported calibration
  - EU’s different specialisation in (High-Tech) services
Policy Instruments for innovation/R&D

- The model considers tax credits & allowances for households; for firms; similar rates for capital investments and license purchases.

- What about the more common R&D subsidies?

- What about patent costs? Patent effectiveness?
  - In EU significantly higher (up to 4 times) than in US (see van Pottelsberghe).
Globalisation scenario

- Despite international spillovers in stock of knowledge; trade of finished goods (services)
- Closed economy model for technology
  - Market for researchers/high skills is national (but see Freeman)
  - Market for disembodied technology buy is national; no Technology Balance of Payment
  - Market for embodied technology buy is national
Can model be used to calibrate differences between Member States?

- See openness/internal market assumptions of the model

Why is there a big part of the employment gap left unexplained?
To summarize

- This discussant loves the results
  - Importance of product market competition and financial constraints to explain US-EU R&D and productivity gap
- But this discussant does not love the model
- Can you reassure her that the results will be robust to alternative specifications that match closer the reality of R&D/innovation?