



EUROPEAN CENTRAL BANK

EUROSYSTEM

# Discussion of the paper “Do recessions slow technology growth? Evidence from the firm level”

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# Main take-aways (personal view)

- **Short-term demand shocks can have long-term impacts on potential output growth**, via their effect on R&D and technology adoption (TA) investment and thereby on TFP growth, even in the absence of financial constraints
  - Supported by data and rationalized with a model with a very interesting endogenous technology growth mechanism depending on both technology creation (R&D) and diffusion (TA)
- **Expectations (on demand or financial constraints)** can also affect innovation decisions of firms and thereby long-term growth
- **Availability of finance** can mitigate the negative impact of short-term shocks on innovative decisions and long-term growth

# Main take-aways (personal view)

- Inclusion of technology adoption (and not only R&D investment) is important:
  - R&D really concentrated in few firms; technology adoption defines the rate at which new technologies diffuse in the economy – aggregate impact; The survey finds that TA is more pro-cyclical than investment in R&D (subject to multi-year plans)

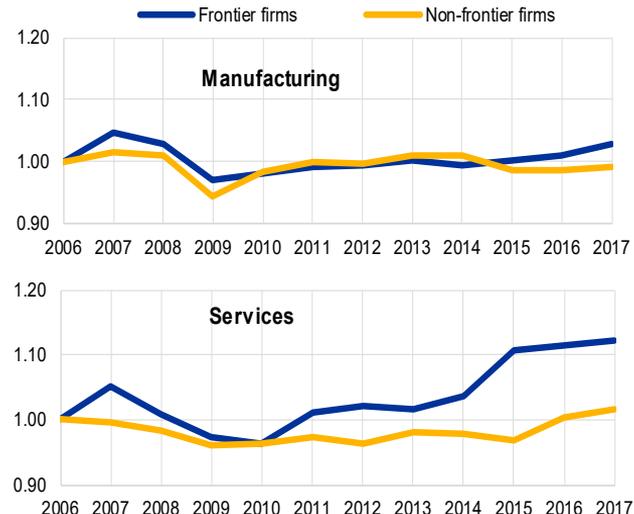
## Concentration of R&D investment

### Concentration within the top 2500 global R&D spenders, 2015

	Share of top 1%	Share of top 10%
R&D	27%	71%
Sales	22%	66%
Employment	18%	61%

Source: Bruegel (2018) based on EU Industrial R&D Investment Scoreboard

## Slow diffusion of technology, in particular in services



# Some questions: survey

- The survey data refers to July/August/September 2021 and offers information on pre-COVID investment plans and actual spending in 2020:

## How “representative” is the COVID-induced crisis? Can we generalize findings?

- *Huge uncertainty (first time ever) – overblown impact of uncertainty/expectations?*
- *Huge liquidity support – driving relatively small role of financing constraints?*
- *Firms needed to invest to increase connectivity (TA) to allow employees to work from home – driving the fact that some firms increased their investment in TA (not shown in PPT)?*
- Can we distinguish between **contact-intensive services and other services like health/educational services in the sector analysis?** Aggregation might drive similar results across sectors
- Can we gauge the **factors behind the decision to invest (only) in R&D, in TA, in both or in none?** We know little about this and it has large aggregate implications

# Some comments: model

- **Mechanism at work:** A transitory demand shock lowers expected payoff of R&D and TA relative to cost of investment -> procyclical investment in innovation and TA-> reduce TFP growth permanently and long-term growth, which drops below pre-crisis trend
  - Alternative mechanism: **Opportunity cost theory** (Saint-Paul 1997; Aghion et al. 2008):
    - *Firms have limited resources which they allocate to current production or to investment in productivity-enhancing activities. Those are costly in terms of forgone output, but benefits extend in the future*
    - *A transitory demand shock reduces the opportunity cost of investing in R&D and TA -> it is optimal to shift resources from current production to innovation-> the **share** of R&D in total investment is **countercyclical** (R&D drops less than other investments)*
    - *If firms depend on external resources to invest in R&D or TA, the drop in revenue could decrease their ability to borrow for long-term projects. Hence, the **share** of R&D and TA in total investment **turns pro-cyclical** (only) in credit constrained firms*
    - *Confirmed on French data (Aghion et al. 2008), Slovenian data (Bovhan-Padilla 2009) and Spanish data (Lopez-Garcia et al 2013)*

# Some comments: model

- How is investment financed in the model? What happens if some firms are financially constrained?
  - *Access to external finance could be modelled as dependent on collateral – i.e. lower in smaller firms, to match survey results*
  - *What do we learn in terms of stabilizing/amplifying impact of monetary policy?*
- What is the assumption on the relative cost (and structure of costs) of investment in R&D vs. technology adoption?
  - *Assuming lower investment costs for TA and financial constraints for certain type of firms could result in interesting dynamics*
- What happens with other investments (in fixed tangible assets)?
  - *Is there a possible substitution between different types of investments?*