Discussion of Benigno-Fornaro
“Stagnation Traps”

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Overview

- How does a deep recession become a long slump?
- Feedback effects on R&D and productivity growth!
  - Recession $\Rightarrow$ lower GDP
  - Reduces PDV of profits from innovation
  - Lowers innovation $\Rightarrow$ lower TFP
Neoclassical Growth Model and Capital

• Recession $\Rightarrow$ lower investment
  ◦ Reduces the capital stock
  ◦ Therefore lowers trend GDP

• Will the economy return to its original steady state?
  ◦ Yes: if the recession is caused by a temporary shock
  ◦ No: if a permanent rise in “user cost of capital”

• This force is partly responsible for the CBO’s downward revisions of potential GDP.
Beyond the Neoclassical Growth Model

- Focus on innovation and TFP, not capital
  - Recession $\Rightarrow$ ↓ PDV profits $\Rightarrow$ ↓ innovation $\Rightarrow$ ↓ TFP
  - Especially in GFC / ZLB: high $r$ $\Rightarrow$ discount future

- Paper explores additional features
  - Endogenous growth
  - Multiple equilibria
  - Zero lower bound issues

- Intriguing. But the heart of the issue:
  
  To what extent has the Great Recession lowered R&D and therefore lowered TFP?
Research during the Financial Crisis and Slump

SHARE OF GDP

0% 1% 2% 3% 4% 5% 6%


YEAR

Private R&D

Government R&D

Software and Entertainment
In chained dollars...
In growth rates...
Quantify effect on TFP?

- Let $A$ denote TFP and $R$ denote R&D spending. Simple idea production function:

$$\frac{\Delta A_t}{A_t} = \alpha R_t A_t^{-\beta}$$

- Calibrate $\beta$ to match the long term trends.

Constant growth $\iff \beta = \frac{\text{Growth of } R_t}{\text{Growth of } A_t} = \frac{7.5\%}{1.5\%} = 5$

- Dynamic forecast: feed through the time series of $R_t$ into the idea production function above!
Forecast of TFP Growth using Simple Model

**TFP GROWTH (PERCENT)**

1.5 ppt slowdown!

**YEAR**

Forecast of TFP Growth using Simple Model

TFP GROWTH (PERCENT)

Predicted from R&D

Actual from J. Fernald (smoothed)
Thoughts

• Surprisingly large decline of 1/2 ppt since 2000!

• But not obvious that 2008 looks different from 2001
  ◦ Collapse of dot-com bubble seems more important?

• Even the large slowdown in R&D explains only a fraction of movements in TFP
  ◦ A point dating back to Griliches and the 1973 productivity slowdown
The Great Depression and 1930s?

SHARE OF GDP

0% 1% 2% 3% 4% 5% 6%

YEAR


Software and Entertainment

Government R&D

Private R&D
In chained dollars: up by 40% (1929-33)!
Why no decline?

- Economic reasons?
  - Maybe the 1930s was a time when R&D productivity was especially high — discovered some “idea gold mines”
  - “During the [Great Depression], the U.S. economy was, in fact, experiencing a period of technological and organizational creativity that, in the aggregate, remains as yet unmatched.” — Alexander Field, 2011, p. 313-14.
    - 1929–1941 featured rapid TFP growth, and numerous innovations
      - Television, nylon, conveyor belts, stainless steel, chrome plating, quick-drying lacquer paints, new plastics, tungsten carbide blades, instrumentation.
Why no decline? (continued)

- Measurement problems?
  - We know R&D expenditures does not fully measure innovation effort
  - E.g. WalMart does zero R&D

- In any case, no strong evidence there for the Benigno-Fornaro hypothesis...
R&D Spending in Japan (share of GDP)

Gross spending on R&D

Business enterprise R&D

YEAR

PERCENT OF GDP


1.0 1.5 2.0 2.5 3.0 3.5
R&D Spending in Europe (15 EU countries)

Gross spending on R&D

Business enterprise R&D
Thoughts

- Contrast research and physical investment
  - Investment share of GDP often falls significantly
  - R&D share in Japan and Europe does not look like this
- Still can have effects since GDP itself is lower, but these are correspondingly smaller
- A bit surprising to me: I would have expected to see bigger effects in the R&D data.
- Look across industries? International spillovers?
Conclusions

• Intriguing hypothesis — ring of truth

• Suggestive evidence of this force at work after 2000 in U.S.

• Smaller effects in Great Depression, Japan, and Europe? Why?