

# Comin & Gertler (2006) - Medium-Term Business Cycles

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## Motivation

- ▶ Economies fluctuate over periods of decades (US growth low in late
- ▶ Such movements are ignored by standard business cycle analyses.
- ▶ What are such movements like? Stylized facts?
- ▶ Might they relate to the fluctuations more normally looked at?

## Defining the Medium-Term

- ▶ Define medium-term as cycles with period of 0 to 200 quarters.
- ▶ This consists of usual definition of 2 to 32 periods, called high-frequency.
- ▶ And of medium-frequency of 32-200 periods.
- ▶ Look at both together as will model the medium-freq fluctuations as resulting from the high-freq.

## The Data

- ▶ Extract medium-term cycles using bandpass filters.
- ▶ Look at a number of standard variables such as output, hours, and investment.
- ▶ And some others like TFP & capacity utilization.
- ▶ Use quarterly data 1948:1 to 2001:2, although some variables only annual.

## Characterizing the Medium-Term: I

- ▶ Figure 1: Line with circles is medium-term as std dev from trend. Solid line is med-freq. Difference is then high-freq.
- ▶ Table 2: Medium-freq components account for much of the variance, more than high-freq.
- ▶ Table 3: Pointless.
- ▶ Table 4: Correlations with output similar for medium-term as for high-freq, with exception of relative price of capital.
- ▶ Figure 3: Notice how A & B are mirror-images. Suggests strong comovement of embodied and disembodied tech change.
- ▶ Later in Figure 5, we see that R&D leads medium-term output, which it does not do for high-freq.

## Characterizing the Medium-Term: II

- ▶ Some recent papers like Smets & Wouters (2005) attribute most short-term fluctuations to markup & capacity utilization, not tech shocks.
- ▶ TFP has medium-term variance of  $2/3$  of output.
- ▶ Although markups & capacity utilization also appear important.

## Idea Behind the Model

- ▶ What if the markup shocks that drive high-freq fluctuations led to medium-freq fluctuations?
- ▶ With endogenous productivity growth, and endog adoption there-of, the high-freq fluctuations can drive R&D, leading in turn to medium-term movements in TFP and output.
- ▶ Based on observation that periods with multiple serious recessions generally are the low growth periods.
- ▶ US 1973-83 is low growth and two big recessions. US 1995-2005 is high growth with one smaller recession.

## The Ingredients

- ▶ Two-sector (capital & consumption) RBC model model.
- ▶ Intermediate goods. Price markups on all goods. Wage markups.
- ▶ Variable capacity utilization. Endogenous R&D and tech adoption.
- ▶ Free-entry to R&D and adoption (intermediate goods) and final goods.
- ▶ Consumers choose consumption, leisure, and savings.

## Final Goods

- ▶ Final composite good for each sector,  $Y_{c,t}$ ,  $Y_{k,t}$ :

$$Y_{x,t} = \left( \int_0^{N_{x,t}} (Y_{x,t}^j)^{1/\mu_{x,t}} dj \right)^{\mu_{x,t}}$$

- ▶ Production function

$$Y_{x,t} = [(U_{x,t}^j K_{x,t}^j)^\alpha (L_{x,t}^j)^{1-\alpha}]^{1-\gamma} [M_{x,t}^j]^\gamma$$

## Intermediate Goods

- ▶ Intermediate composite good for each sector,  $M_{x,t}^j$ :

$$M_{x,t}^j = \left( \int_0^{A_{x,t}} (M_{x,t}^{j,k})^{1/\varphi} dk \right)^\varphi$$

- ▶ Adoption of new technologies increases  $A_{x,t}$ , which decreases the intermediate goods markup, which increases productivity.

## R&D and Adoption

- ▶ Innovation is costly and leads to new 'unadopted' technologies,  $Z$ .
- ▶ These are then adopted with prob  $\lambda(H)$ , where  $H$  is spending on adoption.
- ▶ So both R&D and adoption are costly and will endogenously increase when their rates of return increase.
- ▶ Two-sector model means capital evolves as:  
$$K_{t+1} = (1 - \delta(U))K_t + Y_{k,t}.$$

## How the model works

- ▶ The high frequency business cycle is generate by exogenous shocks to the wage markup (countercyclical).
- ▶ Decreasing wage markups increases output.
- ▶ This increases the profitability of new intermediate goods, and therefore increases adoption.
- ▶ This increases the value of unadopted projects, and therefore increases R&D.
- ▶ Exog high-freq business cycles therefore lead to endog medium-freq cycles.
- ▶ Figure 4: IRFs to an increase in the wage markup.

## Discussion

- ▶ Evaluate the model using standard business cycle stats. (*Table 5*)
- ▶ Compared to a standard RBC model it does about the same, bit better on capacity utilization. Both are good on everything but hours. (*Table 6*)
- ▶ Cross-correlations with output seem fine. (*Figure 5*)
- ▶ Model predicts monetary non-neutrality (if monetary policy can affect wage markup).

## Summary

- ▶ Medium-term fluctuations are large (and thus important).
- ▶ But most models just ignore them.
- ▶ This model endogenizes them as reactions to high-freq fluctuations.
- ▶ Leads to two major conclusions (neither really discussed in paper)
  - ▶ Predicts monetary non-neutrality.
  - ▶ Essentially concludes that the 60s got lucky (no or small recessions), around 1980 was unlucky (big recessions), and late 90s got lucky again. And that this is what caused the differences in the medium-term growth rates. That is, no role for policy etc.