The rise of the service share of intermediate inputs

- We document a new dimension of the structural change from manufacturing to services
- Advanced economies are experiencing a process of services deepening: the service share of intermediate inputs rises over time
- Manufacturing and services are becoming more intensive in services intermediate inputs

Transmission on monetary policy correlates with sectoral composition of intermediate inputs
- In countries which are more intensive in services intermediates:
  - Inflation reacts less to monetary policy shocks
  - Output reacts mildly more to monetary policy shocks

Does the services deepening alter the transmission of monetary policy?

- Services prices are much stickier than manufacturing prices:
  - Duration of service prices ranges between 8 months and 13 months
  - Duration of manufacturing prices is 3 months
- Services deepening dampens the response of aggregate inflation to monetary policy shocks through a marginal cost channel
  - Rise of services intermediates increases the sluggishness of marginal costs & sectoral inflation
  - Rise of services GDP dampens the response of aggregate inflation to monetary policy shocks through a composition channel
  - Neither sectoral marginal costs nor sectoral inflation rates change their dynamics

Motivating evidence

U.S. service share of GDP & employment

- We estimate a SVAR at quarterly frequency for 25 countries
- For each country we have a system of 3 variables:
  - log difference of GDP
  - log difference of CPI
  - nominal short-term interest rate
- We identify monetary policy shocks with sign restrictions:
  - shocks raise nominal interest rates
  - shocks reduce output and inflation
  - restrictions imposed on impact & following quarter
- Relationship between sectoral composition of intermediates & responses to monetary policy shocks is left unrestricted

U.S. service share of intermediate inputs

Inflation response & service share of intermediate inputs

- Changes in sectoral productivities generate endogenous variations in the Input-Output matrix:
  - Non-unitary elasticity of substitution (Ngai and Pissarides, 2007)
  - Non-homothetic component (Kongsamut, Rebelo and Xie, 2001)
  - Calibration matches services deepening between 1947 and 2005
  - We evaluate the responses of monetary policy shocks in the 1947 steady-state and in the 2005 steady-state

A two sector New Keynesian model with a time-varying Input-Output matrix

- Two inter-connected sectors: manufacturing (m) and services (s)
- Sectors differ in durability of the consumption goods, labor share & degree of price rigidity
- Intermediate inputs of services firms and manufacturing firms:
  \[ I_{t}^{m} = \left( \omega_{m} (S_{t}^{m} + h_{m})^{1-n_{m}} + (1-\omega_{m}) (M_{t}^{m} + e_{m})^{1-n_{m}} \right)^{1/n_{m}} \]
  \[ I_{t}^{s} = \left( \omega_{s} (S_{t}^{s} + h_{s})^{1-n_{s}} + (1-\omega_{s}) (M_{t}^{s} + e_{s})^{1-n_{s}} \right)^{1/n_{s}} \]
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Quantitative Results

- From 1947 to 2005, services deepening reduced the response of inflation to monetary policy shocks by 37%
- A third of this change is due to the dampening effect on sectoral marginal cost & inflation rates

Model vs. Data

U.S. service share of intermediate inputs

Inflation response & service share of intermediate inputs

Output response & service share of intermediate inputs