Cleveland FED Conference: “Inflation: Drivers and Dynamics”

Discussion of Smets, Tielens, and Van Hove’s

”Pipeline Pressures and Sectoral Inflation Dynamics”

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The Paper

- Very interesting paper!
- Studies pipeline pressure through the lens of an estimated multi-sector model
  - Inflation is due to: $\boxed{\text{aggregate shocks}} + \boxed{\text{direct effect of sectoral shocks}} + \boxed{\text{pipeline pressure}}$
  - Pipeline pressure: indirect effect of sectoral shocks on sectoral and headline inflation through the production network
- Complements the literature that evaluates spillover effects (to quantities) caused by production networks

Main Findings

- Producer prices of downstream sectors are strongly affected by price changes in upstream sectors
- Common component of inflation estimated using a dynamic factor model captures both aggregate shocks and pipeline pressure
- Pipeline pressure contributes significantly to the volatility and persistence of headline inflation
- Inflation in a given sector responds quickly to shocks originating in that sector (direct effect)...

Main Findings

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- Common component of inflation estimated using a dynamic factor model captures both aggregate shocks and pipeline pressure
- Pipeline pressure contributes significantly to the volatility and persistence of headline inflation
- Inflation in a given sector responds quickly to shocks originating in that sector (direct effect)...
- ... but slowly to shocks originating in the other sectors (pipeline pressure), and to aggregate shocks

Comments: Measurement of Pipeline Pressure

- Consider a toy economy with 2 equal-size sectors: an upstream sector (u) and a downstream sector (d)
- No investment, no government
- Sector d uses labor and the output of sector u as inputs:

$$y_{d,t} = (1 - \alpha)\, n_{d,t} + \alpha y_{u,t}$$

- Sector u uses only labor as input:

$$y_{u,t} = n_{u,t}$$

- Good produced by sector d is just used for consumption

$$c_t = y_{d,t}$$

Comments: Measurement of Pipeline Pressure

- Let $q_{u,t}$ denote the real price of the good produced by sector u. Then

$$\pi_t \equiv \pi_{d,t} = \pi_{u,t} - q_{u,t} + q_{u,t-1}$$

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- Sectoral Phillips curves:

$$\begin{aligned} \pi_t &= \beta E_t \pi_{t+1} + \kappa_d \left[(1-\alpha) w_{d,t} + \alpha q_{u,t} \right] \\ \pi_{u,t} &= \beta E_t \pi_{u,t+1} + \kappa_u \left(w_{u,t} - q_{u,t} \right) + \underbrace{\zeta_{u,t}}_{\textit{shock to sector } u} \end{aligned}$$

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1. Does not necessarily reflect pipeline pressure
   - If real marginal cost in sector d does not change, $\frac{d\pi_{t+i}}{d\zeta_{u,t}}$ simply captures general-equilibrium effects
2. Extent to which $\frac{d\pi_{t+i}}{d\zeta_{u,t}}$ differs from $\frac{d\pi_{u,t+i}}{d\zeta_{u,t}}$ depends on the response of $q_{u,t}$
   - Relative price adjustment depends on the structure of the economy (deep parameters and shocks)

Comments: Implications of Labor Immobility

- STV assume that labor is completely immobile across sectors
- Share of sectoral labor in total labor is constant
- I will argue that this assumption is not innocuous

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- Labor is allocated across sectors according to:

$$
\begin{aligned}
n_{d,t} &= \nu(w_{d,t} - w_t) + n_t \\
n_{u,t} &= \nu(w_{u,t} - w_t) + n_t \\
n_t &= \frac{1}{2}(n_{d,t} + n_{u,t})
\end{aligned}
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- Remaining equations:

$$\begin{aligned} y_{d,t} &= E_t y_{d,t+1} - (\phi \pi_t - E_t \pi_{t+1}) \\ n_{u,t} &= (1-\alpha)(w_{d,t} - q_{u,t}) + y_{d,t} \\ y_{d,t} &= w_t - \varphi n_t \end{aligned}$$

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- **Case 1: prices are rigid in both sectors:** $0 < \kappa_d = \kappa_u < \infty$

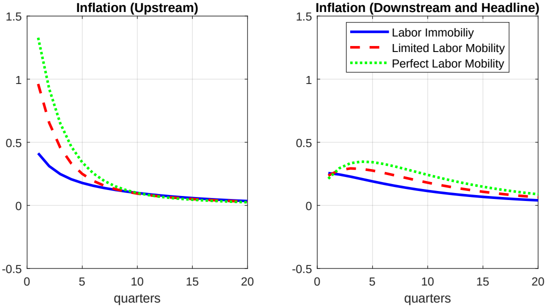

Figure: Impulse responses to $\zeta_{u,t}$ under rigid prices in both sectors

- Positive spillover (pass-through) to headline inflation in all cases
- $\pi_{u,t}$ responds faster to $\zeta_{u,t}$ than does π_t (as in STV's model)
- Allowing for sectoral labor mobility reinforces this result

Comments: Implications of Labor Immobility

- **Case 2: prices are rigid in sector u but flexible in sector d:** $0 < \kappa_u < \infty$ **and** $\kappa_d \to \infty$

- Under labor immobility, one can show that

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\begin{aligned}
y_{d,t} &= y_{u,t} = n_{u,t} = n_{d,t} = n_t \\
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- Headline and sectoral inflation respond in an identical way

- Result holds regardless of the remaining structural parameters
  - degree price rigidity in the upstream sector
  - Frisch elasticity
  - share of intermediate goods
  - etc.

Comments: Implications of Labor Immobility

- Under perfect labor mobility:

$$w_{d,t} = w_{u,t}$$

- But labor falls more in sector u, leading to a larger output decline in sector u than in sector d
- Thus $q_{u,t} = y_{d,t} - y_{u,t} > 0$
- Incomplete pass-through to headline inflation $(\pi_t = \pi_{u,t} - q_{u,t} + q_{u,t-1})$
- Relative price can rise so much that headline inflation actually *falls*

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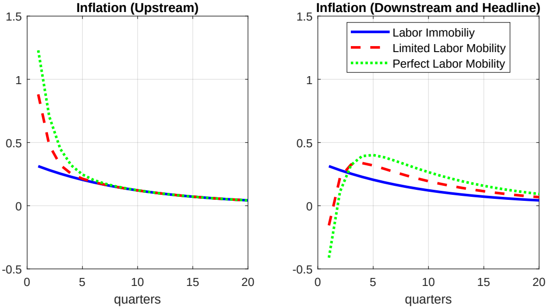

Figure: Impulse responses to $\zeta_{u,t}$ under flexible prices in the downstream sector

- Under labor immobility, pass-through to headline inflation is complete
- With labor mobility, pass-through to headline inflation is initially negative

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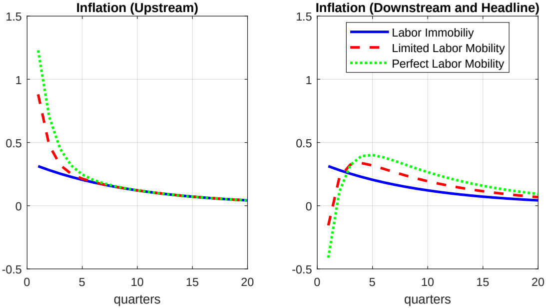

Figure: Impulse responses to $\zeta_{u,t}$ under flexible prices in the downstream sector

- Under labor immobility, pass-through to headline inflation is complete
- With labor mobility, pass-through to headline inflation is initially negative
- In both cases, however, this is not pipeline pressure, as the real marginal cost in sector d remains unchanged

Comments: Implications of Labor Immobility

- At short horizons, $\frac{d\pi_{t+i}}{d\zeta_{u,t}}$ overstates pipeline pressure when labor is immobile and understates it when labor is mobile

- Bottom line: (Mis)measurement of pipeline inflation depends (in a complex way) on the degree of labor mobility

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- Testable implication of STV's model: Everything else equal, pipeline pressure should explain a relatively larger share of the FEV of inflation in more downstream sectors
- Roundabout production structure $\Longrightarrow$ Sectors are not unambiguously downstream or upstream
- Still, one can rank the different sectors according to their 'downstreamness' using measures like the Katz-Bonacich Eigenvector Centrality measure
- Upstream (resp. downstream) sectors will be characterized by a high (resp. low) value of Centrality

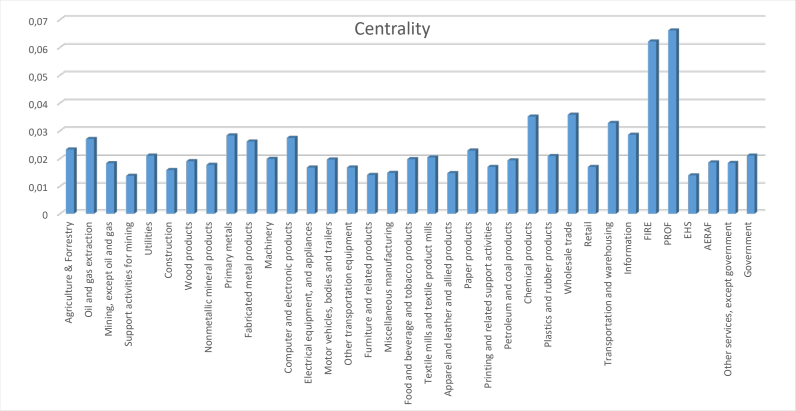

Figure: Centrality measure

Comments: Testable Implication

	Fraction of sectoral PPI inflation FEV(∞) due to pipeline pressure
Labor intensity	-0.2382 (0.1938)
Materials intensity	0.0653 (0.1207)
Price stickiness	**0.2053*** (**0.0749**)
Wage stickiness	0.0660 (0.1445)
Centrality	-0.1062 (1.3501)

Note: Standard errors between parentheses.

- Centrality enters with a negative sign, as expected, but its effect is statistically insignificant
- May be due to the mis-measurement of pipeline pressure

To Summarize

- Very interesting paper
- First attempt to provide a structural evaluation of the importance of pipeline pressure for inflation dynamics
- Some issues that STV may want to think about
  - Measurement of pipeline pressure may be confounded by general-equilibrium effects
  - Complete labor immobility is unlikely to be realistic