

DISCUSSION OF:
“SECTORAL PRICE RIGIDITY AND AGGREGATE
DYNAMICS”
BY BOUAKEZ, CARDIA AND RUGE-MURCIA

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THE GOALS

- Investigate implications of sectoral heterogeneity for
 - Sectoral output and inflation dynamics
 - Aggregate output and inflation dynamics

- Sectoral heterogeneity:
 - Price rigidity
 - Shock variances
 - Labor share, capital share, materials share
 - Mix of intermediate inputs
 - Durability (use as input into investment)

- Earlier work: Bils and Klenow (2002), Carvalho (2006), Nakamura and Steinsson (2008), Bouakez et al. (2009)

THE MODEL

- 30 sectors
- Intermediate inputs:
 - Round about production a la Basu (1995)
- Imperfectly competitive market structure:
 - Monopolistic competition a la Dixit and Stiglitz (1977)
- Price rigidity:
 - Quadratic costs of price adjustment a la Rotemberg (1982)
- Money demand / AR(1) money growth

THE CALIBRATION / ESTIMATION

Mix of calibration and SMM estimation

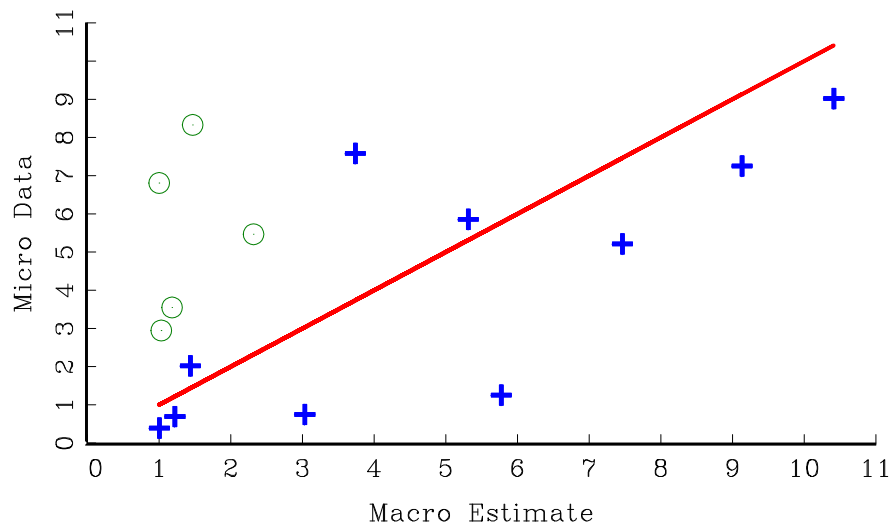
- Calibration:
 - Discount rate, Depreciation rate, Elasticity of substitution between goods, Consumption weights, Input-Output weights, investment weights
- Estimation: 86 moments and 47 parameters
 - Moments: Variances and autocorrelations of 43 series: Consumption, Investment, real money balances, money growth, nominal interest rate and CPI inflation, sectoral PPI inflation and real wages
 - Parameters: 30 sectoral price rigidity parameters, capital adjustment costs, variance and autocorrelation of shocks (sectoral productivity, money demand, labor supply, monetary policy)

THE RESULTS I

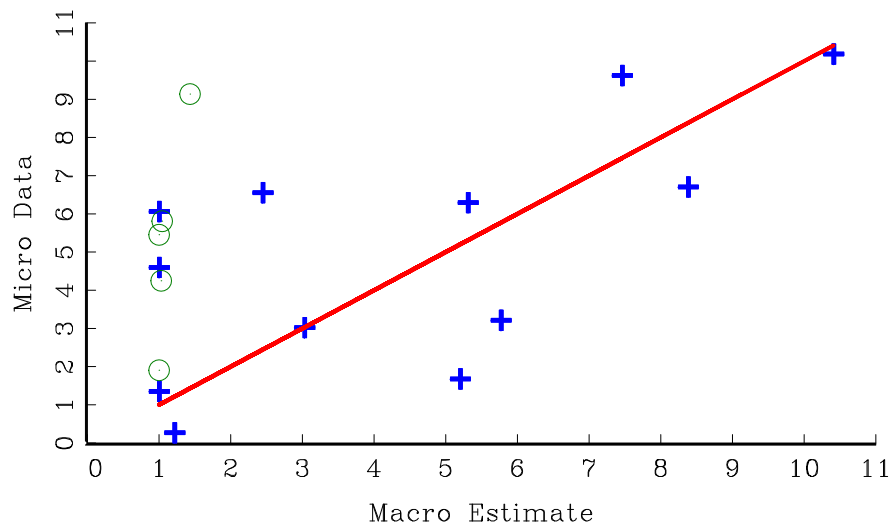
- Estimates of price rigidity based on macro data line up well with price rigidity estimates from micro data
 - Modelling heterogeneity helps solve discrepancy between “flexible” micro prices and macro estimates of rigidity based on aggregate model.
- Heterogeneity increases inflation persistence
 - Modelling heterogeneity helps avoid “rule of thumb” price setters (Gali and Gertler, 1999) or indexation (Christiano, Eichenbaum and Evans, 2005).

Figure 2: Comparison with Micro Estimates of Price Durations

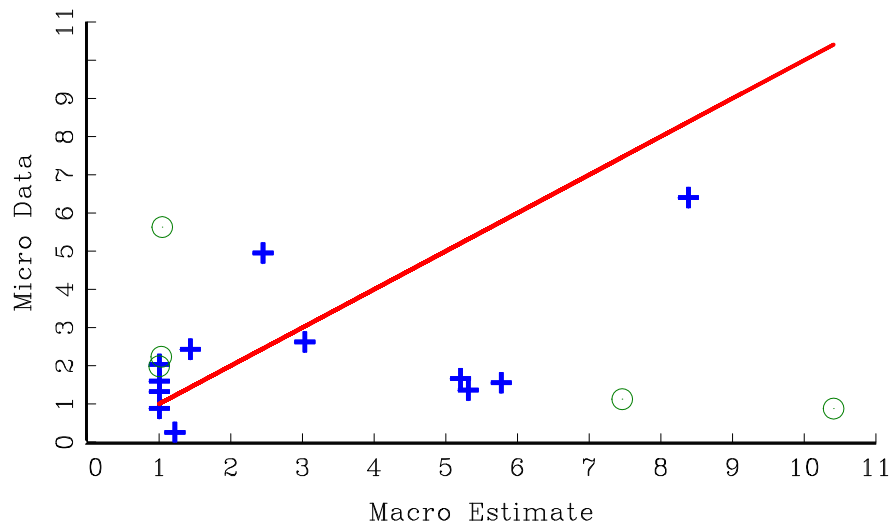
A. PPI



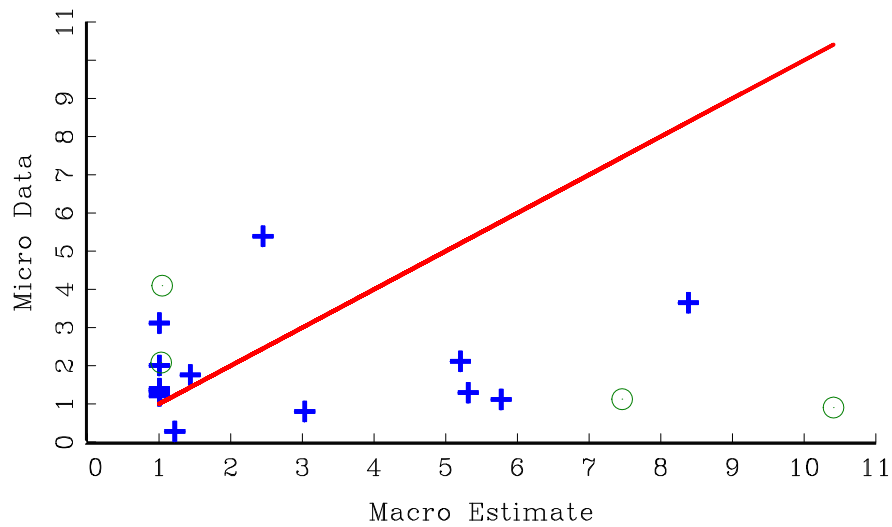
B. N&S (Regular Price)



C. N&S (Final Price)



D. B&K (Final Price)



Sectoral effects of monetary shocks:

- Inflation response stronger in sectors with:
 - Flexible prices, flexibly priced inputs and small materials share
- Output response stronger in sectors that:
 - Produce more durable goods and have high materials share

Table 8. Understanding Sectoral Responses to a Monetary Policy Shock

Sectoral Characteristic	Sectoral Inflation	Sectoral Output
	A. Correlations	
Price rigidity	-0.80*	0.37*
Durability	-0.06	0.65*
Labor intensity	0.00	0.29
Material intensity	-0.37*	0.23
Flexible-price inputs	0.65*	-0.49*
SD of productivity shock	0.03	-0.23
	B. OLS	
Intercept	2.940 (1.447)	-0.306 (2.131)
Price rigidity	-0.221* (0.053)	0.063 (0.076)
Durability	0.098 (0.253)	1.322* (0.436)
Labor intensity	-0.940 (1.620)	4.316 (2.218)
Material intensity	-1.879 (1.236)	3.939* (1.581)
Flexible-price inputs	0.814 (0.693)	-0.990 (1.497)
SD of productivity shock	1.029 (2.815)	-7.412 (4.650)
R-squared	0.707	0.654

Notes: * denotes significance at the 5 percent level. White heteroskedasticity-consistent standard errors are reported in parenthesis.

THE RESULTS III

- Heterogeneity amplifies real effects of monetary shocks
- Real effects 6 times larger in model with heterogeneity
- Generalization of Carvalho (2006) and Nakamura and Steinsson (2008) to allow for IO and production heterogeneity

MY COMMENTS

- 1 Sectoral real effects and price rigidity in the model versus the data
- 2 Strength of amplification of real effects
- 3 Consumption weights

SECTORAL REAL EFFECTS AND PRICE RIGIDITY

- Basic implication of sticky price models:
 - Output in sticky price sectors should rise relative to output in flexible price sectors after an expansionary monetary policy shock
- Bils, Klenow and Kryvtsov (2004): No, it falls.
- Boivin, Giannoni and Mihov (2008):
 - Yes, relative price of flex price sectors rise
- Mackowiak, Moench and Wiederholt (2008):
 - Yes, prices in flex price sectors respond more rapidly
- This paper: Yes, prices in flex price sectors respond more

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SECTORAL REAL EFFECTS AND PRICE RIGIDITY

- But what about output responses?
 - Money demand and non-constant expenditure shares.
- Comparison with sectoral IRF from the data would be a useful specification test

TIME-DEPENDENT VS. STATE-DEPENDENT PRICING

- Authors find:
 - Real effects 6 times larger in model with heterogeneity
- Considerably more than in earlier papers
- Some due to added heterogeneity (IO and production)
- Some due to interaction between time-dependent pricing heterogeneity and intermediate inputs
- Responder vs. non-responder asymmetry muted in state-dependent model

CONSUMPTION WEIGHTS

- Consumption weights are based on Horvath (2000)
- Horvath (2000) says that these are NIPA expenditure weights
- Seem a bit strange:
 - “Other services” gets weight of 1%.
 - Includes: health, legal, education, lodging, recreation, etc.
- Authors might want to use PCE weights
 - Health weight 16%
 - Housing weight 15%

CONCLUSION

- Very rich and interesting paper!
- Strong evidence that cross-sectoral heterogeneity is important for fitting business cycle dynamics