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Durable goods, inter-sectoral linkages and monetary policy

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ABSTRACT

Durable goods pose a challenge for standard sticky-price models because the near constancy of their shadow value and their apparent price flexibility lead to perverse and counterfactual economic implications, such as the tendency of the durables and nondurables sectors to move in opposite directions following a monetary policy shock. This paper introduces input–output interactions and limited input mobility into an otherwise standard sticky-price model with durable and nondurable goods. The extended model generates substantial aggregate effects and positive sectoral comovement following a monetary policy shock, even when durable goods have flexible prices. The latter result is consistent with empirical evidence on the sectoral effects of monetary policy.

1. Introduction

Recent research suggests that, under broad conditions, extending the standard sticky-price model to incorporate durable goods leads to perverse economic implications. In particular, Barsky et al. (2007) find that in the case where only durable good prices are rigid, the whole economy behaves as if characterized by price stickiness despite the fact that this sector is relatively small. In addition, the correlation of sectoral outputs following a monetary policy shock is basically zero. In the more empirically plausible case where durable good prices are flexible, monetary shocks have no effect on aggregate output, and induce negative output comovement across sectors. These results are essentially driven by the (near) constancy of the shadow value of durable goods to households. Since durability is an intrinsic characteristic of many goods in the economy, these results pose a challenge to the large literature that generates money non-neutrality on the basis of sticky prices, and which implicitly assumes that sectoral outputs are highly positively correlated so that it is possible to study the aggregate effects of monetary shocks by focusing on a symmetric equilibrium where this correlation is 1 by construction.

This paper incorporates input–output interactions and limited mobility of productive inputs into an otherwise standard sticky-price model with durable and nondurable goods. We show that these features change the predictions of the model in a way that makes them consistent with empirical evidence on the sectoral and aggregate effects of monetary policy shocks. In particular, the extended model generates positive output comovement across sectors and sizable aggregate

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Table 1
U.S. input–output matrix.

Producer	Consumer	
	Nondurables	Durables
Nondurables	0.904	0.455
Durables	0.096	0.545

Notes: This table reports the share of total material-input expenditures by the consuming sector that goes into goods from the producing sector. Thus, 45.5 percent of the material-input expenditure by the durables sector goes into goods produced by the nondurables sector. The shares were computed by the authors using the table "The Use of Commodities by Industries" for 1992 produced by the BLS.

effects of monetary shocks, even when durable-good prices are completely flexible.[1] We model input–output interactions using a roundabout productive structure, and for simplicity, focus on limited labor mobility, rather than capital mobility, across sectors. We show that each of these features contributes to magnifying the aggregate effects of monetary policy, but that none of them is sufficient, on its own, to overcome the tendency of the flexibly priced durables sector to contract after a monetary expansion. Instead, it is the interaction between the input–output structure and imperfect labor mobility that delivers positive sectoral comovement.

Input–output interactions are empirically important: Dale Jorgenson's data on input expenditures by U.S. industries show that materials (including energy) account for roughly 50 percent of outlays, while labor and capital account for 34 and 16 percent, respectively.[2] The Use Table of the Input–Output (I–O) accounts compiled by the Bureau of Labor Statistics (BLS) shows that 45 percent of the material-input expenditures by the durables sector goes into goods produced by the nondurables sector (see Table 1). The converse proportion is around 10 percent, which is much smaller but still not negligible. More generally, the U.S. I–O matrix is far from being the perfectly diagonal matrix that is implicitly assumed in models without inter-sectoral linkages. Also, the data suggest that labor and capital are not perfectly mobile across sectors. Davis and Haltiwanger (2001) find limited labor mobility across sectors in response to monetary and oil shocks. This suggests that households and firms do not appear to completely arbitrage away sectoral wage differentials, perhaps because workers have sector-specific skills and retraining is costly. Regarding capital, Ramey and Shapiro (2001) find in their case study of aerospace plant closings that transferring equipment to another sector is costly and that a large discount is required to entice buyers from outside the sector.

The manner in which input–output interactions and imperfect labor mobility are modeled here builds on our previous work on monetary multi-sector models (see Bouakez et al., 2009). However, there are two crucial differences between the model developed in this paper and the one in our earlier work. First, Bouakez et al. abstract completely from durability from the households' perspective. This means that that model is completely silent about the constancy or not of the shadow value of durable goods, which is central to Barsky et al.'s results. Second, while sectoral output comoves in both models, the reasons for such comovement are different. In our previous model, output comoves because sticky-price sectors react to a monetary policy expansion raising output and increasing their demand of goods produced in other sectors. Thus, it is price stickiness of the consuming sector that generates the comovement. Instead, what is important in this model is the price stickiness of the producing sector, which moderates the rise in the marginal cost of the flexible-price producer and, hence, its price increase. Limited labor mobility amplifies this effect to the extent of generating positive sectoral comovement following a monetary shock.

Other mechanisms that address this "comovement puzzle" have been proposed in the literature. Carlstrom and Fuerst (2010) consider a model with sticky nominal wages, housing construction adjustment costs, and habit persistence in consumption. The key feature in their model is sticky wages: As the rigid-price intermediate inputs in our model, sticky wages mitigate the increase in the marginal cost and, thus, the price of the flexible-price producer. Adjustment costs and habit persistence are important in that they "spread out" the initial positive comovement to subsequent periods. Lee (2009) estimates a model with price and wage rigidity and finds that a mild price stickiness in durable goods and a realistic degree of wage stickiness can solve the comovement puzzle. Kitamura and Takamura (unpublished) study a model with sticky information and show that this feature moderates the increase in the price of durable goods because not all firms incorporate the latest news into their pricing decisions. If, in addition, labor and capital are sector specific, a limited degree of information stickiness can deliver positive comovement across sectors. Compared with our work (and research that incorporates wage rigidity), where the key mechanism acts through the marginal cost into prices, Kitamura and Takamura consider a mechanism (sticky information) that acts directly into prices. Finally, Monacelli (2009) shows that for credit-constrained households, the user cost of durable goods is not quasi-constant since it also depends on the shadow value of

[1] Barsky et al. point out that their aggregate-neutrality result holds only in special circumstances. For example, it vanishes if there is limited labor mobility, or if labor can flow across sectors but the marginal product of labor in the durables sector is not constant (see p. 991). None of these two conditions, however, is sufficient to generate positive sectoral comovement.

[2] The data set is described in detail in Jorgenson and Stiroh (2000) and is publicly available at http://post.economics.harvard.edu/faculty/jorgenson/data.