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Capital, credit constraints and the comovement between consumer durables and nondurables

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ABSTRACT

Evidence indicates that consumer durables are more flexibly priced than nondurable goods and services. In otherwise standard two-sector neoclassical sticky-price models with flexible durable prices, following monetary tightening, nondurables decrease but consumer durables increase. Friction in lending between households can resolve the comovement problem if durable prices are sticky. However, if durable prices are flexible, friction in lending fails to generate joint decline. This paper resolves the co-movement problem by adding capital into a model with flexible durable prices and friction in lending. When capital is needed in production, monetary tightening reduces the relative price of durables which induces investment and decreases firms' real profits in the short run. Due to fewer profits remitted from firms, savers have a lower disposable income and cannot increase expenditures on consumer durables as much as otherwise. As a consequence, aggregate consumer durables decrease and there is a joint decline of nondurables and consumer durables.

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1. Introduction

Empirical evidence documented by Barsky et al. (2003) and Erceg and Levin (2006) indicates that expenditures on nondurables and consumer durables comove closely. However, in otherwise standard two-sector, neoclassical New Keynesian models calibrated to U.S. data, where nondurable goods have sticky prices and durable goods have flexible prices, as documented by Bils and Klenow (2004) and others, Barsky et al. (2003, 2007) found that in response to monetary tightening, it appears that nondurables decrease but consumer durables increase, thus causing the inconsistent comovement problem between nondurables and durables. This comovement puzzle is robust, whether monetary policy is assumed to follow a money supply rule, as in Barsky et al. (2003, 2007), or an interest rate rule, as in Carlstrom and Fuerst (2010).

To reconcile the inconsistency between the empirical findings and the model-implied responses, Barsky et al. (2003) suggested introducing friction in lending.[1] With frictional financial markets, monetary tightening raises nominal interest rate and causes the severity of borrowing constraints that is negatively related to cash flows or collateral, and agents who face binding credit constraints may spend less income on consumer durables even if durable goods become relatively cheaper. Monacelli (2009) formalized the idea in a model with sticky nondurable prices wherein impatient households borrow from

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[1] Barsky et al. (2003) also proposed that the introduction of friction in the price setting behavior such as sticky wages and complementarities such as consumption habits may resolve such an inconsistency.

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patient households and are subject to collateral constraints. Monacelli's model can resolve the comovement problem when durable prices have some degrees of stickiness. However, the comovement puzzle is not resolved when durable prices are flexible, because relatively cheaper durables make savers increase expenditures on consumer durables so much so that aggregate consumer durables remain increase. Moreover, in an otherwise identical model, Sterk (2010) found that the presence of collateral constraints increases the purchase of consumer durables more than that in the absence of collateral constraints, indicating the Monacelli model with collateral constraints being more difficult to generate the joint decline of durables and nondurables.

The upshot is that with sticky durable prices, the Monacelli model with collateral constraints produces the joint decline, but with flexible durable prices, the Monacelli model with collateral constraints cannot yield the joint decline. The purpose of this paper is to show that if capital is added into the Monacelli model with collateral constraints and flexible durable prices, the comovement problem can be resolved. The result emerges because, with flexible durable prices, monetary tightening reduces the relative price of durables. By way of increases in investment, a lower relative price of durables reduces firms' real profits in the short run. With fewer profits remitted from firms, savers, thus owners of firms, have a lower disposable income and cut their expenditures on consumer durables largely so that aggregate expenditure on consumer durables falls. There is thus a joint decline of nondurables and consumer durables.

It should be noted that in studying the comovement between durables and nondurables, Tsai (2010) introduced a setting where goods producers borrow to finance their payment to production inputs at the beginning of a period. Since a monetary contraction shock is nothing but a positive innovation in the interest rate that firms pay to banks, the nominal marginal cost of durable goods is affected by the sluggish time path of a policy rate which leads to weaker substitution effects. Other than consumers being borrowers in our model and producers being borrowers in the Tsai model, there are two essential differences. First, the mechanisms of borrowing constraints work differently. In Tsai, the borrowing constraint acts to *increase* the cost and thus the durable price which causes less durable production. By contrast, in our model with borrowing constraints, durable prices *decrease* which is consistent with the data.[2] A lower durable price induces investment and reduces firms' profits remitted to savers, so savers decrease expenditures on consumer durables. Next, with our borrowing constraints on consumers, durable goods expenditures are more sensitive to the interest rate than spending on nondurables which is consistent with empirical observation but, if there is no habit formation, Tsai's borrowing constraint on firms cannot generate durable goods expenditures that are more interest-sensitive than nondurables.

Our study complements recent studies which resolved the comovement puzzle using alternative mechanisms. These mechanisms include the input-output linkage between the durable and nondurable sectors (e.g., Sudo, 2012) and its interaction with labor immobility across the two sectors (e.g., Bouakez et al., 2011). In this line of research, the key channel to resolve the comovement puzzle is that nondurable goods are inputs into the durable sector. As a result, the price stickiness of the nondurable sector moderates the decline of the marginal cost in the durable sector and hence, its price decrease which weakens the substitution effect and resolves the comovement problem. Although durable investment goods are inputs into the nondurable sector in our paper, nondurable goods are not input in the durable sector and thus the substitution effect is not weakened. Instead, the key mechanism acts through a firm's increases in investment which lower profits remitted to households and strengthen the income effect.

The second mechanism involves sticky nominal wages as the main channel to resolve the comovement problem. Carlstrom and Fuerst (2010) showed that the co-movement between housing and nondurable consumption can arise under sticky nominal wages, adjustment costs in housing construction, and a large degree of complementarity between the consumption of housing services and nondurable goods, whereas their model indicated that habit formation in consumption helps to move the volatility of nondurable production relative to residential investment closer to that in the data. Finally, the third mechanism includes preference-related contributions to resolve the co-movement problem. Kim and Katayama (2010) examined the implications for sectoral co-movement of the non-separability between consumption and leisure, imperfect capital mobility, and variable capacity utilization. Huang et al. (2013) resolved the co-movement problem by exploring the dynamic interaction between habit formation and non-homothetic preferences on durable and non-durable consumption goods, of which the former weakens the role of the substitution effect and the latter enhances the role of the income effect in shaping the composition of preferred consumption bundles. Through decreases in profits which strengthen the income effect, the primary mechanism in our paper is different from those of sticky nominal wages and preference-related contributions.

This paper is organized thus. In Section 2, we set up basic two-sector sticky-price models. In Section 3, we calibrate the model and envisage the impulse responses of a monetary tightening. Finally, concluding remarks are offered in Section 4.

2. Three sticky-price models with and without collateral constraints and capital

Three neoclassical sticky-price models with consumer durables and nondurables are analyzed. We start with our model; the Monacelli (2009) model; and, the Sterk (2010) model.

[2] Using Romer dates as indicators of distinct monetary tightening, Barsky et al. (2003) found that the price of new houses relative to the consumer price index for nondurables fell by 12% and the relative price of cars fell by more than 6% after a Romer date. The price of durables relative to nondurables fell by 4.8% following a Romer date.

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