한국경제학보 제22권 제1호
The Korean Journal of Economics Vol. 22, No. 1 (Special Issue 2015)

Long-Lived Durables and Fiscal Policy

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Abstract

The presence of long-lived durables substantially mitigates the wealth effects of government spending shocks on labor supply and consumption. This property of durables can induce an increase in consumption in response to a rise in government purchases in a new Keynesian model.

KRF Classification : B030300
Keywords : Durable Goods, Government Spending

Ⅰ. Introduction

This paper investigates the roles that long-lived durables (especially housing) play in the transmission of government spending shocks. The standard neoclassical model predicts that an increase in government spending financed by nondistortionary taxes creates negative wealth effects and that households optimally respond by decreasing their consumption of nondurables and services and increasing their labor supply. In this paper, I show that the presence of long-lived durables substantially mitigates the negative wealth effects of government spending on labor supply and consumption.

Declines in the negative wealth effects of government spending due to the presence of long-lived durables have important

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implications for sticky price models. The new Keynesian models seek to explain how a positive government spending shock can increase private consumption of nondurables and services, a feature that is found in most VAR analyses. To account for this increase, current new Keynesian models incorporate special features such as "rule-of-thumb" consumers (Gali, López-Salido, and Vallés, 2007) and preferences that explicitly eliminate the wealth effect on the labor supply (Monacelli and Perotti, 2008). Here I show, without relying on these features, that the inclusion of long-lived durables into a new Keynesian model can potentially produce an increase in consumption in response to a rise in government spending.

Ⅱ. Model

Household. Households maximize expected lifetime utility, given by

$$U_0 = E_0\left[\sum_{t=0}^{\infty}\beta^t U(C_t, D_t, L_t)\right], 0 < \beta < 1 \qquad (1)$$

where C_t denotes the consumption of nondurables and services, D_t is the consumption of the service flow of long-lived durables such as housing, and L_t is hours worked.

I adopt the following King-Plosser-Rebelo momentary utility function:

$$U(C_t, D_t, L_t) = \frac{Z_t^{1-\frac{1}{\sigma}}(1+(\frac{1}{\sigma}-1)v(L_t))^{\frac{1}{\sigma}}-1}{1-\frac{1}{\sigma}}, \qquad (2)$$

where $Z_t \equiv Z(C_t, D_t) = \left(\psi_c C_t^{1-\frac{1}{\rho}} + \psi_d D_t^{1-\frac{1}{\rho}}\right)^{\frac{\rho}{\rho-1}}$ and $v(L_t) =$

$\varphi\frac{\eta}{1+\eta}L_t^{\frac{\eta+1}{\eta}}$. The parameter ρ denotes the elasticity between C_t and D_t and the parameter η denotes the Frisch elasticity of labor supply. The parameter σ measures the intertemporal elasticity of substitution. Note that the parameter σ also captures the degree of non-separability between Z_t and L_t. When $\sigma=1$, (2) corresponds to the separable preferences that are commonly used in the business cycle literature: $U(C_t, D_t, L_t)=\log(Z_t)-v(L_t)$.

The household's budget constraint is given by :

$$C_t + X_t + B_{t+1}/P_t = W_t L_t + R_t B_t / Pt + \Pi_t - T_t \qquad (3)$$

where X_t is residential investment, P_t is price level, W_t is real wage, Π_t is real dividends, T_t are lump-sum taxes, B_{t+1} is the quantity of one-period bonds purchased at time t, and R_t is gross nominal interest rate. The Lagrangian multiplier on the household budget constraint λ_t represents the marginal utility of wealth.

The stock of durable goods evolves according to

$$D_{t+1} = X_t(1-\phi_t) + (1-\delta)D_t \qquad (4)$$

where δ is the depreciation rate, and $\phi_t = \phi(\frac{X_t}{X_{t-1}})$ represents adjustment cost that occur when the level of investment changes over time. I assume that $\phi(1)=0$, $\phi'(1)=0$, so that there are no adjustment cost in the steady state, and that $\kappa=\phi''(1)>0$. The parameter κ measures how costly it is to change the level of investment: the larger values of κ is, the more costly is to change the level of investment. When $\delta=1$ and $\kappa=0$, (i.e., no investment adjustment costs), the model is composed of only nondurables.

The investment adjustment costs capture the lengthy planning phase associated with residential investment. Before physical

construction actually occurs, as Christiano and Todd (1996) point out, architectural plans need to be drawn up, financing to be arranged, permits to be obtained from various local authorities, and so on.

Firms. The final goods are produced by competitive firms using the technology,

$$Y_t = \left[\int_0^1 y_t(s)^{\frac{\epsilon-1}{\epsilon}} ds \right]^{\frac{\epsilon}{\epsilon-1}}, \epsilon > 1 \tag{5}$$

where $y_t(s)$ denotes the quantity of intermediate good s used as input. Profit maximization, taking as given the final goods price P_t and the prices for the intermediate goods $p_t(s)$, yields a set of demand schedules:

$$y_t(s) = \left(\frac{p_t(s)}{P_t} \right)^{-\epsilon} Y_t \tag{6}$$

Intermediate goods firms operate in a monopolistically competitive market, with the following technology:

$$y_t(s) = l_t(s) \tag{7}$$

where $l_t(s)$ denotes employment. The intermediate goods firm is subject to Calvo-style price setting friction and can optimize its price with probability $1-\theta$.

When given the chance to adjust, a firm chooses its price, p_t*, to maximize its expected future real profits:

$$Max_{p_t^*} E_t \left[\sum_{k=0}^{\infty} \beta^k \theta^k \lambda_{t+k} \left(\left(\frac{p_t^*}{P_{t+k}} \right) y_{t+k}(s) - W_{t+k} y_{t+k}(s) \right) \right] \tag{8}$$

subject to the demand function for $y_t(s)$, given by (6).

Monetary and Fiscal Policy. The central bank is assumed to set the nominal interest rate R_t every period according to a simple interest rate feed-back rule:

$$R_t = R\pi_t^{\phi_\pi} \tag{9}$$

where π_t is final goods inflation and $\phi_\pi > 1$. Lump-sum taxes T_t adjust to balance the government budget constraint:

$$T_t = G_t \tag{10}$$

where G_t is real government spending. Letting $g_t = \frac{G_t - G}{Y}$, I assume that g_t follows the exogenous stochastic process:

$$g_t = \rho_g g_{t-1} + \epsilon_t \tag{11}$$

where $0 < \rho_g < 1$ and ϵ_t represents and i.i.d government spending shock.

Ⅲ. Calibration

I set the subjective discount factor β to 0.99. Following Basu and Kimball (2002), the intertemporal elasticity of aggregate consumption σ is set to 0.5. The parameter ρ, the elasticity of substitution between C_t and D_t, is set to 1.17, following Ogaki and Reinhart (1998). The parameter η, which corresponds to the Frisch labor supply elasticity, is set to 1.25. I choose $\epsilon = 11$ to generate a desired markup of 10

percent. I set the steady state share of government spending in GDP to 0.83 and 0.2, respectively. The rate of depreciation for the durables δ is set to 0.03/4, since the annual depreciation rates for housing and structures are lower than three percent. Finally, I set the size of the response of the monetary authority to inflation, ϕ_π, to 1.5.

Ⅳ. Results

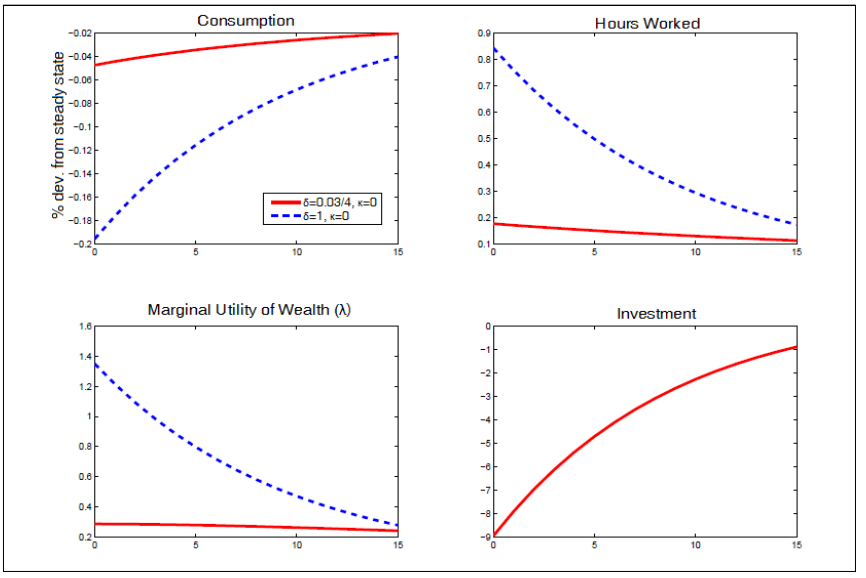
I focus on the reaction of the model to a positive government spending shock, with the autoregressive coefficient, $\rho_g = 0.9$.

Ⅳ-1. Flexible prices

I begin with a case of flexible prices (i.e. $\theta = 0$). To highlight the role of long-lived durables in mitigating the wealth effects of government spending, I compare the reactions of the model composed of only nondurables ($\delta = 1$ and $\kappa = 0$) with the model augmented with durables ($\delta = 0.03$ and $\kappa = 0$).

As Figure 1 clearly shows, the presence of durables significantly mitigates increases in the marginal utility of wealth λ_t, implying a smaller wealth effect of government spending on nondurable consumption and labor supply. Since short-run variations in long-lived durable goods purchases have only minor effects on their shadow values, the optimal response to a positive government spending shock is to let durable goods purchases drop in order to absorb the rise in government spending. This drop in effect allows households to insulate the response of hours worked and consumption of nondurables from the shock.

【Figure 1】 Flexible Prices



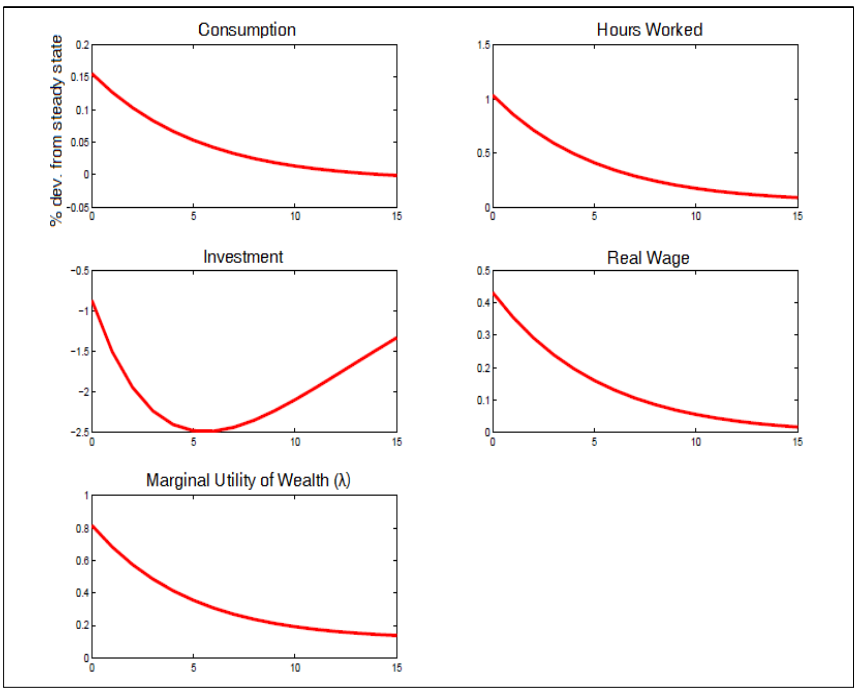
Ⅳ-2. Sticky prices

Next I investigate how the attenuation in the negative wealth effect of government spending due to the durables interacts with nominal price rigidity and investment adjustment costs. Figure 2 displays the reaction of the model with durables, assuming a four-quarter degree of price stickiness ($\theta = 0.75$) and some degree of investment adjustment cost ($\kappa = 2.48$, following Christiano et al. (2005)). It is clear that there is a possibility of crowding-in of consumption of nondurables and services, i.e., and increase in consumption in response to a rise in government spending (Figure 2).

The reasoning behind this result is as follows. Because of nominal price rigidity, price over marginal cost might fall after a rise in government spending, inducing an outward shift in the labor demand curve. If the price markup declines sufficiently to more than offset the wealth effect on labor supply, the real wage can increase. The presence of durables weakens the wealth effect on labor supply, making it easier for real wage to rise. The increase in real wage in

turn stimulates the consumption of nondurables via the standard intratemporal substitution effect on consumption. If the intratemporal substitution effect overcomes the negative wealth effect of a positive government spending shock on consumption, consumption can increase. Since the presence of durables mitigates the negative wealth effects on consumption, it helps the intratemporal substitution effect dominate the negative wealth effect.

【Figure 2】 Sticky Prices



It is worthwhile to note that sticky prices alone does not lead to sufficient increases in real wage and to trigger increases in consumption. Investment adjustment costs and non-separable preferences are also necessary for both real wage and consumption to rise. As households reduce durable goods spending to absorb rises in government spending, aggregate demand may not increase sufficiently. Investment adjustment costs reduce the initial decline in

investment, making the outward shift in the labor demand prevail. Non-separable preferences imply a complementarity between consumption and labor, so that consumption also must rise when employment increases in response to a fall in markup. This induces a new outward shift in the labor demand curve.

Ⅴ. Conclusion

This paper shows that the presence of long-lived durables substantially attenuates the wealth effects of government spending on consumption of nondurables and services. When this effect is coupled with sticky prices, non-separable preferences, and investment adjustment costs, consumption can increase in response to a rise in government purchases. More interestingly, crowding-in of consumption can arise in my model without resorting to non-optimizing behavior or preferences that do not feature wealth effects on labor supply.

Received: March 30, 2015. Revised: April 28, 2015. Accepted: May 1, 2015.

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논문초록

본 논문은 소비자가 비내구재 소비 이외에 내구재 소비로부터 효용을 얻을 경우에 재정정책의 효과를 분석하였다. 내구재소비로부터 효용을 얻을 경우 정부 재정지출 충격이 소비나 노동공급에 미치는 부(wealth)의 효과를 상당히 완화시켜 뉴케인지언 모형에서 정부지출 증가로 인해 민간소비가 증가될 수 있음을 보이고 있다.

주제분류 : B030300
핵심 주제어 : 내구재, 정부지출

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