Danmarks Statistik
MODELGRUPPEN

Arbejdspapir*

Dawit Sisay

26. March 2012

Financial wealth and the consumption function

Resumé:

In this paper we try to show the role of financial wealth in the error correction mechanism for consumption. We do so with the help of two small models that mimic the dynamic structure in Dec09 model version.

DSI

Keywords: consumption, real wealth, financial wealth

1. Introduction

Consumption accounts about 50-70% of GDP in most economies. It is a central part of most macroeconomic models. A sizeable body of literature has been devoted to theoretical and empirical models for consumption. One of such models is the life cycle hypothesis that relates consumption to income and wealth. This model is used in ADAM. The long term relation can be given as

$$C = \beta_0 \cdot Y^{\beta_1} W^{1-\beta_1} \qquad (1)$$

Where C is consumption, Y is income and W is total wealth. Estimation is carried out in an error correction form. Eq. (1) implies consumption will increase by 1 pct if income and wealth increase by 1 pct.

One of the shortcomings with (1) is that wealth can take different forms – financial savings, pension funds, life insurance funds, stock market wealth and housing wealth – and not all have similar effect on consumption in the short and long run. Different assets have different liquidity, as pointed out by Muellbauer and Lattimore (1995), marginal propensities to spend are less for illiquid assets as the degree of liquidity affects its spendability.

From the class of illiquid assets housing wealth plays a special role. A rise in house price has both positive wealth effect and negative income and substitution effect. For renters only the negative effect operates as they need to save more to get into the housing ladder (Aron et al., 2006). Benito et al. (2006) argues that there is no long-run effect of house prices on consumption. In contrast, Case, Quigley and Shiller (2005) showed that the housing wealth effect is larger than the stock market wealth effect for a panel of US states and panel of 14 countries. Poterba (2000) has shown that the rising stock market has contributed to the rising consumer spending in the 1990s in the US economy.

The literature suggests the importance of accounting the different roles played by the different wealth components. Dam et al. (2004) considered three different functional forms (log-log, linear, and log-linear) with four different wealth components with different spendability weights for the consumption equation in Apr00 model version of ADAM. The results of their exercise show that the different functional forms lead to similar changes regarding the effects of policy changes. In this paper we split the wealth concept in the consumption function into two, financial and real (housing) wealth, and demonstrate the stabilizing role of financial wealth in the consumption equation through multiplier experiments. We consider a simple model that mimics the basic structure of *Dec09* model version. In the following we explain our simple model.

2. Setting up the model

We basically need to model the interaction between real wealth, financial wealth and consumption. We, therefore, take the housing model and supplement it with an equation for consumption and financial wealth. The

consumption equation and financial wealth can be reformulated in the following way

$$\begin{aligned}\log(cpuxhw/pcpuxh) &= \beta_1 \cdot \log(yd\_hc/pcpuxh) \\ &+(1-\beta_2)\log((\gamma_1 \cdot wnf + \gamma_2 \cdot wnr)/pcpuxh) \\ &+kcpuxh\end{aligned} \quad (2)$$

$$\begin{aligned}D\log(cpuxh/pcpuxh) &= \alpha_1 \cdot D\log(yd\_hc/pcpuxh) \\ &+\alpha_2 \cdot \log(cpuxh_{-1}/cpuxhw_{-1}) \\ &+gcpuxh\end{aligned} \quad (3)$$

$$wnr = kknbhl \cdot knbhl + whe_{-1} \cdot (phk \cdot fknbhe)/(phk_{-1} \cdot fknbhe_{-1}) \quad (4)$$

$$wnf = wnf_{-1} + yd\_hc - cpuxh - (fibh * pibh) - ipxh \quad (5)$$

$$wcp = wnf + wnr \quad (6)$$

$$yd\_hc = yd\_hcx + 0.035 \cdot wnf \quad (7)$$

Where, *wnr* is real wealth and *wnf* is financial wealth, and *yd_hcx* is an exogenous income component net of interest earnings, all the other variables are as defined in ADAM. Equation (2)-(7) and the housing model constitute our simple model.

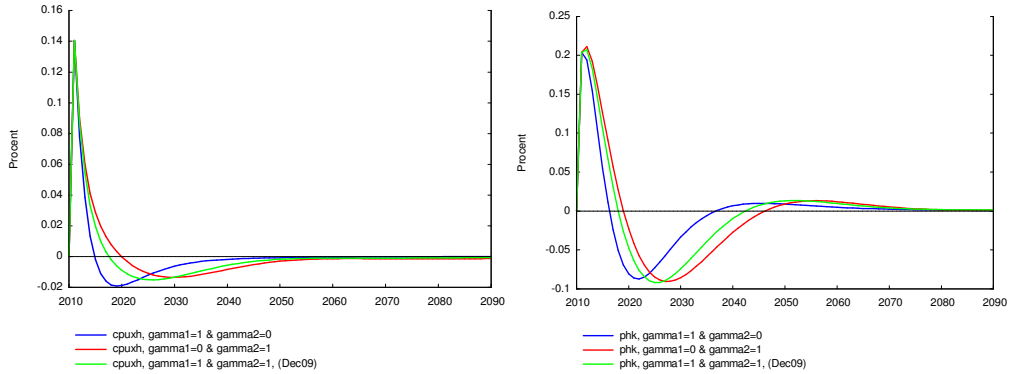
This model reproduces the essentials of the dynamic structure in *Dec09* model. For instance, a rise in consumption will reduce financial wealth, on one hand, and increase housing price and hence real wealth, on the other hand; through error correction mechanism consumption and wealth returns to equilibrium. The reaction of consumption to a change in income or in the propensity to consume depends on the relative importance of real wealth and financial wealth in the consumption equation. That is, the relative size of γ_1 and γ_2 in (2) will affect the short term and long term reactions of consumption. An easy way to illustrate these points is to make a multiplier experiment.

3. Multiplier experiments

A. Temporary shock to consumption

In this experiment consumption is raised by 1 bil. krone temporarily for one year. Figure 1 shows the effect on consumption and house price for different values of γ_1 and γ_2. The role of the financial wealth in stabilizing consumption is significant. The larger the value of γ_1 is relative to γ_2, or the larger financial wealth is relative to total wealth, the quicker consumption and house price find equilibrium. The initial increase in consumption raises house price. The increase in house price induces investment in housing, which consequently drives house price back to equilibrium. In the same way, after an initial increase, consumption finds its way back to equilibrium through error correction and a fall in financial wealth. In an extreme case where $\gamma_1 = 1$ and $\gamma_2 = 0$, consumption and house price reaches equilibrium smoothly and quickly. The intuition is clear, the question is how high should γ_1 and γ_2 be?

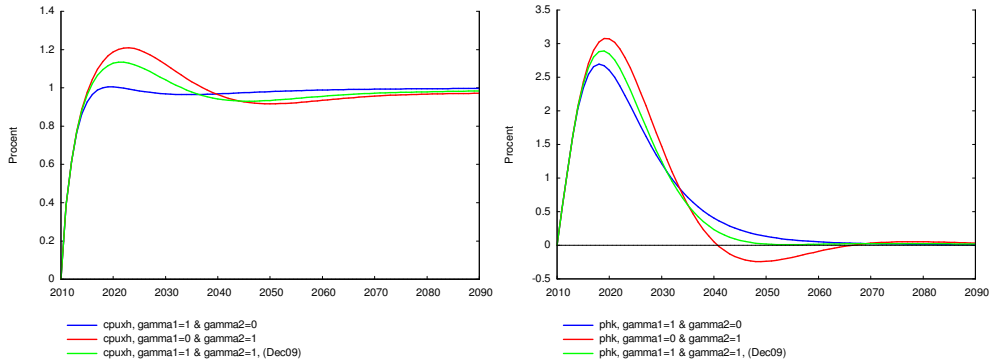
Figure 1. Effects on consumption and house price



B. Permanent shock to income

In this experiment we raise the exogenous income component permanently by 1 pct, figure 2 shows the effect on consumption and house price. In this case, consumption permanently increases, and the higher γ_1 is relative to γ_2, the more stable is the transition of consumption to equilibrium.

Figure 2. Effects on consumption and house price



4. A simple text book model

The role of financial wealth in stability can be further highlighted with the help of a simple text book model, with a linear consumption function and a simple proportional relation between real wealth and consumption. Consider the model

$$C = \alpha_1 Y + \alpha_2 Wf + \alpha_3 Wr \tag{8a}$$

$$Wf = Wf_{-1} + (Y + rWf_{-1}) - C - I \tag{8b}$$

$$Wr = \kappa C \tag{8c}$$

$$I = \Delta Wr + \delta Wr_{-1} \tag{8d}$$

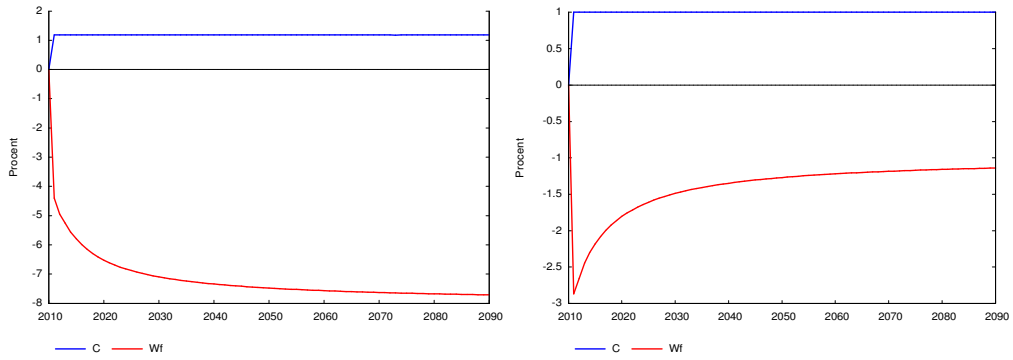
Where C is consumption, Y is income, I is investment, Wf is financial wealth, Wr is real wealth (housing wealth), and r is interest rate. In steady state, all variables grow at a rate $g = r = 3.5\%$ or 1.5% real growth given a constant growth rate of 2% in prices. Real wealth is a constant proportion of

consumption, and investment equals the change in real wealth plus rate of depreciation, δ. Income consist of an exogenous component Y and interest earning on saving. And finally financial wealth is accumulated saving surplus.

Equation (8a)-(8d) implies, if $\alpha_2 = 0$, there will be no adjustment since the financial wealth is cut-off from the model. If, for instance, consumption increases permanently via the adjustment factor in consumption function, *Wf* will be permanently falling, see figure 3a. If, on the other hand, income increases permanently, *Wf*, given sufficient time and/or appropriate set of values for the unknown parameters in the model, will adjust and change parallel with consumption, see figure 3b. An income shock changes consumption proportionally. Consumption shock changes consumption more than the initial shock due to additional effect from real wealth. Figure 3 demonstrates this dynamics with the following assumptions for the unknown parameters, $\alpha_1 = 0.87, \alpha_2 = 0, \alpha_3 = 0.05, r = 0.035, k = 3, \delta = 0.01$.

Figure 3. Effect on consumption and financial wealth

a. Permanent 1% increase in C *b. permanent 1% increase in Y*



5. Conclusion

This paper has tried to show the role of financial wealth in the error correcting mechanism for consumption. With more weight given to financial wealth in the relation for consumption, a significant improvement in stability and crowding out process can be achieved.