

Macro Prelim Question 1, August 2003

Take as given the following long-run fact: over the last 50 years in the US, real wages and consumption have steadily risen at roughly the same rate, while per-capita labor supply has been essentially unchanged.

Suppose that the household's period utility function is additive-separable in consumption and hours worked--that is, suppose

$$(*) \quad U(C,N) = u(C) - v(N),$$

where  $C$  is consumption,  $N$  is hours worked,  $u(C)$  is an increasing and concave function, and  $v(N)$  is an increasing and convex function.

(a) Assuming that in the long run the household chooses labor supply optimally given the real wage, show that the above long-run fact is consistent with the functional form (\*) only if  $u(C)$  is logarithmic.

In fact, empirical work suggests that the intertemporal elasticity of substitution for consumption is likely to be less than one, suggesting that the utility function cannot be of the form (\*). Consider the following non-additive-separable alternative:

$$(**) \quad U(C,N) = (C^{1-\gamma})/(1-\gamma) * (T-N)^{1-\varphi}/(1-\varphi),$$

where  $T$  is total time endowment (assumed fixed over time), so that  $T-N$  is leisure time, and where  $\gamma$  and  $\varphi$  are positive. This says that holding  $N$  constant, utility is CRRA in consumption; conversely, holding  $C$  constant, utility is CRRA in leisure. Unlike the additive separable case, the marginal utility of consumption is no longer independent of hours worked, and vice versa.

(b) Show that (\*\*) is consistent with long-run evidence on labor supply for any permissible values of  $\gamma$  and  $\varphi$ .

A salient fact about consumption is the excess sensitivity puzzle: controlling for interest rates, consumption growth is positively correlated with predictable growth in income, contrary to the standard loglinear Euler Equation. A recent paper by Baxter and Jermann has proposed non-separability between consumption and leisure in the utility function as a possible explanation for excess sensitivity.

Baxter and Jermann's argument asserts that increases in work hours arguably raise the marginal utility of consumption, so that optimally consumption growth should depend positively on both interest rates and the growth rate of hours worked. (Baxter and Jermann use as a motivating example the observation that when you are working hard on finishing a paper, you'd much rather spend the extra money to eat dinner at a restaurant than spend time cooking a less expensive meal at home). Meanwhile, the growth rate of hours worked is strongly positively correlated with the growth rate of income, both for households and over the business cycle in aggregate data. Thus, according to Baxter and

Jermann, predictable income growth is positively correlated with consumption growth in a standard Euler Equation regression not because life-cycle theory is wrong, but because the standard regression incorrectly omits the growth in hours worked. The positive coefficient on predictable income growth is thus just an example of omitted variables bias according to Baxter and Jermann.

(c) Derive the Euler Equation for the (log) growth rate of consumption implied by (\*\*); for simplicity assume no uncertainty. Does hours growth affect consumption growth in the way envisioned by Baxter and Jermann? Can the utility function (\*\*) potentially resolve the excess sensitivity puzzle in the way Baxter and Jermann conjecture? Why or why not?

TRUE, FALSE, UNCERTAIN????

(1) Assets with risky returns must pay higher expected returns in equilibrium than riskless assets as long as people are risk averse.