# A Note for Greenwood, Rogerson, and Wright (1993)

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**Abstract**

This note is a short summary of Greenwood, Rogerson, and Wright (1993). This paper is on Section 4: Deterministic Dynamic Programming of ECON 330 Theory of Income I reading list at University of Chicago.

1. Home production in RBC model is non-trivial in account US business cycle fluctuation.
2. Model with home production allows more substitution into and out of market activity in response of the state of the economy.
3. On the size of home production
   (a) 25% of time on unpaid home production and 33% of time on labor force work.
   (b) Investment in household capital exceeds investment in business capital by 15%
   (c) Value of household sector's output is about 20% to 50% of gross national product
4. Model
   (a) Consumption aggregates from goods and services purchases in the market $c_M$ and at home $c_H$ with a CES aggregator.

$$C = [ac_M^e + (1-a)c_H^e]^{\frac{1}{e}} \tag{1}$$

   A higher value of $e$ implies household are more willing to substitute consumption of one sector to the other.
   (b) Time are spent in leisure, home production and labor market work.
   (c) Home production constraint

$$c_H = k_H^{\eta}(z_H h_H)^{1-\eta} \tag{2}$$

   where $z_H$ represents technological change and $k_H$ is household capital stock and $h_H$ is hours in home production.
   (d) Others are quite standard: taxation, lump-sum transfer, representative firm, government, investment etc.
5. Quantitative results:
   (a) Targeted moment: two investment-output ratio, two capital-output ratio, labor hours in two sectors to determine two depreciation rates and preference parameters.
   (b) Simulation:

i. A higher $e$
   A. Increases output volatility
   B. Generates less volatile investment and more volatile consumption
   C. Hours-worked becomes more variable relative to output and to productivity
   D. A slight decrease of hours and productivity correlation
   E. A huge decrease of two investment series (The baseline cannot capture the data very well.)

ii. Modification to match investment in business capital $x_M$ and household capital $x_H$ to make household want to invest in both business and household capital at the same time and market and home labor inputs in opposite directions in a high productivity time.
   A. More general home production function

$$g(h_H, k_H, z_H) = [\eta k_J^{\psi} + (1-\eta)(z_H h_H)^{\psi}]^{\frac{1}{\psi}} \tag{3}$$

   B. Two shocks $z_H$ and $z_M$ are highly correlated. Intuition: a positive shock arrives it is possible to move hours out of the home and into the market and still end up with more *effective* hours at home.

# References

GREENWOOD, J., R. ROGERSON, AND R. WRIGHT (1993): "Putting home economics into macroeconomics," *Federal Reserve Bank of Minneapolis Quarterly Review*, 17.