Home Production Meets Time-to-build*

Paul Gomme, Finn Kydland and Peter Rupert

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Abstract: An innovation in this paper is to introduce a time-to-build technology for the production of capital into a model with home production. Our main finding is that the two anomalies that have plagued all household production models—the positive correlation between business and household investment, and household investment leading business investment over the business cycle—no longer are anomalies when time-to-build of three or four quarters is added.

Keywords: home production, time-to-build, business cycles, investment

*Affiliations: Gomme, Federal Reserve Bank of Cleveland and CREFE/UQAM; Kydland, Carnegie-Mellon University; Rupert, Federal Reserve Bank of Cleveland. The views stated herein are those of the author and are not necessarily those of the Federal Reserve Bank of Cleveland or of the Board of Governors of the Federal Reserve System.

1 Introduction

The household sector is large. Estimates reported in Benhabib, Rogerson, and Wright (1991) suggest that its output may be as much as half that in the market sector, and the labor input in its production is almost as large as that in the market sector. This labor input competes with valuable time that can be used to produce market goods or enjoy leisure. The production of household capital (consumer durables and residential housing) exceeds that of business capital. Thus, the idea advanced by Benhabib *et al.* (1991) and by Greenwood and Hercowitz (1991), that taking into account household production and its interaction with market production may be important for understanding many macroeconomic phenomena, appears plausible. At the same time, despite many papers pursuing that idea and refining the required measurements, it is probably fair to say that it has not really taken hold in the profession. A reason may be that there are too many anomalies in the data relative to the main candidates for a household-production theory. This paper attempts to settle the issue of the importance of household production for understanding the business cycle.

Two key anomalies to which we were implicitly referring above are as follows. (i) In postwar U.S. data, the correlation coefficient of cyclical fixed business investment with consumer durables expenditures is 0.55 and that with the sum of consumer durables and residential construction is 0.42. The basic models in Benhabib *et al.* (1991) and Greenwood and Hercowitz (1991) generate negative correlations. (ii) Even more importantly, business investment lags the business cycle by about a quarter while both measures of household investment lead the cycle by a quarter or two. Models of household production that have appeared in the literature so far generate the reverse pattern - that household investment lags business investment. This phase shift is such an interesting and striking aspect of the business cycle that any theory of household production is likely to fall flat if it remains an anomaly. While it is possible to find combinations of parameter values in existing models for which the correlation is positive, and then only slightly so (in particular, by making the home- and market-sector shocks almost perfectly correlated and capital and labor inputs highly complementary in household production, as shown by Greenwood and Hercowitz (1991) and by Greenwood, Rogerson, and Wright (1995)), none is consistent with household investment leading business investment. We regard that phase shift as the main challenge.

An innovation in this paper is to introduce a time-to-build technology for the production of capital. Specifically, the time needed to produce business capital is longer than that needed to produce home capital. Only some fraction of a factory is put in place in the period in which its construction starts. Loosely speaking, this reduces the cost (in terms of consumption and leisure) of investing in the home sector, for which an incentive typically arises at the same time as the incentive to invest in the business sector, inducing a positive correlation between the two investments of magnitude similar to that in the data, without the unpalatable model modifications listed above. Moreover, the home investment leads the cycle and market investment lags the cycle as in the data. We draw the conclusion that a time to build of several quarters appears to be an essential feature if a model with home production is to be calibrated reasonably without being associated with significant anomalies.

2 The Economic Environment

2.1 Households

The representative household has preferences over market consumption, c_{Mt}, home consumption, c_{Ht}, market hours, h_{Mt}, and home hours, h_{Ht}, summarized by

$$E_0 \sum_{t=0}^{\infty} \beta^t U(c_{Mt}, c_{Ht}, h_{Mt}, h_{Ht}), \quad 0 < \beta < 1. \tag{1}$$

The momentary utility function has the following form:

$$U(c_M, c_H, h_M, h_H) = \begin{cases} \omega \ln C(c_M, c_H) + (1-\omega)\ln(1 - h_M - h_H) & \text{if } \gamma = 1, \\ \frac{[C(c_M, c_H)^{\omega}(1-h_M-h_H)^{1-\omega}]^{1-\gamma} - 1}{1-\gamma} & \text{if } 0 < \gamma < 1 \text{ or } \gamma > 1, \end{cases} \tag{2}$$

where the consumption aggregator is

$$C(c_M, c_H) = \begin{cases} c_M^{\psi} c_H^{1-\psi} & \text{if } \xi = 0, \\ \left[\psi c_M^{\xi} + (1-\psi) c_H^{\xi}\right]^{1/\xi} & \text{if } \xi < 0 \text{ or } 0 < \xi < 1, \end{cases} \tag{3}$$

Households face a number of constraints. First, its budget constraint is

$$c_{Mt} + x_{Mt} + x_{Ht} = (1 - \tau_K) r_t k_{Mt} + (1 - \tau_H) w_t h_{Mt} + \delta_M \tau_K k_{Mt} + \tau_t. \tag{4}$$

Here, k_{Mt} is the household's stock of market capital, r_t is the rental price of capital, w_t is the real wage rate, and x_{Mt} and x_{Ht} are investment in market and home capital, respectively. Capital income is taxed at the rate τ_K while labor income is taxed at the rate τ_H. The term $\delta_M \tau_K k_{Mt}$ on the right-hand side of (4) is an adjustment so that net rather than gross capital income is taxed. Finally, τ_t is a lump-sum transfer from the government.

Second, as in Kydland and Prescott (1982), capital projects are subject to a J period time-to-build technology constraint. Specifically, starting a project at date t requires investment of resources at dates t, $t+1$, ... $t+J-1$, with the capital finally being read for use at date $t+J$.

A project j periods from completion requires a fraction ϕ_j of the total resources required for that project. Let s_{jt} be the number of projects which are j periods from completion at date t. Then, total market investment is

$$x_{Mt} = \sum_{j=1}^{J} \phi_j s_{jt}. \tag{5}$$

Further, the project commitments evolve according to

$$s_{j-1,t+1} = s_{jt}, \quad j = 2, \ldots, J. \tag{6}$$

That is, a project which is j periods from completion at date t will be $j-1$ periods from completion in the next period.

Third, the household's capital stocks evolve according to

$$k_{Mt+1} = (1-\delta_M)k_{Mt} + s_{1t} \tag{7}$$

$$k_{Ht+1} = (1-\delta_H)k_{Ht} + x_{Ht} \tag{8}$$

δ_M and δ_H are the depreciation rates of market and home capital, respectively. Recall that s_{1t} represents the number of projects which are one period from completion as of the beginning of period t.

Finally, home production is described by

$$c_{Ht} = H(k_{Ht}, h_{Ht}; z_{Ht}). \tag{9}$$

The home production function has the form

$$H(k_h, h_H; z_H) = \begin{cases} e^{z_H} k_H^{\eta} h_H^{1-\eta} & \text{if } \zeta = 0 \\ e^{z_H}\left[\eta k_H^{\zeta} + (1-\eta) h_H^{\zeta}\right]^{1/\zeta} & \text{if } \zeta < 0 \text{ or } 0 < \zeta < 1. \end{cases} \tag{10}$$

The home productivity shock evolves as

$$z_{H,t+1} = \rho_H z_{Ht} + \epsilon_{Ht}, \quad \epsilon_{Ht} \sim N(0, \sigma_H^2). \tag{11}$$

2.2 Firms

Goods producing firms act competitively and seek to maximize profits,

$$F(K_{Mt}, H_{Mt}; z_{Mt}) - r_t K_{Mt} - w_t H_{Mt}. \tag{12}$$

The production function is Cobb-Douglas,

$$F(K_M, H_M; z_M) = e^{z_M} K_M^{\alpha} H_M^{1-\alpha} \tag{13}$$

and the market productivity shock evolves according to

$$z_{Mt+1} = \rho_M z_{Mt} + \epsilon_{Mt}, \quad \epsilon_{Mt} \sim N(0, \sigma_M^2). \tag{14}$$

2.3 Government

In this economy, the government raises revenue via labor and capital taxes, lump-sum rebating the proceeds to households:

$$\tau_t = \tau_K r_t K_{Mt} + \tau_H w_t H_{Mt} - \delta_M \tau_K K_{Mt}. \tag{15}$$

As discussed in Greenwood *et al.* (1995), the reason for including taxes is that they have important implication for the calibration procedure; this issue is discussed in more detail in Section 3.

2.4 Equilibrium

A *competitive equilibrium* is given by a set of prices and quantities such that:

1. $\{c_{Mt}, c_{Ht}, h_{Mt}, h_{Ht}, k_{Mt+1}, k_{Ht+1}, x_{Mt}, x_{Ht}\}_{t=0}^{\infty}$ solve the household's problem of maximizing (1) subject to (2)–(9), taking as given prices, $\{w_t, r_t\}$.

2. $\{K_{Mt}, H_{Mt}\}$ solve the firm's problem of maximizing (12), taking as given prices.

3. The government's budget constraint, (15), is satisfied.

4. Markets clear:

$$k_{Mt} = K_{Mt} \tag{16}$$

$$h_{Mt} = H_{Mt} \tag{17}$$

$$c_{Mt} + x_{Mt} + x_{Ht} = F(K_{Mt}, H_{Mt}; z_{Mt}). \tag{18}$$

3 Calibration

The model is calibrated using the procedure set out by Kydland and Prescott (1982). In particular, as many parameters as possible are set in advance based on either *a priori* information concerning their magnitude, or so as to match certain long run averages observed in the postwar U.S. economy.

The set of parameters which need to be assigned values are summarized in Table 1. A number of parameters are assigned values which are standard in the dynamic, stochastic general equilibrium literature. To start, one period in the model corresponds to one quarter. The discount factor, β, is set to 0.99. The coefficient of relative risk aversion, γ, is set to one which implies log preferences. The home production function and consumption aggregator are assumed to be Cobb-Douglas; thus, $\xi = \zeta = 0$. Evidence on U.S. Solow residuals motivates setting $\rho_M = 0.95$ and $\sigma_M = 0.00763$; see Prescott (1986).

There is little hard evidence to guide the choice of the stochastic process describing the home technology shock. As in Greenwood *et al.* (1995), it is assumed that the home shock resembles the market shock. Thus, $\rho_H = 0.95$ and $\sigma_H = 0.00763$. The correlation between the innovations to the market and home shocks (i.e., between ϵ_M and ϵ_H) is set to $2/3$. In the home production literature to date, the value of this correlation has important implications for the cyclical behavior of home and market investment. In particular, Greenwood *et al.* (1995) show that this correlation has to be quite close to unity for their home production model to predict a positive correlation between the two investment series.

The parameters ω, ψ, α, η, δ_H and δ_M are chosen such that in steady state:

1. Market hours, h_M, is $1/3$ and home hours, h_H, is $1/4$. These values are consistent with evidence from time use surveys.

2. Market capital, k_M, is four times output while home capital, k_H, is five times output.

3. Market investment, x_M, is 11.8% of output while home investment, x_H, is 13.5% of output.

The tax rates are set to $\tau_K = 0.70$ and $\tau_H = 0.25$ which are the same values used by Greenwood *et al.* (1995). Along with the restriction above, these tax rates imply values for ω, ψ, α, η, δ_H and δ_M given in Table 1. As in Greenwood *et al.* (1995), the tax rate on capital income is an important parameter in generating a reasonable capital share parameter in the market sector (given the restrictions above). Models without home production do not seem to have such a problem (related to income taxation) since they calibrate to a much higher capital-output ratio because market and home capital are lumped together.

4 Findings

The benchmark economy is chosen to highlight several key features of the model (both limitations and successes) and to be consistent with several other papers that have included a household production sector. One of these features, namely the correlation between home and market investment, has played a large role in motivating Greenwood and Hercowitz (1991) and Greenwood *et al.*

(1995). In short, the data for the U.S. economy reveal a positive correlation between market and home investment, while "standard" household production models deliver a negative correlation. In addition, the investment patterns are out of phase in relation to output compared to the U.S. data. In the data, home investment leads the cycle somewhat, while market investment is coincident with the cycle (with some indication that it may even lag the cycle).

The strategies used to correct this weakness, however, are themselves somewhat problematic. What is necessary to produce a positive correlation involves assumptions about parameters or functional forms that are not palatable. For example, both Benhabib *et al.* (1991) and Greenwood and Hercowitz (1991) overturn the negative correlation by making the shocks to the market and home sectors nearly (Benhabib *et al.* (1991) case), or perfectly (Greenwood and Hercowitz (1991) case) correlated. While there is little direct evidence on the magnitude of this correlation, indirect evidence suggests that the correlation is less than perfect. Technology shocks, regulatory changes, etc. will not have the same effect on the home and market. In addition, the aforementioned papers also need to assume complementarity between durable goods and household labor in the home production function, rather than Cobb-Douglas.

To obtain the business cycle moments the relevant data was logged and detrended using the Hodrick-Prescott filter. Table 4 shows the correlation between market and home investment and the two capital stocks for the benchmark economy. Table 5 presents selected moments and Table 6 cross-correlations with output from the benchmark economy. Note that the correlation between market and home investment, i_M and i_H is slightly positive, at 0.11. Benhabib *et al.* (1991) report a slightly negative correlation of -0.09. The difference is attributable to the fact that their model incorporates growth and hence a discount factor of 0.9898, while the model here sets $\beta = 0.99$.

Setting the discount factor to 0.9898 in the benchmark model drives the correlation close to that of Benhabib *et al.* (1991). Otherwise, the results are very close to those of Greenwood *et al.* (1995)'s Model 1. Observe in Table 4 that market investment leads the cycle and home investment lags the cycle, just the opposite of what is in the data.

Many of the successes and failures of this structure are well known and have been documented by Greenwood *et al.* (1995), Greenwood and Hercowitz (1991), and Benhabib *et al.* (1991). As mentioned above, however, the model does quite poorly matching up with a key feature of the U.S. data, specifically, the correlation between market and home investment. The home production model was introduced precisely to allow an additional margin of substitution, between the market and home sectors to increase the volatility of hours of work in the market sector. That is, high relative productivity in the market sector induces a reallocation of hours from nonmarket to market labor, not just out of leisure. Obviously, the question that arises is how to get market and home investments to move in the *same* direction when hours in the two sectors are moving in opposite directions?

Greenwood and Hercowitz (1991) overcomes this problem by assuming perfect correlation between the shocks. When a positive shock arrives, hours of work move from the home to market sector; but, because of labor augmenting technological advance, the effective labor hours in the home sector rise. This in conjunction with the complementarity assumption between home capital and home hours induces an increase in investment in home capital. Evidently, these are two unattractive features to impose on the model.

4.1 Reintroducing Time-to-build

An innovation in this paper is to add a time-to-build structure to capital formation. Assume, for example, that it takes four periods before an investment in market capital comes on-line, but only one period for home capital. The basic intuition is that in response to a positive market shock only $1/4$ of the resources will be moved into the market sector this period to build more capital. The cost in terms of consumption of investing in home capital is now lower, giving rise to an increase in investment in home capital.

Table 8 presents selected moments for the 4-period time-to-build economy where all other parameters are the same as in the benchmark economy, Table 7 shows the investment and capital correlations and Table 9 provides the cross-correlations with output.

Two striking results emerge from this model. First, the correlation between market and home investment is now 0.49. Second, the two investments are now in phase with the U.S. data, home investment now leads the cycle and market investment slightly lags the cycle. Moreover, recall this is done without having to resort to modifications of other parameters that were originally set according to *a priori* information or to match key features of the U.S. time series.

5 Conclusion

Our main finding is that the two anomalies mentioned in the introduction—positive correlation between business and household investment, and household investment leading business investment over the business cycle—no longer are anomalies when time-to-build of three or four quarters is added to a model in which all production and utility functions are of the Cobb-Douglas type. While empirical work may eventually find some elasticity to be not exactly one, the magnitude of the deviation from one is likely to be so small that one would not want to let the appropriateness of a model specification hinge on a large deviation as previous literature. Thus, household production still is in the running as a potentially important factor both in terms of accounting for a portion of the business cycle and in understanding the business cycle more generally. Basically, the presence of these important anomalies based on past models of household production is a reflection of how naïve they are otherwise as models of the business cycle.

This finding would not be very interesting if it came at the cost of introducing new anomalies. Benhabib *et al.* (1991), for example, emphasize the hours worked in producing consumption goods. As most sectors experience procyclical hours, some researchers have inferred that hours worked in producing consumption goods must also be procyclical. Benhabib *et al.* (1991) find, for their model, that it can be made to be slightly procyclical (correlation with real GDP of 0.10) but then only for a specification for which household and business investment are strongly negatively correlated. For our benchmark case, this correlation is 0.40 for total consumption although it is negative for nondurable consumption. In future work, we intend to address this issue from two angles. Empirically, it is an open question how much of the contribution to a positive correlation comes from sectors that produce primarily nondurables. From a modeling standpoint, we intend to investigate how close to being procyclical such expenditures can be made with reasonable model features. One idea is to devote attention to the inventory stock. This variable has been procyclical (with a lead of a couple of quarters). Some of this cyclical movement presumably comes from changes in inventories of nondurable consumption goods. Our conjecture is that, by modeling inventories along the lines of Kydland and Prescott (1982), nondurables would become slightly procyclical and, therefore, total consumption even more procyclical than in our reported findings.

It must be said, also, that the extent to which household investment leads the cycle in the model is not quite as large as in the data. Residential construction leads by at least two quarters and purchases of motor vehicles and parts leads by almost as much. Furniture and household equipment leads by about one quarter. We intend to extend our model to account for the long lead in the first two of those three series (with furnishings being somewhat complementary with new residences). Our first approach (backed by preliminary empirical regularities) is that we first need to clarify the connection between these most durable (and large) purchases and interest rates, for example fixed mortgage rates.

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Table 1: Baseline Parameters

Preferences		
β	0.99	discount factor
ω	0.66	consumption-leisure weight
γ	1.0	coefficient of relative risk aversion
ψ	0.55	market-home consumption weight
ξ	0.0	CES parameter in consumption aggregator
Home Production		
η	0.31	capital-labor weight
ζ	0.0	CES parameter
δ_H	0.027	depreciation rate
Time-to-build		
J	4	number of project periods
ϕ_j	0.25	fraction of resources used at stage j
Market Production		
α	0.26	capital share
δ_M	0.0295	depreciation rate
Shocks		
ρ_M	0.95	market shock autocorrelation
ρ_H	0.95	home shock autocorrelation
σ_M	0.00763	standard deviation of market shock innovation
σ_H	0.00763	standard deviation of home shock innovation
corr$(\epsilon_{Mt}, \epsilon_{Ht})$	0.0	correlation of the innovations

Table 2: U.S. Economy (Fixed Weights): Selected Moments

	Percentage Standard Deviation	Autocorrelation	Correlation with Output
Gross Domestic Product	1.45	0.87	1.00
Personal Consumption Expenditures - Total	1.15	0.87	0.89
Personal Consumption Expenditures - Durables	4.82	0.77	0.81
Gross Private Domestic Investment	7.11	0.81	0.89
Fixed Investment, Total	5.22	0.90	0.90
Fixed Investment, Nonresidential	4.78	0.90	0.80
Purchases of Nonresidential Structures - Total	4.69	0.86	0.47
Private Purchases of PDE, Nonresidential	5.55	0.89	0.86
Fixed Investment, Residential	10.53	0.90	0.65
Purchases of Residential Structures - Total	10.68	0.90	0.65

Table 3: U.S. Economy (Fixed Weights): Cross Correlation of Real Output With

	x_{t-4}	x_{t-3}	x_{t-2}	x_{t-1}	x_t	x_{t+1}	x_{t+2}	x_{t+3}	x_{t+4}
Gross Domestic Product	0.27	0.47	0.68	0.87	1.00	0.87	0.68	0.47	0.27
Personal Consumption Expenditures - Total	0.43	0.60	0.76	0.86	0.89	0.75	0.56	0.35	0.12
Personal Consumption Expenditures - Durables	0.48	0.59	0.71	0.79	0.81	0.62	0.41	0.19	−0.03
Gross Private Domestic Investment	0.27	0.45	0.61	0.77	0.89	0.75	0.53	0.29	0.06
Fixed Investment, Total	0.31	0.49	0.68	0.83	0.90	0.80	0.62	0.42	0.19
Fixed Investment, Nonresidential	−0.04	0.15	0.39	0.61	0.80	0.86	0.81	0.70	0.53
Purchases of Nonresidential Structures - Total	−0.22	−0.10	0.07	0.26	0.47	0.60	0.65	0.63	0.55
Private Purchases of PDE, Nonresidential	0.06	0.26	0.50	0.71	0.86	0.87	0.79	0.64	0.45
Fixed Investment, Residential	0.54	0.64	0.71	0.73	0.65	0.44	0.19	−0.03	−0.23
Purchases of Residential Structures - Total	0.54	0.64	0.71	0.73	0.65	0.44	0.19	−0.04	−0.23

Table 4: Benchmark Economy: Selected Correlations

corr(i_M,i_H)	0.11
corr(k_M,k_H)	0.80

Table 5: Benchmark Economy: Selected Moments

	Percentage Standard Deviation	Autocorrelation	Correlation with Output	Correlation with Hours
Output	1.50	0.73	1.00	0.99
Market Consumption	0.58	0.74	0.97	0.93
Home Consumption	0.40	0.72	0.26	0.21
Aggregated Consumption	0.41	0.74	0.86	0.80
Market Investment	7.44	0.28	0.83	0.86
Home Investment	4.27	0.57	0.63	0.60
Total Investment	4.34	0.73	0.99	1.00
Market Hours	0.64	0.73	0.99	1.00
Home Hours	0.31	0.73	-0.99	-1.00
Total Hours	0.23	0.73	0.99	1.00
Market Capital	0.55	0.91	0.59	0.46
Home Capital	0.37	0.94	-0.02	-0.16
Total Capital	0.43	0.95	0.04	-0.10
Productivity	0.87	0.73	0.99	0.97

Table 6: Benchmark Economy: Cross Correlation of Real Output With

	x_{t-4}	x_{t-3}	x_{t-2}	x_{t-1}	x_t	x_{t+1}	x_{t+2}	x_{t+3}	x_{t+4}
Output	0.09	0.27	0.47	0.73	1.00	0.73	0.47	0.27	0.09
Market Consumption	−0.03	0.15	0.37	0.66	0.97	0.76	0.57	0.40	0.25
Home Consumption	−0.14	−0.07	0.02	0.13	0.26	0.24	0.26	0.27	0.25
Aggregated Consumption	−0.09	0.08	0.29	0.56	0.86	0.69	0.55	0.42	0.30
Market Investment	0.19	0.33	0.48	0.66	0.83	0.24	0.10	−0.01	−0.10
Home Investment	−0.01	0.10	0.24	0.41	0.63	0.98	0.67	0.41	0.21
Total Investment	0.14	0.31	0.51	0.74	0.99	0.70	0.43	0.21	0.03
Market Hours	0.17	0.33	0.52	0.75	0.99	0.69	0.40	0.18	−0.00
Home Hours	−0.17	−0.33	−0.52	−0.75	−0.99	−0.69	−0.40	−0.18	0.00
Total Hours	0.17	0.33	0.52	0.75	0.99	0.69	0.40	0.18	−0.00
Market Capital	−0.36	−0.22	−0.02	0.25	0.59	0.67	0.69	0.66	0.60
Home Capital	−0.51	−0.47	−0.38	−0.23	−0.02	0.30	0.51	0.63	0.68
Total Capital	−0.51	−0.45	−0.35	−0.19	0.04	0.33	0.53	0.64	0.68
Productivity	0.04	0.22	0.43	0.70	0.99	0.75	0.52	0.33	0.16

Table 7: Time-to-build Economy: Selected Correlations

corr(i_M,i_H)	0.50
corr(k_M,k_H)	0.77

Table 8: Time-to-build Economy: Selected Moments

	Percentage Standard Deviation	Autocorrelation	Correlation with Output	Correlation with Hours
Output	1.38	0.67	1.00	0.99
Market Consumption	0.55	0.74	0.97	0.92
Home Consumption	0.41	0.73	0.35	0.30
Aggregated Consumption	0.42	0.76	0.86	0.80
Market Investment	5.12	0.66	0.89	0.87
Home Investment	4.02	0.30	0.83	0.86
Total Investment	3.93	0.64	0.99	1.00
Market Hours	0.57	0.63	0.99	1.00
Home Hours	0.28	0.63	−0.99	−1.00
Total Hours	0.20	0.63	0.99	1.00
Market Capital	0.55	0.77	−0.07	−0.20
Home Capital	0.30	0.93	0.28	0.15
Total Capital	0.39	0.91	−0.12	−0.24
Productivity	0.82	0.70	0.99	0.96

Table 9: Time-to-build Economy: Cross Correlation of Real Output With

	x_{t-4}	x_{t-3}	x_{t-2}	x_{t-1}	x_t	x_{t+1}	x_{t+2}	x_{t+3}	x_{t+4}
Output	0.14	0.25	0.42	0.67	1.00	0.67	0.42	0.25	0.14
Market Consumption	0.02	0.15	0.34	0.61	0.97	0.75	0.55	0.39	0.24
Home Consumption	−0.08	−0.01	0.08	0.20	0.35	0.37	0.33	0.25	0.15
Aggregated Consumption	−0.02	0.10	0.28	0.53	0.86	0.71	0.55	0.39	0.24
Market Investment	0.18	0.30	0.45	0.64	0.89	0.68	0.45	0.16	−0.21
Home Investment	0.14	0.19	0.32	0.53	0.83	0.39	0.15	0.16	0.41
Total Investment	0.19	0.28	0.44	0.68	0.99	0.62	0.35	0.18	0.10
Market Hours	0.21	0.30	0.46	0.69	0.99	0.59	0.32	0.15	0.07
Home Hours	−0.21	−0.30	−0.46	−0.69	−0.99	−0.59	−0.32	−0.15	−0.07
Total Hours	0.21	0.30	0.46	0.69	0.99	0.59	0.32	0.15	0.07
Market Capital	−0.44	−0.41	−0.33	−0.19	−0.07	0.12	0.41	0.80	0.65
Home Capital	−0.44	−0.36	−0.23	−0.03	0.28	0.42	0.47	0.51	0.65
Total Capital	−0.49	−0.47	−0.41	−0.30	−0.12	0.08	0.26	0.46	0.73
Productivity	0.09	0.20	0.38	0.65	0.99	0.71	0.48	0.31	0.18