Secular Trends in U.S Saving and Consumption

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Abstract

National saving rate in the U.S. has been declining since the 1960s while the share of consumption in output has been increasing. We explore if a standard growth model can explain the secular trends observed in this time period. Our results indicate that the standard neoclassical growth model is able to generate saving rates and consumption that are remarkably similar to the data during 1960-2004. Our quantitative findings identify the growth rate of total factor productivity as the main factor generating the secular trends in the behavior of consumption and saving in the U.S.

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1 Introduction

Understanding the secular trends in consumption and saving in the U.S. has been an important part of academic research as well as real interest to policy makers. Figure 1 displays the changes in consumption and the saving rate in the U.S. between 1960-2004.[1] The fact that the national saving rate has been declining over time and that U.S. saves less than other countries has been a major concern to economists and policy makers. Gokhale, Katlikoff, and Sabelhaus (1996) attribute the decline in the net national saving rate to the redistribution of resources, though social security and medicare, from young consumers with low marginal propensities to consume to older generations with high marginal propensities to consume. Several papers examine whether particular cohorts are responsible for the low saving rate by examining personal saving rates in the U.S.[2] Attanasio (1998) argues that cohorts born between 1925 and 1939 may be to blame for the low personal saving rate. Summers and Caroll (1987) suggest that it is the reliance of the younger generations on social security that depresses saving in the U.S. Boskin and Lau (1988a and 1988b) formulate a model based on longitudinal and cross-sectional microeconomic data together with aggregate time series and examine the importance of various factors affecting aggregate consumption and saving in the U.S. Their results suggest that it is the decline in the saving of generations born after the great depression that may be responsible for the decline in the national saving rate. Another set of papers have focused on the possible relationship between the increase in stock prices and the boom in consumer spending.[3]

[1] C/Y is the fraction of consumption in GNP, and the saving rate is net national saving as a percent of net national income. In the appendix we explain the adjustments that were made to the data to ensure consistency between the data and the model.

[2] See for example Summers, Caroll, and Blinder (1987), Gale, Sabelhaus and Hall (1999),.

[3] For example, see Parker (1999), Juster, Lupton, Smith, and Stafford (2000) who suggest that the significant capital gains in corporate equities experienced since 1984 is responsible for the decline in the personal saving rate. Backus, Henriksen, Lambert, and Chris Telmer{2005) argue that private saving rates are strongly and negatively correlated with the ratio of net worth to consumption. Also Poterba (2000) for a survey.

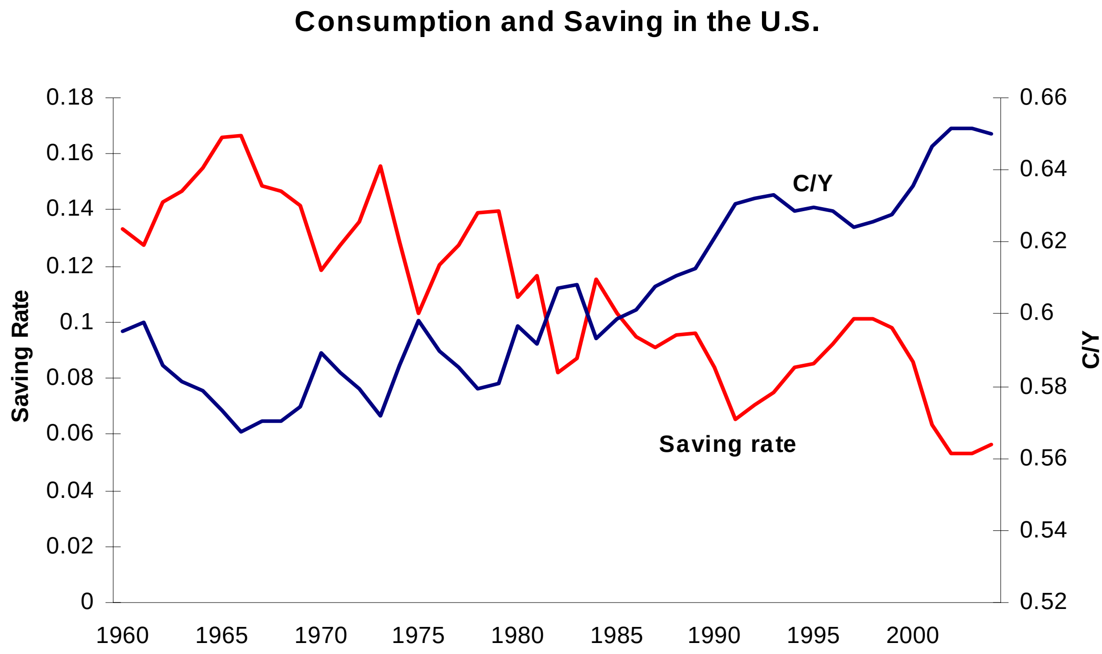

Figure 1: U.S. Data

In this paper we revisit the implications of the Neoclassical growth model on the secular trends of the net national saving rate and the consumption output ratio in the U.S. between 1960 and 2004. Our approach is in line with the recent use of the one-sector growth model to explain 'Great Depressions'. In particular, we follow the methodology of Cole and Ohanian (1999) and Kehoe and Prescott (2002) in using an applied general equilibrium setup to account for the actual time path of the U.S. saving and consumption behavior.[4] We use the standard one-sector, neoclassical growth model with an infinitely-lived representative agent facing complete markets and calibrate the economy to the U.S. data for the 1960-2004 period. We use the population growth rate, the tax rate on capital income, the share of government expenditures in output, the depreciation rate, and the actual time series data for the TFP growth rate for that time period. We conduct deterministic simulations, as in Hayashi and Prescott (2002), and perform an 'accounting exercise' to evaluate the impact of several factors that may explain the secular trends in the saving and consumption behavior the U.S. Our results suggest that the one sector growth model can generate the secular trends in the consumption and the saving behavior remarkably well one the actual time path of TFP growth rate, population growth rate, and the depreciation rate are taken into

[4]Related work that uses general equilibrium models to address short run issues are Ohanian (1997), Cooley and Ohanian (1997), Cole and Ohanian (2002, 2004), and all the papers in the 2002 special issue of *Review of Economic Dynamics,* entitled 'Great Depressions of the 20th Century'.

account.[5] We conclude that the decline in the population and TFP growth rates may have played an important role in the decline of the saving rate until the 1980s. After this period the decline in the TFP growth rate and the increase in the deprecation rate seem to be more important.

The paper is organized as follows. Section 2 presents the two versions of the growth model that are used to evaluate the U.S. consumption and saving behavior. Data and calibration issues are discussed in Section 3, and the quantitative findings are presented in Section 4. Concluding remarks are given in Section 5. Appendix A contains the data sources.

1.1 The Growth Model

There is a stand-in household with N_t working-age members at date t. The size of the household evolves over time exogenously. In this framework a representative household maximizes

$$\sum_{t=0}^{\infty} \beta^t N_t(\log c_t + \alpha log(1 - h_t))$$

where $c_t = C_t/N_t$ is per member consumption and $h_t = H_t/N_t$ is the fraction of hours worked per member of the household subject to

$$C_t + X_t \leq w_t H_t + r_t K_t - \tau(r_t - \delta)K_t - \pi_t,$$

where β is the subjective discount factor, α is the share of leisure in the utility function, H_t is total hours worked by all working-age members of the household, τ is the tax rate on capital income, w_t is the real wage, π_t is a lump sum tax and r_t is the rental rate of capital. Households are assumed to own the capital, K_t, and rent it to businesses. Aggregate output Y_t is divided between consumption, C_t, investment X_t, and government purchases of goods and services, G_t.

$$C_t + X_t + G_t = Y_t.$$

The law of motion for the capital stock is given by $K_{t+1} = (1 - \delta)K_t + X_t$ where δ is the depreciation rate.[6]

The aggregate production function is given by

$$Y_t = A_t K_t^{\theta}(H_t)^{1-\theta},$$

where θ is the income share of capital and A_t is total factor productivity which grows exogenously.

[5] In Chen, Imrohoroglu, Imrohoroglu (2005) we show that the same framework is able to generate the high saving rate that was observed in Japan during most of this time period as well.

[6] In some of our experiments we will let δ be a function of time since Hayashi (1989) argues that there were large changes in the depreciation rate in Japan over time.

1.2 Government

There is a government that taxes income from capital (net of depreciation) and uses the proceeds to finance an exogenously given stream of government purchases G_t. A lump sum tax τ_t is used to ensure that the government budget constraint is satisfied each period: $G_t = \tau_t(r_t - \delta_t)K_t + \pi_t$.

1.3 Competitive Equilibrium

Given a government policy $\{G_t, \tau_t, \pi_t\}_{t=0}^{\infty}$, a competitive equilibrium consists of an allocation $\{C_t, X_t, H_t, K_{t+1}, Y_t\}_{t=0}^{\infty}$ and price system $\{w_t, r_t\}$ such that

- given policy and prices, the allocation solves the household's problem,
- given policy and prices, the allocation solves the firm's profit maximization problem with factor prices given by: $w_t = (1-\theta)A_t K_t^{\theta}(H_t)^{-\theta}$, and $r_t = \theta A_t K_t^{\theta-1}(H_t)^{1-\theta}$,
- the government budget is satisfied,
- and the goods market clears: $C_t + X_t + G_t = Y_t$.

1.4 Numerical Solution

Our numerical solution procedure follows Hayashi and Prescott (2002) by first calculating a steady-state for the Japanese economy. After obtaining the equilibrium conditions for the economy, we detrend the variables and obtain the steady-state. Next, we start from given initial conditions in 1960 and use a shooting algorithm towards the steady-state.[7]

Equilibrium Conditions: The equilibrium conditions of this model can be described in two equations below:

$$\frac{C_{t+1}}{N_{t+1}} = \frac{C_t}{N_t}\beta\left\{1 + (1-\tau_{t+1})\left[\theta A_{t+1}K_{t+1}^{\theta-1}(H_{t+1})^{1-\theta} - \delta_{t+1}\right]\right\}, \quad (1)$$

$$K_{t+1} = (1-\delta_t)K_t + A_t K_t^{\theta}(H_t)^{1-\theta} - C_t - G_t. \quad (2)$$

Detrending: There are year-to-year fluctuations with secular growth in aggregate quantities and the wage rate. For an aggregate variable z_t, its detrended version is given by: $\widetilde{z}_t = z_t / A_t^{\frac{1}{1-\theta}} N_t$. Applying this change of variables, we obtain equations

$$\widetilde{c}_{t+1} = \frac{\widetilde{c}_t}{\gamma_t}\beta\left\{1 + (1-\tau_{t+1})\left[\theta x_{t+1}^{\theta-1} - \delta_{t+1}\right]\right\},$$

$$\widetilde{k}_{t+1} = \frac{1}{\gamma_t n_t}[(1-\delta_t) + (1-\psi_t)x_t^{\theta-1}]\widetilde{k}_t - \widetilde{c}_t,$$

[7] Hayashi and Prescott (2002) contain an appendix that goes over the equilibrium conditions and the calibration in detail. We summarize parts of it below.

where x_t is detrended capital-labor ratio, $(K_t/H_t)/A_t^{\frac{1}{1-\theta}}$.

Steady-state: Setting $\widetilde{z}_t = z$ for all t, we obtain the following steady-state for the model:

$$\begin{aligned} 1 &= \frac{1}{\gamma}\beta\left\{1+(1-\widetilde{\tau})\left[\theta x^{\theta-1}-\widetilde{\delta}\right]\right\} \\ \widetilde{k} &= \frac{1}{\gamma n}[(1-\widetilde{\delta})+(1-\psi)x^{\theta-1}]\widetilde{k}-\widetilde{c}. \end{aligned}$$

These equations are solved for the steady-state values of detrended capital and consumption where $\widetilde{\delta}$ and $\widetilde{\tau}$ are the steady-state depreciation and capital income tax rates. The steady-state saving rate is given by

$$\widetilde{s} = \frac{(\gamma n-1)\widetilde{k}}{\widetilde{y}-\widetilde{\delta}\widetilde{k}}. \quad (3)$$

Transition to the steady-state: Starting from a given value of the initial capital stock K_0, we guess a value for the endogenous variable C_0 and use equations (1) and (2) to obtain a path for the endogenous variables C_t and K_{t+1} towards the steady-state. If this path is not achieved, we iterate on the initial guess for C_0 using this 'shooting' algorithm until convergence to the steady-state is obtained. Equipped with the equilibrium path of C_t and K_{t+1}, we can then use other equilibrium conditions to construct time paths of all aggregate quantities and prices. In particular, we compute the saving rate using[8]

$$s_t = \frac{Y_t - G_t - C_t - \delta_t K_t}{Y_t - \delta_t K_t}.$$

2 Data and Calibration

We calibrate the model economies to the 1960-2004 U.S. economy using the National Income and Product Accounts (NIPA). The capital share parameter, θ is set to its average value of 0.363 over this period. The subjective discount factor, β is set to 0.972 so that the capital output ratio is 3.0 at the final steady state.

For the steady state calculations we set the values for the share of government purchases, G_t/Y_t, the depreciation rate δ_t, and the tax rate on capital income, τ_t equal to their average values over 1960-2004. The resulting values used for the steady state are $G/Y = 14.3\%$, $\delta = 4.4\%$, $\tau = 40\%$. We set share of leisure in the utility function to

[8] We do treat the model as a closed economy where net national saving and invsetment are identical. Figure %% in the Appendix displays the net national saving and investment rates for the U.S. economy in this time period. As expected, after the 1980s there is a divergence between the two series indicating the current accounts deficits in the U.S. Perhaps a two country model for that time period would ne useful especially if the aim is to understand the current account deficits of that period. For the purposes of this model, the closed economy assumption seems sufficient.

$\alpha = 2.21, TO\ MATCH\ ETC.$The growth rate of the TFP factor at the steady state is set to its 1960-2004 average value of 1.6%, the growth rate of the population to 1.2% and assume that the steady state is reached in eighty years.[9]

Since our main question is to examine the secular trends in consumption and saving between 1960-2004, our simulations take the actual capital output ratio in 1960 as the initial condition. We use the data for actual TFP, A_t, during this time period.[10] In addition, we use the actual time paths of the population growth rate, share of government spending in GNP, depreciation rate and the capital income tax rate between 1960 and 2004. To examine the contribution of each one of these factors to the secular trends in consumption and saving we conduct counterfactual experiments where we introduce each time series data one at a time. We use a shooting algorithm to obtain model simulations.

3 Results

We start by examining the net national saving rate and consumption output ratio that are generated by our model and perform counterfactual experiments to isolate the factors that impact the behavior of these variables in the U.S.

3.1 Model

We start this section by comparing some of the key economic variables that are generated by the model versus the data. Figure 4 displays four sets of graphs. First panel is the net national saving rate as a percent of net national product that is generated by the model as well as its counterpart in the data. In general the model does well in capturing the secular movements in the U.S. saving rate. However, between 1975 and 1990 the model generated saving rate is smaller than the one observed in the data. Absolute percentage error between

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[9]Between 2004 and the steady state, we assume that all exogenous variables take their steady state values except for TFP. TFP growth between 2000 and 2004 is 1.66% as opposed to the long-run average of 1.09% (long-run average of the TFP factor is 1.6%). In our benchmark case we assume that the future TFP growth rate follows a 5 year moving average process. In the sensitivity analysis we discuss the sensitivity of our results to this assumption.

[10]The TFP is calculated as

$$A_t = Y_t / K_t^{\theta} (H_t)^{1-\theta},$$

where the capital share ■ is set to 0.4, Y_t is GNP, K_t is the nongovernmental capital stock inclusive of foreign capital, and H_t is aggregate hours worked. In this framework investment consists of domestic private investment and the current account surplus. Even though, we treat the model as a closed economy, we include the foreign capital in the definition of the capital stock to make sure that the TFP growth rates faced by the U.S. individuals can be accurately measured. However, it is important to note that this adjustment is quantitatively very small. None of the results are significantly altered by different measurements of TFP such as inclusion of government capital or the exclusion of foreign capital.

these two series ranges between 0.2% to 57% in 1982 with a mean of 14% for the entire time period. Second panel displays the gross investment to GDP ratio in the data and in the model. Absolute percentage error between these series ranges from almost zero to 23% in 1982. The average absolute percentage error is 6%. In consumption, the percentage error ranges between zero and 10% with an average of 2.5%. In the data the labor input is the total hours worked which is the employment rate times average hours worked. In the model we only have the hours margin so the labor variable from the model reflects the total hours worked. As a result, the model is not able to capture the gradual increase that takes place in the aggregate work (AAAAA)

With these caveats in mind, we can still observe that the model economy generates the decline in the saving rate, the increase in the consumption output ratio and several of the humps in both series that has been taking place in the U.S. economy in this time period. An interesting finding here is that for the periods where the model performance is not good, the model generates hihger consumption (and lower savings) than the data. In other words, if there is any puzzle it would be due to the fact that in the 1980s U.S. consumers were consuming too little and saving too much relative to the implications of the growth model

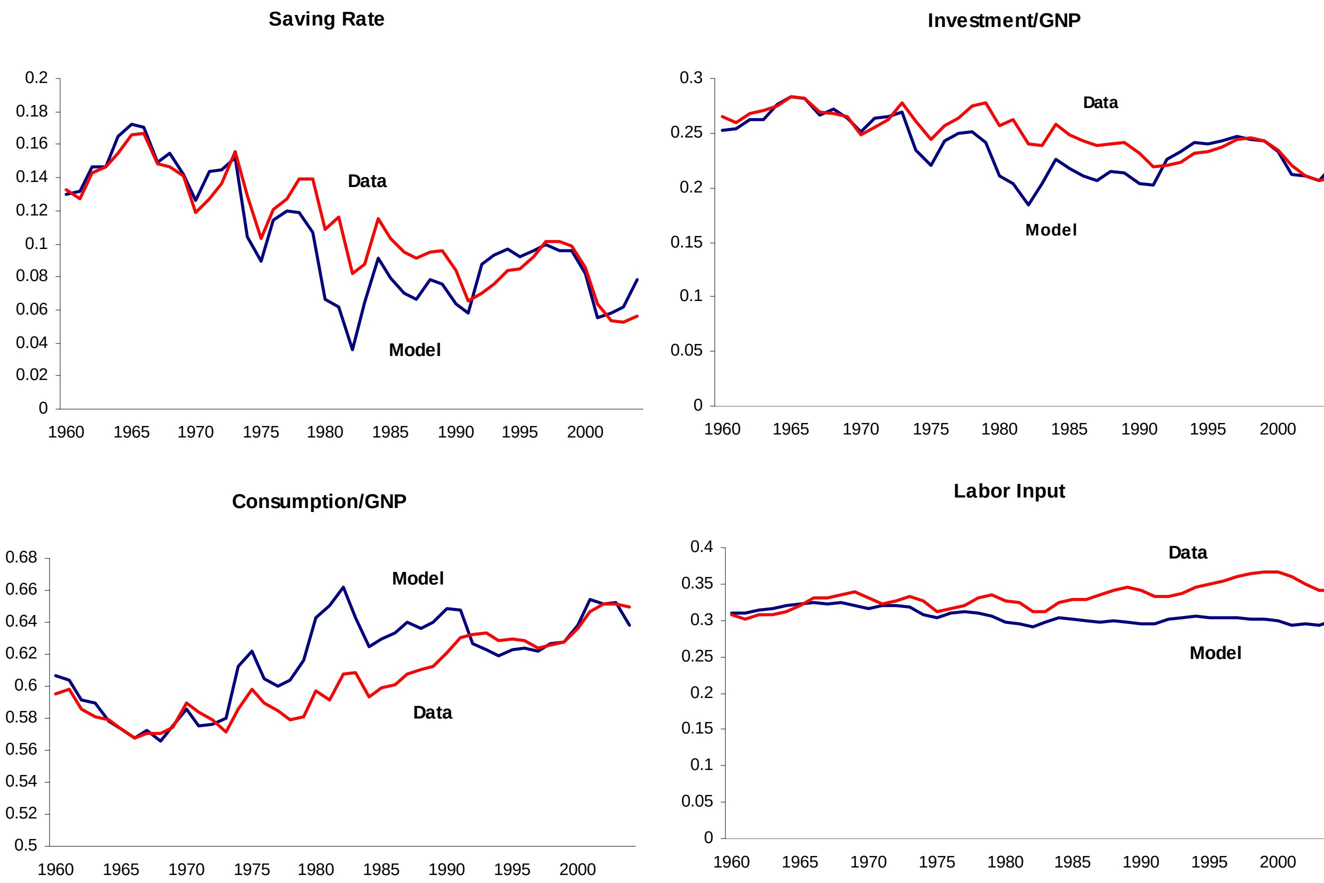

Figure 2: Properties of the Model

In order to understand the main factors behind the behavior of consumption and saving over this time period, we conduct several counterfactual experiments. In our benchmark economy, we have used time series data for the TFP growth rate, population growth rate, depreciation rate, capital income tax rate, and fraction of government expenditures on GNP. Table XX displays the changes that took place in some of the exogenous variables over this time period.

Table 1: Exogenous Variables

	Growth Rates		Average	
	TFP	**Population**	**Depreciation Rate**	**G/Y**
1960-1973	1.25	1.76	4.29%	15.24
1973-1995	0.91	1.37	4.51%	14.90
1995-2004	1.27	1.31	5.31%	13.45
Long-run averages	1.6%	1.2%	4.4%	14.33

To isolate the effect of each factor we can replace the time series data with their steady averages and observe the resulting behavior of saving and consumption. In the following graphs we summarize the outcome of these experiments.

First, notice that if all the exogenous variables are set to their steady state averages than the model generated saving and consumption will be constant over this time period. The horizontal line in the graphs of Figure 3 represent this case, where all the exogenous variables including the TFP growth rate are set to their long-run averages. The series labeled "TFP time-series" displays the saving rate and consumption output ratio that is generated by the model economy when the only time series data that is used in the simulations is the growth rate of TFP. Rest of the exogenous variables, population growth rate, depreciation rate, capital income tax rate and G/Y are set to their long-run averages.

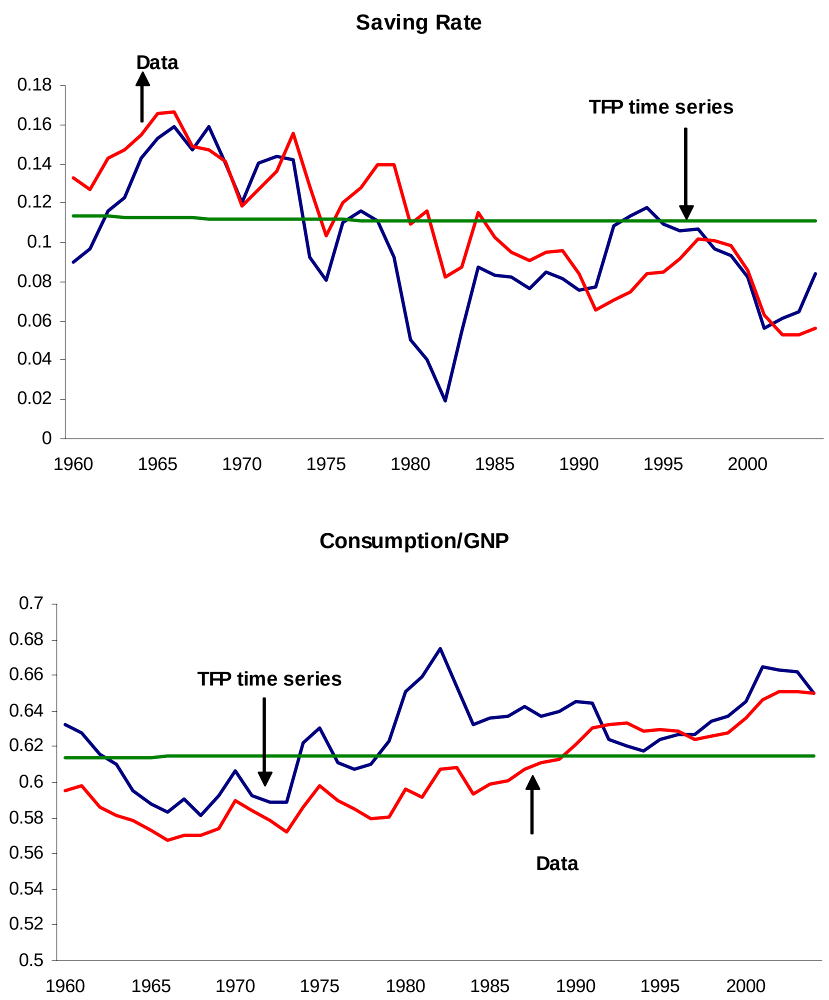

Figure 3: Role of the TFP Growth Rate

In Figure 4 we display the results of an experiment where the growth rate of population is the only time series variable that is used in the simulations, all other variables are set to their long run averages. In the U.S. there was a decline in the population growth rate in this time period. This experiment isolates the effect this change on the saving rate and consumption output ratio.The horizontal line represents the saving rate in the case where the population growth rate, together with all the exogenous variables, is also set to its long run average of 1.2%. Since higher population growth rate results in higher saving rate the gradual decline in the population growth rate results in a decline in the saving rate that is generated by the model. 1960 represents a period where the population growth rate is higher than its long run average, resulting in a higher saving rate and increasing share of consumption in GNP for that period. However, changes in the population growth rate do not seem to be responsible for neither the continuous decline in the saving rate after the 1980s (or the increase in C/Y) nor for the humps that are present in the data.

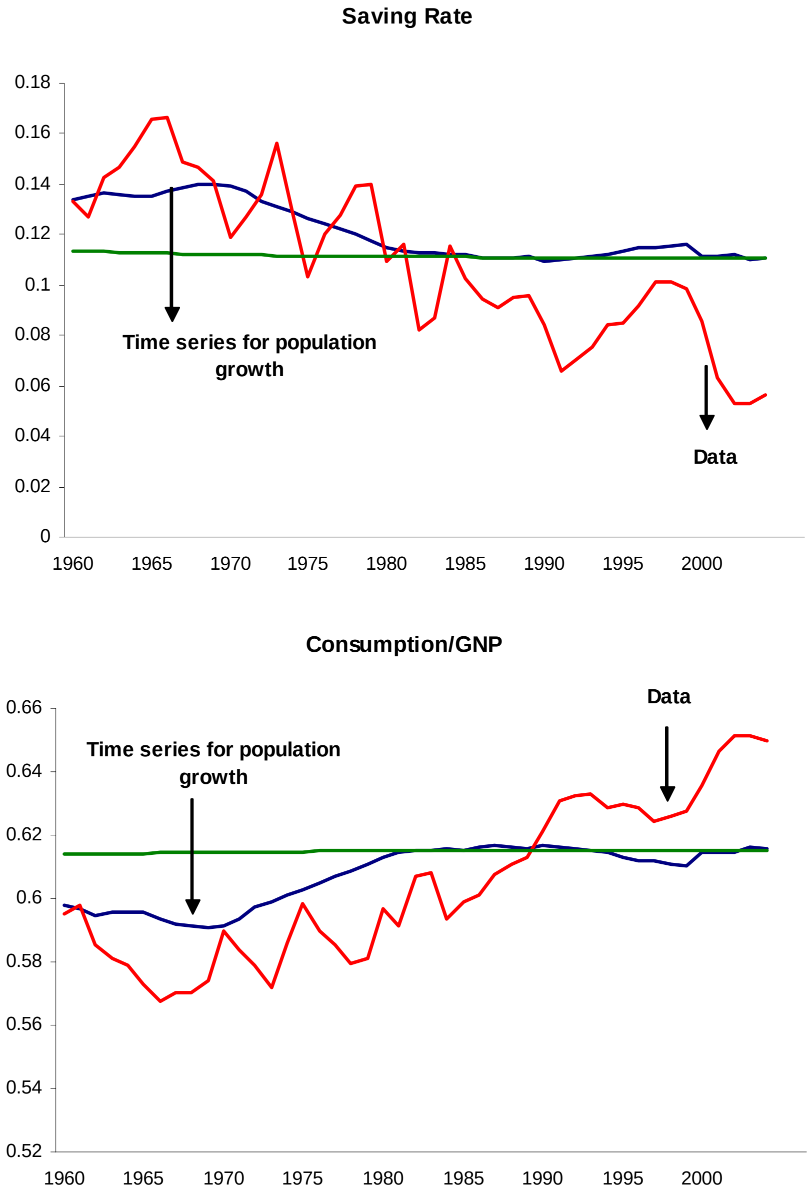

Figure 4: Role of Population Growth Rate

In Figure 5 we display the saving rate generated by the model for two additional experiments. In the first panel we isolate the effect of the depreciation rate. As can be seen from Table XX the depreciation rate in the 1995-2004 period is above its long-run average of 4.4%. This results in a lower saving rate for that period compared to its long run average. In the second panel the only time series data that is used in the simulations is the fraction of government expenditures in GNP. The decline that is observed in this variable over the 1994-2004 period results in a saving rate that is higher than its long run average for that period. It also generates some fluctuations in the saving rate for the entire time period.

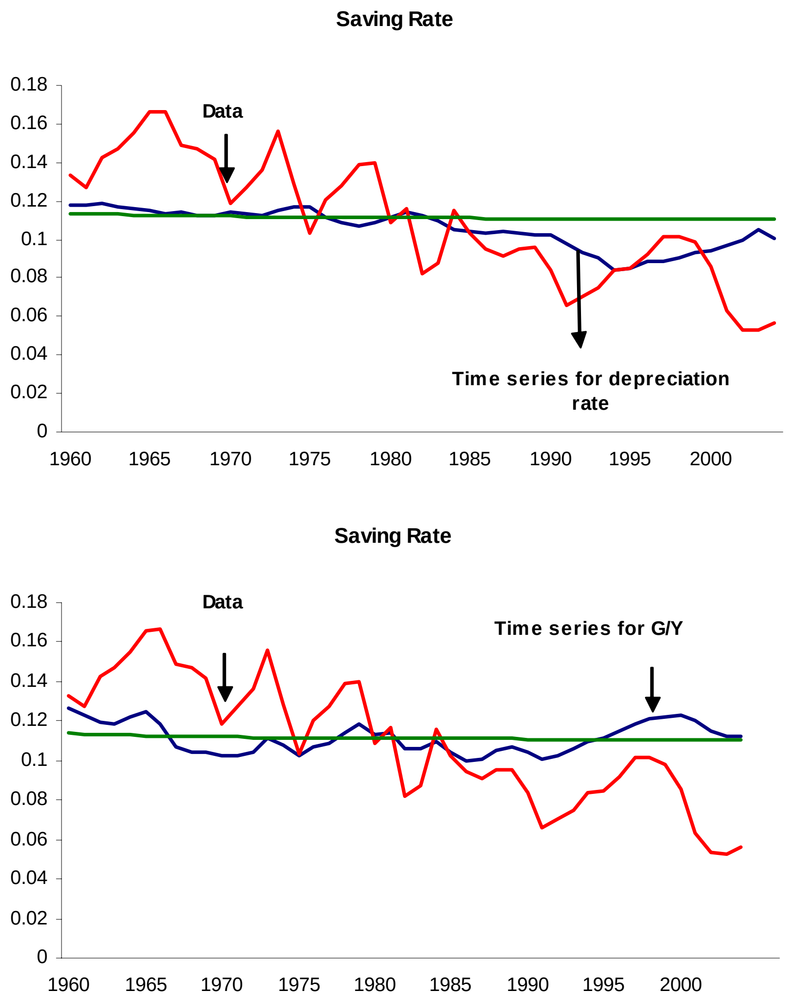

Figure 5: Role of the Depreciation Rate and G/Y

These results indicate that the decline in the population and TFP growth rates may have played an important role in the decline of the saving rate until the 1980s. After this period the decline in the TFP growth rate and the increase in the deprecation rate seem to be more important.

3.1.1 Sensitivity of Results

Assignment of growth rates to the periods between 2004 and the steady state is arbitrary. In our benchmark calculations we have used a 5 year moving average for the TFP growth rates between 2004 and 2013. After 2013 we have assumed the TFP growth rate to take its steady state value. To check the sensitivity of our results to this assumption, we report simulations from a case where we assume the TFP growth rate to go down from 1.66% to its steady state level of 1.09% starting immediately at 2004

In Figure %% we show the saving rate and the C/Y that result from these two experiments. The vertical line represents year 2004 beyond which the two simulations differ in terms of the TFP growth rate. The two series are identical until 1990s. There are noticeable difference in the 1990-2004 period between the two series, however, both capture the increase in the saving rate and the decline in C/Y that takes place in this period. As one can see the implications of the TFP growth rate beyond 2004 significantly differ between the two simulations.

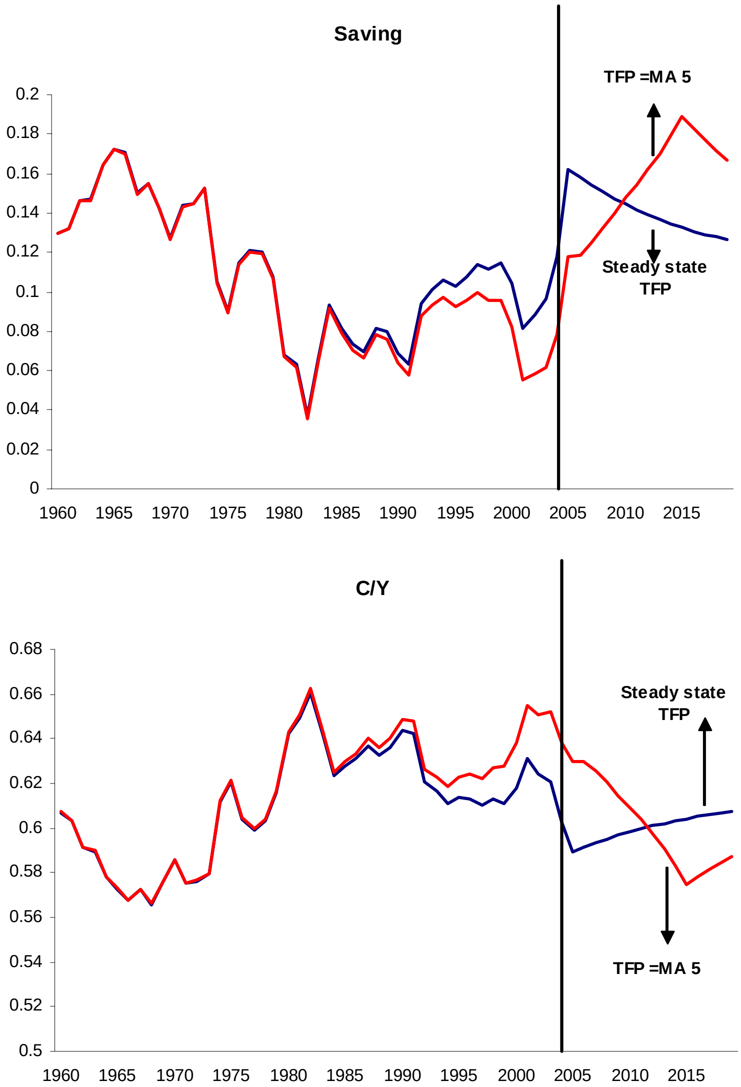

Figure %%: Sensitivity Analysis

4 Appendix

4.1 Calibration of the Benchmark Economy

In this section, we describe the detailed procedure of our calibration for the benchmark economy. We use data from the 2005 revision of National Income and Product Accounts (NIPA) and Fixed Asset Tables (FAT) of Bureau of Economic Analysis (BEA) for the years 1960-2003. The measurement of the macroeconomic aggregates follows Cooley and Prescott (1995) with special attention paid to the following issues.

Denote measured GNP as follows

$$(cs + cnd + icd) + g + i + nx + nfp = GNP = dep + NNP \tag{4}$$

where cs, cnd, icd denote consumption of service flow, consumption of nondurable and expenditure on consumer durable. g denotes the sum of government consumption, denoted as gc, and gross government investment, denoted as gi. i denotes gross private investment. nx denotes net export and nfp denotes net income of foreign assets. dep denotes consumption of fixed capital.

First, we include government capital in the definition of the capital stock. Once we include service flow from government capital, Equation(1) becomes

$$(cs + cnd + icd + sg) + gc + (i + gi) + nx + nfp = GNP + sg = dep + (NNP + sg) \tag{5}$$

where dgi denotes depreciation of government fixed assets. Total government consumption now becomes $g - dgi$ and $dep - dgi$ is depreciation of private fixed asset.

Second, we treat consumer durable as part of capital stock. Then Equation (2) becomes

$$\begin{aligned}(cs + cnd + csd + sg) + gc + (i + nicd + dcd + gi) + nx + nfp &= GNP + sg + csd \\ &= (dep + dcd) + (NNP + sg + csd - dcd\end{aligned}$$

where csd is service flow from consumer durable and dcd denote depreciation of consumer durable. Therefore, total private consumption becomes $(cs + cnd + csd + sg)$ and total investment investment becomes $(i + icd + gi)$ or $(i + nicd + dcd + gi)$, where $nicd$ is referred to as net investment in consumer durable and dcd denotes depreciation of consumer durable. Total depreciation becomes $(dep + dcd)$.

Third, we treat net foreign asset as part of capital stock. The above equation then becomes

$$\begin{aligned}(cs + cnd + csd + sg) + gc + (i + nicd + dcd + gi + nx + nfp) &= GNP + sg + csd \\ &= (dep + dcd) + (NNP + csd + sg - dcd\end{aligned}$$

Now total investment becomes $(i + nicd + dcd + gi + nx + nfp)$.

In summary, we define capital K as the sum of the fixed assets, consumer durables, inventory stock land, and net foreign assets. Output Y corresponds to $GNP + sg + csd$ and total depreciation corresponds to $dep + dcd$.

Following McGrattan and Prescott (2000), we assume that the rate of returns for consumer durable and government fixed assets are equal to the rate of return for non-corporate capital stock. Specifically, we have

$$\begin{aligned} i &= \frac{(\text{Accounting Returns + Imputed Returns})}{(\text{Non-corporate capital +land+inventory+Capital of Foreign Subsidiary})} \\ &= \frac{(0.0603 + 1.6803 i)}{(2.976 + 0.0095/i)} \end{aligned}$$

where 0.0603 is non-corporate profit plus net interest less intermediate financial services, 1.6803 is the sum of the net stock of government capital, consumer durable, land and inventory; 2.976 is the sum of net stock of non-corporate business, government capital, consumer durable, land and inventory. 0.0095 is the net profit from foreign subsidiaries.

The above equation gives a value of i at 3.93% over the period between 1960 and 2000.

Y_{sd} and Y_{sg} are referred to as the service flows from consumer durables and government capital, which is computed following Cooley and Prescott (1995).

$$
\begin{aligned}
Y_{sd} &= csd = (i + \delta_d) K_D \\
Y_{sg} &= iK_G
\end{aligned}
$$

Then the capital share in the output function α is computed as

$$\alpha = \frac{Y_{kp} + Y_{sd} + Y_{sg}}{GNP + Y_{sd} + Y_{sg}}$$

This gives a value 0.41 for α.

Define the net saving rate as

$$
\begin{aligned}
s &= \frac{Y - CON - GOV - DEPR}{Y - DEPR} \\
&= \frac{(GNP + sg + csd) - (cs + cnd + csd + sg) - gc - (dep + dcd)}{(GNP + sg + csd) - (dep + dcd)} \\
&= \frac{GNP - cs - cnd - gc - (dep + dcd)}{NNP + csd + sg - dcd}
\end{aligned}
$$

TFP level is computed as

$$A = \frac{Y}{K^{\alpha} (hE)^{1-\alpha}}$$

Table A1. Model Economy Account

		Model Expression
1	Depreciation	δK
2	Labor income	wE
3	Capital income	rK
4	Total Income	Y
5	Private Consumption	C
6	Government Consumption	G
7	Investment	I
8	Total Product	Y

Table A2. National Accounts, Average 1960-2000 Relative to GNP	
Consumption of fixed capital	0.115
Compensation of employees	0.571
Unambiguous capital income[11]	0.154
Proprietors' Income with IVA and CCadj	0.074
Indirect Business Taxes[12]	0.086
Gross national income	1.000
Personal consumption expenditures	0.635
Durable goods	0.082
Nondurable goods and services	0.553
Gross private domestic investment	0.161
Government consumption expenditures and gross investment	0.206
Consumption expenditures	0.167
Gross investment	0.039
Net foreign investment[13]	-0.002
Gross national product	1.000
Addendum	
Consumption of fixed capital, durable goods	0.062
Consumption of government fixed assets	0.024
Net stock of government fixed assets	0.671
Net stock of consumer durable goods	0.301

[11] Unambiguous capital income = Rental Income of persons with CCAdj + Corporate Profits with IVA and CCadj + Net Interest and miscellaneous payments.

[12] Indirect business taxes are equal to the sum of tax on production and imports less subsidies, business transfer, current surplus of government enterprises and statistical discrepancy.

[13] Net foreign investment is equal to net export of goods and services plus net factor payment.

Table A3. Mapping From National Accounts to Model Accounts (Excluding Gov't Capital

		Model	NIPA
1	Depreciation (δK)	0.153	
	Consumption of fixed capital		0.115
	Consumption of fixed capital, durable goods		0.062
	Less: Consumption of government fixed assets		-0.024
			0.153
2	Labor income (wE)	0.683	
	Compensation of employees		0.571
	0.7×(Proprietors' income + Indirect business taxes)		0.112
			0.683
3	Capital income (rK)	0.228	
	Unambiguous capital income		0.154
	0.3×(Proprietors' income + Indirect business taxes)		0.048
	Imputed capital services from durable goods		0.026
			0.228
4	Total income (Y)	1.064	1.064

Table A3. Mapping From National Accounts to Model Accounts (Excluding Gov't Capital

		Model	NIPA
5	Private consumption (C)	0.641	
	Personal consumption expenditure		0.635
	Less: Consumption expenditure, durable goods		-0.082
	Imputed capital ser. from durable goods[14]		0.026
	Consumption of fixed capital, durable goods		0.062
			0.641
6	Public consumption (G)	0.182	
	Government consumption exp. and gross investment		0.206
	Less: Consumption of fixed capital, gov. capital		-0.024
			0.182
7	Investment (I)	0.241	
	Gross domestic private investment		0.161
	Personal consumption expenditure, durable goods		0.082
	Net foreign investment		-0.002
			0.241
8	Total Product (Y)	1.064	1.064

[14]Imputed capital services from durable goods is equal to net stock of consumer durable goods times 8.69%.

Table A4. Mapping From National Accounts to Model Accounts (including gov't capital)

		Model	NIPA
1	Depreciation (δK)	0.177	
	Consumption of fixed capital		0.115
	Consumption of fixed capital, durable goods		0.062
			0.177
2	Labor income (wE)	0.683	
	Compensation of employees		0.571
	0.7×(Proprietors' income + Indirect business taxes)		0.112
			0.683
3	Capital income (rK)	0.286	
	Unambiguous capital income		0.154
	0.3×(Proprietors' income + Indirect business taxes)		0.048
	Imputed capital services from durable goods		0.026
	Imputed services from government fixed assets		0.058
			0.286
4	Total income (Y)	1.146	1.146
	Table A4 Mapping From National Accounts to Model Accounts (including gov't capital)		
5	Private consumption (C)	0.699	
	Personal consumption expenditure		0.635
	Less: Consumption expenditure, durable goods		-0.082
	Imputed capital services from durable goods		0.026
	Imputed services from government capital[15]		0.058
	Consumption of fixed capital, durable goods		0.062
			0.699
6	Public consumption (G)	0.167	
	Government consumption expenditure		0.167
7	Investment (I)	0.280	
	Gross domestic private investment		0.161
	Personal consumption expenditure, durable goods		0.082
	Net foreign investment		-0.002
	Gross government investment		0.039
			0.280
8	Total Product (Y)	1.146	1.146

[15] Imputed services from government fixed assets is equal to net stock of government fixed assets time 8.69%.

In Figure A1 we provide data on the fraction of consumption as a percent of GDP from the NIPAs and C/GNP that reflects the adjustments we have made to the data.

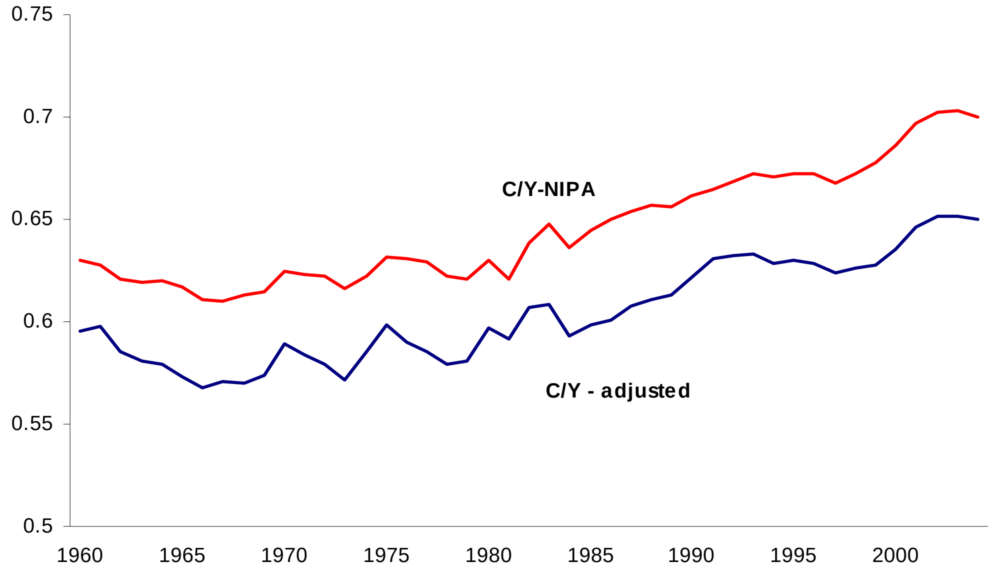

Figure A1: NIPA and adjustments

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