Introduction

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Abstract

A simple AR model with money and income taxes

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A SIMPLE MODEL WITH MONEY AND REAL TANKS

The economy is in equilibrium at the price level where the quantity demanded equals the quantity supplied. At this price level, there are no aggregate excess demands. The model consists of three main sectors: households, businesses, and government. The economy is assumed to be closed, meaning that there is no international trade. The level of output is determined by the interaction of supply and demand. The government sector influences the economy through its spending and taxation policies. The model is used to analyze the impact of policy changes on the economy, such as changes in government spending or taxation. The model is an important tool for understanding the dynamics of the economy and for making policy decisions.
The model of the economy is given by:

\[ \begin{align*}
\frac{dY}{dt} &= a + bY - cY^2 \quad (1) \\
\frac{dL}{dt} &= bY - cY^2 - dL \quad (2) \\
\end{align*} \]

where:
- \( Y \) is the level of income
- \( L \) is the level of labor
- \( a \), \( b \), \( c \), and \( d \) are parameters of the model

The model is subject to the following conditions:

1. \( Y > 0 \) and \( L > 0 \)
2. \( b > 0 \) and \( c > 0 \)
3. \( d > 0 \)

The solution to these equations is given by:

\[ Y = \frac{a + \sqrt{a^2 + 4bd}}{2c} \quad (3) \]

The steady-state level of income is given by:

\[ Y^* = \frac{a}{c} \quad (4) \]

The steady-state level of labor is given by:

\[ L^* = \frac{b}{d} \quad (5) \]

The model of the economy can be extended to include taxes and public expenditure:

\[ \begin{align*}
\frac{dY}{dt} &= a + bY - cY^2 - tY \quad (6) \\
\frac{dL}{dt} &= bY - cY^2 - dL - \frac{G}{Y} \quad (7) \\
\end{align*} \]

where:
- \( t \) is the tax rate
- \( G \) is the government expenditure

The solution to these equations is given by:

\[ Y = \frac{a + \sqrt{a^2 + 4bd}}{2c} \quad (8) \]

The steady-state level of income is given by:

\[ Y^* = \frac{a}{c} \quad (9) \]

The steady-state level of labor is given by:

\[ L^* = \frac{b}{d} \quad (10) \]

The model of the economy can be further extended to include public expenditure:

\[ \begin{align*}
\frac{dY}{dt} &= a + bY - cY^2 - tY - G \quad (11) \\
\frac{dL}{dt} &= bY - cY^2 - dL - \frac{G}{Y} \quad (12) \\
\end{align*} \]

The solution to these equations is given by:

\[ Y = \frac{a + \sqrt{a^2 + 4bd}}{2c} \quad (13) \]

The steady-state level of income is given by:

\[ Y^* = \frac{a}{c} \quad (14) \]

The steady-state level of labor is given by:

\[ L^* = \frac{b}{d} \quad (15) \]
\[
0 = \psi - \left[ \frac{\theta}{\psi} \right] \in \mathbb{R} : \psi > 0
\]

\[
0 = \psi - \left[ \frac{\theta}{\psi} \right] \in \mathbb{R} : \psi > 0
\]

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0 = \psi - \left[ \frac{\theta}{\psi} \right] \in \mathbb{R} : \psi > 0
\]

\[
\psi = \varphi + \frac{\theta}{\psi}
\]

\[
\psi = \varphi + \frac{\theta}{\psi}
\]

\[
\psi = \varphi + \frac{\theta}{\psi}
\]

\[
0 = \varphi - \left[ \frac{\theta}{\psi} \right] \in \mathbb{R} : \psi > 0
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\]

\[
\psi = \varphi + \frac{\theta}{\psi}
\]

\[
\psi = \varphi + \frac{\theta}{\psi}
\]

\[
\psi = \varphi + \frac{\theta}{\psi}
\]
For a "a" which plots in Figure 1. 

The estimated probability density functions for the parameters $\theta_1$ and the standard deviation $\theta_2$ of the crime rate are plotted in Figure 1. The mean values are marked with a line in the center of the estimated range, and the parameters are listed in the table below.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\theta_1$</td>
<td>0.02807</td>
</tr>
<tr>
<td>$\theta_2$</td>
<td>0.00093</td>
</tr>
</tbody>
</table>

The bootstrap results for $\theta_2$ and the standard error of the estimate are given.

$\theta_2 = \sqrt{\text{var}(\bar{y} - \hat{y})}$

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$\theta_2 = \sqrt{\text{var}(\bar{y} - \hat{y})}$

In the following table, the values are estimated for the period 1973 to 1999 and for the quarter of the period 1973 to 1999.

<table>
<thead>
<tr>
<th>Period</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>0.0123</td>
</tr>
<tr>
<td>1974</td>
<td>0.0135</td>
</tr>
<tr>
<td>1975</td>
<td>0.0142</td>
</tr>
</tbody>
</table>

In order to make comparisons with previous studies, the parameters values used were:

$\theta_1 = 0.02807$ and $\theta_2 = 0.00093$

For the purpose of simulations, the length of the period is one quarter, and in order to make comparisons with previous studies, the parameters values used were:
TABLE 2

A SIMPLIFIED MODEL WITH WAGE AND INCOME TAXES

<table>
<thead>
<tr>
<th>Year</th>
<th>Wage Earned</th>
<th>Income from Capital</th>
<th>Total Income</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900</td>
<td>100</td>
<td>50</td>
<td>55</td>
<td>30</td>
</tr>
<tr>
<td>1905</td>
<td>105</td>
<td>55</td>
<td>60</td>
<td>35</td>
</tr>
<tr>
<td>1910</td>
<td>110</td>
<td>60</td>
<td>70</td>
<td>40</td>
</tr>
<tr>
<td>1915</td>
<td>115</td>
<td>65</td>
<td>80</td>
<td>45</td>
</tr>
</tbody>
</table>

Stanard Deviation and Correlation for Political Economy

1. The response of political economy to money is a complex pattern of interaction and manipulation. The model assumes a linear relationship between political economy and money, which is an oversimplification. In reality, the relationship is more complex, involving various factors such as political influence, economic conditions, and social norms. The model also assumes that money is the only variable affecting political economy, which is not entirely accurate. Other factors such as social status, education, and personal beliefs also play a role in shaping political economy.

2. The income from capital is assumed to be constant over time, which is not realistic. Over time, capital income can change due to inflation, changes in economic conditions, and other factors. The model assumes that consumption is a linear function of income from capital and wage earned, which is not entirely accurate. Consumption is also affected by other factors such as savings, debt, and personal preferences.

3. The model assumes that the government can control the money supply and influence political economy. In reality, the government is subject to various constraints and limitations, which can affect its ability to control the money supply and influence political economy.

4. The model assumes that political economy has a direct impact on the economy, which is not entirely accurate. Political economy can indirectly affect the economy through its influence on other factors such as investment, consumer spending, and business confidence.
### TABLE 4

A Simple Ric Model with Money and Income Taxes

<table>
<thead>
<tr>
<th>Economy 1</th>
<th>Economy 2</th>
<th>Economy 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
</tbody>
</table>

### TABLE 3

Revised by Annales Economiques Vol. 9, N° 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Expression</th>
</tr>
</thead>
<tbody>
<tr>
<td>D2 vary</td>
<td>D2 varies</td>
<td></td>
</tr>
<tr>
<td>D1 vary</td>
<td>D1 varies</td>
<td></td>
</tr>
<tr>
<td>D2 dev</td>
<td>D2 deviation</td>
<td></td>
</tr>
<tr>
<td>D1 dev</td>
<td>D1 deviation</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>Standard Deviation</td>
<td></td>
</tr>
</tbody>
</table>

### Standard Deviations and Correlations for Artificial Economies

<table>
<thead>
<tr>
<th>Correlation Matrix of the Innovations and Correlation Matrix (Over the Entropy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.90</td>
</tr>
<tr>
<td>0.90</td>
</tr>
<tr>
<td>0.90</td>
</tr>
</tbody>
</table>

**Correlations for the Fourth Artificial Economy v = a = 1.3**

Additional information and variables involved in the model are not provided in the image.
TABLE 6.1

<table>
<thead>
<tr>
<th>Table: Growth of Money (q = 0.75)</th>
<th>w</th>
<th>1.00</th>
<th>0.01</th>
<th>0.001</th>
<th>0.0001</th>
<th>0.00001</th>
<th>0.000001</th>
<th>0.0000001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>1961</td>
<td>1.00</td>
<td>0.01</td>
<td>0.001</td>
<td>0.0001</td>
<td>0.00001</td>
<td>0.000001</td>
<td>0.0000001</td>
</tr>
<tr>
<td>1962</td>
<td>1.00</td>
<td>0.01</td>
<td>0.001</td>
<td>0.0001</td>
<td>0.00001</td>
<td>0.000001</td>
<td>0.0000001</td>
<td></td>
</tr>
<tr>
<td>1963</td>
<td>1.00</td>
<td>0.01</td>
<td>0.001</td>
<td>0.0001</td>
<td>0.00001</td>
<td>0.000001</td>
<td>0.0000001</td>
<td></td>
</tr>
<tr>
<td>1964</td>
<td>1.00</td>
<td>0.01</td>
<td>0.001</td>
<td>0.0001</td>
<td>0.00001</td>
<td>0.000001</td>
<td>0.0000001</td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>1.00</td>
<td>0.01</td>
<td>0.001</td>
<td>0.0001</td>
<td>0.00001</td>
<td>0.000001</td>
<td>0.0000001</td>
<td></td>
</tr>
</tbody>
</table>

A simple model with money and income taxes.

TABLE 7

| Table: Matrix of the Innovations and Correlation Matrix (over the diagonal) |
|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 0.01 | 0.001 | 0.0001 | 0.00001 | 0.000001 | 0.0000001 |
| 0.01 | 1.00 | 0.01 | 0.001 | 0.0001 | 0.00001 | 0.000001 | 0.0000001 |
| 0.001 | 0.01 | 1.00 | 0.01 | 0.001 | 0.0001 | 0.00001 | 0.000001 | 0.0000001 |
| 0.0001 | 0.001 | 0.01 | 1.00 | 0.01 | 0.001 | 0.0001 | 0.00001 | 0.000001 |
| 0.00001 | 0.0001 | 0.001 | 0.01 | 1.00 | 0.01 | 0.001 | 0.0001 | 0.00001 |
| 0.000001 | 0.00001 | 0.0001 | 0.001 | 0.01 | 1.00 | 0.01 | 0.001 | 0.0001 |
| 0.0000001 | 0.000001 | 0.00001 | 0.0001 | 0.001 | 0.01 | 1.00 | 0.01 | 0.001 |

A correlation matrix for the constant and correlation matrix (over the diagonal).
5. Conclusions

(see Figure 3)

The RBC model with money and income taxes is a useful tool for understanding the economy's response to policy changes. It allows for a deeper understanding of how changes in policy can affect economic outcomes. The model provides insights into the workings of the economy and helps policymakers make informed decisions. The inclusion of money and income taxes adds realism to the model and makes it more applicable to real-world situations. Overall, the RBC model with money and income taxes is a valuable tool for economic analysis.

Figure 3

A SIMPLE RBC MODEL WITH MONEY AND INCOME TAXES

TABLE 62

GROWTH OF MONEY (a = 0.5, v = 1)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Money</td>
<td>8.5%</td>
<td>10.0%</td>
<td>11.5%</td>
<td>13.0%</td>
<td>14.5%</td>
<td>16.0%</td>
<td>17.5%</td>
<td>19.0%</td>
<td>20.5%</td>
<td>22.0%</td>
<td>23.5%</td>
</tr>
</tbody>
</table>

ECONOMIC GROWTH AND SAMPLING VARIANCE

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth</td>
<td>5.0%</td>
<td>7.5%</td>
<td>10.0%</td>
<td>12.5%</td>
<td>15.0%</td>
<td>17.5%</td>
<td>20.0%</td>
<td>22.5%</td>
<td>25.0%</td>
<td>27.5%</td>
<td>30.0%</td>
</tr>
</tbody>
</table>

Note: The table above shows the growth of money and sampling variance for different years. The data is hypothetical and for illustrative purposes only.
Figure 9
Implied responses for selected simulated variables.

A simple model with money and income taxes.