Macro III: Problem Set 3

Deadline: Friday, 17/09/2018

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Source code disponível em: https://github.com/btebaldi/Macro3/tree/master/PSet_03

Questao 2

Item F

A arrecadação do governo pode ser escrita como:

$$G = \tau_y K_t^{\alpha} N_t^{1-\alpha} + \tau_n w_t N_t$$

Em termos per capta temos:

$$g = \tau_y k_t^{\alpha} + \tau_n w_t$$

Se a arrecadação é constante, pelo teorema da função implicita temos:

$$\frac{d\tau_y}{d\tau_n} = \frac{-w}{k^{\alpha}}$$

substituindo a equacoes de w temos:

$$\frac{d\tau_y}{d\tau_n} = -\frac{(1-\tau_y)(1-\alpha)}{(1+\tau_n)}$$

$$\frac{d\tau_y}{d\tau_n} = -0.48$$

Utilizando o conceito de diferencial temos:

$$\Delta\tau_y = -0.48\Delta\tau_n = (-0.48) * (-0.05) = 0.024$$

Logo é esperado que τ_y seja próximo de 0.024.

```
% Lipeza de variaveis
clearvars
clc


% Cria um processo de markov com as caracteristicas especificadas.
sigma = ((1-0.98^2)*0.621)^0.5;
mkv = MarkovProcess(0.98, sigma ,2,7,0);
mkv.AR.sigma2_y
```

```
ans = 0.6210
```

```
[chain,state] = MarkovSimulation(mkv.TransitionMatrix, 1000, mkv.StateVector, 3);
```

```
probability: 1.000000
Warning: The probabilities don`t sum to 1.
probability: 1.000000
Warning: The probabilities don`t sum to 1.
probability: 1.000000
Warning: The probabilities don`t sum to 1.
probability: 1.000000
Warning: The probabilities don`t sum to 1.
probability: 1.000000
Warning: The probabilities don`t sum to 1.
```

```
eco_param.alpha = 0.4;
eco_param.beta = 0.96;
eco_param.delta = 0.08;
eco_param.gamma = 0.75;

eco_param.sigma_c = 2;
eco_param.sigma_l = 2;

eco_param.tau_n = 0.25;
eco_param.tau_y = 0;

% Determina os parametros r e w da economia
eco_param.r_UpperBound = 1/eco_param.beta -1;
eco_param.r_LowerBond = -eco_param.delta;
eco_param.r = (eco_param.r_UpperBound + eco_param.r_LowerBond)/2;
eco_param.r_tilda = eco_param.r + eco_param.delta;


% Determina os Grids
WageShocks.Values = exp(mkv.StateVector);
WageShocks.Grid.Min = min(WageShocks.Values);
WageShocks.Grid.Max = max(WageShocks.Values);
WageShocks.Grid.N = mkv.QtdStates;
WageShocks.PI = mkv.TransitionMatrix;

% Determina as caracteristicas do grid de trabalho
Labor.Grid.N = 20;
Labor.Grid.Min = 0.01;
Labor.Grid.Max = 1;
Labor.Values = linspace(Labor.Grid.Min, Labor.Grid.Max, Labor.Grid.N);

G0 = CalculaRendaGov(eco_param.tau_y ,Labor, WageShocks, eco_param, 1);
```

```
tau_y:0.000 tau_n:0.250
Inter:   1 r: -0.019167 Dem: -8.253269
Inter:   2 r: -0.049583 Dem: 61.290115
Inter:   3 r: -0.034375 Dem: 20.366287
Inter:   4 r: -0.026771 Dem: 6.357693
Inter:   5 r: -0.022969 Dem: 0.695067
```

```
Inter:   6 r: -0.021068 Dem: -3.167669
Inter:   7 r: -0.022018 Dem: -0.961379
Inter:   8 r: -0.022493 Dem: -0.000415
Inter:   9 r: -0.022731 Dem: 0.372352
Inter:  10 r: -0.022612 Dem: 0.159592
Inter:  11 r: -0.022553 Dem: 0.079587
Inter:  12 r: -0.022523 Dem: 0.039594
Inter:  13 r: -0.022508 Dem: 0.019590
Inter:  14 r: -0.022501 Dem: 0.009588
Inter:  15 r: -0.022497 Dem: 0.004586
Inter:  16 r: -0.022495 Dem: 0.002086
Inter:  17 r: -0.022494 Dem: 0.000835
Inter:  18 r: -0.022494 Dem: 0.000210
Inter:  19 r: -0.022494 Dem: -0.000102
Inter:  20 r: -0.022494 Dem: 0.000054
Inter:  21 r: -0.022494 Dem: -0.000024
Inter:  22 r: -0.022494 Dem: 0.000015
interest rate: -0.022494
wage rate: 1.749060
```

ans = *20×7 table*

...

	Var1	Var2	Var3	Var4	Var5	Var6
1	100.0000	16.0791	16.0791	16.0791	16.0791	16.0791
2	16.0791	20.4960	20.4960	20.4960	20.4960	20.4960
3	20.4960	24.9129	24.9129	24.9129	24.9129	24.9129
4	24.9129	24.9129	24.9129	24.9129	24.9129	29.3298
5	29.3298	29.3298	33.7467	33.7467	33.7467	33.7467
6	33.7467	33.7467	38.1636	38.1636	38.1636	38.1636
7	38.1636	38.1636	38.1636	38.1636	38.1636	38.1636
8	42.5805	42.5805	42.5805	46.9974	42.5805	42.5805
9	46.9974	46.9974	46.9974	51.4142	51.4142	51.4142
10	51.4142	51.4142	51.4142	55.8311	55.8311	55.8311
11	55.8311	55.8311	55.8311	60.2480	60.2480	60.2480
12	60.2480	60.2480	60.2480	64.6649	64.6649	64.6649
13	64.6649	64.6649	64.6649	64.6649	69.0818	64.6649
14	69.0818	69.0818	69.0818	69.0818	73.4987	73.4987
15	73.4987	73.4987	73.4987	73.4987	77.9156	77.9156
16	77.9156	77.9156	77.9156	77.9156	82.3325	82.3325

ans = *20×7 table*

...

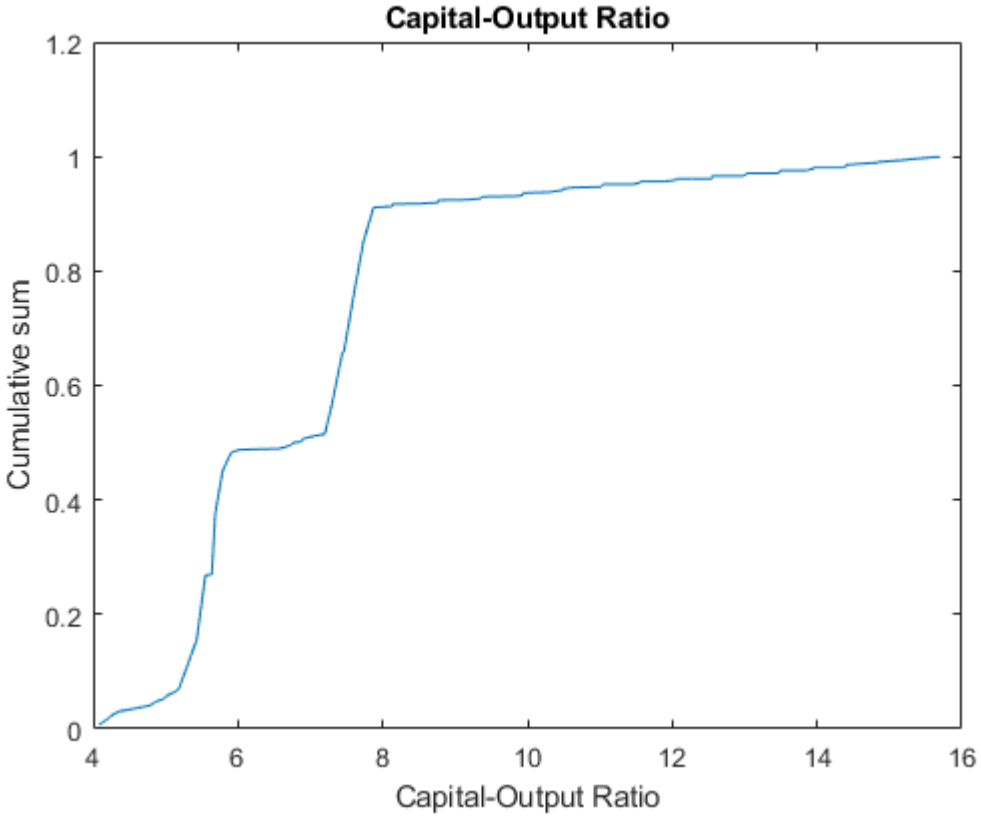
	Var1	Var2	Var3	Var4	Var5	Var6
1	0.0100	0.8437	0.6874	0.5832	0.4789	0.3747
2	0.0100	0.8958	0.7395	0.5832	0.4789	0.4268
3	0.0100	0.9479	0.7916	0.6353	0.5311	0.4268
4	0.0100	0.0100	0.0100	0.0100	0.0100	0.4268

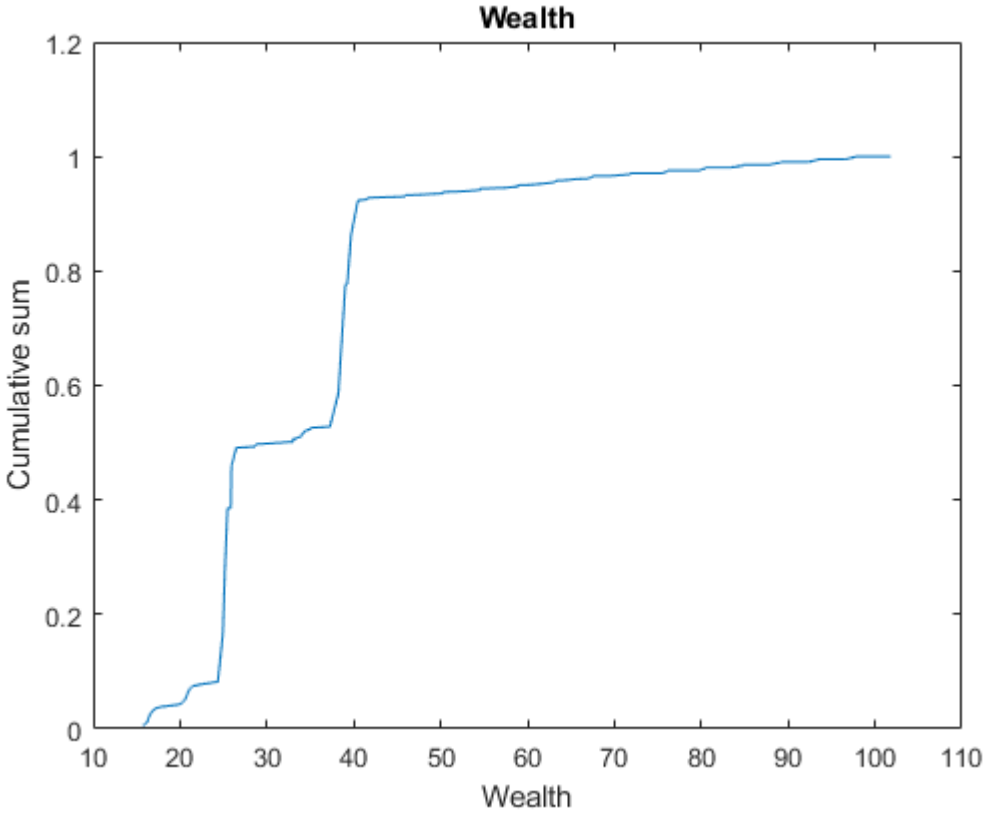
	Var1	Var2	Var3	Var4	Var5	Var6
5	0.0100	0.0100	0.8958	0.6874	0.5311	0.4268
6	0.0100	0.0100	0.8958	0.7395	0.5832	0.4789
7	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100
8	0.0100	0.0100	0.0100	0.7916	0.0100	0.0100
9	0.0100	0.0100	0.0100	0.8437	0.6353	0.4789
10	0.0100	0.0100	0.0100	0.8437	0.6353	0.5311
11	0.0100	0.0100	0.0100	0.8958	0.6874	0.5311
12	0.0100	0.0100	0.0100	0.8958	0.6874	0.5311
13	0.0100	0.0100	0.0100	0.0100	0.7395	0.0100
14	0.0100	0.0100	0.0100	0.0100	0.7395	0.5832
15	0.0100	0.0100	0.0100	0.0100	0.7395	0.5832
16	0.0100	0.0100	0.0100	0.0100	0.7916	0.5832

ans = *20×7 table*

...

	Lambda1	Lambda2	Lambda3	Lambda4	Lambda5	Lambda6
1	0.0048	0.0074	0.0090	0.0085	0.0058	0.0024
2	0.0049	0.0075	0.0093	0.0088	0.0061	0.0026
3	0.0050	0.0836	0.1124	0.1073	0.0742	0.0313
4	0.0021	0.0037	0.0002	0.0000	0.0001	0.0009
5	0.0021	0.0040	0.0056	0.0060	0.0049	0.0029
6	0.0021	0.0040	0.0532	0.0894	0.1009	0.0866
7	0.0022	0.0018	0.0008	0.0000	0.0000	0.0000
8	0.0023	0.0018	0.0008	0.0004	0.0000	0.0000
9	0.0024	0.0017	0.0007	0.0006	0.0004	0.0002
10	0.0025	0.0017	0.0006	0.0005	0.0004	0.0002
11	0.0026	0.0017	0.0006	0.0008	0.0009	0.0008
12	0.0028	0.0016	0.0005	0.0013	0.0011	0.0008
13	0.0029	0.0015	0.0003	0.0000	0.0000	0.0000
14	0.0031	0.0014	0.0003	0.0000	0.0000	0.0000
15	0.0032	0.0013	0.0002	0.0000	0.0000	0.0000
16	0.0034	0.0012	0.0002	0.0000	0.0000	0.0000






```
eco_param.tau_n = 0.20
```

```
eco_param = struct with fields:
            alpha: 0.4000
             beta: 0.9600
            delta: 0.0800
            gamma: 0.7500
          sigma_c: 2
          sigma_l: 2
            tau_n: 0.2000
            tau_y: 0
     r_UpperBound: 0.0417
      r_LowerBound: -0.0800
                r: -0.0192
         r_tilda: 0.0608
```

```
f = @(tau_y)( G0 - CalculaRendaGov(tau_y, Labor, WageShocks, eco_param, 0));

sol = fsolve(f,0.024);
```

```
tau_y:0.024 tau_n:0.200
tau_y:0.024 tau_n:0.200
tau_y:0.023 tau_n:0.200
tau_y:0.023 tau_n:0.200
tau_y:0.021 tau_n:0.200
tau_y:0.021 tau_n:0.200
tau_y:0.021 tau_n:0.200
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tau_y:0.021 tau_n:0.200
tau_y:0.021 tau_n:0.200
tau_y:0.021 tau_n:0.200

Equation solved.

fsolve completed because the vector of function values is near zero
as measured by the default value of the function tolerance, and
the problem appears regular as measured by the gradient.

<stopping criteria details>
```

```
CalculaRendaGov(sol, Labor, WageShocks, eco_param, 1);
```

```
tau_y:0.021 tau_n:0.200
Inter:   1 r: -0.019167 Dem: -9.573394
Inter:   2 r: -0.049583 Dem: 58.723891
Inter:   3 r: -0.034375 Dem: 17.357920
Inter:   4 r: -0.026771 Dem: 5.390330
Inter:   5 r: -0.022969 Dem: -0.160819
Inter:   6 r: -0.024870 Dem: 2.792012
Inter:   7 r: -0.023919 Dem: 1.075791
Inter:   8 r: -0.023444 Dem: 0.473222
Inter:   9 r: -0.023206 Dem: 0.150688
Inter:  10 r: -0.023088 Dem: -0.004259
Inter:  11 r: -0.023147 Dem: 0.078635
Inter:  12 r: -0.023117 Dem: 0.034880
```

```
Inter:  13 r: -0.023102 Dem: 0.015311
Inter:  14 r: -0.023095 Dem: 0.005526
Inter:  15 r: -0.023091 Dem: 0.000633
Inter:  16 r: -0.023089 Dem: -0.001813
Inter:  17 r: -0.023090 Dem: -0.000590
Inter:  18 r: -0.023091 Dem: 0.000022
Inter:  19 r: -0.023091 Dem: -0.000284
Inter:  20 r: -0.023091 Dem: -0.000131
Inter:  21 r: -0.023091 Dem: -0.000055
Inter:  22 r: -0.023091 Dem: -0.000016
interest rate: -0.023091
wage rate: 1.769679
```

ans = *20×7 table*

...

	Var1	Var2	Var3	Var4	Var5	Var6
1	100.0000	15.8481	15.8481	15.8481	15.8481	15.8481
2	15.8481	20.2771	20.2771	20.2771	20.2771	20.2771
3	20.2771	24.7062	24.7062	24.7062	24.7062	24.7062
4	24.7062	24.7062	29.1352	24.7062	24.7062	29.1352
5	29.1352	29.1352	33.5643	33.5643	33.5643	33.5643
6	33.5643	33.5643	37.9933	37.9933	37.9933	37.9933
7	37.9933	37.9933	37.9933	37.9933	37.9933	37.9933
8	42.4224	42.4224	42.4224	46.8514	46.8514	42.4224
9	46.8514	46.8514	46.8514	51.2805	51.2805	51.2805
10	51.2805	51.2805	51.2805	55.7095	55.7095	55.7095
11	55.7095	55.7095	55.7095	60.1386	60.1386	60.1386
12	60.1386	60.1386	60.1386	64.5676	64.5676	64.5676
13	64.5676	64.5676	64.5676	64.5676	68.9967	68.9967
14	68.9967	68.9967	68.9967	68.9967	73.4257	73.4257
15	73.4257	73.4257	73.4257	73.4257	77.8548	77.8548
16	77.8548	77.8548	77.8548	77.8548	82.2838	82.2838

ans = *20×7 table*

...

	Var1	Var2	Var3	Var4	Var5	Var6
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4	0.0100	0.0100	0.8437	0.0100	0.0100	0.4268
5	0.0100	0.0100	0.8958	0.6874	0.5311	0.4268
6	0.0100	0.0100	0.9479	0.7395	0.5832	0.4789
7	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100

	Var1	Var2	Var3	Var4	Var5	Var6
8	0.0100	0.0100	0.0100	0.7916	0.6353	0.0100
9	0.0100	0.0100	0.0100	0.8437	0.6353	0.4789
10	0.0100	0.0100	0.0100	0.8437	0.6353	0.5311
11	0.0100	0.0100	0.0100	0.8958	0.6874	0.5311
12	0.0100	0.0100	0.0100	0.8958	0.6874	0.5311
13	0.0100	0.0100	0.0100	0.0100	0.7395	0.5311
14	0.0100	0.0100	0.0100	0.0100	0.7395	0.5832
15	0.0100	0.0100	0.0100	0.0100	0.7395	0.5832
16	0.0100	0.0100	0.0100	0.0100	0.7916	0.5832

ans = *20×7 table*

...

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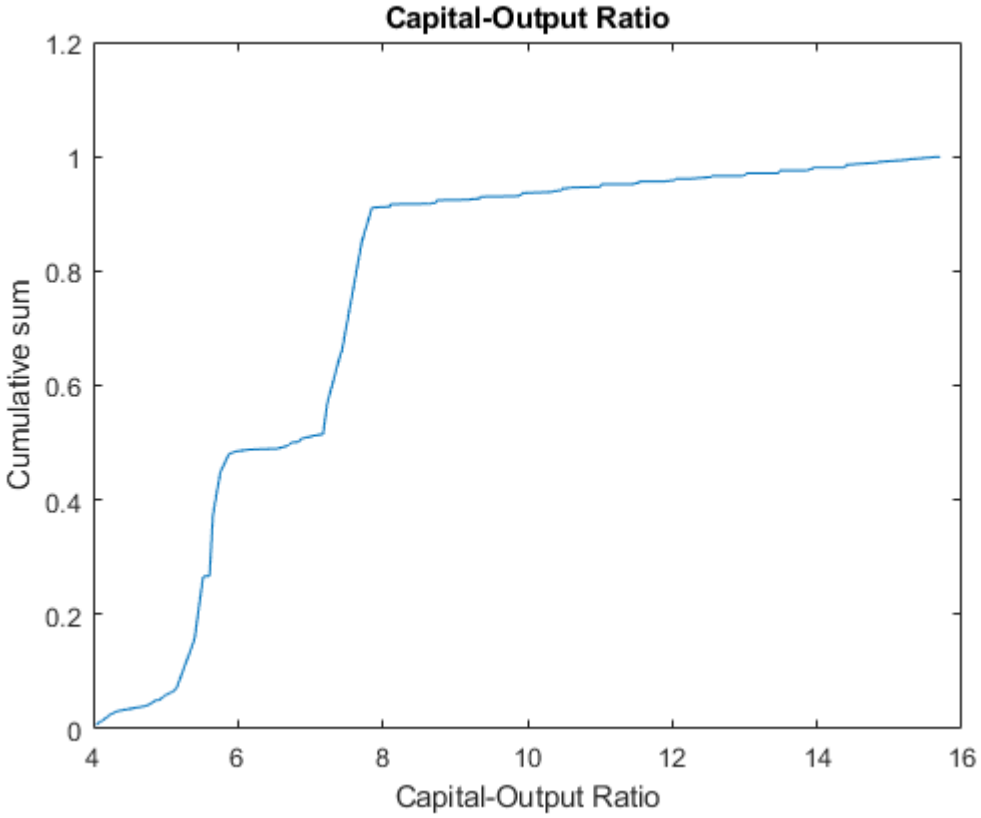
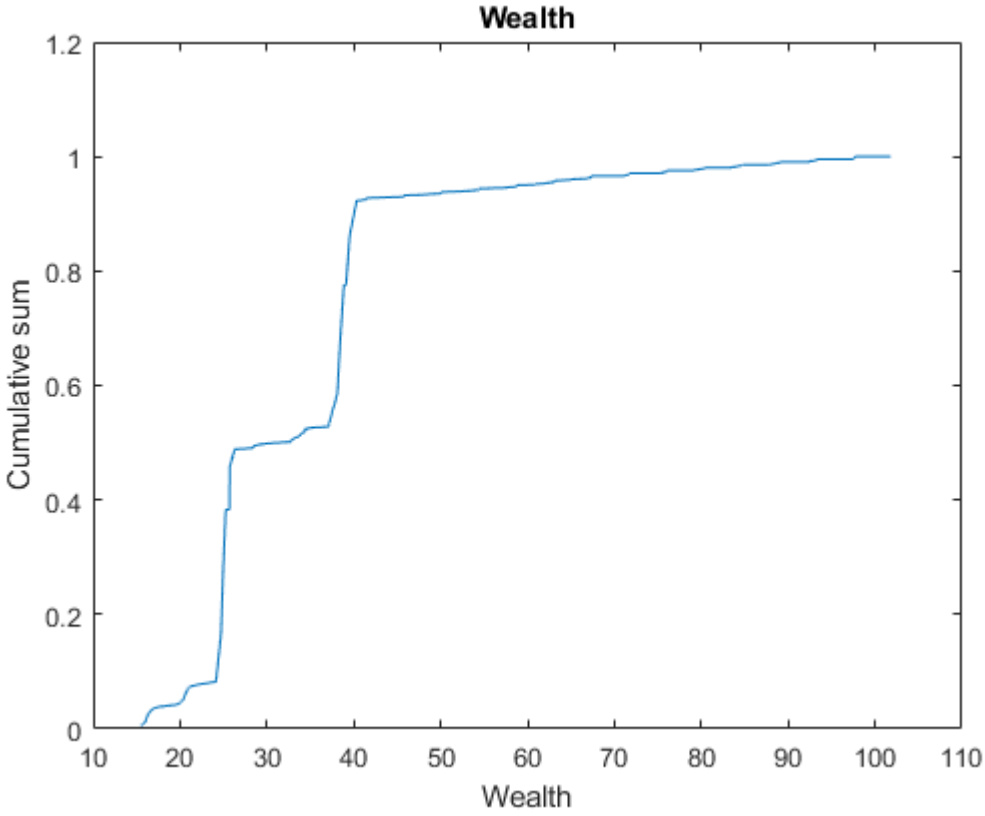
2	0.0049	0.0075	0.0093	0.0088	0.0061	0.0026
3	0.0050	0.0835	0.1101	0.1071	0.0742	0.0313
4	0.0021	0.0038	0.0026	0.0001	0.0001	0.0009
5	0.0021	0.0040	0.0056	0.0060	0.0049	0.0029
6	0.0021	0.0040	0.0532	0.0892	0.1007	0.0866
7	0.0022	0.0018	0.0008	0.0000	0.0000	0.0000
8	0.0023	0.0018	0.0008	0.0006	0.0003	0.0000
9	0.0024	0.0017	0.0007	0.0006	0.0004	0.0002
10	0.0025	0.0017	0.0006	0.0005	0.0004	0.0002
11	0.0026	0.0017	0.0006	0.0008	0.0009	0.0008
12	0.0028	0.0016	0.0005	0.0013	0.0011	0.0008
13	0.0029	0.0015	0.0003	0.0000	0.0000	0.0000
14	0.0031	0.0014	0.0003	0.0000	0.0000	0.0000
15	0.0032	0.0013	0.0002	0.0000	0.0000	0.0000
16	0.0034	0.0012	0.0002	0.0000	0.0000	0.0000


Capital-Output Ratio
Cumulative sum
Capital-Output Ratio
0
0.2
0.4
0.6
0.8
1
1.2
4
6
8
10
12
14
16


Wealth
Cumulative sum
Wealth
0
0.2
0.4
0.6
0.8
1
1.2
10
20
30
40
50
60
70
80
90
100
110