Technical Change and Profitability in General Economies with Fixed Capital and Differential Profit and Wage Rates

Accompanying Simluations

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SetDirectory[""]
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Abstract Price System

The *n*-good price system in symbolic form for testing technical changes and distributional impact.

```
In[2]:= Clear[A, Δ, K, l, k, c, R, W];

In[3]:= sectors = Table[i, {i, 1, 7}]

Out[3]= {1, 2, 3, 4, 5, 6, 7}
```

Technology

```
In[4]:= (A = Table[a_{i,j}, {i, 1, Length[sectors]}, {j, 1, Length[sectors]}]) // MatrixForm
```

Out[4]//MatrixForm=

$$\begin{pmatrix} a_{1,1} & a_{1,2} & a_{1,3} & a_{1,4} & a_{1,5} & a_{1,6} & a_{1,7} \\ a_{2,1} & a_{2,2} & a_{2,3} & a_{2,4} & a_{2,5} & a_{2,6} & a_{2,7} \\ a_{3,1} & a_{3,2} & a_{3,3} & a_{3,4} & a_{3,5} & a_{3,6} & a_{3,7} \\ a_{4,1} & a_{4,2} & a_{4,3} & a_{4,4} & a_{4,5} & a_{4,6} & a_{4,7} \\ a_{5,1} & a_{5,2} & a_{5,3} & a_{5,4} & a_{5,5} & a_{5,6} & a_{5,7} \\ a_{6,1} & a_{6,2} & a_{6,3} & a_{6,4} & a_{6,5} & a_{6,6} & a_{6,7} \\ a_{7,1} & a_{7,2} & a_{7,3} & a_{7,4} & a_{7,5} & a_{7,6} & a_{7,7} \end{pmatrix}$$

In[5]:=
```
(Δ = Table[δ_{i,j}, {i, 1, Length[sectors]}, {j, 1, Length[sectors]}]) // MatrixForm
```

Out[5]//MatrixForm=

$$\begin{pmatrix} \delta_{1,1} & \delta_{1,2} & \delta_{1,3} & \delta_{1,4} & \delta_{1,5} & \delta_{1,6} & \delta_{1,7} \\ \delta_{2,1} & \delta_{2,2} & \delta_{2,3} & \delta_{2,4} & \delta_{2,5} & \delta_{2,6} & \delta_{2,7} \\ \delta_{3,1} & \delta_{3,2} & \delta_{3,3} & \delta_{3,4} & \delta_{3,5} & \delta_{3,6} & \delta_{3,7} \\ \delta_{4,1} & \delta_{4,2} & \delta_{4,3} & \delta_{4,4} & \delta_{4,5} & \delta_{4,6} & \delta_{4,7} \\ \delta_{5,1} & \delta_{5,2} & \delta_{5,3} & \delta_{5,4} & \delta_{5,5} & \delta_{5,6} & \delta_{5,7} \\ \delta_{6,1} & \delta_{6,2} & \delta_{6,3} & \delta_{6,4} & \delta_{6,5} & \delta_{6,6} & \delta_{6,7} \\ \delta_{7,1} & \delta_{7,2} & \delta_{7,3} & \delta_{7,4} & \delta_{7,5} & \delta_{7,6} & \delta_{7,7} \end{pmatrix}$$

In[6]:=
```
(K = Table[κ_{i,j}, {i, 1, Length[sectors]}, {j, 1, Length[sectors]}]) // MatrixForm
```

Out[6]//MatrixForm=

$$\begin{pmatrix} \kappa_{1,1} & \kappa_{1,2} & \kappa_{1,3} & \kappa_{1,4} & \kappa_{1,5} & \kappa_{1,6} & \kappa_{1,7} \\ \kappa_{2,1} & \kappa_{2,2} & \kappa_{2,3} & \kappa_{2,4} & \kappa_{2,5} & \kappa_{2,6} & \kappa_{2,7} \\ \kappa_{3,1} & \kappa_{3,2} & \kappa_{3,3} & \kappa_{3,4} & \kappa_{3,5} & \kappa_{3,6} & \kappa_{3,7} \\ \kappa_{4,1} & \kappa_{4,2} & \kappa_{4,3} & \kappa_{4,4} & \kappa_{4,5} & \kappa_{4,6} & \kappa_{4,7} \\ \kappa_{5,1} & \kappa_{5,2} & \kappa_{5,3} & \kappa_{5,4} & \kappa_{5,5} & \kappa_{5,6} & \kappa_{5,7} \\ \kappa_{6,1} & \kappa_{6,2} & \kappa_{6,3} & \kappa_{6,4} & \kappa_{6,5} & \kappa_{6,6} & \kappa_{6,7} \\ \kappa_{7,1} & \kappa_{7,2} & \kappa_{7,3} & \kappa_{7,4} & \kappa_{7,5} & \kappa_{7,6} & \kappa_{7,7} \end{pmatrix}$$

In[7]:=
```
l = Table[ℓ_i, {i, 1, Length[sectors]}]
```

Out[7]= $\{\ell_1, \ell_2, \ell_3, \ell_4, \ell_5, \ell_6, \ell_7\}$

In[8]:=
```
k = Table[k_i, {i, Length[sectors]}]
```

Out[8]= $\{k_1, k_2, k_3, k_4, k_5, k_6, k_7\}$

In[9]:=
```
c = Table[c_i, {i, 1, Length[sectors]}]
```

Out[9]= $\{c_1, c_2, c_3, c_4, c_5, c_6, c_7\}$

Profit & Wage Rates and Q Matrices

In[10]:=
```
R = Table[r_i, {i, 1, Length[sectors]}]
W = Table[w_i, {i, 1, Length[sectors]}]
```

Out[10]= $\{r_1, r_2, r_3, r_4, r_5, r_6, r_7\}$

Out[11]= $\{w_1, w_2, w_3, w_4, w_5, w_6, w_7\}$

In[12]:=
```
qr = Table[q_{r,i} == r_i/r_m, {i, 1, Length[sectors]}]
qw = Table[q_{w,i} == w_i/w_m, {i, 1, Length[sectors]}]
```

Out[12]= $\left\{q_{r,1} == \frac{r_1}{r_m}, q_{r,2} == \frac{r_2}{r_m}, q_{r,3} == \frac{r_3}{r_m}, q_{r,4} == \frac{r_4}{r_m}, q_{r,5} == \frac{r_5}{r_m}, q_{r,6} == \frac{r_6}{r_m}, q_{r,7} == \frac{r_7}{r_m}\right\}$

Out[13]= $\left\{q_{w,1} == \frac{w_1}{w_m}, q_{w,2} == \frac{w_2}{w_m}, q_{w,3} == \frac{w_3}{w_m}, q_{w,4} == \frac{w_4}{w_m}, q_{w,5} == \frac{w_5}{w_m}, q_{w,6} == \frac{w_6}{w_m}, q_{w,7} == \frac{w_7}{w_m}\right\}$

In[14]:=
```
(Qr = DiagonalMatrix[qr[[All, 1]]]) // MatrixForm
```

Out[14]//MatrixForm=

$$\begin{pmatrix} q_{r,1} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & q_{r,2} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & q_{r,3} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & q_{r,4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & q_{r,5} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & q_{r,6} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & q_{r,7} \end{pmatrix}$$

In[15]:=
```
(Qw = DiagonalMatrix[qw[[All, 1]]]) // MatrixForm
```

Out[15]//MatrixForm=

$$\begin{pmatrix} q_{w,1} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & q_{w,2} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & q_{w,3} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & q_{w,4} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & q_{w,5} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & q_{w,6} & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & q_{w,7} \end{pmatrix}$$

Prices

In[16]:=
```
p = Table[p_i, {i, 1, Length[sectors]}]
```

Out[16]= $\{p_1, p_2, p_3, p_4, p_5, p_6, p_7\}$

In[17]:=
```
pw = Table[p_i^w, {i, 1, Length[sectors]}]
```

Out[17]= $\{p_1^w, p_2^w, p_3^w, p_4^w, p_5^w, p_6^w, p_7^w\}$

In[18]:=
```
pwSys = Thread[p == p.(A + Δ) + r_m p.K.Qr + l.Qw]
```

Out[18]=

$$\{p_1 == \ell_1\, q_{w,1} + p_1 (a_{1,1} + \delta_{1,1}) + p_2 (a_{2,1} + \delta_{2,1}) + p_3 (a_{3,1} + \delta_{3,1}) + p_4 (a_{4,1} + \delta_{4,1}) + p_5 (a_{5,1} + \delta_{5,1}) + p_6 (a_{6,1} + \delta_{6,1}) + p_7 (a_{7,1} + \delta_{7,1}) + r_m\, q_{r,1} (p_1 \kappa_{1,1} + p_2 \kappa_{2,1} + p_3 \kappa_{3,1} + p_4 \kappa_{4,1} + p_5 \kappa_{5,1} + p_6 \kappa_{6,1} + p_7 \kappa_{7,1}),$$

$$p_2 == \ell_2\, q_{w,2} + p_1 (a_{1,2} + \delta_{1,2}) + p_2 (a_{2,2} + \delta_{2,2}) + p_3 (a_{3,2} + \delta_{3,2}) + p_4 (a_{4,2} + \delta_{4,2}) + p_5 (a_{5,2} + \delta_{5,2}) + p_6 (a_{6,2} + \delta_{6,2}) + p_7 (a_{7,2} + \delta_{7,2}) + r_m\, q_{r,2} (p_1 \kappa_{1,2} + p_2 \kappa_{2,2} + p_3 \kappa_{3,2} + p_4 \kappa_{4,2} + p_5 \kappa_{5,2} + p_6 \kappa_{6,2} + p_7 \kappa_{7,2}),$$

$$p_3 == \ell_3\, q_{w,3} + p_1 (a_{1,3} + \delta_{1,3}) + p_2 (a_{2,3} + \delta_{2,3}) + p_3 (a_{3,3} + \delta_{3,3}) + p_4 (a_{4,3} + \delta_{4,3}) + p_5 (a_{5,3} + \delta_{5,3}) + p_6 (a_{6,3} + \delta_{6,3}) + p_7 (a_{7,3} + \delta_{7,3}) + r_m\, q_{r,3} (p_1 \kappa_{1,3} + p_2 \kappa_{2,3} + p_3 \kappa_{3,3} + p_4 \kappa_{4,3} + p_5 \kappa_{5,3} + p_6 \kappa_{6,3} + p_7 \kappa_{7,3}),$$

$$p_4 == \ell_4\, q_{w,4} + p_1 (a_{1,4} + \delta_{1,4}) + p_2 (a_{2,4} + \delta_{2,4}) + p_3 (a_{3,4} + \delta_{3,4}) + p_4 (a_{4,4} + \delta_{4,4}) + p_5 (a_{5,4} + \delta_{5,4}) + p_6 (a_{6,4} + \delta_{6,4}) + p_7 (a_{7,4} + \delta_{7,4}) + r_m\, q_{r,4} (p_1 \kappa_{1,4} + p_2 \kappa_{2,4} + p_3 \kappa_{3,4} + p_4 \kappa_{4,4} + p_5 \kappa_{5,4} + p_6 \kappa_{6,4} + p_7 \kappa_{7,4}),$$

$$p_5 == \ell_5\, q_{w,5} + p_1 (a_{1,5} + \delta_{1,5}) + p_2 (a_{2,5} + \delta_{2,5}) + p_3 (a_{3,5} + \delta_{3,5}) + p_4 (a_{4,5} + \delta_{4,5}) + p_5 (a_{5,5} + \delta_{5,5}) + p_6 (a_{6,5} + \delta_{6,5}) + p_7 (a_{7,5} + \delta_{7,5}) + r_m\, q_{r,5} (p_1 \kappa_{1,5} + p_2 \kappa_{2,5} + p_3 \kappa_{3,5} + p_4 \kappa_{4,5} + p_5 \kappa_{5,5} + p_6 \kappa_{6,5} + p_7 \kappa_{7,5}),$$

$$p_6 == \ell_6\, q_{w,6} + p_1 (a_{1,6} + \delta_{1,6}) + p_2 (a_{2,6} + \delta_{2,6}) + p_3 (a_{3,6} + \delta_{3,6}) + p_4 (a_{4,6} + \delta_{4,6}) + p_5 (a_{5,6} + \delta_{5,6}) + p_6 (a_{6,6} + \delta_{6,6}) + p_7 (a_{7,6} + \delta_{7,6}) + r_m\, q_{r,6} (p_1 \kappa_{1,6} + p_2 \kappa_{2,6} + p_3 \kappa_{3,6} + p_4 \kappa_{4,6} + p_5 \kappa_{5,6} + p_6 \kappa_{6,6} + p_7 \kappa_{7,6}),$$

$$p_7 == \ell_7\, q_{w,7} + p_1 (a_{1,7} + \delta_{1,7}) + p_2 (a_{2,7} + \delta_{2,7}) + p_3 (a_{3,7} + \delta_{3,7}) + p_4 (a_{4,7} + \delta_{4,7}) + p_5 (a_{5,7} + \delta_{5,7}) + p_6 (a_{6,7} + \delta_{6,7}) + p_7 (a_{7,7} + \delta_{7,7}) + r_m\, q_{r,7} (p_1 \kappa_{1,7} + p_2 \kappa_{2,7} + p_3 \kappa_{3,7} + p_4 \kappa_{4,7} + p_5 \kappa_{5,7} + p_6 \kappa_{6,7} + p_7 \kappa_{7,7})\}$$

In[19]:=
```
pwSys2 = Thread[p == l.Qw.Inverse[IdentityMatrix[Length[sectors]] - A - Δ - r_m K.Qr]]
```

Out[19]=

$$\left\{p_1 == \frac{\ell_7\, q_{w,7} \left(-\left(\left(\cdots 1 \cdots\right) \left(-a_{7,1} - \delta_{7,1} - r_m\, q_{r,1}\, \kappa_{7,1}\right)\right) + \cdots 6 \cdots + \left(\cdots 1 \cdots\right) \left(\cdots 1 \cdots\right)\right)}{\cdots 1 \cdots} + \frac{\cdots 1 \cdots}{\cdots 1 \cdots} + \cdots 3 \cdots + \cdots 1 \cdots + \frac{\ell_1\, q_{\cdots 1 \cdots} \left(-\left(\left(\cdots 1 \cdots\right) \left(\cdots 1 \cdots\right)\right) + \cdots 6 \cdots + \cdots 1 \cdots\right)}{\cdots 9 \cdots + \left(\cdots 1 \cdots\right) \cdots 1 \cdots}, \cdots 5 \cdots, \cdots 1 \cdots\right\}$$

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In[20]:=
```
(* rSys=Equal@@@Solve[pwSys,R][[1]] *)
```

Wage-Profit Curve

In[21]:=
```
realWage = {ωm == 1/(pwSys2[[All, 2]].(ϕ c))}
```

Out[21]=

$$\left\{\omega_m == \frac{1}{\phi\, c_7 \left(\frac{\ell_7\, q_{w,7}\,(\cdots 1 \cdots)}{\cdots 1 \cdots} + \cdots 5 \cdots + \frac{\ell_1\, q\,\cdots 1 \cdots\,(\cdots 1 \cdots)}{\cdots 1 \cdots}\right) + \cdots 5 \cdots + \phi\, c_1\,(\cdots 1 \cdots)}\right\}$$

large output | show less | show more | show all | set size limit...

7-Sector Aggregation - Technology and Parameters

Initial data from the 7-sector aggregation for Germany in 2005 from Cogliano, Flaschel, Franke, Fröhlich, and Veneziani (2018).

In[22]:=
```
A1 = {
    {0.030, 0.0, 0.047, 0.0, 0.0, 0.002, 0.002},
    {0.081, 0.241, 0.050, 0.021, 0.003, 0.008, 0.014},
    {0.159, 0.226, 0.338, 0.286, 0.030, 0.060, 0.065},
    {0.010, 0.005, 0.009, 0.020, 0.007, 0.034, 0.020},
    {0.137, 0.107, 0.126, 0.088, 0.291, 0.118, 0.080},
    {0.032, 0.044, 0.045, 0.100, 0.071, 0.139, 0.044},
    {0.034, 0.008, 0.013, 0.007, 0.009, 0.014, 0.025}
  };
```

In[23]:=
```
A1 // MatrixForm
```

Out[23]//MatrixForm=

$$\begin{pmatrix} 0.03 & 0. & 0.047 & 0. & 0. & 0.002 & 0.002 \\ 0.081 & 0.241 & 0.05 & 0.021 & 0.003 & 0.008 & 0.014 \\ 0.159 & 0.226 & 0.338 & 0.286 & 0.03 & 0.06 & 0.065 \\ 0.01 & 0.005 & 0.009 & 0.02 & 0.007 & 0.034 & 0.02 \\ 0.137 & 0.107 & 0.126 & 0.088 & 0.291 & 0.118 & 0.08 \\ 0.032 & 0.044 & 0.045 & 0.1 & 0.071 & 0.139 & 0.044 \\ 0.034 & 0.008 & 0.013 & 0.007 & 0.009 & 0.014 & 0.025 \end{pmatrix}$$

In[24]:=
```
Δ1 = {
    {0.0008, 0.0002, 0.0003, 0.0001, 0.0004, 0.006, 0.0004},
    {0.0455, 0.0126, 0.0161, 0.0061, 0.0233, 0.0322, 0.0251},
    {0.0562, 0.0156, 0.0199, 0.0075, 0.0288, 0.0398, 0.0310},
    {0.0452, 0.0125, 0.0160, 0.0060, 0.0231, 0.0320, 0.0249},
    {0.0223, 0.0061, 0.0079, 0.0030, 0.0114, 0.0158, 0.0123},
    {0.0090, 0.0025, 0.0032, 0.0012, 0.0046, 0.0063, 0.0049},
    {0.0004, 0.0001, 0.0001, 0.0, 0.0002, 0.0003, 0.0002}
   };
```

In[25]:=
```
Δ1 // MatrixForm
```

Out[25]//MatrixForm=

0.0008	0.0002	0.0003	0.0001	0.0004	0.006	0.0004
0.0455	0.0126	0.0161	0.0061	0.0233	0.0322	0.0251
0.0562	0.0156	0.0199	0.0075	0.0288	0.0398	0.031
0.0452	0.0125	0.016	0.006	0.0231	0.032	0.0249
0.0223	0.0061	0.0079	0.003	0.0114	0.0158	0.0123
0.009	0.0025	0.0032	0.0012	0.0046	0.0063	0.0049
0.0004	0.0001	0.0001	0.	0.0002	0.0003	0.0002

In[26]:=
```
K1 = {
    {0.0156, 0.0043, 0.0055, 0.0021, 0.0080, 0.011, 0.0086},
    {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
    {0.4959, 0.1377, 0.1756, 0.0660, 0.2539, 0.3513, 0.2736},
    {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
    {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.1570, 0.1223},
    {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.0460},
    {0.0074, 0.0020, 0.0026, 0.0010, 0.0038, 0.0052, 0.0041}
   };
```

In[27]:=
```
K1 // MatrixForm
```

Out[27]//MatrixForm=

0.0156	0.0043	0.0055	0.0021	0.008	0.011	0.0086
0.3705	0.1028	0.1312	0.0493	0.1897	0.2625	0.2044
0.4959	0.1377	0.1756	0.066	0.2539	0.3513	0.2736
0.9031	0.2507	0.3199	0.1202	0.4624	0.6398	0.4982
0.2217	0.0615	0.0785	0.0295	0.1135	0.157	0.1223
0.0835	0.0232	0.0296	0.0111	0.0427	0.0591	0.046
0.0074	0.002	0.0026	0.001	0.0038	0.0052	0.0041

In[28]:=
```
l1 = {20.23, 5.29, 7.01, 12.50, 9.65, 12.53, 20.03};
```

In[29]:=
```
k1 = {18.95, 55.07, 73.87, 39.33, 31.48, 29.36, 12.29};
```

In[30]:=
```
c1 = {1.61, 6.3, 24.64, 0.4, 7.78, 52.79, 6.48};
ct = {5470, 36 997.1, 95 319.9, 2327.7, 60 821.5, 481 019.8, 411 098.7};
ct2 = {90.342, 20.832, 53.460, 2.250, 50.689, 91.529, 99.381};
```

In[33]:=
```
R1 = 1/100. {5.97, 5.6, 5.51, 47.39, 16.85, 17.32, 5.23}
```
Out[33]=
```
{0.0597, 0.056, 0.0551, 0.4739, 0.1685, 0.1732, 0.0523}
```

In[34]:=
```
W1 = {21.37, 28.72, 26.87, 32.09, 31.57, 24.12, 58.97};
```

Reference Sector & Q Matrices

Reference Sector

In[35]:=
```
ref = sectors[[1]]
```
Out[35]=
```
1
```

Q Matrices

In[36]:=
```
R1 / R1[[ref]]
```
Out[36]=
```
{1., 0.938023, 0.922948, 7.93802, 2.82245, 2.90117, 0.876047}
```

In[37]:=
```
W1 / W1[[ref]]
```
Out[37]=
```
{1., 1.34394, 1.25737, 1.50164, 1.4773, 1.12869, 2.75948}
```

In[38]:=
```
(Qr1 = QrInit = DiagonalMatrix[R1 / R1[[ref]]]) // MatrixForm
```
Out[38]//MatrixForm=

1.	0.	0.	0.	0.	0.	0.
0.	0.938023	0.	0.	0.	0.	0.
0.	0.	0.922948	0.	0.	0.	0.
0.	0.	0.	7.93802	0.	0.	0.
0.	0.	0.	0.	2.82245	0.	0.
0.	0.	0.	0.	0.	2.90117	0.
0.	0.	0.	0.	0.	0.	0.876047

In[39]:=
```
initialR = Flatten[Solve[Table[Qr1[[i, i]] == r_i / r_m, {i, 1, Length[sectors]}], R]];
initialR[[1]] = r_1 → 1.;
initialR
```
Out[41]=

$\{r_1 \to 1., r_2 \to 0.938023\, r_m, r_3 \to 0.922948\, r_m, r_4 \to 7.93802\, r_m, r_5 \to 2.82245\, r_m, r_6 \to 2.90117\, r_m, r_7 \to 0.876047\, r_m\}$

In[42]:=
```
(Qw1 = QwInit = DiagonalMatrix[W1 / W1[[ref]]]) // MatrixForm
```

Out[42]//MatrixForm=

$$\begin{pmatrix} 1. & 0. & 0. & 0. & 0. & 0. & 0. \\ 0. & 1.34394 & 0. & 0. & 0. & 0. & 0. \\ 0. & 0. & 1.25737 & 0. & 0. & 0. & 0. \\ 0. & 0. & 0. & 1.50164 & 0. & 0. & 0. \\ 0. & 0. & 0. & 0. & 1.4773 & 0. & 0. \\ 0. & 0. & 0. & 0. & 0. & 1.12869 & 0. \\ 0. & 0. & 0. & 0. & 0. & 0. & 2.75948 \end{pmatrix}$$

In[43]:=
```
initialW = Table[w_i / w_m == Qw1[[i, i]], {i, 1, Length[sectors]}]
```

Out[43]=
$$\left\{\frac{w_1}{w_m} == 1., \frac{w_2}{w_m} == 1.34394, \frac{w_3}{w_m} == 1.25737, \frac{w_4}{w_m} == 1.50164, \frac{w_5}{w_m} == 1.4773, \frac{w_6}{w_m} == 1.12869, \frac{w_7}{w_m} == 2.75948\right\}$$

Function for threading numerical matrices into abstract price system for numerical exercises.

In[44]:=
```
threadMatrix[B1_, B2_] :=
 Flatten[Table[Thread[B1[[i]] → B2[[i]]], {i, 1, Length[sectors]}]]
```

In[45]:=
```
threadMatrix[A, A1]
```

Out[45]=
$\{a_{1,1} \to 0.03, a_{1,2} \to 0., a_{1,3} \to 0.047, a_{1,4} \to 0., a_{1,5} \to 0., a_{1,6} \to 0.002, a_{1,7} \to 0.002, a_{2,1} \to 0.081, a_{2,2} \to 0.241, a_{2,3} \to 0.05, a_{2,4} \to 0.021, a_{2,5} \to 0.003, a_{2,6} \to 0.008, a_{2,7} \to 0.014, a_{3,1} \to 0.159, a_{3,2} \to 0.226, a_{3,3} \to 0.338, a_{3,4} \to 0.286, a_{3,5} \to 0.03, a_{3,6} \to 0.06, a_{3,7} \to 0.065, a_{4,1} \to 0.01, a_{4,2} \to 0.005, a_{4,3} \to 0.009, a_{4,4} \to 0.02, a_{4,5} \to 0.007, a_{4,6} \to 0.034, a_{4,7} \to 0.02, a_{5,1} \to 0.137, a_{5,2} \to 0.107, a_{5,3} \to 0.126, a_{5,4} \to 0.088, a_{5,5} \to 0.291, a_{5,6} \to 0.118, a_{5,7} \to 0.08, a_{6,1} \to 0.032, a_{6,2} \to 0.044, a_{6,3} \to 0.045, a_{6,4} \to 0.1, a_{6,5} \to 0.071, a_{6,6} \to 0.139, a_{6,7} \to 0.044, a_{7,1} \to 0.034, a_{7,2} \to 0.008, a_{7,3} \to 0.013, a_{7,4} \to 0.007, a_{7,5} \to 0.009, a_{7,6} \to 0.014, a_{7,7} \to 0.025\}$

In[46]:=
```
Thread[l → l1]
```

Out[46]=
$\{\ell_1 \to 20.23, \ell_2 \to 5.29, \ell_3 \to 7.01, \ell_4 \to 12.5, \ell_5 \to 9.65, \ell_6 \to 12.53, \ell_7 \to 20.03\}$

In[47]:=
```
threadMatrix[Qr, QrInit]
```

Out[47]=
$\{q_{r,1} \to 1., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., q_{r,2} \to 0.938023, 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., q_{r,3} \to 0.922948, 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., q_{r,4} \to 7.93802, 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., q_{r,5} \to 2.82245, 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., q_{r,6} \to 2.90117, 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., 0 \to 0., q_{r,7} \to 0.876047\}$

In[48]:=
```
R1
```
Out[48]=
```
{0.0597, 0.056, 0.0551, 0.4739, 0.1685, 0.1732, 0.0523}
```

Sample w-r curve

In[49]:=
```
maxR1 = 1 / Eigensystem[
    Inverse[IdentityMatrix[Length[sectors]] - A1 - Δ1 - R1[[ref]] K1.Qr1]][[1, 1]]
```
Out[49]=
```
0.289085
```

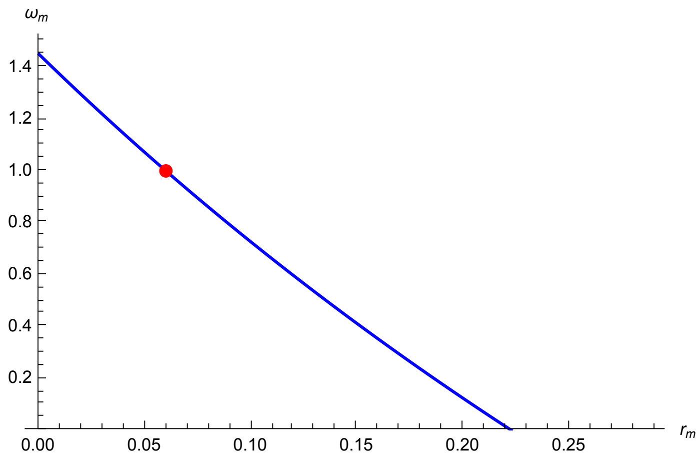
In[50]:=
```
wrPlot =
  realWage /. threadMatrix[A, A1] /. threadMatrix[Δ, Δ1] /. threadMatrix[K, K1] /.
       threadMatrix[Qr, Qr1] /. threadMatrix[Qw, Qw1] /. Thread[l → l1] /.
     Thread[c → c1/100.] /. Rule @@@ initialW /. initialR /. ϕ → 0.020990380445709087
```
Out[50]=
```
{ωm == 1 / (0.00136018 (7.10944 ⋯1⋯ / ⋯1⋯ + ⋯5⋯ + ⋯1⋯ / ⋯1⋯) + ⋯5⋯ + ⋯1⋯)}
```
large output | show less | show more | show all | set size limit...

In[51]:=
```
wagePlot =
  realWage /. threadMatrix[A, A1] /. threadMatrix[Δ, Δ1] /. threadMatrix[K, K1] /.
        threadMatrix[Qr, Qr1] /. threadMatrix[Qw, Qw1] /. Thread[l → l1] /.
      Thread[c → c1/100.] /. Rule @@@ initialW /. initialR /.
    rm → R1[[ref]] /. ϕ → 0.020990380445709087
```
Out[51]=
```
{ωm == 1.}
```

In[52]:=
```
Total[c1 / 100.]
```
Out[52]=
```
1.
```

In[53]:=
```
initialWRPlot = Plot[wrPlot[[1, 2]], {rm, 0, maxR1}, AxesLabel → {"rm", "ωm"},
  PlotRange → {Automatic, {0, Automatic}}, PlotStyle → {Blue},
  Epilog → {PointSize → Large, Red, Point[{R1[[ref]], wagePlot[[1, 2]]}]}]
Export["./wrPlotInitial.eps", initialWRPlot, "EPS"]
```

Out[53]=



Out[54]= ./wrPlotInitial.eps

Initial Prices and Profit Rate

In[55]:=
```
Rule @@@ initialW
```

Out[55]= $\left\{\frac{w_1}{w_m} \to 1.,\ \frac{w_2}{w_m} \to 1.34394,\ \frac{w_3}{w_m} \to 1.25737,\ \frac{w_4}{w_m} \to 1.50164,\ \frac{w_5}{w_m} \to 1.4773,\ \frac{w_6}{w_m} \to 1.12869,\ \frac{w_7}{w_m} \to 2.75948\right\}$

In[56]:=
```
initialR
```

Out[56]= $\{r_1 \to 1.,\ r_2 \to 0.938023\, r_m,\ r_3 \to 0.922948\, r_m,\ r_4 \to 7.93802\, r_m,\ r_5 \to 2.82245\, r_m,\ r_6 \to 2.90117\, r_m,\ r_7 \to 0.876047\, r_m\}$

In[57]:= $p . \frac{c1}{100.} == 1$

Out[57]= $0.0161\, p_1 + 0.063\, p_2 + 0.2464\, p_3 + 0.004\, p_4 + 0.0778\, p_5 + 0.5279\, p_6 + 0.0648\, p_7 == 1$

In[58]:=
```
Flatten[Append[p, rm]]
```

Out[58]= $\{p_1, p_2, p_3, p_4, p_5, p_6, p_7, r_m\}$

```
In[59]:= (pwSys /. threadMatrix[A, A1] /. threadMatrix[Δ, Δ1] /. threadMatrix[K, K1] /.
        Thread[l → l1] /. threadMatrix[Qw, Qw1] /.
      threadMatrix[Qr, Qr1] /. Rule @@@ initialW /. initialR)

Out[59]= {p1 == 20.23 + 0.0308 p1 + 0.1265 p2 + 0.2152 p3 + 0.0552 p4 + 0.1593 p5 + 0.041 p6 +
    1. rm (0.0156 p1 + 0.3705 p2 + 0.4959 p3 + 0.9031 p4 + 0.2217 p5 + 0.0835 p6 + 0.0074 p7) +
    0.0344 p7, p2 == 7.10944 + 0.0002 p1 + 0.2536 p2 +
    0.2416 p3 + 0.0175 p4 + 0.1131 p5 + 0.0465 p6 + 0.938023 rm
     (0.0043 p1 + 0.1028 p2 + 0.1377 p3 + 0.2507 p4 + 0.0615 p5 + 0.0232 p6 + 0.002 p7) + 0.0081 p7,
  p3 == 8.81416 + 0.0473 p1 + 0.0661 p2 + 0.3579 p3 + 0.025 p4 + 0.1339 p5 + 0.0482 p6 + 0.922948
     rm (0.0055 p1 + 0.1312 p2 + 0.1756 p3 + 0.3199 p4 + 0.0785 p5 + 0.0296 p6 + 0.0026 p7) +
    0.0131 p7, p4 == 18.7705 + 0.0001 p1 + 0.0271 p2 + 0.2935 p3 +
    0.026 p4 + 0.091 p5 + 0.1012 p6 + 7.93802 rm
     (0.0021 p1 + 0.0493 p2 + 0.066 p3 + 0.1202 p4 + 0.0295 p5 + 0.0111 p6 + 0.001 p7) + 0.007 p7,
  p5 == 14.256 + 0.0004 p1 + 0.0263 p2 + 0.0588 p3 + 0.0301 p4 + 0.3024 p5 + 0.0756 p6 + 2.82245 rm
     (0.008 p1 + 0.1897 p2 + 0.2539 p3 + 0.4624 p4 + 0.1135 p5 + 0.0427 p6 + 0.0038 p7) + 0.0092 p7,
  p6 == 14.1424 + 0.008 p1 + 0.0402 p2 + 0.0998 p3 + 0.066 p4 + 0.1338 p5 + 0.1453 p6 + 2.90117 rm
     (0.011 p1 + 0.2625 p2 + 0.3513 p3 + 0.6398 p4 + 0.157 p5 + 0.0591 p6 + 0.0052 p7) + 0.0143 p7,
  p7 == 55.2723 + 0.0024 p1 + 0.0391 p2 + 0.096 p3 + 0.0449 p4 + 0.0923 p5 + 0.0489 p6 + 0.876047 rm
     (0.0086 p1 + 0.2044 p2 + 0.2736 p3 + 0.4982 p4 + 0.1223 p5 + 0.046 p6 + 0.0041 p7) + 0.0252 p7}

In[60]:= solRAWphi =
  Solve[(pwSys /. threadMatrix[A, A1] /. threadMatrix[Δ, Δ1] /. threadMatrix[K, K1] /.
        Thread[l → l1] /. threadMatrix[Qw, Qw1] /. threadMatrix[Qr, Qr1] /.
      Rule @@@ initialW /. initialR /. rm → R1[[ref]]), p][[1]]

Out[60]= {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986,
  p4 → 48.4949, p5 → 45.1897, p6 → 48.9874, p7 → 74.0583}

In[61]:= phi = Solve[solRAWphi[[All, 2]].(ϕ c1/100.) == 1, ϕ][[1]]

Out[61]= {ϕ → 0.0209904}

In[62]:= Append[Thread[p > 0.], 0 < rm < maxR1]

Out[62]= {p1 > 0., p2 > 0., p3 > 0., p4 > 0., p5 > 0., p6 > 0., p7 > 0., 0 < rm < 0.289085}
```

In[63]:=
```
pwSol1 = Assuming[Append[Thread[p > 0.], 0 < r_m < maxR1],
    Solve[Flatten[Append[(pwSys /. threadMatrix[A, A1] /. threadMatrix[Δ, Δ1] /.
                threadMatrix[K, K1] /. Thread[l → l1] /. threadMatrix[Qw, Qw1] /.
            threadMatrix[Qr, Qr1] /. Rule @@@ initialW /. initialR),
        p.(phi[[1, 2]] c1/100.) == 1]], Flatten[Append[p, r_m]]]][[1]]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[63]= $\{p_1 \to 55.3531, p_2 \to 36.5576, p_3 \to 40.8986, p_4 \to 48.4949, p_5 \to 45.1897, p_6 \to 48.9874, p_7 \to 74.0583, r_m \to 0.0597\}$

In[64]:=
```
pwSol[A1_, Δ1_, K1_, l1_, Qw1_, Qr1_, R_, c1_, maxR_] := (
  Assuming[Append[Thread[p > 0.], 0 < r_m < maxR],
    Solve[Flatten[Append[(pwSys /. threadMatrix[A, A1] /. threadMatrix[Δ, Δ1] /.
                threadMatrix[K, K1] /. Thread[l → l1] /. threadMatrix[Qw, Qw1] /.
            threadMatrix[Qr, Qr1] /. Rule @@@ initialW /. R),
        p.(phi[[1, 2]] c1/100.) == 1]], Flatten[Append[p, r_m]]]][[1]]
 )
```

In[65]:=
```
pwSol[A1, Δ1, K1, l1, Qw1, Qr1, initialR, c1, maxR1]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[65]= $\{p_1 \to 55.3531, p_2 \to 36.5576, p_3 \to 40.8986, p_4 \to 48.4949, p_5 \to 45.1897, p_6 \to 48.9874, p_7 \to 74.0583, r_m \to 0.0597\}$

In[66]:=
```
pwSol1[[1 ;; 7, 2]].(phi[[1, 2]] c1/100.)
```

Out[66]= 1.

In[67]:=
```
laborValues[A1_, Δ1_, K1_, l1_] := (
  l1.Inverse[IdentityMatrix[Length[sectors]] - A1 - Δ1]
 )
```

In[68]:=
```
laborValues[A1, Δ1, K1, l1]
```

Out[68]= {35.5267, 20.1742, 23.2934, 25.075, 20.6632, 24.3021, 28.069}

In[69]:=
```
Table[pwSol1[[1 ;; n, 2]].K1[[All, j]] / l1[[j]], {j, 1, Length[sectors]}]
```

Part: 1 ;; n is not a valid Span specification. A Span specification should be 1, 2, or 3 machine−sized integers separated by ;;. (Any of the integers can be omitted or replaced with All.)

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General: Further output of Part::span will be suppressed during this calculation.

Out[69]=
```
{0.0494315 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {0.0156, 0.3705, 0.4959, 0.9031, 0.2217, 0.0835, 0.0074},
 0.189036 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {0.0043, 0.1028, 0.1377, 0.2507, 0.0615, 0.0232, 0.002},
 0.142653 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {0.0055, 0.1312, 0.1756, 0.3199, 0.0785, 0.0296, 0.0026},
 0.08 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {0.0021, 0.0493, 0.066, 0.1202, 0.0295, 0.0111, 0.001},
 0.103627 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {0.008, 0.1897, 0.2539, 0.4624, 0.1135, 0.0427, 0.0038},
 0.0798085 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {0.011, 0.2625, 0.3513, 0.6398, 0.157, 0.0591, 0.0052},
 0.0499251 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {0.0086, 0.2044, 0.2736, 0.4982, 0.1223, 0.046, 0.0041}}
```

In[70]:=
```
pwSol1[[1 ;; n, 2]].K1 / l1
```

Part: 1 ;; n is not a valid Span specification. A Span specification should be 1, 2, or 3 machine−sized integers separated by ;;. (Any of the integers can be omitted or replaced with All.)

Out[70]=
```
{0.0494315 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
    {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
    {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
    {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
    {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
    {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
```

```
    {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}},
0.189036 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
    {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
    {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
    {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
    {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
    {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
    {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}},
0.142653 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
    {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
    {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
    {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
    {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
    {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
    {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}},
0.08 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949, p5 → 45.1897,
     p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
    {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
    {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
    {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
    {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
    {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
    {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}},
0.103627 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
    {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
    {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
    {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
    {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
    {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
    {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}},
0.0798085 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
     p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
   {{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
    {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
    {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
    {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
    {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
```

```
    {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
    {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}},
 0.0499251 {p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
    p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧.
  {{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
    {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
    {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
    {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
    {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
    {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
    {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}}}
```

In[71]:=
```
pwSol1[[1 ;; n, 2]]
```

Part: 1 ;; n is not a valid Span specification. A Span specification should be 1, 2, or 3 machine−sized integers separated by ;;. (Any of the integers can be omitted or replaced with All.)

Out[71]=
```
{p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
  p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}⟦1 ;; n, 2⟧
```

Technical Change

Testing changes in reference profit rage r_m for a profitable technical change in a random sector j.

Sample Technical Change

Setting a random sector for technical change that is not the reference sector.

In[72]:=
```
techChangeSector = RandomChoice[sectors[[2 ;; 7]]]
```

Out[72]= 4

In[73]:=
```
n = Length[sectors]
```

Out[73]= 7

In[74]:=
```
technicalChange[j_, Kj_, Aj_, lj_, Rj_, Qw_, pw_] := (
  Clear[prof, Kprime, Aprime, lprime, def1, newTechnique];
  prof = 0;

  While[prof ≠ 1.,
   (* New random technique for sector j *)
   Kprime =
    Kj[[All, j]] × Table[(1 + RandomReal[{0.05, 0.10}]), {Length[sectors]}];
   Aprime = Aj[[All, j]] × Table[(1 + RandomReal[{0.03, 0.05}]),
      {Length[sectors]}];
   lprime = lj[[j]] (1 - RandomReal[{0.1, 0.15}]);

   (* Definition 1 test for profitability *)
   def1 = If[Rj[[j]] × pw[[1 ;; n, 2]].Kj[[All, j]] + pw[[1 ;; n, 2]].Aj[[All, j]] +
       Qw[[j, j]] × lj[[j]] > Rj[[j]] × pw[[1 ;; n, 2]].Kprime +
       pw[[1 ;; n, 2]].Aprime + Qw[[j, j]] lprime, True, False];

   (* Updating technology *)
   If[def1 == True, newTechnique = {Kprime, Aprime, lprime},];
   If[def1 == True, K2 = Kj,];
   If[def1 == True, K2[[All, j]] = Kprime,];
   If[def1 == True, A2 = Aj,];
   If[def1 == True, A2[[All, j]] = Aprime,];
   If[def1 == True, l2 = lj,];
   If[def1 == True, l2[[j]] = lprime,];

   If[def1 == True, prof = 1., prof = 0.];
  ]
 )
```

In[75]:=
```
technicalChange[techChangeSector, K1, A1, l1, R1, Qw1, pwSol1]
```

In[76]:=
```
newTechnique
```

Out[76]=
```
{{0.00227557, 0.0542116, 0.0715586, 0.129065, 0.0311926, 0.0119033, 0.00107932},
 {0., 0.0218606, 0.295569, 0.0208321, 0.090758, 0.10466, 0.0073197}, 10.7803}
```

Testing Changes in Profitability

Definition 1 check:

In[77]:=
```
R1[[techChangeSector]] × pwSol1[[1 ;; n, 2]].K1[[All, techChangeSector]] +
 pwSol1[[1 ;; n, 2]].A1[[All, techChangeSector]] +
 Qw1[[techChangeSector, techChangeSector]] × l1[[techChangeSector]]
```
Out[77]= 47.4743

In[78]:=
```
R1[[techChangeSector]] × pwSol1[[1 ;; n, 2]].K2[[All, techChangeSector]] +
 pwSol1[[1 ;; n, 2]].A2[[All, techChangeSector]] +
 Qw1[[techChangeSector, techChangeSector]] × l2[[techChangeSector]]
```
Out[78]= 46.1905

In[79]:=
```
R1[[ref]]
```
Out[79]= 0.0597

Test aggregate profit rates

In[80]:=
```
x = Table[x_j, {j, 1, Length[sectors]}]
```
Out[80]= $\{x_1, x_2, x_3, x_4, x_5, x_6, x_7\}$

In[81]:=

$$\frac{\texttt{p.(IdentityMatrix[Length[sectors]] - A - }\Delta\texttt{).x - l.Qw.x}}{\texttt{p.}\kappa\texttt{.Qr.x}}$$

Out[81]=

$$\Big(-\ell_1 x_1 q_{w,1} - \ell_2 x_2 q_{w,2} - \ell_3 x_3 q_{w,3} - \ell_4 x_4 q_{w,4} - \ell_5 x_5 q_{w,5} - \ell_6 x_6 q_{w,6} - \ell_7 x_7 q_{w,7} + x_1 \big(p_1 (1 - a_{1,1} - \delta_{1,1}) + p_2 (-a_{2,1} - \delta_{2,1}) + p_3 (-a_{3,1} - \delta_{3,1}) + p_4 (-a_{4,1} - \delta_{4,1}) + p_5 (-a_{5,1} - \delta_{5,1}) + p_6 (-a_{6,1} - \delta_{6,1}) + p_7 (-a_{7,1} - \delta_{7,1})\big) + x_2 \big(p_1 (-a_{1,2} - \delta_{1,2}) + p_2 (1 - a_{2,2} - \delta_{2,2}) + p_3 (-a_{3,2} - \delta_{3,2}) + p_4 (-a_{4,2} - \delta_{4,2}) + p_5 (-a_{5,2} - \delta_{5,2}) + p_6 (-a_{6,2} - \delta_{6,2}) + p_7 (-a_{7,2} - \delta_{7,2})\big) + x_3 \big(p_1 (-a_{1,3} - \delta_{1,3}) + p_2 (-a_{2,3} - \delta_{2,3}) + p_3 (1 - a_{3,3} - \delta_{3,3}) + p_4 (-a_{4,3} - \delta_{4,3}) + p_5 (-a_{5,3} - \delta_{5,3}) + p_6 (-a_{6,3} - \delta_{6,3}) + p_7 (-a_{7,3} - \delta_{7,3})\big) + x_4 \big(p_1 (-a_{1,4} - \delta_{1,4}) + p_2 (-a_{2,4} - \delta_{2,4}) + p_3 (-a_{3,4} - \delta_{3,4}) + p_4 (1 - a_{4,4} - \delta_{4,4}) + p_5 (-a_{5,4} - \delta_{5,4}) + p_6 (-a_{6,4} - \delta_{6,4}) + p_7 (-a_{7,4} - \delta_{7,4})\big) + x_5 \big(p_1 (-a_{1,5} - \delta_{1,5}) + p_2 (-a_{2,5} - \delta_{2,5}) + p_3 (-a_{3,5} - \delta_{3,5}) + p_4 (-a_{4,5} - \delta_{4,5}) + p_5 (1 - a_{5,5} - \delta_{5,5}) + p_6 (-a_{6,5} - \delta_{6,5}) + p_7 (-a_{7,5} - \delta_{7,5})\big) + x_6 \big(p_1 (-a_{1,6} - \delta_{1,6}) + p_2 (-a_{2,6} - \delta_{2,6}) + p_3 (-a_{3,6} - \delta_{3,6}) + p_4 (-a_{4,6} - \delta_{4,6}) + p_5 (-a_{5,6} - \delta_{5,6}) + p_6 (1 - a_{6,6} - \delta_{6,6}) + p_7 (-a_{7,6} - \delta_{7,6})\big) + x_7 \big(p_1 (-a_{1,7} - \delta_{1,7}) + p_2 (-a_{2,7} - \delta_{2,7}) + p_3 (-a_{3,7} - \delta_{3,7}) + p_4 (-a_{4,7} - \delta_{4,7}) + p_5 (-a_{5,7} - \delta_{5,7}) + p_6 (-a_{6,7} - \delta_{6,7}) + p_7 (1 - a_{7,7} - \delta_{7,7})\big)\Big) \Big/ \Big(x_1 q_{r,1} (p_1 \kappa_{1,1} + p_2 \kappa_{2,1} + p_3 \kappa_{3,1} + p_4 \kappa_{4,1} + p_5 \kappa_{5,1} + p_6 \kappa_{6,1} + p_7 \kappa_{7,1}) + x_2 q_{r,2} (p_1 \kappa_{1,2} + p_2 \kappa_{2,2} + p_3 \kappa_{3,2} + p_4 \kappa_{4,2} + p_5 \kappa_{5,2} + p_6 \kappa_{6,2} + p_7 \kappa_{7,2}) + x_3 q_{r,3} (p_1 \kappa_{1,3} + p_2 \kappa_{2,3} + p_3 \kappa_{3,3} + p_4 \kappa_{4,3} + p_5 \kappa_{5,3} + p_6 \kappa_{6,3} + p_7 \kappa_{7,3}) + x_4 q_{r,4} (p_1 \kappa_{1,4} + p_2 \kappa_{2,4} + p_3 \kappa_{3,4} + p_4 \kappa_{4,4} + p_5 \kappa_{5,4} + p_6 \kappa_{6,4} + p_7 \kappa_{7,4}) + x_5 q_{r,5} (p_1 \kappa_{1,5} + p_2 \kappa_{2,5} + p_3 \kappa_{3,5} + p_4 \kappa_{4,5} + p_5 \kappa_{5,5} + p_6 \kappa_{6,5} + p_7 \kappa_{7,5}) + x_6 q_{r,6} (p_1 \kappa_{1,6} + p_2 \kappa_{2,6} + p_3 \kappa_{3,6} + p_4 \kappa_{4,6} + p_5 \kappa_{5,6} + p_6 \kappa_{6,6} + p_7 \kappa_{7,6}) + x_7 q_{r,7} (p_1 \kappa_{1,7} + p_2 \kappa_{2,7} + p_3 \kappa_{3,7} + p_4 \kappa_{4,7} + p_5 \kappa_{5,7} + p_6 \kappa_{6,7} + p_7 \kappa_{7,7})\Big)$$

In[82]:=

```
aggProfitRate[p_, A_, Δ_, K_, l_, Qw_, Qr_, x_] :=
  (p.(IdentityMatrix[Length[sectors]] - A - Δ).x - l.Qw.x) / (p.K.x)
```

In[83]:=

```
refProfitRate[p_, A_, Δ_, K_, l_, Qw_, Qr_, x_] :=
  (p.(IdentityMatrix[Length[sectors]] - A - Δ).x - l.Qw.x) / (p.K.Qr.x)
```

In[84]:=

```
xRef = Table[1., {Length[sectors]}]
```

Out[84]= {1., 1., 1., 1., 1., 1., 1.}

In[85]:=

```
R1
```

Out[85]= {0.0597, 0.056, 0.0551, 0.4739, 0.1685, 0.1732, 0.0523}

In[86]:=
```
aggProfitRate[pwSol1[[1 ;; n, 2]], A1, Δ1, K1, l1, Qw1, Qr1, xRef]
```
Out[86]=
```
0.111865
```

In[87]:=
```
aggProfitRate[pwSol1[[1 ;; n, 2]], A2, Δ1, K2, l2, Qw1, Qr1, xRef]
```
Out[87]=
```
0.116812
```

In[88]:=
```
refProfitRate[pwSol1[[1 ;; n, 2]], A1, Δ1, K1, l1, Qw1, Qr1, xRef]
```
Out[88]=
```
0.0597
```

In[89]:=
```
refProfitRate[pwSol1[[1 ;; n, 2]], A2, Δ1, K2, l2, Qw1, Qr1, xRef]
```
Out[89]=
```
0.0617542
```

Finding new Q^r_m matrix after technical change

Profit rate in the sector with technical change.

In[90]:=
```
techChangeSector
```
Out[90]=
```
4
```

In[91]:=
```
R1
```
Out[91]=
```
{0.0597, 0.056, 0.0551, 0.4739, 0.1685, 0.1732, 0.0523}
```

In[92]:=
```
sectorR[j_, p_, A_, Δ_, K_, l_, Qw_] :=
 (p[[j, 2]] - p[[1 ;; n, 2]].A[[All, j]] - p[[1 ;; n, 2]].Δ[[All, j]] -
    l[[j]] × Qw[[j, j]]) / p[[1 ;; n, 2]].K[[All, j]]
```

In[93]:=
```
sectorR[techChangeSector, pwSol1, A1, Δ1, K1, l1, Qw1]
```
Out[93]=
```
0.4739
```

In[94]:=
```
sectorR[techChangeSector, pwSol1, A2, Δ1, K2, l2, Qw1]
```
Out[94]=
```
0.569949
```

Letting Q^r_m vary with technical change.

In[95]:=
```
Qr2 = Qr1;
```

In[96]:=
```
Qr2
```
Out[96]=
```
{{1., 0., 0., 0., 0., 0., 0.},
 {0., 0.938023, 0., 0., 0., 0., 0.}, {0., 0., 0.922948, 0., 0., 0., 0.},
 {0., 0., 0., 7.93802, 0., 0., 0.}, {0., 0., 0., 0., 2.82245, 0., 0.},
 {0., 0., 0., 0., 0., 2.90117, 0.}, {0., 0., 0., 0., 0., 0., 0.876047}}
```

In[97]:=
```
Qr2[[techChangeSector, techChangeSector]] =
  sectorR[techChangeSector, pwSol1, A2, Δ1, K2, l2, Qw1]
  ─────────────────────────────────────────────────────
                        R1[[ref]]
```
Out[97]=
```
9.54689
```

In[98]:=
```
Qr2
```

Out[98]=
```
{{1., 0., 0., 0., 0., 0., 0.},
 {0., 0.938023, 0., 0., 0., 0., 0.}, {0., 0., 0.922948, 0., 0., 0., 0.},
 {0., 0., 0., 9.54689, 0., 0., 0.}, {0., 0., 0., 0., 2.82245, 0., 0.},
 {0., 0., 0., 0., 0., 2.90117, 0.}, {0., 0., 0., 0., 0., 0., 0.876047}}
```

Updating prices and r_m after technical change

In[99]:=
```
pwSys
```

Out[99]=

$$\{p_1 == \ell_1 q_{w,1} + p_1 (a_{1,1} + \delta_{1,1}) + p_2 (a_{2,1} + \delta_{2,1}) + p_3 (a_{3,1} + \delta_{3,1}) + p_4 (a_{4,1} + \delta_{4,1}) + p_5 (a_{5,1} + \delta_{5,1}) + p_6 (a_{6,1} + \delta_{6,1}) + p_7 (a_{7,1} + \delta_{7,1}) + r_m q_{r,1} (p_1 \kappa_{1,1} + p_2 \kappa_{2,1} + p_3 \kappa_{3,1} + p_4 \kappa_{4,1} + p_5 \kappa_{5,1} + p_6 \kappa_{6,1} + p_7 \kappa_{7,1}),$$

$$p_2 == \ell_2 q_{w,2} + p_1 (a_{1,2} + \delta_{1,2}) + p_2 (a_{2,2} + \delta_{2,2}) + p_3 (a_{3,2} + \delta_{3,2}) + p_4 (a_{4,2} + \delta_{4,2}) + p_5 (a_{5,2} + \delta_{5,2}) + p_6 (a_{6,2} + \delta_{6,2}) + p_7 (a_{7,2} + \delta_{7,2}) + r_m q_{r,2} (p_1 \kappa_{1,2} + p_2 \kappa_{2,2} + p_3 \kappa_{3,2} + p_4 \kappa_{4,2} + p_5 \kappa_{5,2} + p_6 \kappa_{6,2} + p_7 \kappa_{7,2}),$$

$$p_3 == \ell_3 q_{w,3} + p_1 (a_{1,3} + \delta_{1,3}) + p_2 (a_{2,3} + \delta_{2,3}) + p_3 (a_{3,3} + \delta_{3,3}) + p_4 (a_{4,3} + \delta_{4,3}) + p_5 (a_{5,3} + \delta_{5,3}) + p_6 (a_{6,3} + \delta_{6,3}) + p_7 (a_{7,3} + \delta_{7,3}) + r_m q_{r,3} (p_1 \kappa_{1,3} + p_2 \kappa_{2,3} + p_3 \kappa_{3,3} + p_4 \kappa_{4,3} + p_5 \kappa_{5,3} + p_6 \kappa_{6,3} + p_7 \kappa_{7,3}),$$

$$p_4 == \ell_4 q_{w,4} + p_1 (a_{1,4} + \delta_{1,4}) + p_2 (a_{2,4} + \delta_{2,4}) + p_3 (a_{3,4} + \delta_{3,4}) + p_4 (a_{4,4} + \delta_{4,4}) + p_5 (a_{5,4} + \delta_{5,4}) + p_6 (a_{6,4} + \delta_{6,4}) + p_7 (a_{7,4} + \delta_{7,4}) + r_m q_{r,4} (p_1 \kappa_{1,4} + p_2 \kappa_{2,4} + p_3 \kappa_{3,4} + p_4 \kappa_{4,4} + p_5 \kappa_{5,4} + p_6 \kappa_{6,4} + p_7 \kappa_{7,4}),$$

$$p_5 == \ell_5 q_{w,5} + p_1 (a_{1,5} + \delta_{1,5}) + p_2 (a_{2,5} + \delta_{2,5}) + p_3 (a_{3,5} + \delta_{3,5}) + p_4 (a_{4,5} + \delta_{4,5}) + p_5 (a_{5,5} + \delta_{5,5}) + p_6 (a_{6,5} + \delta_{6,5}) + p_7 (a_{7,5} + \delta_{7,5}) + r_m q_{r,5} (p_1 \kappa_{1,5} + p_2 \kappa_{2,5} + p_3 \kappa_{3,5} + p_4 \kappa_{4,5} + p_5 \kappa_{5,5} + p_6 \kappa_{6,5} + p_7 \kappa_{7,5}),$$

$$p_6 == \ell_6 q_{w,6} + p_1 (a_{1,6} + \delta_{1,6}) + p_2 (a_{2,6} + \delta_{2,6}) + p_3 (a_{3,6} + \delta_{3,6}) + p_4 (a_{4,6} + \delta_{4,6}) + p_5 (a_{5,6} + \delta_{5,6}) + p_6 (a_{6,6} + \delta_{6,6}) + p_7 (a_{7,6} + \delta_{7,6}) + r_m q_{r,6} (p_1 \kappa_{1,6} + p_2 \kappa_{2,6} + p_3 \kappa_{3,6} + p_4 \kappa_{4,6} + p_5 \kappa_{5,6} + p_6 \kappa_{6,6} + p_7 \kappa_{7,6}),$$

$$p_7 == \ell_7 q_{w,7} + p_1 (a_{1,7} + \delta_{1,7}) + p_2 (a_{2,7} + \delta_{2,7}) + p_3 (a_{3,7} + \delta_{3,7}) + p_4 (a_{4,7} + \delta_{4,7}) + p_5 (a_{5,7} + \delta_{5,7}) + p_6 (a_{6,7} + \delta_{6,7}) + p_7 (a_{7,7} + \delta_{7,7}) + r_m q_{r,7} (p_1 \kappa_{1,7} + p_2 \kappa_{2,7} + p_3 \kappa_{3,7} + p_4 \kappa_{4,7} + p_5 \kappa_{5,7} + p_6 \kappa_{6,7} + p_7 \kappa_{7,7})\}$$

Updating profit rate expressions

In[100]:=
```
initialR2 = Flatten[Solve[Table[Qr2[[i, i]] == r_i/r_m, {i, 1, Length[sectors]}], R]];
initialR2[[1]] = r_1 → 1.;
initialR2
```

Out[102]=

$$\{r_1 \to 1., r_2 \to 0.938023\, r_m, r_3 \to 0.922948\, r_m, r_4 \to 9.54689\, r_m, r_5 \to 2.82245\, r_m, r_6 \to 2.90117\, r_m, r_7 \to 0.876047\, r_m\}$$

In[103]:=
```
pwSol[A2, Δ1, K2, l2, Qw1, Qr2, initialR2, c1, maxR1]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[103]=
```
{p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
 p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}
```

In[104]:=
```
pwSol1
```

Out[104]=
```
{p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
 p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}
```

In[105]:=
```
pwSol2 = Assuming[Append[Thread[p > 0.], 0 < rm < maxR1],
   Solve[Flatten[Append[(pwSys /. threadMatrix[A, A2] /. threadMatrix[Δ, Δ1] /.
            threadMatrix[K, K2] /. Thread[l → l2] /. threadMatrix[Qw, Qw1] /.
         threadMatrix[Qr, Qr2] /. Rule @@@ initialW /. initialR2),
      p.(phi[[1, 2]] c1/100.) == 1]], Flatten[Append[p, rm]]]][[1]]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[105]=
```
{p1 → 55.3531, p2 → 36.5576, p3 → 40.8986, p4 → 48.4949,
 p5 → 45.1897, p6 → 48.9874, p7 → 74.0583, rm → 0.0597}
```

In[106]:=
```
aggProfitRate[pwSol1[[1 ;; n, 2]], A1, Δ1, K1, l1, Qw1, Qr1, xRef]
```

Out[106]=
```
0.111865
```

In[107]:=
```
aggProfitRate[pwSol[A2, Δ1, K2, l2, Qw1, Qr2, initialR2, c1, maxR1][[1 ;; n, 2]],
 A2, Δ1, K2, l2, Qw1, Qr2, xRef]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[107]=
```
0.116812
```

In[108]:=
```
initialR2 /. pwSol[A2, Δ1, K2, l2, Qw1, Qr2, initialR2, c1, maxR1][[8]]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[108]=
```
{r1 → 1., r2 → 0.056, r3 → 0.0551, r4 → 0.569949, r5 → 0.1685, r6 → 0.1732, r7 → 0.0523}
```

In[109]:=
```
(initialR2 /. pwSol[A2, Δ1, K2, l2, Qw1, Qr2, initialR2, c1, maxR1][[8]])[[All, 2]]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[109]=
```
{1., 0.056, 0.0551, 0.569949, 0.1685, 0.1732, 0.0523}
```

In[110]:=
```
Mean[R1]
```

Out[110]=
```
0.148386
```

In[111]:= pwSol1

Out[111]= $\{p_1 \to 55.3531,\ p_2 \to 36.5576,\ p_3 \to 40.8986,\ p_4 \to 48.4949,\ p_5 \to 45.1897,\ p_6 \to 48.9874,\ p_7 \to 74.0583,\ r_m \to 0.0597\}$

In[112]:= capitalStocks1 = Table[pwSol1[[1 ;; n, 2]].K1[[All, j]], {j, 1, Length[sectors]}]

Out[112]= {93.1425, 25.8493, 32.9861, 12.3978, 47.6882, 65.975, 51.3822}

In[113]:= $\frac{\text{capitalStocks1}}{\text{Total[capitalStocks1]}}$

Out[113]= {0.282746, 0.078469, 0.100133, 0.0376352, 0.144764, 0.200276, 0.155977}

In[114]:= pwSol1[[8, 2]]

Out[114]= 0.0597

In[115]:= Prepend[(initialR /. pwSol[A1, Δ1, K1, l1, Qw1, Qr1, initialR, c1, maxR1][[8]])[[2 ;; n, 2]], pwSol1[[8, 2]]]

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[115]= {0.0597, 0.056, 0.0551, 0.4739, 0.1685, 0.1732, 0.0523}

In[116]:= Prepend[(initialR /. pwSol[A1, Δ1, K1, l1, Qw1, Qr1, initialR, c1, maxR1][[8]])[[2 ;; n, 2]], pwSol1[[8, 2]]] $\left(\frac{\text{capitalStocks1}}{\text{Total[capitalStocks1]}}\right)$

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[116]= {0.0168799, 0.00439426, 0.00551735, 0.0178353, 0.0243927, 0.0346877, 0.00815761}

In[117]:= Total[Prepend[(initialR /. pwSol[A1, Δ1, K1, l1, Qw1, Qr1, initialR, c1, maxR1][[8]])[[2 ;; n, 2]], pwSol1[[8, 2]]] $\left(\frac{\text{capitalStocks1}}{\text{Total[capitalStocks1]}}\right)$]

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[117]= 0.111865

In[118]:= capitalStocks2 = Table[pwSol2[[1 ;; n, 2]].K2[[All, j]], {j, 1, Length[sectors]}]

Out[118]= {93.1425, 25.8493, 32.9861, 13.366, 47.6882, 65.975, 51.3822}

In[119]:= $\frac{\text{capitalStocks2}}{\text{Total[capitalStocks2]}}$

Out[119]= {0.281917, 0.078239, 0.09984, 0.0404555, 0.144339, 0.199689, 0.15552}

In[120]:=
```
Prepend[(initialR2 /. pwSol[A2, Δ1, κ2, l2, Qw1, Qr2, initialR2, c1, maxR1][[8]])[[
  2 ;; n, 2]], pwSol2[[8, 2]]]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[120]= {0.0597, 0.056, 0.0551, 0.569949, 0.1685, 0.1732, 0.0523}

In[121]:=
```
Total[
 Prepend[(initialR2 /. pwSol[A2, Δ1, κ2, l2, Qw1, Qr2, initialR2, c1, maxR1][[8]])[[
   2 ;; n, 2]], pwSol2[[8, 2]]] (capitalStocks2 / Total[capitalStocks2])]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[121]= 0.116812

In[122]:= R1

Out[122]= {0.0597, 0.056, 0.0551, 0.4739, 0.1685, 0.1732, 0.0523}

In[123]:= Mean[R1]

Out[123]= 0.148386

In[124]:=
```
Prepend[(initialR2 /. pwSol[A2, Δ1, κ2, l2, Qw1, Qr2, initialR2, c1, maxR1][[8]])[[
  2 ;; n, 2]], pwSol2[[8, 2]]]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[124]= {0.0597, 0.056, 0.0551, 0.569949, 0.1685, 0.1732, 0.0523}

In[125]:=
```
Mean[
 Prepend[(initialR2 /. pwSol[A2, Δ1, κ2, l2, Qw1, Qr2, initialR2, c1, maxR1][[8]])[[
   2 ;; n, 2]], pwSol2[[8, 2]]]]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Out[125]= 0.162107

Technical Changes Across Sectors

In[126]:=
```
Clear[technologies];
technologies = Table[Table[Table[0.0, {Length[sectors]}, {Length[sectors]}], {3}],
   {Length[sectors] - 1}];
Table[AppendTo[technologies[[i]], Table[0.0, {Length[sectors]}]],
 {i, 1, Length[sectors] - 1}]
```

Out[128]= {{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},

```
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
  {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}},
{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
  {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}},
{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
  {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}},
{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
  {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}},
{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
```

```
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
  {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}},
 {{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
  {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}}}
```

In[129]:=

```
technologies[[1]]
```

Out[129]=

```
{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
 {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
 {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}}
```

In[130]:=

```
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 technologies[[i, 1]] = K1;
 technologies[[i, 2]] = A1;
 technologies[[i, 3]] = Δ1;
 technologies[[i, 4]] = l1;
]
```

```
In[131]:= technologies[[1]]

Out[131]= {{{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
    {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
    {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
    {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
    {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
    {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
    {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}},
   {{0.03, 0., 0.047, 0., 0., 0.002, 0.002}, {0.081, 0.241, 0.05, 0.021,
     0.003, 0.008, 0.014}, {0.159, 0.226, 0.338, 0.286, 0.03, 0.06, 0.065},
    {0.01, 0.005, 0.009, 0.02, 0.007, 0.034, 0.02},
    {0.137, 0.107, 0.126, 0.088, 0.291, 0.118, 0.08},
    {0.032, 0.044, 0.045, 0.1, 0.071, 0.139, 0.044},
    {0.034, 0.008, 0.013, 0.007, 0.009, 0.014, 0.025}},
   {{0.0008, 0.0002, 0.0003, 0.0001, 0.0004, 0.006, 0.0004},
    {0.0455, 0.0126, 0.0161, 0.0061, 0.0233, 0.0322, 0.0251},
    {0.0562, 0.0156, 0.0199, 0.0075, 0.0288, 0.0398, 0.031},
    {0.0452, 0.0125, 0.016, 0.006, 0.0231, 0.032, 0.0249},
    {0.0223, 0.0061, 0.0079, 0.003, 0.0114, 0.0158, 0.0123},
    {0.009, 0.0025, 0.0032, 0.0012, 0.0046, 0.0063, 0.0049},
    {0.0004, 0.0001, 0.0001, 0., 0.0002, 0.0003, 0.0002}},
   {20.23, 5.29, 7.01, 12.5, 9.65, 12.53, 20.03}}
```

In[132]:=
```
technologies[[2]]
```

Out[132]=
```
{{{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
  {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
  {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
  {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
  {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
  {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
  {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}},
 {{0.03, 0., 0.047, 0., 0., 0.002, 0.002}, {0.081, 0.241, 0.05, 0.021,
   0.003, 0.008, 0.014}, {0.159, 0.226, 0.338, 0.286, 0.03, 0.06, 0.065},
  {0.01, 0.005, 0.009, 0.02, 0.007, 0.034, 0.02},
  {0.137, 0.107, 0.126, 0.088, 0.291, 0.118, 0.08},
  {0.032, 0.044, 0.045, 0.1, 0.071, 0.139, 0.044},
  {0.034, 0.008, 0.013, 0.007, 0.009, 0.014, 0.025}},
 {{0.0008, 0.0002, 0.0003, 0.0001, 0.0004, 0.006, 0.0004},
  {0.0455, 0.0126, 0.0161, 0.0061, 0.0233, 0.0322, 0.0251},
  {0.0562, 0.0156, 0.0199, 0.0075, 0.0288, 0.0398, 0.031},
  {0.0452, 0.0125, 0.016, 0.006, 0.0231, 0.032, 0.0249},
  {0.0223, 0.0061, 0.0079, 0.003, 0.0114, 0.0158, 0.0123},
  {0.009, 0.0025, 0.0032, 0.0012, 0.0046, 0.0063, 0.0049},
  {0.0004, 0.0001, 0.0001, 0., 0.0002, 0.0003, 0.0002}},
 {20.23, 5.29, 7.01, 12.5, 9.65, 12.53, 20.03}}
```

In[133]:=
```
technologies[[1, 1, All, 1]]
```

Out[133]=
```
{0.0156, 0.3705, 0.4959, 0.9031, 0.2217, 0.0835, 0.0074}
```

In[134]:=
```
technologies[[1, 4]]
```

Out[134]=
```
{20.23, 5.29, 7.01, 12.5, 9.65, 12.53, 20.03}
```

In[135]:=
```
newTechnique
```

Out[135]=
```
{{0.00227557, 0.0542116, 0.0715586, 0.129065, 0.0311926, 0.0119033, 0.00107932},
 {0., 0.0218606, 0.295569, 0.0208321, 0.090758, 0.10466, 0.0073197}, 10.7803}
```

Technical changes across sectors, except for reference sector.

In[136]:=
```
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 technicalChange[techChangeSector, K1, A1, l1, R1, Qw1, pwSol1];
 technologies[[i, 1, All, techChangeSector]] = newTechnique[[1]];
 technologies[[i, 2, All, techChangeSector]] = newTechnique[[2]];
 technologies[[i, 4, techChangeSector]] = newTechnique[[3]];
]
```

Show profitability across sectors.

Updating r_j for j in which technical change occurs at prevailing p.

In[137]:=
```
Clear[rPrimes];
rPrimes = Table[0.0, {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 rPrimes[[i]] = sectorR[techChangeSector, pwSol1, technologies[[i, 2]],
   technologies[[i, 3]], technologies[[i, 1]], technologies[[i, 4]], Qw1]
]
```

In[140]:=
```
rPrimes
```

Out[140]=
```
{0.0561648, 0.0592632, 0.518386, 0.181657, 0.180436, 0.159368}
```

Updating *Q* matrices

Multiplier on profit differential.

In[141]:=
```
φ = 2.
```

Out[141]=
```
2.
```

In[142]:=
```
Clear[Qs];
Qs =
  Table[Table[0.0, {Length[sectors]}, {Length[sectors]}], {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 Qs[[i]] = Qr1;
 Qs[[i, techChangeSector, techChangeSector]] = φ rPrimes[[i]] / R1[[ref]];
]
```

In[145]:=
```
Qr1 // MatrixForm
```

Out[145]//MatrixForm=

$$\begin{pmatrix} 1. & 0. & 0. & 0. & 0. & 0. & 0. \\ 0. & 0.938023 & 0. & 0. & 0. & 0. & 0. \\ 0. & 0. & 0.922948 & 0. & 0. & 0. & 0. \\ 0. & 0. & 0. & 7.93802 & 0. & 0. & 0. \\ 0. & 0. & 0. & 0. & 2.82245 & 0. & 0. \\ 0. & 0. & 0. & 0. & 0. & 2.90117 & 0. \\ 0. & 0. & 0. & 0. & 0. & 0. & 0.876047 \end{pmatrix}$$

In[146]:= Qs // TableForm

Out[146]//TableForm=

1.	0.	0.	0.	0.	0.	0.
0.	1.88157	0.	0.	0.	0.	0.
0.	0.	0.922948	0.	0.	0.	0.
0.	0.	0.	7.93802	0.	0.	0.
0.	0.	0.	0.	2.82245	0.	0.
0.	0.	0.	0.	0.	2.90117	0.
0.	0.	0.	0.	0.	0.	0.876047

1.	0.	0.	0.	0.	0.	0.
0.	0.938023	0.	0.	0.	0.	0.
0.	0.	1.98537	0.	0.	0.	0.
0.	0.	0.	7.93802	0.	0.	0.
0.	0.	0.	0.	2.82245	0.	0.
0.	0.	0.	0.	0.	2.90117	0.
0.	0.	0.	0.	0.	0.	0.876047

1.	0.	0.	0.	0.	0.	0.
0.	0.938023	0.	0.	0.	0.	0.
0.	0.	0.922948	0.	0.	0.	0.
0.	0.	0.	17.3664	0.	0.	0.
0.	0.	0.	0.	2.82245	0.	0.
0.	0.	0.	0.	0.	2.90117	0.
0.	0.	0.	0.	0.	0.	0.876047

1.	0.	0.	0.	0.	0.	0.
0.	0.938023	0.	0.	0.	0.	0.
0.	0.	0.922948	0.	0.	0.	0.
0.	0.	0.	7.93802	0.	0.	0.
0.	0.	0.	0.	6.08566	0.	0.
0.	0.	0.	0.	0.	2.90117	0.
0.	0.	0.	0.	0.	0.	0.876047

1.	0.	0.	0.	0.	0.	0.
0.	0.938023	0.	0.	0.	0.	0.
0.	0.	0.922948	0.	0.	0.	0.
0.	0.	0.	7.93802	0.	0.	0.
0.	0.	0.	0.	2.82245	0.	0.
0.	0.	0.	0.	0.	6.04474	0.
0.	0.	0.	0.	0.	0.	0.876047

1.	0.	0.	0.	0.	0.	0.
0.	0.938023	0.	0.	0.	0.	0.
0.	0.	0.922948	0.	0.	0.	0.
0.	0.	0.	7.93802	0.	0.	0.
0.	0.	0.	0.	2.82245	0.	0.
0.	0.	0.	0.	0.	2.90117	0.
0.	0.	0.	0.	0.	0.	5.33898

Updating $r_j[r_m]$ expression.

In[147]:=
```
Clear[Rs];
Rs = Table[Table[0.0, {Length[sectors]}], {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 Rs[[i]] = Flatten[Solve[Table[Qs[[i, j, j]] == r_j/r_m, {j, 1, Length[sectors]}], R]];
 Rs[[i, 1]] = r_1 → 1.;
]
```

In[150]:=
```
Rs
```

Out[150]= $\{\{r_1 \to 1., r_2 \to 1.88157\, r_m, r_3 \to 0.922948\, r_m, r_4 \to 7.93802\, r_m, r_5 \to 2.82245\, r_m, r_6 \to 2.90117\, r_m, r_7 \to 0.876047\, r_m\}, \{r_1 \to 1., r_2 \to 0.938023\, r_m, r_3 \to 1.98537\, r_m, r_4 \to 7.93802\, r_m, r_5 \to 2.82245\, r_m, r_6 \to 2.90117\, r_m, r_7 \to 0.876047\, r_m\}, \{r_1 \to 1., r_2 \to 0.938023\, r_m, r_3 \to 0.922948\, r_m, r_4 \to 17.3664\, r_m, r_5 \to 2.82245\, r_m, r_6 \to 2.90117\, r_m, r_7 \to 0.876047\, r_m\}, \{r_1 \to 1., r_2 \to 0.938023\, r_m, r_3 \to 0.922948\, r_m, r_4 \to 7.93802\, r_m, r_5 \to 6.08566\, r_m, r_6 \to 2.90117\, r_m, r_7 \to 0.876047\, r_m\}, \{r_1 \to 1., r_2 \to 0.938023\, r_m, r_3 \to 0.922948\, r_m, r_4 \to 7.93802\, r_m, r_5 \to 2.82245\, r_m, r_6 \to 6.04474\, r_m, r_7 \to 0.876047\, r_m\}, \{r_1 \to 1., r_2 \to 0.938023\, r_m, r_3 \to 0.922948\, r_m, r_4 \to 7.93802\, r_m, r_5 \to 2.82245\, r_m, r_6 \to 2.90117\, r_m, r_7 \to 5.33898\, r_m\}\}$

Updating prices for new techniques.

In[151]:=
```
Clear[prices, values];
prices = Table[Table[0.0, {Length[sectors] + 1}], {Length[sectors] - 1}];
values = Table[Table[0.0, {Length[sectors]}], {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 prices[[i]] = pwSol[technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]], Qw1, Qs[[i]], Rs[[i]], c1, maxR1];
 values[[i]] = laborValues[technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]]];
]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

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Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

General: Further output of Solve::ratnz will be suppressed during this calculation.

In[155]:=
```
prices // TableForm
```

Out[155]//TableForm=

p_1 → 55.447	p_2 → 38.5364	p_3 → 40.9781	p_4 → 48.3914	p_5 → 44.9779	p_6 → 48.7448
p_1 → 55.2359	p_2 → 36.9797	p_3 → 43.3974	p_4 → 48.5099	p_5 → 44.2487	p_6 → 47.9288
p_1 → 55.4704	p_2 → 36.6203	p_3 → 40.9952	p_4 → 54.998	p_5 → 44.9729	p_6 → 48.8934
p_1 → 55.5481	p_2 → 37.4479	p_3 → 41.8054	p_4 → 47.9966	p_5 → 52.6899	p_6 → 47.3352
p_1 → 51.525	p_2 → 34.4222	p_3 → 38.4383	p_4 → 45.281	p_5 → 40.7319	p_6 → 51.4105
p_1 → 55.0948	p_2 → 36.3173	p_3 → 40.6671	p_4 → 48.0284	p_5 → 44.5687	p_6 → 48.2528

In[156]:=
```
values // TableForm
```

Out[156]//TableForm=

35.4557	19.7857	23.2388	25.0419	20.6387	24.2699	28.0424
35.2443	19.8564	22.4243	24.7754	20.5455	24.1392	27.9369
35.4393	20.1174	23.2272	24.194	20.607	24.213	28.0096
35.0706	19.757	22.8435	24.742	19.086	23.9489	27.8245
35.3137	19.9485	23.0625	24.7966	20.4334	22.57	27.9152
35.4093	20.1129	23.2165	25.0233	20.6161	24.2405	25.8416

In[157]:=
```
priceOut = Table[
  Prepend[Prepend[Append[Table[{prices[[i, j, 2]], "&"}, {j, 1, n}], "\\\\"], "&"],
   "$p^{w}$"], {i, 1, Length[sectors] - 1}]
```

Out[157]=
```
{{$p^{w}$, &, {55.447, &}, {38.5364, &}, {40.9781, &},
  {48.3914, &}, {44.9779, &}, {48.7448, &}, {74.0459, &}, \\},
 {$p^{w}$, &, {55.2359, &}, {36.9797, &}, {43.3974, &},
  {48.5099, &}, {44.2487, &}, {47.9288, &}, {73.9278, &}, \\},
 {$p^{w}$, &, {55.4704, &}, {36.6203, &}, {40.9952, &}, {54.998, &}, {44.9729, &},
  {48.8934, &}, {74.2252, &}, \\}, {$p^{w}$, &, {55.5481, &}, {37.4479, &},
  {41.8054, &}, {47.9966, &}, {52.6899, &}, {47.3352, &}, {74.182, &}, \\},
 {$p^{w}$, &, {51.525, &}, {34.4222, &}, {38.4383, &}, {45.281, &}, {40.7319, &},
  {51.4105, &}, {72.2509, &}, \\}, {$p^{w}$, &, {55.0948, &}, {36.3173, &},
  {40.6671, &}, {48.0284, &}, {44.5687, &}, {48.2528, &}, {81.9944, &}, \\}}
```

In[158]:=
```
valueOut =
 Table[Prepend[Prepend[Append[Table[{values[[i, j]], "&"}, {j, 1, n}], "\\\\"], "&"],
   "$v^{w}$"], {i, 1, Length[sectors] - 1}]
```

Out[158]=
```
{{$v^{w}$, &, {35.4557, &}, {19.7857, &}, {23.2388, &},
  {25.0419, &}, {20.6387, &}, {24.2699, &}, {28.0424, &}, \\},
 {$v^{w}$, &, {35.2443, &}, {19.8564, &}, {22.4243, &}, {24.7754, &}, {20.5455, &},
  {24.1392, &}, {27.9369, &}, \\}, {$v^{w}$, &, {35.4393, &}, {20.1174, &},
  {23.2272, &}, {24.194, &}, {20.607, &}, {24.213, &}, {28.0096, &}, \\},
 {$v^{w}$, &, {35.0706, &}, {19.757, &}, {22.8435, &}, {24.742, &}, {19.086, &},
  {23.9489, &}, {27.8245, &}, \\}, {$v^{w}$, &, {35.3137, &}, {19.9485, &},
  {23.0625, &}, {24.7966, &}, {20.4334, &}, {22.57, &}, {27.9152, &}, \\},
 {$v^{w}$, &, {35.4093, &}, {20.1129, &}, {23.2165, &},
  {25.0233, &}, {20.6161, &}, {24.2405, &}, {25.8416, &}, \\}}
```

```
In[159]:= Export["./priceOut.csv", priceOut, "CSV"]
          Export["./valueOut.csv", valueOut, "CSV"]

Out[159]= ./priceOut.csv

Out[160]= ./valueOut.csv

In[161]:= Clear[capLabor];
          capLabor = Table[0.0, {Length[sectors] - 1}];
          For[i = 1, i ≤ Length[sectors] - 1, i++,
           capLabor[[i]] = prices[[i, 1 ;; n, 2]].technologies[[i, 1]] / technologies[[i, 4]];
          ]

In[164]:= Export["./capLabor.csv", capLabor, "CSV"]

Out[164]= ./capLabor.csv

In[165]:= capLabor

Out[165]= {{4.63449, 6.10869, 4.73655, 0.998355, 4.97432, 5.30004, 2.58215},
           {4.65901, 4.94469, 6.01137, 1.00364, 5.00065, 5.32809, 2.59582},
           {4.89539, 5.1956, 5.00326, 1.26655, 5.25436, 5.59845, 2.72751},
           {4.69603, 4.9839, 4.79942, 1.01161, 6.28259, 5.3704, 2.61645},
           {4.31882, 4.58361, 4.41395, 0.930353, 4.63548, 6.10256, 2.40626},
           {4.56614, 4.846, 4.66668, 0.983645, 4.90097, 5.22184, 3.10061}}

In[166]:= Table[prices[[1, 1 ;; n, 2]].technologies[[1, 1, All, j]], {j, 1, Length[sectors]}]

Out[166]= {93.7557, 27.7896, 33.2032, 12.4794, 48.0022, 66.4095, 51.7205}
```

```
In[167]:= Clear[refProfs, aggProfs, meanProfs, capStocks, weightMeanProfs];
refProfs = Table[0.0, {Length[sectors] - 1}];
aggProfs = Table[0.0, {Length[sectors] - 1}];
meanProfs = Table[0.0, {Length[sectors] - 1}];
capStocks = Table[0.0, {Length[sectors] - 1}];
weightMeanProfs = Table[0.0, {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 refProfs[[i]] =
  refProfitRate[prices[[i, 1 ;; n, 2]], technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]], Qw1, Qs[[i]], xRef];
 aggProfs[[i]] = aggProfitRate[prices[[i, 1 ;; n, 2]],
   technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]], Qw1, Qs[[i]], xRef];
 meanProfs[[i]] = Mean[Prepend[Rs[[i, 2 ;; n]] /. r_m → refProfs[[i]],
     r_1 → refProfs[[i]]][[All, 2]]];
 capStocks[[i]] = Table[prices[[i, 1 ;; n, 2]].technologies[[i, 1, All, j]],
   {j, 1, Length[sectors]}];
 weightMeanProfs[[i]] = Total[meanProfs[[i]] capStocks[[i]] / Total[capStocks[[i]]]];
]

In[174]:= refProfs
Out[174]= {0.0579588, 0.0536102, 0.053711, 0.045663, 0.0400637, 0.0570758}

In[175]:= aggProfs
Out[175]= {0.112873, 0.10616, 0.122104, 0.109016, 0.102143, 0.148476}

In[176]:= meanProfs
Out[176]= {0.15187, 0.141386, 0.205844, 0.134783, 0.117571, 0.178253}

In[177]:= weightMeanProfs
Out[177]= {0.15187, 0.141386, 0.205844, 0.134783, 0.117571, 0.178253}

In[178]:= Prepend[
 Append[Flatten[Table[{refProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]], "\\\\"],
 "$r_{m}$"]
Out[178]= {$r_{m}$, 0.0579588, &, 0.0536102, &,
 0.053711, &, 0.045663, &, 0.0400637, &, 0.0570758, &, \\}

In[179]:= Prepend[Append[
  Flatten[Table[{aggProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]], "\\\\"], "$r$"]
Out[179]= {$r$, 0.112873, &, 0.10616, &, 0.122104, &, 0.109016, &, 0.102143, &, 0.148476, &, \\}
```

```
In[180]:= Prepend[
            Append[Flatten[Table[{meanProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]], "\\\\"],
            "$\\bar{r}$"]

Out[180]= {$\bar{r}$, 0.15187, &, 0.141386, &,
            0.205844, &, 0.134783, &, 0.117571, &, 0.178253, &, \\}

In[181]:= Append[
            Flatten[Table[{weightMeanProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]], "\\\\"]

Out[181]= {0.15187, &, 0.141386, &, 0.205844, &, 0.134783, &, 0.117571, &, 0.178253, &, \\}

In[182]:= profOut = {{"", "&", 2, "&", 3, "&", 4, "&", 5, "&", 6, "&", 7, "&", "\\\\"}, Prepend[
              Prepend[Append[Flatten[Table[{refProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]],
                "\\\\"], "&"], "$r_{m}$"], Prepend[
              Prepend[Append[Flatten[Table[{aggProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]],
                "\\\\"], "&"], "$r$"], Prepend[
              Prepend[Append[Flatten[Table[{meanProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]],
                "\\\\"], "&"], "$\\bar{r}$"]}

Out[182]= {{, &, 2, &, 3, &, 4, &, 5, &, 6, &, 7, &, \\},
            {$r_{m}$, &, 0.0579588, &, 0.0536102, &, 0.053711, &, 0.045663, &,
             0.0400637, &, 0.0570758, &, \\}, {$r$, &, 0.112873, &, 0.10616, &, 0.122104,
             &, 0.109016, &, 0.102143, &, 0.148476, &, \\}, {$\bar{r}$, &, 0.15187,
             &, 0.141386, &, 0.205844, &, 0.134783, &, 0.117571, &, 0.178253, &, \\}}

In[183]:= Export["./profOut.csv", profOut, "CSV"]

Out[183]= ./profOut.csv

In[184]:= Clear[techOut];
          techOut =
            Table[Append[Table[0.0, {2}, {Length[sectors]}], 0.], {Length[sectors] - 1}];
          For[i = 1, i ≤ (Length[sectors] - 1), i++,
           techChangeSector = i + 1;
           techOut[[i]] = {NumberForm[technologies[[i, 1, All, techChangeSector]], 4],
             NumberForm[technologies[[i, 2, All, techChangeSector]], 4],
             NumberForm[technologies[[i, 4, techChangeSector]], 4]}
          ]

In[187]:= Export["./techOut.csv", techOut, "CSV"]

Out[187]= ./techOut.csv
```

In[188]:=
```
techOut
```

Out[188]=
```
{{{0.004702, 0.1086, 0.1487, 0.2672, 0.06548, 0.025, 0.002148},
  {0., 0.249, 0.2335, 0.00524, 0.1105, 0.04601, 0.008325}, 4.549},
 {{0.006003, 0.144, 0.1915, 0.3463, 0.08419, 0.03248, 0.002847},
  {0.04852, 0.05168, 0.3498, 0.009354, 0.1298, 0.04657, 0.01342}, 6.031},
 {{0.002272, 0.0528, 0.07219, 0.1287, 0.0323, 0.01203, 0.001088},
  {0., 0.02183, 0.2978, 0.02062, 0.09098, 0.1031, 0.007282}, 11.23},
 {{0.008448, 0.2004, 0.2727, 0.4998, 0.1238, 0.04639, 0.00404},
  {0., 0.003125, 0.03125, 0.007215, 0.3002, 0.07373, 0.009399}, 8.338},
 {{0.01156, 0.2798, 0.3794, 0.6734, 0.1708, 0.06421, 0.005623},
  {0.002082, 0.008258, 0.06293, 0.0353, 0.1221, 0.1441, 0.01461}, 10.81},
 {{0.00928, 0.2176, 0.2973, 0.5317, 0.1338, 0.04876, 0.004347},
  {0.002094, 0.01467, 0.06816, 0.02083, 0.08318, 0.04544, 0.02579}, 17.65}}
```

In[189]:=
```
R1[[1]]
```

Out[189]=
```
0.0597
```

Wage-Profit Frontiers

In[190]:=
```
WRs = Flatten[
   Prepend[Table[realWage /. threadMatrix[A, technologies[[i, 2]]] /. threadMatrix[
           Δ, technologies[[i, 3]]] /. threadMatrix[K, technologies[[i, 1]]] /.
         threadMatrix[Qr, Qs[[i]]] /. threadMatrix[Qw, Qw1] /. Thread[
        l → technologies[[i, 4]]] /. Thread[c → c1/100.] /. Rule @@@ initialW /.
      Rs[[i]] /. phi, {i, 1, Length[sectors] - 1}] // Simplify,
    (realWage /. threadMatrix[A, A1] /. threadMatrix[Δ, Δ1] /. threadMatrix[K, K1] /.
         threadMatrix[Qr, Qr1] /. threadMatrix[Qw, Qw1] /. Thread[l → l1] /.
       Thread[c → c1/100.] /. Rule @@@ initialW /. initialR /. phi) // Simplify]];
```

In[191]:=
```
styles = {Black, Blue, Purple, Orange, Darker[Green], Darker[Gray], Pink};
```

In[192]:=
```
Length[refProfs]
```

Out[192]=
```
6
```

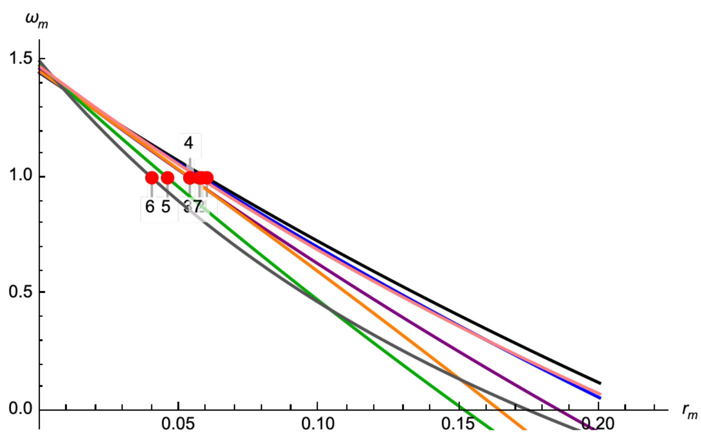
In[193]:=
```
refProfs
```

Out[193]=
```
{0.0579588, 0.0536102, 0.053711, 0.045663, 0.0400637, 0.0570758}
```

In[194]:=
```
wPoints = Flatten[Prepend[
    Table[WRs[[i + 1]] /. r_m → refProfs[[i]], {i, 1, Length[sectors] - 1}], wagePlot]]
```

Out[194]=
```
{ω_m == 1., ω_m == 1., ω_m == 1., ω_m == 1., ω_m == 1., ω_m == 1., ω_m == 1.}
```

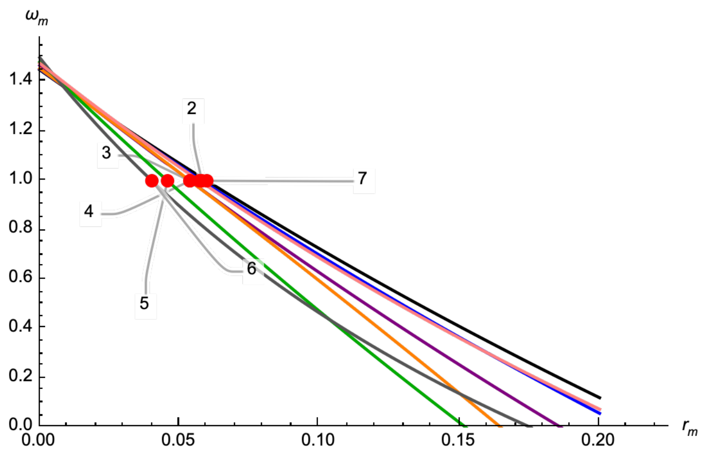
In[195]:=
```
profPoints = Prepend[refProfs, R1[[ref]]]
```
Out[195]=
```
{0.0597, 0.0579588, 0.0536102, 0.053711, 0.045663, 0.0400637, 0.0570758}
```
In[196]:=
```
wrPoints = Table[{profPoints[[i]], wPoints[[i, 2]]}, {i, 1, Length[sectors]}]
```
Out[196]=
```
{{0.0597, 1.}, {0.0579588, 1.}, {0.0536102, 1.},
 {0.053711, 1.}, {0.045663, 1.}, {0.0400637, 1.}, {0.0570758, 1.}}
```
In[197]:=
```
wrPoints[[1]]
```
Out[197]=
```
{0.0597, 1.}
```
In[198]:=
```
sectors
```
Out[198]=
```
{1, 2, 3, 4, 5, 6, 7}
```
In[199]:=
```
positions = {Above, Center, Below, Above, Center, Below, Above};
```
In[200]:=
```
Show[Table[Plot[WRs[[i, 2]], {rm, 0, 0.2}, AxesLabel → {"rm", "ωm"},
    PlotRange → {{0, 0.22}, Automatic}, PlotStyle → styles[[i]],
    PlotLabels → {Callout[sectors[[i]], wrPoints[[i]], LeaderSize → sectors[[i]]}],
   {i, 1, Length[sectors]}], Epilog → {PointSize → Large, Red, Point[wrPoints]}]
Export["./wrTechChange.eps", wrTechChange, "EPS"]
```
Out[200]=



Out[201]=
```
./wrTechChange.eps
```
In[202]:=
```
techLabels = sectors;
techLabels[[1]] = "";
techLabels
```
Out[204]=
```
{, 2, 3, 4, 5, 6, 7}
```
In[205]:=
```
dotColors = {Gray, Red, Red, Red, Red, Red, Red};
```

In[208]:=
```
wrTechChange =
  Show[Table[Plot[Callout[WRs[[i, 2]], techLabels[[i]], Automatic, wrPoints[[i]],
      LeaderSize → {(10 sectors[[i]]), (0.897 sectors[[i]]), Automatic}],
     {r_m, 0, 0.2}, AxesLabel → {"r_m", "ω_m"}, PlotRange → {{0, 0.22}, {0, Automatic}},
     PlotStyle → styles[[i]]], {i, 1, Length[sectors]}],
   Epilog → {PointSize → Large, Red, Point[wrPoints]}]
Export["./wrTechChange.eps", wrTechChange, "EPS"]
```

Out[208]=



Out[209]= ./wrTechChange.eps

Technical Changes Across Sectors - different φ

In[210]:=
```
Clear[technologies];
technologies = Table[Table[Table[0.0, {Length[sectors]}, {Length[sectors]}], {3}],
   {Length[sectors] - 1}];
Table[AppendTo[technologies[[i]], Table[0.0, {Length[sectors]}]],
 {i, 1, Length[sectors] - 1}]
```

Out[212]=
```
{{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
  {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}},
 {{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
```

```
  {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
 {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}},
{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
 {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}},
{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
 {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}},
{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
 {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}},
{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
  {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
```

```
    {0., 0., 0., 0., 0., 0., 0.}}, {{0., 0., 0., 0., 0., 0., 0.},
    {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
    {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
    {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
   {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
    {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
    {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
    {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}}}
```

In[213]:=
```
technologies[[1]]
```

Out[213]=
```
{{{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
  {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}},
  {{0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.}, {0., 0., 0., 0., 0., 0., 0.},
   {0., 0., 0., 0., 0., 0., 0.}}, {0., 0., 0., 0., 0., 0., 0.}}
```

In[214]:=
```
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 technologies[[i, 1]] = K1;
 technologies[[i, 2]] = A1;
 technologies[[i, 3]] = Δ1;
 technologies[[i, 4]] = l1;
]
```

```
In[215]:= technologies[[1]]

Out[215]= {{{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
   {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
   {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
   {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
   {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
   {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
   {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}},
  {{0.03, 0., 0.047, 0., 0., 0.002, 0.002}, {0.081, 0.241, 0.05, 0.021,
    0.003, 0.008, 0.014}, {0.159, 0.226, 0.338, 0.286, 0.03, 0.06, 0.065},
   {0.01, 0.005, 0.009, 0.02, 0.007, 0.034, 0.02},
   {0.137, 0.107, 0.126, 0.088, 0.291, 0.118, 0.08},
   {0.032, 0.044, 0.045, 0.1, 0.071, 0.139, 0.044},
   {0.034, 0.008, 0.013, 0.007, 0.009, 0.014, 0.025}},
  {{0.0008, 0.0002, 0.0003, 0.0001, 0.0004, 0.006, 0.0004},
   {0.0455, 0.0126, 0.0161, 0.0061, 0.0233, 0.0322, 0.0251},
   {0.0562, 0.0156, 0.0199, 0.0075, 0.0288, 0.0398, 0.031},
   {0.0452, 0.0125, 0.016, 0.006, 0.0231, 0.032, 0.0249},
   {0.0223, 0.0061, 0.0079, 0.003, 0.0114, 0.0158, 0.0123},
   {0.009, 0.0025, 0.0032, 0.0012, 0.0046, 0.0063, 0.0049},
   {0.0004, 0.0001, 0.0001, 0., 0.0002, 0.0003, 0.0002}},
  {20.23, 5.29, 7.01, 12.5, 9.65, 12.53, 20.03}}
```

```
In[216]:= technologies[[2]]

Out[216]= {{{0.0156, 0.0043, 0.0055, 0.0021, 0.008, 0.011, 0.0086},
   {0.3705, 0.1028, 0.1312, 0.0493, 0.1897, 0.2625, 0.2044},
   {0.4959, 0.1377, 0.1756, 0.066, 0.2539, 0.3513, 0.2736},
   {0.9031, 0.2507, 0.3199, 0.1202, 0.4624, 0.6398, 0.4982},
   {0.2217, 0.0615, 0.0785, 0.0295, 0.1135, 0.157, 0.1223},
   {0.0835, 0.0232, 0.0296, 0.0111, 0.0427, 0.0591, 0.046},
   {0.0074, 0.002, 0.0026, 0.001, 0.0038, 0.0052, 0.0041}},
  {{0.03, 0., 0.047, 0., 0., 0.002, 0.002}, {0.081, 0.241, 0.05, 0.021,
    0.003, 0.008, 0.014}, {0.159, 0.226, 0.338, 0.286, 0.03, 0.06, 0.065},
   {0.01, 0.005, 0.009, 0.02, 0.007, 0.034, 0.02},
   {0.137, 0.107, 0.126, 0.088, 0.291, 0.118, 0.08},
   {0.032, 0.044, 0.045, 0.1, 0.071, 0.139, 0.044},
   {0.034, 0.008, 0.013, 0.007, 0.009, 0.014, 0.025}},
  {{0.0008, 0.0002, 0.0003, 0.0001, 0.0004, 0.006, 0.0004},
   {0.0455, 0.0126, 0.0161, 0.0061, 0.0233, 0.0322, 0.0251},
   {0.0562, 0.0156, 0.0199, 0.0075, 0.0288, 0.0398, 0.031},
   {0.0452, 0.0125, 0.016, 0.006, 0.0231, 0.032, 0.0249},
   {0.0223, 0.0061, 0.0079, 0.003, 0.0114, 0.0158, 0.0123},
   {0.009, 0.0025, 0.0032, 0.0012, 0.0046, 0.0063, 0.0049},
   {0.0004, 0.0001, 0.0001, 0., 0.0002, 0.0003, 0.0002}},
  {20.23, 5.29, 7.01, 12.5, 9.65, 12.53, 20.03}}

In[217]:= technologies[[1, 1, All, 1]]

Out[217]= {0.0156, 0.3705, 0.4959, 0.9031, 0.2217, 0.0835, 0.0074}

In[218]:= technologies[[1, 4]]

Out[218]= {20.23, 5.29, 7.01, 12.5, 9.65, 12.53, 20.03}

In[219]:= newTechnique

Out[219]= {{0.00928014, 0.217628, 0.29731, 0.531668, 0.133819, 0.0487632, 0.0043473},
  {0.00209379, 0.0146685, 0.0681626,
   0.020828, 0.0831827, 0.0454436, 0.025795}, 17.6463}
```

Technical changes across sectors, except for reference sector.

```
In[220]:= For[i = 1, i ≤ (Length[sectors] - 1), i++,
  techChangeSector = i + 1;
  technicalChange[techChangeSector, K1, A1, l1, R1, Qw1, pwSol1];
  technologies[[i, 1, All, techChangeSector]] = newTechnique[[1]];
  technologies[[i, 2, All, techChangeSector]] = newTechnique[[2]];
  technologies[[i, 4, techChangeSector]] = newTechnique[[3]];
 ]
```

Show profitability across sectors.

Updating r_j for j in which technical change occurs at prevailing p.

In[221]:=
```
Clear[rPrimes];
rPrimes = Table[0.0, {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 rPrimes[[i]] = sectorR[techChangeSector, pwSol1, technologies[[i, 2]],
   technologies[[i, 3]], technologies[[i, 1]], technologies[[i, 4]], Qw1]
]
```

In[224]:=
```
rPrimes
```

Out[224]=
```
{0.0563457, 0.0579089, 0.546976, 0.177492, 0.180883, 0.14907}
```

Updating Q matrices

Multiplier on profit differential.

In[225]:=
```
φ = 1.
```

Out[225]=
```
1.
```

In[226]:=
```
Clear[Qs];
Qs =
  Table[Table[0.0, {Length[sectors]}, {Length[sectors]}], {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 Qs[[i]] = Qr1;
 Qs[[i, techChangeSector, techChangeSector]] = φ rPrimes[[i]] / R1[[ref]];
]
```

In[229]:=
```
Qr1 // MatrixForm
```

Out[229]//MatrixForm=

1.	0.	0.	0.	0.	0.	0.
0.	0.938023	0.	0.	0.	0.	0.
0.	0.	0.922948	0.	0.	0.	0.
0.	0.	0.	7.93802	0.	0.	0.
0.	0.	0.	0.	2.82245	0.	0.
0.	0.	0.	0.	0.	2.90117	0.
0.	0.	0.	0.	0.	0.	0.876047

In[230]:=
```
Qs // TableForm
```

Out[230]//TableForm=
```
1.  0.        0.        0.        0.        0.        0.
0.  0.943814  0.        0.        0.        0.        0.
0.  0.        0.922948  0.        0.        0.        0.
0.  0.        0.        7.93802   0.        0.        0.
0.  0.        0.        0.        2.82245   0.        0.
0.  0.        0.        0.        0.        2.90117   0.
0.  0.        0.        0.        0.        0.        0.876047

1.  0.        0.        0.        0.        0.        0.
0.  0.938023  0.        0.        0.        0.        0.
0.  0.        0.969998  0.        0.        0.        0.
0.  0.        0.        7.93802   0.        0.        0.
0.  0.        0.        0.        2.82245   0.        0.
0.  0.        0.        0.        0.        2.90117   0.
0.  0.        0.        0.        0.        0.        0.876047

1.  0.        0.        0.        0.        0.        0.
0.  0.938023  0.        0.        0.        0.        0.
0.  0.        0.922948  0.        0.        0.        0.
0.  0.        0.        9.16208   0.        0.        0.
0.  0.        0.        0.        2.82245   0.        0.
0.  0.        0.        0.        0.        2.90117   0.
0.  0.        0.        0.        0.        0.        0.876047

1.  0.        0.        0.        0.        0.        0.
0.  0.938023  0.        0.        0.        0.        0.
0.  0.        0.922948  0.        0.        0.        0.
0.  0.        0.        7.93802   0.        0.        0.
0.  0.        0.        0.        2.97307   0.        0.
0.  0.        0.        0.        0.        2.90117   0.
0.  0.        0.        0.        0.        0.        0.876047

1.  0.        0.        0.        0.        0.        0.
0.  0.938023  0.        0.        0.        0.        0.
0.  0.        0.922948  0.        0.        0.        0.
0.  0.        0.        7.93802   0.        0.        0.
0.  0.        0.        0.        2.82245   0.        0.
0.  0.        0.        0.        0.        3.02986   0.
0.  0.        0.        0.        0.        0.        0.876047

1.  0.        0.        0.        0.        0.        0.
0.  0.938023  0.        0.        0.        0.        0.
0.  0.        0.922948  0.        0.        0.        0.
0.  0.        0.        7.93802   0.        0.        0.
0.  0.        0.        0.        2.82245   0.        0.
0.  0.        0.        0.        0.        2.90117   0.
0.  0.        0.        0.        0.        0.        2.49698
```

Updating $r_j[r_m]$ expression.

In[231]:=
```
Clear[Rs];
Rs = Table[Table[0.0, {Length[sectors]}], {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 Rs[[i]] = Flatten[Solve[Table[Qs[[i, j, j]] == r_j/r_m, {j, 1, Length[sectors]}], R]];
 Rs[[i, 1]] = r_1 → 1.;
]
```

In[234]:=
```
Rs
```

Out[234]=
```
{{r1 → 1., r2 → 0.943814 rm, r3 → 0.922948 rm, r4 → 7.93802 rm, r5 → 2.82245 rm,
  r6 → 2.90117 rm, r7 → 0.876047 rm}, {r1 → 1., r2 → 0.938023 rm, r3 → 0.969998 rm,
  r4 → 7.93802 rm, r5 → 2.82245 rm, r6 → 2.90117 rm, r7 → 0.876047 rm},
 {r1 → 1., r2 → 0.938023 rm, r3 → 0.922948 rm, r4 → 9.16208 rm, r5 → 2.82245 rm,
  r6 → 2.90117 rm, r7 → 0.876047 rm}, {r1 → 1., r2 → 0.938023 rm, r3 → 0.922948 rm,
  r4 → 7.93802 rm, r5 → 2.97307 rm, r6 → 2.90117 rm, r7 → 0.876047 rm},
 {r1 → 1., r2 → 0.938023 rm, r3 → 0.922948 rm, r4 → 7.93802 rm, r5 → 2.82245 rm,
  r6 → 3.02986 rm, r7 → 0.876047 rm}, {r1 → 1., r2 → 0.938023 rm, r3 → 0.922948 rm,
  r4 → 7.93802 rm, r5 → 2.82245 rm, r6 → 2.90117 rm, r7 → 2.49698 rm}}
```

Updating prices for new techniques.

In[235]:=
```
Clear[prices];
prices = Table[Table[0.0, {Length[sectors] + 1}], {Length[sectors] - 1}];
values = Table[Table[0.0, {Length[sectors]}], {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 prices[[i]] = pwSol[technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]], Qw1, Qs[[i]], Rs[[i]], c1, maxR1];
 values[[i]] = laborValues[technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]]];
]
```

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

General: Further output of Solve::ratnz will be suppressed during this calculation.

In[239]:=
```
prices // TableForm
```

Out[239]//TableForm=

$p_1 \to 55.3531$	$p_2 \to 36.5576$	$p_3 \to 40.8986$	$p_4 \to 48.4949$	$p_5 \to 45.1897$	$p_6 \to 48.9874$
$p_1 \to 55.3531$	$p_2 \to 36.5576$	$p_3 \to 40.8986$	$p_4 \to 48.4949$	$p_5 \to 45.1897$	$p_6 \to 48.9874$
$p_1 \to 55.3531$	$p_2 \to 36.5576$	$p_3 \to 40.8986$	$p_4 \to 48.4949$	$p_5 \to 45.1897$	$p_6 \to 48.9874$
$p_1 \to 55.3531$	$p_2 \to 36.5576$	$p_3 \to 40.8986$	$p_4 \to 48.4949$	$p_5 \to 45.1897$	$p_6 \to 48.9874$
$p_1 \to 55.3531$	$p_2 \to 36.5576$	$p_3 \to 40.8986$	$p_4 \to 48.4949$	$p_5 \to 45.1897$	$p_6 \to 48.9874$
$p_1 \to 55.3531$	$p_2 \to 36.5576$	$p_3 \to 40.8986$	$p_4 \to 48.4949$	$p_5 \to 45.1897$	$p_6 \to 48.9874$

In[240]:=
```
priceOut = Table[Prepend[
    Prepend[Append[Flatten[Table[{prices[[i, j, 2]], "&"}, {j, 1, n}]], "\\\\"], "&"],
    "$p^{w}$"], {i, 1, Length[sectors] - 1}]
```

Out[240]=
```
{{$p^{w}$, &, 55.3531, &, 36.5576, &, 40.8986, &, 48.4949, &,
  45.1897, &, 48.9874, &, 74.0583, &, \\}, {$p^{w}$, &, 55.3531, &, 36.5576,
  &, 40.8986, &, 48.4949, &, 45.1897, &, 48.9874, &, 74.0583, &, \\},
 {$p^{w}$, &, 55.3531, &, 36.5576, &, 40.8986, &, 48.4949, &, 45.1897,
  &, 48.9874, &, 74.0583, &, \\}, {$p^{w}$, &, 55.3531, &, 36.5576,
  &, 40.8986, &, 48.4949, &, 45.1897, &, 48.9874, &, 74.0583, &, \\},
 {$p^{w}$, &, 55.3531, &, 36.5576, &, 40.8986, &, 48.4949, &, 45.1897,
  &, 48.9874, &, 74.0583, &, \\}, {$p^{w}$, &, 55.3531, &, 36.5576,
  &, 40.8986, &, 48.4949, &, 45.1897, &, 48.9874, &, 74.0583, &, \\}}
```

In[241]:=
```
valueOut = Table[Prepend[
    Prepend[Append[Flatten[Table[{values[[i, j]], "&"}, {j, 1, n}]], "\\\\"], "&"],
    "$v^{w}$"], {i, 1, Length[sectors] - 1}]
```

Out[241]=
```
{{$v^{w}$, &, 35.4494, &, 19.7515, &, 23.234, &, 25.039, &, 20.6365,
  &, 24.2671, &, 28.0401, &, \\}, {$v^{w}$, &, 35.2785, &, 19.8949,
  &, 22.5296, &, 24.8117, &, 20.5598, &, 24.159, &, 27.9529, &, \\},
 {$v^{w}$, &, 35.4057, &, 20.0955, &, 23.2017, &, 23.8554, &, 20.5854,
  &, 24.1788, &, 27.9868, &, \\}, {$v^{w}$, &, 35.108, &, 19.7912,
  &, 22.8804, &, 24.7693, &, 19.2155, &, 23.9779, &, 27.8445, &, \\},
 {$v^{w}$, &, 35.2983, &, 19.9322, &, 23.0459, &, 24.7766, &, 20.4168,
  &, 22.4451, &, 27.9042, &, \\}, {$v^{w}$, &, 35.4202, &, 20.1186,
  &, 23.2236, &, 25.0281, &, 20.6205, &, 24.2462, &, 26.0478, &, \\}}
```

In[242]:=
```
Export["./priceOut2.csv", priceOut, "CSV"]
Export["./valueOut2.csv", valueOut, "CSV"]
```

Out[242]= ./priceOut2.csv

Out[243]= ./valueOut2.csv

In[244]:=
```
Table[prices[[1, 1 ;; n, 2]].technologies[[1, 1, All, j]], {j, 1, Length[sectors]}]
```

Out[244]= {93.1425, 28.0729, 32.9861, 12.3978, 47.6882, 65.975, 51.3822}

```
In[245]:= Clear[refProfs, aggProfs, meanProfs, capStocks, weightMeanProfs];
refProfs = Table[0.0, {Length[sectors] - 1}];
aggProfs = Table[0.0, {Length[sectors] - 1}];
meanProfs = Table[0.0, {Length[sectors] - 1}];
capStocks = Table[0.0, {Length[sectors] - 1}];
weightMeanProfs = Table[0.0, {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 refProfs[[i]] =
  refProfitRate[prices[[i, 1 ;; n, 2]], technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]], Qw1, Qs[[i]], xRef];
 aggProfs[[i]] = aggProfitRate[prices[[i, 1 ;; n, 2]],
   technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]], Qw1, Qs[[i]], xRef];
 meanProfs[[i]] = Mean[Prepend[Rs[[i, 2 ;; n]] /. r_m → refProfs[[i]],
     r_1 → refProfs[[i]]][[All, 2]]];
 capStocks[[i]] = Table[prices[[i, 1 ;; n, 2]].technologies[[i, 1, All, j]],
   {j, 1, Length[sectors]}];
 weightMeanProfs[[i]] = Total[meanProfs[[i]] capStocks[[i]] / Total[capStocks[[i]]]];
]

In[252]:= refProfs
Out[252]= {0.0597, 0.0597, 0.0597, 0.0597, 0.0597, 0.0597}

In[253]:= aggProfs
Out[253]= {0.11152, 0.111743, 0.116071, 0.113981, 0.114407, 0.127212}

In[254]:= meanProfs
Out[254]= {0.148435, 0.148787, 0.158825, 0.14967, 0.149483, 0.16221}

In[255]:= weightMeanProfs
Out[255]= {0.148435, 0.148787, 0.158825, 0.14967, 0.149483, 0.16221}

In[256]:= Prepend[
 Append[Flatten[Table[{refProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]], "\\\\"],
 "$r_{m}$"]
Out[256]= {$r_{m}$, 0.0597, &, 0.0597, &, 0.0597, &, 0.0597, &, 0.0597, &, 0.0597, &, \\}

In[257]:= Prepend[Append[
  Flatten[Table[{aggProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]], "\\\\"], "$r$"]
Out[257]= {$r$, 0.11152, &, 0.111743, &, 0.116071, &, 0.113981, &, 0.114407, &, 0.127212, &, \\}
```

```
In[258]:= Prepend[
  Append[Flatten[Table[{meanProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]], "\\\\"],
  "$\\bar{r}$"]

Out[258]= {$\bar{r}$, 0.148435, &, 0.148787, &,
  0.158825, &, 0.14967, &, 0.149483, &, 0.16221, &, \\}

In[259]:= Append[
  Flatten[Table[{weightMeanProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]], "\\\\"]

Out[259]= {0.148435, &, 0.148787, &, 0.158825, &, 0.14967, &, 0.149483, &, 0.16221, &, \\}

In[260]:= profOut = {{"", "&", 2, "&", 3, "&", 4, "&", 5, "&", 6, "&", 7, "&", "\\\\"}, Prepend[
    Prepend[Append[Flatten[Table[{refProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]],
      "\\\\"], "&"], "$r_{m}$"], Prepend[
    Prepend[Append[Flatten[Table[{aggProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]],
      "\\\\"], "&"], "$r$"], Prepend[
    Prepend[Append[Flatten[Table[{meanProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]],
      "\\\\"], "&"], "$\\bar{r}$"]}

Out[260]= {{, &, 2, &, 3, &, 4, &, 5, &, 6, &, 7, &, \\},
  {$r_{m}$, &, 0.0597, &, 0.0597, &, 0.0597, &, 0.0597, &, 0.0597, &, 0.0597, &, \\},
  {$r$, &, 0.11152, &, 0.111743, &, 0.116071, &, 0.113981,
   &, 0.114407, &, 0.127212, &, \\}, {$\bar{r}$, &, 0.148435, &,
   0.148787, &, 0.158825, &, 0.14967, &, 0.149483, &, 0.16221, &, \\}}

In[261]:= Export["./profOut2.csv", profOut, "CSV"]

Out[261]= ./profOut2.csv

In[262]:= Clear[techOut];
techOut =
  Table[Append[Table[0.0, {2}, {Length[sectors]}], 0.], {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 techOut[[i]] = {NumberForm[technologies[[i, 1, All, techChangeSector]], 4],
   NumberForm[technologies[[i, 2, All, techChangeSector]], 4],
   NumberForm[technologies[[i, 4, techChangeSector]], 4]}
]

In[265]:= Export["./techOut2.csv", techOut, "CSV"]

Out[265]= ./techOut2.csv
```

In[266]:=
```
techOut
```

Out[266]=
```
{{{0.004694, 0.1109, 0.1466, 0.2755, 0.06666, 0.02515, 0.002155},
  {0., 0.2493, 0.2334, 0.005153, 0.1105, 0.04597, 0.008344}, 4.525},
 {{0.006015, 0.138, 0.1865, 0.3478, 0.0849, 0.03128, 0.002817},
  {0.04866, 0.05157, 0.3484, 0.009359, 0.13, 0.04706, 0.01347}, 6.101},
 {{0.002302, 0.05241, 0.07257, 0.1321, 0.03159, 0.01198, 0.001089},
  {0., 0.02204, 0.2973, 0.02092, 0.0909, 0.1047, 0.00725}, 10.88},
 {{0.008539, 0.2053, 0.2749, 0.5066, 0.1229, 0.0463, 0.004138},
  {0., 0.003111, 0.03132, 0.007344, 0.2999, 0.07328, 0.009441}, 8.431},
 {{0.0118, 0.2852, 0.3767, 0.6826, 0.1723, 0.06444, 0.005582},
  {0.002077, 0.008248, 0.06235, 0.0354, 0.1216, 0.1437, 0.01453}, 10.74},
 {{0.009061, 0.2192, 0.2931, 0.5365, 0.13, 0.05057, 0.004439},
  {0.002065, 0.01469, 0.06749, 0.02075, 0.08251, 0.04612, 0.02607}, 17.85}}
```

In[267]:=
```
R1[[1]]
```

Out[267]=
```
0.0597
```

Wage-Profit Frontiers

In[268]:=
```
WRs = Flatten[
   Prepend[Table[realWage /. threadMatrix[A, technologies[[i, 2]]] /. threadMatrix[
            Δ, technologies[[i, 3]]] /. threadMatrix[K, technologies[[i, 1]]] /.
          threadMatrix[Qr, Qs[[i]]] /. threadMatrix[Qw, Qw1] /. Thread[
         l → technologies[[i, 4]]] /. Thread[c → c1/100.] /. Rule @@@ initialW /.
       Rs[[i]] /. phi, {i, 1, Length[sectors] - 1}] // Simplify,
    (realWage /. threadMatrix[A, A1] /. threadMatrix[Δ, Δ1] /. threadMatrix[K, K1] /.
          threadMatrix[Qr, Qr1] /. threadMatrix[Qw, Qw1] /. Thread[l → l1] /.
       Thread[c → c1/100.] /. Rule @@@ initialW /. initialR /. phi) // Simplify]];
```

In[269]:=
```
styles = {Black, Blue, Purple, Orange, Darker[Green], Darker[Gray], Pink};
```

In[270]:=
```
Length[refProfs]
```

Out[270]=
```
6
```

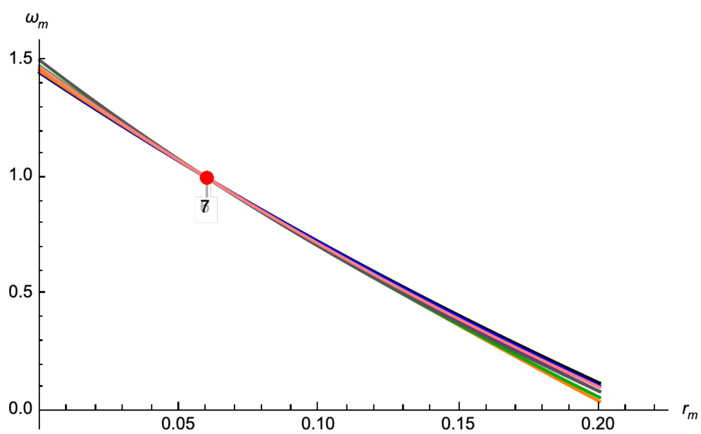
In[271]:=
```
refProfs
```

Out[271]=
```
{0.0597, 0.0597, 0.0597, 0.0597, 0.0597, 0.0597}
```

In[272]:=
```
wPoints = Flatten[Prepend[
    Table[WRs[[i + 1]] /. r_m → refProfs[[i]], {i, 1, Length[sectors] - 1}], wagePlot]]
```

Out[272]=
```
{ω_m == 1., ω_m == 1., ω_m == 1., ω_m == 1., ω_m == 1., ω_m == 1., ω_m == 1.}
```

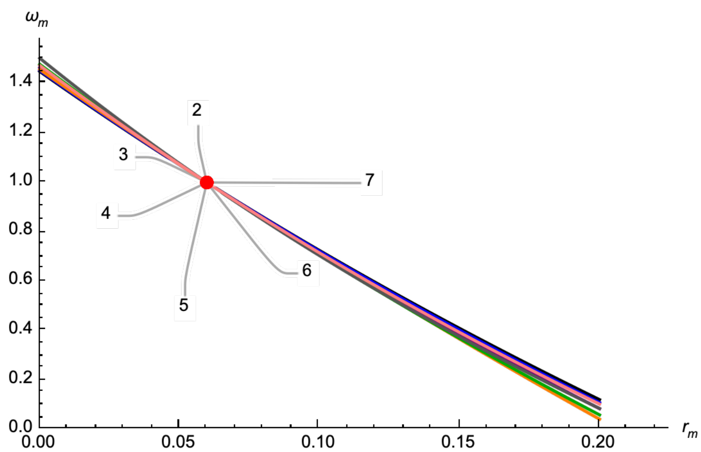
In[273]:=
```
profPoints = Prepend[refProfs, R1[[ref]]]
```
Out[273]=
```
{0.0597, 0.0597, 0.0597, 0.0597, 0.0597, 0.0597, 0.0597}
```
In[274]:=
```
wrPoints = Table[{profPoints[[i]], wPoints[[i, 2]]}, {i, 1, Length[sectors]}]
```
Out[274]=
```
{{0.0597, 1.}, {0.0597, 1.}, {0.0597, 1.},
 {0.0597, 1.}, {0.0597, 1.}, {0.0597, 1.}, {0.0597, 1.}}
```
In[275]:=
```
wrPoints[[1]]
```
Out[275]=
```
{0.0597, 1.}
```
In[276]:=
```
sectors
```
Out[276]=
```
{1, 2, 3, 4, 5, 6, 7}
```
In[277]:=
```
positions = {Above, Center, Below, Above, Center, Below, Above};
```
In[278]:=
```
Show[Table[Plot[WRs[[i, 2]], {rm, 0, 0.2}, AxesLabel → {"rm", "ωm"},
    PlotRange → {{0, 0.22}, Automatic}, PlotStyle → styles[[i]],
    PlotLabels → {Callout[sectors[[i]], wrPoints[[i]]], LeaderSize → sectors[[i]]}],
  {i, 1, Length[sectors]}], Epilog → {PointSize → Large, Red, Point[wrPoints]}]
Export["./wrTechChange2.eps", wrTechChange, "EPS"]
```
Out[278]=



Out[279]=
```
./wrTechChange2.eps
```
In[280]:=
```
techLabels = sectors;
techLabels[[1]] = "";
techLabels
```
Out[282]=
```
{, 2, 3, 4, 5, 6, 7}
```
In[283]:=
```
dotColors = {Gray, Red, Red, Red, Red, Red, Red};
```

In[284]:=
```
wrTechChange =
  Show[Table[Plot[Callout[WRs[[i, 2]], techLabels[[i]], Automatic, wrPoints[[i]],
      LeaderSize → {(10 sectors[[i]]), (0.897 sectors[[i]]), Automatic}],
     {rm, 0, 0.2}, AxesLabel → {"rm", "ωm"}, PlotRange → {{0, 0.22}, {0, Automatic}},
     PlotStyle → styles[[i]]], {i, 1, Length[sectors]}],
   Epilog → {PointSize → Large, Red, Point[wrPoints]}]
Export["./wrTechChange2.eps", wrTechChange, "EPS"]
```

Out[284]=



Out[285]= ./wrTechChange2.eps

Technical Changes - increments of φ

In[286]:=
```
φ = 1;
```

In[287]:=
```
varphi = Table[i, {i, 1, 2, 0.05}]
```

Out[287]=
```
{1., 1.05, 1.1, 1.15, 1.2, 1.25, 1.3, 1.35, 1.4,
 1.45, 1.5, 1.55, 1.6, 1.65, 1.7, 1.75, 1.8, 1.85, 1.9, 1.95, 2.}
```

In[288]:=
```
Length[varphi]
```

Out[288]= 21

In[289]:=
```
For[t = 2, t ≤ Length[varphi], t++,
 Clear[technologies];
 technologies = Table[Table[Table[0.0, {Length[sectors]}, {Length[sectors]}], {3}],
   {Length[sectors] - 1}];
 Table[AppendTo[technologies[[i]], Table[0.0, {Length[sectors]}]],
  {i, 1, Length[sectors] - 1}];

 For[i = 1, i ≤ (Length[sectors] - 1), i++,
  technologies[[i, 1]] = K1;
  technologies[[i, 2]] = A1;
```

```
 technologies[[i, 3]] = Δ1;
 technologies[[i, 4]] = l1;
];

For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 technicalChange[techChangeSector, K1, A1, l1, R1, Qw1, pwSol1];
 technologies[[i, 1, All, techChangeSector]] = newTechnique[[1]];
 technologies[[i, 2, All, techChangeSector]] = newTechnique[[2]];
 technologies[[i, 4, techChangeSector]] = newTechnique[[3]];
];

Clear[rPrimes];
rPrimes = Table[0.0, {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 rPrimes[[i]] = sectorR[techChangeSector, pwSol1, technologies[[i, 2]],
   technologies[[i, 3]], technologies[[i, 1]], technologies[[i, 4]], Qw1]
];
Export["./rPrimes" <> ToString[t] <> ".csv", rPrimes, "CSV"];

Clear[Qs];
Qs =
 Table[Table[0.0, {Length[sectors]}, {Length[sectors]}], {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 Qs[[i]] = Qr1;
 Qs[[i, techChangeSector, techChangeSector]] = varphi[[t]] rPrimes[[i]] / R1[[ref]];
];

Clear[Rs];
Rs = Table[Table[0.0, {Length[sectors]}], {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 Rs[[i]] = Flatten[Solve[Table[Qs[[i, j, j]] == r_j / r_m, {j, 1, Length[sectors]}], R]];
 Rs[[i, 1]] = r_1 → 1.;
];

Clear[prices];
prices = Table[Table[0.0, {Length[sectors] + 1}], {Length[sectors] - 1}];
```

```
values = Table[Table[0.0, {Length[sectors]}], {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 prices[[i]] = pwSol[technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]], Qw1, Qs[[i]], Rs[[i]], c1, maxR1];
 values[[i]] = laborValues[technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]]];
];
Export["./prices" <> ToString[t] <> ".csv", prices, "CSV"];
Export["./values" <> ToString[t] <> ".csv", values, "CSV"];

priceOut =
 Table[Prepend[Prepend[Append[Flatten[Table[{prices[[i, j, 2]], "&"}, {j, 1, n}]],
     "\\\\"], "&"], sectors[[i + 1]]], {i, 1, Length[sectors] - 1}];
valueOut = Table[Prepend[Prepend[Append[Flatten[Table[{values[[i, j]], "&"},
       {j, 1, n}]], "\\\\"], "&"], sectors[[i + 1]]], {i, 1, Length[sectors] - 1}];

Export["./priceOutInc" <> ToString[t] <> ".csv", priceOut, "CSV"];
Export["./valueOutInc" <> ToString[t] <> ".csv", valueOut, "CSV"];

Clear[refProfs, aggProfs, meanProfs, capStocks, weightMeanProfs];
refProfs = Table[0.0, {Length[sectors] - 1}];
aggProfs = Table[0.0, {Length[sectors] - 1}];
meanProfs = Table[0.0, {Length[sectors] - 1}];
capStocks = Table[0.0, {Length[sectors] - 1}];
weightMeanProfs = Table[0.0, {Length[sectors] - 1}];
For[i = 1, i ≤ (Length[sectors] - 1), i++,
 techChangeSector = i + 1;
 refProfs[[i]] =
  refProfitRate[prices[[i, 1 ;; n, 2]], technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]], Qw1, Qs[[i]], xRef];
 aggProfs[[i]] = aggProfitRate[prices[[i, 1 ;; n, 2]],
   technologies[[i, 2]], technologies[[i, 3]],
   technologies[[i, 1]], technologies[[i, 4]], Qw1, Qs[[i]], xRef];
 meanProfs[[i]] = Mean[Prepend[Rs[[i, 2 ;; n]] /. r_m → refProfs[[i]],
     r_1 → refProfs[[i]]][[All, 2]]];
 capStocks[[i]] = Table[prices[[i, 1 ;; n, 2]].technologies[[i, 1, All, j]],
   {j, 1, Length[sectors]}];
 weightMeanProfs[[i]] = Total[meanProfs[[i]] capStocks[[i]] / Total[capStocks[[i]]]];
];

profOut = {{"", "&", 2, "&", 3, "&", 4, "&", 5, "&", 6, "&", 7, "&", "\\\\"}, Prepend[
```

```
    Prepend[Append[Flatten[Table[{refProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]],
      "\\\\"], "&"], "$r_{m}$"], Prepend[
    Prepend[Append[Flatten[Table[{aggProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]],
      "\\\\"], "&"], "$r$"], Prepend[Prepend[
     Append[Flatten[Table[{meanProfs[[i]], "&"}, {i, 1, Length[sectors] - 1}]],
      "\\\\"], "&"], "$\\bar{r}$"]};
Export["./profOutInc" <> ToString[t] <> ".csv", profOut, "CSV"];

 Clear[techOut];
 techOut =
  Table[Append[Table[0.0, {2}, {Length[sectors]}], 0.], {Length[sectors] - 1}];
 For[i = 1, i ≤ (Length[sectors] - 1), i++,
  techChangeSector = i + 1;
  techOut[[i]] = {NumberForm[technologies[[i, 1, All, techChangeSector]], 4],
    NumberForm[technologies[[i, 2, All, techChangeSector]], 4],
    NumberForm[technologies[[i, 4, techChangeSector]], 4]}
 ];
Export["./techOutInc" <> ToString[t] <> ".csv", techOut, "CSV"];

 WRs = Flatten[
   Prepend[Table[realWage /. threadMatrix[A, technologies[[i, 2]]] /. threadMatrix[
          Δ, technologies[[i, 3]]] /. threadMatrix[K, technologies[[i, 1]]] /.
         threadMatrix[Qr, Qs[[i]]] /. threadMatrix[Qw, Qw1] /. Thread[
        l → technologies[[i, 4]]] /. Thread[c → c1/100.] /. Rule @@@ initialW /.
      Rs[[i]] /. phi, {i, 1, Length[sectors] - 1}] // Simplify,
    (realWage /. threadMatrix[A, A1] /. threadMatrix[Δ, Δ1] /. threadMatrix[K, K1] /.
         threadMatrix[Qr, Qr1] /. threadMatrix[Qw, Qw1] /. Thread[l → l1] /.
       Thread[c → c1/100.] /. Rule @@@ initialW /. initialR /. phi) // Simplify]];

 styles = {Black, Blue, Purple, Orange, Darker[Green], Darker[Gray], Pink};

 wPoints = Flatten[Prepend[
    Table[WRs[[i + 1]] /. r_m → refProfs[[i]], {i, 1, Length[sectors] - 1}], wagePlot]];
 profPoints = Prepend[refProfs, R1[[ref]]];
 wrPoints = Table[{profPoints[[i]], wPoints[[i, 2]]}, {i, 1, Length[sectors]}];

 techLabels = sectors;
 techLabels[[1]] = "";

 wrTechChange =
```

```
  Show[Table[Plot[Callout[WRs[[i, 2]], techLabels[[i]], Automatic, wrPoints[[i]],
       LeaderSize → {(10 sectors[[i]]), (0.897 sectors[[i]]), Automatic}],
      {r_m, 0, 0.2}, AxesLabel → {"r_m", "ω_m"}, PlotRange → {{0, 0.22}, {0, Automatic}},
      PlotStyle → styles[[i]]], {i, 1, Length[sectors]}],
    PlotLabel → "φ = " <> ToString[varphi[[t]]],
    Epilog → {PointSize → Large, Red, Point[wrPoints]}];
  Export["./wrTechChangeInc" <> ToString[t] <> ".eps", wrTechChange, "EPS"];

]
```

··· Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

··· Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

··· Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numericizing the result.

··· General: Further output of Solve::ratnz will be suppressed during this calculation.

Generating Profit Rate Tables

In[290]:=
```
profData = Table[
   Import["./profOutInc" <> ToString[t] <> ".csv", "CSV"], {t, 2, Length[varphi]}];
```

In[291]:=
```
profDataClean = NumberForm[Table[Prepend[Drop[profData[[t]], 1],
     "\\hline $\\varphi = " <> ToString[varphi[[t + 1]]] <>
      "$: & & & & & & & \\\\ \\hline"], {t, 1, Length[profData]}], 4]
```

Out[291]//NumberForm=
```
{{\hline $\varphi = 1.05$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05961,
   &, 0.05937, &, 0.05935, &, 0.05879, &, 0.05829, &, 0.05954, &, \\},
  {$r$, &, 0.1116, &, 0.1116, &, 0.1163, &, 0.1145, &, 0.1126, &, 0.1338, &, \\},
  {$\bar{r}$, &, 0.1486, &, 0.1486, &, 0.162, &, 0.1497, &, 0.1467, &, 0.1677, &, \\}},
 {\hline $\varphi = 1.1$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05951,
   &, 0.05906, &, 0.05904, &, 0.05799, &, 0.05692, &, 0.0594, &, \\},
  {$r$, &, 0.1118, &, 0.1111, &, 0.1157, &, 0.1122, &, 0.1124, &, 0.1337, &, \\},
  {$\bar{r}$, &, 0.149, &, 0.1478, &, 0.1607, &, 0.1469, &, 0.1449, &, 0.1675, &, \\}},
 {\hline $\varphi = 1.15$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05942,
   &, 0.05876, &, 0.05871, &, 0.05708, &, 0.05562, &, 0.0593, &, \\},
  {$r$, &, 0.1118, &, 0.1107, &, 0.1162, &, 0.1133, &, 0.111, &, 0.1316, &, \\},
  {$\bar{r}$, &, 0.149, &, 0.1474, &, 0.1655, &, 0.1472, &, 0.1421, &, 0.1656, &, \\}},
 {\hline $\varphi = 1.2$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05933,
   &, 0.05844, &, 0.05837, &, 0.05627, &, 0.05434, &, 0.05909, &, \\},
  {$r$, &, 0.1118, &, 0.1104, &, 0.1168, &, 0.1127, &, 0.1113, &, 0.1369, &, \\},
  {$\bar{r}$, &, 0.1492, &, 0.147, &, 0.1676, &, 0.1461, &, 0.141, &, 0.1701, &, \\}},
 {\hline $\varphi = 1.25$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05924,
```

```
  &, 0.05812, &, 0.05805, &, 0.05562, &, 0.05321, &, 0.05907, &, \\},
 {$r$, &, 0.1121, &, 0.1102, &, 0.1171, &, 0.1112, &, 0.1098, &, 0.1312, &, \\},
 {$\bar{r}$, &, 0.1496, &, 0.1468, &, 0.1701, &, 0.1442, &, 0.1385, &, 0.165, &, \\}},
{\hline $\varphi = 1.3$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05914,
  &, 0.05784, &, 0.05765, &, 0.05482, &, 0.05211, &, 0.05895, &, \\},
 {$r$, &, 0.1124, &, 0.1097, &, 0.1187, &, 0.1112, &, 0.1087, &, 0.1322, &, \\},
 {$\bar{r}$, &, 0.1501, &, 0.1461, &, 0.1778, &, 0.1437, &, 0.1365, &, 0.1658, &, \\}},
{\hline $\varphi = 1.35$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05906,
  &, 0.05756, &, 0.05742, &, 0.05388, &, 0.05093, &, 0.05873, &, \\},
 {$r$, &, 0.1122, &, 0.1094, &, 0.118, &, 0.1121, &, 0.1093, &, 0.1367, &, \\},
 {$\bar{r}$, &, 0.1499, &, 0.1458, &, 0.1763, &, 0.1438, &, 0.1355, &, 0.1694, &, \\}},
{\hline $\varphi = 1.4$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05899,
  &, 0.05716, &, 0.05715, &, 0.05314, &, 0.04995, &, 0.05846, &, \\},
 {$r$, &, 0.1121, &, 0.1094, &, 0.1179, &, 0.1118, &, 0.1076, &, 0.1424, &, \\},
 {$\bar{r}$, &, 0.1498, &, 0.1457, &, 0.178, &, 0.1429, &, 0.1331, &, 0.1742, &, \\}},
{\hline $\varphi = 1.45$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.0589,
  &, 0.05694, &, 0.05664, &, 0.05265, &, 0.04889, &, 0.05848, &, \\},
 {$r$, &, 0.1121, &, 0.109, &, 0.1202, &, 0.1103, &, 0.1079, &, 0.1383, &, \\},
 {$\bar{r}$, &, 0.15, &, 0.1451, &, 0.188, &, 0.1411, &, 0.1321, &, 0.1706, &, \\}},
{\hline $\varphi = 1.5$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05882,
  &, 0.05668, &, 0.05656, &, 0.05192, &, 0.04797, &, 0.05821, &, \\},
 {$r$, &, 0.1123, &, 0.1087, &, 0.1185, &, 0.1103, &, 0.1067, &, 0.1434, &, \\},
 {$\bar{r}$, &, 0.1502, &, 0.1447, &, 0.1815, &, 0.1406, &, 0.1302, &, 0.175, &, \\}},
{\hline $\varphi = 1.55$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05873,
  &, 0.05623, &, 0.05601, &, 0.05136, &, 0.04703, &, 0.05834, &, \\},
 {$r$, &, 0.1123, &, 0.1086, &, 0.1209, &, 0.1097, &, 0.1061, &, 0.1366, &, \\},
 {$\bar{r}$, &, 0.1503, &, 0.1446, &, 0.1928, &, 0.1398, &, 0.1285, &, 0.169, &, \\}},
{\hline $\varphi = 1.6$: & & & & & & & \\ \hline,
 {$r_{m}$, &, 0.0586, &, 0.05605, &, 0.0557, &, 0.05053, &, 0.04623, &, 0.0581, &, \\},
 {$r$, &, 0.1125, &, 0.1083, &, 0.1213, &, 0.1101, &, 0.105, &, 0.1408, &, \\},
 {$\bar{r}$, &, 0.1508, &, 0.1442, &, 0.1957, &, 0.1394, &, 0.1268, &, 0.1726, &, \\}},
{\hline $\varphi = 1.65$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05849,
  &, 0.05582, &, 0.05545, &, 0.05001, &, 0.04535, &, 0.05816, &, \\},
 {$r$, &, 0.1126, &, 0.1078, &, 0.1212, &, 0.1094, &, 0.1045, &, 0.137, &, \\},
 {$\bar{r}$, &, 0.151, &, 0.1436, &, 0.1954, &, 0.1384, &, 0.1255, &, 0.1691, &, \\}},
{\hline $\varphi = 1.7$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05847,
  &, 0.05553, &, 0.05512, &, 0.04922, &, 0.04446, &, 0.05782, &, \\},
 {$r$, &, 0.1125, &, 0.1077, &, 0.1218, &, 0.11, &, 0.1046, &, 0.1432, &, \\},
 {$\bar{r}$, &, 0.1509, &, 0.1435, &, 0.1998, &, 0.1382, &, 0.1242, &, 0.1744, &, \\}},
{\hline $\varphi = 1.75$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05836,
  &, 0.05528, &, 0.05508, &, 0.04881, &, 0.04378, &, 0.05738, &, \\},
 {$r$, &, 0.1127, &, 0.1074, &, 0.1205, &, 0.1089, &, 0.1034, &, 0.1506, &, \\},
 {$\bar{r}$, &, 0.1513, &, 0.1431, &, 0.1947, &, 0.1369, &, 0.123, &, 0.1799, &, \\}},
{\hline $\varphi = 1.8$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05826,
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  &, 0.05493, &, 0.0549, &, 0.04788, &, 0.04291, &, 0.05721, &, \\},
 {$r$, &, 0.1127, &, 0.1073, &, 0.1203, &, 0.11, &, 0.1034, &, 0.1527, &, \\},
 {$\bar{r}$, &, 0.1514, &, 0.1429, &, 0.1959, &, 0.1372, &, 0.1217, &, 0.182, &, \\}},
{\hline $\varphi = 1.85$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05818,
  &, 0.05475, &, 0.0542, &, 0.04751, &, 0.04219, &, 0.05744, &, \\},
 {$r$, &, 0.1127, &, 0.1068, &, 0.123, &, 0.1089, &, 0.1029, &, 0.146, &, \\},
 {$\bar{r}$, &, 0.1514, &, 0.1422, &, 0.2075, &, 0.136, &, 0.1205, &, 0.1764, &, \\}},
{\hline $\varphi = 1.9$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05811,
  &, 0.05447, &, 0.05383, &, 0.04714, &, 0.0416, &, 0.05745, &, \\},
 {$r$, &, 0.1128, &, 0.1067, &, 0.1238, &, 0.1082, &, 0.1018, &, 0.144, &, \\},
 {$\bar{r}$, &, 0.1517, &, 0.1421, &, 0.2128, &, 0.1351, &, 0.1191, &, 0.1747, &, \\}},
{\hline $\varphi = 1.95$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05802,
  &, 0.05404, &, 0.05394, &, 0.04649, &, 0.0407, &, 0.0568, &, \\},
 {$r$, &, 0.1128, &, 0.1065, &, 0.122, &, 0.1083, &, 0.1025, &, 0.1552, &, \\},
 {$\bar{r}$, &, 0.1517, &, 0.1418, &, 0.2057, &, 0.1347, &, 0.1183, &, 0.1837, &, \\}},
{\hline $\varphi = 2.$: & & & & & & & \\ \hline, {$r_{m}$, &, 0.05786,
  &, 0.05385, &, 0.05321, &, 0.04612, &, 0.04012, &, 0.05732, &, \\},
 {$r$, &, 0.1132, &, 0.1061, &, 0.1247, &, 0.1075, &, 0.1016, &, 0.1441, &, \\},
 {$\bar{r}$, &, 0.1525, &, 0.1413, &, 0.2183, &, 0.1336, &, 0.117, &, 0.1748, &, \\}}}
```

In[292]:= **NumberForm[Flatten[profDataClean[[1]]], 4]**

Out[292]//NumberForm=

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{\hline $\varphi = 1.05$: & & & & & & & \\ \hline, $r_{m}$, &, 0.05961,
 &, 0.05937, &, 0.05935, &, 0.05879, &, 0.05829, &, 0.05954, &, \\, $r$,
 &, 0.1116, &, 0.1116, &, 0.1163, &, 0.1145, &, 0.1126, &, 0.1338, &, \\,
 $\bar{r}$, &, 0.1486, &, 0.1486, &, 0.162, &, 0.1497, &, 0.1467, &, 0.1677,
 &, \\, \hline $\varphi = 1.1$: & & & & & & & \\ \hline, $r_{m}$, &,
 0.05951, &, 0.05906, &, 0.05904, &, 0.05799, &, 0.05692, &, 0.0594, &, \\,
 $r$, &, 0.1118, &, 0.1111, &, 0.1157, &, 0.1122, &, 0.1124, &, 0.1337, &,
 \\, $\bar{r}$, &, 0.149, &, 0.1478, &, 0.1607, &, 0.1469, &, 0.1449, &,
 0.1675, &, \\, \hline $\varphi = 1.15$: & & & & & & & \\ \hline, $r_{m}$,
 &, 0.05942, &, 0.05876, &, 0.05871, &, 0.05708, &, 0.05562, &, 0.0593, &,
 \\, $r$, &, 0.1118, &, 0.1107, &, 0.1162, &, 0.1133, &, 0.111, &, 0.1316,
 &, \\, $\bar{r}$, &, 0.149, &, 0.1474, &, 0.1655, &, 0.1472, &, 0.1421, &,
 0.1656, &, \\, \hline $\varphi = 1.2$: & & & & & & & \\ \hline, $r_{m}$,
 &, 0.05933, &, 0.05844, &, 0.05837, &, 0.05627, &, 0.05434, &, 0.05909, &,
 \\, $r$, &, 0.1118, &, 0.1104, &, 0.1168, &, 0.1127, &, 0.1113, &, 0.1369,
 &, \\, $\bar{r}$, &, 0.1492, &, 0.147, &, 0.1676, &, 0.1461, &, 0.141, &,
 0.1701, &, \\, \hline $\varphi = 1.25$: & & & & & & & \\ \hline, $r_{m}$,
 &, 0.05924, &, 0.05812, &, 0.05805, &, 0.05562, &, 0.05321, &, 0.05907, &,
 \\, $r$, &, 0.1121, &, 0.1102, &, 0.1171, &, 0.1112, &, 0.1098, &, 0.1312,
 &, \\, $\bar{r}$, &, 0.1496, &, 0.1468, &, 0.1701, &, 0.1442, &, 0.1385, &,
 0.165, &, \\, \hline $\varphi = 1.3$: & & & & & & & \\ \hline, $r_{m}$,
 &, 0.05914, &, 0.05784, &, 0.05765, &, 0.05482, &, 0.05211, &, 0.05895, &,
```

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\\, $r$, &, 0.1124, &, 0.1097, &, 0.1187, &, 0.1112, &, 0.1087, &, 0.1322,
&, \\, $\bar{r}$, &, 0.1501, &, 0.1461, &, 0.1778, &, 0.1437, &, 0.1365, &,
0.1658, &, \\, \hline $\varphi = 1.35$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.05906, &, 0.05756, &, 0.05742, &, 0.05388, &, 0.05093, &, 0.05873, &,
\\, $r$, &, 0.1122, &, 0.1094, &, 0.118, &, 0.1121, &, 0.1093, &, 0.1367,
&, \\, $\bar{r}$, &, 0.1499, &, 0.1458, &, 0.1763, &, 0.1438, &, 0.1355, &,
0.1694, &, \\, \hline $\varphi = 1.4$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.05899, &, 0.05716, &, 0.05715, &, 0.05314, &, 0.04995, &, 0.05846, &,
\\, $r$, &, 0.1121, &, 0.1094, &, 0.1179, &, 0.1118, &, 0.1076, &, 0.1424,
&, \\, $\bar{r}$, &, 0.1498, &, 0.1457, &, 0.178, &, 0.1429, &, 0.1331, &,
0.1742, &, \\, \hline $\varphi = 1.45$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.0589, &, 0.05694, &, 0.05664, &, 0.05265, &, 0.04889, &, 0.05848, &,
\\, $r$, &, 0.1121, &, 0.109, &, 0.1202, &, 0.1103, &, 0.1079, &, 0.1383,
&, \\, $\bar{r}$, &, 0.15, &, 0.1451, &, 0.188, &, 0.1411, &, 0.1321, &,
0.1706, &, \\, \hline $\varphi = 1.5$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.05882, &, 0.05668, &, 0.05656, &, 0.05192, &, 0.04797, &, 0.05821, &,
\\, $r$, &, 0.1123, &, 0.1087, &, 0.1185, &, 0.1103, &, 0.1067, &, 0.1434,
&, \\, $\bar{r}$, &, 0.1502, &, 0.1447, &, 0.1815, &, 0.1406, &, 0.1302, &,
0.175, &, \\, \hline $\varphi = 1.55$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.05873, &, 0.05623, &, 0.05601, &, 0.05136, &, 0.04703, &, 0.05834, &,
\\, $r$, &, 0.1123, &, 0.1086, &, 0.1209, &, 0.1097, &, 0.1061, &, 0.1366,
&, \\, $\bar{r}$, &, 0.1503, &, 0.1446, &, 0.1928, &, 0.1398, &, 0.1285, &,
0.169, &, \\, \hline $\varphi = 1.6$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.0586, &, 0.05605, &, 0.0557, &, 0.05053, &, 0.04623, &, 0.0581, &, \\,
$r$, &, 0.1125, &, 0.1083, &, 0.1213, &, 0.1101, &, 0.105, &, 0.1408, &, \\,
$\bar{r}$, &, 0.1508, &, 0.1442, &, 0.1957, &, 0.1394, &, 0.1268, &, 0.1726,
&, \\, \hline $\varphi = 1.65$: & & & & & & & \\ \hline, $r_{m}$, &,
0.05849, &, 0.05582, &, 0.05545, &, 0.05001, &, 0.04535, &, 0.05816, &,
\\, $r$, &, 0.1126, &, 0.1078, &, 0.1212, &, 0.1094, &, 0.1045, &, 0.137,
&, \\, $\bar{r}$, &, 0.151, &, 0.1436, &, 0.1954, &, 0.1384, &, 0.1255, &,
0.1691, &, \\, \hline $\varphi = 1.7$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.05847, &, 0.05553, &, 0.05512, &, 0.04922, &, 0.04446, &, 0.05782, &,
\\, $r$, &, 0.1125, &, 0.1077, &, 0.1218, &, 0.11, &, 0.1046, &, 0.1432, &,
\\, $\bar{r}$, &, 0.1509, &, 0.1435, &, 0.1998, &, 0.1382, &, 0.1242, &,
0.1744, &, \\, \hline $\varphi = 1.75$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.05836, &, 0.05528, &, 0.05508, &, 0.04881, &, 0.04378, &, 0.05738, &,
\\, $r$, &, 0.1127, &, 0.1074, &, 0.1205, &, 0.1089, &, 0.1034, &, 0.1506,
&, \\, $\bar{r}$, &, 0.1513, &, 0.1431, &, 0.1947, &, 0.1369, &, 0.123, &,
0.1799, &, \\, \hline $\varphi = 1.8$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.05826, &, 0.05493, &, 0.0549, &, 0.04788, &, 0.04291, &, 0.05721, &,
\\, $r$, &, 0.1127, &, 0.1073, &, 0.1203, &, 0.11, &, 0.1034, &, 0.1527, &,
\\, $\bar{r}$, &, 0.1514, &, 0.1429, &, 0.1959, &, 0.1372, &, 0.1217, &,
0.182, &, \\, \hline $\varphi = 1.85$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.05818, &, 0.05475, &, 0.0542, &, 0.04751, &, 0.04219, &, 0.05744, &,
```

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\\, $r$, &, 0.1127, &, 0.1068, &, 0.123, &, 0.1089, &, 0.1029, &, 0.146,
&, \\, $\bar{r}$, &, 0.1514, &, 0.1422, &, 0.2075, &, 0.136, &, 0.1205, &,
0.1764, &, \\, \hline $\varphi = 1.9$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.05811, &, 0.05447, &, 0.05383, &, 0.04714, &, 0.0416, &, 0.05745, &,
\\, $r$, &, 0.1128, &, 0.1067, &, 0.1238, &, 0.1082, &, 0.1018, &, 0.144,
&, \\, $\bar{r}$, &, 0.1517, &, 0.1421, &, 0.2128, &, 0.1351, &, 0.1191, &,
0.1747, &, \\, \hline $\varphi = 1.95$: & & & & & & & \\ \hline, $r_{m}$,
&, 0.05802, &, 0.05404, &, 0.05394, &, 0.04649, &, 0.0407, &, 0.0568, &, \\,
$r$, &, 0.1128, &, 0.1065, &, 0.122, &, 0.1083, &, 0.1025, &, 0.1552, &, \\,
$\bar{r}$, &, 0.1517, &, 0.1418, &, 0.2057, &, 0.1347, &, 0.1183, &, 0.1837,
&, \\, \hline $\varphi = 2.$: & & & & & & & \\ \hline, $r_{m}$, &, 0.05786,
&, 0.05385, &, 0.05321, &, 0.04612, &, 0.04012, &, 0.05732, &, \\, $r$, &,
0.1132, &, 0.1061, &, 0.1247, &, 0.1075, &, 0.1016, &, 0.1441, &, \\, $\bar{r}$,
&, 0.1525, &, 0.1413, &, 0.2183, &, 0.1336, &, 0.117, &, 0.1748, &, \\}
```

```
In[293]:= Export["./profDataClean.csv", NumberForm[Flatten[profDataClean[[1]]], 4], "CSV"]
Out[293]= ./profDataClean.csv
```

Generating Price and Value Tables

```
In[294]:= priceData = Table[
    Import["./priceOutInc" <> ToString[t] <> ".csv", "CSV"], {t, 2, Length[varphi]}];

In[295]:= valueData = Table[
    Import["./valueOutInc" <> ToString[t] <> ".csv", "CSV"], {t, 2, Length[varphi]}];

In[296]:= priceDataClean = NumberForm[Table[
    Prepend[priceData[[t]], "\\hline $\\varphi = " <> ToString[varphi[[t + 1]]] <>
      "$: & & & & & & & \\\\ \\hline"], {t, 1, Length[priceData]}], 6]

Out[296]//NumberForm=
{{\hline $\varphi = 1.05$: & & & & & & & \\ \hline,
  {2, &, 55.358, &, 36.66, &, 40.9027, &, 48.4895, &, 45.1788, &, 48.9748,
   &, 74.0576, &, \\}, {3, &, 55.3468, &, 36.5805, &, 41.0341, &, 48.4957,
   &, 45.1387, &, 48.93, &, 74.0512, &, \\}, {4, &, 55.3596, &, 36.561,
   &, 40.9039, &, 48.8516, &, 45.1779, &, 48.9822, &, 74.0674, &, \\},
  {5, &, 55.3655, &, 36.6141, &, 40.9562, &, 48.4632, &, 45.666, &, 48.8824,
   &, 74.0661, &, \\}, {6, &, 55.0608, &, 36.3945, &, 40.7107, &, 48.2494,
   &, 44.8493, &, 49.1724, &, 73.9203, &, \\}, {7, &, 55.3376, &, 36.5432,
   &, 40.8847, &, 48.4668, &, 45.1525, &, 48.9433, &, 74.5347, &, \\}},
 {\hline $\varphi = 1.1$: & & & & & & & \\ \hline, {2, &, 55.3631, &,
   36.769, &, 40.9071, &, 48.4838, &, 45.1671, &, 48.9614, &, 74.057, &, \\},
  {3, &, 55.341, &, 36.6011, &, 41.1564, &, 48.4964, &, 45.0927, &,
   48.8781, &, 74.0448, &, \\}, {4, &, 55.3654, &, 36.5642, &,
   40.9087, &, 49.1773, &, 45.167, &, 48.9775, &, 74.0758, &, \\},
  {5, &, 55.3764, &, 36.664, &, 41.007, &, 48.4353, &, 46.0865, &, 48.7898,
```

```
  &, 74.0731, &, \\}, {6, &, 54.7802, &, 36.238, &, 40.5304, &, 48.0138,
  &, 44.5225, &, 49.35, &, 73.7878, &, \\}, {7, &, 55.3234, &, 36.5299,
  &, 40.8719, &, 48.4411, &, 45.1182, &, 48.9028, &, 74.9721, &, \\}},
{\hline $\varphi = 1.15$: & & & & & & & \\ \hline, {2, &, 55.3679, &,
  36.8684, &, 40.9111, &, 48.4786, &, 45.1565, &, 48.9493, &, 74.0563, &, \\},
 {3, &, 55.3352, &, 36.6221, &, 41.2803, &, 48.4972, &, 45.046, &,
  48.8257, &, 74.0384, &, \\}, {4, &, 55.3715, &, 36.5674, &,
  40.9137, &, 49.5148, &, 45.1557, &, 48.9726, &, 74.0845, &, \\},
 {5, &, 55.3889, &, 36.721, &, 41.065, &, 48.4034, &, 46.5664, &, 48.6841,
  &, 74.081, &, \\}, {6, &, 54.5164, &, 36.0909, &, 40.3609, &, 47.7924,
  &, 44.2154, &, 49.517, &, 73.6633, &, \\}, {7, &, 55.313, &, 36.5203,
  &, 40.8627, &, 48.4224, &, 45.0933, &, 48.8733, &, 75.2905, &, \\}},
{\hline $\varphi = 1.2$: & & & & & & & \\ \hline, {2, &, 55.3727, &,
  36.9709, &, 40.9152, &, 48.4732, &, 45.1455, &, 48.9367, &, 74.0557, &, \\},
 {3, &, 55.3291, &, 36.6443, &, 41.4117, &, 48.4979, &, 44.9965, &, 48.77,
  &, 74.0315, &, \\}, {4, &, 55.3779, &, 36.5708, &, 40.919, &, 49.8667,
  &, 45.144, &, 48.9675, &, 74.0935, &, \\}, {5, &, 55.4, &, 36.7718,
  &, 41.1167, &, 48.375, &, 46.994, &, 48.5899, &, 74.088, &, \\},
 {6, &, 54.2598, &, 35.9477, &, 40.1959, &, 47.577, &, 43.9166, &,
  49.6794, &, 73.5421, &, \\}, {7, &, 55.2927, &, 36.5014, &,
  40.8445, &, 48.3858, &, 45.0445, &, 48.8156, &, 75.9142, &, \\}},
{\hline $\varphi = 1.25$: & & & & & & & \\ \hline, {2, &, 55.3778, &,
  37.0771, &, 40.9195, &, 48.4677, &, 45.1341, &, 48.9237, &, 74.055, &, \\},
 {3, &, 55.3229, &, 36.6664, &, 41.5428, &, 48.4987, &, 44.9471, &, 48.7144,
  &, 74.0246, &, \\}, {4, &, 55.384, &, 36.5741, &, 40.924, &, 50.2054,
  &, 45.1327, &, 48.9626, &, 74.1022, &, \\}, {5, &, 55.4089, &, 36.8125,
  &, 41.1582, &, 48.3522, &, 47.3369, &, 48.5144, &, 74.0937, &, \\},
 {6, &, 54.0323, &, 35.8208, &, 40.0497, &, 47.386, &, 43.6517, &,
  49.8234, &, 73.4347, &, \\}, {7, &, 55.2911, &, 36.4999, &,
  40.843, &, 48.3828, &, 45.0405, &, 48.8109, &, 75.9649, &, \\}},
{\hline $\varphi = 1.3$: & & & & & & & \\ \hline, {2, &, 55.3834, &,
  37.1963, &, 40.9242, &, 48.4615, &, 45.1214, &, 48.9091, &, 74.0543, &, \\},
 {3, &, 55.3176, &, 36.6856, &, 41.6564, &, 48.4994, &, 44.9044, &,
  48.6663, &, 74.0187, &, \\}, {4, &, 55.3917, &, 36.5782, &,
  40.9304, &, 50.6338, &, 45.1184, &, 48.9565, &, 74.1132, &, \\},
 {5, &, 55.42, &, 36.8631, &, 41.2097, &, 48.3239, &, 47.763, &, 48.4205,
  &, 74.1007, &, \\}, {6, &, 53.8143, &, 35.6992, &, 39.9096, &, 47.2029,
  &, 43.3978, &, 49.9614, &, 73.3317, &, \\}, {7, &, 55.2788, &, 36.4884,
  &, 40.832, &, 48.3606, &, 45.011, &, 48.7759, &, 76.3429, &, \\}},
{\hline $\varphi = 1.35$: & & & & & & & \\ \hline, {2, &, 55.3873, &,
  37.2782, &, 40.9275, &, 48.4572, &, 45.1126, &, 48.899, &, 74.0538, &, \\},
 {3, &, 55.3123, &, 36.7047, &, 41.7693, &, 48.5001, &, 44.8618, &,
  48.6185, &, 74.0128, &, \\}, {4, &, 55.3961, &, 36.5806, &,
  40.934, &, 50.8812, &, 45.1102, &, 48.9529, &, 74.1195, &, \\},
```

```
 {5, &, 55.433, &, 36.9223, &, 41.27, &, 48.2908, &, 48.2616, &, 48.3107,
  &, 74.109, &, \\}, {6, &, 53.5823, &, 35.5698, &, 39.7605, &, 47.0081,
  &, 43.1276, &, 50.1083, &, 73.2222, &, \\}, {7, &, 55.257, &, 36.4682,
  &, 40.8125, &, 48.3213, &, 44.9587, &, 48.7141, &, 77.0105, &, \\}},
{\hline $\varphi = 1.4$: & & & & & & & \\ \hline, {2, &, 55.3915, &,
  37.3667, &, 40.9311, &, 48.4525, &, 45.1031, &, 48.8882, &, 74.0532, &, \\},
 {3, &, 55.3046, &, 36.7322, &, 41.9323, &, 48.5011, &, 44.8004, &,
  48.5495, &, 74.0043, &, \\}, {4, &, 55.4012, &, 36.5833, &,
  40.9382, &, 51.1636, &, 45.1008, &, 48.9488, &, 74.1268, &, \\},
 {5, &, 55.4432, &, 36.9691, &, 41.3177, &, 48.2646, &, 48.6559, &, 48.2238,
  &, 74.1155, &, \\}, {6, &, 53.3911, &, 35.4631, &, 39.6376, &, 46.8476,
  &, 42.905, &, 50.2293, &, 73.132, &, \\}, {7, &, 55.2307, &, 36.4437,
  &, 40.7889, &, 48.2738, &, 44.8954, &, 48.6392, &, 77.8198, &, \\}},
{\hline $\varphi = 1.45$: & & & & & & & \\ \hline, {2, &, 55.3963, &,
  37.4672, &, 40.9351, &, 48.4473, &, 45.0924, &, 48.8758, &, 74.0526, &, \\},
 {3, &, 55.3004, &, 36.7474, &, 42.0223, &, 48.5016, &, 44.7666, &,
  48.5113, &, 73.9996, &, \\}, {4, &, 55.4113, &, 36.5887, &,
  40.9465, &, 51.7198, &, 45.0822, &, 48.9408, &, 74.1411, &, \\},
 {5, &, 55.45, &, 37.0001, &, 41.3493, &, 48.2472, &, 48.9174, &, 48.1662,
  &, 74.1198, &, \\}, {6, &, 53.1849, &, 35.3481, &, 39.5051, &, 46.6745,
  &, 42.6648, &, 50.3598, &, 73.0346, &, \\}, {7, &, 55.232, &, 36.4449,
  &, 40.7901, &, 48.2762, &, 44.8986, &, 48.643, &, 77.779, &, \\}},
{\hline $\varphi = 1.5$: & & & & & & & \\ \hline, {2, &, 55.4004, &,
  37.5556, &, 40.9387, &, 48.4427, &, 45.0829, &, 48.865, &, 74.0521, &, \\},
 {3, &, 55.2954, &, 36.7657, &, 42.1305, &, 48.5023, &, 44.7258, &,
  48.4655, &, 73.994, &, \\}, {4, &, 55.4127, &, 36.5895, &,
  40.9477, &, 51.8018, &, 45.0795, &, 48.9396, &, 74.1432, &, \\},
 {5, &, 55.4602, &, 37.0465, &, 41.3966, &, 48.2212, &, 49.3086, &, 48.08,
  &, 74.1262, &, \\}, {6, &, 53.0081, &, 35.2494, &, 39.3914, &, 46.5261,
  &, 42.4589, &, 50.4717, &, 72.9511, &, \\}, {7, &, 55.206, &, 36.4208,
  &, 40.7668, &, 48.2292, &, 44.8361, &, 48.569, &, 78.5779, &, \\}},
{\hline $\varphi = 1.55$: & & & & & & & \\ \hline, {2, &, 55.405, &,
  37.6511, &, 40.9425, &, 48.4377, &, 45.0727, &, 48.8533, &, 74.0515, &, \\},
 {3, &, 55.2867, &, 36.797, &, 42.3159, &, 48.5034, &, 44.656, &, 48.387,
  &, 73.9843, &, \\}, {4, &, 55.4236, &, 36.5953, &, 40.9567, &, 52.4055,
  &, 45.0593, &, 48.9309, &, 74.1587, &, \\}, {5, &, 55.4681, &, 37.0825,
  &, 41.4332, &, 48.2011, &, 49.6111, &, 48.0134, &, 74.1312, &, \\},
 {6, &, 52.8279, &, 35.1489, &, 39.2757, &, 46.3748, &, 42.2491, &,
  50.5858, &, 72.8661, &, \\}, {7, &, 55.2187, &, 36.4325, &,
  40.7781, &, 48.2521, &, 44.8665, &, 48.605, &, 78.189, &, \\}},
{\hline $\varphi = 1.6$: & & & & & & & \\ \hline, {2, &, 55.4121, &,
  37.8003, &, 40.9485, &, 48.4299, &, 45.0567, &, 48.835, &, 74.0505, &, \\},
 {3, &, 55.2833, &, 36.8092, &, 42.3879, &, 48.5038, &, 44.6289, &,
  48.3565, &, 73.9805, &, \\}, {4, &, 55.4299, &, 36.5986, &,
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  40.9618, &, 52.7536, &, 45.0477, &, 48.9258, &, 74.1676, &, \\},
 {5, &, 55.4797, &, 37.1355, &, 41.4872, &, 48.1714, &, 50.0583, &, 47.9149,
  &, 74.1386, &, \\}, {6, &, 52.675, &, 35.0636, &, 39.1774, &, 46.2464,
  &, 42.071, &, 50.6826, &, 72.7938, &, \\}, {7, &, 55.1955, &, 36.411,
  &, 40.7574, &, 48.2102, &, 44.8108, &, 48.5392, &, 78.9004, &, \\}},
{\hline $\varphi = 1.65$: & & & & & & & \\ \hline, {2, &, 55.4182, &,
  37.9307, &, 40.9537, &, 48.4231, &, 45.0427, &, 48.819, &, 74.0497, &, \\},
 {3, &, 55.2788, &, 36.8254, &, 42.4837, &, 48.5044, &, 44.5928, &,
  48.3159, &, 73.9755, &, \\}, {4, &, 55.4347, &, 36.6012, &,
  40.9658, &, 53.022, &, 45.0388, &, 48.922, &, 74.1745, &, \\},
 {5, &, 55.4869, &, 37.1686, &, 41.5209, &, 48.1529, &, 50.3371, &, 47.8534,
  &, 74.1432, &, \\}, {6, &, 52.5089, &, 34.971, &, 39.0706, &, 46.107,
  &, 41.8777, &, 50.7877, &, 72.7155, &, \\}, {7, &, 55.2008, &, 36.4159,
  &, 40.7621, &, 48.2197, &, 44.8234, &, 48.5541, &, 78.7397, &, \\}},
{\hline $\varphi = 1.7$: & & & & & & & \\ \hline, {2, &, 55.4193, &,
  37.954, &, 40.9547, &, 48.4218, &, 45.0402, &, 48.8162, &, 74.0496, &, \\},
 {3, &, 55.2732, &, 36.8456, &, 42.6036, &, 48.5051, &, 44.5476, &,
  48.2651, &, 73.9692, &, \\}, {4, &, 55.4414, &, 36.6048, &,
  40.9713, &, 53.3921, &, 45.0264, &, 48.9166, &, 74.184, &, \\},
 {5, &, 55.498, &, 37.2193, &, 41.5725, &, 48.1245, &, 50.7636, &, 47.7595,
  &, 74.1502, &, \\}, {6, &, 52.3397, &, 34.8766, &, 38.9619, &, 45.965,
  &, 41.6807, &, 50.8948, &, 72.6356, &, \\}, {7, &, 55.1681, &, 36.3855,
  &, 40.7328, &, 48.1607, &, 44.7449, &, 48.4612, &, 79.7434, &, \\}},
{\hline $\varphi = 1.75$: & & & & & & & \\ \hline, {2, &, 55.4254, &,
  38.0809, &, 40.9598, &, 48.4152, &, 45.0266, &, 48.8006, &, 74.0488, &, \\},
 {3, &, 55.2683, &, 36.8633, &, 42.7083, &, 48.5058, &, 44.5082, &,
  48.2207, &, 73.9638, &, \\}, {4, &, 55.4423, &, 36.6053, &,
  40.972, &, 53.4395, &, 45.0249, &, 48.9159, &, 74.1852, &, \\},
 {5, &, 55.5037, &, 37.2453, &, 41.599, &, 48.11, &, 50.9826, &, 47.7112,
  &, 74.1538, &, \\}, {6, &, 52.2135, &, 34.8062, &, 38.8808, &, 45.859,
  &, 41.5337, &, 50.9747, &, 72.576, &, \\}, {7, &, 55.1249, &, 36.3453,
  &, 40.6941, &, 48.0827, &, 44.641, &, 48.3383, &, 81.0707, &, \\}},
{\hline $\varphi = 1.8$: & & & & & & & \\ \hline, {2, &, 55.4306, &,
  38.1917, &, 40.9642, &, 48.4094, &, 45.0148, &, 48.787, &, 74.0481, &, \\},
 {3, &, 55.2617, &, 36.887, &, 42.8489, &, 48.5066, &, 44.4553, &, 48.1612,
  &, 73.9564, &, \\}, {4, &, 55.4459, &, 36.6072, &, 40.975, &, 53.6431,
  &, 45.0181, &, 48.913, &, 74.1904, &, \\}, {5, &, 55.5168, &, 37.3048,
  &, 41.6596, &, 48.0767, &, 51.4843, &, 47.6007, &, 74.1621, &, \\},
 {6, &, 52.0499, &, 34.7149, &, 38.7756, &, 45.7216, &, 41.3431, &,
  51.0783, &, 72.4987, &, \\}, {7, &, 55.1077, &, 36.3293, &,
  40.6786, &, 48.0515, &, 44.5996, &, 48.2893, &, 81.6002, &, \\}},
{\hline $\varphi = 1.85$: & & & & & & & \\ \hline, {2, &, 55.4348, &,
  38.2799, &, 40.9678, &, 48.4048, &, 45.0053, &, 48.7762, &, 74.0475, &, \\},
 {3, &, 55.2581, &, 36.8997, &, 42.9239, &, 48.5071, &, 44.427, &, 48.1294,
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&, 73.9525, &, \\}, {4, &, 55.4602, &, 36.6149, &, 40.9868, &, 54.4364,
&, 44.9916, &, 48.9015, &, 74.2108, &, \\}, {5, &, 55.522, &, 37.3287,
&, 41.684, &, 48.0633, &, 51.6857, &, 47.5564, &, 74.1654, &, \\},
{6, &, 51.9168, &, 34.6407, &, 38.6901, &, 45.6099, &, 41.1881, &,
51.1625, &, 72.4359, &, \\}, {7, &, 55.1306, &, 36.3505, &,
40.6992, &, 48.0929, &, 44.6546, &, 48.3544, &, 80.897, &, \\}},
{\hline $\varphi = 1.9$: & & & & & & & \\ \hline, {2, &, 55.439, &,
38.3686, &, 40.9713, &, 48.4002, &, 44.9958, &, 48.7653, &, 74.047, &, \\},
{3, &, 55.2527, &, 36.9192, &, 43.0394, &, 48.5078, &, 44.3835, &, 48.0805,
&, 73.9465, &, \\}, {4, &, 55.4679, &, 36.619, &, 40.9931, &, 54.8621,
&, 44.9774, &, 48.8954, &, 74.2217, &, \\}, {5, &, 55.5273, &, 37.3527,
&, 41.7084, &, 48.0498, &, 51.888, &, 47.5118, &, 74.1688, &, \\},
{6, &, 51.8071, &, 34.5795, &, 38.6196, &, 45.5178, &, 41.0605, &,
51.2319, &, 72.3841, &, \\}, {7, &, 55.1313, &, 36.3513, &,
40.6998, &, 48.0943, &, 44.6564, &, 48.3566, &, 80.8732, &, \\}},
{\hline $\varphi = 1.95$: & & & & & & & \\ \hline, {2, &, 55.4437, &,
38.4685, &, 40.9753, &, 48.3949, &, 44.9851, &, 48.7531, &, 74.0464, &, \\},
{3, &, 55.2443, &, 36.9497, &, 43.2201, &, 48.5088, &, 44.3155, &, 48.0039,
&, 73.9371, &, \\}, {4, &, 55.4656, &, 36.6177, &, 40.9913, &, 54.735,
&, 44.9817, &, 48.8972, &, 74.2185, &, \\}, {5, &, 55.5365, &, 37.3948,
&, 41.7513, &, 48.0263, &, 52.2423, &, 47.4338, &, 74.1746, &, \\},
{6, &, 51.6421, &, 34.4875, &, 38.5136, &, 45.3793, &, 40.8683, &,
51.3364, &, 72.3062, &, \\}, {7, &, 55.0681, &, 36.2924, &,
40.6432, &, 47.98, &, 44.5044, &, 48.1767, &, 82.8166, &, \\}},
{\hline $\varphi = 2.$: & & & & & & & \\ \hline, {2, &, 55.4521, &,
38.6456, &, 40.9825, &, 48.3857, &, 44.9662, &, 48.7314, &, 74.0453, &, \\},
{3, &, 55.2405, &, 36.9632, &, 43.2997, &, 48.5093, &, 44.2855, &,
47.9702, &, 73.9329, &, \\}, {4, &, 55.4808, &, 36.6259, &,
41.0038, &, 55.5777, &, 44.9536, &, 48.885, &, 74.2401, &, \\},
{5, &, 55.5416, &, 37.4182, &, 41.775, &, 48.0132, &, 52.439, &, 47.3904,
&, 74.1779, &, \\}, {6, &, 51.5345, &, 34.4274, &, 38.4444, &, 45.2889,
&, 40.743, &, 51.4045, &, 72.2554, &, \\}, {7, &, 55.1188, &, 36.3396,
&, 40.6886, &, 48.0717, &, 44.6264, &, 48.3211, &, 81.2573, &, \\}}}
```

```
In[297]:= Export["./priceDataClean.csv", NumberForm[Flatten[priceDataClean[[1]]], 6], "CSV"]

Out[297]= ./priceDataClean.csv
```

```
In[298]:= valueDataClean = NumberForm[Table[
    Prepend[valueData[[t]], "\\hline $\\varphi = " <> ToString[varphi[[t + 1]]] <>
      "$: & & & & & & & \\\\ \\hline"], {t, 1, Length[valueData]}], 6]

Out[298]//NumberForm=
{{\hline $\varphi = 1.05$: & & & & & & & \\ \hline,
  {2, &, 35.4498, &, 19.7536, &, 23.2343, &, 25.0392, &, 20.6367, &,
   24.2673, &, 28.0402, &, \\}, {3, &, 35.2383, &, 19.8496, &, 22.4058, &,
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    24.769, &, 20.543, &, 24.1358, &, 27.9341, &, \\}, {4, &, 35.4118, &,
    20.0995, &, 23.2063, &, 23.9166, &, 20.5893, &, 24.185, &, 27.991, &, \\},
   {5, &, 35.0436, &, 19.7323, &, 22.8168, &, 24.7223, &, 18.9927, &, 23.928,
    &, 27.81, &, \\}, {6, &, 35.3558, &, 19.9931, &, 23.1081, &, 24.8516,
    &, 20.4788, &, 22.9122, &, 27.9456, &, \\}, {7, &, 35.3828, &, 20.0991,
    &, 23.1992, &, 25.0117, &, 20.6055, &, 24.2266, &, 25.3393, &, \\}},
  {\hline $\varphi = 1.1$: & & & & & & & \\ \hline, {2, &, 35.4437, &,
    19.72, &, 23.2296, &, 25.0363, &, 20.6345, &, 24.2645, &, 28.0379, &, \\},
   {3, &, 35.2659, &, 19.8807, &, 22.4908, &, 24.7984, &, 20.5545, &, 24.1517,
    &, 27.947, &, \\}, {4, &, 35.4324, &, 20.1129, &, 23.2219, &, 24.1246,
    &, 20.6026, &, 24.206, &, 28.005, &, \\}, {5, &, 35.2278, &, 19.9008,
    &, 22.9985, &, 24.8568, &, 19.6297, &, 24.0707, &, 27.9088, &, \\},
   {6, &, 35.3253, &, 19.9608, &, 23.0751, &, 24.8118, &, 20.4459, &,
    22.6644, &, 27.9236, &, \\}, {7, &, 35.3914, &, 20.1035, &,
    23.2047, &, 25.0154, &, 20.6089, &, 24.231, &, 25.5009, &, \\}},
  {\hline $\varphi = 1.15$: & & & & & & & \\ \hline, {2, &, 35.4509, &,
    19.7592, &, 23.2351, &, 25.0397, &, 20.637, &, 24.2677, &, 28.0406, &, \\},
   {3, &, 35.2728, &, 19.8885, &, 22.5121, &, 24.8057, &, 20.5574, &,
    24.1557, &, 27.9502, &, \\}, {4, &, 35.4347, &, 20.1144, &,
    23.2237, &, 24.1476, &, 20.6041, &, 24.2083, &, 28.0065, &, \\},
   {5, &, 35.0911, &, 19.7758, &, 22.8637, &, 24.757, &, 19.157, &, 23.9648,
    &, 27.8355, &, \\}, {6, &, 35.3222, &, 19.9575, &, 23.0718, &, 24.8078,
    &, 20.4426, &, 22.6395, &, 27.9214, &, \\}, {7, &, 35.4113, &, 20.114,
    &, 23.2178, &, 25.0242, &, 20.6169, &, 24.2415, &, 25.8796, &, \\}},
  {\hline $\varphi = 1.2$: & & & & & & & \\ \hline, {2, &, 35.4479, &,
    19.7433, &, 23.2328, &, 25.0383, &, 20.636, &, 24.2664, &, 28.0395, &, \\},
   {3, &, 35.2769, &, 19.8931, &, 22.5247, &, 24.81, &, 20.5591, &, 24.158,
    &, 27.9522, &, \\}, {4, &, 35.4291, &, 20.1107, &, 23.2194, &, 24.0911,
    &, 20.6004, &, 24.2026, &, 28.0027, &, \\}, {5, &, 35.1069, &, 19.7902,
    &, 22.8793, &, 24.7685, &, 19.2116, &, 23.977, &, 27.8439, &, \\},
   {6, &, 35.2903, &, 19.9237, &, 23.0372, &, 24.7661, &, 20.4082, &,
    22.3802, &, 27.8984, &, \\}, {7, &, 35.3862, &, 20.1009, &,
    23.2014, &, 25.0132, &, 20.6068, &, 24.2284, &, 25.4033, &, \\}},
  {\hline $\varphi = 1.25$: & & & & & & & \\ \hline, {2, &, 35.447, &,
    19.7382, &, 23.2321, &, 25.0379, &, 20.6357, &, 24.266, &, 28.0392, &, \\},
   {3, &, 35.2645, &, 19.8791, &, 22.4865, &, 24.7968, &, 20.5539, &,
    24.1509, &, 27.9463, &, \\}, {4, &, 35.4302, &, 20.1114, &,
    23.2202, &, 24.1018, &, 20.6011, &, 24.2037, &, 28.0034, &, \\},
   {5, &, 35.2447, &, 19.9162, &, 23.0152, &, 24.8691, &, 19.688, &, 24.0837,
    &, 27.9178, &, \\}, {6, &, 35.331, &, 19.9669, &, 23.0813, &, 24.8193,
    &, 20.4521, &, 22.7111, &, 27.9278, &, \\}, {7, &, 35.4239, &, 20.1205,
    &, 23.226, &, 25.0297, &, 20.6219, &, 24.2481, &, 26.1174, &, \\}},
  {\hline $\varphi = 1.3$: & & & & & & & \\ \hline, {2, &, 35.4386, &,
    19.6919, &, 23.2256, &, 25.034, &, 20.6328, &, 24.2622, &, 28.036, &, \\},
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 {3, &, 35.2816, &, 19.8984, &, 22.5391, &, 24.815, &, 20.5611, &,
  24.1607, &, 27.9543, &, \\}, {4, &, 35.4058, &, 20.0955, &,
  23.2017, &, 23.8557, &, 20.5854, &, 24.1788, &, 27.9868, &, \\},
 {5, &, 35.2082, &, 19.8828, &, 22.9792, &, 24.8425, &, 19.5618, &, 24.0554,
  &, 27.8982, &, \\}, {6, &, 35.3574, &, 19.9948, &, 23.1099, &, 24.8537,
  &, 20.4805, &, 22.9252, &, 27.9468, &, \\}, {7, &, 35.4228, &, 20.12,
  &, 23.2253, &, 25.0293, &, 20.6215, &, 24.2476, &, 26.0977, &, \\}},
{\hline $\varphi = 1.35$: & & & & & & & \\ \hline, {2, &, 35.4492, &,
  19.7499, &, 23.2338, &, 25.0389, &, 20.6364, &, 24.267, &, 28.04, &, \\},
 {3, &, 35.2872, &, 19.9046, &, 22.5562, &, 24.8209, &, 20.5634, &,
  24.1639, &, 27.9569, &, \\}, {4, &, 35.4294, &, 20.1109, &,
  23.2196, &, 24.0935, &, 20.6006, &, 24.2029, &, 28.0029, &, \\},
 {5, &, 35.0534, &, 19.7413, &, 22.8265, &, 24.7294, &, 19.0266, &, 23.9356,
  &, 27.8153, &, \\}, {6, &, 35.2931, &, 19.9267, &, 23.0403, &, 24.7698,
  &, 20.4113, &, 22.4032, &, 27.9004, &, \\}, {7, &, 35.4041, &, 20.1102,
  &, 23.2131, &, 25.021, &, 20.614, &, 24.2377, &, 25.7423, &, \\}},
{\hline $\varphi = 1.4$: & & & & & & & \\ \hline, {2, &, 35.4527, &,
  19.7691, &, 23.2365, &, 25.0405, &, 20.6376, &, 24.2685, &, 28.0413, &, \\},
 {3, &, 35.2655, &, 19.8802, &, 22.4896, &, 24.7979, &, 20.5544, &,
  24.1514, &, 27.9468, &, \\}, {4, &, 35.4381, &, 20.1166, &,
  23.2262, &, 24.1817, &, 20.6062, &, 24.2118, &, 28.0088, &, \\},
 {5, &, 35.0547, &, 19.7425, &, 22.8278, &, 24.7304, &, 19.0313, &, 23.9367,
  &, 27.816, &, \\}, {6, &, 35.3268, &, 19.9624, &, 23.0768, &, 24.8138,
  &, 20.4476, &, 22.6771, &, 27.9248, &, \\}, {7, &, 35.3809, &, 20.0981,
  &, 23.1979, &, 25.0108, &, 20.6047, &, 24.2255, &, 25.3014, &, \\}},
{\hline $\varphi = 1.45$: & & & & & & & \\ \hline, {2, &, 35.451, &,
  19.7599, &, 23.2352, &, 25.0397, &, 20.6371, &, 24.2678, &, 28.0407, &, \\},
 {3, &, 35.2788, &, 19.8952, &, 22.5306, &, 24.812, &, 20.5599, &, 24.1591,
  &, 27.953, &, \\}, {4, &, 35.3998, &, 20.0917, &, 23.1972, &, 23.7959,
  &, 20.5816, &, 24.1728, &, 27.9828, &, \\}, {5, &, 35.1891, &, 19.8654,
  &, 22.9604, &, 24.8285, &, 19.4959, &, 24.0407, &, 27.888, &, \\},
 {6, &, 35.3009, &, 19.9349, &, 23.0487, &, 24.7799, &, 20.4196, &,
  22.4662, &, 27.906, &, \\}, {7, &, 35.4071, &, 20.1118, &,
  23.2151, &, 25.0224, &, 20.6152, &, 24.2393, &, 25.7999, &, \\}},
{\hline $\varphi = 1.5$: & & & & & & & \\ \hline, {2, &, 35.4554, &,
  19.7839, &, 23.2385, &, 25.0418, &, 20.6386, &, 24.2698, &, 28.0423, &, \\},
 {3, &, 35.2855, &, 19.9027, &, 22.551, &, 24.8191, &, 20.5627, &, 24.163,
  &, 27.9562, &, \\}, {4, &, 35.4408, &, 20.1183, &, 23.2283, &, 24.2087,
  &, 20.608, &, 24.2145, &, 28.0106, &, \\}, {5, &, 35.1619, &, 19.8405,
  &, 22.9335, &, 24.8087, &, 19.4018, &, 24.0196, &, 27.8734, &, \\},
 {6, &, 35.3202, &, 19.9554, &, 23.0696, &, 24.8052, &, 20.4405, &,
  22.6232, &, 27.92, &, \\}, {7, &, 35.3886, &, 20.1021, &,
  23.2029, &, 25.0142, &, 20.6078, &, 24.2296, &, 25.4476, &, \\}},
{\hline $\varphi = 1.55$: & & & & & & & \\ \hline, {2, &, 35.4598, &,
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  19.8081, &, 23.2419, &, 25.0438, &, 20.6401, &, 24.2718, &, 28.044, &, \\},
 {3, &, 35.245, &, 19.8572, &, 22.4266, &, 24.7762, &, 20.5458, &,
  24.1396, &, 27.9372, &, \\}, {4, &, 35.3974, &, 20.0901, &,
  23.1954, &, 23.7718, &, 20.5801, &, 24.1703, &, 27.9812, &, \\},
 {5, &, 35.2235, &, 19.8969, &, 22.9943, &, 24.8537, &, 19.6149, &, 24.0673,
  &, 27.9065, &, \\}, {6, &, 35.3094, &, 19.9439, &, 23.0579, &, 24.791,
  &, 20.4288, &, 22.5351, &, 27.9121, &, \\}, {7, &, 35.423, &, 20.1201,
  &, 23.2255, &, 25.0294, &, 20.6216, &, 24.2477, &, 26.1014, &, \\}},
{\hline $\varphi = 1.6$: & & & & & & & \\ \hline, {2, &, 35.4474, &,
  19.7404, &, 23.2324, &, 25.0381, &, 20.6358, &, 24.2662, &, 28.0393, &, \\},
 {3, &, 35.285, &, 19.9022, &, 22.5495, &, 24.8186, &, 20.5625, &, 24.1627,
  &, 27.9559, &, \\}, {4, &, 35.3997, &, 20.0916, &, 23.1971, &, 23.7941,
  &, 20.5815, &, 24.1726, &, 27.9827, &, \\}, {5, &, 35.1292, &, 19.8106,
  &, 22.9013, &, 24.7848, &, 19.2889, &, 23.9943, &, 27.8559, &, \\},
 {6, &, 35.3485, &, 19.9854, &, 23.1003, &, 24.8422, &, 20.471, &,
  22.8533, &, 27.9404, &, \\}, {7, &, 35.4102, &, 20.1134, &,
  23.2171, &, 25.0237, &, 20.6165, &, 24.2409, &, 25.8586, &, \\}},
{\hline $\varphi = 1.65$: & & & & & & & \\ \hline, {2, &, 35.4387, &,
  19.6929, &, 23.2257, &, 25.034, &, 20.6328, &, 24.2622, &, 28.0361, &, \\},
 {3, &, 35.2937, &, 19.912, &, 22.5763, &, 24.8278, &, 20.5661, &, 24.1677,
  &, 27.96, &, \\}, {4, &, 35.4099, &, 20.0982, &, 23.2048, &, 23.897,
  &, 20.5881, &, 24.183, &, 27.9896, &, \\}, {5, &, 35.1857, &, 19.8623,
  &, 22.957, &, 24.8261, &, 19.4842, &, 24.0381, &, 27.8862, &, \\},
 {6, &, 35.349, &, 19.9859, &, 23.1008, &, 24.8428, &, 20.4715, &,
  22.857, &, 27.9407, &, \\}, {7, &, 35.4295, &, 20.1235, &,
  23.2297, &, 25.0322, &, 20.6242, &, 24.2511, &, 26.2252, &, \\}},
{\hline $\varphi = 1.7$: & & & & & & & \\ \hline, {2, &, 35.4528, &,
  19.77, &, 23.2366, &, 25.0406, &, 20.6377, &, 24.2686, &, 28.0414, &, \\},
 {3, &, 35.2729, &, 19.8885, &, 22.5122, &, 24.8057, &, 20.5574, &,
  24.1557, &, 27.9503, &, \\}, {4, &, 35.4049, &, 20.0949, &,
  23.201, &, 23.8464, &, 20.5848, &, 24.1779, &, 27.9862, &, \\},
 {5, &, 35.1092, &, 19.7923, &, 22.8815, &, 24.7702, &, 19.2194, &, 23.9788,
  &, 27.8452, &, \\}, {6, &, 35.3055, &, 19.9398, &, 23.0537, &, 24.7859,
  &, 20.4246, &, 22.5035, &, 27.9093, &, \\}, {7, &, 35.408, &, 20.1122,
  &, 23.2156, &, 25.0228, &, 20.6156, &, 24.2398, &, 25.8165, &, \\}},
{\hline $\varphi = 1.75$: & & & & & & & \\ \hline, {2, &, 35.4493, &,
  19.7507, &, 23.2339, &, 25.039, &, 20.6365, &, 24.267, &, 28.04, &, \\},
 {3, &, 35.3094, &, 19.9297, &, 22.6247, &, 24.8445, &, 20.5727, &,
  24.1768, &, 27.9674, &, \\}, {4, &, 35.436, &, 20.1152, &,
  23.2246, &, 24.1599, &, 20.6048, &, 24.2096, &, 28.0074, &, \\},
 {5, &, 35.19, &, 19.8662, &, 22.9612, &, 24.8292, &, 19.4989, &, 24.0414,
  &, 27.8885, &, \\}, {6, &, 35.3608, &, 19.9984, &, 23.1136, &, 24.8582,
  &, 20.4842, &, 22.953, &, 27.9493, &, \\}, {7, &, 35.3775, &, 20.0963,
  &, 23.1957, &, 25.0093, &, 20.6033, &, 24.2238, &, 25.2378, &, \\}},
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{\hline $\varphi = 1.8$: & & & & & & & \\ \hline, {2, &, 35.4454, &,
  19.7294, &, 23.2309, &, 25.0372, &, 20.6351, &, 24.2653, &, 28.0386, &, \\},
 {3, &, 35.2736, &, 19.8894, &, 22.5145, &, 24.8065, &, 20.5577, &,
  24.1561, &, 27.9506, &, \\}, {4, &, 35.4473, &, 20.1225, &,
  23.2332, &, 24.2743, &, 20.6121, &, 24.2211, &, 28.0151, &, \\},
 {5, &, 35.0482, &, 19.7365, &, 22.8214, &, 24.7256, &, 19.0086, &, 23.9316,
  &, 27.8125, &, \\}, {6, &, 35.3186, &, 19.9537, &, 23.0678, &, 24.803,
  &, 20.4387, &, 22.6097, &, 27.9188, &, \\}, {7, &, 35.3747, &, 20.0948,
  &, 23.1938, &, 25.0081, &, 20.6022, &, 24.2223, &, 25.1839, &, \\}},
{\hline $\varphi = 1.85$: & & & & & & & \\ \hline, {2, &, 35.4484, &,
  19.7456, &, 23.2331, &, 25.0385, &, 20.6361, &, 24.2666, &, 28.0397, &, \\},
 {3, &, 35.2833, &, 19.9003, &, 22.5443, &, 24.8168, &, 20.5618, &, 24.1617,
  &, 27.9551, &, \\}, {4, &, 35.4048, &, 20.0949, &, 23.201, &, 23.8463,
  &, 20.5848, &, 24.1779, &, 27.9862, &, \\}, {5, &, 35.1424, &, 19.8227,
  &, 22.9143, &, 24.7945, &, 19.3345, &, 24.0045, &, 27.863, &, \\},
 {6, &, 35.3238, &, 19.9592, &, 23.0735, &, 24.8099, &, 20.4443, &,
  22.6523, &, 27.9226, &, \\}, {7, &, 35.4079, &, 20.1122, &,
  23.2156, &, 25.0227, &, 20.6155, &, 24.2397, &, 25.8143, &, \\}},
{\hline $\varphi = 1.9$: & & & & & & & \\ \hline, {2, &, 35.4507, &,
  19.7584, &, 23.235, &, 25.0396, &, 20.637, &, 24.2677, &, 28.0406, &, \\},
 {3, &, 35.2932, &, 19.9114, &, 22.5747, &, 24.8273, &, 20.5659, &,
  24.1674, &, 27.9598, &, \\}, {4, &, 35.3921, &, 20.0866, &,
  23.1914, &, 23.7177, &, 20.5766, &, 24.1649, &, 27.9775, &, \\},
 {5, &, 35.208, &, 19.8827, &, 22.979, &, 24.8424, &, 19.5613, &, 24.0553,
  &, 27.8982, &, \\}, {6, &, 35.3677, &, 20.0058, &, 23.1211, &, 24.8673,
  &, 20.4917, &, 23.0095, &, 27.9543, &, \\}, {7, &, 35.4188, &, 20.1178,
  &, 23.2227, &, 25.0275, &, 20.6199, &, 24.2454, &, 26.0206, &, \\}},
{\hline $\varphi = 1.95$: & & & & & & & \\ \hline, {2, &, 35.4472, &,
  19.7394, &, 23.2323, &, 25.038, &, 20.6358, &, 24.2661, &, 28.0393, &, \\},
 {3, &, 35.2569, &, 19.8705, &, 22.4631, &, 24.7888, &, 20.5508, &, 24.1465,
  &, 27.9428, &, \\}, {4, &, 35.4355, &, 20.1149, &, 23.2243, &, 24.1555,
  &, 20.6046, &, 24.2091, &, 28.0071, &, \\}, {5, &, 35.1721, &, 19.8499,
  &, 22.9436, &, 24.8161, &, 19.4371, &, 24.0275, &, 27.8789, &, \\},
 {6, &, 35.3018, &, 19.9359, &, 23.0497, &, 24.7811, &, 20.4206, &,
  22.4735, &, 27.9067, &, \\}, {7, &, 35.3779, &, 20.0965, &,
  23.1959, &, 25.0095, &, 20.6035, &, 24.224, &, 25.2449, &, \\}},
{\hline $\varphi = 2.$: & & & & & & & \\ \hline, {2, &, 35.4403, &,
  19.7014, &, 23.2269, &, 25.0348, &, 20.6334, &, 24.2629, &, 28.0367, &, \\},
 {3, &, 35.2675, &, 19.8824, &, 22.4956, &, 24.8, &, 20.5552, &, 24.1526,
  &, 27.9477, &, \\}, {4, &, 35.3896, &, 20.085, &, 23.1895, &, 23.6924,
  &, 20.575, &, 24.1623, &, 27.9758, &, \\}, {5, &, 35.2326, &, 19.9051,
  &, 23.0032, &, 24.8603, &, 19.6461, &, 24.0743, &, 27.9113, &, \\},
 {6, &, 35.3239, &, 19.9593, &, 23.0736, &, 24.81, &, 20.4444, &,
  22.653, &, 27.9226, &, \\}, {7, &, 35.4268, &, 20.122, &,
```

In[299]:=
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Export["./valueDataClean.csv", NumberForm[Flatten[priceDataClean[[1]]], 6], "CSV"]
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Out[299]=
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./valueDataClean.csv
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