

Readme for Ely-Lecture
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Below you will find a description of the sources, and construction of series in the file: Ely-Sources.xls.

The file Ely-Sources.xls contains the original data and constructed series used to generate the Tables 1 to 6 and the Figures 1 to 3. Each of the nine objects has its own worksheet in the file. For example the worksheet that contains series used to generate figure 1 in the paper, is entitled Fig 1. In each worksheet, original series are labeled On and constructed series are labeled Cn. Constructed series Cn are obtained from the original and/or other constructed series in the *respective worksheet*.

Original series

Figure 1:

Series	Name	Description
O1	Y/N	U.S. Real GDP per capita 1900-1994 [in 1990 Geary-Khamis \$]
O2	Y/N	U.S. Real GDP per capita 1950-1998 [in 1990 Geary-Khamis \$]
O3	N	Midyear population
O4	N 15-64	Population age 15 - 64

Figure 2:

Series	Name	Description
O1	New Zealand	GDP at constant 1995 prices for New Zealand (in U.S. \$)
O2	Switzerland	GDP at constant 1995 prices for Switzerland (in U.S. \$)
O3	New Zealand	Population age 15-64 for New Zealand
O4	Switzerland	Population age 15-64 for Switzerland

Figure 3:

Cell	Name
D1	GDP for Japan, year 1999 (billions of US\$ at prices and PPP terms of 1995)
D2	Population age 20-69 for Japan in 1999 (millions)
D5	Nominal GDP for USA in 2000 (billions \$)
D6	Real GDP for USA in 2000 (billions of 1996 US \$)
D8	Nominal GDP for USA in 1995 (billions \$)
D9	Real GDP for USA in 1995 (billions of 1996 US \$)
D11	Population US age 20-69, year 2000 (thousands)

Series	Name
O1	Japanese GNP in 1990 terms
O2	Japanese population of age 20-69.

Table 1:

Series O1-O6 contain for all countries in the list the GDP per hours worked, in 1990 dollars.

Table 2:

All series contain the respective data for France, Japan, U.K., U.S.

Series	Name	Description
O1	Population	Population of age 15-64
O2	Employment	Total number of persons employed in the economy
O3	Hours worked	Average annual hours actually worked
O4	Real GDP of 1998	Real GDP in 1995 PPP terms [1995 US\$]
O5	Nominal GDP 1996	Nominal GDP in terms of local currency
O6	Nominal capital stock, 1996	Nominal net capital stock in terms of local currency

Table 3:

Column A contains the name of the variables: Net-capital Stocks in 1990 in nominal terms and GDP in 1990 in nominal terms.

O1-O10 contain for each of the countries in the displayed table the capital stock and the GDP.

Table 4:

Column A of the worksheet contains the country and years for which data is provided.

Series	Name	Description
O1	GDP	Nominal GDP in local currency
O2	I Tax	Indirect Business Taxes less subsidies
O3	C	Total private consumption expenditure in local currency
O4	X	Total investment in local currency
O5	HH D Tx	Direct taxes paid by households
O6	HH SS Tx	Social security taxes paid by households
O7	h	Annual hours actual worked
O8	E	Employed persons
O9	N	Population age 15-64

Table 5:

Series	Name	Description
O1	Y	GDP per working age person [indexed Yen]
O2	A	Total factor productivity
O3	$A^{1/(1-\theta)}$	Productivity factor
O4	h	Workweek length [hours/week]
O5	e	Employment Rate [Number of persons employed / Number of persons of age 15 – 64]
O6	$x^{\theta/(1-\theta)}$	Capital Factor ($x=K/Y$)

The calculations in Hayashi and Prescott (2002) assume that $\theta = 0.36$. The precise factor is listed in the cell B3 of worksheet.

Table 6:

Column	Name	Description
O1	Delta	Depreciation rate of capital
O2	Theta	Capital income share
O3	Beta	Utility function discount rate
O4	Alpha	Utility function labor supply parameter

Original series: Sources

Figure 1:

Both output per capita series (O1 and O2) are from Maddison publications. Namely,

O1 - Maddison, Angus, *Monitoring the world economy 1820-1992*. Paris: Development Centre of the OECD, 1995.

O2 - Maddison, Angus, *The world economy: A millennium perspective*. Paris: Development Centre of the OECD, 2001.

The population data (O3 and O4) are from the Bureau of Census, they can be found at <http://www.census.gov/statab/www/minihs.html>. These data belong to the Mini Historical Statistics, which is a put together by a subgroup of the division that publishes the Statistical Abstract of the United States. The download for this data appendix was done in September, 2004.

Figure 2:

O1 and O2: real GDP numbers are from OECD Annual National Accounts database, B.3 Gross domestic product - at the price levels and PPPs of 1995, billions of \$US, series code: COUNTRY NAME.B1_GE.VPVOB. Data was downloaded in December 2001.

O3 and O4: The Population of age 15-64 is from the Labor Market Statistics of the OECD Corporate Data Environment, which can be accessed at: www1.oecd.org/script/cde, the download was done in December, 2001.

Figure 3:
Single cells:

Cell	Name	Source
D1	GDP for Japan, year 1999	OECD (2002)
D2	Population age 20-69 for Japan in 1999	Hayashi and Prescott (2002)
D5	Nominal GDP for USA in 2000	OECD (2001)
D6	Real GDP for USA in 2000	OECD (2001)
D8	Nominal GDP for USA in 1995	OECD (2001)
D9	Real GDP for USA in 1995	OECD (2001)
D11	Population US age 20-69, year 2000	Bureau of Census

O1 and O2 are from Hayashi and Prescott (2002).

Sources Mentioned:

OECD (2002): OECD, *National accounts of OECD countries, Volume I: Main aggregates*. Paris: Organization for Economic Cooperation and Development, January 2002.

OECD (2001): OECD, *Quarterly National Accounts No.1, 2001*. Paris: Organization for Economic Cooperation and Development, January 2001.

Hayashi, Fumio, and Prescott, Edward, C., "The 1990s in Japan: A Lost Decade," *Review of Economic Dynamics*, Academic Press for the Society for Economic Dynamics, vol. 5(1), pages 206, January 2002.

Bureau of Census: The population numbers for the U.S. were taken from the Census 2000 project of the Bureau of Census. They were downloaded on the 27th of September, 2004 from the web page: http://factfinder.census.gov/servlet/DTTable?_bm=y&-geo_id=01000US&-ds_name=DEC_2000_SF1_U&-redoLog=false&-mt_name=DEC_2000_SF1_U_PCT012.

Table 1:

O1 to O6: The GDP per hour worked data are from: Maddison, Angus, *Monitoring the world economy 1820-1992*. Paris: Development Centre of the OECD, 1995; page 249, Table J-5.

Table 2:

O1, O2, and O3: The Population of age 15-64, Employment, and Annual hours actual worked are from the Labor Market Statistics of the OECD Corporate Data Environment, which can be accessed at: www1.oecd.org/script/cde, the download was done in December, 2001.

O5 and O4: Both nominal GDP and real GDP in PPP terms are from OECD, *National accounts of OECD countries, Volume I: Main aggregates*. Paris: Organization for Economic Cooperation and Development, January 2002.

O6: Capital Stocks from: OECD, *Flows and Stocks of Fixed Capital, 1971-1996*, OECD, 1997.

Comment 1: Since the capital stock for later years was not available the 1996 number was used, here only the private capital stock was considered. Furthermore the respective 1996 GDP was used to get the capital output ratio. For the U.S. the capital output ratio for the year 1994 was used.

Comment 2: The exception of the capital stock source is Japan. That net capital stock is taken from ESRI, *Annual report on national accounts*, Cabinet Office, Government of Japan. Dublin, Ireland: Economic and Social Research Institute, 2000. Also the GDP and the capital stock and the GDP used are for the year 1998.

Table 3:

O1 to O10: GDP numbers are from: OECD, *National accounts of OECD countries, Volume I: Main aggregates*. Paris: Organization for Economic Cooperation and Development, January 2002.

O1: O10: Capital Stocks from: OECD, *Flows and Stocks of Fixed Capital, 1971-1996*, OECD, 1997. The capital stock number consist of the private capital stock (i.e. the public capital is not included).

The exception is the capital stock for Japan. That number is taken from ESRI, *Annual report on national accounts*, Cabinet Office, Government of Japan. Dublin, Ireland: Economic and Social Research Institute, 2000. Also the GDP and the capital stock and the GDP used are for the year 1998.

Table 4:

All the data in this section are from the respective country sections of: United Nations, *National accounts statistics: Main aggregates and detailed tables, 1996-1997*. New York: United Nations, 2000.

O1, O3, O4: GDP, private consumption expenditure and Investment are from the table 1.1: Expenditure on the gross domestic product, in current prices (lines equals: GDP, 2, and 3)

O2: Net-indirect taxes are from the table 1.3: Cost components of the gross domestic product (line 1)

O5 and O6: Taxes are from table 1.6: Current income and outlay of households and non-profit institutions (Disbursements: lines 4.B and 4.A)

O9, O8, and O7: The Population of age 15-64, Employment, and Annual hours actual worked are from the Labor Market Statistics of the OECD Corporate Data Environment, which can be accesses at: www1.oecd.org/script/cde, the download was done in December, 2001.

Table 5:

O1 to O6: All the data are from the data appendix of: Hayashi, Fumio, and Prescott, Edward, C., "The 1990s in Japan: A Lost Decade," *Review of Economic Dynamics*, Academic Press for the Society for Economic Dynamics, vol. 5(1), pages 206, January 2002.

Table 6:

O1 to O4: All the data are from the data appendix of: Hayashi, Fumio, and Prescott, Edward, C., "The 1990s in Japan: A Lost Decade," Review of Economic Dynamics, Academic Press for the Society for Economic Dynamics, vol. 5(1), pages 206, January 2002.

Constructed series: Description**Figure 1:**

Series	Name	Description
C1	Y/WAP	GDP per population of age 15-64, 1900-1950
C2	Y/WAP	GDP per population of age 15-64, 1950-1998
C3	Y/WAP_cons	GDP per population of age 15-64, 1900-2000
C4	y_detrended	log(C3, Base 2)
C5		Scale for plot in \$
C6	Scale	Scale for plot in log(\$)

Figure 2:

Series	Name	Description
C1	New Zealand	GDP per person age 15-64
C2	Switzerland	GDP per person age 15-64
C3	New Zealand	Detrended real GDP per person age 15-64 (annual rate 2 %), Base 1970 = 100.
C4	Switzerland	Detrended real GDP per person age 15-64 (annual rate 2 %), Base 1970 = 100.

Figure 3:

Single Cells:

Cell	Name	Description
D3	GDP/N	GDP of Japanese economy in 1999 in 1995 US\$
D7	GDP deflator 2000	GDP deflator for the year 2000, reference year 1996
D10	GDP deflator 1995	GDP deflator for the year 2000, reference year 1996
D12	GDP per 20-69 (2000)	GDP per population age 20-69 for the US in the year 2000 in terms of year 2000 US\$

Series	Name
C1	Japan GNP per WAP, 1990 yen
C2	Japan GNP per WAP, 1995 US\$
C3	Japan GNP per WAP, 2000 US\$
C4	Japan GNP per WAP relative to 2000 US GDP per WAP (in 2000 US\$)

Table 1:

C1 to C6: Detrended country GDP per hour series in real PPP terms detrended with a 2 % annual rate.

C7: Average over the GDP per hour series for the countries, normalizing 1913 to 100.

Table 2:

Series	Name	Description
C1	y	GDP real in PPP terms per population
C2	Productivity factor	see paper
C3	K/Y	Capital Output ratio
C4	H	Aggregate hours worked in weekly terms
C5-C8		Series C1-C4 just divided by the U.S. level
C9-C12		Series C5-C8 as logarithmic values in percentages
cell: H2	theta	0.3

Table 3:

C1 to C10 contains the capital output ratio for the different countries.

Table 4:

The key parameters alpha and (1-theta) are in the cells L15 and L16.

Column	Name	Description
C1	Y	GDP net of Indirect taxes
C2	C true	Private consumption net of indirect taxes on consumption
C3	Tau_inc	Average Marginal income tax rate
C4	Tau_ss	Average social security tax rate
C5	c/y	Consumption output ratio
C6	Tau_c	Average consumption tax rate
C7	Tau_h	Marginal labor income tax rate
C8	Wedge	Labor tax wedge
C9	h	Predicted working time
C10	1/wedge	1/ Labor tax wedge
C11	h_act	Actual labor supply

Table 5:

Column	Name	Description
C1	Output	% Change over period of output
C2	Growth	2 % long run growth
C3	TFP factor	% Change over period of productivity factor (see paper for definition of productivity factor)
C4	Workweek	% Change over period of workweek length
C5	Employment	% Change over period of employment rate (Employment per population 15-64)
C6	Labor	% Change over period of labor = e*h
C7	Capital	% Change over period of capital intensity factor

Table 6:

Column	Name	Description
C1	Delta	Depreciation rate of capital
C2	Theta	Capital income share
C3	Beta	Utility function discount rate
C4	Alpha	Utility function labor supply parameter

Construction of series

Figure 1:

Series	Name	Construction
C1	Y/WAP	$O1 \cdot O3 / O4$
C2	Y/WAP	$O2 \cdot O3 / O4$
C3	Y/WAP_cons	Spliced series: C1 and C2
C4	y_detrended	$\log(C3; \text{Base } 2)$
C5	Scale	Scale for plot in \$
C6	Scale	Scale for plot in $\log(C5; \text{Base } 2)$

Figure 2:

Series	Name	Description
C1	New Zealand	$O1 / O3$
C2	Switzerland	$O2 / O4$
C3	New Zealand	$C1 / C1(1970) \cdot 1.02^{(1970-t)} \cdot 100$
C4	Switzerland	$C2 / C2(1970) \cdot 1.02^{(1970-t)} \cdot 100$

Where $C_i(1970)$, $i=1,2$ denotes the observation from the constructed series C_i , that corresponds to the year 1970.

Figure 3:

Single Cells:

Cell	Name	Calculations
D3	GDP/N	$D1 / D2$
D7	GDP deflator 2000	$D5 / D6$
D10	GDP deflator 1995	$D8 / D9$
D12	GDP per 20-69 (2000)	$D5 / D11 \cdot 1000000$

Series	Name	Calculations
C1	GNP per WAP, 1990 yen	$O1 / O2$
C2	GNP per WAP, 1995 US\$	$C1 \cdot D3 / C1(1999) \cdot 1000$
C3	GNP per WAP, 2000 US\$	$C2 \cdot D7 / D10 \cdot 1.02^{(2000-t)}$
C4	GNP per WAP relative to 2000 US GDP per WAP (in 2000 US\$)	$C3 / D12 \cdot 100$

Table 1:

Series C1-C6: Formula used

$$\frac{y}{h}(t) = \frac{Y}{H}(t) 1.02^{1913-t}$$

Here small letters stand for the detrended series.

Series C7:

$$\frac{y}{h} EU |_{1913=100}(t) = \frac{\sum_{C2}^{C6} (y_i/h_i(t))}{\sum_{C2}^{C6} (y_i/h_i(1913))} 100$$

Table 2:

Theta is taken from cell H10.

Column	Name	Transformation
C1	y	O4/O1
C2	Productivity factor	C1/(C3^(theta/(1-theta))*C4/100)
C3	K/Y	O6/O5
C4	H	O2/O1*O3/52
C5-C8		Ci/Ci(USA) i=1,2,3,4
C9-C12		Ci/Ci(USA) i=5,6,7,8.

Table 3:

Series C1 – C10 obtained

$$\frac{K}{Y}(i) = \frac{\text{Net capital stock of country } i}{\text{GDP of country } i}$$

Table 4:

The key parameters alpha and (1-theta) are in the cells L15 and L16.

Column	Formula used
C1	O1-O2
C2	O3-O2
C3	1.6*O5/(C1-0.1*O1)
C4	O6/(0.7*C1)
C5	C2/C1
C6	O2/C2
C7	C3+C4
C8	(1+C6)/(1-C7)
C9	(1+alpha/(1-theta)*0.8*C8)^(-1)
C10	1/C8
C11	O7/50*O8/O9/100

Table 5:

Suppose we are considering the change from period t to period $t+s$ for series i , $i=1,4,5,7$ then the following calculation was used:

$$C_i(t, t+s) = \left(\frac{O_j(t+s)}{O_j(t)} \right)^{1/s} - 1$$

where $i = 1,4,5,7$ and $j = 1,4,5,6$ respectively.

Moreover,

$$C_2 = 2\%$$

$$C_3 = \left[\frac{O_3(t+s)}{O_3(t)} \right]^{\frac{1}{s}} - 1 - 0.02$$

$$C_6 = C_4 + C_5.$$

Table 6:

Suppose we are considering the period t to period $t+s$ for series i , $i=1,2,3,4$ then the following calculation was used:

$$C_i(t, t+s) = \frac{1}{s} \sum_{\tau=t}^{t+s} O_i(\tau).$$

Figures and tables

Figure 1:

Using excel to plot the series in C4 against the time index. The scale is adjusted to put ticks on one intervals starting at $\log(4000; \text{Base } 2)=11.96578$ and by hand the scale from C5 is filled in.

The trend is introduced using the excel-trend function.

Figure 2:

Just plot the series in C3 and C4 against the time index column A of worksheet.

Figure 3:

Just plot the time index in column A of worksheet against the series C4.

Table 1:

The data for the table in the paper are taken directly from column C7.

Table 2:

The table is taken from the columns C9 to C12.

Table 3:

The numbers are directly taken from the series C1 - C10.

Table 4:

All the values for the table in the paper are taken from the series: C3, C4, C5, C6, C8, C9, and C11.

Table 5:

For the table in the paper we take the results in the series: C1, C2, C3, C6, and C7.

Table 6:

The table reports series C1-C4.