Economic Development

Population

November 2010

Definition (**Fertility**)

The quality of being able to produce young

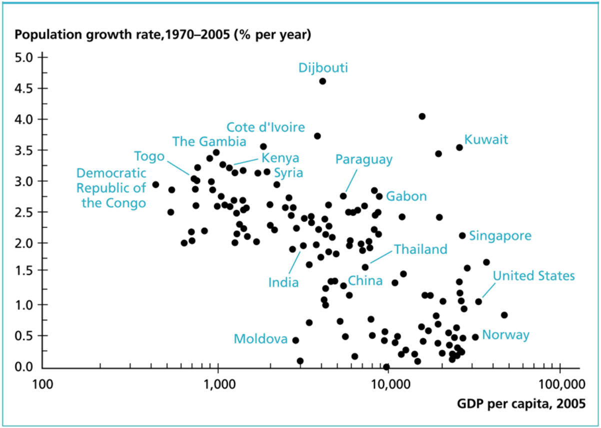
© Cambridge Dictionary

Fact

'With every mouth God sends a pair of hands.' *An old saying*

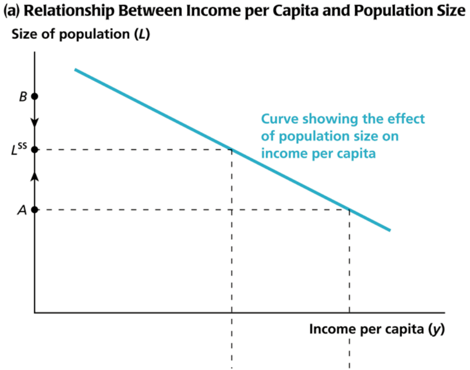
Growth and Fertility Development

Facts

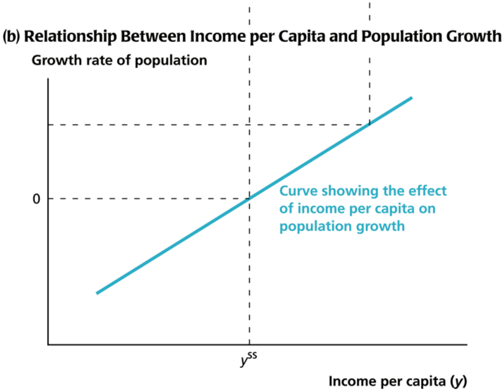


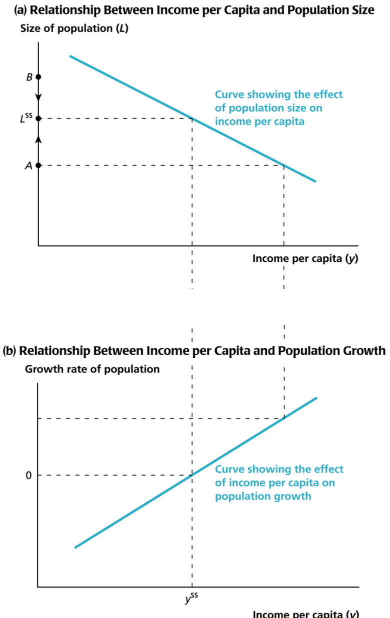
Source: Heston et.al. (2006), World Bank (2007a).

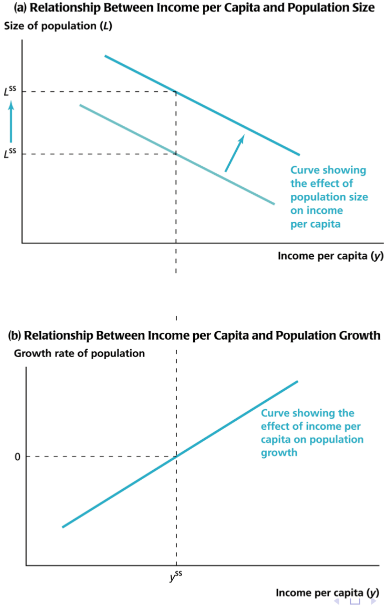
Malthus Theory



Malthus Theory




(a) Relationship Between Income per Capita and Population Size
Size of population (L)
B
L^ss
A
Curve showing the effect of population size on income per capita
Income per capita (y)
(b) Relationship Between Income per Capita and Population Growth
Growth rate of population
0
Curve showing the effect of income per capita on population growth
y^ss
Income per capita (y)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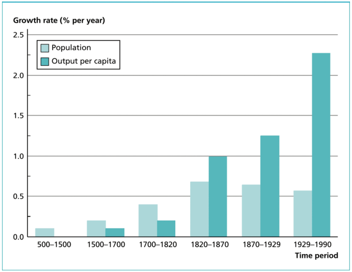
Income per capita (y)

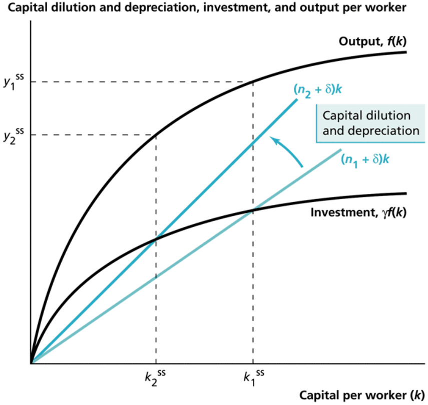
Corollary

Unless 'passion between sexes' is suppressed, the human race is doomed to breed itself into poverty.

Fact



Source: Galor and Weil (2000).



Capital Dilution

$\Delta K = s \cdot F(K, L) - \delta K$

Per capita

$\Delta k = s \cdot f(k) - (\delta + n)\, k$

steady state $\Delta k = 0$

$s \cdot f(k_{ss}) = (\delta + n)\, k_{ss}$

Quantitative Analysis

$$f(k) = Ak^{\alpha}$$
$$k_{ss} = \left(\frac{sA}{n+\delta}\right)^{\frac{1}{1-\alpha}}$$

$$sAk^{\alpha} = (\delta + n)\, k$$
$$y_{ss} = A^{\frac{1}{1-\alpha}} \left(\frac{sA}{n+\delta}\right)^{\frac{1}{1-\alpha}}$$

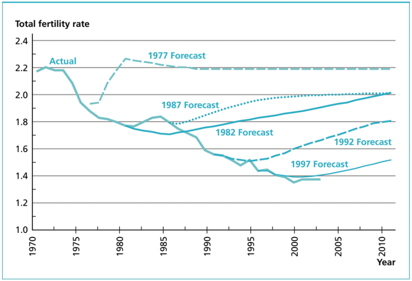
$$\frac{y_{ss}^{A}}{y_{ss}^{B}} = \left(\frac{n_B + \delta}{n_A + \delta}\right)^{\frac{\alpha}{1-\alpha}}$$

$$\frac{y_{ss}^{A}}{y_{ss}^{B}} \overset{\alpha=\frac{1}{3}}{=} \left(\frac{0,04 + 0,05}{0,00 + 0,05}\right)^{1/2} = 1,34$$

Corollary

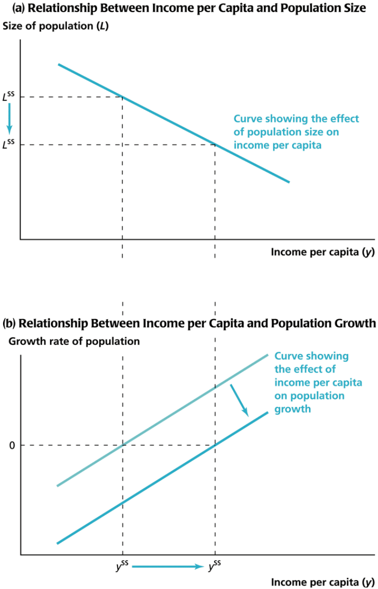
Higher population growth dilutes the per-worker capital stock more quickly and so lowers the steady-state level of output per worker.

Fact



Source: Yashiro (1998).

- Child Labour
- Old-age Insurance
- Tandem Effect
- Family Planning (Malthus)
- Income and Substitution Effects for Female labor
- Quality-quantity Tradeoff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Growth rate of population
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0
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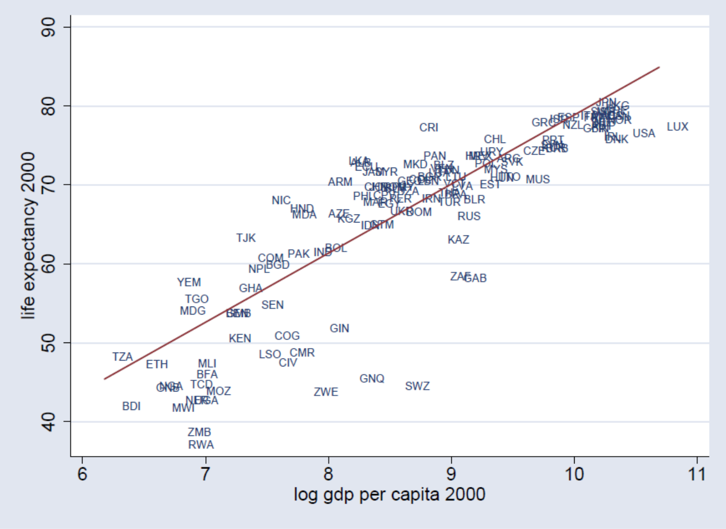
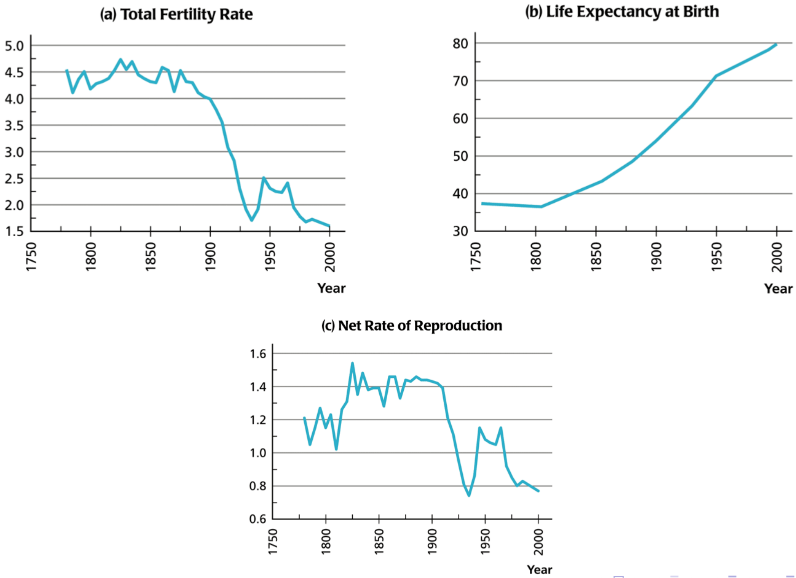
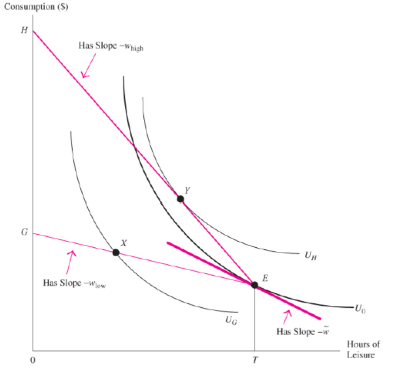
y^{ss}
Income per capita (y)

GDP and Life Expectancy




(a) Total Fertility Rate
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1750
1800
1850
1900
1950
2000
Year
(b) Life Expectancy at Birth
80
70
60
50
40
30
1750
1800
1850
1900
1950
2000
Year
(c) Net Rate of Reproduction
1.6
1.4
1.2
1.0
0.8
0.6
1750
1800
1850
1900
1950
2000
Year

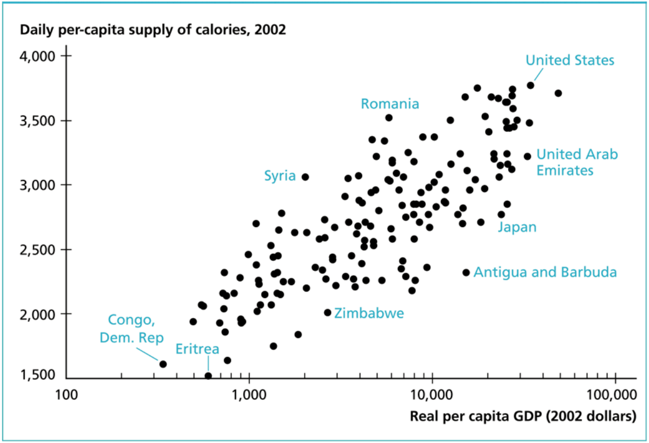

Consumption ($)
H
Has Slope $-w_{high}$
Y
G
X
Has Slope $-w_{low}$
E
U_H
U_0
U_G
Has Slope $-\tilde{w}$
0
T
Hours of Leisure

Human Capital

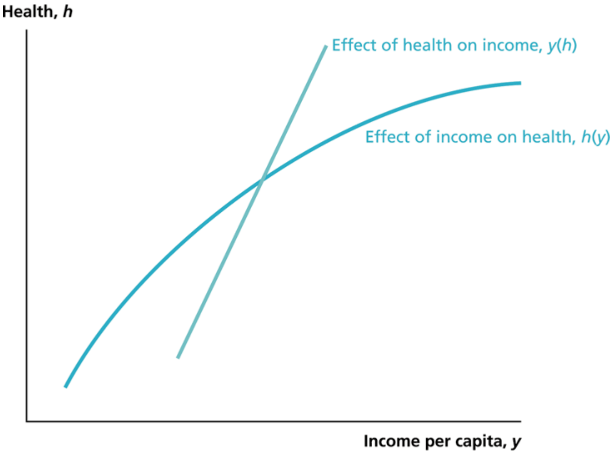
Definition

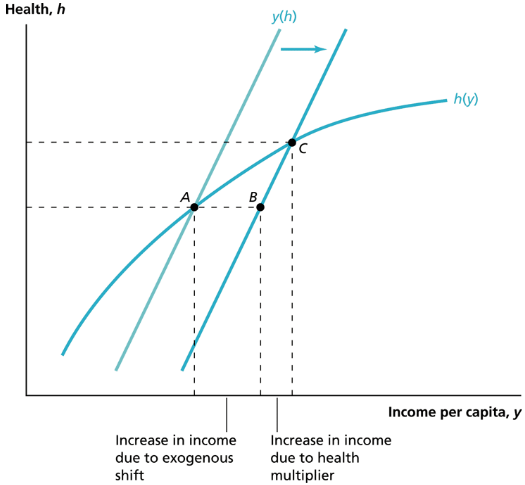
Human capital refers to the stock of competences, knowledge and personality attributes embodied in the ability to perform labor so as to produce economic value.

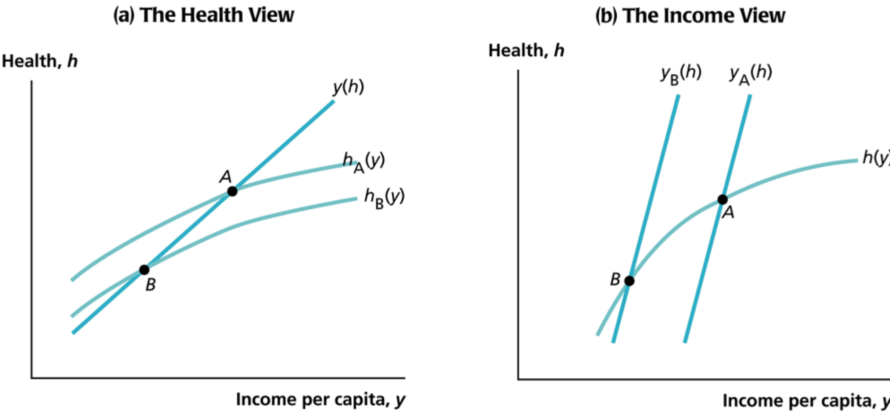
- Health
- Education



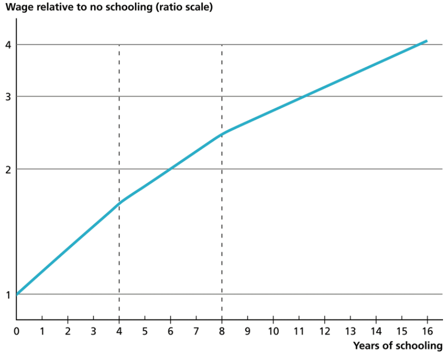
Sources: FAOSTAT database, Heston, Summers, and Aten (2006).


Health, h
Effect of health on income, y(h)
Effect of income on health, h(y)
Income per capita, y

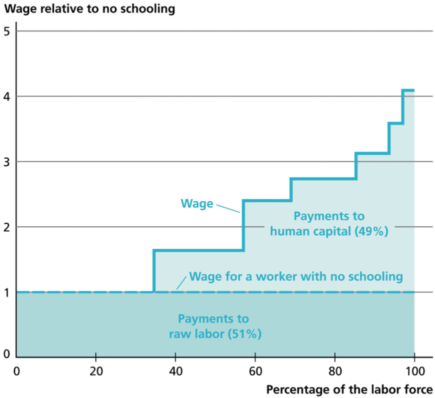

Health, h
y(h)
h(y)
C
A
B
Income per capita, y
Increase in income due to exogenous shift
Increase in income due to health multiplier

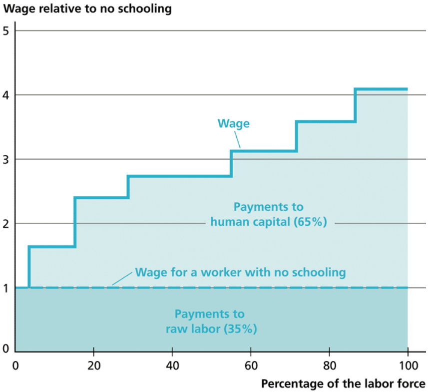

(a) The Health View
Health, h
y(h)
h_A(y)
h_B(y)
A
B
Income per capita, y
(b) The Income View
Health, h
y_B(h)
y_A(h)
h(y
A
B
Income per capita, y

Returns to Education



Human Capital's Share of Wages





Quantitative Analysis

$$Y = AK^{\alpha}(hL)^{1-\alpha}$$
$$Y = \left(h^{1-\alpha}A\right)K^{\alpha}L^{1-\alpha}$$

From before:

$$y_{ss}^{OLD} = A^{\frac{1}{1-\alpha}}\left(\frac{s}{n+\delta}\right)^{\frac{\alpha}{1-\alpha}}$$

Now:

$$\begin{aligned} y_{ss} &= \left(h^{1-\alpha}A\right)^{\frac{1}{1-\alpha}}\left(\frac{s}{n+\delta}\right)^{\frac{\alpha}{1-\alpha}} \\ &= h \times \left[A^{\frac{1}{1-\alpha}}\left(\frac{s}{n+\delta}\right)^{\frac{\alpha}{1-\alpha}}\right] \end{aligned}$$

Quantitative Analysis

$$\frac{y_{ss}^{A}}{y_{ss}^{B}} = \frac{h_A \times \left[A^{\frac{1}{1-\alpha}} \left(\frac{s}{n+\delta}\right)^{\frac{\alpha}{1-\alpha}}\right]}{h_B \times \left[A^{\frac{1}{1-\alpha}} \left(\frac{s}{n+\delta}\right)^{\frac{\alpha}{1-\alpha}}\right]} = \frac{h_A}{h_B}$$

Corollary

The difference in incomes is fully explained by the difference in the human capital.

Fact