

The Industrial Society's natural Sustainability

Hans G. Danielmeyer and Thomas Martinetz, www.inb.uni-luebeck.de (March '15)

Sylvie Geisendorf SOE 1.1: a [Newtonian approach](#) might overcome macro-economic theory's lack of contact with reality

Julia Steinberger SOE 12.3: [life expectancy](#) versus energy is very non-linear

We do not apply physical solutions to economic problems. In 1971 we promised a [Newtonian theory](#) for the industrial evolution allowing for the first time valid predictions without fitting parameter or data extrapolation.

[Last year we completed it](#): Successful recoveries from disasters converge into a peaceful industrial evolution that runs perfectly parallel to the

[saturating G7 life expectancy](#) (HGD & TM, An exact theory of the industrial evolution and national recovery, 2009 pdf, via www.inb.uni-luebeck.de)

Then came a CEPR report: Selected [economic experts see no cause and cure for the saturating G7 growth & interest rates](#) (C.Teuling and R.

Baldwin, Secular Stagnation: Facts, Causes, and Cures, CEPR London 2014, www.voxeu.org/sites/default/files/Vox_secular_stagnation.pdf)

What are the motives for such behavior of a relevant academic discipline?

It is systematic:

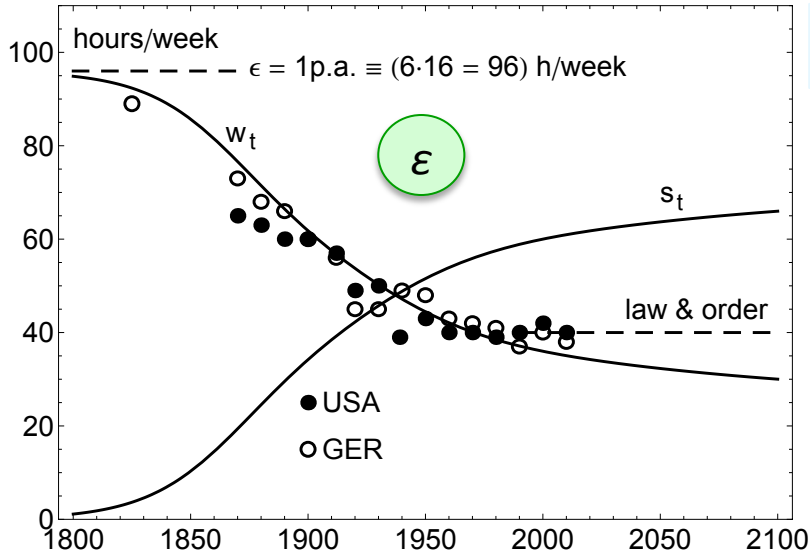
- (1) saturating growth with negligible interest dries out the financial system
- (2) maintaining monetarism's growth fetishism established in the 1980ies
- (3) maintaining the neoclassical exponential growth paradigm of 1957
- (4) conserving the division in verbal (AEA) and "metric" (ES) economists
- (5) 2nd edition of Barro & Sala-i-Martin's *Economic Growth* erased long-term data

S-functional growth yields a limited & materially sustainable macro-system orders of magnitude below exponential expectations of banks & economics

$$\dot{a}/a = (1 - a/\bar{a})/E \rightarrow 0, \quad a = \bar{a} / (1 + e^{(T-t)/E}) \rightarrow \bar{a}$$

Saving is financially ineffective, life insurance and pension funds empty catastrophically instead of inheritance with $1/L_o = 3.3\% p.a.$, and

Governments fear financial instability more than environmental problems



An educated interpretation of G7 data

Industry enforces equilibrium: $w + s = \epsilon$

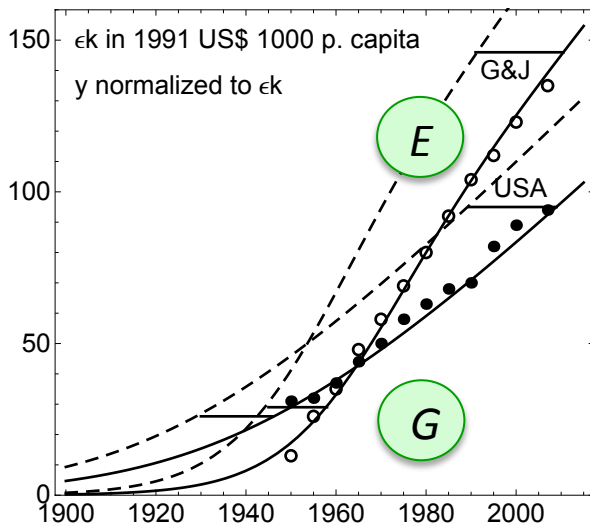
Spare time $s(t)$ was neglected to date but is inevitable for enjoying G7 affluence

Engineers design working time $w(t)$ p.a. irreversibly into physical capital $k(t)$

Law and order costs are largest in the G7

Stabilize $w(t)$ at 38 hrs/week after 1980

No trace of World Wars: Technical progress

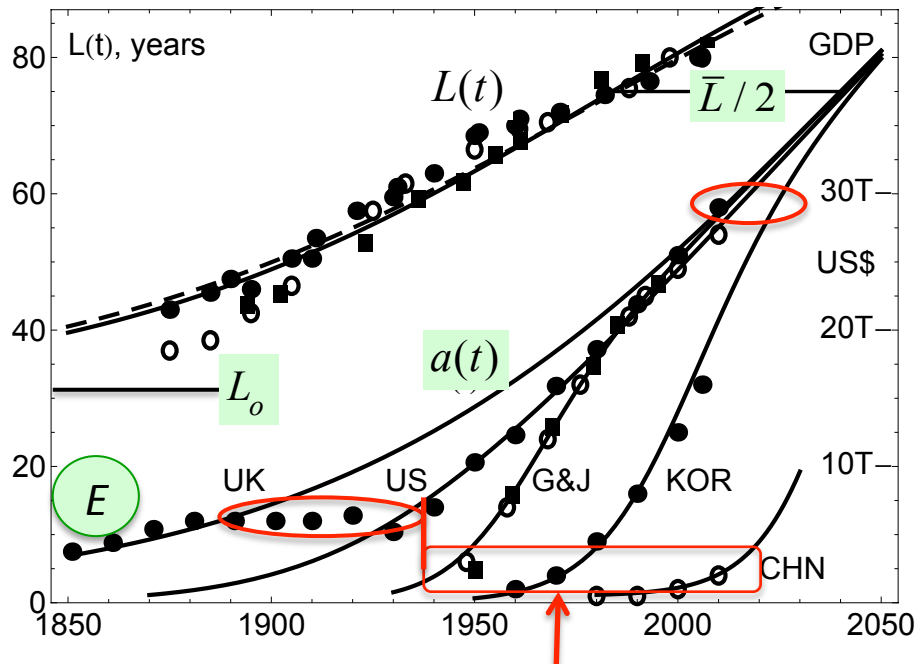


After the longest peace on G7 soil appears a second reaction time $E = 62$ years: indestructible inherited and educated human capacity $h(t)$ determines demand.

S-functions show storing processes with time shifts (unobservable with exponential growth theories).

Recovery from the Great Depression (USA) and WW II (Germany & Japan) shows for the first time the storing lifetime $G = 25$ years of destructible $k(t)$

The first measurement of the maximum unisex life expectancy $\bar{L} = 118 \text{ years}$



individual life integrates and averages over existential conditions

$$L(t) = L_o + N \int_t^{t+\bar{L}} a(t) dt$$

$L_o = 30 \text{ years}$. dashed : integral

solid line : best fit less G & J's 6 lowest

$$N = (\bar{L} - L_o) / \bar{a} \bar{L} \text{ calibrates } \bar{a}$$

The Great Depression ended with the top growth rates of WWII

London's CEPR took hostile rates for regular and peaceful $a(t)$ -rates for accidental

The common denominator of and S-functional development is the removal of obstacles as they appear on the way to a common goal. The systems "know" with $\dot{a}/a = (1 - a/\bar{a})/E$ the current gap to be closed in the future. Protecting the genome from manipulation allows individual and industrial forecasting

Engineering & human nature form a macro-system with 6 S-functions and 6 constants $\varepsilon, G < L_o, \bar{\mu}, \bar{\nu}, E, \bar{L}$

Economics: no info on demand, only $\bar{\mu}$

$w + s = \varepsilon = 1 p.a.$ annual working + spare time = time flow

$y = wk_w = wk/2$ generation of GDP (gross domestic product)

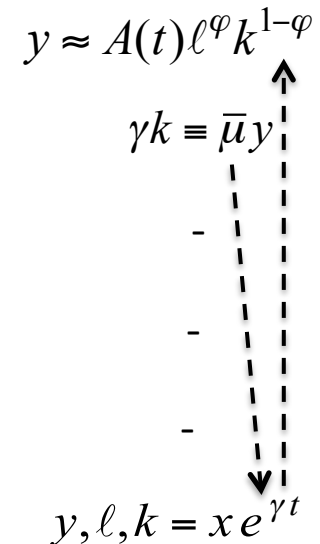
$k/G \equiv \mu(t)y$ maintaining physical capital $k(t)$

$\dot{k} + k/G = \bar{\mu}y + \dot{\mu}Gy$ generating physical capital

$h/E \equiv \nu(t)y$ educating human capacity

$sh = y = wk$ economic equilibrium

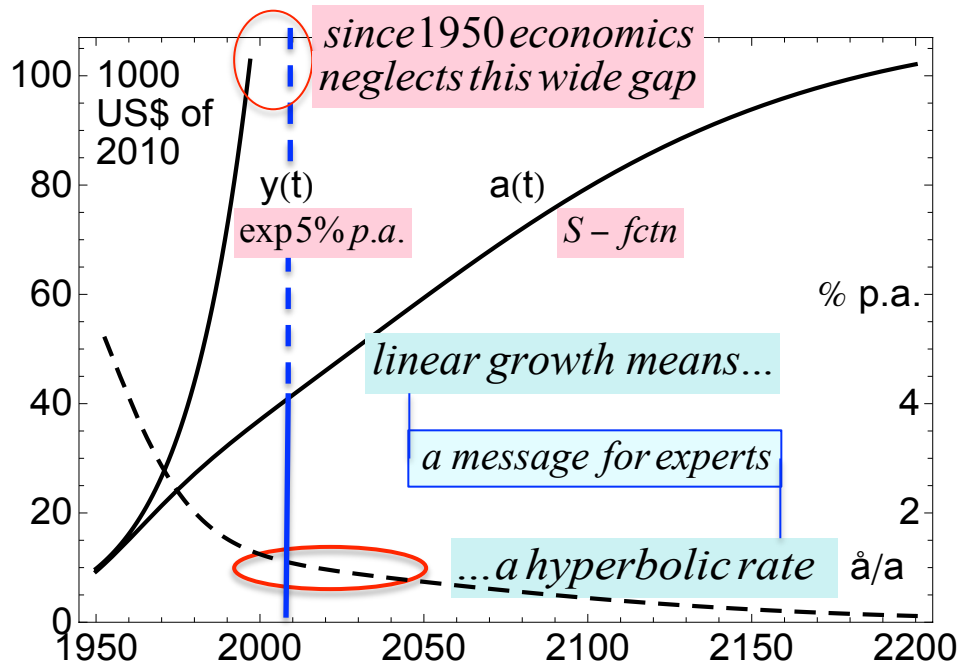
$y = \bar{a} / (1 + e^{(2040-t)/E} + e^{\beta(\tau-t)}) \rightarrow a(t)$ GDP solution



There can be no growth without increasing national capital coefficient $\mu(t)G$ since technical progress is designed into in $k(t)$. Every limit $(\bar{\mu}, \bar{\nu}, \bar{L})$ causes S-functions

The neoclassical paradigm follows from assuming exponential growth with the same rate for all production variables and estimating technical progress $A(t)$

Result I: S-functional growth allows a materially sustainable G7 future



$a(t)$ was stable for a quarter millennium and a 100-fold GDP. Factor 2.5 brings $\bar{L} = 118$ years to the majority of G7 people

How can our civilization resolve the mutual exclusion of material and financial sustainability?

Governments fear the political consequences of permanent financial crises more than debt

Part II: Saturating rates dry out saving, pension funds, and life insurance

Resolving mutual exclusion of material and financial sustainability

Money is not subject to and therefore not stabilized by the laws of nature

J. M. Keynes 1930: The material needs will be satisfied within this century
but there will always be some people seeking power through money

Terrorism from Belfast to OPECs: When poverty, birth rate and population
increase, average age decreases, and the sons get no job and no family

Monetary institutions must be supervised

Injecting just money delays required reforms

The social reaction time $E = 62$ years requires two diligent generations

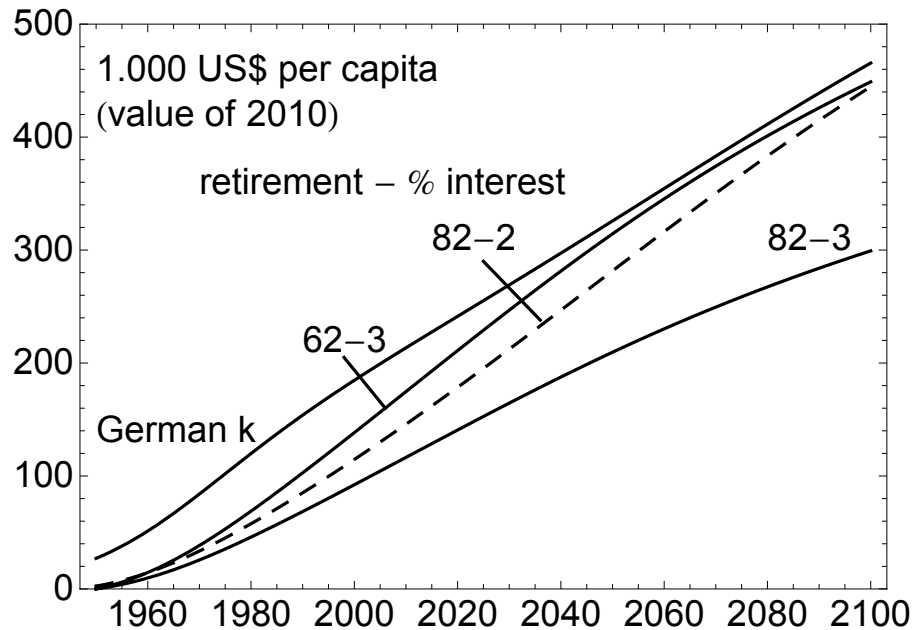
Act with sufficient power to win the battle

The EU is far from having the political power of its former nations

A monetary institution (e.g., the ECB) cannot and should not rule the EU

Provide fair distributions of incomes, wealth, and resources (L and N?)

Example: The new theory allows forecasting the industrial evolution, the life expectancy, and the problems of all funds

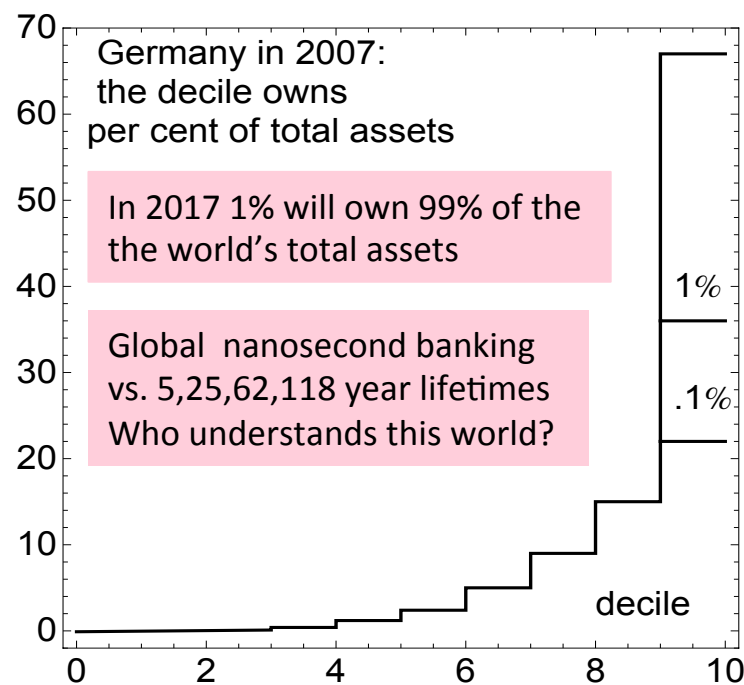
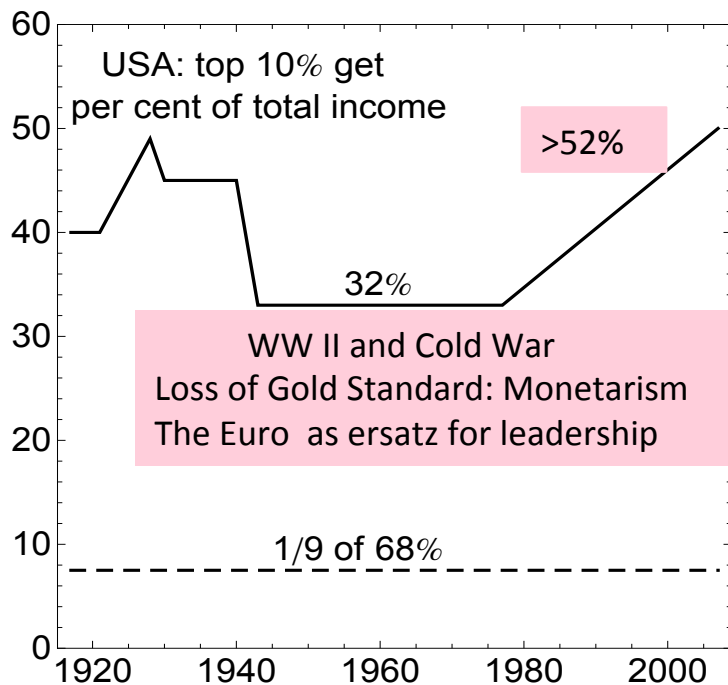


Only one pension fund for all: Required value compared to Germany's entire wealth $k(t)$ per capita for constant population.

The fund pays the usual 50% of average income from an interest rate of 2 or 3% p.a. after 62 or increasing from 63 to 82 parallel to $L(t)$

The fund 82-2 requires nearly the entire $k(t)$ but growth $<1\%$ and interest <0

Diverging distributions of incomes and wealth drive law and order costs



The +20 % higher income of top 10% pays a 50% level for 40 % pensioners

The transitional middle class and middle nations disappear

The only possible & urgent actions for the G7 & China are absolutely clear

A sustainable future requires fair distributions of incomes and wealth

The Cure

All G7 institutions must adjust to S-functional growth

The retirement age must be increased by 1 year every 7 years

Government has the motive, industry opportunity and means
for achieving fair income distributions

Fair distributions of wealth result from L_o with negligible interest

Epilogue

Where are now economic man, endogenous growth, the market?

Adam Smith's invisible hand of 1776 is fortunately embodied in
everybody's heritable, educated, and evolving human capacity

Human nature & industrial engineering form a complete macro-system

National economics is a part of the natural sciences