What Percentage of Our Ancestors Were Men?
The Most Underappreciated Fact About Men!

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www.riskcenter.ethz.ch

- Most ancient female ancestors have passed their genes to the present population.
- Most ancient male ancestors have **not** passed their genes to the present population.
- About 100 thousand years ago, when the most recent common male ancestor (MRCA) is found, as many as **thousands to perhaps hundreds of thousands of contemporary women** have been able to transmit their genes to the present generation (compared to just one man, this "most recent common ancestor").
- Theory and agent-based models suggest that this can result simply from difference in biology (cost of gestation and child caring) aided by male competition.
- Implications for understanding cultural evolution and social human norms.
- In the same way that "Nothing in biology makes sense except in the light of evolution" (Theodosius Dobzhanski, 1973), we contend that "**Nothing in human cultural evolution makes sense except in the light of this most underappreciated and extraordinary fact about female-male evolutionary success toward eternity.**" [inspired from Roy F. Baumeister, 2010]

Testosterone and high finance do not mix: so bring on the women

Gender inequality has been an issue in the City for years, but now the new science of 'neuroeconomics' is proving the point beyond doubt: hormonally-driven young men should not be left alone in charge of our finances...

(Joe Herbert and John Coates)

Guardian News
19 June 2011

Financial Bubbles, Prediction and the Financial Crisis Observatory

"The budget should be balanced, the Treasury should be refilled, public debt should be reduced, the arrogance of officialdom should be tempered and controlled, and the assistance to foreign lands should be curtailed lest Rome become bankrupt. People must again learn to work instead of living on public assistance."

Cicero - 55 BC

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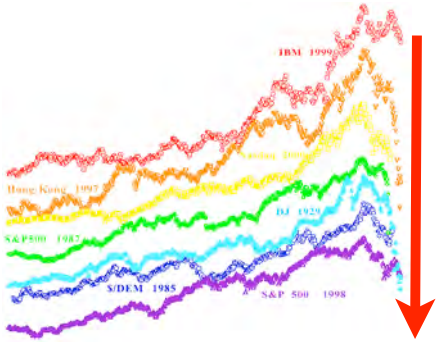
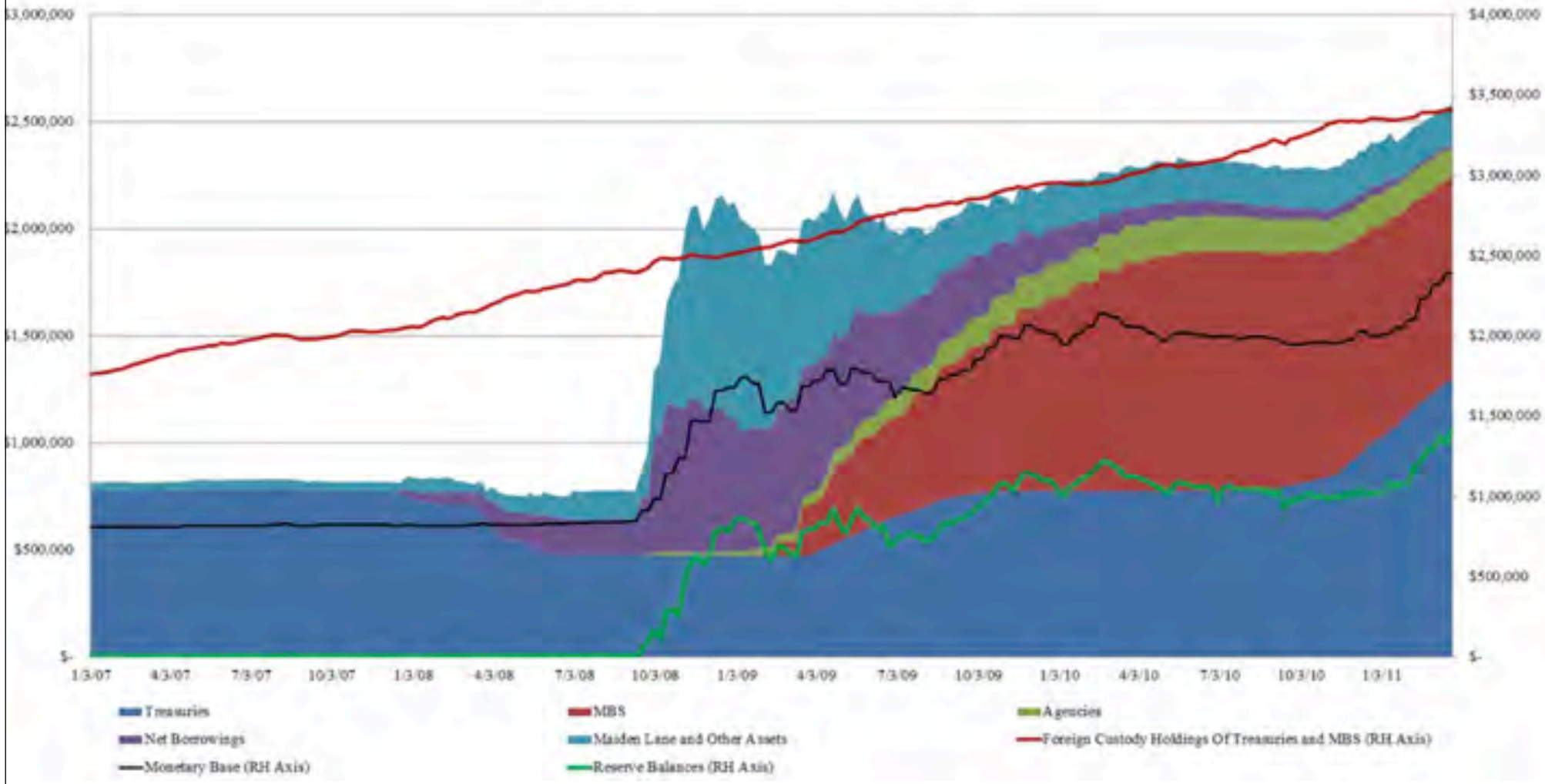
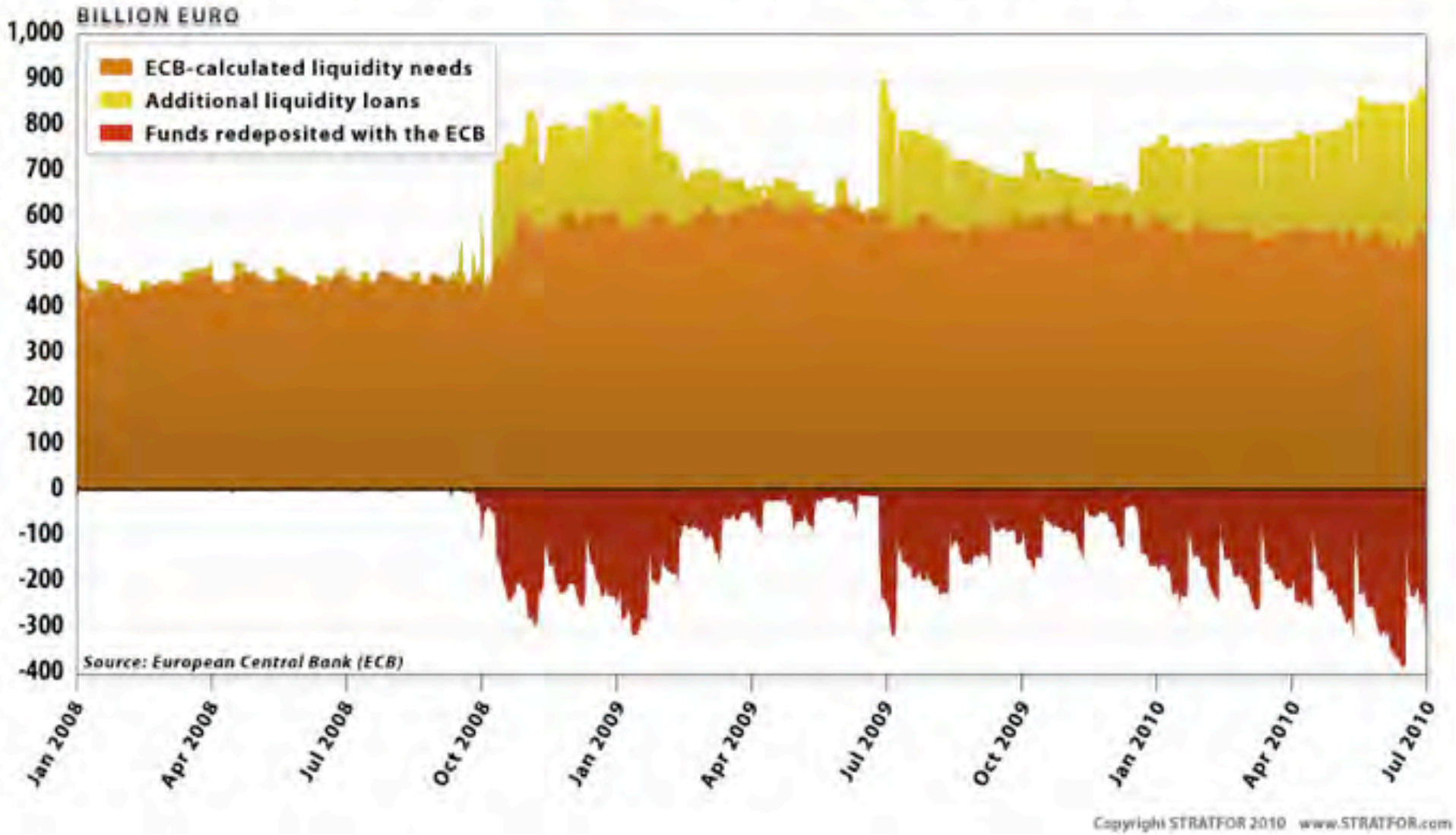


Federal Reserve Balance Sheet

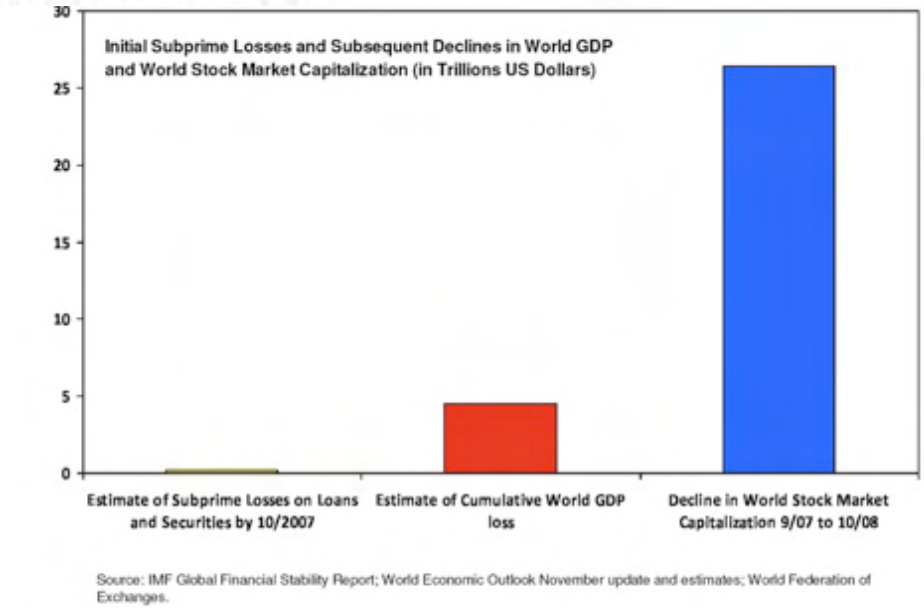


EUROZONE BANKS: LIQUIDITY SUPPLY AND DEMAND



Black Swan story

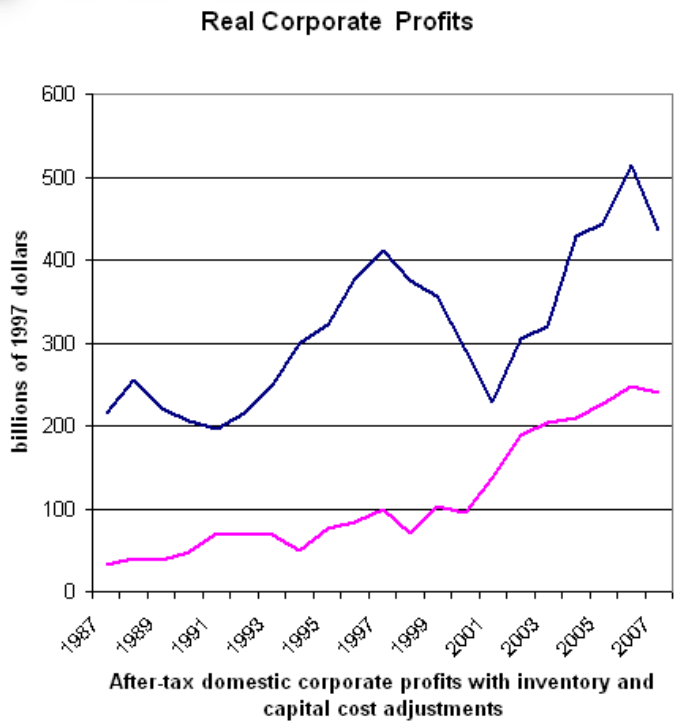
- Unknown unknowable event
  - ★ cannot be diagnosed in advance, cannot be quantified, no predictability
- No responsability ("wrath of God")
- One unique strategy: long put options and insurance

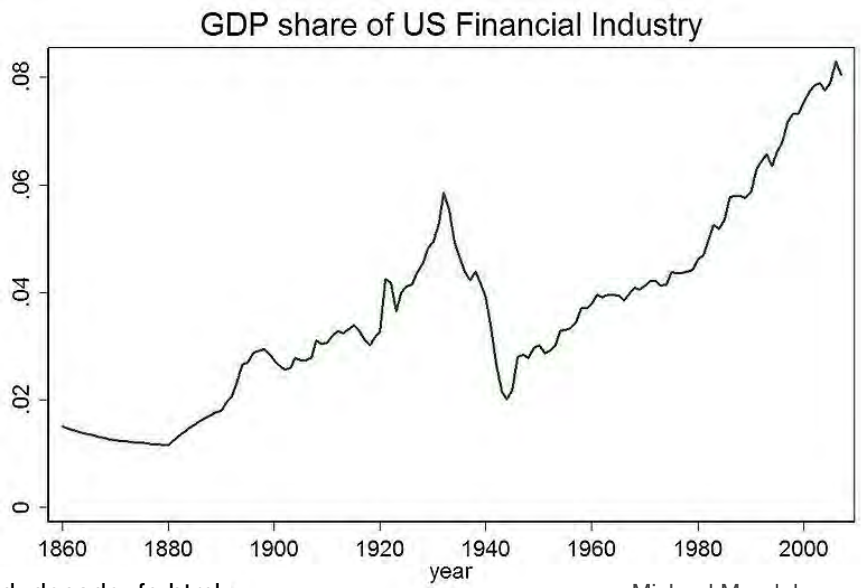


Dragon-king hypothesis

- Most crises are "endogenous"
  - ★ can be diagnosed in advance, can be quantified, (some) predictability
- Moral hazard, conflict of interest, role of regulations
- Responsibility, accountability
- Strategic vs tactical time-dependent strategy
- Weak versus global signals

POSITIVE FEEDBACKS





http://www.businessweek.com/the_thread/economicsunbound/archives/2009/03/a_bad_decade_fo.html

Origin of the 2007-XXXX crisis: 15y History of bubbles and Dragon-kings

- The ITC “new economy” bubble (1995-2000)
- “Slaving” of the Fed monetary policy to the stock market descent (2000-2003)
- Real-estate bubbles (2003-2006)
- MBS, CDOs bubble (2004-2007) and stock market bubble (2004-2007)
- Commodities and Oil bubbles (2006-2008)

Didier Sornette and Ryan Woodard
Financial Bubbles, Real Estate bubbles, Derivative Bubbles, and the Financial and Economic Crisis (2009)
(http://arxiv.org/abs/0905.0220)

Financial Crisis Observatory

www.er.ethz.ch/fco

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

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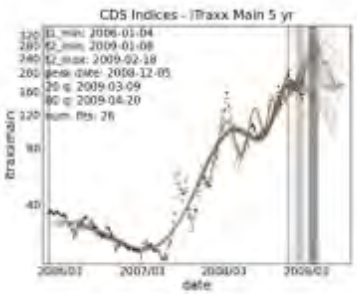
Financial Crisis Observatory

Financial Crisis Observatory

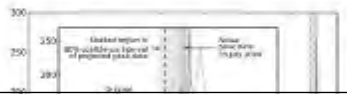
- Description
- Highlights
- Is there an oil bubble?
- Pertinent articles
- Websites and Blogs
- Market Anxiety Measures

The Financial Crisis Observatory (FCO) is a scientific platform aimed at testing and quantifying rigorously, in a systematic way and on a large scale the hypothesis that financial markets exhibit a degree of inefficiency and a potential for predictability, especially during regimes when bubbles develop.

Current analysis and forecasts

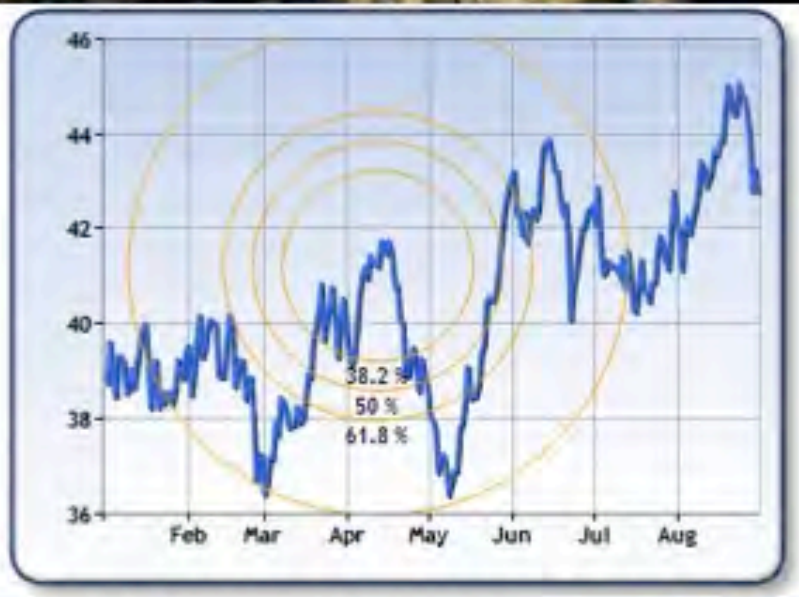


CDS (19 February 2009)
Our analysis has been performed on data kindly provided by Amjed Younis of Fortis on 19 February 2009. It consists of 3 data sets: credit default swaps (CDS); German bond futures prices; and spread evolution of several key euro zone sovereigns. The date range of the data is between 4 January 2006 and 18 February 2009. Our log-periodic power law (LPPL) analysis shows that credit default swaps appear bubbly, with a projected crash window of March-May, depending on the index used. German bond futures and European sovereign spreads do not appear bubbly. (See report for more information.)



OIL (27 May 2008)
Oil prices exhibited a record rise followed by a spectacular crash in 2008. The peak of $145.29 per barrel was set on 3 July 2008 and a recent low of $40.81 was scraped on 5 December, a level

Financial Observatory



International Herald Tribune, October 27, 1989. Kal, Cartoonists and Writers Syndicate, 1989.

The Financial Bubble Experiment

advanced diagnostics and forecasts of bubble terminations

- ***Hypothesis H1*: financial (and other) bubbles can be diagnosed in real-time before they end.**

- ***Hypothesis H2*: The termination of financial (and other) bubbles can be bracketed using probabilistic forecasts, with a reliability better than chance (which remains to be quantified).**

The Financial Bubble Experiment: Advanced Diagnostics and Forecasts of Bubble Terminations Volume III

R. Woodard, D. Sornette, J. Berninger
(The Financial Crisis Observatory)*
Department of Management, Technology and Economics,
ETH Zurich, Kreuzplatz 5, CH-8032 Zurich, Switzerland
(Dated: 2 May 2011)

This is a summary of the third installment of the Financial Bubble Experiment (FBE), where we identified 27 asset bubbles in November 2010 and revealed their names on 2 May 2011. Here we provide the following original documents packaged as one in the following sequence:

1. the initial public summary document of the FBE Vol. III, uploaded on 12 November 2010 as v1 at `http://arxiv.org/abs/1011.2882` and which includes the digital fingerprint of the original *Master* document of the 27 assets (item 3 in this list);

2. the **names**, **forecast quantiles** and final analysis of the 27 bubbles released on 2 May 2011;

3. the original *Master* document identifying the 27 assets, created on 11 November 2010 and whose checksum (digital fingerprint) appears in the document of item 1).

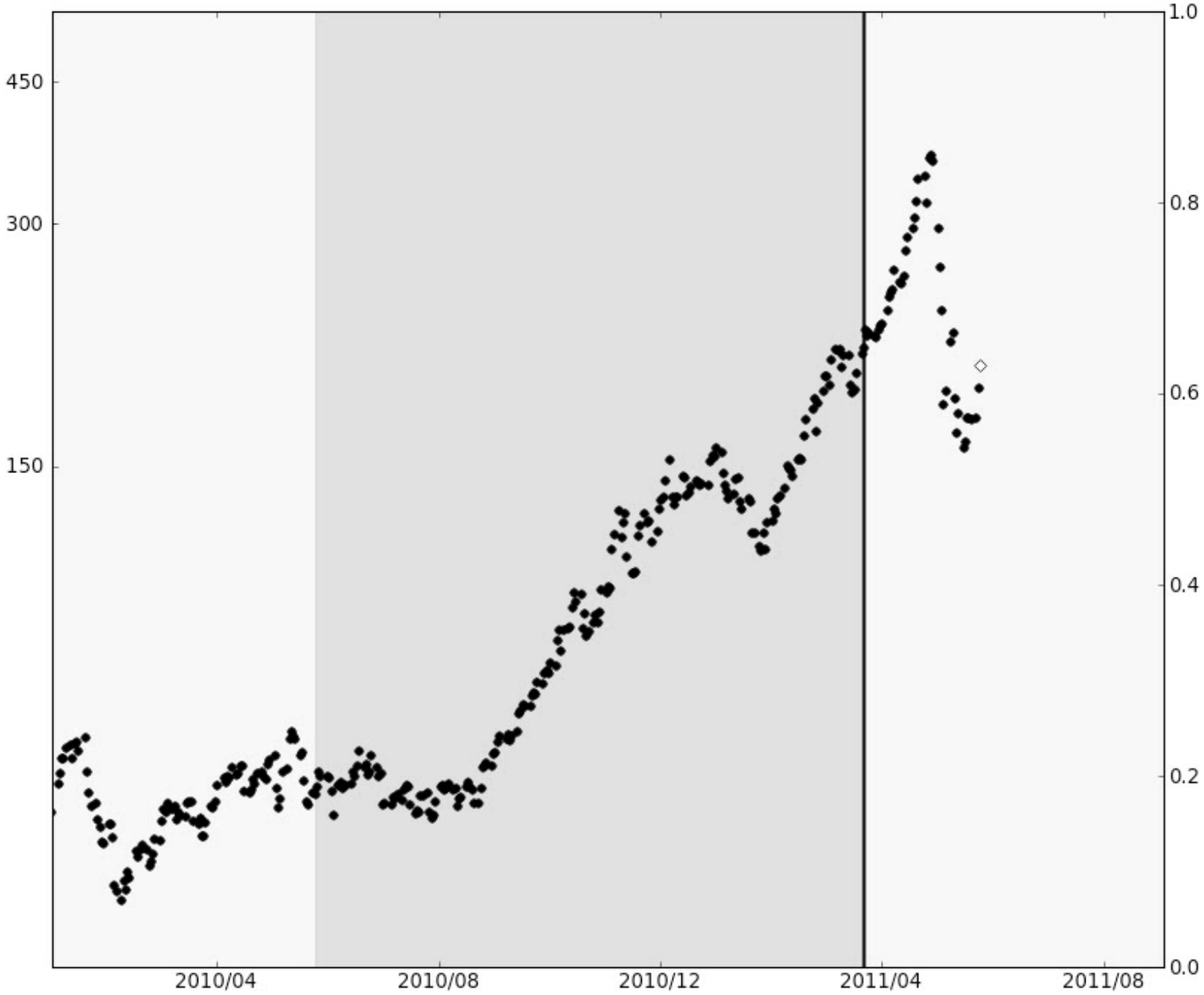
For the purpose of verifying the checksums of the original *Master* document (item 3 in the above list), it and the rest of the contents of this summary document can be found individually online at `http://www.er.ethz.ch/fco/index`.

The checksums of the document in item 3 are:

Document name	
SHA256SUM	4994beab18293be021d751d513b6fec0776fde9cf74c0098f7da8657487d950d
SHA512SUM	ee20682b696a2ce880870b513e7b9e7ebb67bfbe62e2cad50dd18276a5158765af6fdf88d9fef6e047526c40478a865c722cab041396aa8efdd95da24dd9239d

TABLE I. Checksums of Financial Bubble Experiment Vol. III forecast document.

Silver bubble and crash (May 2011)

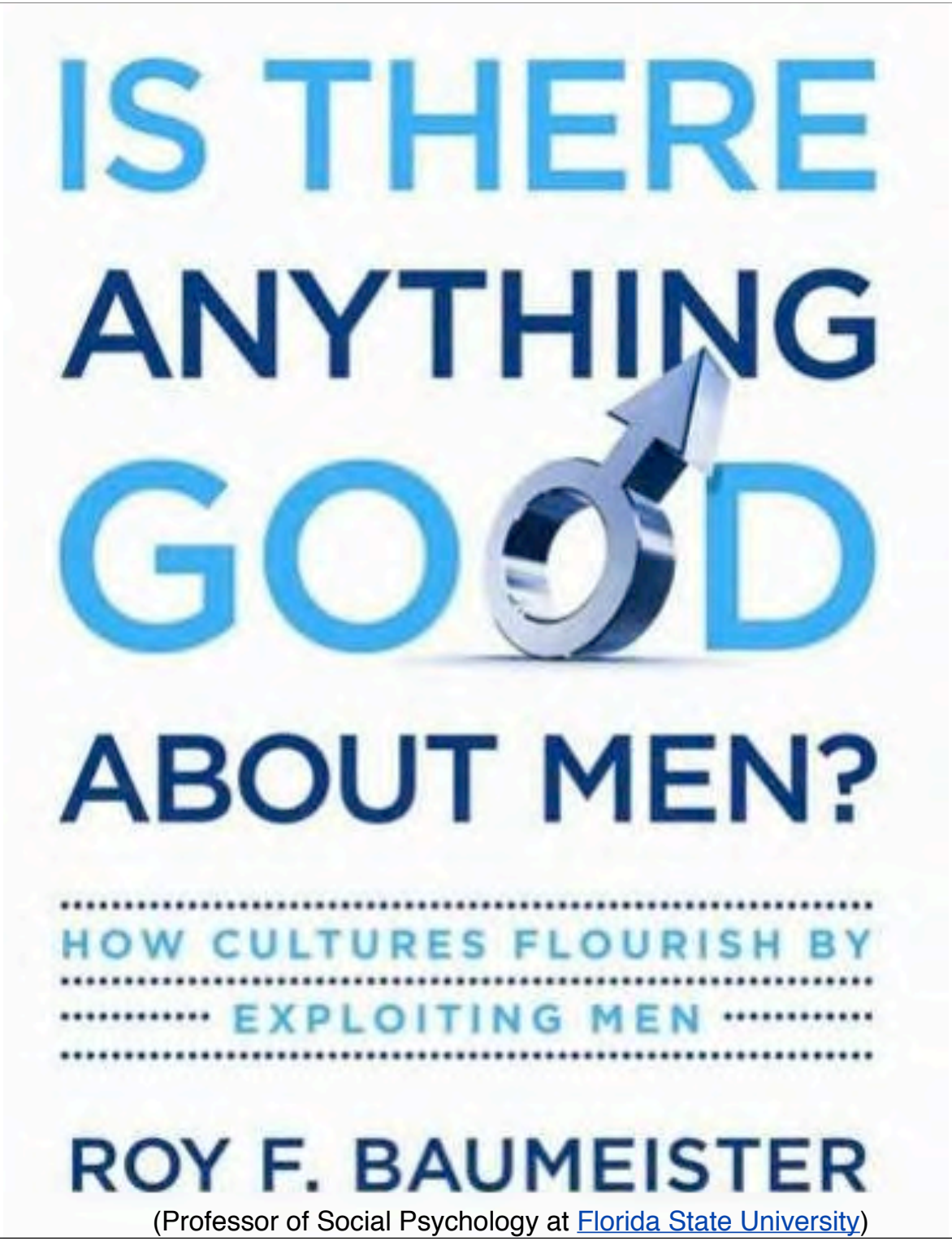


MESSAGE

- Crises are the “norm” rather than the exception
- Crises are often the consequence of excess leverage, i.e., bubbles
- Bubbles results from procyclical positive feedbacks
- Nonlinear stochastic finite-singular processes
- Possibility of developing probabilistic warning

  1) diagnostic of bubbles

  2) forecast of change of regime (burst)



(Professor of Social Psychology at Florida State University)

What Percentage of Our Ancestors Were Men?
The Most Underappreciated Fact About Men!

Men go to extremes more than women.

Men really are better AND worse than women.

If one were to look downward to the BOTTOM of society, one finds mostly men there too.

The pattern with mental retardation is the same as with genius.

Most cultures have tended to use men for these high-risk, high-payoff slots.

Men outnumber women both among the losers and among the biggest winners. (On the Titanic, the richest men had a lower survival rate (34%) than the poorest women (46%))

What is clear is that there are neurological differences between the sexes. Women, in very general terms, are less competitive, and less concerned with the status of being successful (Joe Herbert, Cambridge)

To maximize reproduction, a culture needs all the wombs it can get, but a few penises can do the job.

The differences between the genders are more about motivation than ability.

Higher sex drive in men.

Workaholics are mostly men.

Hardly any women improvise in Jazz... and so on, and so on....

(R.F. Baumeister, 2010)

What Percentage of Our Ancestors Were Men?
The Most Underappreciated Fact About Men!

Most men who ever lived did not have descendants who are alive today. Their lines were dead ends.

R.F. Baumeister: "Today's human population is descended from TWICE as many women as men."

I am going to show that the real situation is much more extreme!

Genetic Evidence for Unequal Effective Population Sizes of Human Females and Males

Jason A. Wilder, Zahra Mobasher, and Michael F. Hammer

Molecular Biology and Evolution (2004)

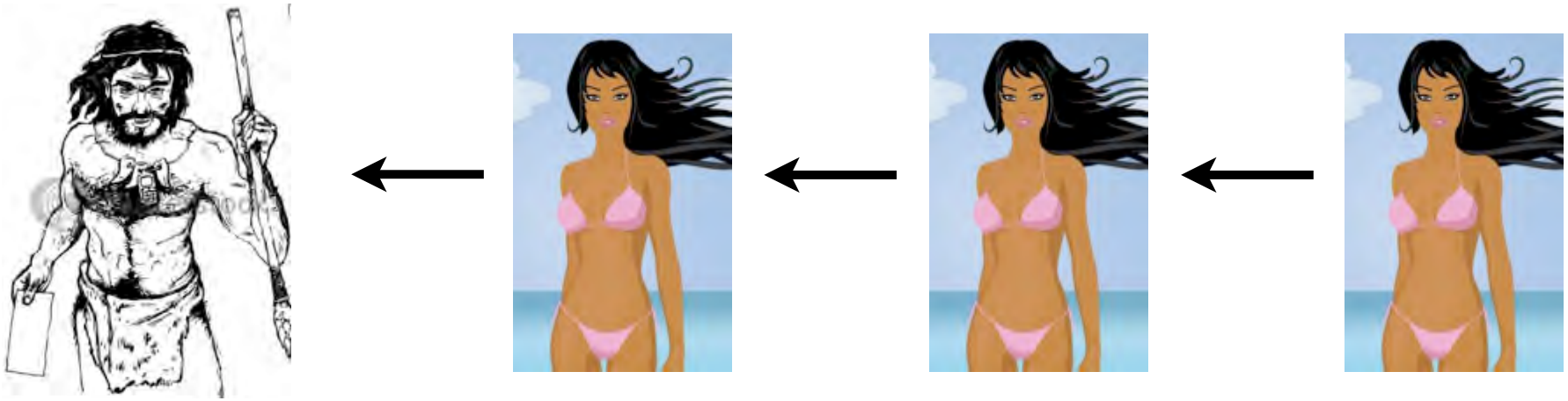
25 Khoisan, 24 Mongolians, and 24 Papua New Guineans (all males)

mtDNA transmitted 100% from their mother

=> gives genealogy of mother, mother of mother, mother of mother of mother, ...

=> female ancestor genealogy

=> Most Recent Common Ancestor Female (MRC-F)



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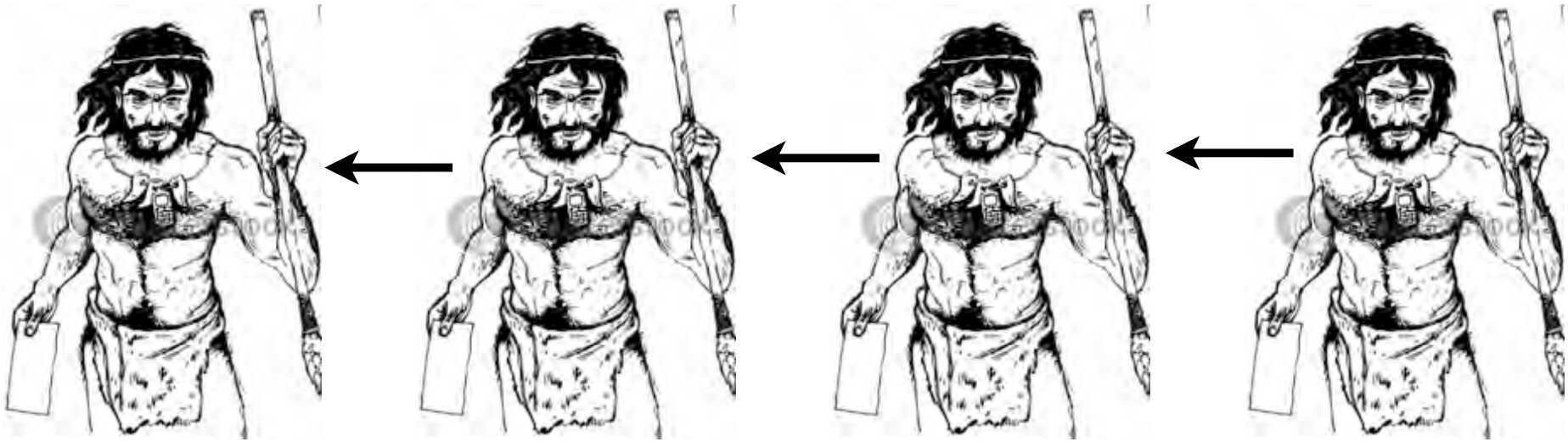
NRY (Non-Recombinant portion of Y chromosome) comes 100% from their father

=> gives genealogy of father, father of father, father of father of father, ...

=> male ancestor genealogy

=> Most Recent Common Ancestor Male (MRCA-M)



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mtDNA transmitted 100% from their mother

NRY (Non-Recombinant portion of Y chromosome) comes 100% from their father

Khoisan: **73.6 kya** for the NRY and **176.5 kya** for mtDNA
Non-African: **47.7 kya** for the NRY and **92.8 kya** for mtDNA

FACTOR 2 in time to MRCA

No difference in natural selection.

Results are most consistent with a
higher female effective population size.

Genetic Evidence for Unequal Effective Population Sizes of Human Females and Males

Jason A. Wilder, Zahra Mobasher, and Michael F. Hammer

Molecular Biology and Evolution (2004)

FACTOR 2 in time to MRCA

Does it mean that "Today's human population is descended from TWICE as many women as men"?

ANSWER: Today's human population is descended from 10'000 to 100'000 as many women as men !

In other words, for each male who made it today through his genes, 10'000 to 100'000 women made it !

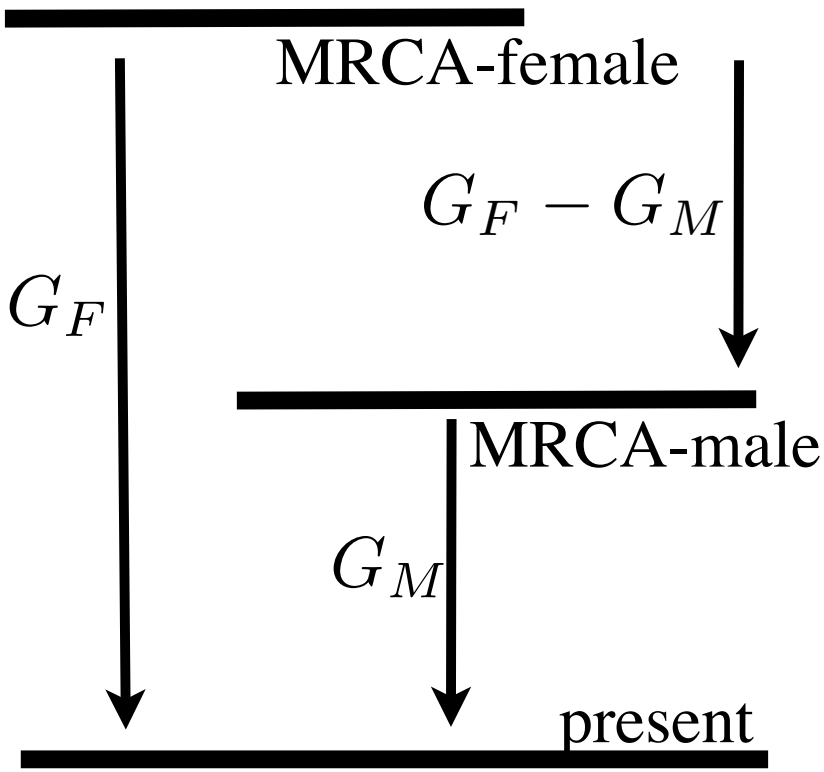
Let n_F and n_M be the number of girls per female and the number of boys per male

$$\alpha n_F = n_M$$

Let P be the number of females in the current generation

G_F and G_M : number of generations back in time where the most recent common ancestor (MRCA) female and resp. male lived.

$$\begin{aligned}
n_F^{G_F} &= n_M^{G_M} \\
n_F^{G_F} &= (\alpha n_F)^{G_M} \\
G_F \ln n_F &= G_M \ln(\alpha n_F) \\
\frac{G_F}{G_M} &= \frac{\ln(\alpha n_F)}{\ln n_F} \\
\frac{G_F}{G_M} &= \frac{\ln \alpha + \ln n_F}{\ln n_F} \\
\frac{G_F}{G_M} &= 1 + \frac{\ln \alpha}{\ln n_F}
\end{aligned}$$



As $\frac{G_F}{G_M} = 2$, we have $\frac{\ln \alpha}{\ln n_F} = 1$, thus $\alpha = n_F$ and $n_M = n_F^2$

Let n_F and n_M be the number of girls per female and the number of boys per male

$$\alpha n_F = n_M$$

Let P be the number of females in the current generation

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$$\boxed{\text{As } \frac{G_F}{G_M} = 2, \text{ we have } \frac{\ln \alpha}{\ln n_F} = 1, \text{ thus } \alpha = n_F \text{ and } n_M = n_F^2}$$

Ex: $n_F = 3,\ 4 \quad \rightarrow \quad n_M = 9,\ 16$

At the time of the male MRCA, for this one male, there were

$$n_F^{(G_F - G_M)} = n_F^{G_F/2} = P^{1/2} \quad \text{females}$$

who have transmitted their genes to the present generations

$$P \simeq 10^9 \quad \rightarrow P^{1/2} \simeq 10^{4.5} \sim 30'000$$

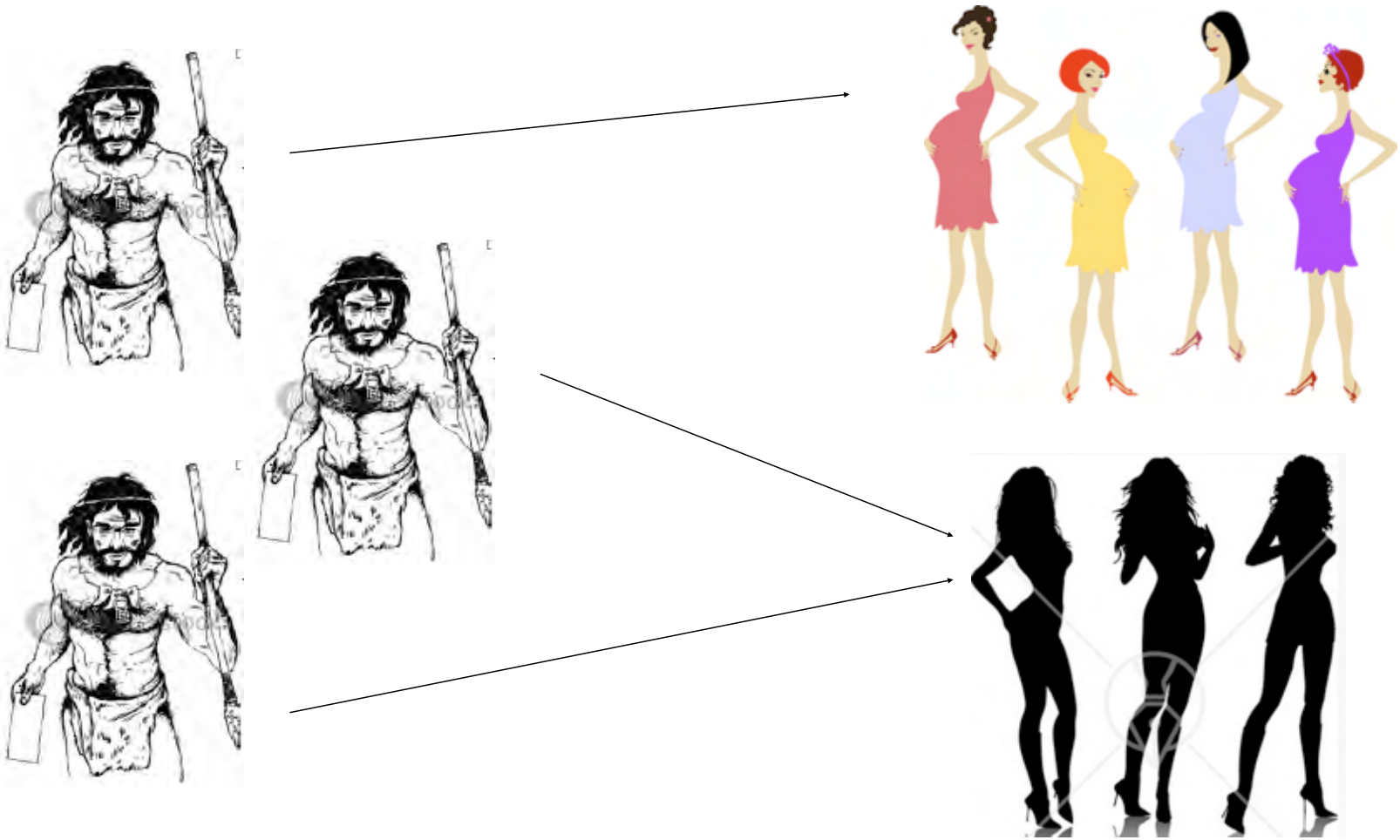
Today's human population is descended from 10'000 to 100'000 as many women as men.

Agent-based model

Picking couples

In an order randomized at each time step, each male picks up a random female (free or already pregnant).

If free: becomes pregnant with a 10% probability



Hypotheses to picking couples

- Males do not target immature females
- Males distinguish or not pregnant from adult pre-menopausal females
- There is an ‘inbreeding tolerance’ (0.1) to closely related couples (siblings or parent-child)
- As the order in which males are considered is randomized at each time step, it is as if males were picking females at the same time during each time step, and sometimes fighting for the same female, the winner being then randomly chosen.

Deaths

- Carrying capacity K (=2*Nmax)
- Total population N
- If N < K, only agents who reach the maximal allowed age die
- If N > K, each agent has a K/N probability to survive, and dies if reaches the maximal age

This maintains a constant population of about K agents at each time step.

Pregnancies and births

- Pregnant females remain so for G time steps
- If they die during pregnancy, unborn child is not counted as an agent
- Newborns have a 50% chance of being of either sex
- Children have to reach Maturity to be able to reproduce and participate to the ‘picking couples’ loop
- Children do not inherit any traits from their parents

1. Nf (100), the initial number of females
2. Nm (100), the initial number of males
3. Nmax (100), the 'carrying capacity': the maximum number of agents of either sex, i.e. the maximum size of the population is 2*Nmax
4. G (100), the pregnancy duration
5. Maturity (1500), the age at which agents of either sex become mature and can reproduce
6. Menopause (3000), the age at which females undergo menopause (we do not include menopause at the moment but we have the option)
7. MaxAge (3000), the maximum age that agents of either sex can reach
8. InbreedTol or Inbreeding tolerance (0.1), the probability that the program tolerates encounters between a closely related couple, defined as siblings or parent-child
9. ProbPreg or Probability of pregnancy (0.1), the probability that a free female becomes pregnant when hit on by a male, given that the encounter is tolerated. We usually chosse 0.1 because a human female is fertile about 2-3 days out of about 28 days. Example: when a male hits on his mother, the probability that she becomes pregnant, if she's free, is Inbreeding tolerance*Probability of pregnancy.
10. Definition of the sample of males, i.e. males the program considers to find their male or female Most Recent Common Ancestor (MRCA). Usually, we choose the complete next-to-last generation of males (which size is of order 300 with the above typical parameters).
11. Definition of the death distribution.
12. Niter (10^6), the number of iterations in the simulation run.

Our definition of a generation is based on the agents' date of birth and MaxAge: agents born between iterations n*MaxAge and (n+1)*MaxAge belong to generation n+1.

Algorithm finding ancestry lines

Algorithm 1: Follow female ancestry lines from a sample of males. Finding male ancestry lines works the same way.

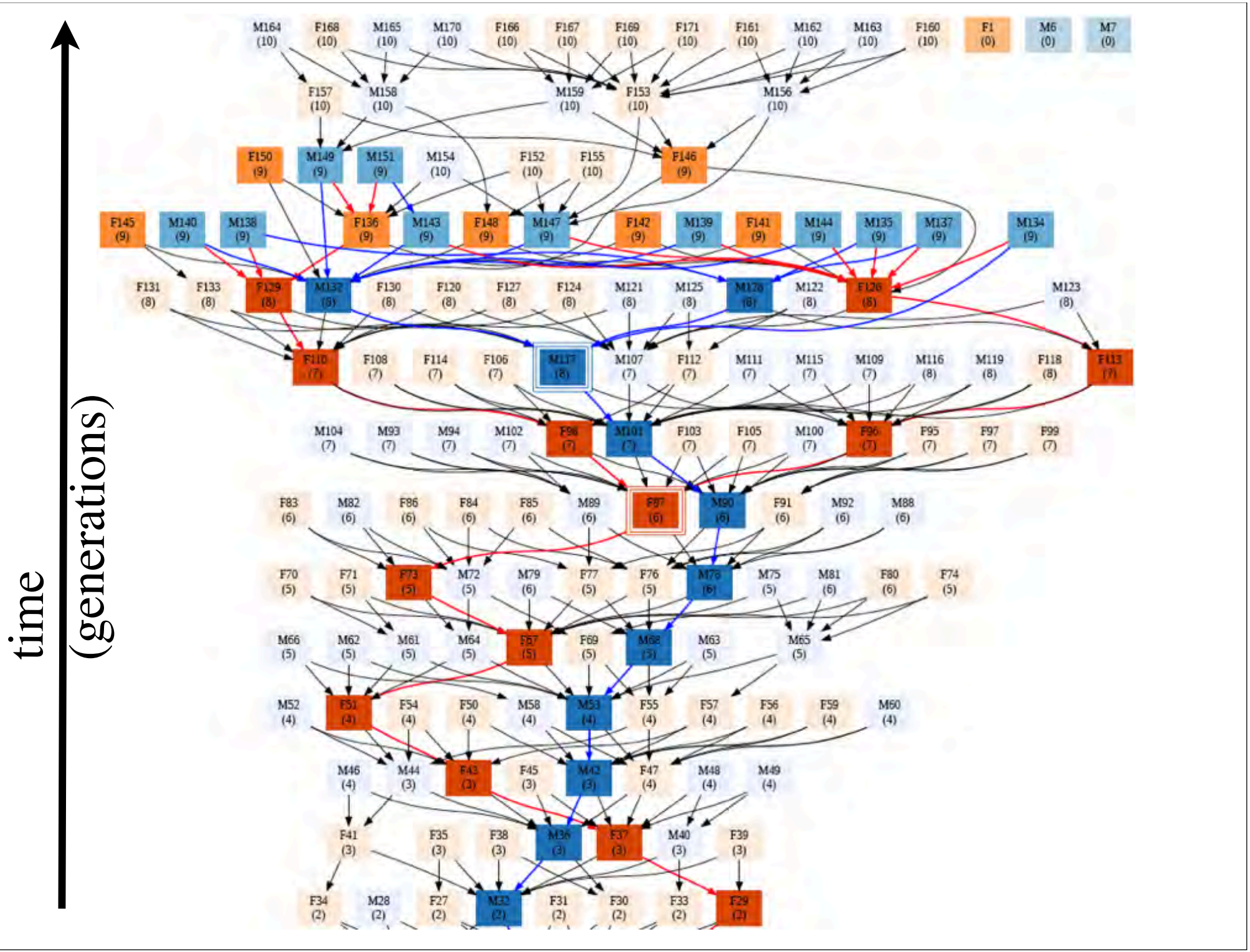
```
Input: A sample of males (vector Males)
Output: Female ancestry lines of the males (vector FemalesAncestors). Each ancestor has a
        counter descendants which is the number of descendants she or he has among the
        sample of males.
function Follow(agent)
    if agent has no mother then  // happens when agent belongs to initial population
        return
    end
    let ancestor = agent's mother
    if ancestor is not in FemalesAncestors then
        FemalesAncestors.Insert(ancestor)
    end
    add 1 to ancestor's counter 'descendants'
    Follow(ancestor's mother)
end
foreach male of Males do                                          // main loop
    Follow(male)
end
```

Algorithm finding the MRCA-F or -M

Algorithm 2: Finding the female Most Recent Common Ancestor of a sample of males. Date of birth is given in terms of number of time steps since the beginning of the simulation.

Input: A sample of males (vector Males), the vector FemalesAncestors, an MRCA (initially empty)
Output: The female MRCA

```
foreach ancestor of FemalesAncestors do
    if ancestor.descendants == Size(Males) then
        if MRCA does not exist yet then MRCA ← ancestor
        else
            if ancestor's date of birth > MRCA's date of birth then MRCA ← ancestor
        end
    end
end
```


time
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M163 (10)
F160 (10)
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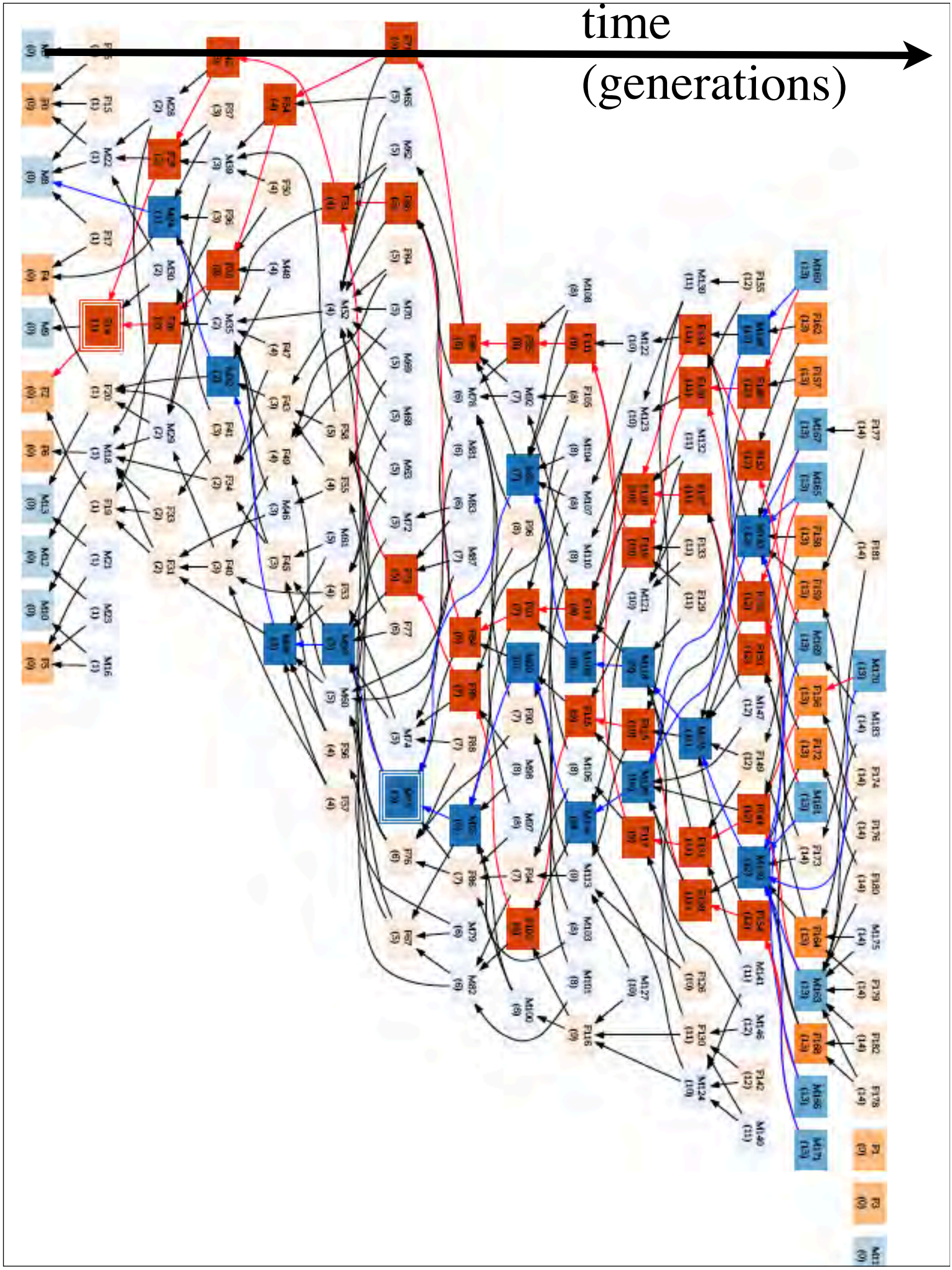
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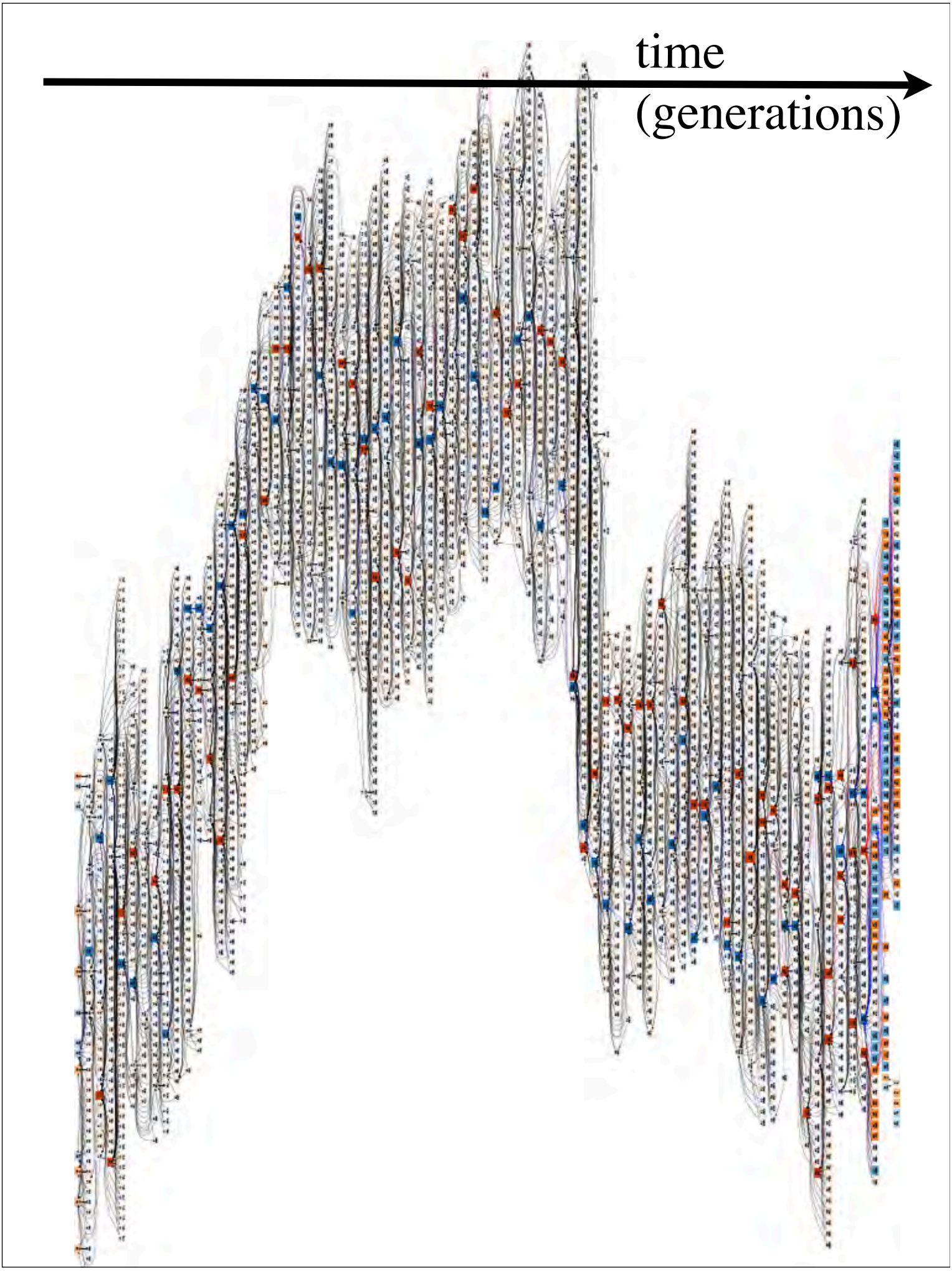
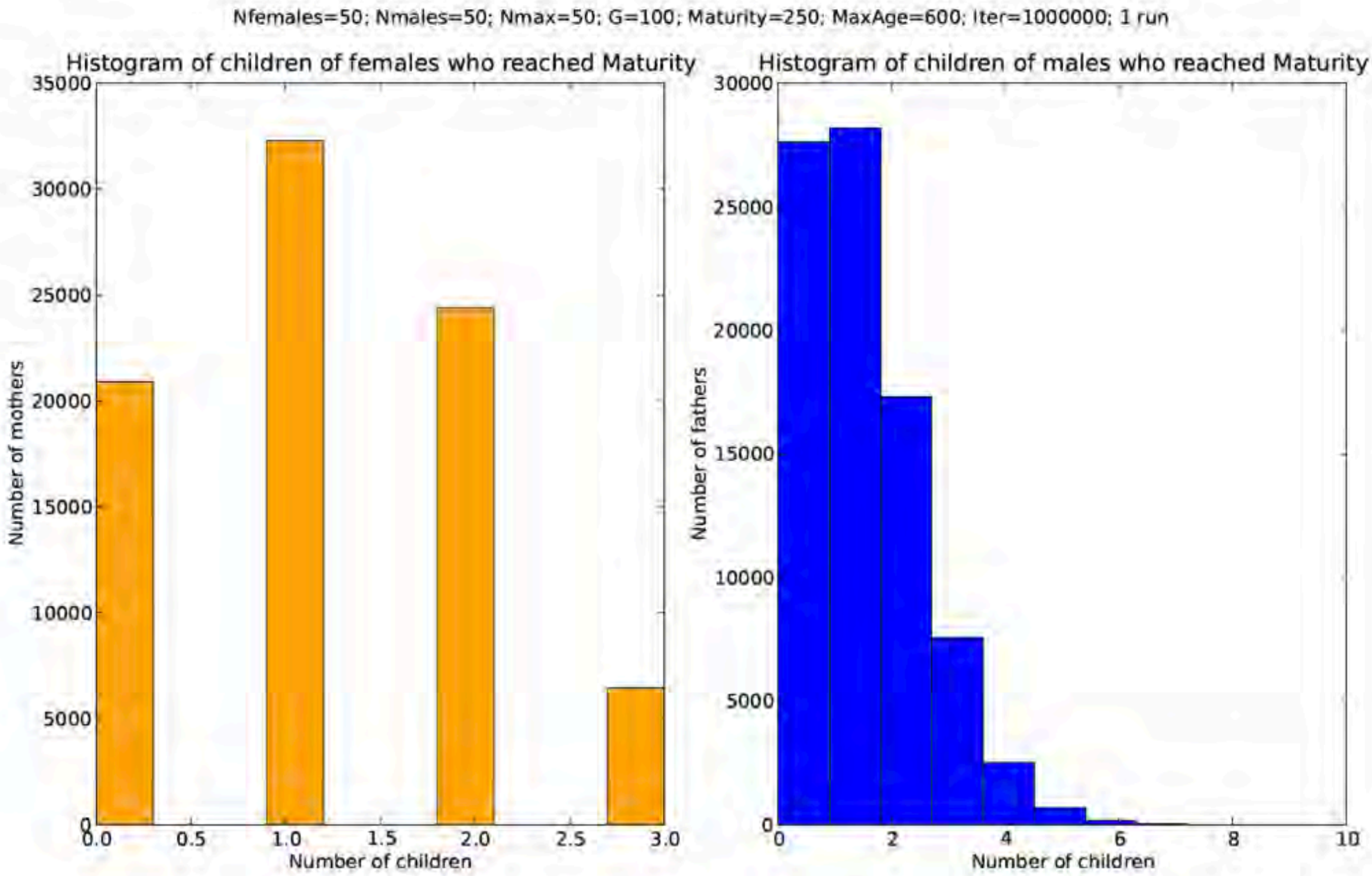
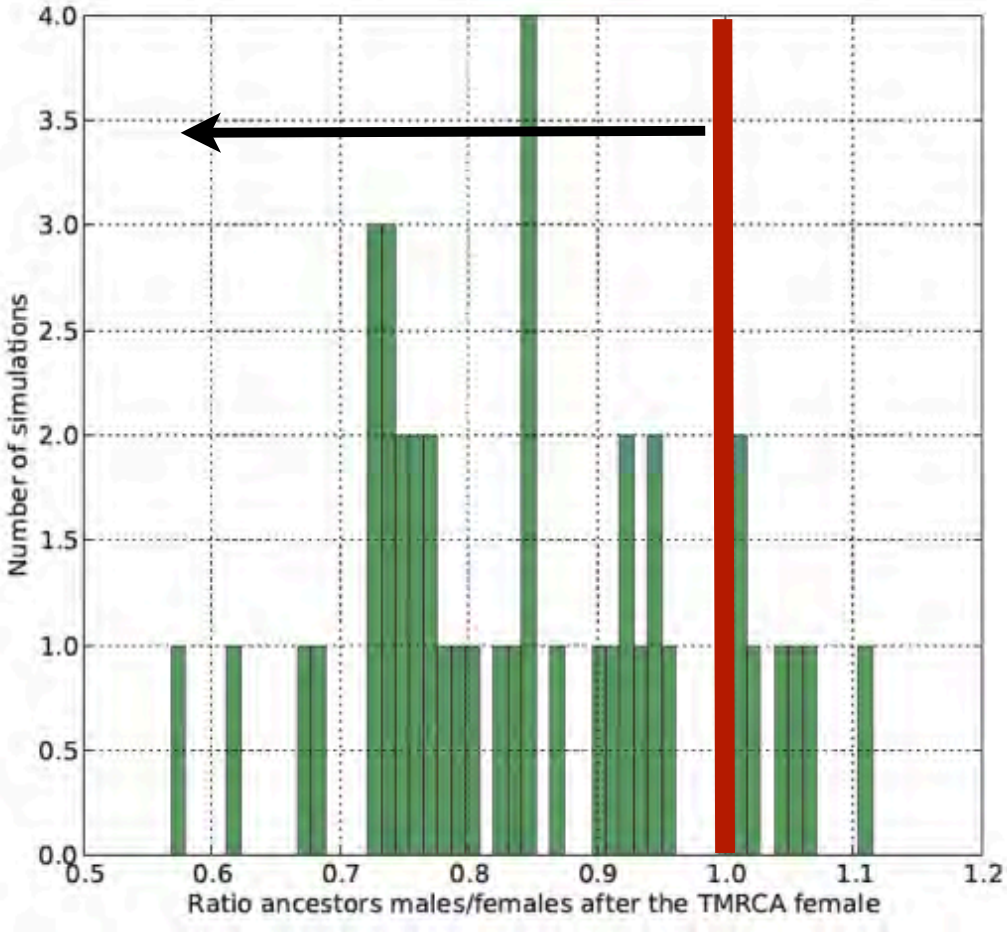
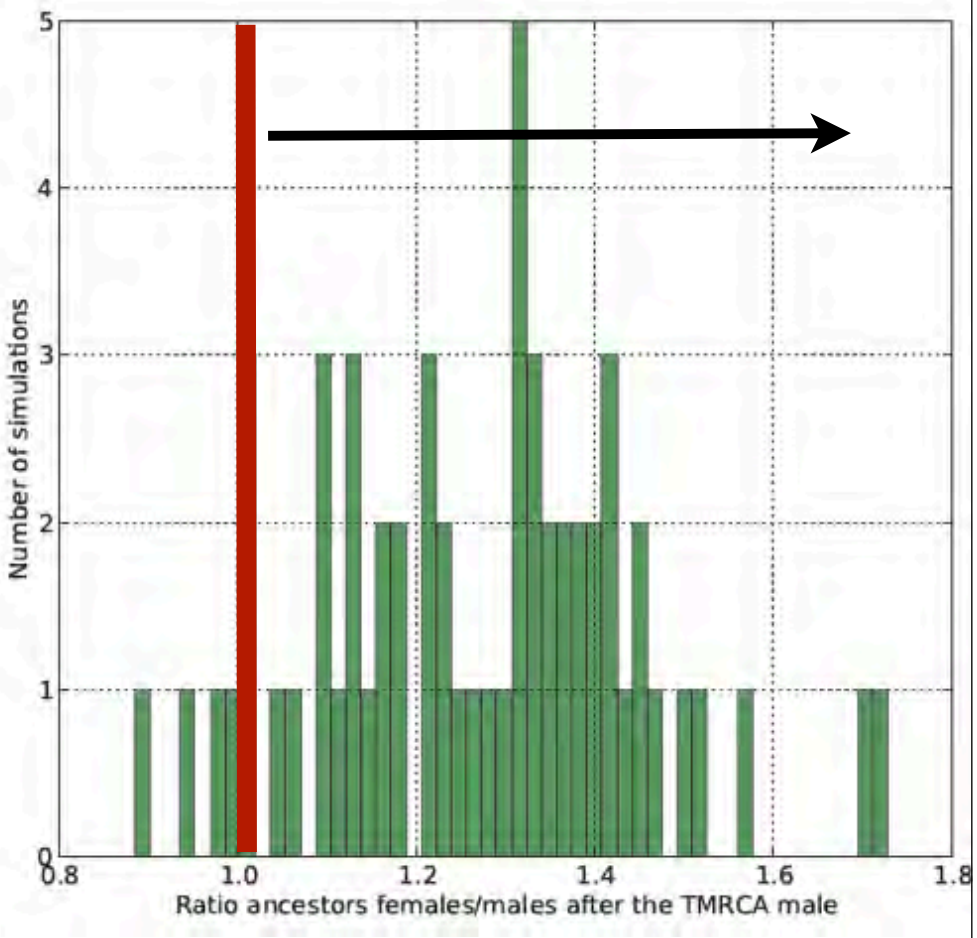

time
(generations)



limited population 50 males + 50 females
(>1600 generations)

RATIO ANCESTORS MALE / FEMALE





Male / Female
at TMRA female

Female / Male
at TMRA male

limited population 50 males + 50 females
(>1600 generations)

MRCA Male older (42 runs), Nfemales=50; Nmales=50; Nmax=50; G=100; Maturity=250; MaxAge=600; Iter=1000000; NGenerations=1667; Nruns=100; NoExtinc=100; BothMRCA=100

Theoretical mean-field model of female and male ancestors

$$
\begin{aligned}
n_M(t+1) &= n_M(t)(1-\alpha) + 0.5 n_{pF}^G(t)(1-\alpha) \\
&= (1-\alpha)\left[n_M(t) + 0.5 n_{pF}^G(t)\right]
\end{aligned}
$$

$$
\begin{aligned}
n_{fF}(t+1) &= n_{fF}(t)(1-\alpha) + 0.5 n_{pF}^G(t)(1-\alpha) - \eta n_{fF}(t) n_M(t)(1-\alpha)^2 + (1-\alpha) n_{pF}^G(t) \\
&= (1-\alpha)\left[n_{fF}(t) + 0.5 n_{pF}^G(t) - \eta n_{fF}(t) n_M(t)(1-\alpha) + n_{pF}^G(t)\right]
\end{aligned}
$$

$$
\begin{aligned}
n_{pF}^g(t+1) &= n_{pF}^{g-1}(t)(1-\alpha) \quad \text{for} \quad g = 2, \ldots, G \\
n_{pF}^{g=1}(t+1) &= \eta n_{fF}(t) n_M(t)(1-\alpha)^2
\end{aligned}
$$

$$
n_F(t) = n_{fF}(t) + \sum_{g=1}^{G} n_{pF}^g(t).
$$

$$
\begin{aligned}
n_F(t+1) &= n_{fF}(t+1) + \sum_{g=1}^{G} n_{pF}^g(t+1) \\
&= n_F(t)(1-\alpha) + 0.5 n_{pF}^G(t)(1-\alpha)
\end{aligned}
$$

Theoretical mean-field model of female and male ancestors

α is the probability to die at each time step.
η is the encounters' efficiency.
τ is $G+1$, where G is the pregnancy duration.
$x(t)$ is the number of free females.
$y(t)$ is the number of males.

$$\boxed{\begin{aligned} x(t+1) &= (1-\alpha)x(t) + \frac{3}{2}\eta(1-\alpha)^{\tau+2}x(t-\tau)y(t-\tau) - \eta x(t)y(t)(1-\alpha)^2 \\ y(t+1) &= (1-\alpha)y(t) + \frac{1}{2}\eta(1-\alpha)^{\tau+2}x(t-\tau)y(t-\tau) \end{aligned}}$$

Fixed point solution:

$$\begin{aligned} x^* &= \frac{2\alpha}{\eta}\frac{1}{(1-\alpha)^{\tau+2}} \\ y^* &= \frac{2\alpha}{\eta}\frac{1}{(1-\alpha)^2}\frac{1}{3(1-\alpha)^{\tau}-2} \end{aligned}$$

Theoretical mean-field model of female and male ancestors

$$x^* = \frac{2\alpha}{\eta}\frac{1}{(1-\alpha)^{\tau+2}}$$

$$y^* = \frac{2\alpha}{\eta}\frac{1}{(1-\alpha)^2}\frac{1}{3(1-\alpha)^{\tau}-2}$$

α is the probability to die at each time step.
η is the encounters' efficiency.
τ is $G+1$, where G is the pregnancy duration.
$x(t)$ is the number of free females.
$y(t)$ is the number of males.

As $(1-\alpha)^{\tau} \to 2/3$ from above, y* diverges but x* remains finite.

Most females are pregnant (unavailable). Almost zero probability to find a free female at each time step.

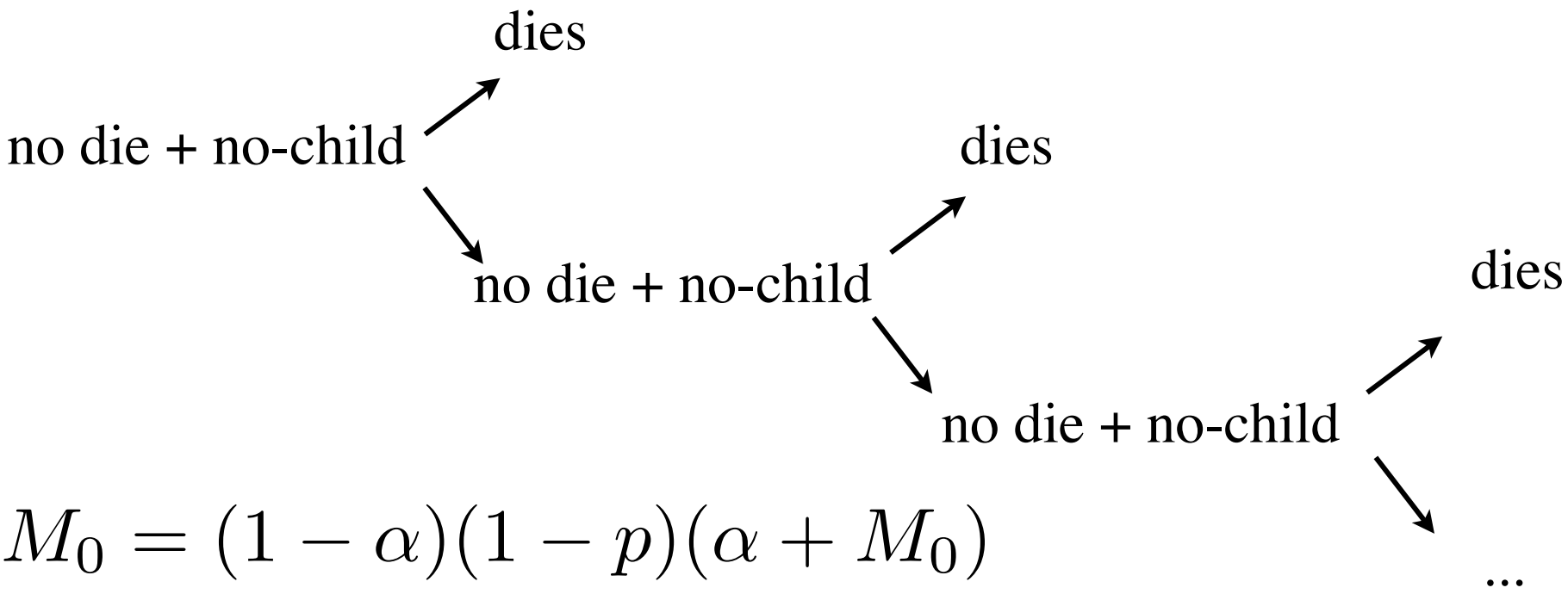
Almost all females are continuously pregnant and just a small fraction is free.

And at any time, a tiny fraction of males can fertilize the few free females.

Theoretical mean-field model of female and male ancestors

At each time step, the probability for a male to encounter a free female is p = x*/y* << 1.

Probability no child for a male:



$$M_0 = (1-\alpha)(1-p)(\alpha + M_0)$$

$$M_0 = \frac{\alpha(1-\alpha)(1-p)}{p+\alpha(1-p)} \quad \rightarrow \quad 1-\alpha \quad \text{for } p \rightarrow 0$$

Theoretical mean-field model of female and male ancestors

At each time step, the probability for a male to encounter a free female is p = x*/y* << 1.

Probability no child for a female:

$$F_0 = \alpha + (1-\alpha)\alpha + (1-\alpha)^2\alpha + ... + (1-\alpha)^{G-1}\alpha$$

$$= 1 - (1-\alpha)^G \approx \alpha \times G$$

$$\alpha = 0.05 \qquad G = 1$$

Probability no child for a male:

$$P_0 = \frac{\alpha(1-\alpha)(1-p)}{p + \alpha(1-p)} \qquad \rightarrow \qquad 1-\alpha \qquad \text{for } p \rightarrow 0$$

What Percentage of Our Ancestors Were Men?
The Most Underappreciated Fact About Men!

- Most ancient female ancestors have passed their genes to the present population.
- Most ancient male ancestors have **not** passed their genes to the present population.
- About 100 thousand years ago, when the most recent common male ancestor (MRCA) is found, as many as **thousands to perhaps hundreds of thousands of contemporary women** have been able to transmit their genes to the present generation (compared to just one man, this "most recent common ancestor").
- Theory and agent-based models suggest that this can result simply from difference in biology (cost of gestation and child caring) aided by male competition.
- Implications for understanding cultural evolution and social human norms.
- "**Nothing in human cultural evolution makes sense except in the light of this most underappreciated and extraordinary fact about female-male evolutionary success toward eternity.**" [inspired from Roy F. Baumeister, 2010]

What Percentage of Our Ancestors Were Men?

The Most Underappreciated Fact About Men!

Women specialize in the narrow sphere of intimate relationships. Men specialize in the larger group.

Men are social too — just in a different way.

The male pattern is suited for the large groups, the female pattern is best suited to intimate pairs.

Culture can be seen as a biological strategy.

Culture relies on men to create the large social structures.

Men create the kind of social networks where individuals are replaceable and expendable. Women favor the kind of relationships in which each person is precious and cannot truly be replaced.

Fundamental Origin of the Crises

FINANCIAL SYSTEM

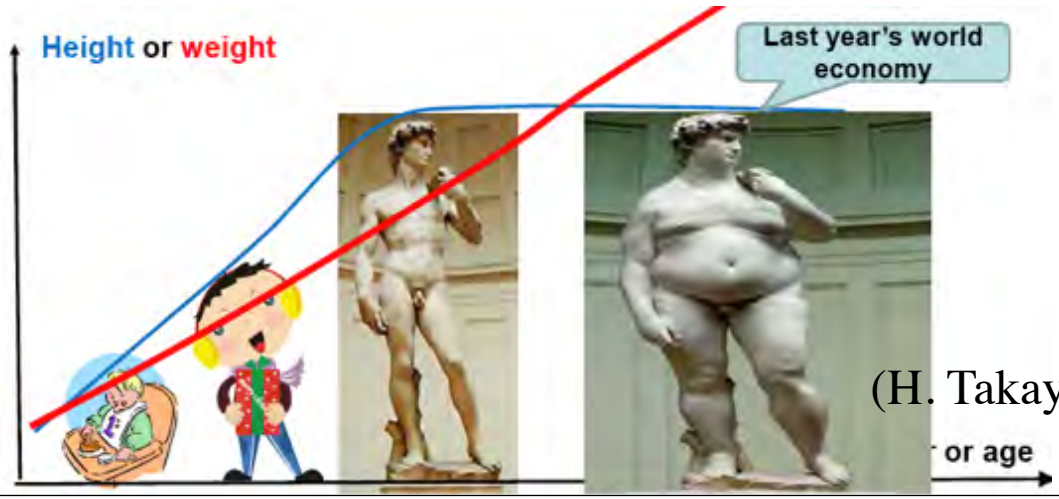
- The illusionary quest of society-at-large, pensions funds, mutual funds... to gain more than 2% return in real terms (above inflation)
- The "gambling society" (stardom culture, emphasis on "luck") vs work and risk management

The root cause of the crisis is our illusion on financial solution to growth (high returns above GDP growth).

FOOD AND HEALTHCARE

- The illusionary syndrome for "blue pills and red pills"...
- Principle of least effort (Zipf, 1949)
- Principle of immediate or short-term gratification (large "discount rate")

The root cause of the coming healthcare crisis is our illusion in simple top-down control technical solutions as opposed to account for systemic network of networks.



(H. Takayasu)

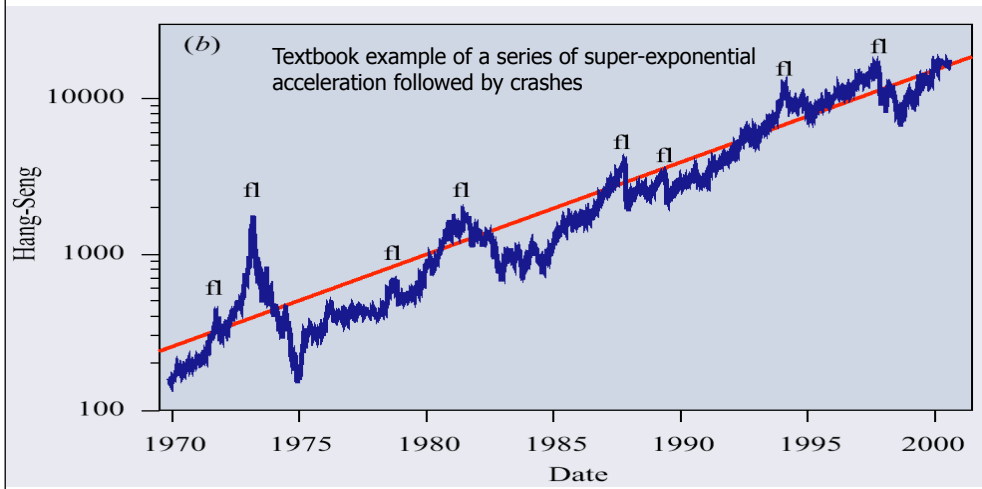
HUMAN INTRINSIC WEAKNESSES

Fundamental failure to grasp the SYSTEM nature of the problems:
Instead, one problem => one proximate solution: THIS IS WRONG!

FINANCIAL SYSTEM

- Bankers are sellers of dreams.
- Bankers exploit our illusions and cognitive limitations... like casinos and lotteries...

Hong-Kong



FOOD AND HEALTHCARE

- The food industry exploits our weakness (addictive and/or compensatory nature of some foods).
- The pharmaceutical industry exploits our illusions for simple solutions to health problems.

CONFLICTS OF INTERESTS

FINANCIAL SYSTEM

Loss of "Fiduciary Principle"

'*no man can serve two masters*'
(J. Bogle, former CEO Vanguard group, JPM 2009)

"Legal relationship of confidence or trust between two parties"

The issue of "moral relativism"

Moral hazard

Incentives

FOOD AND HEALTHCARE

Loss of "Hippocratic oath"

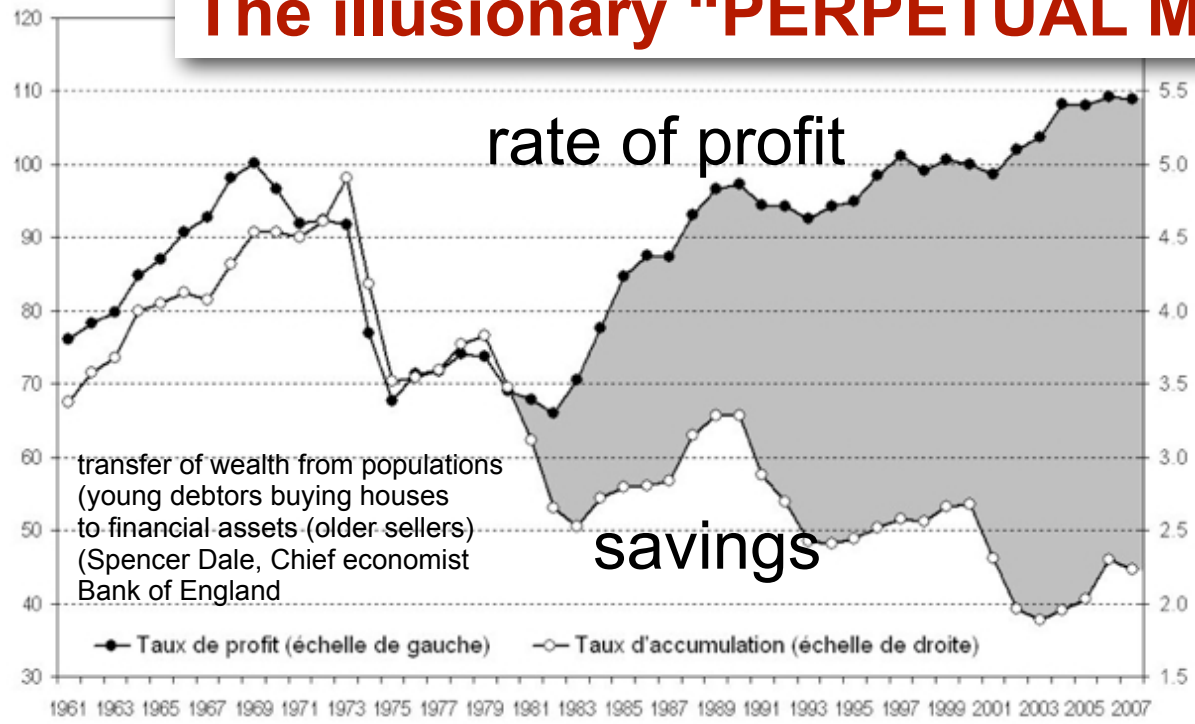
'*nil nocere*'

Fundamental conflict of interest to keep us "marginally ill"

Maximizing share-holder value

Rational focus on short-term in the presence of large risks and uncertainties

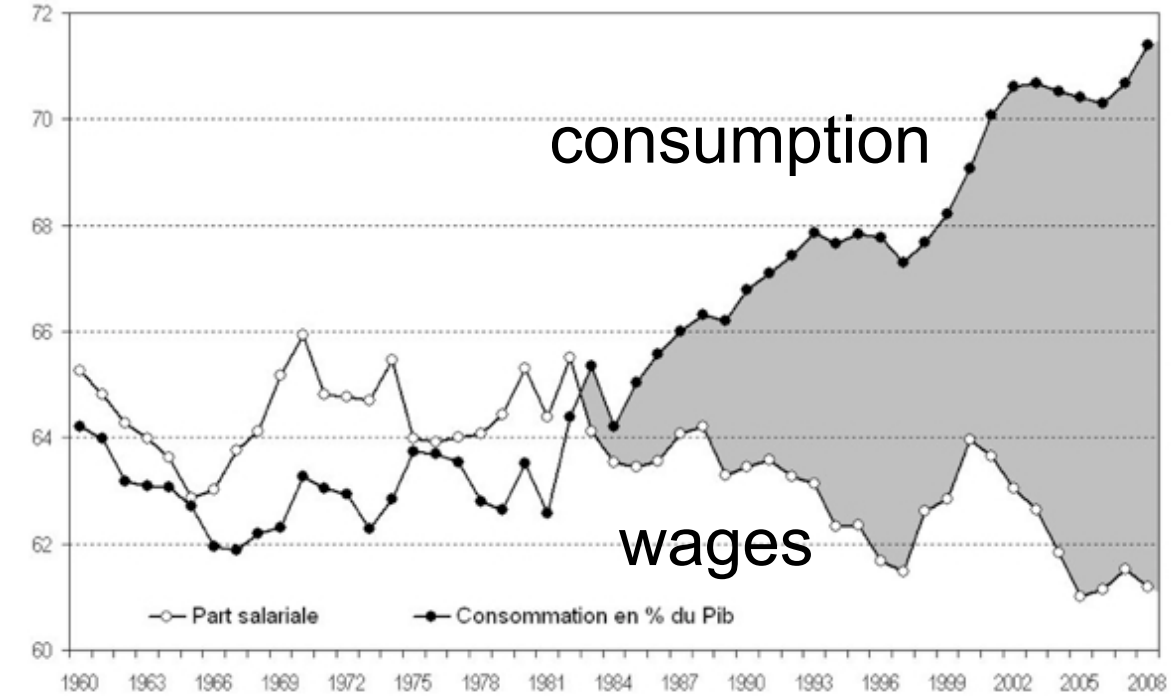
The illusionary "PERPETUAL MONEY MACHINE"



Rate of profit and rate of accumulation: The United States + European Union + Japan

* Rate of accumulation = rate of growth rate of the net volume of capital * Rate of profit = profit/ capital (base: 100 in 2000)

Sources and data of the graphs: http://hussonet.free.fr/toxicap.xls



Thee gap widens between the share of wages and the share of consumption (gray zones), so as to compensate for the difference between profit and accumulation. FINANCE allows increasing debt and virtual wealth growh... which can only be transitory (even if very long).

United States Share of wages and of private consumption in Gross Domestic Product (GDP)

Source of data and graphics: http://hussonet.free.fr/toxicap.xls

Solutions for Financial and biological Health?

Solutions have to go very deep to the roots to develop a culture of ethics, morality and respecting the fiduciary principle.

Social capital includes reciprocal effects, fairness, altruism and other-regarding behavior rule the world.

Self-sustaining incentive to foster "social capital" of a culture / society / communities / group.

Field studies and lab experiments in close combination with complex system theory (ABM) can considerably contribute to improve the understanding of cooperation in order to promote and spread a sustainable behavior.