

Human Carrying Capacities: a New Economics

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Abstract— *This ‘position’ paper explores a methodology for changing how economists view the world. In biology, the ‘carrying capacity’ (‘K’) is the maximum sustainable population where deaths catch up to births, usually due to resource depletion, competition, and disease. If the global economy was to internalize the sum of our resources, its collapse, together with recent ‘ecological surprises, may well be another early warning that the world at 7 billion people has surpassed K. Criteria for a new economic model are proposed, which, applied to accumulating debt and unemployment, support the early warning hypothesis. ‘Depopulate, automate, and conserve’ policies are proposed to be the best approach to this threat to the quality of human life.*

Index Terms— *Global economy, externality, overpopulation, carrying capacity (‘K’), resource depletion.*

1. INTRODUCTION

Unable to explain current economic difficulties, former chairman of the Federal Reserve Alan Greenspan stated:

“I made a mistake in presuming that the self-interest of organizations, specifically banks and others, was such that they were best capable of protecting their own shareholders and their equity in the firms”.¹

Thus, the “enlightened self interest” assumed by liberal economic philosophy from Adam Smith to Milton Friedman simply no longer fits the facts. No accurate economic ‘big picture’² exists. This is mainly because economic theorists have always ‘externalised’ the biological limitations on an economy, especially overpopulation^{3,4}.

The legal philosopher Hart⁵ first sought a ‘big picture’ of basic human needs, recognizing that legal theory needed to ‘fit the facts’. He set out ‘moral minima’ for humans - including limited altruism and limited resources. Hart’s methodology of first seeking an accurate “big picture” is noted here for economic theorists to

¹ Edmund L. Andrews, “Greenspan Concedes Error on Regulation” New York Times October 23, 2008 www.nytimes.com/2008/10/24/business/economy/24panel.html?n=Top/Reference/Times%20Topics/People/G/Greenspan,%20 in response to Congressman Henry Waxman, Chairman of the Oversight and Government Reform Committee that day.

² Colander, D., Föllmer, H., Haas, A., Goldberg, M., Juselius, K., Kirman, A. Lux1, T. & Sloth, B. “The Financial Crisis and the Systemic Failure of Academic Economics”, opinion paper from a ‘Modeling of Financial Markets’ 98th Dahlem Workshop, 2008.

³ Ord, 2006.

⁴ Diamond 2004.

⁵ Hart HLA “Social Solidarity and the Enforcement of Morality”, (1967) 56 University of Chicago Law Review, 9

consider – in terms of limited resources, overpopulation, and the “carrying capacity (‘K’, the maximum sustainable population) of states or regions.

2. METHODOLOGY

“Big picture” economic appreciation requires multidisciplinary research to obtain enough scientific information to propose a model. An economic theory must be able to reconcile unassailable basic limitations from physics, from biology and from its fellow social sciences. Old economic theory promoted large populations for both markets and large labour pools and externalized the ultimate consequences of these in terms of resources and pollution. But habitable territory and non-renewable resources (water, oil) are unassailable limitations - desert countries cannot support large populations. Meanwhile, past & present Western economic crises have largely involved ‘debt’ (a promise to pay for the value of a purchase) and ‘redundancies’ (unemployment), with little predictability.

In contrast, a ‘big picture’ economic model based on limited resources:

- would treat human economic ‘growth’ like any other biological growth curve (i.e. Fig 1).

Fig. 1: Verhulst Logistic Growth

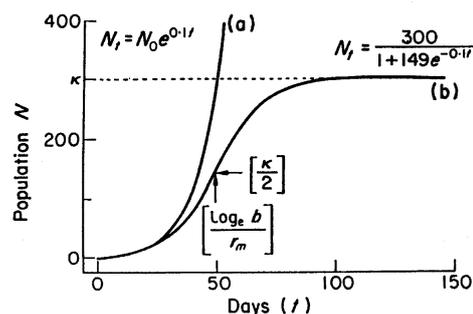
$$dN/dt = rN [(K - N)/K]$$

$$Nt = K / (1 + b e^{-rt})$$

$$b = (K - N_0) / N_0$$

$$\ln h = t/r$$

Source: Lectures from Centre for Biological Control.



<http://www.cnr.berkeley.edu/biocon/BC%20Class%20Notes/67-72%20Factors%20Growth.pdf>

In such models, K , the point at which births = deaths, defines the local carrying capacity.

- b. would see 'redundancies' for what they are – literally humans 'excess to capacity';
- c. would predict when debt could not be repaid (such as the subprime debt of 2008-9) because resources are no longer available
- d. would take account of humans' highly evolved "social contracts":
 - Labour in return for food and shelter;
 - The 'rule of law' – protection in return for compliance.
 - Responsibility in return for 'rights'.
 - The acceptance of 'money' as a substitute for barter when supplying a good or a service.
- e. would involve thinking from the bottom-up⁴, starting from 'human resources' (real people or 'laborers') who are generally required to add value even with automation.
- f. would involve thinking from the top-down⁶:
 - With population-based resourcing, a country which retains non-renewable resources does not need to trade (as much) and is less vulnerable.
 - With Hart's 'basic needs', a country which cannot supply its population with a basic need (food or shelter) will exceed its carrying capacity (' K ') unless it can buy it.
 - Trade involves borrowing to pay for the resource, while you supply your own resources and wait for payment. Is debt via money still appropriate?
 - There is likely to be some economic predictor for a country approaching K .

3. ASSESSMENTS

Both Hart's model and population-based resourcing can be addressed in terms of bottom-up basic needs for shelter and consumables. Focusing on shelter and excluding people who have 'secured' their shelter*, an economic

* Banks in a country lend to its individuals, and the shelter (i.e. housing) is provided. The laborer pays back the bank, and the bank services its debts. People who have paid in full for their shelter can then use their income to invest in banks by lending the banks their money, and a cycle ensues. But if the bank doesn't get paid as with the US subprime situation, the houses are abandoned or foreclosed and the debts passed on to the bank. If enough debts come to rest with the bank the bank's value collapses as shareholders realize that they are unlikely to get their investment back. At this stage prudent investors who had completely paid for their shelter and other assets lose their savings but are otherwise secure. The population of non-debtors will survive as they can work for consumables and they have their shelter. Up to 40% of 17 million (mostly older) British homeowners are debt free and have 1.4 trillion pounds in shelters ! The situation is similar in the US south, but only 17% in the US west are mortgage-free . These are the lucky ones.

overview which is compatible with biology can be proposed to explain the subprime crisis:

- Shelter is a basic need.
- Both employee and employer are often in debt to the bank. If the bank cannot or will not lend more money, both employee and employer debt increases, because neither can service existing debt.
- Laborers' wages cannot pay off debt and buy resources, consumption drops and foreclosures commence.
- Employers who produce the resources do not sell as much and have to cut back on production and lay off staff.
- Redundant staff (as in the USA where up to 10% are expected to be unemployed by 2010) are surplus and unsupported in their community.
- It is intuitively evident that the community carrying capacity ' K ' has fallen, victims must seek to 'make a living' elsewhere, or alternatively the state has to take over providing shelter to the unemployed.
- But the state itself has high debt and limited resources. Americans owe more than \$10 trillion dollars for mortgages), and the US debt to China is \$2.5 trillion as of early 2009.

An alternative hypothesis mooted for the economic downturn is a lack of trust in the monetary system. Most now agree that the subprime crisis was in essence a pyramid scheme, and pyramid schemes often continue until the 'resources' of the participants are exhausted. But resources are already limited, especially money. Interestingly, recent media reports the lack of money to lend has led to Europe considering barter, suggesting that money may be sidestepped.

Some commentators still believe that Western populations need to increase births and migration⁶, to maintain production and consumption. While this is counterintuitive, the latter can only be tested when the critical parameters are internalized.

4. DISCUSSION

K can be assessed locally or globally, and has significant "quality of life" implications for an economy. Cohen⁷ stated that "human carrying capacity cannot be defined independently of other regions if that nation trades with others and shares the global resources." Trade clearly allows rich countries to postpone locally or even

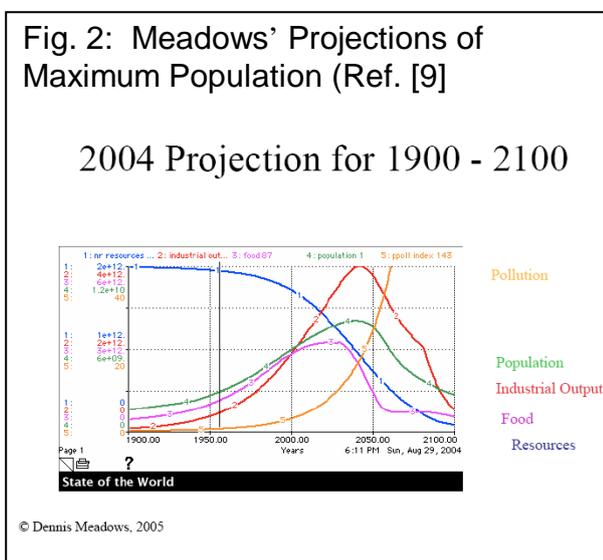
⁶ Russell Shorto "No Babies?" *New York Times, Magazine* June 29 2008 http://www.nytimes.com/2008/06/29/magazine/29Birth-t.html?_r=3&pagewanted=all&oref=slogin&oref=slogin

⁷ Cohen, JE, Population growth and Earth's human carrying capacity, *Science* 269, 341 (1995).
<http://www.biology.ualberta.ca/courses/biol468/uploads/w05/announcements/Topic%2001%20Population%20growth%20paper.pdf>.

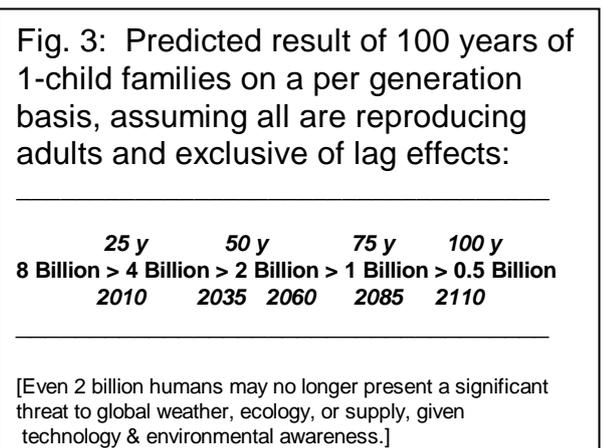
avoid the parameters contributing to K. The United States through debt servicing, for example, may have sufficient land, water and energy to prevent deaths from rising to match births for some time.

However, with costs for these basics escalating, the United States now finds itself with debt which must frequently be assumed by the taxpayer. There appears to be scope for a precursor to K, K', the load on a society due to debt, unemployment or rationing (of shelter, food, health care and education), which exceeds its ability to take on new births or immigration.

Such a point (K or K') is proposed to signal that local carrying capacity has been reached. Any economics based on K thus internalises resource depletion and pollution, migration and births.



A K based model immediately puts economics in perspective. A population in excess of K will decrease (Fig 2). How it decreases is up to us. Apocalypse is the usual means, but the perspective allows fresh approaches to be considered. For example, an alternative to the economic "growth" model (of more labour for more products for more capital) becomes obvious: "depopulate, automate and conserve". One-child families appear to rapidly result in sustainable population levels³. (Fig. 3).



Intuitively, a state whose citizens voluntarily undertook 100 years of one-child families would soon have adequate *per capita* shelter and resources, particularly with automation, to avoid the debt, unemployment and rationing issues of their grandparents. Is it just a coincidence that China and India, both of which undertook single child family policy, pulled themselves out of economic torpor so quickly?

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