

Mankind's Future in Doubt?

By

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All NYC high schools are required to have a health resource room where free condoms are available. Parents can choose not to allow their children to use the resource room. CBS has learned about 2 percent do just that.

CBS News: May 24, 2012

Overview

Statistically speaking contraception prevents far more live births from occurring in the United States than does abortion of which there have been 55 million since Roe v. Wade was decided almost 40 years ago. Thus, the Pope, his Cardinals, his Priests and their legions of followers are right -- use of "the pill" is just as antiseptic, or invisible, a method of preventing new life as dropping a bomb from 10,000 feet is at ending it. For both the pilot delivering his version of doom, or the woman swallowing a dose of progesterin, the termination of life and/or the prevention of it, is experienced as a passive act. For the innocent victims of either approach, however, it matters little what method of execution was chosen – it's all over for them! Likewise for the tens of thousands of embryos (aka "snowflakes") routinely discarded by fertility clinics.

Meanwhile, in some quarters it is claimed that every life (from conception to death) is pre-ordained. Such a belief stands in contrast to the incredible roll of the dice that 360 million genetically unique sperm competing to fertilize a single (genetically unique and randomly selected) egg in waiting (from a stockpile of over a million) entails. Moreover, medical studies reveal that one-third of all normal conceptions end in the aftermath of a spontaneous miscarriage. In short, with or without the availability of contraception or abortion, each one of us is phenomenally lucky to have been born.

As it turns out, those millions of "ghost children" that contraception, abortion or war have denied a full measure of life to are in the same state of mind that each of us experienced for 15 billion years before the day we were born. The great unknown, of course, is what we will be doing during the 15 billion + years following our death. It is questions like these for which no scientifically creditable answers exist. Thus the fallback position is what Catholicism, Methodism, Mormonism, Judaism, Buddhism, Hinduism, and Islam have to offer. And because of this – the prospect of being endowed at conception with an immortal soul and a joyous afterlife -- the religious crusade against contraception (and/or abortion) is very much alive.

So Where do We go from Here?

In purely mathematical terms, the handwriting depicting the future of mankind is on the wall. For example, according to Burton Malkiel (former Dean of the Yale School of Management and a professor of economics at Princeton), Albert Einstein once declared compound interest to be "the greatest mathematical discovery of mankind." (See the latest edition of Malkiel's widely acclaimed book, *A Random Walk Down Wall Street*, for confirmation of this astounding observation.) Also see Table 1 below¹:

Table 1

Ending Value of \$1 - Rounded to Nearest \$1							
At Selected Compound Annual Rates of Growth							
# of Years	1.1%	2.1%	3.3%	5%	10%	15%	20%
5	1	1	1	1	2	2	2
10	1	1	1	2	3	4	6
20	1	2	2	3	7	16	38
30	1	2	3	4	17	66	237
40	2	2	4	7	45	268	1,470
50	2	3	5	11	117	1,084	9,100
100	3	8	26	132	13,781	1,174,313	82,817,995
200	9	64	661	17,293	189,905	1,139,012,080,496	6,858,816,903,929,000
500	237	32,574	11,224,339	39 Billion+	-	-	-

To put Table 1 in perspective, consider the following:

- 1.1% = Current world population growth rate.
- 2.1% = Social Security Trustees estimate of U.S. real GDP growth rate for the next 75 years.
- 3.3% = U.S. real GDP growth rate for most of the 20th century and real GDP growth of the world for the last 40 years.
- 5% = Approximate nominal total return on long-term government bonds for the past 85 years.
- 10% = approximate nominal total return on the S&P 500 stock index for the past 85 years.
- 5 to 10% = Estimated real growth of China's GDP for the next 50 years.
- 15% = Approximate rate of investment return for Bill Miller / Legg Mason for 24 years (1982 – 2006).
- 20% = Approximate rate of return for Warren Buffett / Berkshire for 40 years (1965 – 2005).

In regard to Table 1, there is an extraordinary, but little known fact about compound rates of growth that can be illustrated as follows:

- For any compound rate of growth, when the number of years an investment of \$1.00 is held is **DOUBLED**, the ending value of that investment is **SQUARED**. For example, at a 10% rate of growth an investment of \$1.00 becomes \$6.73 in 20 years and 45.26 in 40 years and \$2,048.40 in 80 years.
- For a given number of years if the compound annual rate of growth is **DOUBLED**, the ending value of a \$1.00 investment is approximately **SQUARED**. Thus, \$1.00 compounded at a 5% rate for 40 years becomes \$7.04 and at a 10% rate for 40 years grows to \$45.26.

These compounding relationships hold for a starting value of 1.00 in oil, population or GDP.

What Does It All Mean?

To put it bluntly, unless the invincible wind of compounding is somehow brought under control there isn't much hope for the human race surviving (in comfort or otherwise) for another 200 (much less 500) years. Of course mankind can bury its head in the sand and proclaim, as Keynes did, that it doesn't matter because we're all dead in the long run!

In the meantime, world population over the past 200 years (a blink in time) has grown from around 1 billion to 7 billion at present -- after reaching 6 billion as recently as 12 years ago. At its current growth rate of 1.1%, population will reach 146.3 billion in 100 years which is an absurdity on its face since birth control (including abortion) is going to (i.e., will have to) become far more widespread -- despite some of the world's 100 conflicting religions issuing proclamations against it.

Just consider that if the world's population growth rate were immediately cut in half to 0.55%, population would still reach 12.1 billion a century from now -- an increase of 73%. Clearly it is birth control (in all its aspects), and not a diminution in the popularity of sex, that will bring some degree of control (although war is a distinct alternative) to the population dilemma.

In addition to population growth, moreover, the time bomb of compounding has a formidable impact in many areas of mankind's material world. Thus as worldwide population grows² and developing countries become more advanced so does the consumption of fresh water, food, coal, oil, natural gas, rare minerals, etc.

These vital resources are finite and worldwide GDP growth is dependent upon them. For example, at current rates of consumption, the world is using 8 million tons of coal and 1.3 trillion gallons of crude oil a year. Thus, earth's 4.5 billion year in the making bounty of such finite resources is going to invariably run out -- and quite soon in the cosmic scheme of things.

Take worldwide GDP of \$63.2 trillion, for example. At a modest 1% real compound annual growth rate, GDP would increase to \$762 trillion (12.1 fold) in 250 years and to \$9,149 trillion (145 fold) in 500 years. Of course, such projections are out of the question. But what mankind has to prepare for is that the age old (5,000 year) game of exponential/compound growth as far as the eye can see, with rising standards of living for all, is drawing to a close.

Of course there is always the possibility that before 500 years have elapsed, WW III will erupt or another three mile diameter asteroid will impact earth causing a mass extinction. Whatever transpires, however, it is worth noting that those of us born in the second half of the 20th century have been riding a Merry-Go-Round in terms of what lies ahead for mankind!

¹Writing about compound interest (or growth) in a 1930 essay, *Economic Possibilities for Our Grandchildren*, John Maynard Keynes observed, “The power of compound interest over two hundred years is such as to stagger the imagination...If capital increases, say, 2 per cent per annum, the capital equipment of the world will have increased by a half in twenty years, and seven and a half times in a hundred years. Think of this in terms of material things -- houses, transport, and the like...I would predict that the standard of life in progressive countries one hundred years hence will be between four and eight times as high as it is today. There would be nothing surprising in this even in the light of our present knowledge. It would not be foolish to contemplate the possibility of a far greater progress still...”

[For example] “Let me give in illustration of this a sum which I have worked out.” At this point Keynes refers to the exploits of Francis Drake who returned to England in 1580 with “the prodigious spoils of the Golden Hind” enabling Queen Elizabeth to invest 40,000 pounds in the Levant company which prospered. Keynes then observes that “40,000 pounds accumulating 3.25% compound interest approximately corresponds to the actual volume of England’s foreign investments at various dates, and would actually amount today [360 years later] to the total of 4,000,000,000 pounds which I have already quoted as being what our foreign investments now are. Thus, every pound which Drake brought home in 1580 has now become 100,000 pounds. Such is the power of compound interest!”

Needless to say, the power of compounding has resulted in innumerable benefits to mankind. Indeed, virtually every nation on earth [194 in all] is working to turn the force of compounding (through saving and reinvestment) to its advantage and thereby improve the prosperity of its citizens. How this mechanism works, therefore, is worth examining. The process begins with simple interest. That is, at a 2% simple annual rate, \$1 grows to \$3 in 100 years and \$5 in 200 years. Likewise, at a 4% simple rate, \$1 becomes \$5 in 100 years and \$9 in 200. *Through saving and reinvestment of these simple interest amounts*, however, \$1 growing at a 2% will compound to \$7.24 in 100 years and \$52.48 in 200 years. Now, double the rate of growth to 4% and in 100 years \$1 becomes \$50.50 and jumps to \$2,550.75 in 200 years.

²China, with a population of 1.340 billion, and annual GDP of \$6 trillion is striving to grow its economy in the 5 – 10% annual rate range, as it graduates four times as many engineers each year as the United States and is the largest consumer of many of the earth’s natural resources.

Along these lines, in a 2008 article in *Newsweek*, former Treasury Secretary Lawrence Summers was quoted as predicting that a typical Chinese citizen would experience a “10,000%” (or 100 fold!) rise in living standards during his lifetime. Since life expectancy in China stands at 72, this implies a real compound annual growth rate of 6.6% in output. Of course, China has been growing at a much faster rate for the last two decades. Still, given that China’s GDP stands at \$6 trillion, a literal extrapolation of Mr.

Summers' conjecture would imply China's real GDP in 2085 will reach \$600 trillion, or 9.5 times worldwide GDP of \$63.2 trillion today. This is clearly out of the question.

Whatever the case, China (which has three times the coal reserves of the U.S) is adding one coal powered plant per week while Germany, which recently abandoned atomic energy, is stepping up its use of coal accordingly – as is the rest of the world with global coal consumption growing at a 3.9% annual rate from 2000 through 2010.

Meanwhile, if the American economy continues to grow at just a 2.1% compound annual rate for the next 75 years (as the Trustees of Social Security are projecting) our real GDP will reach \$73.5 trillion by 2088, versus \$15.4 trillion today. Likewise, America is the world's largest consumer of oil burning through roughly 20 million barrels (or 840 million gallons) of crude a day. If our consumption of oil grows at just a 1% compound annual rate, we will be consuming 2.7 times as much in 2113 as we do now or 2.3 billion gallons a day. At a 2% rate of growth, consumption will reach 6.1 billion gallons a day by 2113 or 7.2 times today's consumption.

Insofar as the global economy is concerned (according to the World Bank) worldwide real GDP has grown at around a 3.3% rate for the last 40 years. Meanwhile, at current rates the global economy consumes around 3.7 billion gallons of oil a day. Thus, if world oil consumption grows at just a 1% annual rate over the next 100 years the planet will have to extract and refine 10 billion gallons of crude a day by 2113. At a 2% rate of growth the requirement would be 27 billion gallons a day.

Such are the future implications for mankind of the “greatest mathematical discovery” of all time.

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