



Meltdown! The Global Competence Crisis

Jeremy Grantham

"Nobody up there understands American capitalism." Hyman Minsky¹

The Confessions of an Optimist

I thought things would be bad enough but they turned out to be a lot worse. I thought a year ago we were looking at the "first truly global bubble" in asset prices. The credit crisis looked to be so predictably powerful and unstoppable then that I likened the experience to "watching a slow motion train wreck," and I predicted that "one major bank (broadly defined) will fail within 5 years," for which I got considerable grief as a doomsayer, as the less optimistic strategists usually do. Well a year later one bank failure looks positively quaint as a prediction. Ironically for a "perma bear," I underestimated in almost every way how badly economic and financial fundamentals would turn out. Events must now be disturbing to everyone, and I for one am officially scared!

A lot of this worsening situation was unpredictable, but some of our optimism I fear was caused by that old bugaboo, career risk, because our asset forecasts were more pessimistic than others and only half-believed by clients. Our low return forecasts only required that above average profit margins and P/E ratios revert to normal. The forecasts did not need any help from a very weak economy other than a slow unraveling of the credit boom. In our experience, the U.S. economy usually stepped around the land mines, but this time it has not been so lucky. These are some of the unexpected surprises:

1. The Fed has lost more credibility and lost it faster than expected. Misreading or not seeing bubbles at all was a key. It is becoming increasingly clear that extreme asset price surges are too dangerous to ignore. Greenspan's self-serving drivel also did not help. Nor did over-zealous bailouts or Bernanke's underestimation – in world opinion – of inflation. The risk of international loss of confidence in the dollar
2. Other central bankers and financial authorities also underperformed. The British dithered in crisis and, together with the European Central Bank (ECB), failed to move early against housing prices in the U.K., Spain, and Ireland that rose far higher than those in the U.S.
3. China and several other emerging countries, by allowing currency underpricing and huge trade surpluses, almost guaranteed eventual inflation, which is now exported.
4. I had offered the price of oil as a probable paradigm shift and suggested not going seriously short until \$100 in the January 2005 *Barron's* when oil had just broken \$50. Well, there is a big gap between "might" reach \$100 and actually reaching \$150. Such high and sustained prices act as a dangerously high tax on consumers, particularly in the U.S., which is shamefully only half as energy efficient per unit of

has arisen as a consequence. The Fed's primary job is really quite simple: Protect the integrity of the U.S. financial system. In this they have sadly failed.

The Fed and the Treasury have moved to bail out large financial corporations under the smoke screen of a liquidity crisis. As is increasingly realized, it was not a liquidity crisis primarily, but a solvency crisis. Marked to market 6 months ago, Bear Stearns and Lehman were bankrupt as are Fannie and Freddie today. The bailouts are really providing what amounts to capital to insolvent firms as opposed to preventing the classic run on a bank as occurred in "It's a Wonderful Life," where a bank goes bust through no fault of its own. These bailouts permit a shameful lack of accountability for reckless behavior.

¹ Hyman P. Minsky, "Can 'It' Happen Again?" *Essays on Instability and Finance* (Armonk, NY: M.E. Sharpe, 1982) 202.

GDP as Europe and Japan. The growing surpluses of oil countries must be recycled, and this can be destabilizing.

5. Almost all other commodities have also soared in price, transferring income to farmers and miners and taking more buying power from consumers.
 6. Congress behaved at the lower end of its range of effectiveness. It overestimated corn-based ethanol, which is a minuscule help to gasoline but a strong push on corn and other grain prices. Since ethanol creates more carbon dioxide than pumping oil, the ethanol program is mainly another testimonial to the agribusiness lobby.
 7. China's ability to sustain rapid growth and avoid a serious stumble has become an article of faith that I was buying into without much skepticism. But why? No sooner do we finish wallowing in the idea of Soviet incompetence than we start to believe that Chinese central planners can wonderfully manage a complicated economy, growing unprecedentedly fast and transforming overnight from a rural society to a capital-intensive industrial wonder using half of some of the world's resources. Economic logic and history suggest that their governmental interferences will be sub-optimal, and that China's current level of investment will turn out to be dangerously high, encouraging waste. They continue to build basic capacity on automatic pilot even as they encounter dangerous times for their export-led economy, since we are all facing the rising probability of a global slowdown in economic growth and trade. China also has to deal with rising energy costs in their particularly energy inefficient economy. Surely they will stumble. And if we are all unlucky, they will stumble right into the global credit crisis.
 8. Didn't we all expect at least modest competence from most of our financial companies? I always thought it was the Bear Stearns of the world who knew what was going on, and that when the music stopped, the financial junk would be safely (from our point of view) in the hands of, say, Taiwanese banks. How did the guys who put some dead rats in the pot end up eating some of their own stew? (To be charitable, perhaps the head chefs did not realize that the kitchen staff was throwing in the odd rat to increase their Christmas bonus!) I never realized how far it would reach: into municipal bonds, SIVs, insurance companies, instruments represented as cash-like, and former stalwarts of prudence such as Citibank, UBS, and The Royal Bank of Scotland.
 9. The emergence of Iran as a latent military target has become a potentially destabilizing factor, especially for oil prices (or even oil availability) and the U.S.'s image globally.
 10. A year ago I thought that the credit crisis would drastically reduce the availability of "soft" loans with few lender rights. I expected this to be a major threat to silly overleveraged deals such as 2006-07 vintage private equity. But second quarter loan growth did not merely slow; it declined at an annualized rate of over 6%, the worst since consistent records started in the early 1970s. This threatens the well-being of not just flaky companies but also more ordinary companies, in fact the whole economy.
 11. It is quite well known that much of the world has been living beyond its means in a short-term financial sense by increasing its consumer debt and by benefiting from excessive global money supply. Less well known is that we have been collectively living beyond the planet's means by over-consuming finite resources. The disappointment here in the U.S. has been the chronic inability of government to get this point and, in particular, to develop a serious long-term energy policy. (See the attached *Letters to the Investment Committee XV*.)
 12. Most dangerously, all of these factors interact, creating a broad based – even global – vulnerability in the financial system. Given the growing perception of incompetence that is broadly distributed throughout the system, we run a serious risk of a meltdown in confidence in leadership totally unlike anything we have seen since World War II. And with substantial justification! Why should we trust the financial system the way we used to? We should distrust the general competence of financial management: of governments and of corporations and of all bankers, whether commercial, investment, or central bankers.
- Global asset prices, in complete contrast to these unpleasant surprises in fundamentals, have been more or less predictable. Some, like Chinese equities, have come down much faster than I expected, and some, like U.K. house prices, have really taken their time. Also, junky, risky stocks have toughed it out far better than I believed

likely or than the rest of the financial picture would have suggested – they have held their own with the blue chips – but this is, after all, the stock market and some surprises are expected.

Where does this leave me? Believing that asset prices will come down to fair price and below by about 2010, a belief I have held since 1999. This means about a 10% to 15% decline in the S&P by then (to about 1100) and a similar percentage decline for EAFE; about another 10% decline in U.S. housing and perhaps a 40% decline in U.K. housing, which is likely to take quite a while longer than 2010 to bottom out. Critically, overruns on the downside for all asset prices after a bubble breaks are much more the rule than the exception!

So, in general, the unexpectedly bad fundamentals have not dramatically changed our asset class forecasts. Yes, there has been an unexpectedly large bite taken out of the net worth of financial companies. But other than that, it is more that the probability has increased for longer and deeper overruns below fair value and the chance of a “meltdown” substantially more rapid than my long-held suggestion of a leisurely move to a low in 2010 or later.

There is, though, one important change in our outlook for emerging market equities. I still believe they will end up selling at a large P/E premium some time in the next 5 years or so, for reasons outlined last quarter in “The Emerging Emerging Bubble.” What has changed is the risk over the next couple of years. I now realize that in an unexpectedly bad global economy, the combination of rising inflation, commodity dependence, and particularly high export ratios leave them more vulnerable than I had thought. Economically, most emerging countries really looked to have decoupled for 18 months as we slowed and they did not. But in a global recession no one decouples. As German, French, and British growth slowed rapidly in the last 6 weeks, a global slowdown looks more likely and more painful. To this end, we have done an about-face and lowered our weightings in emerging equities to neutral or just below. To critics of this change, I would cite the quote attributed to Keynes, caught in the same predicament: “When the facts change, I change my mind – what do you do, sir?”

Commodities do not play a very big part in our current asset mix and more’s the pity, a clear mistake on our part. If they did however, we would be reducing our exposure and again expecting short-term 1- to 3-year price problems

within a very positive long-term view. (See the attached *Letters to the Investment Committee XV*.)

Summary and Recommendations

Due to a combination of spectacular mismanagement by the authorities that resulted in very excessive and dangerous speculation and very bad luck in the timing of commodity problems and over-rapid expansion of China, the fundamental global outlook is substantially worse than expected. These problems lower long-term asset values by a little and increase the chances of deeper overruns and perhaps a faster trip to the lows. Our advice until now was very simple: take as little risk as possible except for emerging markets. Now it is even simpler: take as little risk as possible.

The more complex issues, as always, involve timing. Both emerging markets and commodities (especially oil) have a creative tension between the negative and risky short term (1-2 years) and the attractive long-term (5-10 years) prospects. In the short term, slowing world economic growth combines with credit, currency, and inflation problems to dominate the outlook and offer poor prospects for emerging markets and commodities. Longer term, the reverse is true and they look like the assets to own. But for those who can keep some of their powder dry, there are likely to be much better investment opportunities in a year or two (or three) than we have seen for 20 years. Our motto should be:

Don’t be brave, run away.

Live to fight another day.

How Did Things Get So Bad?

At one level, we have spent 20 years or more digging our deep hole. We slowly and steadily lowered our financial standards and increased our debt leverage and our general risk-taking in the ways predicted by the late but newly famous Hyman Minsky. And we and a rapidly increasing number of others have commented quite bitterly on this long slide.

But what I think has been under analyzed is the proximate cause – the thing that really tipped us into the manure: a remarkable unwillingness of the authorities and financial leadership to believe that asset bubbles, however arrived at, always revert to normal.

The first dramatic example of this disbelief in the existence of bubbles was of course the internet and tech

bubble, with the market at 35x earnings (compared with the 1929 and 1965 highs of 21x) and with the growth half of the market at over 50x! Famously, our much praised Fed boss could see no bubble and respected the thousands of “well informed investors,” most of whom by then were actually playing musical chairs and momentum and could not have cared less about information! Having been a cheerleader rather than a stern enforcer of standards, the Fed, as promised, rushed to provide help as that bubble inevitably burst. This – as we all know to our cost – facilitated a much more dangerous bubble in housing. And again the Fed cheered the “ingenuity” of the sexy new financial instruments, notably the asset-backed and subprime mortgage-backed paper.

If only financial lenders had understood the full consequences of the housing bubbles – that U.S. house prices would decline by 25% or more and U.K. prices by 40% or more – they would have acted very differently. Greenspan and Bernanke would have responded early and often to help shrink the volume of subprime mortgages instead of emphasizing, as Bernanke did, the normalcy of the market at its peak and the fact that U.S. house prices had never declined. If Hank Paulson had counted on a 30% decline, he would have foreseen a calamity for banks and related entities, since he especially must have known about the highly suspicious quality of the instruments. He would have known that Fannie and Freddie, to be topical, at over 60x leverage obviously did not have enough equity for this kind of decline. Had he believed, he would have entered his job demanding immediate damage control and that much more equity be raised rather than suggesting that all was well and contained. The big-wig bankers at Merrill, Citi, Lehman, Bear Stearns, et al. could never have behaved the way they did had they understood the size of the likely drop in housing values.

We now have several other big negatives that are unrelated (or only slightly related) to U.S. housing: commodity price increases, rising inflation, and dollar problems. They will independently cause plenty of grief. But without the U.S. (and soon the U.K.) housing issues, the pressure on the global financial system would have been manageable. And without ignorant behavior around bubbles – the near certainty of their breaking and the damage they invariably cause, especially in housing – most of our current near disaster would have been avoided. It is all very, very

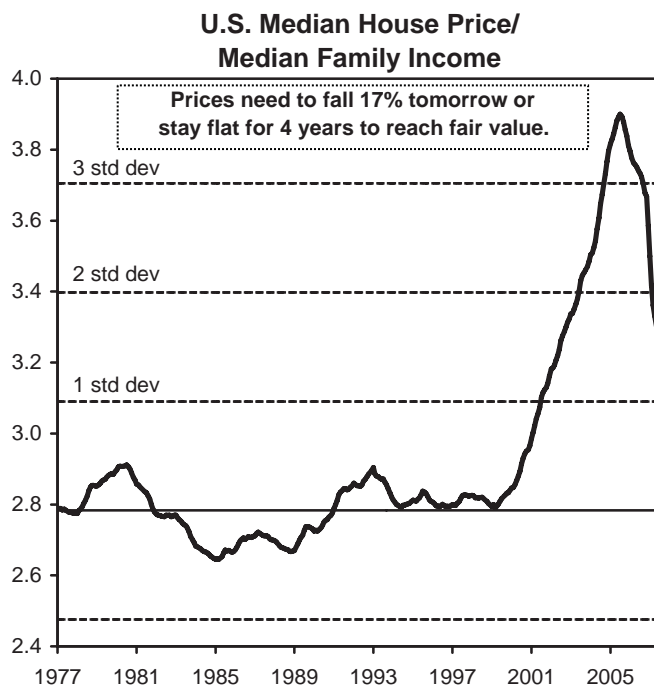
frustrating. It’s almost as bad as struggling with the efficient market hypothesis for 30 years, and is closely related to it. As Kindleberger² said, this kind of belief in efficiency that denies the existence of bubbles “ignores a condition for the sake of a theory.” To which I can’t resist adding: Bubbles occur. They always burst. They always cause pain. Financial leaders, please wake up!

The U.S. Housing Bubble and the Poor U.K.

Well, it’s been an eventful 6 months in housing! Exhibit 1 shows our well-worn, but updated exhibit of the classic bubble in U.S. house prices that we have been showing for 3 years now. It is interesting to read how surprising the U.S. house price decline has apparently been for many commentators. But in real life, it would have been far more than merely surprising, perhaps even unique, if they had not declined, as our study of all similar 2-standard-deviation (40-year event) bubbles has indicated. The reason house prices had never declined before was that hitherto the U.S. housing market was very diverse, bubbling in one area while cooling in another. Uniquely this time, the areas varied from red hot to merely warm, with the average deep in extreme bubble territory (the 100-year event or 3 standard deviations from long-term

Exhibit 1

U.S. House Prices Will Continue to Decline



Source: National Association of Realtors, U.S. Census Bureau, GMO
As of 6/30/08

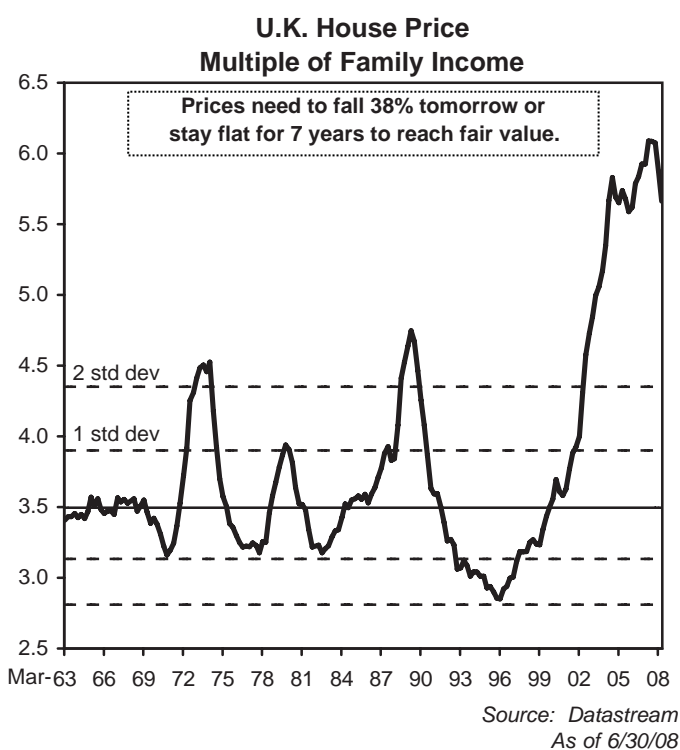
² Charles P. Kindleberger, *Manias, Panics, and Crashes: A History of Financial Crises* (New York: John Wiley & Sons, 2005).

trend). From this extreme level, this bubble has burst quite rapidly, in fact about as rapidly as it went up, which is also typical of large bubble events. In order for house prices to reach normal from here, they must either decline 17% immediately or experience 4 flat years while income catches up, or some combination. However, what we must worry about is the normal tendency for bubbles to overrun on the downside. Exhibit 2, my recent favorite exhibit, shows the dramatic differences between our housing prices and those in the U.K. While the U.S. is a newcomer to housing bubbles, the Brits are old pros. It's practically their national past time. They may not win at Wimbledon, but they can do really good housing bubbles! 1973 and 1989 were the peaks of two handsome, fairly symmetrical housing bubbles in the U.K. Note in particular how the housing market reached fair value at trend in 1992 and overran considerably by 1996, which produced the lowest income multiples since the records began in 1950. We had all been told that the 1989 U.K. prices were a new high plateau because they were no longer making any more land and certainly were not zoning any more old land for housing. Presumably by 1997, they had decided to make some more after all.

The U.K. housing event is probably second only to the Japanese 1990 land bubble in the Real Estate Bubble

Exhibit 2

U.K. House Prices Will Really Decline!



Hall of Fame. It was no fantasy that the land under the Emperor's palace really did equal the whole of California at the peak prices. The current U.K. housing event had become the biggest tease in bubble history, beginning to decline almost 4 years ago, then putting together another 2-year rally before finally flagging this year. The bad news is that as usual it will go all the way back to normal – which you can barely see from here – and very probably will overrun just to rub it in. It will make our troubles look like a toothache to their hip replacement. Unfortunately for global financial well being, the U.K. is not Iceland, but a major player in the global banking business, so the scale of the write-downs will produce yet another wave of destabilization.

In the U.K., house prices could easily decline 50% from the peak, and at that lower level they would still be higher than they were in 1997 as a multiple of income! It is a truly ugly thought that mortgage lenders and the guardians of the financial system seem never to have considered, at least until recent weeks. If prices go all the way back to trend, and history says that is extremely likely, then the U.K. financial system will definitely need some serious bailouts and the global ripples will be substantial. Of all the negative possibilities out there, and there are plenty, real pain in this area is the most likely; I would say, nearly certain.

Thank Heaven for Optimists

George Soros has long believed in "Reflexivity," a term he uses to describe how even strange and irrational investment beliefs can still impact and change reality. Seldom has this been demonstrated better than in the irrational belief that the credit cycle's problems were over late last year and again in April this year. This belief allowed for two waves of capital raising by banks and related entities from sovereign funds, institutions, and corporations, who assumed all the bad news was over and the price was right. Investors have been conditioned to buy the dips since 1982, because doing so was most often successful, notably so in the 1987 crash. But this time really is different, and the problems will be deeper and longer than most investors even now expect. By the end, capital equal to a third of all the financial capital that existed in June 2007 may have been written off. At this level of reduced equity, the banking system could not function effectively. I believe that realistic investors should have held back from investing in weakened financial companies and mostly still should. But we all need the financial system

to survive and function effectively, and to do this it needs more capital. We have all benefited from the generous, if misguided, investments that have already taken place and the increasingly reluctant ones that will continue to be made. So, to all you sovereign funds, private equity funds, Bank of Americas, and shareholders who threw your money into overpriced banking stocks to provide new capital, a heartfelt "Thank you!" from all of us.

Recent Performance

This year has not been without unexpected problems for us. Our fixed income difficulties from last year continued, but now we believe, given higher yields on our asset-backed paper and the likelihood of being paid off, that we will get back over the coming months at least most of what we lost this year.

In equities, all measures of value have had a very tough time globally, and the expected move to fundamental quality and away from riskier stocks has been very slight and uneven, which is remarkable given the heightened risk awareness in fixed income. The first week of the year was phenomenally good in this respect, but in the months following the Fed's string of bailouts, risky stocks came

roaring back. By May, most of our equity strategies were down against their benchmarks. Reality, however, began to bite in June and most of our equity strategies nosed ahead and continued to run in early July. For the year, our Emerging and International Active strategies were slightly behind, U.S. Core and Quality very slightly ahead, and International Quant about 2 points ahead. Asset Allocation's long-only strategies such as global balanced were slightly ahead, and our hedge strategies performed well in a difficult period. Multi-Strategy was up 6.5% for the year. We continue to have high expectations from our very conservative disposition in equities, hedge strategies, and asset allocation.

Footnote: GMO's 10-year Forecast from June 1998

There have been very good times and very bad times over the last decade, so it's a reasonably appropriate moment to look at the 10-year forecast we put out in June 1998. As you can see from Table 1, U.S. equity performance came in dead last out of 10 asset categories, as we suggested it would, but it was still 1.3% a year ahead of our expectations. All of this outperformance resulted from profit margins that in June were still well above the long-term average, in our view unsustainably so. If profit

Table 1

GMO 10-Year Forecasts for June 30, 1998

Forecasts from June 30, 1998 vs. actual as of June 30, 2008

Asset Class	Estimated Rank	GMO 10-Yr Forecast June '98 (% Real Return/Yr)	Actual 10-Yr Return*	Actual Rank
Emerging Market Equities	1	7.0	13.4	1
U.S. REITs	2	5.2	7.4	2
Emerging Country Debt	3	4.9	6.9	3
International Small Cap	4	4.9	6.5	4
U.S. TIPS	5	3.8	4.8	5
Lehman Aggregate	6	2.6	2.7	7
EAFE	7	2.5	2.9	6
U.S. T-Bills	8	2.1	0.6	9
Foreign Bonds	9	2.0	2.2	8
S&P 500	10	-1.3	0.0	10

**Actual real index returns are for 6/30/98 to 6/30/08 period. Source: GMO*

margins were normal today, even with no shift in P/E ratios, the last 10 years' returns would have been 0.6% a year behind our estimate. EAFE equities came in 0.4% a year ahead of expectations. Emerging equities that we ranked in first place indeed came in first, outperforming – bless them – by 6.4% a year, ahead of our already strong estimate. Although we were a little pessimistic in general, accounted for by remarkably strong ending margins, we nailed the rankings with none of the 10 categories being more than 1 place from the correct ranking. (Forestry was not a serious asset class 10 years ago but, for the record, our forestry estimate was 5.0% real – shortly after that date

to be raised to 7.0% – and the actual performance on the NCREIF Timberland index came in at 6.0%, handsomely ahead of the major asset classes.)

We so-called “perma bears” are criticized because negativity is unpleasant and off-putting to most investors. Most strategists, through this dismal 10 years for U.S. equities, have been more or less “perma bulls.” Back in 1998, they were arguing for a normal long-term return, that is to say about 7-8% real. If we feel that we have been unduly optimistic, what must they feel? They really do get away with murder!

Disclaimer: The views expressed are the views of Jeremy Grantham through the period ending July 25, 2008, and are subject to change at any time based on market and other conditions. This is not an offer or solicitation for the purchase or sale of any security and should not be construed as such. References to specific securities and issuers are for illustrative purposes only and are not intended to be, and should not be interpreted as, recommendations to purchase or sell such securities.

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*Letters to the Investment Committee XV**

Living Beyond Our Means: Entering the Age of Limitations

Jeremy Grantham



“Wolf! Wolf!”

How many times over the last 200 years have gloomy economists predicted limitations to growth? And always they were wrong. Science and human ingenuity always came to the rescue. Instead of rising steadily in price, raw materials and food fell in real terms. And since hourly income rose, raw materials became ever more affordable as the specter of starvation, although always around, steadily retreated. Food, for example, fell from 70% of a typical American’s budget 200 years ago to about 10% today. And, every time a warning was redundant, the idea that science always wins and that the human brain and talent are boundless and can conquer all took deeper root. We have learned in the stock market not to underestimate the power of repeated events to create a consensus. Humans are just plain eager to see patterns, and 200 years of increasing plenty in the face of recurrent pessimism is serious reinforcement indeed. It is hardly surprising, therefore, to find ourselves in a position where faith in our ability to rise above the planet’s limitations is complete.

It is believed today by just about everyone, smart or not, well informed or not. And so it probably was with the Mayans, whose civilization withstood the limitations imposed by the local environment and other stresses for almost 1000 years. Yes, there were close calls, dreadful droughts and wars, but with their boundless ingenuity and a few human sacrifices, they scraped through over and over again. A millennium must have left the Mayans feeling that their prosperity was divinely endowed. But eventually, despite their time-baked confidence, they leaned a little too hard on their resources, the droughts lasted a little too long, and it all ended.

Our current faith, though, is based on impressive data. Every commodity (with the clear exception of wood, and the possible exception of oil) has declined in real price for 200 years. These prices have fallen despite the obvious truth that we try to use the most fertile soil first and find the shallowest oil, the thickest coal seams, and the richest ores. Offsetting this pressure from naturally rising marginal costs was a steady rise in technological progress: it became cheaper to drill ever deeper wells because techniques for both locating and drilling oil improved. And so it was with corn and copper and everything else. But it was not a natural law that this trend would continue indefinitely. It happened because of the accidental confluence of favorable factors. As the world entered the technological and agricultural revolutions led by Britain in the 18th century, productivity surged. Britain’s per capita wealth doubled in 100 years, equaling the growth of at least the previous 1000 years. This doubling occurred in Germany in 70 years, and then eventually in Japan in 40, in South Korea in 30, and finally in China in 10 or 12. This acceleration reflected the growing accumulation of advanced techniques that were exploited by the latest arrivals. The accumulated body of science and technology was applied in each new country to economic and agricultural systems that had changed only slightly for the mass of people in thousands of years. This created a mass of low-hanging fruit and, with these easy pick-ups, populations could expand and grow wealthier simultaneously. The new arrivals to economic take-off helped sustain the momentum of the more mature countries such as the U.S. and European nations that were growing at the boundaries of technology. Almost too good to be true, cumulative technological progress was a

* The Letters to the Investment Committee series is designed for a very focused market: members of institutional committees who are well informed but non-investment professionals.

little faster than the increasing marginal costs of a world now growing at a remarkable 3% a year. The real price of commodities, defying the doomsayers, fell about 1.5% a year, a number that sounds small but is large enough to steadily increase global wealth.

There were however, at least two worms in the apple. The first is that if enough people enter economic take-off at approximately the same time, as 2.3 billion Chinese and Indians have now done, then the pressure on resources might happen to increase marginal costs slightly faster than technology could offset them. The second worm, though, is much more serious: the developed world's great growth spurt has been facilitated by and sustained only at the cost of eating through our patrimony, the incredibly fortunate set of unique but finite resources that our planet inherited utterly by chance: underground water resources that currently sustain some of our most productive land but like a metronome tick off a reduction of several feet each year; rain-fed waters that, although renewable, are finite and already so overused that previously valuable lakes retreat to sometimes disastrous local effects and river volumes, once seemingly limitless, are now fought over; subsoil, which took thousands of years to form, is depleted through casual use (In the Midwest, for every bushel of wheat produced, it is said that a bushel of subsoil is lost. Our farmers are in the mining business! Yes, the soil is incredibly deep, but it is still finite.); high-grade mineral ores are fully developed, the very best are long gone, and all are irreplaceable; previously fertile land has often been overgrazed and turned into desert.

At the end of this list is the one we usually worry about the most: hydrocarbons. Here technology has remarkably kept the life of resources from imploding. But there are limits, and we have reached them. Since 1974 the U.S., despite all investments and improved technology, has steadily reduced oil output. Now the entire world routinely adds less oil to reserves than it pumps.

And you, of course, have heard it all before and dismiss it. Well, let me give you a thought experiment to mentally chew on. For the last 2 years the world's growth (of goods and services) has grown at 4.5% a year. Since we can convince ourselves that services like haircuts that were once 50¢ (or \$5 in today's currency) are now "worth" \$25 for an identical service, we had better limit ourselves to goods, for they are what sustain us: food, clothing, housing, and vehicles. Let us imagine a long-lived civilization. The longest lived is probably in Egypt,

where a closely related culture existed for 3000 years. And let us assume, to simplify, that wealth could be defined as tangible, as the cubic capacity of possessions. If Ancient Egypt had started in 3000 BC with just 1 cubic meter of possessions and had grown them at 4.5% a year, sustained by technology and the unbounded inventiveness of man's brain, then man's brain would have a major parking problem to deal with. Egypt's wealth would have grown from 1 cubic meter to 10^{67} cubic meters, an amount so vast it could not be squeezed into the entire known universe! So let's reverse engineer it. What growth could have been sustained? At a lowly 1%, Egypt's physical wealth would have increased by more than 9 trillion times. Even at 1/10 of a percent, Egypt's wealth would have multiplied by 20 times, very much more than they accomplished but at least a level of growth in physical assets that the planet could probably sustain for another 5000 or 10,000 years. Not however, the kind of growth to which we think we are entitled, and even then only possible if there were no simultaneous population growth. For the long-term growth consequences for population are the same. The world's population, which is thought to have been about 15 million in 3000 BC, would have become 1.5×10^{20} at 1% growth or almost 150 million times 1 trillion people by the time of Christ! And remember, this is a growth rate in global population far less than the 1.5% in my lifetime, and indeed close to that which Malthus was seeing when he wrote his famous "Essay on the Principle of Population" in 1798.

I like to say that of course Malthus was right; he merely got his timing wrong. And even that comment might be unfair. He argued that if population compounded at that rate in 1800, it would eventually get ahead of food supply. With the vision of quadrillions of people before us, after 3000 years at a mere 1%, it should be easy to buy his argument. There would be nowhere to stand, let alone grow food. Impatient as ever, we wanted Malthus to be right immediately rather than realizing that his argument draws its power from its inevitability, not its immediacy. But, let's look at Malthus' argument in more detail for a few minutes. From the 15 million inhabitants of 3000 BC, population about doubled every 1000 years with some spurts and setbacks until 1000 AD, when the world's population was about 250 million. This 4000-year growth rate was coincidentally just a shade over 0.1% a year. It continued to grow at just over that rate, and by 1700 had doubled again in those 700 years. Then as the Industrial Revolution kicked in, observed by

Malthus, global population exploded: up over 10 times in 300 years, more than the prior 3000 years had produced. Even in this explosive phase, it started relatively slowly, at about 0.4% for the first 150 years and accelerated to 0.8% for the second 150 years. And that was not the end, for in the last 70 years, it averaged over 1% and actually peaked at over 2% – or at least we must pray it peaked – a few years ago!

Malthus recognized that man's ingenuity could increase agricultural output, as well he might, since he lived through England's agricultural revolution with "Turnip Townshend" and other gentlemen-scientist-farmers of that era who pioneered crop rotation, fallow years, and nitrogen-fixing crops. On the positive side of the equation, he did not foresee what might be called "The Hydrocarbon Revolution," in which a bountiful store of energy and fertilizer could be unexpectedly used to muscle multiples of the output that mere brainpower could achieve. To be fair though, he also missed the comparable increases from human engineered improved crops. On the negative side, his barely imagined worst nightmare of an accelerating growth in human population was exactly what came to pass. And, at anything like current or recent growth rates in population, we will of course – guaranteed beyond all doubt – outrun all of our resources including simply the space to put ourselves, let alone our burgeoning possessions. Indeed, if we were to try and go down that path, we would also guarantee the destruction of a great majority of the planet's diversity, quite probably including ourselves.

Malthus' second edition urged voluntary ("moral") checks on population growth but, since he considered man's sexual desire and fertility to be a given, he cannot have been too confident. So Malthus expected that it was more likely that humans, like rats, would multiply right up to the boundary of food supply and permanently stay there. Into this ugly Malthus-was-right world, however, entered a positive and unforeseen factor: a voluntary reduction in birth rate caused by two completely different reasons. For agrarian societies, as abject poverty decreases, so does the need for the old age insurance that having 10 children used to provide. Even more unexpectedly, for developed economies the second variable is the love of the good life. What a delicious irony that the very factor that causes us so much trouble in resource depletion and climate change will through a similar motive lead to fewer inconvenient and expensive children!

Whatever the reasons, it looks increasingly as if global birth rates will slow for a long time, and that before the end of this century, and perhaps much sooner, global population will start to fall until once again we are below the long-term sustainable capacity of Earth. The critical period is precisely this century. We are living in a thoroughly dangerous and interesting phase where we determine how much irreversible and semi-permanent damage we do to our planet and test our previously modest abilities to cooperate and defer gratification for the greater good of our future.

In the meantime, we are living increasingly beyond our means, and Mr. Market is about to help us reconsider our behavior. This century will likely see the end of the Industrial Revolution and the age of "limitless resources." Higher prices and (hopefully) voluntary improved behavior will together usher in the post-Industrial Revolution phase of limited resources and frugality. We will all modify our behavior and probably quite fast. We will all re-adopt Yankee virtues (or Yorkshire virtues, I might add) of "waste not, want not," and get accustomed to using our brains instead of our hydrocarbon brawn.

The prices of commodities are likely to crack short term (see first section of this letter), but this will be just a tease. In the next decades, the prices of all future raw materials will be priced as just what they are: irreplaceable. Oil, for example, will never again be priced on the marginal cost of pumping a marginal barrel from some giant Saudi oil field, as has been the practice for most of the last 100 years of oil production. Real cost is always replacement cost and oil, a precious feedstock for chemicals and fertilizers, simply cannot be replaced. Using marginal cost as a substitute was ignorant and conducive to wasteful consumption of scarce energy resources. It also enabled us to put our collective head in the sand and ignore the growing need for an enlightened long-term energy and climate policy.

Relatively quickly, in 100 years or so, we will run out of oil, underground water, and most non-fully-renewable resources. At current rates, we will do it very, very fast. A major complication now, though, is that we have been brainwashed by repetition to reject this whole idea as irretrievably pessimistic and defeatist, and just well ... thoroughly un-American.

One of the most unfortunate features of our sustained ability to overcome presumed limitations by applying

technology is in the dangerous overconfidence it has given us, particularly in our casual and profligate use of resources. Starting now, higher prices will steadily overcome our optimistic assumptions and change our wasteful behavior. We must remember that, after all, in the wolf story, the wolf finally comes.

Investment Implications

Looking ahead to the next several decades, investors should be particularly interested in all finite raw materials, especially land useful for farming or forestry, and preferably in those emerging countries where one can stand the legal risks. I would include water rights and water treatment in this category as well.

There will also be a bottomless pit of investment opportunities in new technologies that address energy conservation, alternative energy (including nuclear), carbon extraction, and agricultural improvements (including new farming techniques that conserve land and limit resource-intensive fertilizer as well as designer grains).

Those who are moving early on these issues are sending a very positive signal to investors. They are showing a willingness to think long term in a world increasingly fixated by next quarter's earnings. They are, in my opinion at least, flagging that they are quicker on the uptake and simply better suited for success in the new era. That some investors have shorter horizons than these progressive companies do will almost certainly turn out to be a failing of investors and not the corporations!

Redesigning corporations for a resource-limited world will not be easy. They have been conditioned by a 25-year credit expansion to think ... well, expansively. With this attitude, declining commodity prices for the first 20 years was strong reinforcement. "Top-line growth at all costs" and "the devil take the hindmost" were the slogans. And now, you can hear the gears grinding as the early handful realize the game has changed to careful, frugal, and profitable growth.

This is not to say that all fault lies with corporations. Mostly the profligacy has been on the part of consumers, with their McMansions and Hummers, but there has still

been a critical difference between the Toyotas leading the consumers and the GMs following them.

The American genius suited the era of the Industrial Revolution. As the Confederate General Forrest would say, victory goes to those who get there first with the most. An age of limitations will be more like the "Tragedy of the Commons," where uncontrolled and uncooperative access to the common land resulted in sheep destroying grazing land. The American hard-driving way has historically been to get the most darned sheep on the common first. Going forward, the types of problems we will have to deal with include climate change, environmental pollution, and resource limitation. They need broad-ranging thinking that must be long term and must put the common good above corporate interests. Unfettered capitalism, however desirable in principle, can never handle these problems! It can never prevent over-grazing or over-fishing of common property any more than it can handle over-carbonizing of our common atmosphere. Whether the think tanks and libertarians like it or not, tragedies of the commons need enlightened government, cooperation, and leadership.

Other developed countries seemed to start this era with more suitable predispositions for dealing with the problems we all face. Recent history in the U.S., with no sensible energy policy and failure of leadership in climate problems (including the lack of government assistance for alternative energy research), means we start the new race a few steps off the pace. The French famously derive a nearly 8 times larger share of electricity from nuclear power than the U.S. The Germans have well over 8 times our share from solar and wind, in which they have become leaders. We must either change quickly, or we will fall behind. The change will not be easy, for our faith in American ingenuity conquering all – if unfettered by government – is very substantial, and we have not been in the mood to make hard choices for some time. Congress' attempt to scapegoat buyers of commodity futures as the cause of the rise in oil prices, rather than their own vacuous and weak-kneed lack of a long-term energy policy, is not a promising start. Nor is the fact that at the end of this year, Congress will have allowed subsidies for alternative energy to expire while retaining subsidies for oil and gas. That's right: they really don't get it yet. But they will.

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