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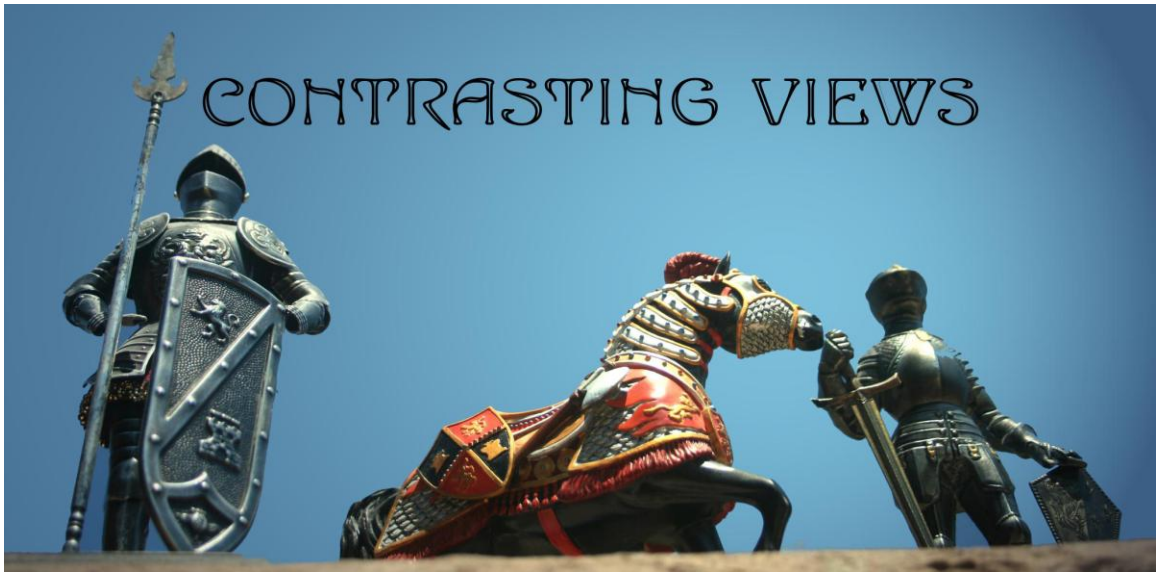

Fabricating the Doomsday Crisis

by Craig S. Marxsen

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Abstract

Efforts to prevent environmental degradation from causing global collapse have greatly contributed to initiating an energy price shock that apparently triggered the great financial crisis of 2008. In contrast to faster acting energy supply disruptions in prior decades, the 2007-2008 petroleum price increase, more a demand-pull oil shock, devastated both automobile and suburban commuter housing markets after a lag. A pyramid of financial derivatives supported by the real estate market collapsed. As a root cause, the stifling effects of rising and prospective future political risk, for producers of carbon fuels, engendered investment inhibiting ripple effects through various pathways. For the sake of global warming mitigation, an optimal adjustment of carbon fuels use, instead of the unrestrained continuing campaign to deter investment in carbon fuel infrastructure, could avoid promoting economic collapse. Believers in Jay Forrester's doomsday forecast from the 1970s are demonstrating the possibility of its becoming a self-fulfilling prophecy.

Introduction

Forrester's well-known work, *World Dynamics*, exemplified in Meadows, et. al. (1972), explored a simulation model of the world's population support system that exhibits an overwhelming tendency to overshoot any sustainable global population and production equilibrium, and collapse. Concerned subscribers to this doomsday forecast have subsequently propelled political efforts to constrain expansion of fossil fuel production.

In the author's 2003 article, "Prophecy de-Novo: The Nearly Self-Fulfilling Doomsday Forecast" he claims that Forrester's 1971 World Model has had a harmful influence on the course of world events. Myrtveit (2005, p. 24) summarizes this article thusly: "The impact that the World Model and related works have on political thinking, legislation and regulation has increased costs and reduced economic growth..." and that, in this sense, the Forrester World Model has become a "self-fulfilling prophecy." In this article, the author argues that the politics of such environmental protection played a large role in bringing about an energy shock that helped ignite the financial crisis of 2008.

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Financial overleveraging and a prolonged period of discordantly low interest rates [topics that are beyond this paper's scope] probably helped set up the financial system for a great fall. However, without the price jump in fuels markets, the U.S. and global economy might have muddled through without its great crash. The overzealous effort to prevent further consumption of carbon fuels has thus showed itself capable of substantially contributing to a global collapse not entirely different from the sort Jay Forrester predicted. His World Dynamics Model attempts to show that the world will overshoot any sustainable global and production equilibrium and then collapse in a crisis of output contraction that causes population loss. Although Forrester obtains his model behavior from an absurd production function, its catastrophic contractions derive from natural resource exhaustion and pollution that will allegedly ravage the industrial and agricultural sectors of the global economy. The crisis of 2008 may be a preview of how fear of resource exhaustion and pollution might indeed devastate global output, but by means of the ill-advised expansion of regulation rather than by any mechanisms that Forrester thought he was simulating.

This paper develops its thesis in the sections that follow. The first section links the crisis of 2008 to an energy shock that ignited it. The next section then extends the analysis by focusing on the collapse of housing prices because of the energy shock. The next section contrasts mild effects predicted from general production function analysis with more extreme effects predicted by models emphasizing frictions in capital stock adjustments. The following section examines reasons that the energy shock took so much longer to crash the economy than in the 1970s. The paper then turns to implications for economic growth and another section briefly contrasts actual policy with efficient policy options. The final two sections emphasize the discouragement of investment in energy infrastructure, and investment more generally.

Nordhaus (1973) contends that Forrester's model, built from relationships neither taken from established principles or theory, nor obtained from empirical examination of data, offers little prospect for accurately predicting what Forrester foresees in our future. Indeed, Nordhaus shows that Forrester specifies critical relationships (such as between population growth and output, and saving and output) that are contradicted by cross-sectional and time series data representing real world experience. However, by promoting a widespread belief that humankind will suffer a great die-off due to overpopulation, pollution, and resource exhaustion, Forrester has given greater political traction to his subscribers, who are eager to prevent his imagined doomsday by multiplying government interventions. Nordhaus (1992, p. 16) explains that neoclassical

growth models support the conclusion that multifactor productivity must grow at least at an average rate of 0.25 percent per year to provide enough economic growth to prevent a perpetual decline of real per capita global output. Unfortunately, widespread belief in Forrester's hypothesis played enough of a role in causing the recent economic crisis to reveal that his hypothesis is a self-fulfilling prophecy in that it inspires government intervention that diminishes average productivity growth, and economic growth, to below Nordhaus' 0.25 percent stall speed.

Petroleum Price Shock Ignites Economic Crisis

Along with experts warning of overleveraging in the housing market, a respected authority on the petroleum market foresaw the financial crash of 2008 as an energy shock repercussion. Philip K. Verleger Jr. predicted, in his winter 2006 article, "Hundred Dollar Oil, Five Percent Inflation, and the Coming Recession," that a crunch was coming. The supply curve for energy having turned vertical or "totally inelastic," the Federal Reserve encountered a constraint that Verleger (p. 19) thought might propel the U.S. economy into a deflationary cycle. At this point, his prediction has proved essentially correct and the recession appeared initially to enlarge into a financial crisis of nearly unprecedented proportions. The recession came on the heels of collapsing housing and transportation equipment markets and, therefore, clearly appeared linked to the energy crisis Verleger foretold.

Verleger (2006, pp. 59-60) explained that environmental regulations adopted across the globe, combined with energy industry underinvestment in downstream capacity, have crimped global fuel supplies. Low sulfur diesel fuel standards and legislation forcing the removal of MTBE from gasoline reduced fuel supplies by several percent (U.S. Energy Information Administration, 2002). Tightened specification standards on petroleum product imports prevented foreign suppliers from making up the difference. A further 30% of the fuel supply constraint came from discouragement of investment in new refining capacity. This discouragement was achieved by three categories of impediments: 1) Financial returns were low in refining; 2) refiners were required to invest large sums to comply with ever tightening emission and fuel specification standards; and 3) antitrust enforcers made large integrated companies sell refineries to smaller undercapitalized companies as a condition for mergers. Verleger (2006, pp. 62-63) predicted that fuel supply constraints would hinder economic growth as massive petroleum price increases forced the monetary authority to fight a rising potential inflationary problem. Indeed, he rightly foresaw the pre-October

2008 reluctance to ease monetarily, though easing might have diminished the stress that erupted into the financial crisis of 2008.

James Hamilton, cited by Gordon (2008, p. 7) as “the most quoted advocate of the argument that oil shocks cause major macroeconomic dislocations,” examined the 2008 financial crisis in a paper presented in 2009 at the Brookings Institution. Attributing the near record breaking 2007-2008 petroleum price spike to failure of production to increase between 2005 and 2007, Hamilton (2009, pp. 8-16) emphasizes petroleum income and price elasticities in the context of global economic expansion. After discussing the causal role of speculation (2009, pp. 16-23), he focuses on the consequences of the price spike. Without the decrease in automobile sales reducing GDP growth by almost half a percent, no recession would have been declared for the period from 2007:Q4-2008:Q3, Hamilton reasons (2009, pp. 34-35).

Hamilton (2009) emphasizes the strong role that high fuel prices played in bringing about recession in 2007-2008, before the great financial meltdown. He compares events to those of 1990 and 1991 when a big increase in oil prices reduced both consumer spending and automobile purchases, leading to a recession in an economy in which housing investment had already been weak. Similarly, weak automobile sales reduced GDP growth by about half a percent (per year) during the first half of 2008. Weak housing investment had been subtracting about 0.9 percent per year from GDP during the Q4, 2007 through Q3 2008 period. The rise in fuel prices, as in 1990-1991, brought down consumption and auto purchases, and therefore, income, enough to affect adversely the housing sector late in 2008. However, on top of the ripple effects through income and spending, high fuel prices also greatly discouraged the purchasing of houses that commuters had previously acquired in suburbs distant from central business districts where they worked.

Residential Capital Stock Adjustment

The global financial crisis of October 2008 centered on the collapse of a so called “housing bubble,” the resulting collapse of the market for mortgage-backed securities, and the tsunami of repercussions among derivative holders and guarantors. While allegations of over-leveraging, insufficient financial intermediary supervision, and lack of derivative transparency probably identified a major element in explaining the astonishing financial system volatility that

marked what some authorities called the worst financial crisis in a hundred years, energy problems, as a root cause, received little attention. Why did the prices of houses fall so far and so persistently in the first place given that houses seem a preferred asset for the huge baby-boom cohort of investors? Was irrational exuberance really the obvious cause of irrationally high prices in the first place? James Kahn (2009) explains the increase in the price of houses resulted from rapid productivity growth that began in the 1990s and led to expectations of rising incomes among the cohort purchasing the ever-appreciating houses. He perceives that a more recent slowing of productivity growth then played a major role in the downturn in housing values as poorer productivity performance dashed expectations of rising incomes. Kahn rejects the bubble theory of housing prices.

Citing Cortright (2008), Hamilton (2009, pp. 39-40) emphasizes that the decline in housing prices was concentrated in places where residents commuted to more distant job locations. Rising gasoline prices triggered the residential real estate collapse, not only through ripple effects from the declining earnings in the automobile industry, but also through more direct effects on the viability of the suburban lifestyle. Declining income and house prices ultimately undermined the solvency of the entire financial system according to Hamilton (2009, p. 40). One might conclude that rising energy prices played a major role in depressing productivity growth and thus find a harmony between Kahn, Hamilton, and Cortright.

Joseph Cortright (2008) reaches the conclusion (that Hamilton reports) by studying the pattern of housing price declines and foreclosures. In 2004, gasoline prices reached their lowest inflation-adjusted levels since 1990, and then rose abruptly beyond $3 per gallon, popping the housing bubble partly by devastating the budgets of suburban commuters all across America when they bought gasoline. Cortright shows evidence that house prices in suburbs more distant from their respective central business districts declined the most, while houses located closer to central business districts of cities declined very little or even increased. Furthermore, Cortright measures urban core vitality using an index of relative levels of educational attainment in neighborhoods close to urban central business districts. He shows that cities with more vital urban cores have suffered substantially smaller housing price declines than cities with less vital urban cores populated by less educated, lower socio-economic residents. Cheap fuel was the basis of the growth of suburban housing and the rise in gasoline prices thus

abruptly collapsed the demand for houses in the suburbs. According to Cortright, fuel costs reduced the effective incomes of prospective buyers of suburban houses and a powerful substitution effect diverted buyers to housing accommodations located closer to their places of work (2008, p. 3).

Magnitude of the Expected Impact

Economists tend to think of output changes as predictable from production functions. In theory, one might expect the impact of an oil price increase on real GDP to be small, especially considering claims by carbon cap enthusiasts that substantially reducing carbon dioxide emissions would make little difference in the size of GDP 20 or 30 years from now. They draw on theory partly formed from experience when oil was cheaper than in 2008 and oil expenditures thus were a smaller fraction of GDP. For instance, Hamilton (2005) discussed the theoretical impact of a 10 percent petroleum supply reduction. Assuming crude oil accounted for under a 4 percent share in the production function that relates GDP to all of its inputs, Hamilton reasoned that such a supply reduction would theoretically have reduced GDP by under 0.4 percent at most. A 10 percent reduction in oil was less than a 0.4 percent reduction in the total of all the inputs used to produce GDP. Nordhaus (2007a, p. 4) similarly illustrated the "productivity response" to a doubling of the real price of oil. Demand elasticity for oil in the short run is reportedly about 0.04, meaning that a 100 percent price increase results in just a 4 percent decrease in oil usage. Nordhaus reasoned that a 0.04 short run oil demand elasticity, and a roughly 3 percent oil share of GDP in the past, suggested a GDP drop only slightly larger than 0.1 percent during a one year time horizon. Although the GDP decrease from a doubling of the price of oil enlarges thereafter, in the long run, when oil demand is less inelastic, an oil price shock causing a recession still seemed implausible. To have a "recession" we must see GDP growth actually turn negative for two consecutive quarters, and these back of the envelope estimated GDP impacts seemed too mild to cause one. Oil just constitutes too small a fraction of the inputs that the economy transforms into its output, GDP.

Hamilton and Nordhaus, on the other hand, both speculated on how the recessions that followed past oil shocks might have resulted from mechanisms not captured by inspecting production function equations describing a frictionless neoclassical economic system. Hamilton (2005) described one set of theories that emphasize that an oil shock may differentially affect various sectors, setting in motion a significant and costly reallocation of capital and labor among different

production activities. An example would be decline in value of gas guzzling motor vehicles causing the closure of factories that assemble them, while fuel-efficient vehicles increase in value and their production expands elsewhere in the country. We can further elaborate similar effects spatially reallocating the stock of capital consisting of residential and commercial structures as fuel prices alter costs of commuting. Indeed, in 1999 the average motorist spent almost 5 percent of personal income on commuting and 10 percent of the official poverty budget went for commuting expenses, compared with 30 percent for housing (U.S. Department of Transportation, 2003).

In the extreme, one might imagine residential and commercial structures and many other tangible assets of the capital stock vanishing in a value sense, like the buildings of a ghost town where residing became infeasible because a local mine became exhausted. A severe energy crisis might ruin the value of many houses, leaving their owners financially impaired in the business of building new houses in the locations to which they must relocate. Frictions in the reallocation of capital and labor might thus adversely affect investment because relevant capital proves mobile only in a multi-decade period.

Hamilton (1988) shows that the existence of goods that depend critically on energy (e.g., transportation equipment) magnifies the impact of an energy price increase. A 10 percent reduction in energy will reduce the output of the whole economy not just by 10 percent of energy's share of the composition of the economy's output, but also by a larger amount that includes a 10 percent reduction in the use of goods that depend critically on energy for their usage (Hamilton, 1988, p. 612). Pindyck and Rotemberg (1983, p. 1066) emphasize the need for a dynamic model incorporating adjustment costs for changing capital and labor in response to sharp changes in energy prices. Using post-war U. S. manufacturing sector data, Pindyck and Rotemberg (pp. 1071-1072) estimate that an increase in the price of energy results in a decrease in both the use of energy and the use of capital, reducing output substantially (pp. 1076-1077). Atkeson and Kehoe (1999) discuss Pindyck and Rotemberg's earlier findings, contrasting them with another model that Atkeson and Kehoe call the "putty-clay" model that they constructed to be only about one sixth as sensitive to long run energy price increases. The authors explain (1999, p. 1028) that Pindyck and Rotemberg's model predicts a 33 percent long run decline in output in response to an energy tax that doubles the price of energy! Energy and capital are very complimentary in the Pindyck and Rotemberg model so that energy consumption changes only as the capital stock changes as well (Atkeson and Kehoe, 1999, p. 1029). We should note, however, that doubling energy prices in the less sensitive

putty-clay model nonetheless reduces output by 5.3 percent in the long run, even though capital is regarded as substitutable by other, much more energy efficient capital in that model (Atkeson and Kehoe, 1999, p. 1028). An output decrease of that size is still enough to cause a severe recession if it happens suddenly.

Even before recession resulted, the impact of recent energy price increases on U.S. consumption was larger than the impact on U.S. production of GDP. An oil price spike siphons off earnings in the form of bigger payments to foreign petroleum suppliers, even if GDP in America stays the same. Real income (inflation-adjusted) thus suffers a double blow. Huntington (2007, p. 45) explained this initial impact of increasing crude oil prices. Because of the immediate effect on U.S. terms of trade, real income falls by an additional 1 percent to 1.7 percent in the quarter immediately following a doubling of crude oil prices, rather than just the amount that GDP falls. Doubling oil prices meant we got smaller amounts of our oil imports in exchange for the same amounts of our exports. Nordhaus (2007a, p. 6) emphasized that higher oil prices work much like a tax that lowers consumers' real disposable income, affecting real GDP through an effect on aggregate demand. Foreigners, effectively, receive much of this "tax."

Why not Sooner?

In light of the crisis in late 2008, the lack of substantial reaction to rising energy prices during the earlier part of the present decade seems puzzling. The first round of the "energy crisis" in the 1970s caused a severe recession that followed oil price increases much more promptly. With effects now so large, why was the delay in their onset of the 2008 crisis so long? Kilian (2009) emphasizes that demand rising due to a global economic boom caused most of the upward displacement of petroleum prices since the beginning of the present decade. This differs from previous oil price shocks that had larger causal contributions from sources besides rising aggregate demand. Kilian identifies three distinct sources of past oil price shocks: 1) supply disruptions; 2) aggregate demand shocks; and 3) precautionary demand driven by the expectation of future price increases.

Looking for output depressing effects as if an oil price shock was an exogenous event neglects the fact that aggregate demand was causing output expansion that was causing, in turn, the most recent oil price shock in the first place. Ultimately, Kilian emphasizes, the high oil prices affected output, but only after a delay during which rising output had influenced oil prices. History was a

seemingly poor guide because previous shocks had greater precautionary demand components and/or supply disruption components, neither of which tended to push output upward like aggregate demand shocks do. Output thus may seemed to have reacted negatively sooner in the course of past oil price shocks than in the most recent episode. Indeed, MacAvoy (1983) elaborates the very disruptive impact of energy policies that reduced energy supplies in the 1970s, but he (1992) also identifies more far-reaching advances in regulation (throughout the economy) that suppressed output growth in manifold other ways. MacAvoy (1992) showed that regulation, increasing in 8 industries between 1973 and 1987, reduced national product by 1.5 to 2 percent back then – a finding emphasized by Guasch and Hahn (1999, p. 144) in their broad summary including other investigators' similar findings. Guasch and Hahn also cite findings of substantial 1970s productivity growth slowing effects of regulations as reported by, for example, Robinson (1995) for manufacturing, and by Christainsen and Haveman (1981). Like in the 1970s, regulation helped drive up fuel prices more recently, but without so great a sweep through other sectors that regulation suffocated back in the 1970s.

Yergin (2009) expressed concern that investment in petroleum production capacity is presently insufficient for a return of prosperity. Reporting that the surge in oil prices contributed very significantly to causing the deepest recession since the Great Depression, Yergin (2009, p. 3) emphasized the impact on consumer budgets, on businesses – especially airlines, and on the automobile industry knocked "flat on its back" – and he expressly concurred with Hamilton's view presented in the same hearing. Yergin (p. 4) said another era of strong global economic growth could thus result in another adverse shock to the U.S. economy and an upset to global energy security. He concluded (2009, p. 12) by focusing on Canadian oil sands that now supply roughly one fifth of U.S. oil and emphasized that future prices from $60 to $85 per barrel are needed to justify investment in this alternative source of oil that is second only to Saudi Arabia in production potential. The prospect for greenhouse gas regulation in the future particularly threatens this Canadian source of American oil since GHG emissions are 5 percent to 15 percent greater for this oil than from an "average" barrel of conventional oil.

Implications for Long-Term Growth

Kopits (2009a) contends that the downturn that began at the end of 2007 is a "peak oil recession." He (2009a) explains that European oil consumption began falling in mid-2006, when oil rose above $70 per barrel, a little later than

Japan's oil consumption, and after U.S. oil consumption had flattened in 2005, though U.S. consumption did not begin falling precipitously until late in 2007. The downturn, he suggests, may portend a new era in which sharp recessions will be the chief mechanism by which advanced industrial economies surrender shares of global oil supply to developing countries such as China and India.

A gradual and smooth adjustment process would doubtlessly be more desirable. Kopits (2009b) observes that, in the past, recession seems to have invariably resulted whenever oil expenditures have risen above 4 percent of U.S. GDP – a threshold reached recently when petroleum prices topped $80 per barrel. In fact, reasons Kopits (2009b, p. 6), in order to avoid recession, oil must not rise in price more than 50 percent during a given year, demand adjustment should be kept below 0.8 percent of GDP during any single year, and oil expenditures should be kept below 4 percent of GDP in total. Past violation of any of these constraints seems to have triggered an oil-shock recession, argues Kopits, and, although his past recession sample size is small, the dilemma he identifies seems qualitatively correct even if his precise numbers are wrong. Therefore, the public apparently faces a choice between prioritizing climate policy with economic impact secondary, or of being more concerned about the effect on economic well-being.

Public ignorance of what was likely to result from this policy seems more likely than public willingness to suffer the recent economic perturbations, according to Kopits. Since the global price of oil has not really gone far below the $80 per barrel threshold even in the deep recession during 2008 and 2009, oil prices are likely to promptly abort any coming recovery unless a serious policy shift soon takes place. These constraints imply that an oil tax equivalent to less than 20 cents per gallon of gasoline at the pumps is about as far as climate policy should go if we wish to avoid causing another recession. Then, if oil prices rise rapidly, government might temporarily reduce the tax to moderate the oil price shock to the economy, explains Kopits (2009b). European countries, by manipulating their higher gasoline taxes that are well entrenched, can likewise blunt oil price spikes to keep them within appropriate limits, though Kopits does not precisely state what price change thresholds would trigger recession in Europe. This way, governments could give greater attention to the health of the economy while not abandoning climate change objectives in the process.

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Efficient Policy in Contrast

Analyses that compare alternative general equilibriums that efficiently use one amount of carbon fuels or another, underestimate the recent petroleum price shock's impact on GDP in yet another way. The actual interventions reducing energy supply expansion deviate from hypothetical efficient adjustments. They come as tug-of-war of outcomes emerging as political factions fight for control, rather than from well designed, efficiently optimizing programs. The 1970s "energy crisis" involved, for example, the emergence of negative real interest rates, government price controls, and the advent of rigorous command and control environmental regulation.

Environmental regulation, as in the past, tends to slow productivity growth in the U. S. manufacturing sector and elsewhere in the economy, although the extent remains controversial. Regulatory stringency contributes to lowering the return on investment in new capital. This helps encourage monetary excess to maintain a low or negative real interest rate to rescue a low growth economy. The low or negative real interest rate helped perpetuate the petroleum supply reduction that constituted the core of the "energy crisis" in the 1970s and early 1980s. Petroleum reservoir owners found in the 1970s that oil in the ground appreciated faster than money in the bank and so were discouraged from expanding extraction rates (Marxsen, 1991). Low real interest rates aim at stimulating investment otherwise depressed by an imbroglio of regulations today, much as in the 1970s.

Creyts (2007) concluded that the United States could reduce prospective greenhouse gas emissions by the equivalent 3.0 to 4.5 gigatons of CO_2 at a marginal cost of less than $50 per ton and an average net cost well below that. This conclusion is consistent with Nordhaus (2007b, p. 35). Nordhaus advocated a tax equal to the optimal marginal cost he calculated – a carbon tax of $37 per ton in 2010, increasing to $90 per ton in 2050. (Nordhaus reports this optimal tax as $34 per metric ton of carbon in 2010, measured in "2005 international U.S. dollars," in his 2008 book, on p. 91.) Nordhaus (2007b, p. 35 and 2008, p. 95) states that a tax of $10 per ton of carbon would raise gasoline prices by about $0.04 per gallon. Tol (2009, p. 41), in a recent summary of 232 published estimates of the social cost of an additional metric ton of carbon added to the atmosphere, reports a median value of $29. At present, however, the political system has used very different tactics consisting of regulating, forbidding, litigating, and otherwise impeding private efforts to expand energy infrastructure.

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By 2008 when gasoline topped $4 a gallon, antagonists had driven the price of gasoline up, not by 10 or 15 cents, but by dollars per gallon by means of a production reduction, politically implemented through manifold efforts to diminish America's energy infrastructure.

Growing Curtailment of Investment

People who oppose cheap gasoline because it might contribute to global warming can prevail in imposing their will even without new legislation. Uncertainty about how governments will reduce greenhouse gas emissions, according to Verleger (2007, pp. 55-56), inhibits energy supply capacity investment that might mitigate large energy price increases in coming years. By increasing the perceived likelihood that zealous environmentalism will become an ever-growing future political threat to energy producers, interventionists can discourage energy infrastructure investment enough to achieve their goal. They reduce the expected return on various investments by changing the probabilities of future government intrusions and regulatory takings.

If such people measured their efforts so that they brought about an economically efficient reduction, then their actions might be less objectionable. However, the effect of present global warming prevention zeal has already gone far beyond any such limits and has succeeded, first, in adding excessively to the per gallon price of gasoline and, subsequently, in contracting carbon fuels' demand by helping to cause a severe contraction of the global economy. The fact that the price of gasoline rose dollars higher (to its peak) seemed to have no impact at all on the intentions of global warming prevention zealots, who continued to demand action to curtail carbon fuel use even as the global economy collapsed in the wake of the energy price shock.

Morriss (2007) discussed the pervasive impact of regulation on the gasoline market in the United States. Creating a series of fragmented regional markets has resulted in refining capacity well below what a free market in gasoline would have produced. Shurtleff and Burnett (2007, p. 2), arguing along similar lines, emphasized that regulation has discouraged the building of refining capacity so that, from 1981 to 2005, U.S. refining capacity actually fell 8.1 percent while oil consumption increased 29.7 percent. Citing the U.S. Energy Information Agency, they (2007, p. 2) projected that U.S. refining capacity will grow only 9.4 percent by 2020 in spite of projected 19.2 percent growth in gasoline demand. Clean air regulations, boutique fuel requirements, and ethanol mandates particularly discourage would-be refining capacity builders, assuming

they can see their way through permitting and litigation obstacles to expanding refining capacity.

As conventional crude oil reserves threatened to reach their peak, unconventional sources such as tar sands and oil shale became viable alternatives in the face of rising crude oil prices. The expansion of such resources promised to moderate the rise in crude prices if people are willing to invest in the considerable capital needed to extract and process them. However, Perry (2008) wrote that, while the U.S. obtained about 1 million barrels a day from Canadian tar sands, opponents were determined to block efforts to get permits to expand capacity in the U.S. to refine heavy crude oil. Congress passed legislation in 2007 to block government use of oil refined from any source that has a larger carbon footprint than conventional crude oil, thus preventing the U.S. Defense Department from using this relatively secure supply from Canada. A dozen states were likewise considering actions similar to those advocated by Environment Illinois that wanted to ban the expansion of tar sands refining activity in Illinois, according to Perry.

The rising price of gasoline has resulted partly from imposing other kinds of political risk on oil producers. The last decade witnessed the diversion of nearly 25 percent of the investment spending in the petroleum refining industry to regulatory compliance expenditures to meet ever-tightening standards. Indeed, Shurtleff and Burnett (2007) elaborate this, reporting that an attempt at constructing a new refinery in Arizona begun in 1997 and obtaining all necessary permits, remains delayed after more than 10 years due to concerns over environmental impact and the proposed site of the plant. If the construction had succeeded, this would be the only new refinery built in the last 20 years in the U.S. In the summer of 2007, petroleum companies announced that they were scaling back plans to expand existing refineries because of the government's intention to promote biofuels. Hebert (2007) reports that oil companies, prompted by high fuel prices in 2006, had made plans at that time to boost refining capacity by about 10 percent, but then, in 2007, scaled back those plans by nearly 40 percent because of congressional efforts to enact expanded ethanol mandates. Ripple effects from discouraged investment in the energy sector add to a similar atmosphere of regulatory harassment pervading other sectors of the economy. This encourages the channeling of investment spending away from these sectors and into bubbles such as in the housing market.

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Subdued Investment in Past Recessions

The aborting of refinery investment plans illustrates a broader mechanism that Higgs (2006) identifies as responsible for the prolonging of the Great Depression after the Roosevelt Administration came to power. Higgs argues (2006, P. 5) "that the insufficiency of private investment from 1935 through 1940 reflected a pervasive uncertainty among investors about the security of their property rights in their capital and its prospective returns." The character of the actions of the Roosevelt Administration during the "New Deal" era fomented the investment stifling uncertainty over that time interval, according to Higgs. The fiscal excesses of a war finally propelled GDP growth until private investment was able to make a comeback after the death of Roosevelt. In our times, the war in Iraq and asset bubbles substituting for investment sidelined by fear of regulatory takings may have temporarily averted the economic collapse that came in 2008.

Malkiel (2007, p. 323) attributes the poor performance of the stock market during the decade of the 1970s to an increase in perceived risk rather than to inflation. Malkiel writes, "The growth rate of earnings did compensate for inflation during 1969-81, but the drop in price-dividend and price-earnings multiples, which I believe reflected increased perceived risk, is what killed the stock market." We can add to Malkiel's reflections that government imposition of wage and price controls and the advent of the major environmental regulatory legislation, which came with the creation of the EPA, accompanied a greater 1970s inflation volatility.

Energy supply uncertainty seemingly abounds outside of the transportation sector. Some of the same people who desire transition to electric automobiles now boast of discouraging increases in electrical generating capacity. John G. Edwards (2008) reported that the Natural Resource Defense Council counted 26 coal-fired power plant projects scrapped by January 4, 2008, since March 2006. He cites Charles Benjamin, director of the Nevada office of Western Resource Advocates, who attributes dropping of coal plant projects because of uncertainty over how much it will cost to comply with expected future regulations on carbon emissions. Broadening the definition of projects to include proposed projects not counted by Benjamin reveals a wider destruction of would-be future coal-fired power plants. A web posting called "Coal Moratorium Now" (2008) reports shelving or cancellation of 59 proposed coal-fired power plants during 2007 and it lists all 59 projects specifically. *SourceWatch* (2008) also lists

59 such cancellations in 2007, observing that utilities abandoned more plants than were rejected by regulators (44 abandoned; 15 rejected).

The present global energy and food crisis is fundamentally the result of a political movement lacking intelligent design and focus. Zealous people are attempting to resist all manner of activities they perceive as adding *to* a global warming threat. They are politically resisting every kind of use of fossil fuels as if they might soon wean humankind off the use of carbon fuels altogether. The benefits from whatever reduction in carbon combustion this multifold attack might achieve promises to be small relative to the costs imposed on people all over the world. A 2005 report published by the British House of Lords (p. 63) estimated what would happen if the world's industrialized countries, under the Kyoto Protocol, fully complied to reduce their greenhouse gas emissions below 1990 levels and then held emissions constant thereafter. It would reduce global warming by 2100 by only 0.2 degrees Celsius, and the sea level would rise 47.5 cm, rather than 50 cm.

Conclusion

An energy crisis and related global food crisis mimics the beginnings of a global collapse similar to the one foreseen by Jay Forrester based on his World Dynamics model. Popularized in the early 1970s by the best selling book, *The Limits to Growth*, Forrester's ideas gained a following of environmental extremists who may feel vindicated. However, causality is largely circular because efforts by believers in *The Limits to Growth* collapse hypothesis are themselves causing our present quasi collapse by impeding the use of carbon fuels. Fear of pollution and fuel exhaustion has prompted the politics and policies causing the crisis that so worsened in 2008 that it almost, at first, seemed to signal a collapse of modern industrial society. A self-fulfilling prophecy thus drives a vicious circle promoting economic contraction because environmental activists are stifling the expansion of energy production. As this political feedback loop becomes increasingly apparent, it adds to the very uncertainty that is largely causing our present situation.

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