

Review of Radical Political Economics

<http://rrp.sagepub.com>

Climate Change, Peak Oil, and Globalization: Contradictions of Natural Capital

Fred Curtis

Review of Radical Political Economics 2007; 39; 385

DOI: 10.1177/0486613407305288

The online version of this article can be found at:
<http://rrp.sagepub.com/cgi/content/abstract/39/3/385>

Published by:



<http://www.sagepublications.com>

On behalf of:



[Union for Radical Political Economics](#)

Additional services and information for *Review of Radical Political Economics* can be found at:

Email Alerts: <http://rrp.sagepub.com/cgi/alerts>

Subscriptions: <http://rrp.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

Citations <http://rrp.sagepub.com/cgi/content/refs/39/3/385>

Climate Change, Peak Oil, and Globalization: Contradictions of Natural Capital

FRED CURTIS

*Department of Economics, Drew University;
e-mail: fcurtis@drew.edu*

Abstract

This article argues that economic globalization may be undermined by predicted impacts of global warming and peak oil (depletion). They are projected to cause significant damage to transportation infrastructure and increase transportation costs. They may also increase business risk, food prices, and general prices. As a result, the long distance exploitation of cheap labor may lose much of its economic profitability in coming decades, and supply chains may contract to regional and local lengths.

JEL classification: F18, Q4, Q5

Keywords: global warming; peak oil; globalization

I. Introduction

The literature on globalization and the environment primarily concerns the impact of trade and investment on the global commons, in terms of pollution, resource depletion, and the erosion of ecosystems. This article reverses that approach and examines the impact of changes in natural capital on globalization, particularly trade. It concludes that the erosion of natural capital—in the form of climate change and oil depletion—could undermine the economic logic of globalization. This article begins the discussion of the intertwined effects of peak oil and climate change on the future of the global economy.

In its most recent phase, globalization is understood as the treaty-based liberalization of trade and investment via, inter alia, NAFTA and the WTO. The reduction of barriers to trade and investment has enhanced global economic growth and rapidly increased international trade. “Between 1950 and the mid-1990s, while world output grew by a factor of five, exports went up by over 14 times. Global trade in goods and services grew twice as fast as GDP during the 1990s” (Simms 2000). Growth in the volume of trade increased shipping, which expanded 70 percent between 1990 and 2004 (Pirog and Benjamin 2003).

Author’s Note: This article was presented originally as “Is Globalization Dying? Implications of Global Warming and Peak Oil.” Thanks to Rona Weiss for help on an earlier version of this article and to RRPE reviewers Ann Jennings and Victor Lippit.

Review of Radical Political Economics, Volume 39, No. 3, Summer 2007, 385-390

DOI: 10.1177/0486613407305288

© 2007 Union for Radical Political Economics

This increase in international trade (and movement of freight) is frequently attributed to three factors: (1) trade and investment liberalization, (2) transportation and communications technologies (e.g., containerization and satellite communications), and (3) the low cost of labor in developing nations, exploitation of which has been made accessible by both trade and investment treaties and the new technologies. Also, key to the long-distance exploitation of cheap labor is the physical infrastructure of roads, railroads, ports, and airports and historically cheap (and largely untaxed for international journeys) fuels for aviation and shipping. This tax subsidy—along with until-recently cheap fuels¹—has made long-distance passenger and freight transport inexpensive.

Such factors have changed the pattern of international trade, lengthening supply chains. For example, the formation of NAFTA led many U.S. firms to relocate production to Mexico to take advantage of lower labor costs. When China joined the WTO, some of those firms relocated there to get the benefit of even cheaper labor despite a large increase in transportation miles and thus higher transportation costs for the finished goods (Jordan 2002). The legal context for such changes in the international division of labor and production is the specific provisions of the NAFTA, WTO, and other treaties. However, cheap, rapid, and predictable transportation is a critical prerequisite for the exploitation of cheap labor at the end of long-distance global supply chains (especially in the case of just-in-time inventory strategies for manufacturing or retail trade). These supply chains are put at risk by global warming and peak oil.²

2. Global Warming

The human economy contributes to global climate change by burning fossil fuels, thereby increasing greenhouse gas emissions, and by changes in land use patterns (e.g., deforestation). The accumulation of greenhouse gases in the atmosphere determines the degree of climate warming. Critical effects of global warming include rising sea levels, higher maximum and average temperatures, increasing frequency and severity of storms, and changed growing conditions for the human food supply (Ackerman and Stanton 2006). Furthermore, extreme weather events—for example, hurricanes, heat waves, and floods—will be more frequent and more destructive.

Impacts of global warming on economic growth are now estimated to range from 6 to 8 percent of GDP cumulative impact by 2100 (Ackerman and Stanton 2006). Stern reports impacts of 5 percent reduction of GDP with the possibility of a 20 percent per capita fall in consumption (Stern 2007). Falling GDP is projected to reduce global purchasing power. Lower GDP also reduces funds for investment to mitigate greenhouse gas emissions and the damages of global warming. This further undermines the logic of long-distance supply chains.

Globalization is heavily dependent on an elaborate system of physical capital to move very large quantities of goods and personnel long distances. This physical capital consists of port facilities, highway systems, rail networks, and airports. They will be put increasingly at risk by rising sea levels, storms (including hurricanes), and higher temperatures.

1. Adjusted for inflation, between 1986 and 2003, the annual average price of crude oil ranged from \$14.83 to \$36.00 per barrel. In 2004, it was \$40.42, rising to \$51.94 in 2005, and \$60.78 for 2006 (as of September 18) (Historical crude oil prices 2006).

2. For a discussion of how globalization itself affects global warming and peak oil, and a more expanded version of points made in this article, see Curtis (2006a).

The impact of rising sea levels could be severe for port facilities, roads, and even airports, which are often located at or just above sea level. These impacts will increase costs of transoceanic, intercontinental, transcontinental, and inland water shipping. They could also interrupt and slow the movement of goods along the long-distance supply chains. Global warming may also raise fuel usage rates through the impact of rising temperature on engine efficiency, cargo capacity, and need for refrigeration of cargo (Caldwell et al. 2002). Thus, in the absence of cost-lowering technological changes, the long-distance movement of goods could be undermined by increasing costs of transportation due to global warming's impact on the movement of goods.

Furthermore, global warming is projected to change the natural capital of soil, water, and ecosystems in ways that lower crop yields and food supplies. The changing geography of food production—due to new patterns of heat, storm, and rainfall—feeds back onto physical infrastructure. In the future, the existing network of roads, railroads, terminals, grain storage facilities, and so forth may not be well located for the new geography of agricultural production. Hence, global warming will affect the production and physical distribution of food crops, a major component of long-distance trade.

Globalization eases boundaries of locality and season to create a global food market, increasing food miles traveled from producer to consumer. It is a cheap food system allowing the long-distance transportation of food, eating higher on the food chain for more people, and lower food costs to consumers. By reducing the proportion of consumers' budgets for food (now at 11.5 percent of disposable income in the United States), the global cheap food system has made more possible the purchase of nonfood consumer goods in higher-income nations and among middle and working classes around the world (U.S. Department of Agriculture 2006).

Due to global warming, food will likely become more expensive, and the current variety of products less available. This will harm the global food industry. As food becomes more expensive, it may put upward pressure on wages and claim a larger part of consumer budgets. This could reduce consumer demand for other products provided by global supply chains. Also, food production may become more local and seasonal (see Curtis 2006b). In such a scenario, climate change would undermine the globalization of food.

The physical impacts of global warming related to storms, sea level rise, higher temperatures, and so forth have already begun to affect financial capital, in particular global insurance. "Climate change has the potential to affect virtually all segments of the insurance business—including those covering damages to property, crops, and livestock; pollution-related liabilities; business interruptions, supply chain disruptions, or loss of utility service; equipment breakdown arising from extreme temperature events; data loss from power surges or outages; and a spectrum of life and health consequences" (Mills and Lecomte 2006). The kinds of losses projected due to global warming could put the entire insurance and re-insurance industries at risk of bankruptcy. For example, in the case of the United Kingdom, "the extent of the value at risk from climate change could be as much as 15 per cent of the total market capitalization of major companies" (New Economics Foundation 2003). By increasing risks, global warming puts financial capital in danger.

In these ways, climate change is projected to undermine the further increase of long-distance trade, regardless of how liberal the regime of international trade and investment. It does so by its impact on the natural, physical, and financial capital critical to globalization.

3. Peak Oil

Peak oil is the absolute maximum of annual oil production that will be followed by the slow but inexorable decline in global production (Deffeyes 2001). Global oil production is expected to peak between 2007 and 2025 (Hirsch, Besdek, and Wendling 2005). Concurrently, world oil demand continues to rise at a rapid rate. As a result, crude oil prices are predicted not only to increase rapidly but to be more unstable in coming decades. Oil prices rose from \$20 a barrel in 2001 to more than \$70 per barrel in April 2006. But these price changes may be small compared to those that lie ahead: Goldman Sachs predicts \$105 by 2010 (Luft 2006: 3).

Higher oil prices raise the price of products across the board (unevenly according to their oil intensity) and reduce consumer disposable income and the demand for manufactured products. Large increases in oil prices of the sort predicted may be recessionary. The impact on developing nations of higher prices will be even more severe than in developed economies. "On average, developing countries use more than twice as much oil to produce a unit of output as developed countries. . . . The vulnerability of developing countries is exacerbated by their limited ability to switch to alternative fuels" (Hirsch, Besdek, and Wendling 2005). As oil prices rise, the higher oil intensity and lower fuel flexibility could raise manufacturing costs in developing nations and further erode the cheap labor advantage of long-distance supply.

Higher oil prices erode past benefits of trade liberalization. "The \$30 per barrel increase in crude prices since late 2003 is equivalent to an average tariff increase of 5 percentage points—more than doubling the current average world tariff rate of 4.5%. . . . The tariff equivalent impact of \$100 per barrel would be tantamount to an almost tripling of current tariff rates and a de facto elimination of the entire cumulative tariff reduction of the past 45 years" (Rubin and Tal 2006). Here, peak oil and higher prices overcome the impact of liberalization and underscore the importance of natural capital for globalization.

Air transportation is the most energy-intensive way of moving people and freight. It is particularly vulnerable to fuel price increases. Luft estimates that if the price of crude oil rose to \$100 a barrel, the price of jet fuel would be more than \$3 a gallon, versus the November 2006 spot price of \$1.80 (Luft 2006). This would endanger the profitability and survival of passenger and freight airlines. Passenger travel would likely grow less fast than predicted or even fall, both for business travel and tourism. Airfreight would decline, particularly for less valuable cargoes such as produce (Brown 2006).

An additional impact of higher jet fuel prices on globalization concerns the military. The Department of Defense uses 500,000 barrels of oil per day, 81 percent for aviation fuel (Karbusz 2006). The recent 31 percent increase in jet fuel prices paid by the Pentagon has led to a 10 percent reduction in Air Force flying hours (Wicke 2006). As military power undergirds trade relations, cheap jet, gasoline, and diesel (e.g., for ships and Humvees) fuels are important to support the projection of military power in support of global trade and global flows of oil (see Westervelt and Fournier 2005; Wicke 2006).

As the prices of fuels rise with oil peak, one possible effect (in the absence of countervailing trends) is the shortening of supply chains and the regionalization of imports and exports. "The rising transportation costs have changed the economic principles behind some offshore manufacturing strategies. For instance, Mexico's labor is nearly five times the cost of labor in China. But one U.S. food manufacturer found that at today's fuel rates, transport costs were double in China compared to Mexico. Moving more production to Mexico saved the company more than \$1 a unit" (Girotti and Kilgore 2006). Such factors could shorten supply chains and support more local and regional production and distribution (Curtis 2006b).

Global agriculture depends on petroleum to ship grains, produce, and livestock to market or processing plants. Furthermore, it requires additional fuel to refrigerate produce and meat traveling long distances to consumers. Industrial agriculture also relies on oil as feedstocks for fertilizers and pesticides, to operate agricultural machinery, and to pump irrigation water (Goldsmith 2005). Increasing fuel prices reduce the profitability of long-distance supply of perishable foods. Sufficiently and persistently high oil prices will likely result in a reconfiguration of the food economy on a more regional or local basis.³ When rising oil prices increase production costs, they will increase food prices. This may raise the portion of incomes devoted to food, again leaving less disposable income for the manufactured products of the global economy.

4. Conclusion

If current projections are correct, climate change and oil depletion could begin to undermine the logic of the present international division of labor in the near future. The current pattern and distance of the transportation of goods would be much less profitable than at present. This reduced profitability would result from impacts of peak oil and climate change on transportation infrastructure and the fuel costs of moving freight. Transportation costs could rise significantly. Food would then become more expensive, much more regional or local, and seasonal as well.

Increasing fuel and food prices would likely reduce consumers' disposable incomes, lowering demand for manufactured goods (from clothing to electronics) that are a mainstay of global trade. Both global warming and peak oil would thus reduce economic growth, if not turn it negative. Finally, they will increase uncertainty and risk, raise insurance costs, and undermine business confidence, as they have already begun to do. The double threat of climate change and peak oil would thus pose serious problems for continued globalization.⁴

Under such circumstances, the long-distance, global supply-chain economy depending heavily on fossil fuel and current transportation infrastructure could not easily continue. Its economic logic and physical possibilities would be seriously undermined by the significant onset of climate change and peak oil. Such erosion of the natural capital basis of current patterns of the international division of labor and the exploitation of far-away cheap labor (based on treaties that liberalize both foreign trade and investment) would begin to reverse globalization unless significant countervailing factors came into play. If not, then the prospect for continuation and growth of the current globalization model may be dim.

References

- Ackerman, F., and E. Stanton. 2006. *Climate change—The costs of inaction*. Report to Friends of the Earth England, Wales and Northern Ireland. Medford, MA: Global Development and Environment Institute.
- Brown, L. 2006. The world after oil peaks. *Earth Policy News*. http://www.earth-policy.org/Books/Seg/PB2ch02_ss6_7.htm.

3. See Curtis (2006b) on this point and for sources.

4. Policies designed to deal with peak oil and global warming—such as those found in the Hirsch, Besdek, and Wendling (2005) report and the Stern (2007) review, respectively—would also undermine the economic logic of globalization (see Curtis 2006a).

- Caldwell, H. K., H. Quinn, J. Meunier, J. Suhrbier, and L. Grenseback. 2002. *Impacts of global climate change on freight*. Washington, DC: Center for Climate Change and Environmental Forecasting, U.S. Department of Transportation.
- Curtis, F. 2006a. Is globalization dying? Impacts of global warming and peak oil. Unpublished manuscript.
- . 2006b. Relocalization as response to peak oil (and global warming). Unpublished manuscript.
- Deffeyes, K. S. 2001. *Hubbert's peak: The impending world oil shortage*. Princeton, NJ: Princeton University Press.
- Girotti, G., and M. Kilgore. 2006. Peak oil and the supply chain. *Traffic World*. <http://www.trafficworld.com/newssection/columns.asp?id=37420>.
- Goldsmith, E. 2005. Farming and food production under regimes of climate change. In *The final energy crisis*, ed. A. McKillop, 56–73. London: Pluto.
- Hirsch, R., R. Besdek, and R. Wendling. 2005. *Peaking of world oil production: Impacts, mitigation & risk management*. Washington, DC: U.S. Department of Energy, National Energy Technology Laboratory. http://www.projectcensored.org/newsflash/the_hirsch_report.pdf.
- Historical crude oil prices*. 2006. InflationData.com.
- Jordan, M. 2002. Factories leave Mexico to find cheaper labor. *Washington Post*, June 20.
- Karbus, S. 2006. Long live the Pentagon. *Energy Bulletin*. <http://www.energybulletin.net/21330.html>.
- Luft, G. 2006. *The oil crisis and its impact on the air cargo industry*. Washington, DC: Institute for the Analysis of Global Security.
- Mills, E., and E. Lecomte. 2006. *From risk to opportunity: How insurers can proactively and profitably manage climate change*. Boston: CERES. http://www.ceres.org/pub/docs/Ceres_Insurance_Climate.
- New Economics Foundation. 2003. *Free riding on the climate: The possibility of legal, economic and trade restrictive measures to tackle global warming*. London: New Economics Foundation. <http://www.neweconomics.org/gen/uploads/fcle3ufmrk3r2h55tbg3nw4520082004164028.pdf>.
- Pirog, R., and A. Benjamin. 2003. *Checking the food odometer: Comparing food miles for local versus conventional produce sales to Iowa institutions*. Ames: Leopold Center for Sustainable Agriculture, Iowa State University.
- Rubin, J., and B. Tal. 2006. Soaring oil prices will make the world rounder. Occasional paper 55, CIBC World Markets. http://research.cibcwm.com/economic_public/download/occ_55.pdf.
- Simms, A. 2000. *Collision course: Free trade's free ride on the global climate*. London: New Economics Foundation. http://www.neweconomics.org/gen/uploads/doc_1011200072237_3192.
- Stern, N. 2007. *Stern review on the economics of climate change*. London: HM Treasury.
- U.S. Department of Agriculture, Economic Research Service. 2006. *Food CPI, prices and expenditures: Food expenditures by families and individuals as a share of disposable personal money income*. Washington, DC: U.S. Department of Agriculture.
- Westervelt, E., and D. Fournier. 2005. *Energy trends and implications for U.S. Army installations*. Washington, DC: U.S. Army Corps of Engineers Research and Development Center.
- Wicke, R. 2006. Rising fuel costs tighten Air Force belt. *Air Force Print News*. <http://www.militaryh.com/features/0,15240,113248,00.html>.

Fred Curtis is a professor of economics and environmental studies at Drew University, where he has taught since 1979. His current research is on the economics of relocalization in response to peak oil and global warming.