

March 23, 2020

## On Optimization

In our discussions of COVID-19, we have noted that part of the reason the virus has been so disruptive is because the world has adopted a stance that optimization is an unalloyed positive. When I was in graduate school, I participated in a seminar with several professional private sector economists. A question was posed about what the goal of economics should be, and the resounding response was “efficiency.” On its face, that position makes sense; after all, who wants to be inefficient? But the key is how efficiency is defined and measured.

There are two underlying issues that frame optimization. The first is the broad number of variables that may be considered in optimization. The second is that many actions designed to optimize suffer from the error of composition. In other words, what is rational at the micro level may be irrational at the macro level. Both of these factors are affected by globalization, thus making them appropriate for a geopolitical report.

One of the reasons COVID-19 has had such a drastic impact on the global economy is because companies and governments have optimized to a narrow set of factors and the lack of redundancies in the system has caused breakdowns in supply chains. As we have watched this crisis unfold, we have been struck by the fact that much of the impact was tied to the drive for optimization.

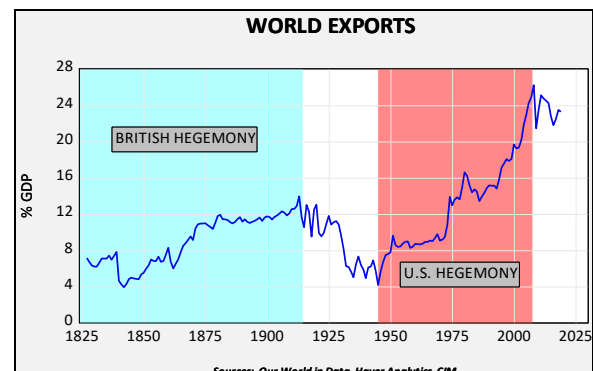
In this report, we will examine the issue of optimization. We will start by discussing the expanse of variables considered and why market participants tend to assume that slow moving variables are constant and thus they are vulnerable when they change. An analysis of the error of composition problem will also be included. We will conclude with market ramifications.

## Determining What Counts in Optimization

Most students first encounter optimization when they study calculus. Finding the optimal size of a can or maximum profitability are common exercises in that course. The key to the analysis is what constraints are included in the problem.

In real life outside the laboratory or the mental exercise, the number of variables that could affect a cause and effect relationship could be extensive. In most circumstances, the analyst will restrict his study to variables that show variation and correlation; items that are mostly constant are ignored.

For example, globalization has been steadily expanding since 1945.



The above chart shows world exports as a percentage of GDP, which is a basic metric of globalization. In general, the more the world exports, the greater the degree of global integration. This number steadily rose from 1840 to 1914 and then rose again from 1945 to 2008. There were a couple of “stalls,” in 1950-70 and 1980-90. But, for the most part, world exports have been rising under U.S. hegemony, an indicator of global integration.

However, the chart also shows that globalization rests on the existence of a functioning hegemon. When the British were not up to the task after WWI and the U.S. was unwilling to accept the mantle, globalization declined.

Globalization is often thought of as an immovable force.

*Globalization is not something we can hold off or on...it is an economic force of nature, like wind or water.*

– [Bill Clinton](#)

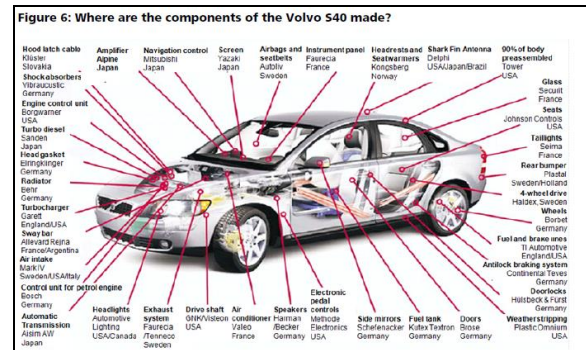
In reality, global integration requires a hegemon to provide the global public goods of security, especially the safety of the major sea lanes, and a stable reserve currency. Without these, globalization will flounder. Until recently, the U.S. consistently supplied these global public goods. And so, most businesses and governments have ignored the risk that the U.S. may retreat from the hegemonic role and have engaged in a number of practices that may be at risk if globalization retreats.

**Example #1: Extended supply chains.**

Richard Baldwin argued in his book, *The Great Convergence*,<sup>1</sup> that information

<sup>1</sup> Baldwin, Richard. (2016). *The Great Convergence: Information Technology and the New Globalization*. Cambridge, MA: Harvard University Press.

technology allows for knowledge work to shift across borders. Essentially, any facet of manufacturing can be sourced to its most optimal point. Companies have taken this to heart.



(Source: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.670.3067&rep=rep1&type=pdf>)

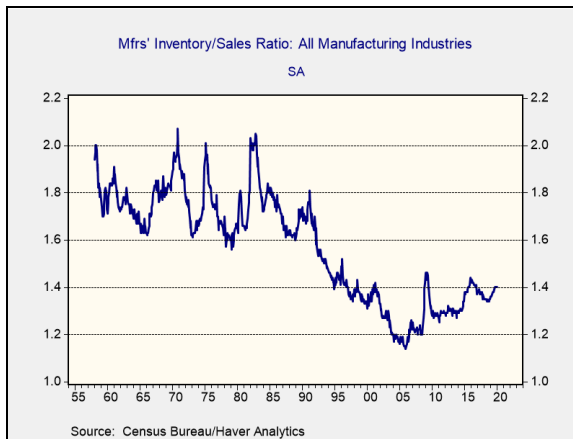
Parts for cars come from all over the world. The design and other services can be executed globally as well. Globalizing the process reduces costs if one assumes political and economic stability in all these supplier nations. Disruptions at one point of the chain can disrupt the finished product. The Fukushima nuclear disaster affected automobile and [technology](#) assembly. The world is waiting to see the impact on global supply chains from COVID-19, but it does appear that global supply chains will be affected.

**Example #2: Just-in-time inventory methods.**

The idea of holding as little inventory as possible became popular in the 1980s. High interest rates made funding inventory expensive. The idea of holding minimal inventory makes sense at the micro level. If a company can force a different level of the supply chain to hold the stockpile instead, it saves the cost of financing the inventory. However, what works on the individual level creates risk at the macro level. This is because there is no part of the supply chain that feels compelled to hold inventory. After all, why should any

company in the supply chain absorb the costs of others? This is an example of the error of composition. The lack of inventory becomes a risk for the entire supply chain.

This chart shows the inventory/sales ratio for U.S. manufacturing.



Although we have seen higher ratios since 2005, it remains well below levels seen in the early 1980s.

**Example #4: Industries caught in the crossfires of geopolitics.** [Taiwan is a semiconductor powerhouse.](#) Taiwan Semiconductor (TMSC, 52.23) supplies 48% of the global chip market. The country is also important in the development of 5G. Both the U.S. and China are consumers of its products. When the U.S. and China were on good terms, this industry in Taiwan could flourish by supporting both markets. However, as tensions rise between Washington and Beijing, the chip industry in Taiwan finds itself trapped between two competing superpowers. Putting a critical supplier in a geopolitically sensitive area only makes sense if one assumes stable hegemony. However, Taiwan's position between the U.S. and the PRC is risky for both nations under conditions of geopolitical tensions. [The Pentagon is pressing TMSC to build its chips in the U.S.](#) Since China

considers Taiwan a province, we suspect it will oppose such measures.

**Example #3: The war against the stabilizers.** Paying someone to maintain markets and provide around-the-clock security or a face to the public has fallen out of fashion. For years, financial markets deployed market makers, either in the form of specialists, who were charged with providing orderly markets for equities, or floor traders, who performed a similar function for commodity markets. Equities in the U.S. used to trade in fractions of an eighth, which meant that there was at least a 12.5 cent spread on each transaction. This spread compensated the specialist for providing liquid markets at all times. Commodity floors had pit traders who essentially did the same thing. Having a seat on the exchange was guaranteed money.

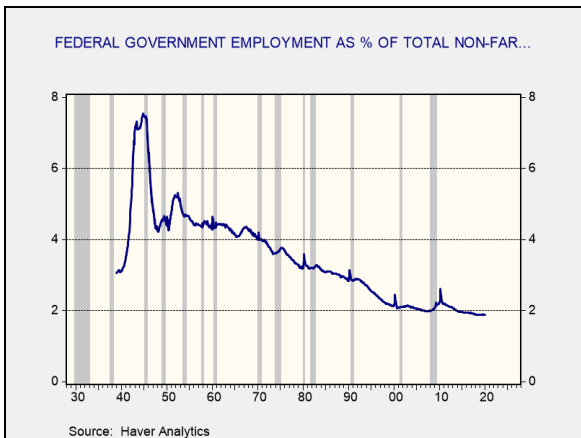
As technology evolved, it became apparent that buy and sell orders could be matched without these middlemen. The equity market specialists were mostly eliminated by moving to digital pricing, which reduced the spread on bid/ask quotes to a cent or less and made it uneconomical to maintain that role. Floor traders were eliminated by converting seats to shares; instead of pressing to keep the role in place as seat holders, they wanted the efficiencies brought by electronic trading as shareholders.

Under normal trading conditions, this conversion worked rather well. But, under periods of uncertainty or high volume, bid/ask spreads often become volatile and trade execution becomes more difficult.

There are other examples as well. Firms with variable demand have moved to flexible scheduling that forces their employees to be perpetually on call. This development has reduced labor costs but

made life for these workers unsettled. They can't easily manage other activities, such as childcare or education, because they could be called into work at any moment.

To some extent, government workers include those who are there to handle emergencies and provide stability. They are there to provide assistance for natural disaster preparation, civil defense, disease mitigation and enforce regulations. Since the 1980s, government workers have been denigrated in popular culture. And, with the end of the Cold War, there is evidence to suggest there are fewer of these positions filled.



Current civilian federal government employment is about 1.9% of total employment. For the most part, government workers don't contribute directly to output; they offer assistance in that effort but are often there to deal with problems that emerge. Fewer government workers relative to the rest of the civilian workforce suggests there is [less capacity to respond to natural disasters or events such as COVID-19](#).

**Ramifications**

As the world becomes less stable, our notions of optimization will change. Instead of viewing inventory accumulation as a negative or long supply chains as a positive, sentiment will likely reverse. Current ideas about optimization all assume globalization will be maintained. Given our doubts about this outcome, we would expect companies with shorter supply chains and redundant capacity to be rewarded.

Bill O’Grady  
 March 23, 2020

*This report was prepared by Bill O’Grady of Confluence Investment Management LLC and reflects the current opinion of the author. It is based upon sources and data believed to be accurate and reliable. Opinions and forward-looking statements expressed are subject to change without notice. This information does not constitute a solicitation or an offer to buy or sell any security.*

**Confluence Investment Management LLC**

Confluence Investment Management LLC is an independent, Registered Investment Advisor located in St. Louis, Missouri. The firm provides professional portfolio management and advisory services to institutional and individual clients. Confluence’s investment philosophy is based upon independent, fundamental research that integrates the firm’s evaluation of market cycles, macroeconomics and geopolitical analysis with a value-driven, fundamental company-specific approach. The firm’s portfolio management philosophy begins by assessing risk and follows through by positioning client portfolios to achieve stated income and growth objectives. The Confluence team is comprised of experienced investment professionals who are dedicated to an exceptional level of client service and communication.