ADVISOR PERSPECTIVES

Investing in a Resource-Constrained World

By Richard Vodra, JD, CFP
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Arctic ice cover is at its lowest level in decades – and maybe in millennia. All over the world, heat records are being broken, and droughts affect vast areas. Meanwhile, conventional oil production has been flat worldwide since 2005, and despite the ongoing recession, prices remain high.

A recent study of 405 of the biggest global companies reported that 37 percent say they are already seeing the effects of climate change on their businesses, up from 10% just two years ago. The potential consequences of these conditions for society are written about frequently, but here is a simpler question that is important to our community: How are these and related facts likely to affect investment returns going forward? How can we even frame such questions usefully?

I'll discuss how advisors can construct portfolios that will respond well to future resource constraints and environmental change, but first let's consider a model that can help us explain how long-term investment performance depends on the underlying forces driving our economy.

A resource-based economic model

The easiest way to think about the factors affecting stock performance is a simple formula that works to define the overall level of stock prices in terms of other features of the economy:

Stock Prices = GDP x Percent in Profits x P/E ratio

The first factor is the GDP – the level of production for our country. This is multiplied by the percentage of GDP that goes to corporate profits. The final factor is the price paid for those profits, or the P/E ratio. For simplicity, let's set aside dividends, stock repurchases and other sources of return for stocks, and let's instead focus simply on prices.

This formula is an identity at the broad market level, but each of the factors can change independently:
GDP measures the level of all economic activity, including both real changes and price changes (since stock prices are in nominal dollars). The economy grows or shrinks based on the availability and use of capital, labor, and natural resources, and on whether investment is sufficient to grow those factors faster than depletion and depreciation decrease them. Changes in demand are the other side of the coin, since inadequate demand makes investment and production less profitable.

Profit levels are based on what share of the economy the corporate sector comprises and how much is left after expenses for compensation for labor and management, taxes and regulatory compliance, natural resources, real estate, transportation costs, R&D, interest on debt, and other costs of doing business.

Price-earnings ratios are determined by the need for capital, available alternatives for money, risk expectations, and the general outlook for growth and inflation.

Over time, if the percentage of the GDP in profits and P/E ratios both do not change, then stock prices will generally track the overall economy. Usually, though, those factors do change a lot, and the link between stocks and GDP is often weak.
Currently, corporate profits as a share of the economy are at an all-time high, price-earnings ratios are modestly above historical averages and GDP growth is slow but positive.

The above framework is useful for testing any general investing hypothesis. If an investor (or advisor) believes that profit margins or P/E ratios will rise, then being long in the stock market makes sense. On the other hand, if the overall expectation is for margins to revert to normal or P/E ratios to fall, then stock returns will likely disappoint. A shrinking economy is usually a bad place to invest.

Using this framework, let's consider the effects of some of the resource trends we have observed in recent years.

The effects of reduced oil production

Conventional (liquid) crude oil production around the world has not increased since 2005, and overall "petroleum" production has grown only because that category has come in to include more natural-gas liquids like butane (which can't be used for transportation), biofuels (which require oil and gas for production), and unconventional oil (like tar sands, hydrofracked shale oil, and heavy oil, all of which are much more expensive to produce, thus yielding less net energy).

There is a basic link between fossil-fuel consumption (mostly oil, but also coal and natural gas) and GDP. In the developed world, GDP has grown about 1-1.5% faster than oil consumption, while the ratio has been more nearly one-to-one in the developing economies. In the US for the last 30 years, the correlation between total employment and energy use has been 0.98.

Thus, if more oil is not available, it will be difficult for GDP to grow.

Oil prices, meanwhile, have become both very volatile and very high. A barrel of oil could be had for $10 in 1998, but it now costs $100. James Hamilton, an economist at UCSD,

has determined that all but one of the 11 recessions since 1945 were preceded by a spike in oil prices.

Supplies are also uncertain, since one cause of volatile prices is lack of flexible backup production capacity. Demand for energy is very inflexible, so a shortage (whether from a refinery fire, a tanker accident, a hurricane, or a geopolitical incident) can lead not just to high prices but also to the absolute inability to fully satisfy demand at any price, just as many developing nations lack reliable electricity on a 24/7 basis. Such uncertainty will reduce P/E ratios over time.

Impact of climate change

Late in August, ice cover in the Arctic reached record lows, and it ended up at least 20% below the previous minimum, set in 2007. Over 80% of the ice mass present in 1979 is now gone, and its absence is having an immediate impact on our weather and our lives.

The jet stream is one of the major influences that move weather across the northern hemisphere. The strength and location of the jet stream are largely determined by the difference in temperature between the arctic and temperate zones. As the ice melts, that difference gets smaller, which means that, on average, the jet stream moves northward and slows down. As a result, weather patterns persist longer (fueling droughts and floods) and the mixing of cooler air from the north slows, exacerbating heat waves and raising average temperatures. (Other factors contribute to these patterns, too, of course.)

These changes affect each of the three factors in our model. Responding to forest fires, flooding, and of the aftermath of strong storms all siphon capital resources that otherwise might fund economic growth, and such natural disasters also disrupt current production activities, lowering GDP. These extra costs can also affect profit margins, as food costs and transportation costs rise, and possibly taxes as well to pay for mitigation. Finally, as the future events become less predictable, contingent future costs must be taken into account (only some of which are insurable), so risks rise, which reduces P/E ratios.

Water is another increasingly limiting factor on our economy. When rain doesn't fall, rivers and lakes dry up, leading to the sort of widespread agricultural problems we have experienced this year. While few Americans are farmers, food represents one of our largest export sectors, and the impact of drought in our Midwest is felt globally. Between 20% and 40% of overall water use is related to energy production. Already some states have curtailed the use of hydrofracking for oil and gas because of water shortages, while elsewhere nuclear power plants have been shut down because the temperature of the water they use for cooling rose above critical levels. It has been almost 30 years since Hoover Dam's turbines ran at full capacity. Ongoing water problems will both slow growth and raise operating costs in our economy, adversely affecting both GDP and the share that goes to corporate profits.

Alternative energy sources, a new electrical grid, more efficient transportation systems, and other energy efficiency efforts are often touted, but so far these represent a small part of our overall energy picture. That's in part because these innovations require "patient capital," since their payoff periods are often quite long. As long as current energy sources are in place, subsidized, and not required to carry all their costs (for example, if they are not required to internalize their ill effects on the climate), they will remain less expensive than wholly-new solar or wind projects. Energy transitions require decades to achieve, and their early stages have low profitability and usually require subsidies.

If we decide to pursue these alternatives, we will either need to offer private investors much higher returns (or lower initial P/E ratios) to lock up their capital, or we will need higher taxes to support public financing of the efforts (like we did for the railroads, the large dams, the airlines, the internet, and the interstate highway system). Either way, P/E ratios will go down.

One of the biggest effects of cheap oil has been to lower the cost of transportation and, effectively, to make distance disappear as an economic consideration. The globalized economy and the transferring of jobs and manufacturing did not take off until shipping costs became so low that raw materials and finished products could be moved efficiently around the world. Higher prices change that dynamic. In 2008, the cost of making steel in Asia and shipping it here surpassed the cost of making it here, and some steel mills reopened. As oil prices continue to rise, expect some manufacturing to return to the United States. That could be good for jobs, but, since rising prices would spark the change, it may not be good for profit margins.

Public policy

To date, the United States has not done much at a policy level to address climate change or resource constraints for a variety of debatable reasons, none of which are worth getting into here. If we (along with other nations, especially China) decide to undertake the extensive measures necessary to have a real impact on climate change and reduce the use of oil and other fossil fuels, a whole host of new taxes and regulations would be implemented. These can be expected to negatively affect all three factors (although the short-term financial hit would be worth it if a functioning planet were the result). At this point, it seems unlikely that anything big will be done unless a consensus emerges that radical change is actually necessary.

Broadly speaking, the effects of climate change and resource constraints will not be good for the overall market level. That said, opportunities will emerge as well. Companies and industries that can effectively reduce the energy intensity of the economy, find ways to use water more effectively, develop efficient ways to tap and distribute alternative energy sources, or deal more quickly with rebuilding and reconnecting after weather emergencies – all of these could well prosper. Other, unforeseen positive innovations are inevitable, too.

Also, the timing of these effects is not predictable. Right now, for instance, North American energy production is currently on the upswing, and there is a vigorous debate about how far that trend can go, or what it means in the context of a global energy market in which oil production from North Dakota currently satisfies about 10 minutes worth of worldwide daily oil demand. On the other hand, the effects of climate change seem to be coming faster and with more intensity than we expected only a few years ago.

Portfolio construction in a resource-constrained world

We hear a lot of talk about QE3, debt levels, the euro crisis, the state of the Chinese economy, and high-frequency trading. These things seem to be driving markets right now. But, in strategic terms, it is important to include the "real world" in your calculations and expectations.

Real constraints – whether they are energy limits, effects of climate change, high food prices, or the political changes driven by these factors – will increasingly work against all three of the determinants of stock prices, holding down or reversing price growth. We could easily experience another decade of price declines going forward.

Without more energy and with continuing climate change, GDP growth will be hard to generate, especially in the developed world.

Higher energy costs will take away several of the drivers of corporate profits. A retreat even to the average since 2000 could represent more than a 20% decline in this factor.

Finally, the current price-earnings ratio of 16.5 for the S&P 500 implies an earnings yield of 6%. With increased uncertainty and any return of inflation, the market could demand an expected return of 10%, dropping the P/E ratios to 10, a 40% decline.

These factors alone suggest that the market could be overpriced by half right now, should investors decide tomorrow to take the considerations I've just discussed into account. We can perhaps expect positive developments in the realms of innovation and public policy to mitigate some of this potential decline, but it seems clear that there remains a big risk that too few people appreciate the extent to which the natural world interacts with the world of finance and economic orthodoxy – and that we may all be forced to confront these truths sooner rather than later.

The best investment strategies should include non-security "investments" like energy efficiency, low debt, and support of community and local enterprises. At the very least, confirm that any manager or strategy being employed takes these physical changes seriously. Right now, few do.

Richard Vodra, J.D., CFP®, is the President of Worldview Two Planning of McLean, VA. He recently retired from a 27-year career as a personal financial planner. He is a member of the Board of the Association for the Study of Peak Oil (ASPO-USA). He can be reached at rvodra@worldviewtwo.com.

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