China’s Slowdown: The First Stage of the Bullwhip Effect

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For the last two months, global supply chains have been experiencing the first stage of a bullwhip effect triggered by uncertainties about the severity of China’s economic slowdown. While the contractions in business activity along global supply chains will cause companies to cut capital investments and inventories, we should remember that this is only the first leg of the phenomenon. The second stage of the bullwhip is likely to involve renewed demand, with orders reverberating upstream with increasing amplitudes. Consequently, although companies should cut costs now, they should be on the lookout for the quick rebound that is likely to follow.

The bullwhip effect is the amplified response to demand signals as one moves “upstream” in the supply chain: from retailers to manufacturers to suppliers to commodity providers. The essence of the phenomenon is the fact that each stage in the supply chain plans its capital projects and operations, including inventory levels, based on its future expectations.

Here’s a hypothetical illustration of the bullwhip effect: A retailer might experience an X% drop in sales owing to some external event. As a result, it might reason that future sales will be low, too, because most forecasts are based on past experience. In addition, it might realize that its current inventories are too high if future sales continue to be low. Consequently, the retailer might cut orders to the wholesaler by, say, 2X% (reflecting both its expectations of lower future sales and its desire to reduce its current inventory).

The wholesaler, seeing the 2X% drop in orders from the retailer, might prepare for future lower sales and too much inventory on hand by cutting orders to the manufacturer by 4X%. The manufacturer, in turn, may cut orders to its suppliers by an even larger amount, and so on. At each tier of the supply chain, the decline in demand sparks a bigger decline in orders from suppliers — each company reasoning that it needs to quickly cut production (to adjust to declining sales) and work off its seemingly bloated inventory.

In the context of a normal economy with modest demand volatility, the bullwhip effect causes volatility to vary across the tiers of a supply chain. Wholesale volumes will be more volatile than retail volumes, manufacturing volumes will be more volatile than wholesale volumes, and supplier volumes will be more volatile still. This phenomenon has been documented in the consumer-packaged-goods, food, semiconductor-manufacturing, and other industries.

During an economic crisis, the exaggerated decline in orders can be especially damaging to upstream suppliers that have high fixed costs tied to production assets. Ford CEO Alan Mulally tried to mitigate the impending bullwhip during the 2008 financial crisis by imploring the U.S. Senate Banking Committee to save his competitors. He argued that if the automakers failed, then their suppliers would fail, and so on, affecting the entire U.S. automobile industry.

The China-Sparked Crisis

The trigger unleashing the current bullwhip was the implosion of the Shanghai Stock Exchange (SSE) Composite Index. It reached a peak on June 12 and then proceeded to lose over 40% of its value by the end of August despite efforts by the Chinese government to prop up the market. The SSE carnage led to widespread stock markets declines all over the world as investors, fearing the implications of a Chinese economic slowdown, started to flee equities, especially those of companies exposed to China's appetite for commodities.

Since 2000, the Chinese economy has been growing at an increasing rate — from 6% per year in 2000 to 12% per year in 2010. This performance, combined with policies of the Chinese government, led investors to believe that future growth would be ever higher, creating the stock-market bubble.

Even as the Chinese annual growth started to slow to the current official 7% rate, it was still growing and companies were still counting on this growth to continue. Consequently, they continued with capital investments and accumulated inventories to meet the future growth. As the SSE bubble burst, the belief in the "Chinese Miracle" seems to have burst as well and companies started to pull back, unleashing a bullwhip that continues to reverberate throughout the global supply chains.

Lessons from the Past

Lessons from the 2008 financial crisis can help companies adjust to both the down swings in demand as well as the upswings that are sure to follow.

Macroeconomic data during the 2008 financial crisis show the bullwhip effect operating on a much broader scale. For example, U.S. retail sales (representing consumer demand) declined by 12%; yet U.S. manufacturers pulled down inventories by 15% and manufacturing sales declined almost 30%, while imports plunged over 30%. The financial crisis created a broad bullwhip across the globe. More than 90% of OECD countries exhibited simultaneous declines in exports and imports of more than 10%. A survey of 125 Dutch companies found that those in Tier 1 and Tier 2 relative to the end-consumers saw a 25% drop in revenues, while those in Tiers 3 and 4 experienced a 39% to 43% drop.

When the business cycle turns — as it will surely do once the SSE will find its equilibrium and China continues to grow at an enviable rate — demand will revive. (This is exactly what happened during 2010 and 2011 as the global economy was bouncing back.) At that point, the bullwhip pattern reverses as each echelon boosts ordering both to cover expected higher sales and to quickly replenish depleted inventories. Again, the effect amplifies up the chain with larger and larger order-size increases upstream in the supply chain.

However, because of cuts in capacity during a downturn, upstream companies take time to respond to orders. Consequently, as orders flood in, lead times grow, suppliers start allocating partial shipments to customers, and customers respond by boosting orders even more in an effort to garner a greater percentage of the allocation. All of this causes significant swings in inventory and orders.

Strategies to Implement Now

As the bullwhip roars and media reports increase the fear in the marketplace, companies can expect consumers to become more frugal. Companies should anticipate this trend and start developing “value pricing” and less expensive products. Firms in the upstream echelons of the supply chain should tighten their belts fast and hard but understand that this is to be expected. Demand forecasting may become more challenging as demand patterns change, and companies may be advised to look into forecasting methods based on scenario planning rather than historical patterns.

Conserving cash is extremely important — both in order to survive the downturn and in order to be able to respond quickly when the demand returns. Good critical suppliers should be protected in case they run into difficulties so they will be there for the long term. Layoffs should be kept to a minimum, using the time for training and upgrading capabilities in order to anticipate the second, up-stage of the bullwhip.

I couldn’t agree more with economist Paul Romer, who once said: “A crisis is a terrible thing to waste.” Downtimes, when there is significantly less resistance to change and underutilized workers are available to make on them, provide excellent opportunities for companies to tackle challenging restructuring projects.

With this in mind, some companies used the 2008 financial crisis and the Great Recession to their advantage. To improve its operations, Staples, the office-supplies giant, made major changes to its IT systems by merging two IT networks. Home Depot implemented a new distribution strategy, consolidating cross-docking flow centers to improve delivery efficiency. As the China crisis continues and the bullwhip cracks, leaders should follow suit and focus on strengthening their operations.