

## **Inviting the Lash of the Bullwhip: "Make in India" Risks Unintended Consequences**

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### ABSTRACT

Few realize that India today is among the most export-dependent of Asia's big economies. Yet that export-dependence – along with the "Make in India" program – may create unprecedented cyclical vulnerability.

While India's export prowess has helped to shrivel its trade deficit, it is not only how much – but what – India exports, that creates this vulnerability. The reason is the bullwhip effect, which is liable to be amplified in the "yo-yo years" due to declining long-term trend growth in the world's major economies.' Making India a global manufacturing hub will amplify the bullwhip effect, and thus the economy's susceptibility to upswings and downswings in the world economy.

India need not become less export-oriented or abandon the "Make in India" initiative. But if it is to progress along this path, policymakers should become much more attuned to Indian and international economic cycles in order to navigate the economy's potentially amplified cyclical swings.

Keywords: Economic Cycles, Bullwhip Effect, Supply Chains, Exports, Make in India

### 1. INTRODUCTION

India accounted for nearly a third of the world's output – more than the Roman Empire or China – two thousand years ago, and even as late as 1700, produced a quarter of the world's GDP – more than China and almost as much as all of Europe. Yet, by the end of the 1970s, India's share of world GDP had plummeted to a historical low of just 3% (Maddison, 2007). From that nadir, India has seen its GDP share climb back to some 8% (The Conference Board, 2015) – the highest in over a century – while also becoming an export-dependent economy.

Witnessing the "Chinese miracle" next door, many Indians aspire to follow their own national agenda for economic renewal, spearheaded by exports and manufacturing. However,

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few appreciate the implications of either such export-dependence, or Prime Minister Narendra Modi's "Make in India" program, for the cyclical stability of the Indian economy. Neither is an affliction in itself; rather, both may be potential boons. But, as many a folk tale cautions, we should be careful what we wish for.

## 2. INDIA'S EXPORT DRIVERS

One key driver of Indian growth in recent decades has been the rise in its exports.

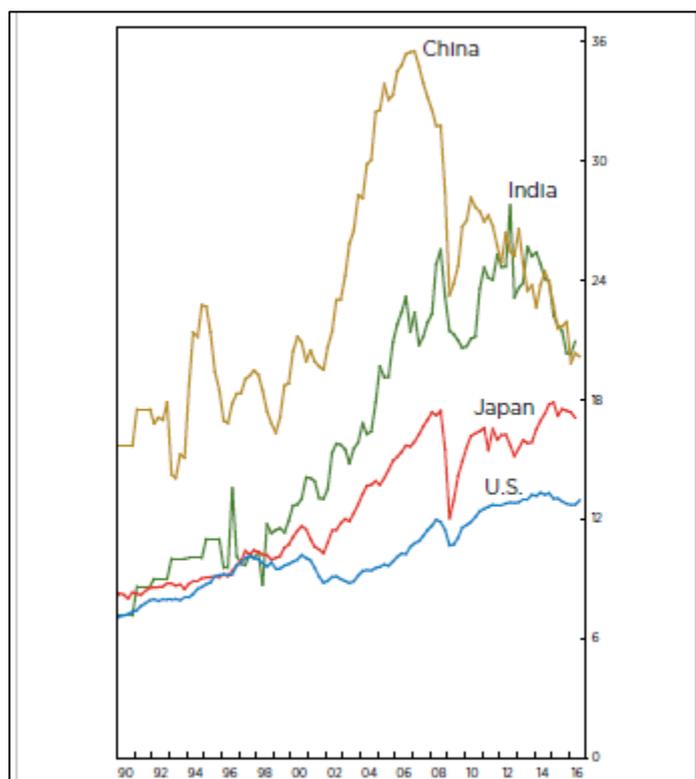


Figure 1: Export Share of GDP (%)

Source: Bureau of Economic Analysis, Japanese Cabinet Office, OECD: Haver Analytics; World Bank; ECRI

In fact, its export share of GDP practically quadrupled from just over 7% in 1990 to almost 28% at its high point in 2012 before easing to 21% by mid-2016 (Figure 1, green line). While the export share of GDP soared even more in China to a peak of 35½% in early 2007, it has since fallen precipitously, to 20% (gold line), making it slightly less export-dependent than India. The export shares of GDP are lower still for Japan, at 17% (red line), and for the U.S., at 13% (blue line). Thus, for the last few years, India has been among the most export-dependent of the big Asian economies.

Modern India's export prowess has been partly responsible for its shriveling trade deficit (Figure 2, red area). While imports have dropped off sharply in recent years, thanks in

part to the declines in crude oil prices and gold imports, the latest uptick in exports – especially the exports of services, which have jumped by almost 27% in the last three quarters (green area) – has also helped. Even so, goods exports (blue area) – which have always constituted the majority of India’s exports – still make up 60% of total exports.

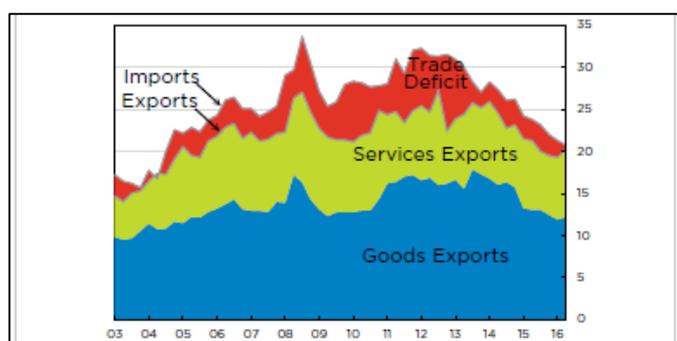


Figure 2: India’s Exports and Imports (% of GDP)  
Source: Central Statistical Office/ Reserve Bank of India; ECRI

As we shall explain, this dominance of goods exports – currently equivalent to one-eighth of India’s GDP, down from nearly one-fifth three years ago – has important consequences for the Indian economy’s sensitivity to global growth. Indeed, while global growth has experienced merely a *cyclical slowdown* over the past couple of years, as anticipated by ECRI’s international leading indexes (Economic Cycle Research Institute, 2014a), India’s goods exports have actually *fallen* by some 13% from its peak in early 2014. To understand why, it is important to appreciate the broader international context within which this pullback has occurred.

### 3. EXPORT ENGINES CUT OUT

A key objective of repeated rounds of quantitative easing by international central banks in recent years has been competitive devaluation to boost exports. This helped advanced economies’ export volumes to improve a bit a couple of years ago, but only at the expense of a nosedive in export price growth. Since then, advanced economies’ year-over-year (yoy) export volume growth has petered out, mostly hugging the zero line since late 2015 despite much lower prices. In fact, yoy export price growth for advanced economies – which are hardly dominated by energy or commodities – fell deep into negative territory last year, exhibiting the worst export price deflation since the Global Financial Crisis (GFC), before turning less negative (CPB Netherlands Bureau for Economic Policy Analysis, 2016).

For emerging economies, the picture is at least as dire, with export volume growth hovering near zero since early 2015, while yoy export price growth continues to display deflation. In fact, export volumes for both advanced and emerging economies have been essentially flat for the past couple of years, even with emerging economies' export prices plummeting by more than a quarter and advanced economies' export price levels plunging by a fifth by the beginning of 2016. Plainly, even rampant export price deflation for advanced and emerging economies alike has been unable to boost export volumes.

As a result, following years of unprecedented stimulus by rich countries' central banks, yoy growth in the volume of world exports has been hovering near zero for the past year or so, far below the pre-GFC norm (Figure 3, top line). Meanwhile, world export prices – which plunged between the summer of 2014 and early 2016 before stabilizing somewhat – are still in deflationary territory in yoy terms, after experiencing in 2015 a degree of deflation only seen during the GFC (bottom line).

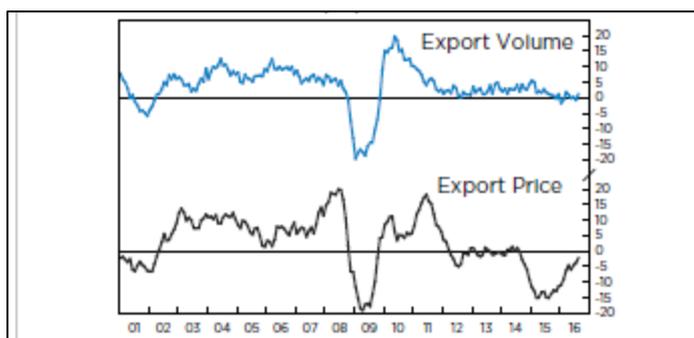


Figure 3: World Export Volume and Price, Growth Rates (%)  
Sources: CPB Netherlands Bureau for Economic Policy Analysis; ECRI

To be clear, there are two separate processes unfolding here that should be disentangled. First, over the last five years, world export volume growth has averaged only 1.7% a year, well below the 7.7% average for the five-year period through the beginning of 2008, i.e., preceding the GFC. Meanwhile, world export price growth has averaged -4.6% a year over the last five years, radically different from the 8.5% average for the five years preceding the GFC. In other words, following the early-21<sup>st</sup> century “globalization tsunami” (Economic Cycle Research Institute, 2004), with the tsunami now having receded, we are now caught in its backwash – a period of de-globalization that is a far cry indeed from the heydays of rampant globalization. Export-driven growth is rather difficult in such times.

Overlaid on this massive *structural* shift, however, has been a more recent *cyclical* slowdown. Specifically, world export volume growth peaked at the beginning of 2015, and has

since stayed in a cyclical downswing. World export price growth peaked a bit earlier, in the spring of 2014, and then plunged deep into negative territory before staging a partial revival this year. The decline in Indian goods exports since its 2014 high reflects primarily this *cyclical* swoon, driven primarily by the bullwhip effect, which we will explain in a moment, and it is liable to be amplified in these “yo-yo years” – the result of the decline in long-term trend growth for the world’s major economies.

#### 4. THE YO-YO YEARS

As students of the business cycle, we have a distinctive cyclical perspective at the Economic Cycle Research Institute. In fact, our focus on cycles lets us discern what is cyclical and, by elimination, what is not. Thus, in the summer of 2008 prior to the Lehman Brothers collapse, we were able to first identify the long-term pattern of weaker and weaker growth during successive U.S. expansions, stretching back to the 1970s (Economic Cycle Research Institute, 2008). Our finding was reported in *The New York Times* (Norris, 2008) but otherwise went largely unnoticed.

As we continued investigating this troubling long-term trajectory, looking at other developed economies in the process, we wrote about the implications of this “ominous pattern ... of falling growth in GDP and jobs during successive expansions” (Banerji and Achuthan, 2012). More than a year later, that reality began to gain broader traction when a former U.S. Treasury Secretary promoted the notion of “secular stagnation” (Summers, 2013).

Economic growth tends to converge toward long-term trend growth, which, as mentioned, has been declining for decades. To assess whether this pattern is likely to persist, it is helpful to ask what potential GDP growth is likely to be in the years ahead.

So, let us review some simple math. In essence, growth in labor productivity (output per hour) and potential labor-force growth add up to potential GDP growth. Therefore, a closer look at these two measures is in order.

The U.S. Congressional Budget Office (CBO) pegs potential labor force growth at 0.4 percent a year for the 2016–2020 timeframe. This is an uncontroversial estimate, given that the demographics are pretty much set in stone. While this may seem quite weak, it is better than those for the major Eurozone economies or Japan.

Separately, U.S. productivity growth, which has been falling for years (Economic Cycle Research Institute, 2014b) has averaged about 0.7 percent a year for the last five years and 0.3% for the last two years, and has fallen to just under zero percent for the past one year. As

to where productivity growth is headed from here, some would like to believe that it will approach its average of 2% per year from 1970 to the GFC eve, or even its average between World War II and the GFC eve of about 2¼% per year. But, as Federal Reserve Vice Chairman Stanley Fischer (2015) has noted, “productivity is extremely difficult to predict.” Accordingly, it is prudent to avoid heroic assumptions. Indeed, even if productivity growth does exhibit reversion to the mean, it is not clear why the relevant mean should be the one for the post-World War II period prior to the GFC, or the 1970-2008 time span, considering that the next few years are unlikely to resemble those earlier periods.

Rather, the default assumption ought to be the simplest one, namely, that productivity growth over the next five years will average what it did for the last few years. In that case – meaning that if things stay around where they are – simple math suggests that potential real GDP growth will amount to about zero to 0.7 percent productivity growth, plus 0.4 percent potential labor force growth, that is, around 1% per year through the beginning of the 2020s.

To a large extent, demographics is destiny, and indeed, a sustainable boost to productivity growth is realistically possible only in the long run. Until one or both change, U.S. GDP growth will most likely converge to somewhere around 1% a year.

Analogous calculations suggest that for the next five years, potential GDP growth is likely to converge to about 0.8% for the U.K. and France, and to as low as 0.4% in Germany and 0.3% in Italy due to their dismal demographics. In Japan, where demographics are even worse, potential GDP growth is likely to stay at zero, around which it has hovered for the last eight years. The problem is that most other major advanced economies are also “becoming Japan.”

Twice a year, the International Monetary Fund (IMF) makes five-year-ahead forecasts of real GDP growth, which have seen significant declines in recent years for most major economies. A case in point is the U.S., whose GDP growth forecast has just been slashed to 1.6%, less than half the high of 3.4% from five years ago. Meanwhile, the GDP growth forecast for China has been cut almost in half to only 5.8% from 10.0% eight years ago. While markdowns to the Eurozone GDP growth forecast have been more gradual, it has been reduced to just under 1.5% – only five-eighths of the 2.4% estimated in the spring of 2008. Of course, it is Japan that has led this particular race to the bottom, with its five-year-ahead GDP growth forecast being reduced to a scant 0.6%, less than a quarter of the 2.5% estimated in the spring of 2009, yet only one percentage point below the latest forecast for the U.S.

What is extraordinary is the extent of the reductions in the longer-term GDP growth forecasts for the world’s largest economies – the U.S., China, Japan and Germany – whose

latest forecasts are respectively 48%, 58%, 24% and 54% of what they were estimated to be during the GFC. For China in particular, the degree to which growth expectations have been scaled back is breathtaking. And for the world's three largest developed economies, it is remarkable that their longer-term GDP growth rates are now expected to be between about 0.6% and 1.6% per year. To be clear, the growth potential of these economies has not plummeted only recently. Rather, while ECRI first identified the long-term decline in trend growth some eight years ago, it is only in the last few years that this structural shift has been more widely recognized by the consensus. Yet, our "simple math" suggests that they still have further to go in downgrading their forecasts. And even without such further downgrades, this is a very different global growth environment for countries banking on export-driven growth.

Now, please consider the business cycle in the abstract. It is the nature of economic cycles that slowdowns in economic growth alternate with periods of reacceleration, with economic growth cycling up and down around the economy's long-term trend growth rate, which is synonymous with potential GDP growth for the purpose of this discussion.

Suppose this trend growth rate is relatively high, i.e., well above zero. In that case, even when economic growth cycles down, it is unlikely to dip below zero very often, resulting in infrequent periods of negative growth, meaning that recessions become relatively rare.

A case in point is India, where real GDP growth has averaged 7% a year since the end of 1996, when its last recession ended, according to the authoritative international business cycle chronologies and recession dates established by ECRI (2016) for 20 economies. Because ECRI decides these recession start and end dates on the basis of the approach used to determine the official U.S. recession dates, they have long been used in research as standard benchmarks by academics and central bankers alike (e.g., Dueker and Wesche, 2001; Sensier *et al.*, 2004; Ferguson, 2005; Fernandez and Nikolsko-Rzhevskyy, 2011).

In contrast, in Japan, where GDP growth has averaged zero percent a year since the beginning of 2008, there have been four recessions just since 2008. This is because GDP growth has dipped below zero almost every time Japan has experienced a slowdown over this period. As potential GDP growth converges to the 0% to 1% range in most advanced economies, as discussed, this will increasingly be the state of affairs – virtually dictating more frequent recessions – unless there is a significant reduction in cyclical volatility for some reason. This is what we call "the yo-yo years" (Banerji and Achuthan, 2012).

## 5. THE LASH OF THE BULLWHIP

The bullwhip effect refers to a phenomenon in which relatively small fluctuations in the growth of consumer demand are amplified up the supply chain into big swings in demand as one moves away from the end consumer. In effect, smaller shifts in end-consumer demand growth translate into larger fluctuations in intermediate goods demand, and even bigger ones in input material demand, and especially in raw material prices (Banerji and Achuthan, 2012).

A pioneering study of the shoe-leather-hide sequence by Ruth Mack (1956) showed how shifts in demand cascade through supply chains to produce larger and larger cyclical swings (Figure 4). During periods of growth, shoe manufacturers anticipate rising demand, but if demand growth slows, i.e., there is a *slower increase* in demand for shoes, shoe manufacturers will be stuck with excess shoe and leather inventory.

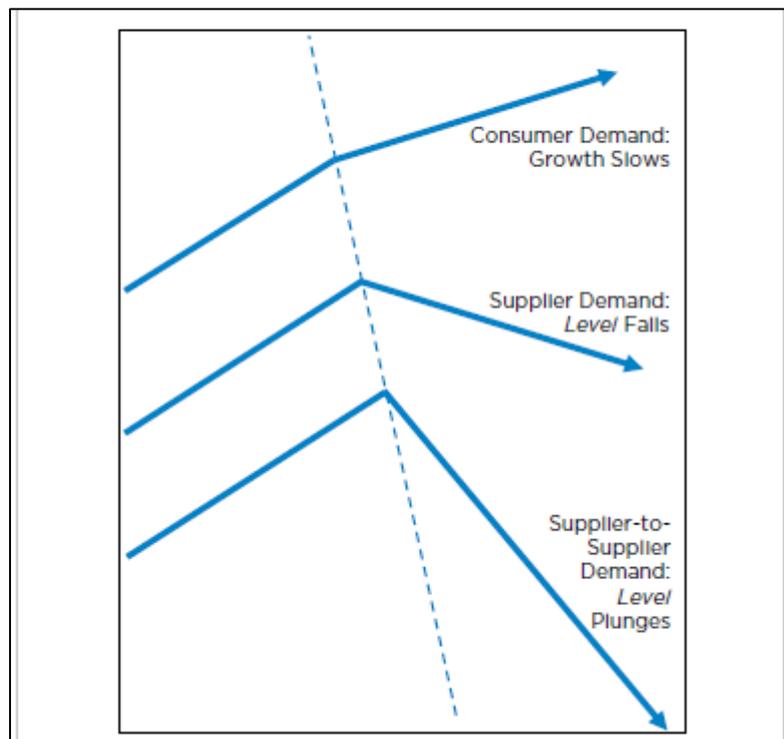


Figure 4: Shoe-Leather Hide Sequence: The Bullwhip Effect  
Source: ECRI

Thus, new orders for leather have to be *reduced* significantly. In turn, the leather manufacturer, stuck with an even larger excess inventory, *slashes* orders for hides. Hides producers end up experiencing an even more precipitous drop in demand than the leather manufacturer does.

This amplification of cycles up the supply chain has a direct impact on prices. After all, fewer cattle will not be slaughtered because the demand for hides has plummeted, as hides are

a by-product of meat production. Therefore, prices for hides start to plunge. Just as the production of hides is insensitive to demand, so is the supply of crude oil, silicon chips, steel, and copper relatively inelastic to demand. Therefore, their prices plunge when consumer demand growth eases, because their supply cannot be reduced quickly.

Mack's study showed how small shifts in demand growth at the consumer level are amplified up the supply chain. This magnification of demand fluctuations is called the bullwhip effect in analogy to the way a little flick of the wrist makes the end of the whip swing in a big arc.

The sequence of events described by Mack is not merely theoretical and, even though it was based on her observations from the early 20<sup>th</sup> century, its relevance has not diminished over the decades. Indeed, I remember reading a newspaper article a couple of months after the Lehman Brothers collapse about how well New York City cobblers were faring – unlike most other businesses – with consumers suddenly more inclined to get their footwear repaired instead of buying new shoes. Meanwhile, the price of hides plunged by more than half in the three months that followed the Lehman collapse in mid-September 2008.

A few months later, en route from Hong Kong to Kolkata, an Indian gentleman of Chinese ancestry who owned a shoe factory in Kolkata, sitting next to me, struck up a conversation. When he described the state of his shoe export business, I mentioned Mack's shoe-leather-hides sequence. He was so excited about the precise description of the real-life situation in his industry that he would not take his leave at the airport until I promised to join him for dinner later in the week to continue our conversation.

But this phenomenon does not ring true just at the anecdotal or micro level. A decade or so ago, a large delegation of Chinese economists paid an official visit to ECRI to learn about economic cycles. Presenting some basic insights, we complimented them on China's export-driven "miracle," as it had become "the world's factory floor," but cautioned them about the potential downside – the bullwhip effect. They listened politely, took notes, but did not ask further questions. However, following the GFC, which resulted in "20 to 45 million migrant workers [returning] to their home villages" after losing their jobs (Meng, 2012) in 2008 alone, the Chinese government was forced to launch a massive stimulus program, the likes of which the world had never seen – including the pouring of one and a half times as much concrete in a three-year period (2011-13) as the United States had poured in the entire 20<sup>th</sup> century (Swanson, 2015).

## 6. A WORD OF CAUTION

The point is that even a modest decline in consumer spending *growth* in developed countries like the U.S. and those in Europe can help trigger a significant drop in the *level* of demand from supplier economies and, in turn, a serious downturn in the level of demand for “suppliers to suppliers.” Becoming part of global supply chains as a supplier economy or as a commodity supplier to a supplier economy leaves an economy highly vulnerable to the bullwhip effect. Therefore, India’s greater export dependence, potentially accompanied by growing involvement in global supply networks, makes it increasingly difficult to decouple from global economic cycles. This is especially true for suppliers of early-stage goods that are embedded farther up the supply chain, away from the final consumer.

Please note that goods exports, involving inventory dynamics, lie at the heart of the bullwhip effect. In essence, the fact that goods exports now amount to an eighth of India’s GDP, and could rebound to a fifth of GDP or more, makes the economy highly vulnerable to the bullwhip effect, placing it at the mercy of cyclical fluctuations in end-user demand growth. But because these fluctuations flow largely from developed economies, which in an era of drastically reduced trend growth have entered “the yo-yo years” – an era of more frequent recessions, not just growth slowdowns, that involve larger fluctuations in consumer demand growth – this could add up to greater cyclical volatility for the Indian economy.

It is not only how much India exports, but what it exports – goods, including raw materials and parts – that creates this vulnerability. As a result, making India a global manufacturing hub is likely to boost the bullwhip effect, and thus the economy’s susceptibility to upswings and downswings in the world economy. This is a hard lesson already learned by China, which remains “the world’s factory floor,” but is deliberately moving away from that role.

Whether the plan is to make India a bigger supplier of goods to cater to foreign markets or the home market, there is an additional complication that could potentially enhance the bullwhip effect. As I have personally verified in experimental settings in simulated supply chains, the bullwhip effect is amplified by longer lags in receiving orders and shipments (Steckel *et al.*, 2004). Even assuming that lags in transmitting orders are much smaller than they used to be, given the growing prevalence of online communications, endemic shipment delays – especially when sending goods abroad – can greatly magnify the bullwhip effect. Because India has such poor transportation infrastructure, this is a serious potential concern that needs to be mitigated over time through appropriate infrastructure investment.

At the macroeconomic policy level, there is evidence that significant policy mistakes in the 21<sup>st</sup> century, traceable to cyclical misconceptions, have placed the major economies in difficult long-term predicaments with regard to global growth prospects (Banerji and Achuthan, 2016). Especially in this context, the greater coupling with global economic cycles, especially with advanced-economy business cycles, would be critical to manage. Appropriate monitoring tools are already available, in the form of ECRI's leading indexes for 21 economies, including all major advanced economies, as well as China, Russia, Brazil and South Africa. Another key economic indicator, our long leading index of global industrial growth, is also relevant, as are our Indian Leading Exports Index and Indian Long Leading Index, developed in the context of an indicator approach to Indian business and growth rate cycles (Dua and Banerji, 2001).

In sum, our words of caution do not imply that India should try to become less export-oriented or abandon the "Make in India" initiative. However, if it is to progress along this path, it would be critical for policymakers to be forewarned about cyclical swings in both domestic and foreign economies. In essence, it behooves them to become much more attuned to Indian and international economic cycles, to help navigate the ups and downs of the global economy.

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