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Chief economist's comment

Will recessions be less recessionary in the future?

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- Recessions tend to be caused by policy error, or by bubbles that burst. These things will still happen in the future. While UBS does not see the causes of a recession in the coming year, at some point there will be a downturn.
- How weak a recession is, and how strong a recovery is, is determined in part by the inventory cycle. In the global financial crisis, around 70% of the loss of real US GDP was due to companies reducing inventory.
- Inventories make economic cycles more volatile – the economic highs are higher and the lows are lower because of inventory.
- There are three reasons why inventory cycles may be less volatile in the future. If inventory cycles are less volatile, then while recessions will still happen they are likely to be less recessionary. Similarly, economic recoveries are likely to be less booming.

Economic downturns (what the media tend to call "recessions") are typically caused by policy error or by economic imbalances. If policy makers tighten too early or too aggressively, growth can be forced lower. Alternatively, if a bubble of imbalances has built (generally involving credit), then a period of above-trend growth will typically be reversed very quickly as the bubble bursts. At the moment, neither of these risks looks very likely in the near term, and a global downturn in the next 18 months is a relatively low probability.

When a downturn does occur, how bad it gets is determined (in part) by a very specific part of the economy: inventories. Inventories are the stocks of products stored in warehouses, piled in the back rooms of small shops, and kept on shelves in case a customer wants to purchase. Normally in a downturn there will be a rise in inventory at first – as companies are caught unawares by weaker customer demand, their stock of inventory rises unexpectedly. Economists (with characteristic pithy precision) refer to this as "involuntary inventory accumulation."

As inventories rise, companies will stop ordering new supplies from their suppliers and try and sell the stock that they already have. The suppliers will stop making additional product (because there is no demand), and tell *their* suppliers to stop supplying them with components. This reduction in production carries on up the supply chain. The process amplifies the loss of weaker consumer demand; the loss of one dollar of consumer spending will reduce economic activity (GDP) by more than one dollar.

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The reverse process tends to happen in a recovery. Companies suddenly find their stock rooms are emptying as demand improves, and they then tend to order more than they need from their suppliers in order to build inventory levels back up again.

There are two points from this that are extremely important for investors.

1. Inventories make the economic cycle more volatile. The economic lows are lower (and the economic highs are higher) as a result of companies holding inventory.
2. Inventory does not cause a recession, but it is a big part of how bad a recession gets. During the global financial crisis, 70% of the drop in US GDP was caused by inventories being cut.

Why would anyone but an economist care about all of this? Because there are three reasons why inventory management may be more efficient in the future. Efficient inventory management means less inventory volatility. If there is less inventory volatility, future recessions may be less severe than the recessions of the past. Recessions will still happen, but they may be more benign.

Scrapping inventory entirely – digitization

For economists of a certain age, the high street music store evokes a powerful nostalgia. The high street music store was where the cool kids hung out (and economists are by definition cool). Each of those stores was full of records, cassettes, (briefly) minidiscs and compact discs (CDs). Stocks of CDs were kept on shelves and in back rooms. Stocks of CDs were kept in warehouses. Further up the supply chain, CD manufacturers kept raw materials in their warehouses, so as to be able to produce CDs quickly and efficiently.

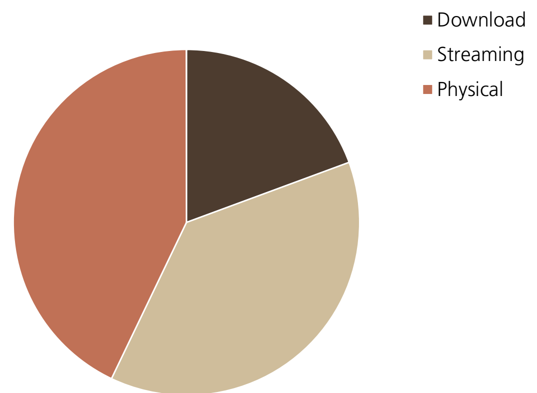
In the UK today, less than 30% of music is sold in stores. The stock that they once held has long since disappeared. In 2000, worldwide physical music revenues (CDs, tapes, vinyl, etc.) were USD 23.3bn and digital revenues did not exist. By 2016, worldwide physical music revenues were only USD 5.4bn. Downloading and streaming music is more valuable than physical music.

Replacing CDs with online content removes the need for any inventory to be held at all – and of course that means the death of inventory all the way up the supply chain. CD manufacturers (if they exist at all) also hold less inventory of plastics, etc.

How big an impact is this? Assuming an inventory to sales ratio of 1.4 (a relatively conservative assumption) the loss of UK physical music sales since 2000 equate to a loss of inventory just over 0.2% of UK GDP. That inventory loss no longer has the potential to create volatility in the economy. On top of that there is the inventory of CD producers, which will have collapsed as well.

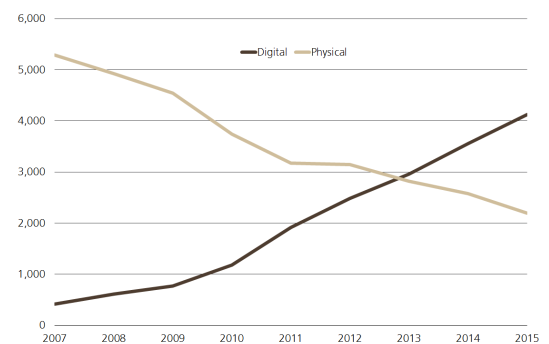
This is just one sector of digitization. Computer games, television and film, books, computer software, even economic journals can all be digitized – and digitization needs no inventory. This is hyper-efficient inventory management. Hyper-efficient inventory management means less inventory volatility. If there is less inventory volatility, future recessions may be less severe than the recessions of the past.

Fig. 1: Share of UK music sales, 2016



Source: Entertainment Retailers Association

Fig. 2: Total UK entertainment sales history including music, film and games, digital versus physical, GBPm



Source: Entertainment Retailers Association

Cutting credit, creating inventory efficiency

Most inventory is held by small and medium-sized businesses, not the large listed companies that excite the passions of equity analysts. As a rough rule of thumb, around 70% of an economy's inventory will be held by smaller businesses.

Traditionally, small businesses have relied on credit to fund their holdings of inventory – normally borrowing from their suppliers using invoice credit. A supplier will deliver goods to a company, but require payment 20 days later (for example). This means that the company can hold 20 days' worth of inventory for very little cost beyond the rent of storage space.

One of the very unusual features of the global financial crisis is that suppliers stopped lending to their customers. As a result, small businesses simply stopped holding inventory (because it was no longer free to do so).

Interestingly, suppliers seemed not to understand their customers' reactions. We can compare sentiment data for what large companies thought their customers needed, and what small companies intended to do when it came to stockpiling goods. Sentiment data is a very poor quality economic indicator, but the trends are so clear here that they are worth repeating.

Before 2008, suppliers were pretty good at predicting when their customers would need to increase inventory. After 2008, suppliers were completely wrong. Large companies assumed that their customers would restock inventory (the light brown line rose). In the absence of credit from large companies, smaller businesses carried on reducing their stock (the dark brown line remains negative until 2015). This is a structural break.

As small businesses were not given interest-free credit to finance holdings of inventory, they were forced to become more efficient at inventory management. Efficient inventory management means less inventory volatility. If there is less inventory volatility, future recessions may be less severe than the recessions of the past.

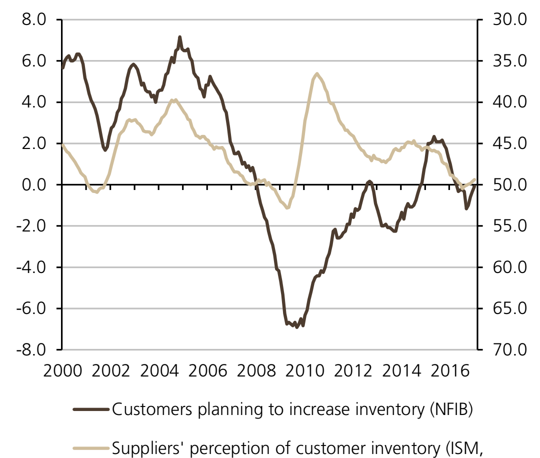
Embracing the barcode – technology and efficiency in managing inventory

Small businesses were helped in their drive for inventory efficiency by technological change, which lowered the costs associated with efficient inventory management. Four changes have taken place since the 2008 financial crisis:

1. Software for inventory management became cheaper and more readily available.
2. Barcode technology became cheaper and more readily available.
3. Online ordering became standard.
4. Production is beginning to localize.

The combination of cheaper software, barcode technology and online ordering came together to allow small businesses to run integrated (or nearly integrated) inventory management systems that were sophisticated. No longer were store owners touting clipboards, checking off items that sat on shelves. Small business owners had a better idea of the demand that they were facing (still imperfect, but much improved). For those willing

Fig. 3: Small businesses do not hold inventory if they have to pay for the privilege
Comparison of small businesses' desire to increase inventory with large businesses' perception of their customers need to change inventory



Source: UBS, NFIB, ISM, via Haver. NB this is survey based sentiment data which is significantly less reliable than proper economic data

to take on the technology, this improved sales management and thus inventory efficiency.

Large companies had had early access to these advantages (or the staff to handle paper ordering systems), and had embraced this inventory efficiency in the wake of the 1991 economic downturn. Large businesses are relatively unimportant to overall levels of inventory however, so their efficiencies had a relatively small economic impact on inventory and economic volatility. Small businesses were not large enough to manage inventory in the same way as listed companies until technology could provide a cheap substitute for lots of labor – and until the loss of invoice credit provided a powerful incentive to become efficient quickly.

To this post-2008 trend, modern technology now adds the advantage of shrinking distance between the producer and the customer. For perhaps the first time since the first industrial revolution a quarter millennia ago, the trend is towards localizing production.

A small village shop with a robotic baker can produce bread almost on demand, and significantly reduce inventory and waste associated with shipping in bread from a remote factory. Clothing can be produced locally, responding to weather and fashion whims alike without the lead times associated with shipping from Asia – and critically without the inventory levels that those lead times necessitate. If a business is close to its customer and can produce (almost) on demand, there is little need for inventory. The digitization theme is perhaps the most extreme example of this – the CD could be produced by the customer at home, at the moment the customer decides they wish to own the album. The possibilities of 3D technology will only increase the potential of localized production.

Technology is therefore allowing even very small businesses to be more efficient in their inventory management, reducing inventory volatility. If there is less inventory volatility, the severity of future recessions is reduced.

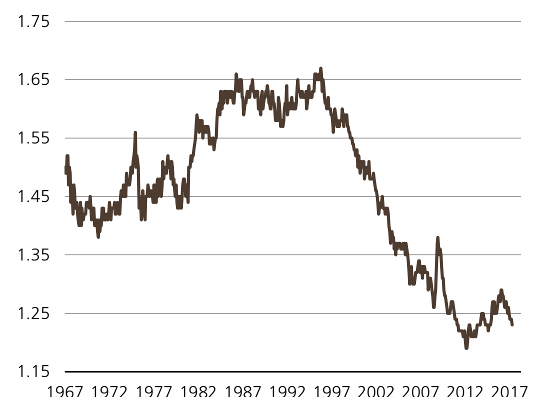
Efficiency in inventory should make recessions less violent

The revolution in inventory efficiency has largely been overlooked by financial markets. This might be because inventory is a small business story, and equity markets rarely care about small businesses. The changes in credit, and of the digitization and technology of the fourth industrial revolution have created an inventory revolution in the past 10 years. The inefficiency of the old way of managing inventory has been reduced, and a more streamlined system is in its place.

This efficiency means that inventory levels will be lower relative to sales – as the US so clearly demonstrates. Now, if consumer demand falls, the impact that is transmitted through the inventory cycle will be less severe. The recession will be less violent than would otherwise be the case.

Of course, large policy errors will still produce large downturns, and smaller policy errors will produce smaller downturns – this is not to suggest that the economic cycle is dead. Central banks have played a significant role in reducing volatility in recent years, and an error in central bank policy could raise volatility from current levels. But as the wild swings of inventory have proved to be so significant in exaggerating the economic cycle in the past, creating a world that is more efficient in managing inventory in the future will moderate some of the extremes.

Fig. 4: US inventory efficiency visible in the collapse of the inventory to sales ratio
Retail inventory to sales (excluding auto sector)



Source: Haver

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