

Fundamentals:

Bean Counter.



The productivity conundrum could be partly explained by statisticians overestimating inflation by around ½% from new digital services, discount stores and the sharing economy.

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In this edition of Fundamentals, LGIM Economist James Carrick looks at how the economy is measured and finds that real GDP and

living standards are probably higher than assumed. But inflation is even lower, implying a greater threat to indebted incumbent companies from disruption.

COMPUTING INFLATION

Advanced economy labour productivity growth remains puzzlingly weak, while employment growth remains rapid despite modest real GDP growth (**figure 1**). Professor Charlie Bean¹ has been asked by the UK government to investigate whether statisticians are adequately measuring the modern digital economy. Techno-optimists see productivity improvements everywhere: free video calls, instant information, real-time navigation, online

shopping, e-tickets, increased choice of (often free) entertainment, driverless vehicles. By contrasts, pessimists such as Robert Gordon² argue the computer revolution peaked in the late 1990s.

The late 1990s is a fascinating case study, as it is a period where we saw huge changes to how inflation was measured. In 1995, Fed Chairman Alan Greenspan argued that US inflation was overestimated by ½–1½%. The Boskin Commission was then appointed and confirmed an upward bias to inflation, partly due to introduction of new and better quality products. As a result, in 1998 the US CPI was adjusted to take into account improvements in computer technology. Instead of just comparing list prices for new computers,

Figure 1. Employment growth has been surprisingly strong relative to GDP



Source: OECD EO

statisticians would ‘hedonically’ adjust them for quality improvements. \$1000 got you a better computer every year. When adjusted for factors like speed, memory and storage, prices were estimated to be falling by around 30% per year.

Combining this with the increasing number of computers bought by households and businesses, we calculate that computers alone reduced the GDP deflator by around 0.35% in the late 1990s (figure 2). This compares with a pre-1995 average drag of 0.1%. The difference (¼%) is a direct estimate of the boost to US productivity that occurred in the late 1990s purely from lower computer prices. Unfortunately, statisticians estimate computer prices are no longer falling rapidly, depressing productivity. While these numbers are disputed, we also believe they are failing to capture the revolution in cloud computing.

CLOUDED JUDGEMENT

In “The Second Machine Age”, Brynjolfsson and McAfee show that while there has been a slowdown in Moore’s law (the number of transistors per chip), supercomputer speeds continue to rise at the same exponential pace and there has actually been an acceleration in supercomputer energy efficiency.

The world has changed since the late 1990s. The innovation

is no longer in making cheaper yet more powerful individual computers, but in networking and getting computers to work with each other. When Larry Page, the founder of Google, started his internet indexing project, he didn’t use an expensive supercomputer – he networked together some generic servers. For complex processing tasks, it is estimated to be 10-100x cheaper to get a group of computers to share that task than to ask one giant power-hungry super computer. The revolution has been in the software and algorithms that allow computers to work together in a network or cloud rather than cheaper hardware.

Every time you search the internet, you tap into Google’s networked power. You don’t need a powerful device yourself, just the ability to communicate with Google. Similarly, we no longer need huge storage capacity on our personal devices as we can stream content

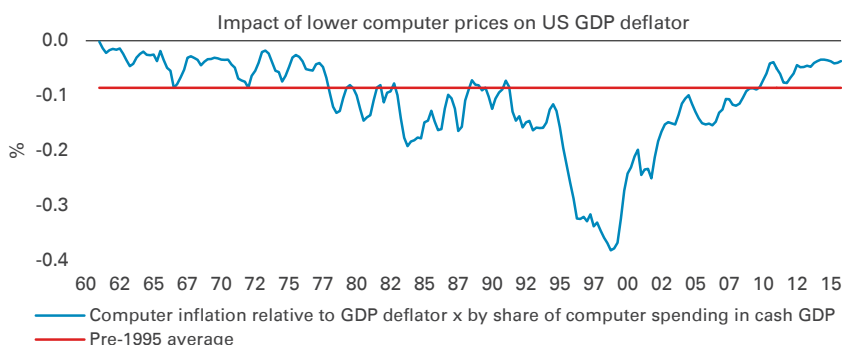
on demand from the cloud – text-based entries on Wikipedia, videos on YouTube or music from Spotify – for free! ‘On demand’ TV from Netflix and iPlayer has replaced traipsing to Blockbuster or waiting several days for a DVD rental to arrive in the post.

NEW PRODUCT BIAS – PHONEY DATA.

The Boskin Report highlighted this “New Product Bias” as upwardly distorting inflation. It recommended updating CPI baskets regularly to capture new products. But this doesn’t solve the problem if there is no adjustment for quality improvements. Although the ONS updates its basket every year, it merely chains the price index for new services onto old ones, without making any quality adjustments. Netflix was introduced into the CPI in 2014, but its price was chained onto the price of DVD rental by post, which in turn was introduced in 2009 and chained onto the old Blockbuster store rental price. In other words there has been no adjustment for being able to watch what you want instantaneously rather than waiting for it to be in stock and being delivered or collected.

Similarly, the ONS estimates that real consumption of newspapers has fallen by 50% since 2000 (figure 3) as cash spending on

Figure 2. Lower computer prices saw the US GDP deflator collapse in the late 1990s



Source: Macrobond, LGIM estimates

Figure 3. Statisticians estimate that newspaper consumption has collapsed

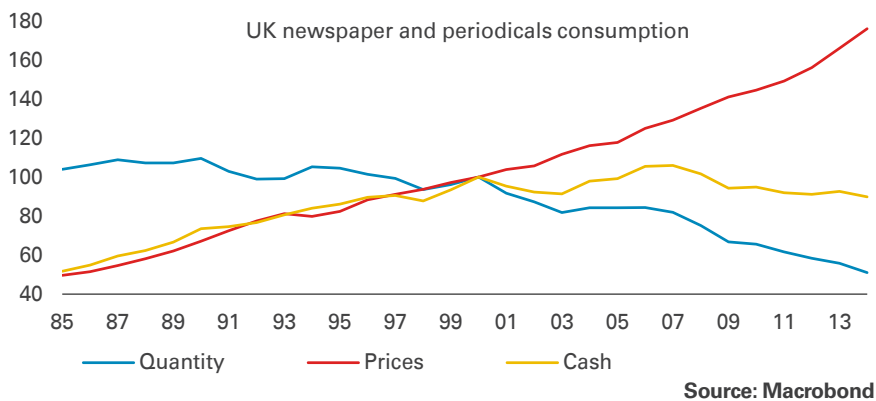
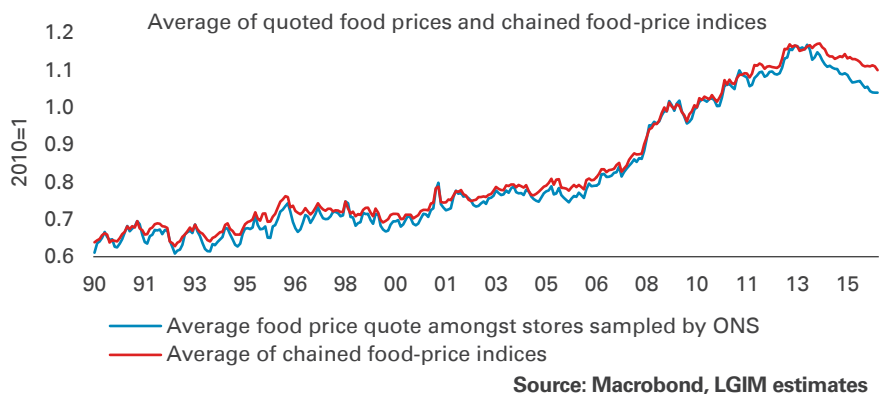


Figure 4. The new store bias could be boosting UK food inflation by 2% per year



newspapers has fallen by 10% but prices have risen by 75%. Yet surveys show we're spending the same amount of time reading – we just have more up-to-date choices online rather than reading yesterday's news in print.

MEASURING 'FREE' ENTERTAINMENT

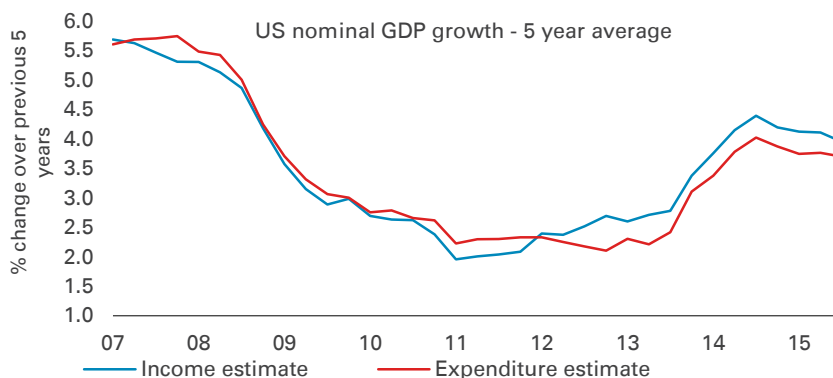
Many of these 'free' services are paid for by advertising. Rachel Soloveichik³ of the BEA points out that advertising-funded entertainment does not count as real GDP. This applies to websites, apps, streaming services, TV, radio and printed materials funded by advertising. Instead, the wages of entertainers are deemed an intermediate cost for the production of branded products such as soap and show up as higher inflation, not higher real GDP.

Soloveichik argues it doesn't matter if you counted advertising-related entertainment as part of real GDP via higher real consumption. Advertising-funded entertainment

would account for just 0.6% of US GDP and there has been little change in overall spending as rising online spending has offset a decline in print media. We disagree with her conclusion because it implies there has been no increase in quality for consumers or advertisers. Consumers have more choice and the internet allows both targeted and search-related advertising which seems more efficient (lower cost) than taking out blanket adverts in a newspaper.

Brynjolfsson and Oh⁴ argue more forcefully. Based on the increasing

Figure 5. The sharing economy is probably reflected in strong income-based measures of GDP



amount of time people spend on the internet and the opportunity cost of working longer hours, they believe the welfare gains to consumers added the equivalent of an extra 1% to US GDP growth per year between 2007 and 2011.

SELF SERVICE

Charlie Bean makes an additional point that information services we used to pay for can now be done for free by ourselves. For example travel agents used to act as an agent between hoteliers and holiday makers but today the internet allows consumers to do their own research and book directly. Accordingly, employment of travel agents has halved since 2000 and their 'value added' (commissions) are lost to the economy even though households have more information than before! The money saved on holiday commissions can be spent in restaurants – incidentally, employment of waiters has increased by 20% over the same period. This could explain the divergence between weak measured GDP and strong employment, if information jobs have been lost and replaced by lower-skilled ones.

NEW STORE BIAS – EVERY LIDL HELPS

Inflation statistics also suffer from 'New Store Bias'. If a new

discounter enters the market and sells eggs for one pound, where these cost two pounds at supermarkets, statisticians don't record the 'average' egg price as £1.50. Instead, as per Netflix, they chain on the discounter's egg price to the old egg price index. They grow the egg price index by the average CHANGE in prices at both the discounter and the supermarket, weighted by their (lagged) market share.

This means that the ONS only captures the indirect effects from the rise of discounters as supermarkets cut their egg prices to match. But they don't capture the direct effect of households switching to cheaper stores. We can proxy this effect by comparing how an average of food prices sampled by the ONS across different stores compares with an average of the chained food-price indices (as per Reinsdorf 1993)⁵. In recent years, the difference for food prices has been 2% per year, which is worth 0.2% for overall inflation – a significant amount (figure 4).

SOFTWARE AND SHARING

Consumers have also benefitted

from switching to online retailers, which benefit from lower rent, wage and tax costs. For US retailers, cash software investment has overtaken structures investment. Statisticians assume little productivity in software and generally deflate software investment by programmers' salaries. We think this underestimates 'real' growth in the capital stock of software. Take for example banking. We no longer need to go to a physical branch to undertake transactions, but can transfer money using phone apps. Is this adequately captured in the national accounts?

Statisticians could also be underestimating the sharing economy. High frequency estimates of GDP are calculated by sampling large companies (e.g. Travelodge). As consumers switch to Airbnb, small proprietors' data will only show up with a lag when they fill in their tax returns. US data show that the income measure of GDP has outstripped the expenditure measure by an average of ¼% per year since 2010. So the economy is doing better than big businesses report, but only because of the

growth of new, often disruptive entrants (figure 5).

The sharing economy – which is driven by free exchange of information – is therefore as much of a threat to old economy indebted incumbents as the rise of digital companies like Google, Amazon and Netflix have proven to be.

POLICY IMPLICATIONS

Although we think consumers' living standards and real output are higher than assumed (by around ½%), our analysis suggests that underlying inflation is lower. This is not simply a matter of statistics, but could have fundamental macroeconomic and market consequences - for instance, central banks may need to re-think monetary policy guidelines if actual inflation is lower than reported and growth higher. In the short term, we believe that the issues covered here explain at least some of the productivity puzzle, and that this is another reason why developed market interest rates will stay lower for longer. We will explore the potential effects further in a future edition of Fundamentals.

¹Charlie Bean – Independent Review of Economic Statistics - Interim Report

²Robert J Gordon – Is US economic growth over? Faltering innovation confronts the six headwinds

³Rachel Soloveichik – Valuing 'Free' Entertainment in GDP: An Experimental Approach

⁴Brynjolfsson and Oh – The Attention Economy: Measuring the value of free digital services on the internet

⁵Marshall Reinsdorf – The Effect of Outlet Price Differentials on the US Consumer Price Index

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Legal & General Investment Management Ltd, One Coleman Street, London, EC2R 5AA

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