

## In case you missed it: Secular stagnation?

As the US economy smashes forecast and grows at 3.2%, the focus shifts to Europe with Spain's third election in four years on Sunday, S&P's review of Italian sovereign ratings after the close today, and French president Emmanuel Macron's 'Act II'. Also, don't miss our latest central bank forecasts, showing the recent dovish global policy shift

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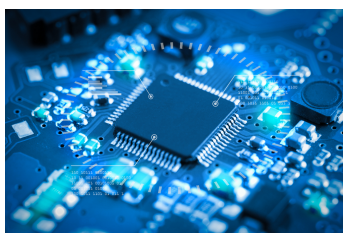
By James Knightley



## Spain

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Spaniards go to the polls for the third time in four years this Sunday. While economic activity is still decent, political uncertainty could cast a shadow...



## Dollar strength dominates

Dollar strength is evident across FX space, with notable gains against the KRW and AUD. Strong US data combines with weakness in Asia exports to amplify...



## France

### France: Macron's speech keeps debate open

In an unusually long address, French President Emmanuel Macron outlined his plans for the coming years- although financing remains unclear. The speech was...



## Energy | Sustainability

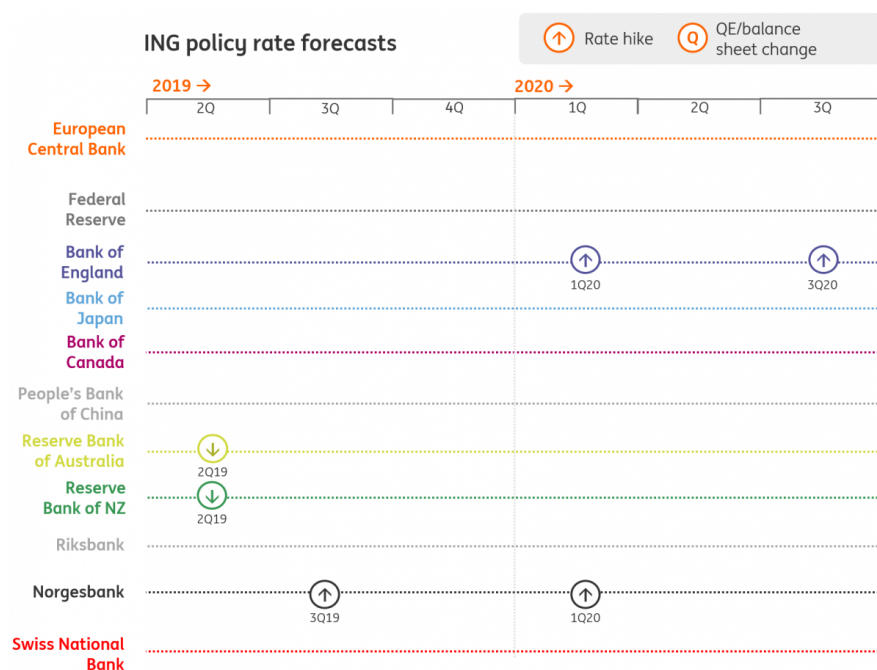
### Counting the cost of a low carbon economy

Wind and solar power will need a \$13 trillion investment over 30 years to reach emissions targets, as demand for power doubles  
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# Our April guide to global central banks

Everything you need to know about central bank policy around the world over coming months

## Our global central bank forecasts



Source: ING

## Federal Reserve: Economy back from the brink?

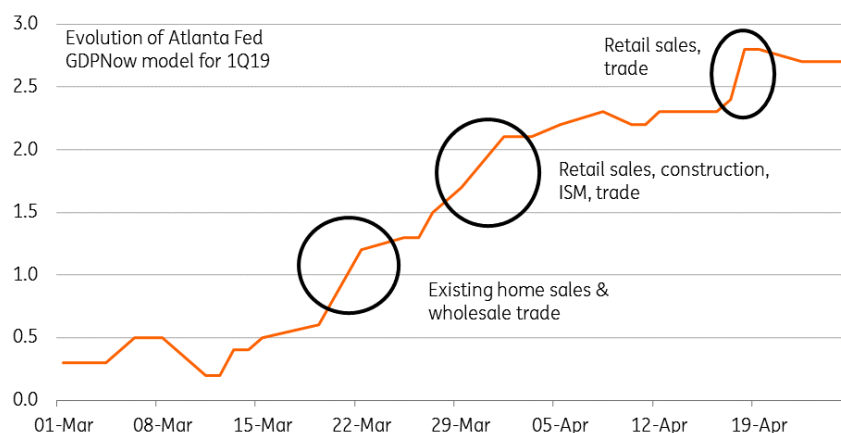
There was a lot of pessimism at the start of the year with the government shutdown, global slowdown fears and an inverted yield curve heightening talk of Federal Reserve interest rate cuts and a potential US recession. However, a recent run of firm macro data and a robust corporate earnings season have eased those fears.

Consumer spending is looking healthy, and there is the growing prospect of a US-China trade deal that can help lift some of the gloom and uncertainty hanging over the global economy. At the same time, the labour market looks resilient and wage growth is on an upward trend while the plunge in mortgage rates is helping to stimulate housing demand and construction spending is accelerating.

There are certainly more headwinds this year, but we continue to look for decent GDP growth in 2019 of 2.4%. We also expect inflation pressures to gradually build thanks to rising labour costs and improving corporate pricing power in an environment of firm demand. As such we see little reason for the Fed to cut interest rates this year with the market seemingly moving in our direction

given the re-steepening of the yield curve.

## The Atlanta Fed GDPNow estimate has staged a big turnaround



Source: Atlanta Fed, ING

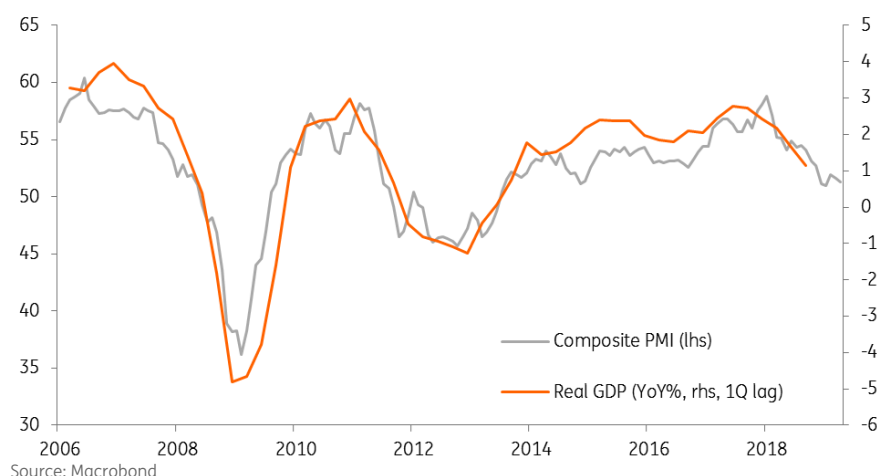
## European Central Bank: Wait-and-see with a dovish tilt

They could if they would but they hope that they won't.

This is more or less the summary of the ECB's current monetary policy stance. The unexpected slowdown of the eurozone economy, an unprecedented list of external risks and an inflation outlook far below target motivated the ECB to move towards an easing bias. At the last press conference, ECB president Mario Draghi tried to convey the message that the ECB stood ready to act to any further slowdown of the economy if needed. However, the ECB knows very well that its options for further easing are rather limited. In our view, the ECB will announce the technical details of the next round of TLTROs at the June meeting. The tiering system being discussed will only be an option if the growth outlook worsens further, as it would be the technical preparation for another cut in the deposit rate.

For the time being, the ECB is keeping its fingers crossed, hoping for stabilisation of the eurozone economy over the course of the year. This would mean no additional easing action. Even in such a scenario, any rate hikes are completely off the table. In its current set-up, the ECB has a clear easing bias. This, however, could change with the new ECB president, taking office in November. Until then, it is wait-and-see with a dovish tilt.

## Eurozone PMIs have fallen



## Bank of England: Brexit delay reduces chances of 2019 hike

While the Bank of England has kept the door ajar to further tightening, the chances of it happening this year have receded. The six-month Brexit delay means the threat of a ‘no deal’ Brexit has been postponed but will come back into focus as the new October deadline approaches. This looks set to keep a lid on growth, as firms maintain preparations for a possible cliff-edge scenario.

That said, skill shortages in the labour market have continued to drive wage growth higher. That means that if a Brexit deal can be approved by parliament, enabling the UK to leave the EU smoothly at some point over the next few months, then this could, in theory, bring a rate hike into sharper focus. But this is a big ‘if’, and in reality, we think it is more likely that no meaningful progress will be made before October. A rate hike this year is therefore not our base case, particularly amid the global shift to a more dovish central bank stance.

## The latest Brexit timeline



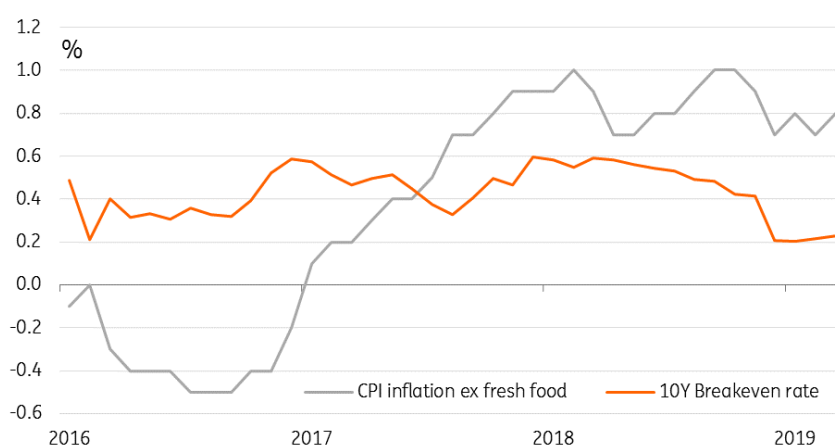
Source: ING

## Bank of Japan: Are there any easing options left?

In the press conference of the latest BoJ meeting, Governor Haruhiko Kuroda admitted his frustration with the BoJ's inability to meet its 2% inflation goal. Along with this, came with an increasingly fierce pushback on what he was terming "Modern Monetary Theory" or MMT, which is shorthand for saying that ultra-low interest rates don't work. Tragically, we believe that there is more than a grain of truth in some of this critique of ultra-low rates. Kuroda's "gift" to the markets this time was to change the wording in the BoJ statement, which replaced "extended period" for describing how long low rates would be in place, to "around Spring 2020".

To paraphrase his explanation, he suggested markets were misinterpreting "extended period" and was anticipating rate hikes much sooner than was probable. This assessment by the Governor is, in our view, completely without substance. Not only does the market not believe that the BoJ will meet their inflation target over the BoJ's forecasting horizon, but an increasing number of market participants don't believe they will ever meet it (notwithstanding some slightly better Tokyo CPI figures for April). A tweak to forward guidance as delivered on this occasion is as meaningless as it is irrelevant, and markets shrugged it off as they should have done.

## Japanese inflation is still well below 2%



Source: Bloomberg

## People's Bank of China: Managing liquidity carefully

Strong credit growth (40% YoY) in the first quarter came as a big surprise to the market. After the release of credit data, the Chinese central bank (PBoC) has changed its policy tool from the required reserve ratio (RRR) to some more flexible liquidity management tools, including the medium liquidity facility (MLF), targeted MLF (that provides liquidity to smaller private firms) and seven-day open market operations.

We believe the central bank's rationale behind not using RRR is that it's one of the most rigid liquidity management tools. Once the RRR is cut, the liquidity injection is long-lasting, and the central bank can only absorb liquidity through open market operations, or by raising the RRR to unwind the impact.

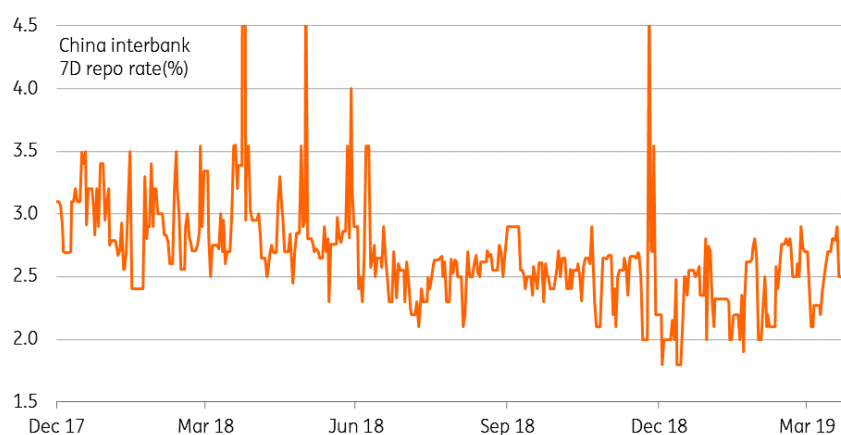
The change of tools does not mean liquidity will be tighter, it just means the same amount of liquidity will be injected by different tools. We now expect no blanket RRR cuts in 2019, having previously forecasted three cuts. Targeted RRR cuts (for smaller firms) would only be needed if

there is a series of bond defaults by private firms, which seems to be less likely given these firms can get loans from banks.

The central bank has been silent on using the 7-day policy interest rate. We believe that this tool has been shelved for now, given the central bank has stated that the interest rate transmission mechanism is incomplete.

USD/CNY continued to follow the ups and downs of the dollar index but not to the same extent. It was stable in the first quarter, and the yuan only depreciated 0.18% and fluctuated in a narrow range of around 1.8%. This narrow trading range could remain in place even after a trade deal has been reached.

## China 7-day repo rate



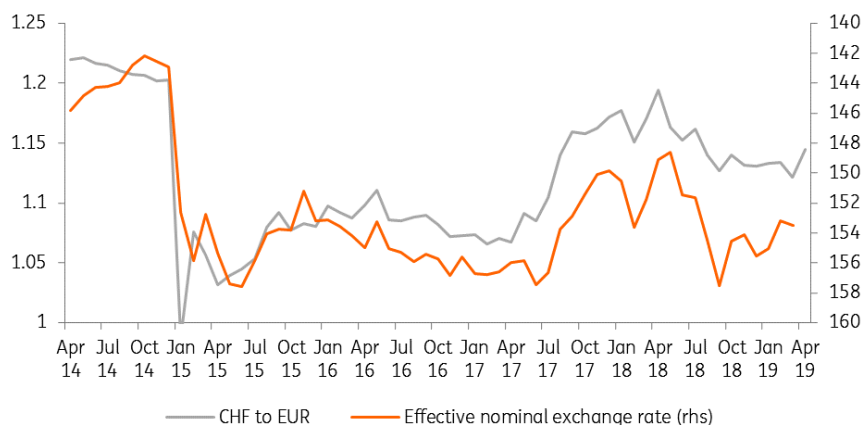
Source: Bloomberg

## Swiss National Bank: Negative rates set to remain the new norm

At the March meeting, the SNB maintained its ultra-loose monetary policy, keeping policy rates in negative territory and maintaining a willingness to continue intervening in the foreign exchange market if needed. The SNB has also reduced its conditional inflation forecast (which assumes an unchanged policy rate) and now expects an inflation rate of 0.3% in 2019 and 0.6% in 2020. This downward revision is the result of lower growth prospects in Switzerland, weaker inflation and a revision of expectations concerning global monetary policy. We believe that this downward revision is a sign that the SNB is more dovish than ever before, and does not plan monetary tightening over the forecast period.

The first interest rate increase will not, in our view, be considered before the next economic cycle begins. In the meantime, negative rates are likely to remain the norm for Switzerland.

## The Swiss franc



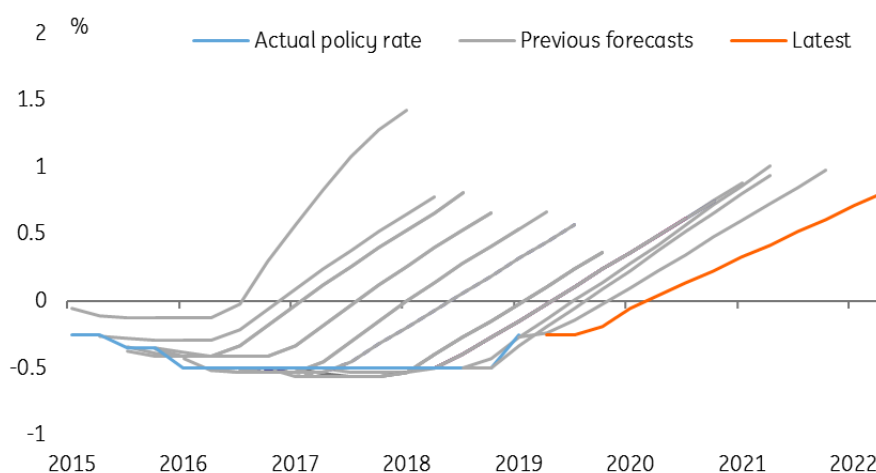
Source: Reuters Datastream

## Riksbank: Another delay; more of the same to come

True to form, the Swedish central bank delivered yet another dovish surprise this week. A downward revision to its interest rate forecast pushed the expected date of the next rate hike into “the end of the year or at the beginning of next year” (i.e. 4Q19 or 1Q20) and also reduced the pace of tightening further out to just one hike per year in 2020-2022. In addition, the Riksbank announced a further SEK 45 billion of QE ‘pre-reinvestments’ from mid-2019 to the end of 2020.

We expect more of the same later this year. The key factor for the Riksbank is continued anaemic inflation pressure, which looks unlikely to change in the near term. And with the major central banks on hold, we have a hard time seeing the Riksbank tightening policy at a time when the Swedish economy is slowing and looks set to underperform peer economies.

## The Riksbank keeps delaying



Source: Riksbank

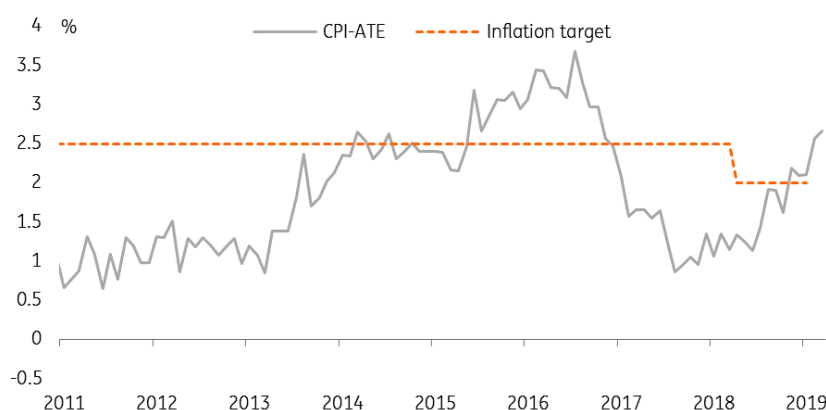
## Norges Bank: Rising inflation pressure to keep central bank in hiking mode

In contrast to its Scandinavian neighbours, the Norwegian central bank has seen ample – and perhaps even excessive – inflation pressure this year. Core inflation in Norway has jumped to 2.5% and could well stay around that level this year as momentum in the domestic economy remains solid and wage growth is likely to increase further. While inflation is still comfortably within the NB's +/- 1 percentage point tolerance band, strong price pressure means the central bank is likely to keep raising rates.

In addition to higher inflation, oil prices have risen further, boosting the energy-dependent Norwegian economy, and the Norwegian krone has remained weaker than the NB's forecast. If this combination continues, that strengthens the case for higher rates in Norway, as higher oil prices stimulate both growth and inflation, while the exchange rate is not tightening financial conditions as much as the NB has anticipated.

We think the NB will hike at least once more this year and again early next year (at the September and March meetings). And if we see further upside surprises to inflation, or if oil prices rise further, those hikes could easily shift forward to June and December this year.

### Norwegian inflation pushes higher



Source: Macrobond

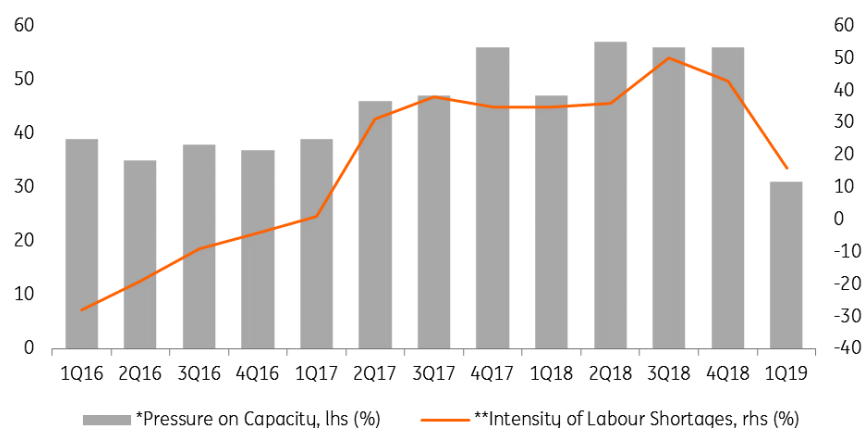
### Bank of Canada: Tightening bias abandoned

The Bank of Canada has been taking a more dovish line for some time, but if there were any remaining hints of hawkishness, they were firmly abandoned at the April policy meeting. Interest rates were kept on hold at 1.75%, but more notably, the central bank removed its explicit reference to possible future rate hikes.

The labour markets underlying strength has been one of the only bright spots in the economy, but if the Bank of Canada's (BoC's) spring Business Outlook Survey is anything to go by, the positive news we've been getting from employment reports could slowly start to fade. Even though labour-related production constraints remain the most frequently cited bottleneck, the indicators of labour shortages fell. This could suggest labour market pressures are beginning to subside.

Overall, policymakers will focus on three things: global trade uncertainty, the weaker outlook for the energy sector and doubt surrounding household activity. We think there is scope for some upbeat news as we enter the second half of the year - reinforced by the fact that the Bank still describes its current stance as “accommodative”, suggesting that the committee are less convinced than the market that rate cuts are on the horizon. Nevertheless, we aren’t expecting a rate hike this year.

## Bank of Canada Business Outlook Survey suggests jobs market weakness ahead



Source: Bank of Canada Business Outlook Survey

## Reserve Bank of Australia: Weaker inflation raises chances of a rate cut

The latest set of RBA minutes discussed the case for a rate cut. But even though the conclusion was that there was no strong case for an imminent cut, markets aren’t convinced, and neither are we.

Data initially supported the “on hold” view, with full-time jobs in March rising by more than 48,000, reversing the previous month’s weakness, though this may have come at the expense of some temporary jobs (not necessarily a bad thing). A rising unemployment rate can also be put down to greater labour market participation (also probably not a sign of desperation).

But more recent inflation data was a huge disappointment, and at 1.3% in 1Q19, down from 1.8% in 4Q18, seem far too dismal for the RBA to ignore. Indeed, these inflation numbers are so bad, that a cut at the 7 May meeting can’t be totally ruled out.

Forecasters and the market had been converging on an August rate cut, just after the next CPI reading. But waiting this long against this backdrop seems completely unnecessary.

## Australian inflation components



Source: Macrobond

## Reserve Bank of New Zealand: A rate cut looks increasingly likely

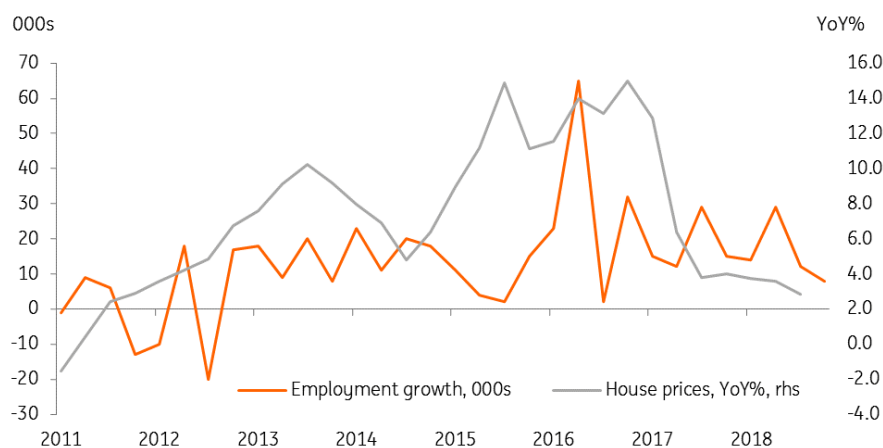
Further inflation weakness in New Zealand also puts the 'on-hold' RBNZ view at considerable risk, and without the same labour-market strength that was helping to keep thoughts of the RBA on hold alive (until their inflation data snuffed out this idea).

The next RBNZ meeting on 8 May will come just a week after 1Q19 employment data (and the day after the RBA) and with no expectation that the labour market will do enough to provide reassurance that a balance between low inflation and decent growth is being achieved, a cut on 8 May looks increasingly likely.

The balancing factor here is house prices, which are in a healthier position than they are in Australia, but they are still growing more slowly, and are sufficiently soft that they won't change the picture even if they hold at the March 19 growth rate of 2.6%YoY.

Market OIS futures put the probability of a cut at the next meeting at 61.7% now, which is up to a level that makes it hard for the RBNZ to ignore.

## New Zealand house prices vs. employment



Source: Macrobond

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## Decent US growth suggests Fed rate cut unlikely

Markets are pricing in at least one rate cut over the next year, but with the economy continuing to perform solidly, we think it is much more likely that the Federal Reserve keeps rates on hold for the foreseeable future



Source: Shutterstock

Despite the mountain of headwinds clouding the US outlook at the start of the year, the economy put in a decent performance in the first quarter. The quarterly pace of growth accelerated to 3.2% annualised, up from 2.2% in the fourth quarter of 2018. The overall growth mix was fairly broad-based, although a few key trends stand out.

Firstly, consumer spending slowed to around half the pace of growth recorded in 4Q18. That may be partially related to the government shutdown, but equally the boost from last year's tax cuts is beginning to fade. That said, there are good reasons to expect consumer spending to perform solidly over coming months. The jobs market is strong, and with skill shortages emerging in different parts of the economy, wage growth has been accelerating.

# 3.2%

## US 1Q growth

(QoQ annualised)

Higher than expected

Unsurprisingly, trade made a strong contribution to the overall growth number. At the end of last year, firms appeared to bring forward imports to the fourth quarter to get ahead of the anticipated increase in tariffs. While that deadline was later postponed by President Trump, there was still a corresponding fall in imports during the first quarter, helping to lift overall GDP growth by 0.6 percentage points.

To the extent that these excess imports were simply stockpiled at the end of 2018, you might have expected inventories to correspondingly decline in the first quarter, as these stocks were unwound. In the end though, the inventory component – which is typically very volatile and can be affected several different factors – actually increased, inflating the growth number by 0.7ppts.

The bottom line is that there are some growth-positive factors at play here that are unlikely to persist into the second quarter. Having said that though, we continue to expect a solid performance from the US economy this year, particularly if we get some more encouraging news from the US-China trade talks. While we don't expect the Fed to hike rates again this year, we think it looks pretty unlikely that rate cuts are on the horizon at this stage.

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## Does secular stagnation help the dollar?

The Dollar Index has broken to a new high for the year – largely on the back of weaker growth prospects overseas. If secular stagnation fears grow and asset allocation shifts towards bonds from equities, prohibitively high dollar hedging costs could mean the dollar does even better



Source: Shutterstock

### Secular stagnation fears in the ascendancy

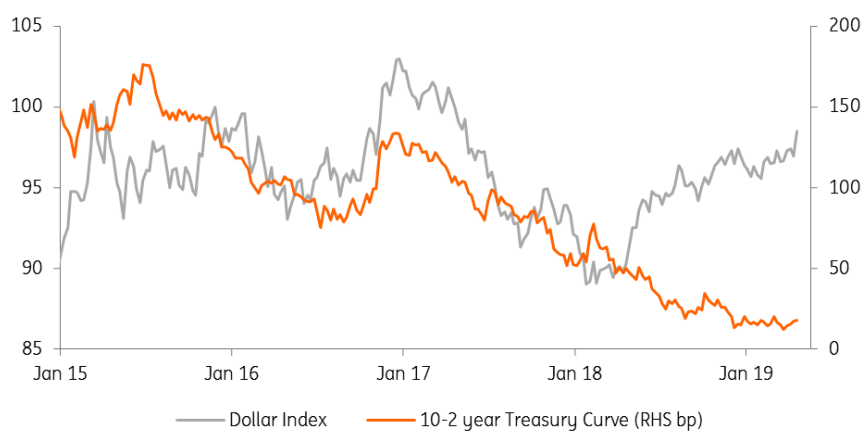
This week the trade-weighted dollar has rallied to a new high for the year. This has been driven less by US growth news, but more by sluggish activity and softer monetary policy prospects in the rest of the world. In fact, most fund managers have a growing conviction that the world economy is entering into a period of low growth and low inflation - or secular stagnation.

Fanning the fears of low growth and low inflation this week have been: [soft CPI readings in Australia](#), continued pessimism from European manufacturers ([German IFO](#)) and a [poor 1Q19 GDP release from Korea](#). We've also seen a dovish raft of central bank communication from the likes of the Bank of Canada, Sweden's Riksbank and, surprisingly, the Central Bank of Turkey.

Despite prospects of [some better US activity data near term](#), the interest rate market has struggled to shrug off fears of a slowdown. And while the jury is still out on whether a flat/inverted yield curve foreshadows the next US recession, the dollar continues to perform well. In fact, the dollar index (DXY) has broken to a new high for the year and has now reclaimed around three-quarters of

the decline since Trump took office in January 2017.

## Despite US yield curve flattening, the dollar rallies



Source: ING, Bloomberg

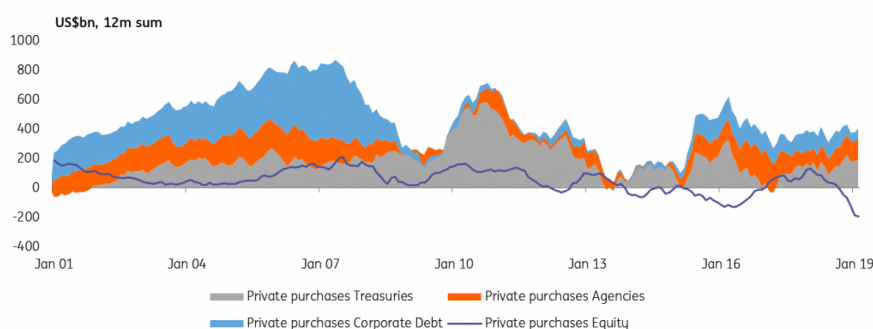
## Asset allocation shift to bonds from equities?

If increasing fears of secular stagnation are realised, we would expect to see the investment community (eg, those running balanced funds which invest in both equities and bonds) rotate away from equities and into the bond market.

Buy-side surveys suggest investors are still underweight bonds and overweight equities, although there is some evidence that the rotation (at least in US asset markets) is already underway. Here the US Treasury releases its Treasury International Capital (TIC) data series, showing foreign purchases of US securities and US purchases of foreign securities. The data (as of February 2019) shows consistent foreign private sector purchases of US bonds (Treasuries, Agencies and Corporates). In contrast, foreigners have sold US equities for the last ten months.

Were secular stagnation fears to take hold and more investments be directed towards bonds, market liquidity considerations mean that US fixed income would receive sizable inflows as a result of its large weight in global bond benchmarks. Currently, the US has the largest weight (around 30%) in the Bloomberg Barclays Global Sovereign Index.

## Foreign private sector purchases of US securities (US\$bn, 12m sum)



Source: ING, Bloomberg

## A rotation to bonds could send the dollar even higher

The recent decline in market interest rates seems to have done the dollar no harm at all. This may be because those foreign asset managers wanting to increase their exposure to the US bond market are faced with prohibitively high dollar hedging costs. For Eurozone or Japanese-based investors the annual cost of hedging FX exposure to US asset markets is now around 3.00/3.10% (using the 3 month FX forwards markets as a proxy). This cost exceeds the yields available across the entire US Treasury curve. It would be no surprise to hear that some of the Japanese Life Insurers are increasing their allocations to unhedged foreign bond positions in the new fiscal year starting this month.

Unless we see a sharp, positive re-assessment of growth overseas, or much weaker US growth to trigger a serious re-assessment of Fed policy including expectations of an imminent easing (such that the short-end of the US curve really softens and USD hedging costs cheapen), we fear that the dollar is going to be staying much stronger than our current baseline forecasts. As such our year-end 2019 EUR/USD and USD/JPY forecasts of 1.18 and 108 look like they'll have to be revised in favour of a stronger dollar.

## US Treasury yields, unhedged versus hedged into EUR and into JPY (%)



Source: ING, Bloomberg

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## President Trump's tariffs: Did the 'forgotten men' get their jobs back?

Industries, like steel and aluminium, that President Trump protected with higher import tariffs have shown above-average jobs growth and the downward trend in overall manufacturing employment has stopped. However, this isn't the result of the promised 'industrial revolution' but reflects lower productivity growth that may not last



Source: Shutterstock

### A new industrial revolution

["I will be the greatest jobs president God ever created"](#), Donald Trump said when he announced he would run for president back in 2015. In the same speech, he promised a new industrial revolution that would restore manufacturing and bring back jobs that had disappeared to China and other emerging economies.

During his election campaign, President Trump laid out his trade policy which can be characterised as America's trade partners should grant the US better terms of trade or else face higher import tariffs at US borders.

2018 showed that President Trump wasn't bluffing. The president picked a fight with China and many other countries by hiking US import tariffs on a wide range of products. While tariffs are primarily a means to pressure trade partners into giving the US better trade terms, President

Trump doesn't really hide the fact that he likes tariffs too. "I'm a tariff man", he tweeted last December. He thinks import tariffs are good for economic growth and employment.

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*We're not trying to answer the question about the overall effect of Trump's tariff policy on US employment but instead, we're focusing on manufacturing employment to see whether President Trump has managed to address the needs of the 'forgotten men and women' in manufacturing that lost their jobs*

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Have the tariffs created new jobs in the targeted industries and what has been the effect in other manufacturing industries where steel and the other targeted products are used as inputs?

For a complete analysis of the effects of tariffs on employment, we should also look into the impact on employment due to retaliatory measures by US trade partners and take into account second-round effects on consumer spending and business investments. For example, employment effects due to Chinese tariff hikes on American soya beans, are ignored in this article. But it's worth noting, that these kinds of retaliatory measures amount to about USD140 billion, less than half of the USD300 billion of US imports that have been impacted by the hikes.

So, we're not trying to answer the question about the overall effect of President Trump's tariff policy on US employment. Instead, we're focusing on manufacturing employment to see if he has managed to address the needs of the 'forgotten men' in manufacturing that lost their jobs.

Since most tariff hikes were implemented in the second half of 2018, there isn't enough data available for a conclusive analysis. Nevertheless, it's possible to draw some tentative conclusions for a few industries, as they've been subject to elevated tariffs for somewhat longer, resulting in six to nine months of available data.

We also try to get an idea of the impact of tariff hikes on the performance of manufacturing as a whole. In that way, we take into account that tariff hikes raise input costs for many manufacturers which potentially undo positive employment effects in the industries protected by higher tariffs.

## President Trump's tariff hikes in 2018

- **February 2018:** President Trump hiked tariffs on the import of solar panels and washing machines in an attempt to halt the dominance of Asian producers.
- **March 2018:** President Trump picked a fight with a wide range of countries by elevating tariffs on steel and aluminium by 25 and 10 percentage points.
- **July 2018:** President Trump started a bilateral trade battle with China by imposing 25 percentage point tariff hike for a package of USD 34 billion of goods imported from China followed by the same tariff increase on a package of USD 16 billion in August.
- **September 2018:** After Chinese retaliation, President Trump stepped up the fight with a 10 percentage point increase in tariffs on no less than USD 200 billion of imports from China.

## The steel and aluminium test

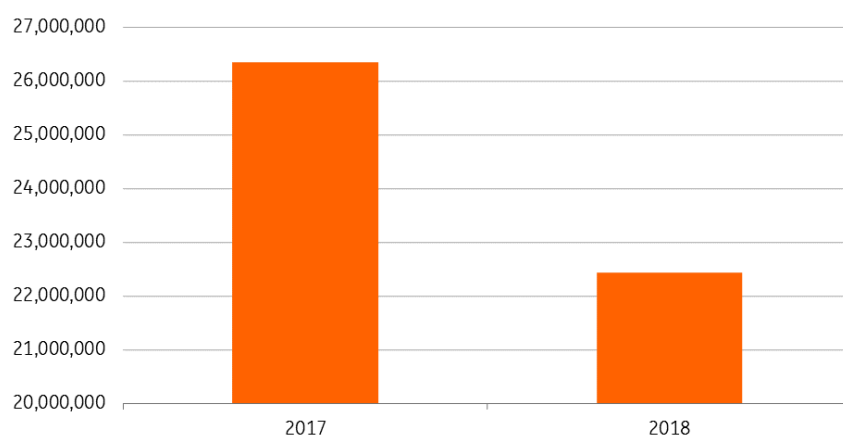
Higher tariffs on steel seem to have been successful in diminishing the American use of foreign steel. Imports of steel volumes have been 12% lower in the nine months after the increase in tariffs than during the same period in 2017, as you can see below.

At the same time, the growth of steel production in the US accelerated from 4% in 2017 to 6.2% in 2018 - above the growth of worldwide steel production (4.8%). However, the growth of US steel exports was lower. In other words, US demand for steel has been serviced to a large extent by domestic steel producers than in the past and this increase in the use of domestic steel, at the expense of foreign steel, is precisely the goal of President Trump's protectionist policies.

Demand dropped back at the beginning of 2019, but this may be tied to uncertainty after temporary concerns about the government shutdown at the start of 2019 and fear of a US downturn in late 2018, signalled by sharp sell-off in risk assets. We suspect a rebound.

### US steel imports (metric/tons)

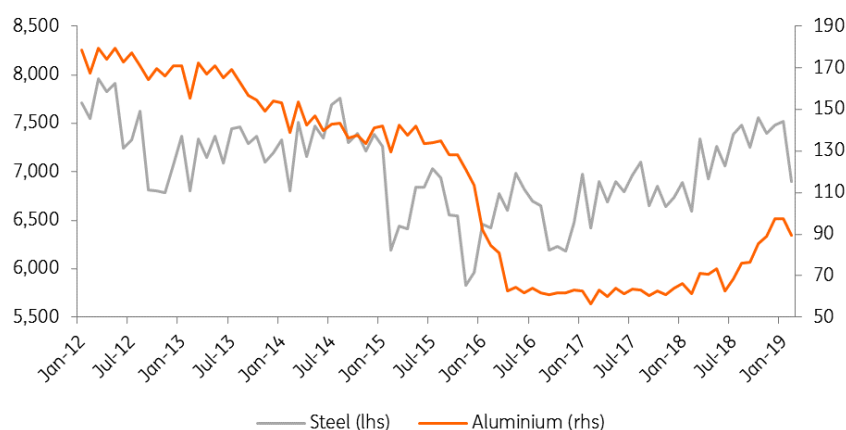
April- December



Source: US Department of Commerce

## Steel and aluminium output

(monthly in tons)

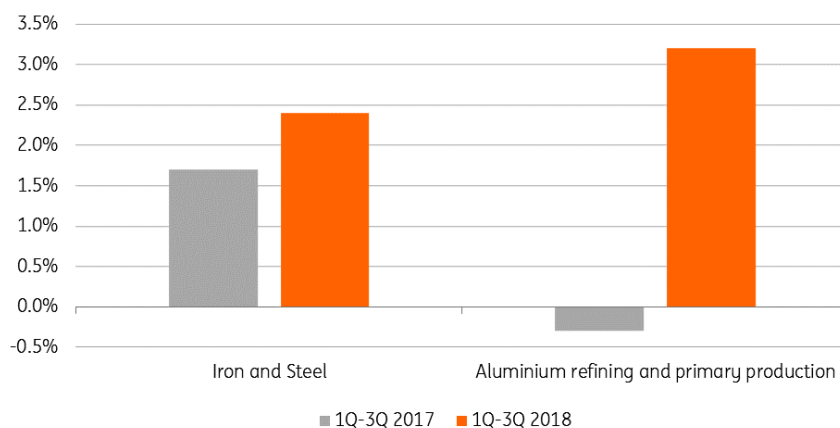


Source: Macrobond

Now, how has this influenced employment in the steel (and iron) industry? Well, jobs growth was 2.4% in the six months after the tariff hikes. The figure below shows that's 1.5 times higher than jobs growth during the same period in 2017, and also higher than employment growth in total manufacturing for the whole of 2018 (2.1%).

## Employment growth before and after the tariff hike

Employment growth in steel, iron and aluminium industries for the first six months after the tariff hike compared to the same period in the previous year



Source: BLS

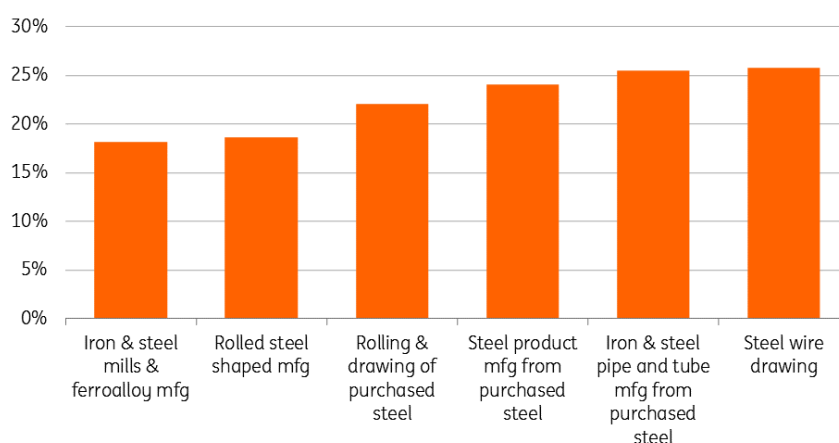
The turnaround in aluminium production has been even better than in steel after several poor years: a 33% increase in production since the imposition of aluminium tariffs (chart 2). The evidence regarding job creation is positive as well: a 3.2% job increase in the first six months after the tariff hikes, compared to a decline of 0.3% in the same period a year earlier, according to the Bureau for Labour Statistics.

## Negative price effects

To get a grip on the overall impact of President Trump's steel and aluminium tariffs on manufacturing employment, effects on other industries need to be taken into account too. In the US, steel is an input for many industries and the tariff hikes mean those industries suffer from higher steel prices.

## Price increases for different types of steel in the six months after tariff hikes

Annual increases through September 2018 for PPI steel series



Source: Bureau of Labour Statistics

Higher input prices will either lead to higher product prices, which suppresses demand or leads to lower profit margins that could result in lower business investments. So, it's not surprising that many steel-using companies have objected to the tariff hikes and warned about negative employment effects. For example, Ford Motor Co. is blaming President Trump's tariffs for an increase of USD 1 billion annual increase in costs.

Other companies like Caterpillar Inc and 3M Co objected to the steel tariff hike too and said tariff-related costs for this year would likely be USD100 million or more.

## Limited damage

The negative indirect effects of higher steel prices have probably contributed to somewhat slower development of production and employment in some manufacturing industries, as the chart below shows. However, so far it hasn't led to eye-catching setbacks.

US automobile industry is a good example. Employment growth was 1.9% during the six months after the tariff hikes. That is less than half the job growth during the same period in 2017, but better than total manufacturing employment growth. Apparently, the cost-effect of the tariffs and potential fall out of demand through higher prices isn't strong enough (yet) to undo tailwinds like the corporate tax reform of late 2017.

*Not high production, but low productivity in manufacturing is key in explaining jobs growth*

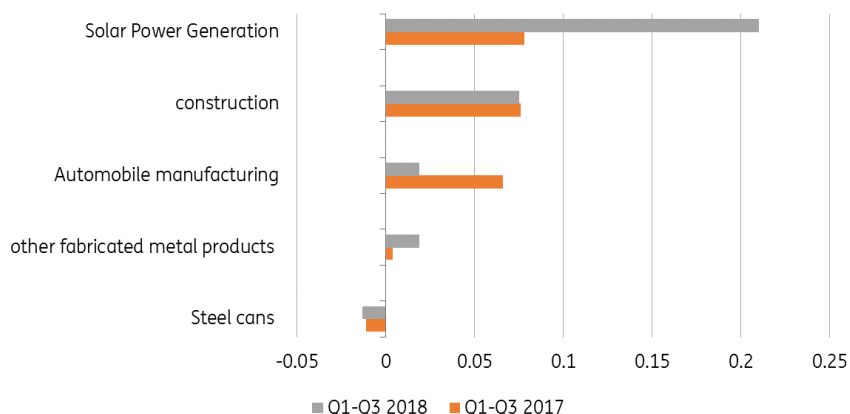
US car companies complaints about steel tariffs have so far not led to their undoing, but haven't completely fallen on deaf ears either. Automakers are probably taking solace in the prospect of potential tariffs on car imports now that the Department for Commerce has, according to press agency AFP, decreed that the import of cars is a threat to the US and a national security issue. President Trump has until mid-May to decide whether to proceed and if he does hike tariffs, it would make American autos more competitive from a pricing perspective.

The industry for steel cans is another industry that has been hit by higher costs of steel. In this industry, employment contracted by 1.3% in the six months after the tariff hike. Bad news, but not much worse than the employment development in the same period in 2017 (-1.1%) before the tariff hikes on steel and aluminium.

At first sight, construction is a sector that seems little affected by the higher costs for steel and aluminium, although it's important to remember that, especially lumber, costs are more important cost factors for residential construction. Interest rates are also low, so that has helped support demand. Nevertheless, we observe that the higher prices of steel and aluminium haven't spoiled the employment party that started in 2017, at least not yet. Employment increased by 7.5% in the six months after the tariff hike, almost the same growth as in the same period in 2017 (7.6%).

Another industry that uses steel as an input is the so-called 'other fabricated metal products', where the evidence isn't very worrying either. Employment is up more than 5,200 (1.9%) between the start of 2Q and the end of 3Q which is five times as much as during the same period in 2017, and more than the average jobs growth in US manufacturing during this period (1.4%).

**Employment growth (%), selected industries**



Source: Macrobond

**Washing machines**

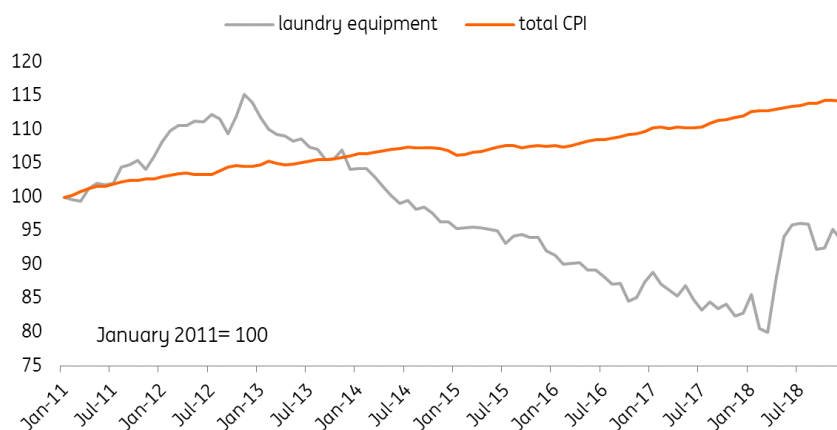
Unfortunately, data on domestic production and employment in the washing machines and solar panels industry is insufficient to draw conclusions about the employment effects of the tariff hikes in these industries. But we do have some information that allows us to get an idea of the

potential negative side effects.

The chart below shows tariff hikes have fired up US consumer prices for washing machines. The negative effect on demand for washing machines seems bearable though because more washing machines were sold in the US in 2018 than in previous years (chart 7). The growth of sales was lower than in 2017, but only by a small amount. And, this decline seems to be only partly attributable to the price rise, because the slowdown of the growth rate fits in a long-standing downward trend.

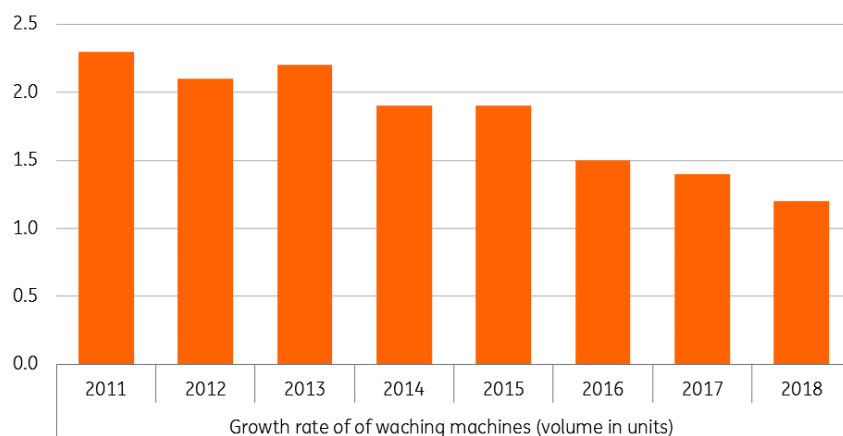
Because of the lack of data, we don't know whether the tariff hike has succeeded in replacing imported washing machines by domestically manufactured machines and subsequently raising employment in the US. Having said that, anecdotal evidence points to some positive employment developments. Sales growth at LG, one of the largest suppliers of washing machines, has been accompanied by employment gains when it opened up a new factory in Tennessee this year. We also see that some companies expanded existing facilities, such as Samsung's plant in South Carolina.

### Higher prices for washing machines in the US



Source: Macrobond

### Washing machines sold (units, growth rate per annum)



Source: Macrobond

## Solar panels

No disaggregated employment data is available for the solar cells/ panels sector either. However, the (employment) development in the solar power generation sector can indicate whether the price increase of solar panels has restrained growth of this sector. After all, 90% of the 38,000 people working in the solar business are employed in the installation business which could be hurt by lower demand caused by the price rises of the panels due to the tariff hike.

The negative effect of higher prices on demand for this product seems to be limited as well. Growth of production of solar power has been three times as high in the nine months after the tariff hike in January than in the same period in 2017.

## Summing up

Looking at the data for the industries we've looked at suggests the direct effect of the tariff hikes has been positive in steel and aluminium industries. The indirect effects on production and employment in other sectors, through higher prices, seem to wipe out these benefits in some cases, like for steel cans. For industries like the car industry and construction, the rise of input costs (steel and aluminium in this case) hasn't prevented the growth of production and employment, although at a slower pace than in 2017 in case of the car industry.

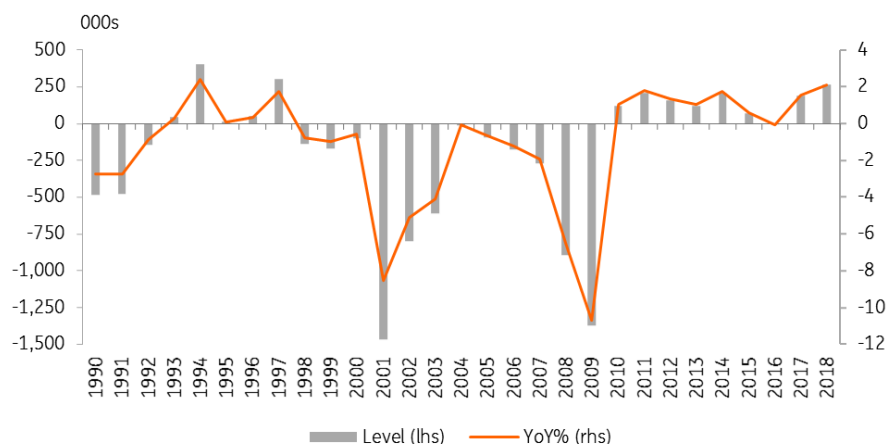
For washing machines and solar panels, indications are that tariffs haven't done harm either, although it should be stressed that data availability for washing machines and solar panels is poor.

## A turnaround in total manufacturing

After steel and aluminium, a wide range of Chinese products that have been targeted by the US administration with tariff hikes in 2H18. They are mainly for manufacturing industries in the US. Data about employment development after the tariff hikes in many cases isn't available yet. However, given the fact that it concerns hikes for thousands of input products, looking at the performance of production and employment in total, manufacturing gives us some idea if the positive direct effects (on production and employment in the targeted industries) are wiped out by losses in industries that use these products as inputs.

A first glance, total manufacturing employment suggests President Trump has brought about a positive turnaround as promised. Manufacturing employment has been growing since he took office in 2017 and last year's 2.1% increase (264,000 jobs) is the best jobs result since 1994, as you can see below.

## Annual change in manufacturing employment



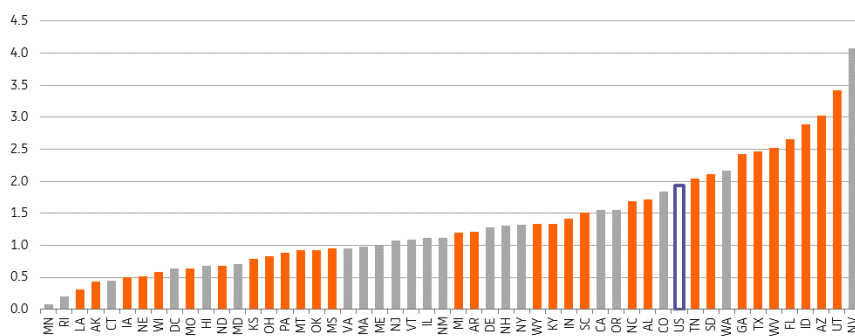
Source: Bureau of Labour Statistics, ING

## What about Rust Belt states?

Interestingly, the so-called Rust Belt states which saw significant declines in their manufacturing sectors in the 1980s have continued to underperform. Iowa, Illinois, Pennsylvania, Wisconsin, Ohio and Indiana have all seen weaker employment growth than the growth for the entire economy as the chart below shows.

As such, it doesn't appear that President Trump's policies have yet been able to produce the industrial revolution that he promised the 'forgotten men' in this region, although the growth of employment is, of course, better than decline which was the case during most years since the '80s.

## Employment growth (%) at state level since the start of 2018



Source: Bureau of Labour Statistics, ING

Anyways, the president can point to the fact that under his watch total manufacturing jobs, as a proportion of total US employment has been growing. That is a reversal of the steep downward trend since World War II. The pace of job creation in manufacturing outpaced that of total US employment in each of the first two years of his presidency, as you can see below.

*The president can point to the fact that under his watch the share*

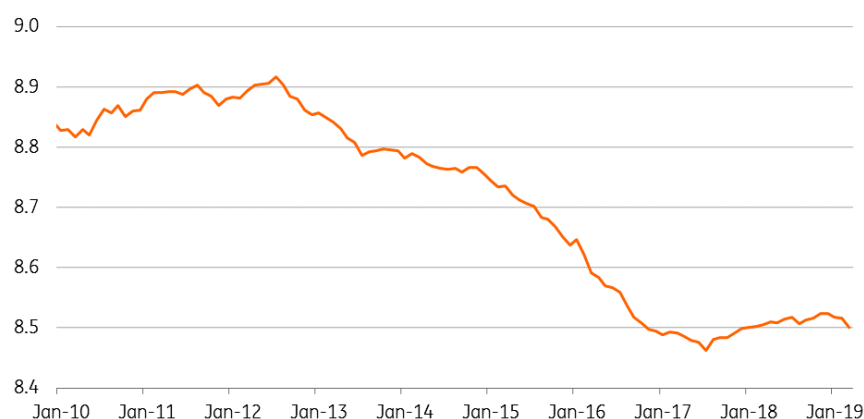
*of manufacturing jobs in total US employment has been growing*

Manufacturing has begun to underperform once again since late 2018, but we will need to wait and see if this is the beginning of a renewed downward trend of the share of manufacturing employment in total employment. It could also just be a temporary blip. There has been a noted improvement in the ISM manufacturing index and its employment sub-component in March. Anyways, the net increase of manufacturing's share in total employment during Trump's watch suggests that besides general policy measures like the tax cuts, that have impacted employment in all sectors of the economy, something else is going on in manufacturing.

As we've shown above, in some cases the tariff hikes have stimulated employment in the sectors involved with apparently limited damage through the indirect effect of higher prices. But this non-random selection of a couple of sectors doesn't say much about the development of total manufacturing.

Maybe something else is responsible for the positive employment performance of manufacturing under the Trump presidency. Actually, aggregate data for manufacturing shows that seems to be the case indeed.

### Manufacturing employment (%) of total employment

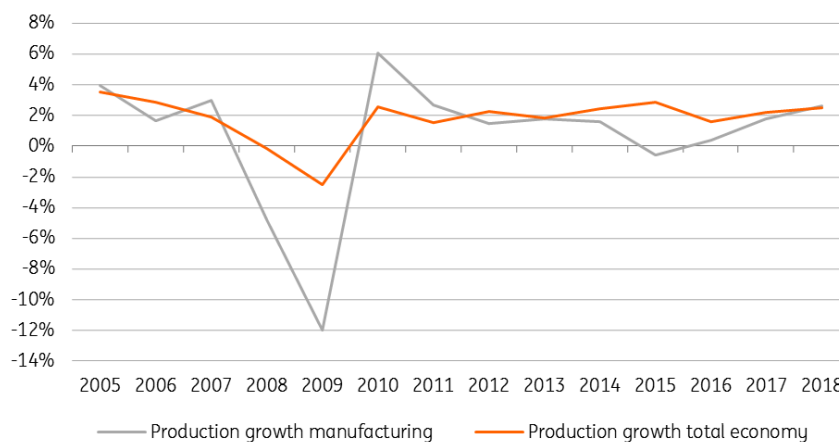


Source: Macrobond

### Not high production but low productivity is key

The figure below shows that the 2.2% average production growth of manufacturing during 2017 and 2018 is very good compared to the previous two years but is nothing special if we look a bit further back in time. During the period 2005- 2016 (with the exceptional crisis years 2008 and 2009 taken out), average production growth of manufacturing production has been 2.2% as well.

## Annual percentage production growth, manufacturing and all economy



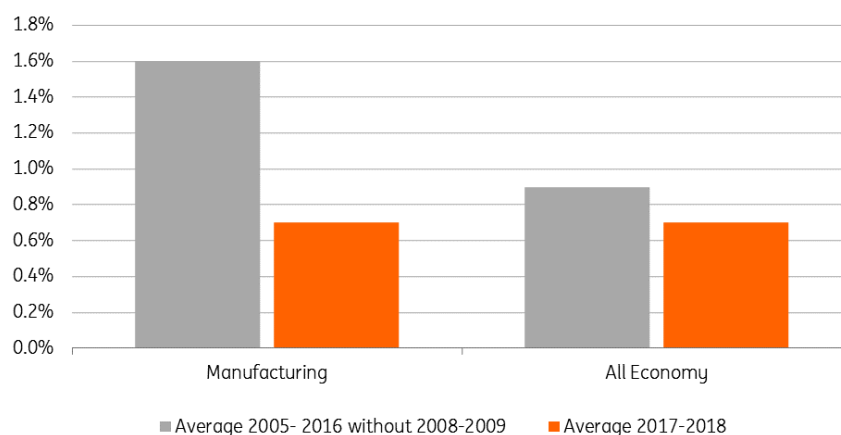
Secondly, the chart also shows that manufacturing hasn't done better than the overall economy. The overall economy grew a bit faster over the last two years (at an average rate of 2.4%).

So, how come that the share of manufacturing jobs in total employment has gone up? The answer is weak productivity growth in manufacturing! Labour productivity grew on average at 0.7% in 2017 and 2018, compared to an average of 1.6% during the 2006-2016 period - again excluding the crisis years of 2008 and 2009.

If productivity had developed at this previous pace, less extra labour would have been needed to produce the production growth that has been realised in 2017 and 2018. In this case, employment growth in manufacturing would have been only 0.9%. considerably lower than the average of 1.6% during the preceding ten years (excluding the crisis years).

A look at the productivity growth for the entire economy shows that jobs growth has been stimulated in other sectors as well by the slow productivity growth over the last two years, but not as much as in manufacturing (Figure 12)!

## Large productivity drop in US manufacturing under President Trump's watch



Source: Macrobond, calculations ING

### Unintended side effects

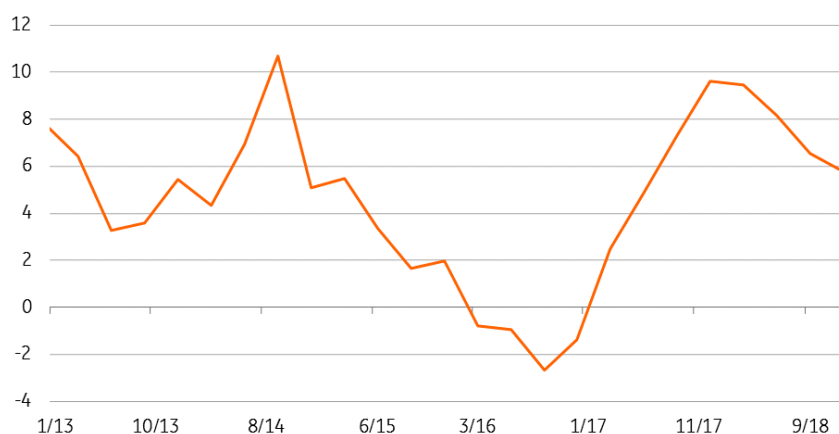
One potential reason for the weak productivity is that US companies simply over predicted demand for their products and hired too many workers. This would tie in with the decline in manufacturing out of total employment in recent months. Businesses may now be slowing their hiring of manufacturing workers after the recent softer patch for US growth.

The strong hiring, weak productivity nexus for manufacturing could also be because of the uncertainty that President Trump's trade policy has created. Businesses might be reluctant to make significant financial outlays on capital expenditure, given fears that an escalating trade war will push up costs, hurt supply chains and limit access to foreign markets in the future. Therefore, to boost output in the near term, firms have been using more labour rather than long term investments in capital goods like machines and production facilities. This aligns well with the observed slowdown of capital expenditure on equipment for the second half of 2018. (Chart 13).

Lower productivity growth was probably not President Trump's goal of the trade war, but as far as uncertainty about trade has contributed to lower productivity growth, the President will welcome this unintended effect of his controversial trade policies.

If the US can strike trade deals with China and the EU in 2019, this may give businesses enough clarity and confidence to make more capital expenditure investments. The result could be that worker productivity growth rises and production growth in manufacturing leads to fewer employment gains than in recent years.

## Annual capital expenditure on equipment in manufacturing



Source: Macrobond

## What does this mean for the 2020 US presidential race?

If people have jobs and rising pay, President Trump will be keen to take credit for all of this, as he seeks re-election next year. We can see that of the 11 states that have shown the fastest employment growth since the beginning of 2018 than the national 1.9% increase, nine were won by Donald Trump in the 2016 presidential election. They accounted for 123 of the 538 college votes used to determine who wins the presidency. So if he can retain these nine states, he is close to halfway to achieving the 270 electoral votes he already needs. The caveat here is that migration and demographic change will have an impact on the results too.

Also, the top states for employment growth taken by Democrat Hillary Clinton in 2016, Colorado and Nevada were viewed as key swing states that could have gone either way, accounting for a further 15 college votes. Convincing electorates in these important swing states that his tariff and tax policy is responsible for their strong employment performance will be critical in his election campaign.

### Conclusion

US manufacturing growth has increased since President Trump kicked off his trade war, but we have to remember the economy was already in good shape and received further boost from a pick-up in real incomes and his 2017 tax reform.

Manufacturing production growth has been higher too, but it doesn't beat growth in the rest of the economy and isn't significantly higher than the average of the previous ten years. So, for now, we can't really see anything, which we might call the 'new industrial revolution' that President Trump promised.

*US manufacturing growth has increased since President Trump kicked off his trade war. However it is not higher than the average of the preceding ten years, so we can't really see the 'new industrial revolution' as the president*

*promised. Employment growth however has been above average, but this mainly reflects lower productivity growth.*

For jobs growth, it's a different story. There are clear signs of positive direct effects of the tariff hikes, given the above-average jobs growth seen in the steel and aluminium industry. There is no disaggregated employment data for solar panels and washing machines, but indicative data, like units of washing machines sold, don't look very bad either. Moreover, the mentioned counterweights to the price pressures have limited the negative employment effects of the cost increases. But the jobs growth is largely due to weaker productivity growth.

The indirect effect on other manufacturing industries with higher input prices has been, by definition, negative. But sound profitability of US manufacturers means this cost rise hasn't always translated (fully) into higher prices. As far as price increases are concerned, they've probably been bearable for now given the rise in real household incomes.

We'd like to repeat the fact that our analysis is a partial one and doesn't take into account the employment effects of retaliating trade partners implemented after the US hiked tariffs. Neither does it evaluate the employment effects outside manufacturing.

Despite the fact that manufacturing employment growth can largely be attributed to falling productivity growth, President Trump's good jobs track record gives him the opportunity - politically - to say that his trade policies have been helpful and if anything, are likely to serve him well in the 2020 presidential campaign.

Concerning his particular interest in the 'forgotten men' from the Rust Belt states, the President can point to manufacturing employment growth there too but it is lower than in other states.

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## Spain goes to the polls - once again

Spaniards go to the polls for the third time in four years this Sunday. While economic activity is still decent, political uncertainty could cast a shadow over the outlook



Source: Shutterstock

(L-R) Spanish presidential candidates: Leader of People's Party, Pablo Casado; Spanish Prime Minister and leader of PSOE party, Pedro Sanchez; leader of Citizens, Albert Rivera; and leader of Unidas Podemos, Pablo Iglesias

### What do opinion polls suggest?

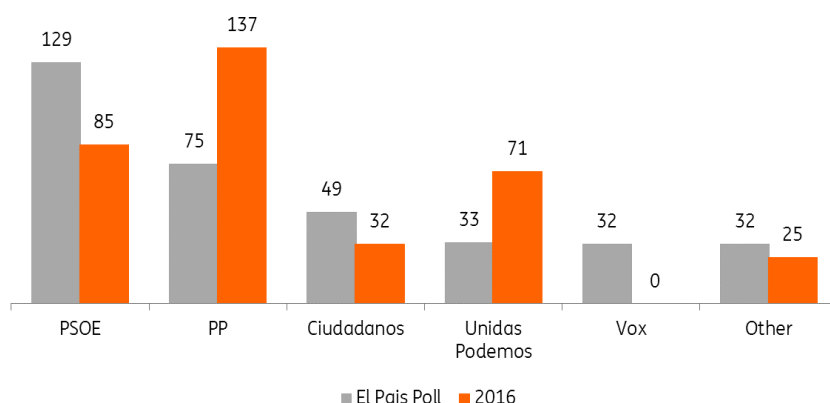
The latest opinion polls confirm big shifts in Spanish politics. Focussing on the recent Spanish newspaper El País opinion poll we conclude that:

- Pedro Sanchez's socialist party would become the largest party with 129 of the 350 seats - a sharp increase compared to 2016, where the party gained only 85 seats. Despite, being the largest party, the PSOE is likely to fall short of an absolute majority, and so a coalition would be required.
- The other large left-wing party, **Unidas Podemos**, would lose 28 seats and became the fourth largest party. It seems likely that the gains for the PSOE will come at the expense of Unidas Podemos. These results imply that a coalition between the PSOE and Unidas Podemos, with 162 seats, would not have a majority. Even adding the left wing Valencian party Compromis, which is likely to gain three seats might not be enough. A majority, however, could be formed by adding nationalistic parties, but this seems unlikely. The Catalan pro-independence parties continue to ask for an independence

- referendum, but prime minister Sanchez has said this is unconstitutional and he wouldn't accept it.
- On the right, the **PP** could lose about 60 seats and would become the second largest party with 75 seats. The liberal **Ciudadanos** (Citizens) could gain about 20 seats and would become the third largest party with 49 seats. But the big winner on the right is clearly **Vox** who could jump from zero to 32 seats. The party wants to abolish the autonomous regions and bring more power to Madrid and also want to combat illegal immigration and prohibit abortion.
- A coalition of the three biggest right-wing parties would have 156 seats and so also fall short of a majority. Adding nationalistic parties to this mix is highly unlikely, given the harsher stance against an independent Catalan by all three right-wing parties.
- A coalition between the PSOE and Ciudadanos would have a majority (178 seats). However, Albert Rivera, the leader of Ciudadanos has already ruled this out as he believes prime minister Pedro Sanchez was too lenient on the Catalan issue. If the first round of coalition talks fail, then this coalition could become more likely.

However, we won't exclude the possibility that the inability to form a coalition leads to new elections as we have seen previously in 2016.

## Latest El País poll



Source: El País

## Increasing political uncertainty likely

If the polls are right, then it looks like forming a government will be quite a hard task and would imply an extended period of political uncertainty, which could harm investment and hiring decisions. Admittedly, uncertainty has already been quite high in recent years, but Spanish growth has still been impressive. Indeed, political uncertainty shot up at the end of 2015 due to the elections and in October 2017 as a result of the Catalan referendum, but annual growth still managed to stay above 3% in 2015, 2016 and 2017.

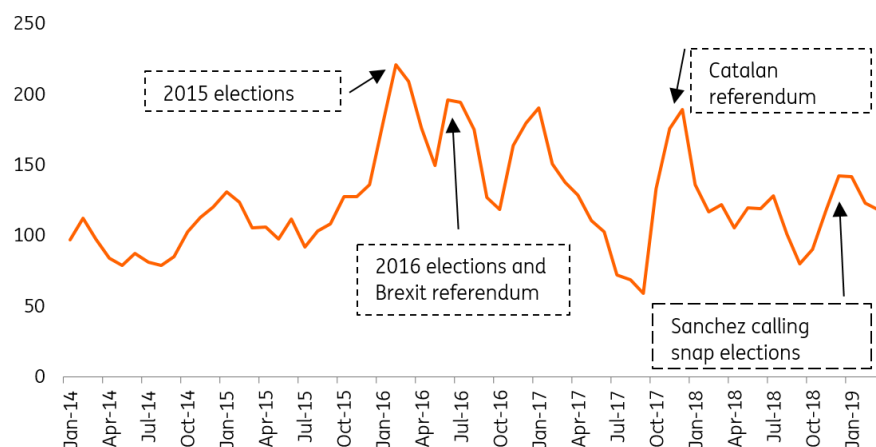
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*We shouldn't exclude the possibility that the inability to form a coalition could lead to new elections, as we have seen previously in 2016*

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During that time, the economy benefited from earlier structural reform, notably in the labour market, and from the strong external environment, but these factors are much less likely to help Spanish growth now.

## Political uncertainty in Spain



Source: [www.policyuncertainty.com](http://www.policyuncertainty.com)

## Even though the economy is slowing, it's still in a decent shape

Although the economy is slowing, the current outlook is still positive. In part, a slower economy was inevitable given the fast growth in recent years and the low potential growth rate -1.4% in 2019 according to the European Commission. The weaker external environment also affects Spanish growth negatively.

Currently, we forecast 2.0% growth in 2019, compared to 2.5% in 2018. All in all, this is still a good performance and above our eurozone forecast of 1.2%.

## But it's taken a backseat during the campaign

The election campaign concentrated on constitutional issues like Catalonia and social issues, such as woman's rights, Francisco Franco's legacy and the population decline in small villages. Given the strong growth performance of the recent past, it might seem that Spaniards aren't really all that interested in economic issues, as all seems well.

However, the latest survey from Eurobarometer carried out for the European Commission, found that's not really the case. According to the latest poll, Spaniards are most concerned about unemployment, the economic situation and pensions.

It is true that Spain's economic improvement was accompanied by lower unemployment rates as the unemployment rate reached a peak of 26.3% in 2013, but since then has continuously dropped and is now at about 14%. This is quite a substantial improvement, but unfortunately, it is still higher than the pre-crisis level of about 8.5%. Youth unemployment also remains sky-high at 32% in 2018, which helps to explain the concern around it all.

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*The latest Eurobarometer shows that Spaniards are most*

## *concerned about unemployment, the economic situation and pensions*

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Even though economic issues took a backseat during the campaign, various political parties understand that some reforms are needed. But the views on the direction are fundamentally different. The political right wants to reduce workers' rights and make redundancies easier, whereas the left wants to repeal parts of the past labour reforms to reinforce workers' rights.

The typical left/right divide also applies to tax policy. The left wants to concentrate on taxing the rich more, whereas the right wants to lower taxes, but what impact this would have on the deficit isn't really clear yet. And given the fact that we don't know who will be in government, it's difficult to judge what the deficit will be in 2019.

Based on the draft budget, that was not approved by parliament, the European Commission forecasted a deficit of 2.1%. We think it will be slightly higher than that, but lower than 2.7% in 2018. Overall we can say that Spain's fiscal situation improved in recent years, due to reform and a strong economy. The debt, however, remains high - 97.1% of GDP in 2018 - and so there isn't much more room for a much larger deficit.

Opinion polls suggest forming a government will be difficult. Political uncertainty could impact economic activity negatively and as a result, bond spreads could also rise, but by much less than during the eurozone crisis. But even though there are challenges ahead, the economy is now much stronger.

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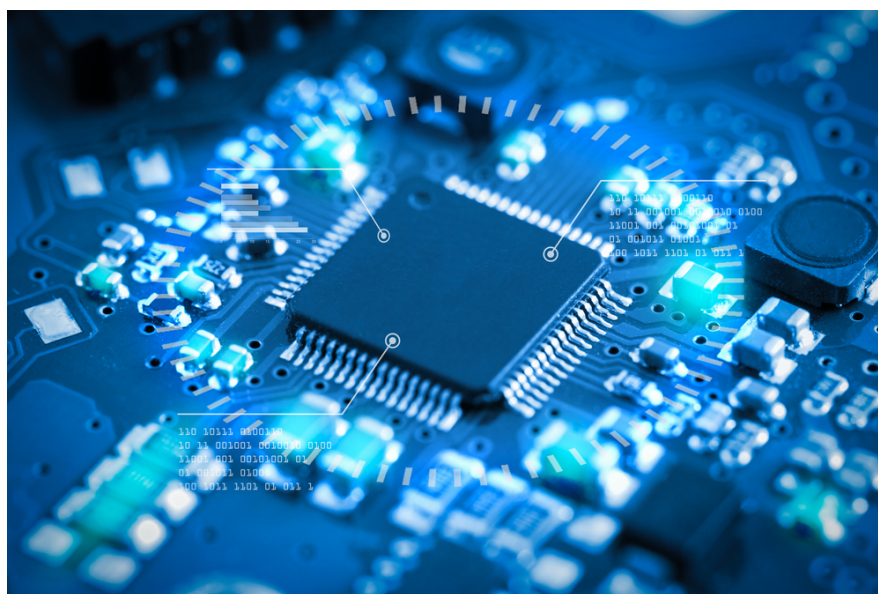
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Opinion | 26 April 2019

## Dollar strength dominates

Dollar strength is evident across FX space, with notable gains against the KRW and AUD. Strong US data combines with weakness in Asia exports to amplify the effect.



### Tech weakness still weighing on Asia

My journey into work each day involves sitting on public transport reading the daily summary of economic and market views from one of the big providers. I'll leave you to guess which. We don't get paid for advertising.

Today, I counted three specific company references to weak semiconductor/tech earnings expectations or demand, which tells you that the global tech slump is still a force to be reckoned with. For sure, there may be some activity going on in China related to the 5G rollout. Our Iris Pang referred to this in a recent industrial production note. But foreign firms exposed to China are not seeing any strength in tech demand, which either means it is all being sourced locally (doubtful, though in time that may become more likely as China pushes forwards its self-sufficiency in tech) or the big boost in China 5G activity is more infrastructure-related - laying of cables, transmitting stations etc. It doesn't mean we are on the verge of a technological breakthrough that will see Asian economies fly again. Though that day will come eventually.

Engineers I have spoken to recently in Singapore tell me that there are still fundamental problems with making 5G work, and suggest 2022 is a more likely blast off date to have at the back of your mind. So it's great that Chinese data is looking strong again, but what is good for China, isn't

necessarily going to have a very big impact on the rest of the region whilst this tech weakness prevails. Singapore's industrial production data for March due out later this morning will, I think, back up this gloomy prognosis.

## Local factors overlay on USD strength

The USD is strong, but let's not get too bogged down with the USD, some Asia/Pac currencies are actually "weak", in their own right, and for good reason. The AUD took a bath this week on low inflation. We can argue about the timing of the RBA response - there is the small matter of the election on May 18 to deal with, which may postpone any easing until June (May 21 minutes could provide a big clue) - but the ultimate direction of travel now seems clear.

And despite their protestations, the Bank of Korea (BoK) must surely also soon have to throw in the towel and concede that all the official BoK and government forecasts for growth this year are grossly optimistic, and require some additional assistance to supplement the insufficient budget stimulus penciled in so far. We have one cut forecast for this quarter. But to be honest, that may not be enough.

## Japan at a crossroads

Yesterday saw the Governor of the BoJ admit his frustration with the BoJ's inability to meet its 2% inflation goal. This came with an increasingly fierce pushback on what he was terming "Modern Monetary Theory" or MMT, which is shorthand for saying that ultra-low interest rates don't work. Personally, although I hate the MMT monicker, I think there is a more than a grain of truth in some of this critique of ultra-low rates, which I have written about repeatedly in this note. Kuroda's gift to the markets this time was to change the wording on the BoJ statement, which replaced "extended period" for describing how long low rates would be in place, to "around Spring 2020".

To paraphrase his explanation, he suggested that the market was misinterpreting "extended period" and was anticipating rate hikes much sooner than was probable. Governor Kuroda almost certainly doesn't read this note, but if he did, I would have to respectfully suggest that this assessment is completely without substance. Not only does the market not believe that the BoJ will meet their inflation target over the BoJ's forecasting horizon, but many of us also don't believe they will meet it, ever (notwithstanding some slightly better Tokyo CPI figures today). A tweak to forward guidance as delivered yesterday is as meaningless as it is irrelevant, and markets shrugged it off as they should have done.

I am more interested in a Japan story running today that backs up our current forecast that the Consumption Tax hike, planned for October, will be delayed again this year. Isabel Reynolds on Bloomberg (OK, I've told you now), runs through four factors to watch out for, which will indicate whether or not we are right to have ditched this tax hike from our forecasts. These include a turn in public opinion, evidenced from the July Upper House elections, a further decline in the June Tankan, the summoning of renowned economists (I won't be on that list, sadly), and a worsening in the global outlook. This seems like a good list to me.

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## France: Macron's speech keeps debate open

In an unusually long address, French President Emmanuel Macron outlined his plans for the coming years- although financing remains unclear. The speech was wide-ranging enough to keep the "Great Debate" open, which could help his party's EU election campaign



Source: Shutterstock

In an unusually long address on Thursday, President Macron outlined his intentions for the second half of his presidency- responding to the yellow vest protest movement and the subsequent "Great Debate", which allowed citizens to air grievances and propose new ideas.

In the speech, he stood by the actions taken during the first half of his mandate and insisted that reforms would continue. But the address was clearly inspired by the main themes of the national debate, and the major proposals, some of which were described in detail, clearly reflect public concerns.

### 1 Improving democracy

Macron talked about reforming France's parliament, the National Assembly and increasing the number of local referendums. But he also floated the idea of a national petition and said the government would have to find ways of improving the decentralisation of powers before 2020 through a new "territorial pact".

## 2 Tax cuts

On the fiscal side, Macron confirmed that the initial reforms (notably the wealth tax) would not be touched before being properly evaluated in 2020. But he promised more income tax cuts for the middle-class and more incentives for low-wage workers. However, he said the government would have to fight inequality through other policies as well: more education reform is planned and the heavy investments in life-long learning will be maintained.

## 3 Transitional agenda

Macron also discussed how to manage significant transitions such as climate change and ageing. On ageing, most of the proposed measures have already been under discussion in some form or another. However, Macron was particularly keen to push climate policies. This will be his first priority at the EU level (pleading for carbon tax, greener EU investments...). But the government will have to reconsider all existing incentives and taxes linked to households' decisions that have an impact on climate change (heating systems, house isolation, cars etc...). A collective strategy will have to be in place in 2025, which seems late given the Paris Agreement targets.

## 4 Identity

Macron also spoke about "what it means to be French", signalling his second European priority: redefining the rules of Schengen and a European migration policy.

Overall, it seems that the speech could open, rather than close the debate, especially on ways to finance the expected policy measures. Ten days before the launch of his party's EU election programme, this is a strategy that could play well in the polls. In the meantime, the main message is clear: this government has more reforms on its agenda than any government in the last 20 years. The second half of this presidency looks terribly short in comparison to the task at hand.

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# Counting the cost of a low carbon economy

Wind and solar power will need a \$13 trillion investment over 30 years to reach emissions targets, as demand for power doubles



## Key points

- A low carbon global economy would more than double the demand for power, from 27,000 terawatt hours (TWh) to 57,000 TWh.
- Wind and solar energy are key in the energy transition: an estimated \$13 trillion of investments in wind and solar are needed to reduce CO<sub>2</sub> emissions by 64% in 2050 compared to current levels.
- The potential for private investment is dependent on public investment: additional grid investment is needed to accommodate the increased power demand and volatility of supply.
- Public commitment is needed in terms of spatial planning, smooth permitting procedures and the labour force to install solar and wind projects.

## 1 Tech and the transition to a low carbon economy

At the end of 2018, we asked whether technology could provide the answer to climate change. In [our report](#), we presented a 'Positive Tech' scenario, which was optimistic about the pace of solar and wind energy adoption. In this paper, we calculate the amount of investment needed for a 64% reduction in global energy-related CO<sub>2</sub> emissions by 2050.

Although this reduction is in line with the IPCC emissions target for a low carbon economy, it takes

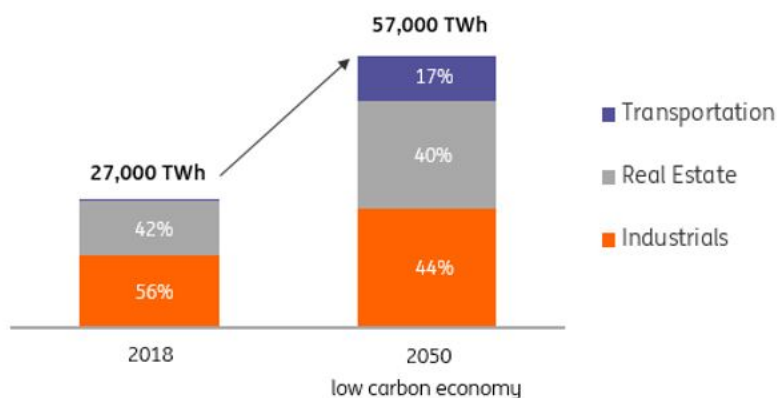
time for new technologies to be implemented while the global economy continues to grow. As a result, the 'Positive Tech' scenario is in line with the 2050 targets, but misses the 2030 targets.

The scenario focuses on the substitution of oil, coal and gas for wind and solar energy sources. These are a crucial factor behind the reduction in CO2 emissions. We believe the scenario is realistic as it factors in sensible implementation pathways of new technologies. It also does not include still highly uncertain technologies like nuclear fusion.

## Global power demand more than doubles

**Power demand increases from 27,000 TWh today to 57,000 TWh in 2050**

Global electricity demand in TWh \*



Source: ING Economics Department

Note that numbers from the report, 'Technology, the climate saviour?' have been updated to match IEA's latest data

Energy demand is expected to grow in the coming decades as a result of continuing economic and demographic growth. Electricity consumption is expected to grow even faster because of the search for new technologies that do not need fossil fuels and can therefore reduce emissions. This is likely to happen in the major energy intensive sectors, for example:

- In manufacturing: through increased recycling rates using electric instead of fossil-based processes, for instance in steel. Furthermore, using electricity instead of gas for steam production and the production of hydrogen;
- In real estate: through an increased use of electrical appliances, space cooling and heat pumps and - specifically in developing countries - substitution of bioenergy (burning wood for heating and cooking) for electricity;
- In transport: further uptake of electric vehicles, which could lead to global sales being fully electric by 2040, with almost the entire fleet making the switch by 2050. Furthermore, the electric truck is expected to gain substantial market share in the next decade. This applies to electric ships as well, but to a lesser extent.

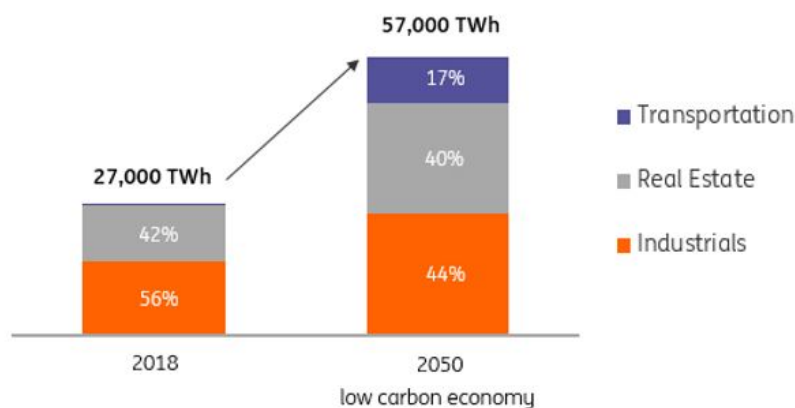
As a result, power demand increases from around 27,000 TWh currently to 57,000 TWh by 2050 in ING's Positive Tech scenario. To put this in perspective, power demand in 2040 is 9,000 TWh higher in our scenario compared to the well-known Sustainable Development scenario from the International Energy Agency, which has a planning horizon to 2040 instead of 2050.

### 3 38,000 TWh of wind and solar power generated in 2050

Currently, fossil fuels account for two-thirds of the global power mix. In ING's 'Positive Tech' scenario, wind and solar would provide two-thirds of electricity. They would each account for half of the total of 38,000 TWh that is needed in 2050, so 19,000 TWh. Current levels for solar and wind are 600 TWh and 1,500 TWh, respectively.

#### Power demand increases from 27,000 TWh today to 57,000 TWh in 2050

Global electricity demand in TWh \*



Source: ING Economics Department

Note that numbers from the report, 'Technology, the climate saviour?' have been updated to match the IEA's latest data

### 4 Solar needs more capacity than wind

Since the sun does not always shine and the wind can be unpredictable, more capacity is needed to steadily produce 19,000 TWh each. In other words, these two sources of energy are less efficient than oil and gas. For wind specifically, offshore is the most efficient as wind is abundant and relatively constant at open sea. On a global level, one gigawatt (GW) of offshore wind capacity generates about the same amount of power as one GW of a coal or gas fired power plant. Twice as much capacity is needed for onshore wind farms as turbines on land are smaller than turbines at sea and onshore wind is less abundant.

Solar, on the other hand, needs almost four times as much capacity to generate the same amount of power as gas and coal fired power plants. This is because of the obvious problem that the sun does not shine at night and panels produce less power on cloudy days.

Overall, solar capacity needs to grow to an estimated 14,000 GW by 2050 to deliver the 19,000 TWh needed. Onshore wind would have to grow to 4,700 GW and offshore to around 1,200 GW to achieve its share of TWh generation.

### 5 \$13 trillion investment in solar panels and wind farms needed from now to 2050

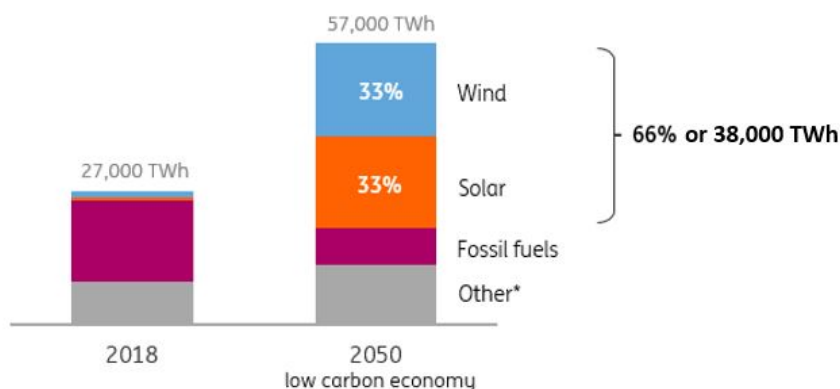
This increase in wind and solar capacity would require a combined, estimated investment of \$13 trillion up to 2050, with wind taking the lion's share at \$7.3 trillion.

The full amount does not include related investments in grids, which rely heavily on public

investment. It also does not include investments in energy storage, which are needed to store electricity for days with less wind and sun. The role of energy storage is complex and yet unclear and will be the topic of a later report.

### Two thirds of electricity from solar and wind by 2050

Global power mix (%) and total power generation (TWh)



Source: ING Economics Department

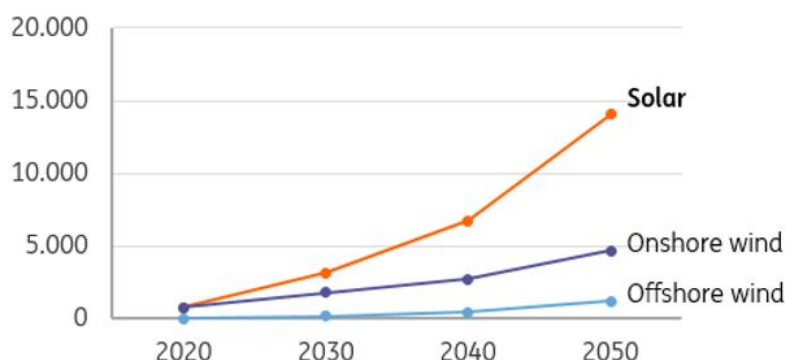
Based on ING's global Energy Transition Model \*Nuclear, hydro, geothermal and biomass

## 6 Wind and solar would reach current oil and gas investment levels by early 2030s

To put the US\$13 trillion investment in perspective, average annual investments in wind and solar would need to grow from around \$200 billion globally in the next decade to around \$500 billion annually between 2036 and 2050. By then, annual investment in solar and wind would at some point exceed current investment levels in upstream oil & gas.

### To generate 19,000 TWh of power, more solar than wind capacity is required

Installed capacity in GW



Source: ING Economics Department

Based on ING's global Energy Transition

## 7 Enormous business opportunity...

The huge investments needed for a low carbon economy suggest unprecedented business opportunities in the wind and solar industry. The global solar and wind markets will have high

growth rates that are expected to last for many years.

Highly innovative companies could particularly benefit from the opportunities that will arise. This may not be true for the production of solar panels, which has almost fully been taken over by Chinese companies, but it could be the case for the development of technology. For example, [technology](#) developed by TNO/ECN in the Netherlands has been applied for decades in the production of silicon photovoltaic cells and they are now developing technology that can capture light on both sides of the cell and solar panel. In addition, European companies are developing new [wind turbines](#) that use less rare earth elements and have higher conversion rates.

### Investments in solar and wind total US\$ 13 trillion up to 2050

Global cumulative investments, 2019-2050 (US\$ trillion in 2018 prices)



Source: ING Economics Department

Based on ING's global Energy Transition Model

## ...but with significant uncertainties

At the same time, businesses are confronted by unknown variables that could prevent them from profiting from this trend. Public investment and future power prices are particularly uncertain.

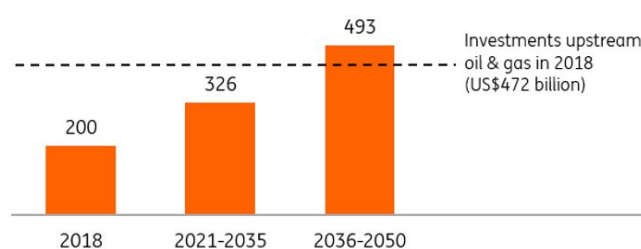
The potential for private investment is highly dependent on public investment. Additional grid investment is needed to accommodate the increased power demand and volatility of supply that comes with weather-dependent energy sources. Furthermore, public commitment is needed in terms of spatial planning, smooth permitting procedures and the labour force to install solar and wind projects. If public companies or governments do not follow, private investments could stall.

Furthermore, uncertainty about future power prices rises as the share of solar and wind energy goes up. According to [Bloomberg](#) and the [New York Times](#), power prices have become more volatile, with increasing hours of negative prices. And a recent [report](#) by Sweco argues that solar and wind will, on average, lower energy prices in the future. It is still uncertain how investors can mitigate these risks.

So while solar and wind certainly provide a bright future in terms of investment volumes, it might become more difficult to navigate these markets skilfully.

**Average yearly wind and solar investment exceed current oil & gas upstream investment between 2036-2050**

Average annual wind and solar investments, US\$ billion, real prices



Source: ING Economics Department

Based on BNEF and IEA

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