

# ECN320 SRP for session 7. Domestic Macroeconomic Concerns

## INTEREST RATES AND INFLATION

In February 2022, when the Fed published the winter edition of its semi-annual report to Congress, it dropped a normal section outlining the appropriate level of interest rates as determined by “monetary-policy rules”. Its inclusion might have been awkward, because it would have suggested that **rates should be as high as 9%, when the Fed still had them near to 0%** [1].

The omission was important. It shone light on a decades-old question that was being asked with more insistence amid soaring inflation: **should central banks limit their discretion and set interest rates according to black-and-white rules?** The search for rules to guide and constrain central banks has a long pedigree. It dates back to the 1930s when Henry Simons, a US economist, argued that authorities should aim to maintain “the constancy” of a predetermined price index—a novel idea in his era. In the 1960s Milton Friedman called for central banks to increase the money supply by a set amount every year. That monetarist rule was influential until the 1980s, when the relationship between money supply and GDP broke down [1].

Any discussion of rules conjures up a seminal paper written in 1993 by John Taylor, an economist at Stanford University. In it he presented a straightforward equation which came to be known as the “Taylor rule”. The only variables were the pace of inflation and the deviation of GDP growth from its trend path. Plugging these in produced a recommended **policy-rate path** which, **over the late 1980s and early 1990s, was almost identical to the actual federal-funds rate, the overnight lending rate targeted by the Fed.** So it seemed to have great explanatory power. Mr Taylor argued that his rule might help to steer central banks on the right path for rates in the future [1].

However, just as the Taylor rule started to get attention from economists and investors alike, its **explanatory power grew weaker. In the late 1990s** the recommended Taylor rate was consistently lower than the fed-funds rate. That sparked a cottage industry of academic research into alternative rules, mostly grounded by Mr Taylor’s original insights. Some put more weight on the GDP gap. Others added inertia, since central banks take time to adjust rates. Another group shifted from current inflation to forecasts, trying to account for the lag between policy actions and economic outcomes. In its reports the Fed usually mentions five separate rules [1].

The appeal of rules lies in their cold neutrality: they are swayed only by numbers, not by fallible judgment about the economy. Central bankers love saying that their policy decisions are dependent on data. In practice they sometimes struggle to listen to the data when their message is unpalatable, as it was with **inflation during 2021-22.** Central bankers found numerous reasons, from the supposedly transitory nature of inflation to the limited recovery in the labour market, to delay raising rates. But throughout that time, the suite of rules cited by the Fed was unambiguous in its verdict: tightening was needed [1].

The rules are, however, **not perfectly neutral.** Someone first has to construct them, deciding which elements to include and what weights to ascribe to them. Nor are they as tidy as implied by the convention of calling them “**simple monetary-policy rules**”. They are simple in the sense that they contain relatively few inputs. But just as a bunch of simple threads can make for one messy knot, so a proliferation of simple rules has made for a baffling array of possibilities. For example, the Cleveland Fed publishes a quarterly report based on a set of seven rules. A mid-2022 report indicated that interest rates should be anywhere between 0.6% (per a rule focused on inflation forecasts) and 8.7% (per the original Taylor rule)—an uncomfortably wide range [1].

Moreover, each rule is built on top of a foundation of assumptions. These typically include estimates of the long-term unemployment rate and of the natural interest rate (the theoretical rate that supports maximum output for an economy without stoking inflation). Modellers must also settle on which of a range of inflation gauges to use [1].

There is a big difference between taking rules seriously and treating them as holy writ. After all the inflation missteps after the pandemic recession, a healthy sample of rules deserves a closer look during policy debates [1].

At the close of 2022 the rate of inflation caused concern in the rich world, especially in the US. Central banks had to correct the error by raising interest rates sharply and swiftly. **The rule tells central bankers to raise interest rates by more than inflation has gone up.** To disregard the rule is to allow inflation-adjusted borrowing costs to fall, administering a stimulus that makes the problem worse. To follow the principle, **policymakers must raise real rates every time prices accelerate.** If they do, sooner or later the economy will slow and order will be restored. The Taylor principle is necessary to stabilise inflation in state-of-the-art economic models. It is also common sense [2].

Yet at the end of 2022, no major central bank was following the principle. Since the start of 2021 inflation had risen by five percentage points in the US, eight points in the UK and ten points in the euro zone. Central banks’ interest-rate rises were rapid by historical standards. But they are nowhere close to keeping pace with this price growth. Alarm bells rang. “The Fed had not yet hit the brakes,” declared Jonathan Parker of MIT after a bumper 0.75-percentage-point increase in Nov [2].

The trouble is that **although the Taylor principle makes sense in theory, there is disagreement about how to apply it in practice.** A true measure of real interest rates is forward-looking. **New borrowers and lenders need to know what inflation will be in the future, not what it was in the past.** According to a survey by the New York Fed, consumers expected inflation of 5.4% in 2023. Mr Parker subtracted this from the Fed’s target interest-rate range of 3.75-4% to get a negative real interest rate of about -1.5%. That was below the prevailing rate before the covid-19 pandemic and “very, very not contractionary”, he said [2].

But why only look forward one year? **Many loans are provided over a longer time frame.** And here lies the doveish calculation. Greg Mankiw of Harvard University worried that the Fed may have been overdoing things because the **five-year real interest rate priced into financial markets had risen sharply since the start of 2001, by 3.4 percentage points at the time of writing.** The textbook version of the Taylor rule, a more expansive cousin of the Taylor principle, says that **real interest rates should go up by half the increase in inflation.** Look five years ahead in financial markets, and take a measure of underlying inflation—Mr Mankiw points to a three-point rise in annual wage growth—and **real rates roughly kept pace with inflation.** In other words, the Fed’s tightening looked like too much, rather than too little [2].

The argument relies on what economists call “**rational expectations**”. The **public’s view about what a central bank might do tomorrow is in theory just as important as today’s short-term interest rates.** As a result, in modern economic models it does not matter much if **policymakers fail to raise interest rates above inflation at a given point in time,** notes Michael Woodford of Columbia University. Only the expectation of a systematic disregard for the Taylor principle “**indefinitely into the future**” would cause monetary mayhem. And the Fed’s policymakers hardly showed that sort of disregard. The central bank was not done raising interest rates: markets expected them to rise above 5% next year. That could be enough to satisfy the Taylor principle by then [2].

A belief that expectations are rational is usually associated with a conservative, hawkish view of the world, in which people belong to the species *Homo economicus*. Today these arguments help doves who argue that central banks should calm down. The Fed boasts that it turned the real interest rates that were priced into financial markets positive at almost all horizons. The worst case of a yield curve having slipped away from a central bank's control was in the UK—but, ironically, the problem is that markets seemed to expect more interest-rate increases than the Bank of England would have liked. The central bank forecast that the path for rates envisaged by markets would result in a deep recession and bring inflation well below target. It is almost as if the BoE had too much inflation-fighting credibility [2].

Even if the Taylor principle was being met on a forward-looking basis, that was not the end of the story. The principle prescribes only the minimum tightening that is needed to bring inflation to heel. Were central banks only narrowly to clear the hurdle then inflation could take a long time to return to target. Another issue is that interest rates are supposed to rise still higher when an economy is overheating. In the US, where there were almost two job openings for every unemployed worker, clearly this was a problem. Failing to respond to it could prolong the inflationary episode [2].

Perhaps the best argument for more rate rises, though, is the poor record of both economic models and financial markets at predicting inflation. Between 2021-22, both had persistently underestimated its rise. In an uncertain environment, it makes sense to put more weight on data and less on forecasts—a point central bankers emphasised. Following the Taylor principle with respect to realised inflation might make policymakers slow to react to a change in the economic winds. But that is a price worth paying to be sure of bringing inflation under control [2].

## INFLATION AND UNEMPLOYMENT

The relationship between inflation and unemployment was first studied by Irving Fisher in 1926 before Phillips' work [3]. The Phillips curve, the result of a 1958 study documenting a striking near century-long (1861-1957) stable, negative relationship between lower unemployment rates and faster UK wage inflation, became described as “probably the single most important macroeconomic relationship” [4][3]. This was remarkable, given the changes over that period in workers' rights. In 1861 most workers could not vote; by 1957 the post-war Labour government had nationalised much of the economy [3]. However, even as the relationship has been called into question often since the 1960s, the logic of the curve, the trade-off between inflation and unemployment, still guides and preoccupies central bankers in the 2020s [4][3].

When business is brisk and unemployment low, central bankers worry that workers will demand pay raises over and above inflation and any improvement in their productivity. If firms pass higher wages on to customers by increasing prices, inflation will rise. If central bankers wish to prevent this, they will raise the interest rate they charge for the money they lend, slowing the economy and curbing the wage pressure [4].

The opposite happens at the other end of the curve. High unemployment flattens wages and spending, putting downward pressure on inflation. To counteract this, policymakers typically cut interest rates. Central bankers hope to find themselves somewhere in the middle: with inflation where they want it to be and unemployment neither high nor low enough to affect it. They aim to set a “neutral” interest rate that leaves inflation stable where it is [4].

A fundamental macroeconomic question then is why does unemployment even exist? There are few bigger wastes than the loss to idleness of hours, days and years by people who would rather be working. Unemployment can ruin lives, sink budgets and topple governments. Yet policymakers do not wage all-out war on joblessness. The Fed, uniquely among major central banks, is required to pursue “maximum employment” (defined as making sure that anyone who wants a job can get one) only really targets what is known as unemployment's “natural” rate, at which inflation is stable [3].

The importance of this concept is hard to overstate. The Fed's argument for interest-rate rises in 2017, for example, hinged on stopping unemployment from falling too far beneath the natural rate. Yet the natural rate is in many respects an article of faith, always sought but never seen. Where does it come from [3]?

There are several reasons why unemployment cannot simply be eradicated fully. It takes time for people to move from one job to another: this is said to cause “frictional” unemployment. If people cannot find jobs because they have outdated skills—think hand weavers after the invention of the loom—they might become “structurally” unemployed [3].

John Maynard Keynes, the great British economist, took a first step towards the natural-rate hypothesis when he focused minds on “involuntary” unemployment. In *The General Theory*, published in 1936 in the aftermath of the Depression, Keynes noted that many people could not find jobs at the going wage, even if they had comparable skills to those in work. Classical economics blamed artificially high wages, perhaps caused by trade unions. But Keynes pointed to lacklustre economy-wide spending. Even if wages fell, he reasoned, workers would have less to spend, making the demand deficiency worse. The answer, he thought, was for governments to manage aggregate demand to keep employment “full” [3].

Keynes was not the father of all that is now thought of as “Keynesian”. Inflation, for instance, barely entered his analysis of unemployment. But by the late 1960s Keynesianism had become associated with the idea that when managing aggregate demand, policymakers are not just choosing a rate of unemployment. They are simultaneously choosing how fast prices rise [3].

Paul Samuelson and Robert Solow, two other economic luminaries, investigated the relationship in the US, and reported that there was no such stability there. The Phillips curve shifted around. In any given era, Samuelson and Solow wrote, “wage rates do tend to rise when the labour market is tight, and the tighter the faster.” They described the relationship as a “menu”, encouraging the idea that the job of Keynesian policymakers was to pick a point on the curve that best aligned with their preferences. How low unemployment could fall, in other words, depended only on what level of inflation was tolerable (for rising wages would surely end up lifting prices, too) [3].

It is unclear whether policymakers actually thought of the relationship between inflation and unemployment as a menu. But the idea was prominent enough by the late 1960s to attract withering criticism. Its two main detractors, Edmund Phelps and Milton Friedman, would each go on to win a Nobel prize. Mr Phelps began writing groundbreaking models of the labour market in 1966. A year later, Friedman gave what became the canonical criticism of the old way of thinking in an address to the American Economics Association. He argued that, far from there being a menu of options for policymakers to pick from, one rate of unemployment—a natural rate—would eventually prevail [3].

Suppose, Friedman reasoned, that a central bank prints money to push unemployment lower than the natural rate. A larger money supply would lead to more spending. Firms would respond to increased demand for their products by expanding

production and raising prices, say by 5%. This inflation would catch workers by surprise. Their wages would be worth less than they bargained for when they had negotiated their contracts. Labour would, for a while, be artificially cheap, encouraging hiring. Unemployment would fall below the natural rate. The central bank would achieve its goal [3].

However, the next time pay was negotiated, workers would demand a 5% raise to restore their standard of living. If neither firm nor worker gained or lost negotiating power since the last time real wages were set, the natural rate of unemployment would reassert itself as firms shed staff to pay for the raise. To get unemployment back down again, the central bank could embark on another round of easing. But workers can be fooled only for so long. They would come to expect 5% inflation, and would insist on commensurately higher wages in advance, rather than playing catch-up with the central bank. Without an inflation surprise, there would be no period of unexpectedly cheap labour. So unemployment would not fall [3].

The implication? For a central bank to keep unemployment below the natural rate, it must keep outdoing itself, delivering inflation surprise after inflation surprise. Enter the second driver, the public's expectations. Friedman reasoned, Keynesians were wrong to pin a low rate of unemployment to a given, high rate of inflation. To sustain unemployment even a little below the natural rate, inflation would need to accelerate year in, year out. Friedman's and Phelps's natural rate became known as the "non-accelerating inflation rate of unemployment" (NAIRU) [3].

No society could tolerate endlessly rising, or falling, inflation. Phillips had observed a correlation in the data, but it was not one that policymakers could exploit in the long run. "There is always a temporary trade-off between inflation and unemployment," Friedman said. "There is no permanent trade-off." That remains the premise on which rich-world central banks operate. When officials talk about the Phillips curve, they mean Friedman's temporary trade-off. In the long run, they believe, unemployment will come to rest at the natural rate [3].

The idea has such influence partly because Friedman's and Phelps's contributions were so well timed. Before 1968, the US had had two years with unemployment below 4% and inflation below 3%. When Friedman spoke, prices were indeed accelerating; inflation rose to 4.2% in 1968. The next year it hit 5.4% even as unemployment changed little. The "stagflation" of the 1970s killed off the idea of a stable Phillips curve. Successive shocks to oil prices, in 1973 and 1979, sent both inflation and unemployment surging. In 1975 both were above 8%; in 1980 inflation hit 13.5% even as unemployment exceeded 7% [3].

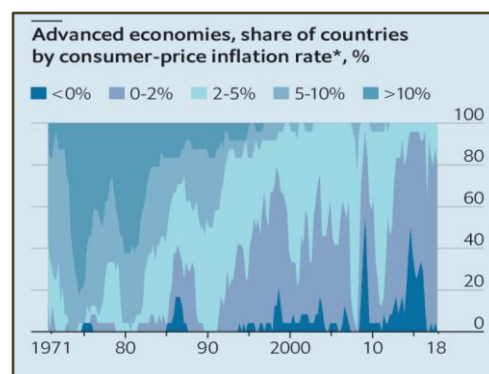
The idea of the NAIRU looked a little shaky, too; inflation was meant to fall so long as unemployment was too high. Friedman's followers could argue that bad supply-side policies, in conjunction with the oil-price shocks, had pushed the NAIRU up, but the concept of the NAIRU also came under attack from theorists. It was built, in part, on the idea that inflation expectations are "adaptive": to predict inflation, firms and workers look at its current value. But the doctrine of "rational expectations" decreed that firms and consumers would, to the greatest extent possible, anticipate policymakers' actions. Whenever the public suspected that central bankers would try to push unemployment below the natural rate, inflation would rise immediately. On the other hand, a credible promise not to seek any unsustainable jobs booms should keep inflation under control, simply by "anchoring" expectations [3].

That proposition was put to the test after Paul Volcker became Fed chairman in 1979. Mr Volcker was set on getting inflation down. As it turned out, he would need to prove his mettle. His tight monetary policies brought the federal funds rate to almost 20% in 1981, contributing to a double-dip recession with a rate

of unemployment above 10%. It got the job done; inflation tumbled. Since Mr Volcker's time at the Fed, it has rarely exceeded 5% [3].

Some economists still point to the Volcker recessions as proof that inflation expectations are adaptive. The public did not believe inflation would fall just because the Fed said it would. The US had to suffer high unemployment to bring inflation down. Policymakers had to grapple with a short-term Phillips curve after all, as Friedman and Phelps argued. Yet the experience of the 1980s would not be repeated. In the decades that followed, central banks committed to inflation targets. As they gained credibility, the trade-off between inflation and unemployment weakened. Economists wrote "New Keynesian" models incorporating rational expectations. By the mid-2000s some of these models showed a "divine coincidence": targeting the best possible path for inflation, after an economic shock, would also result in the best possible path for unemployment. Few economists think the divine coincidence holds in practice. New Keynesian models usually struggle to explain reality unless they are tweaked to incorporate, for example, at least some people with adaptive expectations. A cursory examination of the data suggests expectations follow inflation (they sank, for instance, after oil prices fell in late-2014) [3].

Inflation behaved strangely after the GFC, falling persistently short of the central banks' targets in many advanced economies (see chart, CPI rate) [4]. The recession that followed sent US unemployment soaring to 10%. But underlying inflation fell below 1% only briefly—nothing like the fall that models predicted [3]. It was a surprise that inflation did not fall further than it did. After the recovery, inflation continued to remain muted even as unemployment in the US, eurozone and Japan fell unusually far [4]. Because the only way economists can estimate the natural rate is by watching how inflation and unemployment move in reality, they assumed that the natural rate had risen (a US estimate in 2013 by Robert Gordon, of Northwestern University, put it at 6.5%). Yet as labour markets tightened—US unemployment was 4.3% in 2017—inflation remained quiescent. Estimates of the natural rate were revised back down [3].

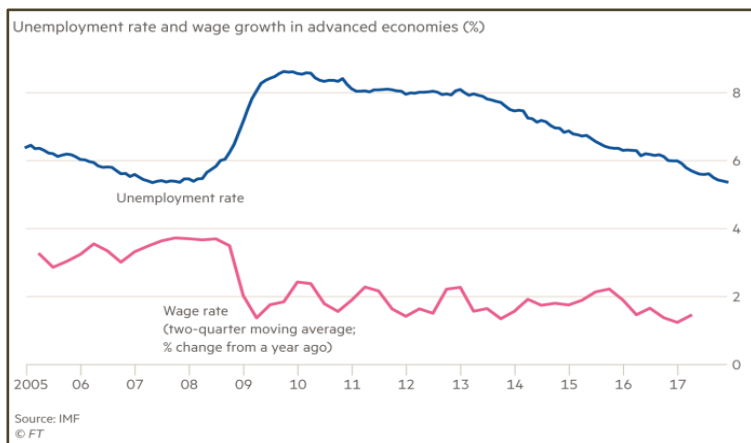


Such volatility in estimates of the natural rate limits its usefulness to policymakers. Some argue that the wrong data are being used, because the unemployment rate excludes those who have stopped looking for work. Others say that the short-term Phillips curve has flattened as inflation expectations have become ever more firmly anchored. The question is: how long will they remain so? So long as low unemployment fails to generate enough inflation, central banks will face pressure to keep applying stimulus. Their officials worry that if inflation suddenly surges, they might lose their hard-won credibility and end up back in 1980, having to create a recession to get inflation back down again [3].

This recent experience has again led some to doubt the very existence of the natural rate of unemployment. But to reject the natural rate entirely, you would need to believe one of two things. Either central banks cannot influence the rate of unemployment even in the short term, or they can peg

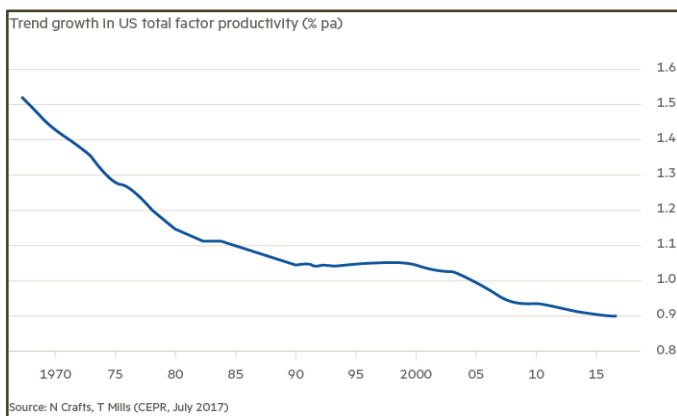
unemployment as low as they like—zero, even—without sparking inflation. Neither claim is credible. The natural rate of unemployment surely exists. Whether it is knowable is another matter [3].

That wages did not rise faster in the mid-2010s, given the low level of unemployment owes much to the public's expectations. Firms feel freer to push up prices, and employees to bargain for bigger wage rises, if they expect higher inflation [5]. Inflation and wage rates remained low since the GFC even as employment was historically high and unemployment falling (see chart, unemployment rate and wage growth) [6].



Consider the three big drivers of general price changes for a macroeconomy: capacity pressures in the domestic economy, the price of imports, and the public's expectations [5][7]. The first big influence on inflation is the amount of slack (or spare capacity) in the domestic economy. The unemployment rate, measuring labour-market slack, is convenient and the most-used gauge [5]. As the economy approaches full employment, the scarcity of workers ought to put upward pressure on wages, which companies pass on in higher prices [7].

The US economy, with unemployment at 4.2% at the end of 2017 (the lowest for 16 years), was close to full capacity [5][7]. Average wages rose by 2.9% over 2016, the highest rate since 2009. Assuming a trend productivity growth of around 1% (see chart, trend growth in US TFP [10]), then wage growth of around 3% would have been consistent with a 2% rise in unit-wage costs, in line with the Fed's inflation target [5].



The picture was cloudier in other parts of the rich world. Euro-area jobs markets are more rigid and run into bottlenecks more readily than in the US. Even so, the euro-area economy had far greater slack. The big southern euro-zone economies, such as Italy and Spain, had ample spare capacity. So if inflation was to get back to the ECB's target of close to 2%, it would require other economies, notably Germany, to generate inflation rates well above 2% [5].

Germany had a tight labour market. The unemployment rate was just 4.1% and the workforce shrunk as the population aged. After a decade or more of restraint, wages picked up a bit. Compensation per employee rose at an average annual rate of 2.5% since 2010, according to the OECD, a rich-country think-tank. That was faster than in any other G7 country, but not enough to drive German inflation up to the sorts of levels needed to push euro-zone inflation close to 2%. Average core inflation was around 1.1% since 2010. German firms absorbed rising wage costs without increasing prices [5].

The second big influence on inflation is the transient effects of import prices, i.e., imported inflation, which is determined by the balance of supply and demand in globally traded goods, such as commodities, as well as shifts in exchange rates [5][7]. After two years of unusually low price pressures, inflation across the rich world revived in 2017. This was mostly due to oil prices, which fell below \$30 a barrel in the early months of 2016 before increasing to above \$60 late in 2017 [5].

Unemployment at home has little bearing on wages abroad. The price of anything consumers buy from the rest of the world will be determined by other factors. For this reason, some economists add a measure of import prices to the curve. However, neither addition helped to explain the missing inflation since the GFC. Imports from countries like China may have depressed the price of some products, such as electrical appliances. But that is no reason why prices in general should be subdued. If China is holding down the price of one corner of the shopping basket, the central bank should be able to encourage other prices to rise to offset it. Inflation of 2% is perfectly compatible with some prices dropping steeply, as long as enough others rise sufficiently fast [4].

In 2016, global goods prices fell because of a slide in aggregate demand and a seemingly endless glut of basic commodities and manufactures. China's economy wobbled. Emerging markets in general were in a funk; two of the largest, Brazil and Russia, were deep in recession. Then things picked up in 2017. China's supply glut, though vast, was shrinking. Surveys of manufacturing purchasing managers across Asia and the rich world reflected an improving demand climate, which was visible in a revival in commodity prices [5].

How big an impact commodity prices have on inflation depends on the exchange rate (many of which are denominated in US dollars). In much of the rich world, currency markets were proving helpful. In the US, where underlying inflation was close to 2%, the Federal Reserve's goal, the dollar was rising. In Japan and the euro area, where underlying inflation was lower the yen and euro were weakening [5].

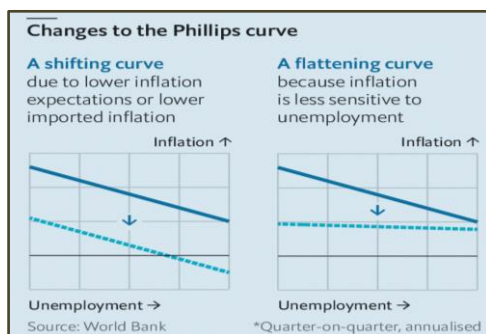
How expectations are formed is not well understood [7]. In theory, expectations are in the gift of central banks. If they can convince the public that they have the tools to regulate aggregate demand, and thus the level of slack, expectations should converge on the central bank's inflation target, usually 2% in rich countries. But expectations are also influenced by what inflation has been recently. In rich countries, during the mid-2010s inflation fell short of the targets. Rates in the euro area were well shy of the target. Japan was something of an outlier. Almost three decades of deflation seem to have taught firms and wage-earners to expect a rate of inflation a lot less than 2% [5]. Japan, to kick-start inflation, called for companies to raise wages by 3% in the 2018 wage round [5].

The inclusion of expectations as a determinant of inflation was an effort to "augment" the Phillips curve mode. The tug-of-war trade-off between the amount slack in the economy and the

public's expectations that is the Phillips curve has become less steep (see chart, US Phillips curve [11]). Blanchard (2016) of the Peterson Institute for International Economics found that a drop in the unemployment rate in the US has less than a third as much power to raise inflation as it did in the mid-1970s [7].<sup>1</sup>



Expectations can also explain only part of the puzzle. Inflation expectations in the US had not exceeded 3% for 20 years and were low for decades. The subdued expectations should have shifted the Phillips curve downward, so that a given rate of unemployment is associated with a lower rate of inflation (see chart, changes to the Phillips curve) [4].



But what happened to the curve since the GFC is more like a rotation, rather than a shift up or down. Inflation has become seemingly insensitive to joblessness, yielding a curve that has become strangely flat. This may be because the unemployment rate misstates the amount of spare capacity or “slack” in the economy. By 2019 unemployment in the US, Europe and Japan had fallen to surprisingly low levels, which tempted some people on the periphery of the labour force back into work. Japan’s firms found room to grow by hiring many women and old folk who had not been counted as unemployed [4].

Inflation may also be slow to rise in a jobs boom for the same reason it is slow to fall in a bust. In downturns, firms are reluctant to lower wages, because of the harm to staff morale. But because they refrain from cutting wages in bad times, they may delay raising them in good. According to this view, wages will eventually pick up. It just takes time. And many other things, like a pandemic, can intervene before they do [4].

Although the flat Phillips curve puzzled central banks as much as anyone, they may be partly responsible for it. The curve is supposed to slope downwards (when inflation or unemployment is high, the other is low). But central banks’ policies tilt the other way. When inflation looks set to rise, they typically tighten their stance, generating a little more unemployment. When inflation is poised to fall, they do the opposite. The result is that unemployment edges up before inflation can, and goes

down before inflation falls. Unemployment moves so that inflation will not [4].

The relationship between labour-market buoyancy and inflation still exists, according to this view. And central banks can still make some use of it. But precisely because they do, it does not appear in the data. “Who killed the Phillips curve?” asked Jim Bullard, a US central banker, at a conference of his peers in 2018. “The suspects are in this room” [4].

But what happens when the killers run out of ammunition? To keep the Phillips curve flat, central banks must be able to cut interest rates whenever inflation threatens to fall. Yet they can run out of room to do so. They cannot lower interest rates much below zero, because people will take their money out of banks and hold onto cash instead [4].

When Mr Bullard spoke, the Fed expected the economy to continue strengthening, allowing it to keep raising interest rates. But that proved impossible. The Fed was able to raise interest rates no higher than 2.5% before it had to pause (in January 2019) then reverse course. The neutral interest rate proved to be lower than it thought. That left it little room to cut interest rates further when covid-19 struck [4].

The neutral interest rate has fallen, according to some observers, because of global capital flows. Heavy saving by the world’s ageing populations has resulted in too much money chasing too few investments. By lowering the neutral rate, this “global savings glut” has left interest rates closer to the floor than central bankers would like. That makes it harder for them to offset any additional downward pressures on prices [4].

Friedman thought central banks could prevent inflation if sufficiently determined to do so. “There is no technical problem about how to end inflation,” he wrote in 1974. “The real obstacles are political.” Is reviving inflation any different? Central banks face two technical limits. First, they cannot lower interest rates much below zero. And they can only purchase financial assets, not consumer goods. Central banks can create unlimited amounts of money. But they cannot force anyone to spend it [4].

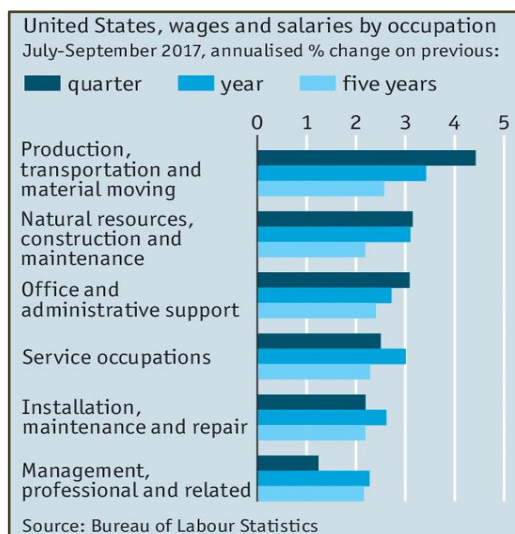
A solution is to work in tandem with the government, which can spend any money the central bank creates. Before covid-19, such dalliances were rare. But an increasing number of central banks, in both the rich and emerging world, were changing course. These partnerships will try to stop pandemic-related unemployment turning low inflation into outright deflation. If they failed it could have been an economic disaster: mass joblessness coupled with negative inflation [4].

But prior to the pandemic, some central banks saw a need for tighter monetary policy because they worried about diminishing slack [8]. There were signs of stronger pay pressures in the UK and the US, and firm evidence of them in the Czech Republic, where wage growth was above 7% [7]. There was fear of the US economy overheating in 2018. The Fed announced a third interest-rate rise in Dec 2017, the fifth since the economic expansion started in 2010, taking rates to 1.25-1.5%. The sustainable rate of growth, as the US’s population greys, is thought to be closer to 2% than to 3%, whatever US President Trump said [who promised 4% growth before lowering his preference to 3%]. Joblessness could not fall forever, so, unless productivity accelerated, growth had to slow. If money was kept too loose, inflation would rise as the economy over heated [8].

<sup>1</sup> Blanchard, Olivier, “The US Phillips Curve: Back to the 1960s?”, Policy brief, Peterson Institute of International Economics, No. PB16-1,

Jan. 2016, accessed at <https://www.piie.com/publications/pb/pb16-1.pdf>.

Overall wages and salaries did not reflect the apparent strength of the labour market. Blue-collar and service workers saw higher pay rises, with wages of production workers growing at more than a 3% annualised pace in the 3<sup>rd</sup> quarter of 2017. Professionals saw their pay growth slow (see chart, US wages and salaries by occupation[23]). Overall, average hourly earnings rose by 2.5% and exceeded core inflation (see chart, bottom panel, hourly earnings vs inflation) [8].



As noted, it takes time for low unemployment to translate into inflation [8]. Perhaps the labour market might not have been as hot as the Fed thought. Estimates of the “natural” rate of unemployment are notoriously unreliable. Rate-setters have gradually revised theirs down, from over 5% at the end of 2013 to 4.6% at the end of 2017. Persistent low inflation may force them to repeat the trick. In any case, notes Michael Pearce of Capital Economics, a consultancy, the Fed’s surveys suggest the labour market was not as tight as it was in, say, mid-2000, when unemployment fell as low as 3.8%. Even in that expansion, underlying inflation did not hit 2%. The boom ended not because of an inflationary surge, but because the dotcom bubble burst [8].

Sceptics doubt whether participation is tightly linked to the economic cycle. They point out that some trends, such as falling participation among working-age men, are very long-running. But participation is at least tricky to forecast. Its growth defied official projections produced by the Bureau of Labour Statistics (BLS) [8].

The ECB was quite a way from such considerations. The unemployment rate was falling quickly, but remained high, at 8.9%. Despite the European Commission’s economic-sentiment index rising in 2017 to its highest level in almost 17 years, the ECB’s governing council decided to keep interest rates unchanged late in 2017, at close to zero, and to extend its bond-buying programme (QE) into 2018. There was still room for the euro-zone economy to grow quickly without stoking inflation [7].

The ECB said only that it would slow down the pace of bond purchases each month, to €30bn (\$35bn) from Jan 2018, but Mario Draghi, the bank’s then boss, declined to set an end-date for QE. A hefty dose of easy money was necessary, he argued, until inflation durably converged on the ECB’s target of just below 2%. It showed few signs of doing so, despite the economy’s strength (see chart, consumer prices, core rate vs target/range). The Bank of Japan kept rates unchanged and continued buying assets at a pace of around ¥80trn (\$700bn) a year [7].



In Turkey, perhaps the only big economy that was obviously overheating in late 2017, the central bank—which has been browbeaten by the president, Recep Tayyip Erdogan, who believes that high interest rates cause inflation—opted to keep interest rates on hold [7].

#### Post-covid inflation and monetary policy

Brad DeLong (2022)<sup>2</sup> presents perspectives on the post-covid macroeconomic situation in mature economies. Those who blame central bankers argue that the transatlantic effect of the GFC through 2015 was the product of over-loose monetary policy. Over-loose monetary policy, plus bailouts, thwarted the creative destruction that would have returned the economy to vigorous health. After covid, another burst of over-loose monetary policy, combined with aggressive fiscal policy, caused high inflation and still more financial fragility. This story is simple, but it is wrong [9].

Another perspective is that central bankers alone could not have delivered a decline of more than eight percentage points in real interest rates over three decades. If such a fall in real rates were incompatible with the needs of the economy, one would surely have seen surging inflation earlier. The background changes were financial liberalisation, globalisation, and the entry of China into the world economy. The latter two not only lowered inflation. They introduced a country with colossal surplus

<sup>2</sup> DeLong, J.B., *Slouching Towards Utopia: An Economic History of the Twentieth Century*. New York: Basic Books, Hachette Book Group, 2022.

savings into the world economy. Add in rising inequality within high-income countries, combined with ageing populations, creating surplus saving in some of them, too, most notably Germany. This needed exceptional credit-fuelled investment, notably in housing, to balance global demand and supply. The financial liberalisation provided the means to facilitate the credit boom [9].

Perhaps the big “non-surprise” inflation is not that it returned but the lack of a consensus of what caused it: over-loose monetary policy and the increased public debt ratios; fiscal stimulus (and fiscal dominance, or the subordination of the central bank to government demands for cheap finance); supply chain disruptions US-China tensions, the pandemic, and Russia’s invasion of Ukraine; a commodity price spike and disruptions to Europe’s energy market from the war; and energy price shock, US-China tensions and supply chain disruptions, tight labor markets affecting wage demands, etc. Whichever was the cause of the inflation, could have required a different policy response or the scale of the response.

Central bankers were slow to react to the signs of inflation. They seemed still in the post-GFC epoch when every price spike, even of oil, barely affected the overall price level. Approaching the end of the pandemic for an era of structurally low demand and weak inflation, was the wrong one for a macroeconomic situation where inflation was about to take off. What the lessons of the 1970s provide is that the time to tackle inflation is at its beginning, when central bankers still have the public’s expectations on their side. The trick is to bring down inflation while avoiding a recession.

The economic effect of Covid-19 was different from that of a big war or financial crisis. Wars restructure economies and destroy physical capital. Consider the initial conditions. We entered this pandemic with high level of private debt, low interest rates and persistently low inflation. None of the G7 high-income countries had debt close to that of the UK in 1945. Japan’s net debt was 154% of GDP and Italy’s was 121% pre-crisis. [12].

Corona virus shrunk economies by suppressing both supply and demand that depend on close human contact. The immediate situation, as Olivier Blanchard of the Peterson Institute for International Economics argued, looked strongly deflationary in 2020: **unemployment soared**, commodity prices collapsed, spending vanished and **precautionary savings soared**. Consumption patterns changed so much that inflation indices were meaningless [12].

For more than a decade since the GFC, hysterics have argued that expanded central bank balance sheets were the harbingers of hyperinflation. Followers of Friedman knew this was wrong: the expansion of central bank money offset the contraction of credit-backed money. Money supply grew slowly since the 2008 crisis [12].

In 2020 it was different. Broad measures of money supply showed large jumps in growth. For a monetarist, the combination of constrained output with rapid monetary growth forecasts a jump in inflation. But it is **possible that the pandemic lowered the velocity of circulation: people may hold this money, not spend it** [12].

But there were three reasons why the “surprise” inflation was not a surprise: increases in public debt ratios; a big jump in the interest rates needed to keep economies operating close to potential output; and “fiscal dominance”, or the subordination of the central bank to government demands for cheap finance [12].

Worries about soaring prices start with the observation that virus-fighting measures choked off production. If inflation is the result of too much money chasing too few goods, then the **economic effect of Covid is the tumbling amount of goods and services available for purchase. Many services industries shut down. If supply interruptions translated into shortages in shops, then higher prices could follow** [13].

**Massive stimulus programmes were another potential source of inflation. Governments around the world borrowed heavily to finance schemes that support firms and workers.** Central banks flooded economies with newly created money. Printing money during the GFC did not spark rapid inflation. Yet its coincidence with a collapse in supply might lead you to expect rocketing prices. The broad, sustained increases in price levels associated with accelerating inflation were unlikely to materialise in the short run, because lockdowns both interrupt supply and undercut workers’ ability to earn and spend. Closing a restaurant limits food-service supply, but it also means that sacked waiters and kitchen staff have no income. And in some circumstances **the drop in demand induced by a supply shock may be larger than the decline in supply—a source of deflationary, rather than inflationary, pressure** [13].

Veronica Guerrieri of the University of Chicago, Guido Lorenzoni of Northwestern University, Ludwig Straub of Harvard University and Iván Werning of the Massachusetts Institute of Technology explore this.<sup>3</sup> If some sectors of the economy shut down entirely, affected workers will curtail their spending dramatically. Spending by other workers could make up for the shortfall—only if the goods and services that can still be produced are substitutes for those that cannot. **The abrupt drop in consumers’ spending on plane tickets or hotel bookings was always unlikely to be offset by more purchases of teleworking software instead.** In the absence of good substitutes, say the authors, the economy experiences a “Keynesian supply shock”, where demand falls by more than supply. They provide another useful way to think about this state of the world: that consumption will be much more valuable in the future, as goods and services that cannot be had today become available once more. So, it makes sense to spend less now, and more later [13].

Available figures suggested that fewer goods were indeed being chased by even less spending. In March 2020 the annual CPI inflation slowed in both the US and the euro area, compared with rates in February. Much of that reflected tumbling energy costs; but core inflation—which strips out food and energy prices—also decelerated [13].

Before the pandemic struck, the Fed was the only central bank to have attempted reversing QE. It had to abruptly stop in 2019 because of market ructions. At the start of 2022, with inflation racing ahead and the labour market tight, the central bank wanted to cool the economy quickly. The Fed’s implementation of QT, quantitative tightening or the shrinking of the balance sheets, would likely be a drag on growth. During the pandemic alone the Fed bought \$3.3 trn in Treasuries and \$1.3 trn in mortgage-backed securities as it sought to keep borrowing costs low [14].

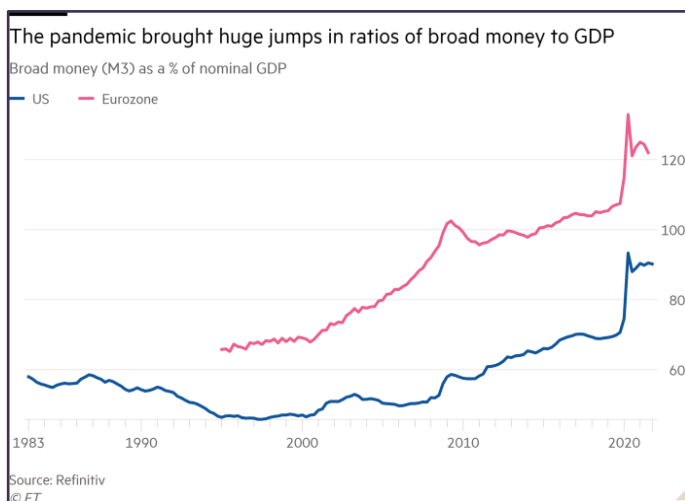
In the US, the country that splurged the most, had the fastest rate of inflation. In the 2010s central banks created vast amounts of money through QE schemes, while governments enacted fiscal austerity. Inflation in the rich world was mostly too low, undershooting central banks’ targets. With the pandemic, there was more QE. But the truly novel truly novel economic policy response during covid was the \$10.8trn in fiscal stimulus implemented worldwide, equivalent to 10% of global GDP. The result was inflation [15].

<sup>3</sup> Guerrieri, Veronica, G. Lorenzoni, L. Straub and I. Werning, “Macroeconomic implications of Covid-19: Can negative supply shocks

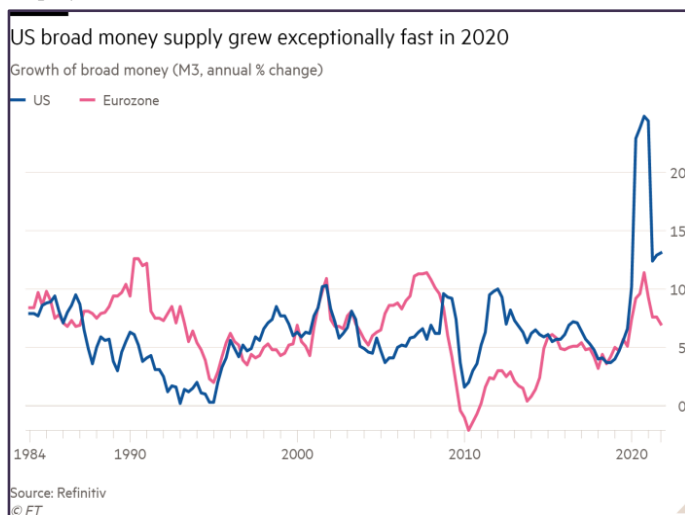
cause demand shortages?”, NBER working paper, No. 26918, Apr 2020, accessed at <https://www.nber.org/papers/w26928>.

At first glance, this supremacy of fiscal policy is awkward for fans of Milton Friedman's view that inflation is "always and everywhere a monetary phenomenon". Central banks, not governments, are charged with hitting inflation targets. But does the experience of the pandemic show that inflation is really fiscal? What the past decade has shown is that when interest rates fall to zero, it takes more than just QE to escape a low-inflation world [15].

A big lesson of history is that if economists think they understand how the macroeconomy works, they will be wrong. In the 1930s, the conventional wisdom was that the economy was self-stabilising. In the 1960s, it was that inflation expectations and money did not matter. In the 1980s, it was that only money mattered. In the 2000s, it was that credit expansion would not destabilise the financial system. In 2020, it was that money was irrelevant. The expansion of the monetary base in response to the GFC did not matter because it did not affect broader aggregates (see chart, money supply growth; money to GDP) [16].

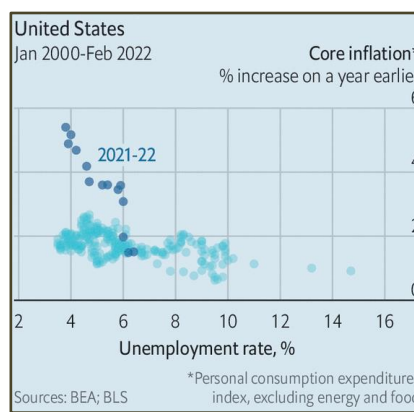


The failure of monetarism to steer the economy would not have surprised Friedman. He argued that money affected the economy with "a lag that is both long and variable". He did not believe in steering the economy. Those who did moved on the inflation targeting instead. The optimists who saw the recent rise in inflation considered it the result of temporary shortages and supply chain issues associated with the pandemic. While that was part of the story, inflation has become general (see chart, inflation generalization). To make matters worse, Alex Domash and Lawrence Summers argued that measures showing a very tight US labour market, such as the vacancy and quite rates, were better indicators of inflationary pressures than non-employment [16].



The long drawn out recovery of the GFC with inflation staying subdued, gave rise to the idea that inflation expectations were so well-anchored that a free lunch seemed available. There could be massive expansion of fiscal and monetary policy and still have no impact on inflation. After the pandemic, the economy was not emerging from a deep financial crisis. Rather, the pandemic was more akin to a natural disaster from which recoveries tend to be much swifter [17].

A more technical explanation of the Fed's mistake was its new framework for monetary policy, unveiled in Aug 2020, known as "flexible average inflation targeting". Boiled down, the idea was to let the economy run hot to make up for colder periods, so that inflation averages 2% over time. Bill Dudley, a former president of the New York Fed, argues that this framework has merit, but that its implementation was clumsy. The Fed wanted to be certain that inflation would stay above 2% for a while and that the job market was in rude health before lifting rates (see chart, US core inflation)[17].



The labour market tightness in 2022 would previously have been associated with sub-2% unemployment. In sum, the inflationary genie was out of the bottle in the 1<sup>st</sup> quarter of 2022. The danger is that this would ignite a spiral, in which inflation expectations shift upwards, causing a flight from money and so further destabilising expectations. Just as the GFC showed that banking matters, so this inflationary upsurge shows that money matters. It also indicates that forward guidance assumes more knowledge than anybody possesses. Central banks may explain their reaction function, but cannot say what they are going to do, because they do not know what the economy will do. Last but not least, average inflation targeting is surely stillborn. It never made sense to target future inflation in the light of past mistakes. Is the US Federal Reserve really going to lower inflation below 2% to make up for a prolonged overshoot? What does make sense is to reassert its determination to hit its forward-looking target. But it is also possible we are going to see a degree of financial instability that will force deeper thinking on this, too [16].

In Mar 2023, turmoil in US banks and with Credit Suisse further complicated central banking. The job of central banks is to keep inflation low and banks stable. The two goals looked contradictory in the US. After many years of low inflation and interest rate little consideration was given to how banks would be affected if long-term bonds fell in value (from an increase in rates). During the pandemic, as savings increased from stimulus checks and lockdowns limiting spending, deposits increased. Banks, in turn, used the deposits to buy long-term bonds and government-guaranteed, mortgage-backed securities. All but the biggest US banks were suffering the consequences of higher interest rates. Dearer money reduced the value of their securities portfolios and made it likelier that depositors would flee to big banks, or to money-market funds. Cutting interest rates would help the banks; so would



backstopping the financial system. Neither would stimulate the economy and both would make inflation worse. Yet another unpleasant trade-off confronted the central bankers: tame inflation or save banks. The third option was to bail out the banks and unprotected savers.

### Japan: Living with low inflation and interest rates

In the 1980s, the Japanese economy grew by an average of 4% a year and seemed set to continue on a similar path. In the early 1990s, foreign officials, financiers and journalists rushed to Tokyo to learn the lessons of Japan. Thirty years on, rather than understanding the secrets to miraculous economic growth, students of Japan wanted to know how to respond when the good times stop [18].

Economically, those lessons include the vital importance of maintaining public confidence in central bank policy, and the need for a strategy to generate economic growth. Japan's decades of experience offer a template for how a society can live with low interest rates. Japan has experienced stagnation the past three decades. Since 1990, Japan has recorded average annual real growth of 0.8% and inflation of 0.4%. The Nikkei index never again came close to the Dec 1989 peak of 38,857. In Nov 2020, it stood at 25,907. In dollars, per capita incomes in Japan are a third lower than in the US [18].

While the rest of the world enjoyed booming growth in the 1990s and 2000s, Japan's problems seemed unique, and foreign economists lined up to propose radical solutions. In the wake of the 2008-09 GFC, their own economies showed an eerie similarity: interest rates fell to zero in Europe and the US, and inflation did not return with the recovery. Thus, Japan was a case study of what happens in an environment of persistent low inflation and interest rates — a situation much of the developed world feared in the aftermath of the Covid-19 pandemic [18].

It is important to understand what happened in Japan over the past 30 years in terms of low growth, low inflation and low interest rates. There were three distinct but mutually reinforcing chapters: financial crisis in the 1990s; persistent, mild deflation in the 2000s; and then, in the 2010s, an attempt to fight back against Japan's ageing demographics. With three chapters in Japan's post-bubble era, the lessons for the rest of the world are inevitably nuanced [18].

#### The 1990s — a banking crisis

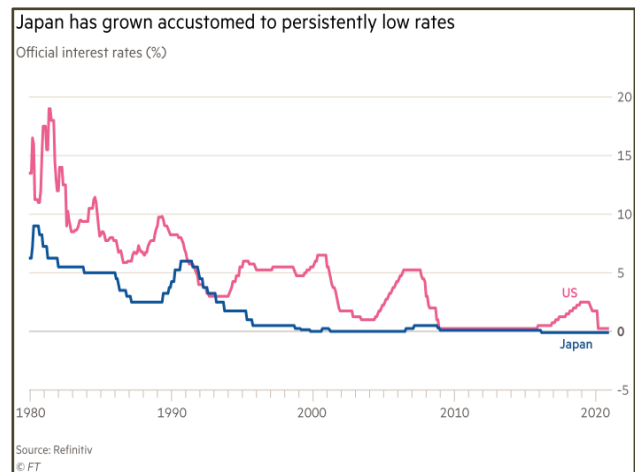
Early in the 1990s, it became evident that the heady peak in stock and land markets was a bubble — one backed by trillions of yen in bank loans, which speculators and property developers had no way to pay back. Rather than foreclose on bad loans, however, corporate Japan and its bankers pretended the assets were still solid and the debts were still good. The technocrats wanted to recapitalise the banks with public money, but they could not persuade the politicians [18].

Initial attempts to fix the banks made matters worse. A widespread credit crunch hammered the economy. Scarred by the bubble, the Bank of Japan (BoJ) was slow to cut interest rates, and repeated rounds of fiscal stimulus had little effect. Inflation declined steadily and by 1999 it was below zero. But the underlying cause was not peculiar to Japan or even historically unusual — it was an unresolved banking crisis [18].

Watching from the other side of the Pacific, US policymakers learnt this lesson thoroughly. When the GFC crisis struck in 2008-09, they were quick to slash interest rates and force public capital on banks through the Troubled Asset Relief Programme. In Japan, the bad loan problem and financial trouble was not resolved until 2003 [18].

#### The 2000s – stagnation

The weakness of the economy was obvious and the BoJ needed to do something. The question was what. All the textbooks assumed positive interest rates. The resulting period of experimentation in Japan wrote the manual for central banks around the world. First, the BoJ cut interest rates to zero (see chart, persistent low interest rates). At the time it was thought that negative rates were not possible. Meanwhile, a former businessman on the BoJ's policy board called Nobuyuki Nakahara began to promote the ideas of Bennett McCallum, a US economist. Mr McCallum proposed a rule for how a central bank should increase the money supply when the economy fell short of full employment. The BoJ could not cut interest rates any further, but it could increase the quantity of bank reserves. This became known as "quantitative easing" [18].



Quantitative easing brought down long-term interest rates and had a calming effect on financial markets, but it did not transform inflation or growth, which recovered slowly through the 2000s. The central problem, it slowly became clear, was that the public no longer expected prices or wages to go up, and no matter what the central bank did, their expectations were self-fulfilling.

Experience shows that anchoring inflation expectations is important. In Japan, under the prolonged period of deflation, inflation expectations came to be anchored around zero. One of the primary lessons of Japan's experience is the need for aggressive action to pre-empt any fall in inflation expectations — and the limited power of monetary policy if that is not achieved. But the lesson about expectations has hit home in central banks across developed economies.

Jay Powell, US Federal Reserve chairman, pledged to raise inflation to moderately exceed its 2% target "for some time", expressing "determination" to succeed in ensuring inflation expectations did not fall to zero in the wake of the pandemic. The ECB and BoE both revised their guidance in the autumn of 2020 to commit to keeping monetary policy as loose or looser until inflation rises back to target and shows no signs of falling again [18].

#### The 2010s — Fighting demographics

As the period of low inflation dragged on, however, and other advanced countries adopted zero interest rates after 2008, economists began to consider deeper causes. Towards the end of the decade, the then BoJ governor began to argue that the root cause of Japan's low inflation was weak economic growth, and that was linked to the country's demographics. "Nowadays everybody says the Japanese economy has poor future prospects because of population decline. But that kind of view is actually quite new," says Mr Yoshikawa [18].

During the 2000s, when companies were cutting jobs, he says, the debate was about Japan's surplus of workers, not a shortage.

Japan's fertility rate has been low since the 1970s and the working age population peaked in the 1990s. With ageing workers wanting to save, and little motivation for businesses to invest in a declining economy, the logical result is a low natural interest rate [18].

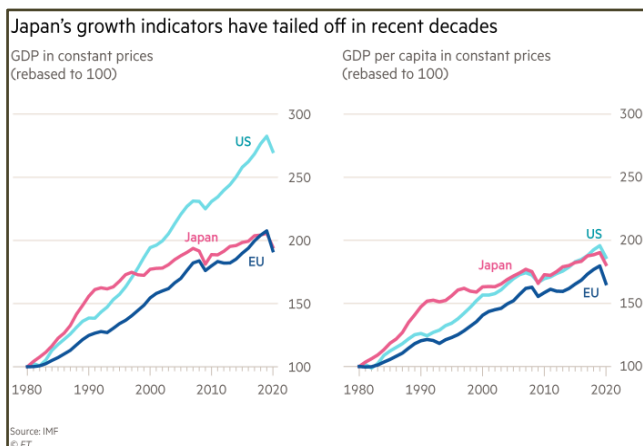
Lawrence Summers crystallised this line of thinking in 2014 when he revived the concept of "secular stagnation". If demographics are the root of Japan's problems, then there is a mixed message for the rest of the world. Fertility rates are higher in Europe and the US, and they both have meaningful immigration. Although their populations are ageing, that suggests they have a better chance of escaping persistent zero inflation and interest rates. But other east Asian economies such as China, South Korea and Taiwan are closely following Japan's demographic track [18].

Many economists think the theory of demographic destiny is oversold, and either does not explain the trend towards zero inflation and interest rates or is framed incorrectly [18].

The 2010s in Japan brought a determined effort to shake the nation out of its stagnation: the stimulus known as Abenomics. The performance of the economy under former Shinzo Abe's premiership improved significantly and public debt stabilised for the first time in years, but the fundamentals of interest rates and inflation were ultimately little changed. Inflation remained low and interest rates were still pinned to the floor, providing little scope to act as a cushion when downturns such as the Covid-19 crisis hit [18].

Thirty years on from the bursting of the bubble, a common reaction to Japan's predicament is to ask whether there is really a problem at all. The country is stable and prosperous. Per capita growth in output has not been too bad. For many, especially the elderly, low inflation is a good thing, and a large public debt is less daunting when it carries an interest rate of zero [18].

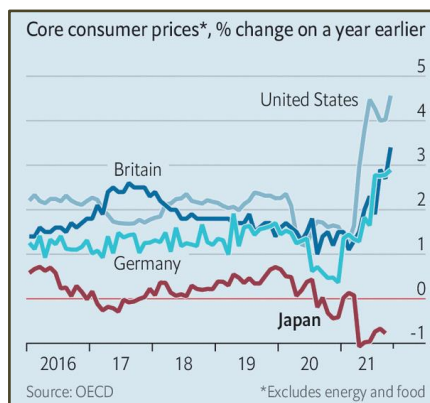
Such optimism, however, belies difficult problems of economic management. For much of the past three decades, Japan's economy has operated below full capacity, (see chart, Japan's growth indicators) ruining the life chances of millions of people who graduated into a weak labour market. The country's only option when a crisis such as Covid-19 strikes is to run up ever more public debt [18].



What are the lessons from Japan's experience? One is that the route to zero interest rates and zero inflation does not matter. The crucial requirement is to find a way to stop a temporary plunge to zero interest rates from becoming a self-fulfilling prophecy [18].

In late 2021, as inflation surged around the world, with price rises exceeding central banks' targets, Japan was a notable holdout. Consumer prices in Japan refused to budge. In Sep 2021 they rose by just 0.2% year-on-year, and inflation,

excluding fresh food and energy prices, actually fell by 0.5% in the same period. By comparison, a "core" measure rose by 4.6% in the US in Oct, 3.4% in the UK and 2.9% in Germany (see chart, core CPI) [19].



What's going on? Entrenched expectations built up through decades of little to no inflation play a big role in explaining why rising producer costs have not fed through to consumer prices. Domestic companies are notoriously unwilling to pass on increases in the prices of imports to consumers. At a press conference in Oct 2021 Kuroda Haruhiko, the governor of the BoJ, attributed this reluctance to habits picked up during the country's periodic bouts of deflation. Companies have a good reason to resist increases [19].

Another crucial factor is the weakness of Japan's consumer recovery. Private spending fell. Spending on durable goods, the source of much US inflation, has been practically flat for the past eight years in Japan [19].

Despite the BoJ's activism, inflation persistently failed to reach its 2% target. Its assets ran to 103% of Japanese nominal GDP even before the pandemic, and bond and stock purchases pushed that share up to 134% in 2021. In the same period, the Federal Reserve's purchases rose from 19% to 36% of US GDP. The BoJ's policy to keep ten-year government-bond yields at around 0% was still firmly in place, even as a similar effort at yield-curve control by the Reserve Bank of Australia was abandoned after it came under market pressure in October [19].

This suggests that whatever raised prices elsewhere in the world—whether supply-side constraints associated with the pandemic, demand-side stimulus, or some combination of the two—monetary easing alone struggled to move the needle when confronted with decades of low inflation expectations. Japan's government vowed to deploy a fiscal-stimulus package that included cash for poor families and the under-18s [19].

## LABOR, WAGES AND EMPLOYMENT

### Minimum Wages

Neoclassical economists have tended to see minimum wages as harmful, especially those residing in the US. A consensus has long held that minimum wages increase unemployment among young and low-skilled workers.

Recently the conventional wisdom on minimum wages has been challenged in the US and elsewhere. The UK introduced a national minimum wage in 1998 and increased it in 2020. Germany's came into effect in 2015. Around 90% of countries have some sort of legal wage floor, although enforcement practices vary widely. Economists now have lots of data with which to understand how minimum wages affect the economy in practice (see chart, minimum wage as % of median wage) [20].



The concern that minimum wages destroy jobs comes from the most basic of economic models: supply and demand. If labour is made more expensive, employers will probably want less of it. Textbooks state that, in the absence of a minimum wage, a worker is paid his “marginal product of labour”, which means the value of what is produced. There is no room to deviate from this wage in either direction. If an employer tries to pay a worker less, the worker will be poached by a rival firm. If the government imposes a minimum wage that is higher than a worker’s marginal product, the firm loses money by employing the worker. The worker is left jobless instead [20].

Reality is more complex. Firms do not know how much each worker contributes to their revenues. Few workers can find a new job at the drop of a hat. Yet the basic model reveals one important truth: the workers who are most vulnerable to losing their job from a minimum wage are those whose productivity is low—the very people the policy is designed to help [20].

More sophisticated theorising about labour markets recognises that they are not perfectly competitive. There is no single wage at which a worker has his pick of employers. As a result, firms probably pay workers less than their marginal revenue product. How much less depends on negotiations and who does best there depends on bargaining power. In this framework, the goal of the minimum wage is not to defy market logic but to stop firms in a strong negotiating position from squeezing their workers [20].

The upper bound on the minimum wage still applies: firms will not willingly employ workers at a loss. But below that ceiling, the effect of the minimum wage is ambiguous. It depends on a series of questions. Can a company replace its workers with machines? Can it raise prices and make its customers pay for the minimum wage? Does it face competition from foreign firms who face laxer rules overseas [20]?

Consider a comparison between factories and restaurants. Logically, there would be little scope to increase manufacturing pay using minimum wages, because firms face stiff international competition, and jobs are constantly automated away. By contrast, jobs in restaurants are hard to automate and face no foreign competition. Any increase in costs affecting the whole sector should be passed on to consumers. Job losses should be lower—especially if it turns out that consumers are willing to pay higher prices. So can one minimum wage do justice by both sectors [20]?

The empirical study which revitalised the debate on minimum wages was by David Card and Alan Krueger, both then at

Princeton University<sup>4</sup>. In 1992 New Jersey increased its hourly wage floor from \$4.25 to \$5.05. Neighbouring Pennsylvania kept its own at \$4.25. Thrilled at the prospect of a naturally occurring case study, the two economists gathered information of employment at fast-food restaurants in both states before the April increase and again several months later. Fast food seemed to offer the ideal conditions for a study, as a homogenous sector employing unskilled workers [20].

The increase in the wage floor did not lead to jobs being lost in New Jersey; employment in the restaurants they looked at went up. Nor did the authors find any indication that the opening of future restaurants would be affected. Looking at the growth in the number of McDonald’s restaurants across the US, they saw no tendency for fewer to open where minimum wages were higher [20].

Card and Krueger (1995)<sup>5</sup>, changed a lot of minds. Less than half of the American Economics Association membership polled were certain that a minimum wage increased unemployment among the young and low-skilled: to the rest the textbook view—that, faced with a rise in the cost of employing workers, firms would use fewer of them—was wrong. But why? Since 2000 a growing body of research has shown that a key consideration is the power enjoyed by employers [20].

This school of thought argues that some labour markets are characterised by a market structure known as monopsony. Under a monopolistic regime one dominant supplier sells to many buyers, whereas under a monopsonic regime, one dominant buyer purchases from many sellers. Just as a monopolist can set prices higher than would be the case in a competitive market, a monopsonist can set prices artificially lower [20].

Thus, though it may sound counterintuitive for a higher wage to lead to more employment, it makes sense if what the legislation is doing is pushing a wage kept artificially low by monopsony back to where it would be in a market where supply and demand were matching each other freely. People who may not have bothered to look for a job at \$10 an hour may be drawn into a job market offering \$15 an hour. Push the minimum wage significantly beyond that point, though, and jobs will indeed be lost as companies find labour too expensive to afford [20].

Once the role of (imperfect) competition in the labour market is accepted, the debate on minimum wages becomes more nuanced and more empirical. Gathering data is not easy. Researchers must consider whether to track jobs or workers, and whether to study certain groups, such as teenagers or the unskilled, or broader sectors. And the job market is affected by more than just minimum-wage rules. Constructing reasonable counterfactuals is hard [20].

Ekaterina Jardim et al. (2017)<sup>6</sup> from the University of Washington found that minimum-wage increases in Seattle (at the forefront of the support for US president Biden’s pledge to raise the minimum wage to \$15/hr) in 2015 and 2016 led to employers reducing hours in low-paid sectors. The average low-paid worker earned more per hour but because they worked fewer hours, their monthly earnings dropped by \$74—the equivalent of five hours’ pay [20].

That paper used aggregate data on hours and earnings by sectors. Their work in 2018 used administrative data to track individual workers rather than looking at averages. This time

<sup>4</sup> Card, D. and A.B. Krueger, “Minimum Wages and Employment: Case Study of the Fast Food Industry in New Jersey and Pennsylvania”, NBER working paper 4509, Oct. 1993, access at <https://www.nber.org/papers/w4509>

<sup>5</sup> Card, D. and A.B. Krueger, *Myth and Measurement: The New Economics of the Minimum Wage*, Princeton University Press, 1995.

<sup>6</sup> Jardim, E., M.C. Long, R. Plotnick, E. Van Inwegen, J. Vigdor and H. Wething, “Minimum Wage Increases, Wages, and Low-Wage Employment: Evidence from Seattle”, NBER working paper no. 25182, 2018.

they found that low-paid workers saw their weekly earnings increase by \$8-12 a week. Most of that gain, though, was taken by low earners with above-median experience levels and some of it from workers making up lost hours worked in Seattle with additional hours elsewhere in Washington state [20].

In 2019 a review commissioned by the British government of more than 50 recent empirical studies into wage floors found the effect on employment to be generally muted, even with relatively ambitious increases. Yet some studies did find higher impacts. Arindrajit Dube<sup>7</sup> warned that the evidence base is still developing. It was, at that time, too soon to opine on South Korea's 25% increase in its minimum wage between 2016 and 2018 [20].

The effects of a wage floor can also be felt outside low-pay sectors. A preliminary study in 2019 of the impact of Germany's minimum wage found it led to more reallocation of workers from smaller, lower-paying firms to larger, higher-paying ones. The same year an article in the *Quarterly Journal of Economics* found that the impact of minimum-wage laws on average earnings was amplified by small but important spillover effects higher up the earnings ladder. Employers tend to want to maintain some sort of wage differential for staff with more responsibility. So if the minimum wage boosts the pay of fast-food workers, then restaurants may also need to raise the pay of fast-food supervisors [20].

**Who pays for the minimum wage?** In theory a higher cost base could be passed on to consumers through higher prices, or absorbed by employers through lower profit margins. In reality the answer varies by market. In competitive sectors, such as fast food, research has found that a 10% increase in the wage floor pushes up burger prices by just 0.9%. In 2019 a study of supermarkets in Seattle found no impact on grocery prices from big increases [20].

Economists no longer think higher minimum wages are always bad. But that is not the same as saying they are always good. Isaac Sorkin (2018) and others cautioned policymakers to take a longer-term view, rather than worry about short-term unemployment. Its authors found that if firms perceived a higher wage floor to be permanent and unlikely to be eroded by inflation, it could encourage them to automate more and decrease employment growth in the future. The idea that a minimum wage can sometimes lead to higher rather than lower employment does not mean it always will. When pushing up the floor, policymakers need to ensure they do not hit the ceiling [20].

Empirical work assembled over the past 30 years has demonstrated that modest increases in the minimum wage typically have, at most, small negative effects on employment. A match between a job and a worker creates a surplus to be divided between employee and employer, in a manner that is largely determined by the bargaining power each side wields. Minimum-wage rules may help workers capture more of this surplus. The case of a large minimum-wage rise is more unclear. The increase in the US minimum wage to \$15/hr proposed by President Biden would be more than double the minimum in 21 states and in 28 it would push the pay floor above 80% of the state-level median [21].

Convergence in income in the US between poor and rich states, so rapid prior to 1980, slowed dramatically since. It coincided with the rise in the federal minimum wage, adjusted for inflation between the 1930s and 1960s, before it stagnated and declined thereafter. The latter period also saw productivity gaps between superstar cities and smaller cities and towns that reflect inequalities. Low minimum wages enabled some firms to rely on pockets of low-skilled labour, rather than investing in

modern equipment and processes. A higher minimum wage could press them to change course, eventually yielding benefits to the economy at large. It could also be wise to allow low-wage states more time to phase in a \$15 minimum to give them an opportunity to invest in education and infrastructure. It would also do to incentivize the private sector to boost productivity, rather than to shut up shop or leave town [21].

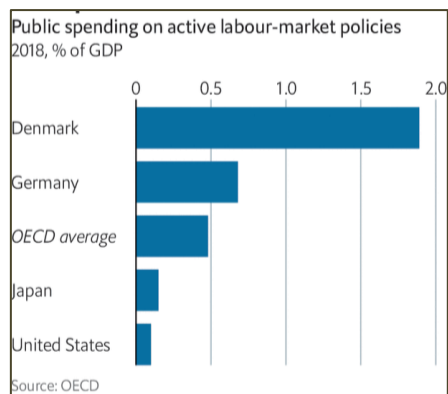
### Can a welfare state be both generous and efficient?: Case of Denmark

A study in 2015 looked into what had caused a surge in employment in the US over the previous year. A jobs boom coincided with reforms to make unemployment benefits less generous. The authors demonstrated, convincingly, that the one had caused the other, with the benefit cut leading to the creation of 1.8m extra jobs in 2014—about two-thirds of the total.

The notion that lavish welfare benefits discourage work, so that cutting them makes people look harder for a job, is widely accepted not just by economists but by most politicians and voters. Few elections are won by promising to lavish the unemployed with public funds. So it is surprising to find that the country with the world's most generous offer to the out-of-work also has one of its best-functioning labour markets (see chart, public spending).

Danish benefits are worth more than 80% of previous earnings after six months out of work, compared with 60% across the rich world and less than 50% in Britain (the US is even stingier). For Danish parents who lose their jobs, replacement rates can approach 100%.

The generosity of Denmark's unemployment system is the flipside of its liberal regulation of employment contracts—a combination called “flexicurity”. Danish employers can hire and fire workers pretty much as they please. Jobs therefore come and go, but people's incomes are stable. However, the state's munificence has not produced a class of feckless drifters. Denmark's unemployment rate is lower than the rich-world average and its working-age employment rate is higher. Long-term unemployment is low. When Danish people lose a job, they find a new one faster than almost anyone else in the world, according to the OECD.



Denmark makes it hard for people to live off welfare. Recipients must submit a cv to a coach within two weeks of becoming unemployed. They can be struck off for not trying hard enough to search for work or to keep up with adult-education programmes. As a share of GDP Denmark spends four times as much as the average OECD country, and more than any single one, on “active labour-market policies” to make people more employable.

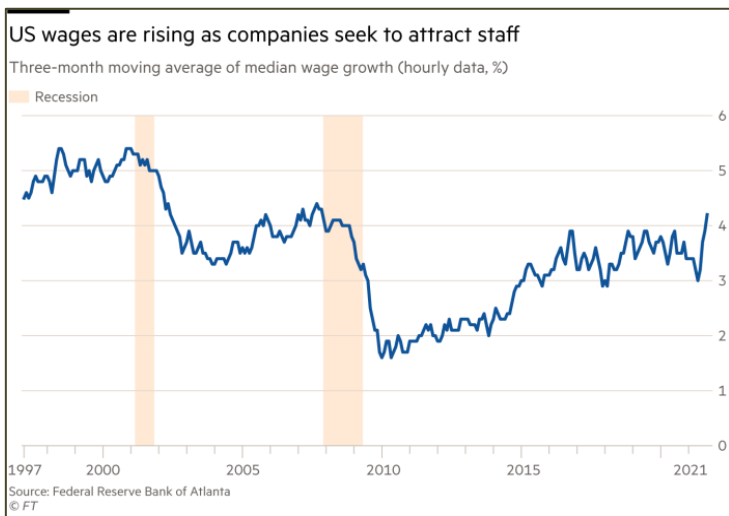
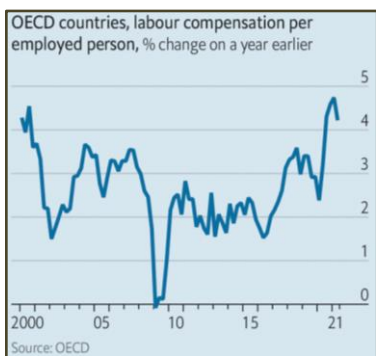
<sup>7</sup> A. Dube, “Impacts of Minimum Wages: Review of the International Evidence”, University of Massachusetts Amherst, NBER and IZA

This offers a tough lesson for those arguing for more generous welfare states. Simply boosting benefits may dissuade employment, as it did in the US before 2014. To stop this happening requires massive investment in training, monitoring and enforcement of the rules for those out of work—spending money to avoid wasting it, in other words. The world’s best welfare system does not come cheap.

*Economist*, “How the Danes do it”, Special report on the future of work, 10 Apr 2021, p. 11.

**Trends in wages**

Since before 2000, the average labour compensation trended downward until the recovery from the GFC, supporting the notion of increasing inequality across the rich world. The trend across the OECD countries matches that of what has happened in the US economy (see charts, *OECD labour compensation* [30]; and *US wages* [22]).



If there was a defining economic problem for the US as it recovered from the GFC, it was stagnant wages. In the five years following the end of the recession in June 2009 wages and salaries rose by only 8.7%, while prices increased by 9.5%. In 2014 the median worker’s inflation-adjusted earnings, by one measure, were no higher than they were in 2000. It is commonly said that wage stagnation contributed to an economic anxiety in middle America that lifted Mr. Trump to the White House [23].

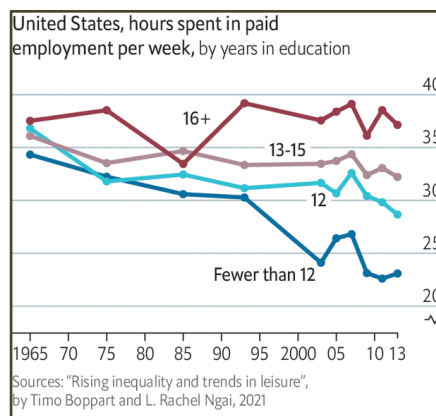
After years of imbalance, a shift in economic power towards workers was to be welcomed, so long as inflation remained low. Mr Trump’s administration coincided with a turnaround in fortunes for the middle class. In 2015, median household income, adjusted for inflation, rose by 5.2%; in 2016 it was up by another 3.2%. During those two years, poorer households gained more, on average, than richer ones. Then blue-collar wages began to rocket. Wage and salary growth for factory workers, builders and drivers outstripped that for professionals and managers. Blue-collar pay growth exceeded 4% [23].

As unemployment fell, from over 6% in mid-2014 to 4.1% by the end of 2017, wage growth picked up. In 2016, service workers enjoyed the biggest pay rises in the economy—3.4%, on average. A year later, growth in service wages decelerated slightly, but blue-collar wage growth surged ahead [23].

Strong demand, rather than a productivity boom, drove the scramble for workers. In the manufacturing sector, for example, output per hour worked was just 0.1% higher in 2017 than in 2016, and had not grown at all in the previous five years. Production and wages picked up anyway. One reason was a weaker dollar in 2017. On a trade-weighted basis, the dollar fell by almost 9% through mid-Sep. The weaker dollar and a strengthening world economy spurred demand for US goods which were up by 4% on 2016 [23].

**Labour market before/after covid**

Before the pandemic, employment levels among groups with higher education were likely to be employed or were able to find work when the economy recovered. In the US the spread in the number of hours worked per week consistently widened from the 1980s, especially between those with less than 13 years of education (see chart, *US hours spent in paid employment*) [24].



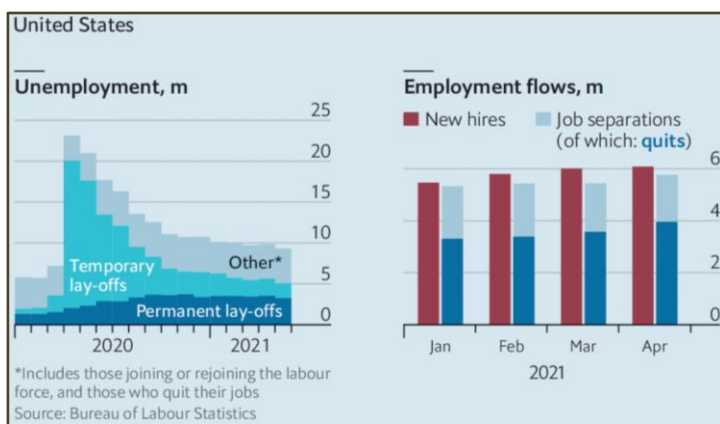
In 2019 the rich world’s unemployment rate was lower than at any time since the 1960s. In the US and UK joblessness among minorities was the lowest ever. Youth unemployment, which once seemed intractable (especially in Europe) was also down. The working-age employment rate (the share of 16 to 64-year-olds) was also at an all-time high in rich countries. This job boom occurred even as minimum wages rose smartly across the rich world and as immigration increased. Capitalism was delivering gains for those at the bottom end of the labour market again. The wages of the worst-paid Americans increased 50% faster than those of the best paid. The labour share, measuring the proportion of the total pay and benefits (such as health care or pension contributions) of national income, increased in the US, UK, Japan, and the EU [24].

This must be tempered by the fact that income inequality had been high by historical standards. However, by the late 2010s inequality was no longer rising and had started to fall. The question for the labour market becomes what will happen in the aftermath of the pandemic’s shock? How will remote work, government policy responses, automation affect mobility, pay, employment, etc. [24]?

At the height of the first pandemic lockdowns, unemployment rose from 5% to 9% in the rich world. Yet unemployment across the club fell from the peak of 9% to 6.9% at the end of 2020. The labour-market recovery was faster than expected. The rich world got better at coping with lockdowns: dining in was replaced by takeaway and delivery services and governments allowed more low-risk activity (e.g., manufacturing and

construction). Even under later lockdowns, demand for worker was higher than before covid arrived in early 2020 [25].

The type of unemployment matters. Temporary layoffs makes it easier to return to an old job than to find a new one [25]. The unique nature of the pandemic recession reflected the rebound in employment. Employers shed 22m jobs in Mar and Apr 2020, but about 80% of the unemployed at the time were temporarily laid off, with a job to which they expected to be recalled after the lockdowns. After the lockdowns, the temporarily unemployed resumed work quickly (see chart, US unemployment) [26]. Corporate bankruptcies were lower than expected – workers had jobs to go back to. Labour-market reallocation helped others to find new jobs. Losses in the travel, leisure and hospitality sectors were gains in other services, warehousing and delivery services. Technology helped to smoothen reallocation [25]. There was a blurring of the line between work and home [27].



It is hard to disentangle the effect of technological change from lockdowns. Frey and Osborne (2013) produced results on automation and jobs that were widely misinterpreted as meaning that 47% of US jobs were at risk of being automated. Countries facing what they called higher “automation risk” in 2012 saw stronger employment growth, consistent with the idea that technology adoption leads to higher productivity. Japan, Singapore and South Korea had world-beating rates of robot adoption with low unemployment. Perhaps technology does allow more people, not fewer, to be employed. The “lump-of-labour fallacy” may be partly to explain the erroneous view of the doomsdayer. That is, there is a finite amount of work, so if some is automated that makes there less work to go around. In fact, by lowering costs of production, automation can create more demand for goods and services, boosting jobs that are harder to automate. The economy may need fewer checkout attendants at supermarkets, but more health care providers. Technology often changes rather than scraps jobs [27].

But technology is so sophisticated that it is difficult to split jobs into those that are automated and those that cannot.<sup>8</sup> Technological progress increases demand for work but it is wrong to think that human beings will necessarily be better placed to perform the tasks involved in meeting that demand. Even still there may be other factors that will have an impact on automation [28].

Automation is still difficult. Even in a pre-covid world it took time to understand the ins and outs of a business process and how technology could improve it. Second, is the level of investment. Companies shun capital spending when uncertainty is high. Fiscal stimulus focused on protecting households’ and companies’ balance sheets, but not on creating more incentives for investment. A growing share of jobs require people to be

physically involved. The number of jobs in health care and education continues to rise fast [28].

The pandemic helped to contribute to an intellectual revolution in macroeconomics. There is greater recognition of the enormous redistributive power of a booming economy – one that generates both plentiful jobs and healthy wage growth – for low-income and minority groups. Low-wage workers and low-income households are relative more sensitive to the business cycle, but policymakers can do a lot more to push the economy to the top of that cycle. They are now more willing to live with the trade-offs this entails [29].

There were signs of change even before the pandemic. By 2015 governments were losing their enthusiasm for fiscal austerity that had marked the period after the GFC. Many came to realise the damage done by budget cutting. Lowered cost of borrowing made fiscal stimulus less expensive. Public spending was a drag on the global economy in every year from 2010-14. Fiscal stimulating the economy started in 2015 and the effect was worth as much as 1% of global income by 2019. Some of the extra spending was directed at reducing inequality. The pro-poor shift was not just about cash. Legislation gave workers more rights, e.g., Uber drivers were not independent contractors and so were entitled to benefits and minimum wage [29].

Central banks changed too. Persistently low inflation meant central bankers had to revise down their estimates of the rate of unemployment that was consistent with a 2% inflation target, from 5.5% in 2012 to 4.1% by 2020. The pandemic helped drive this process. The Fed switched to “average inflation targeting”. The Fed now emphasizes the goal of maximizing employment, implying that inflation could temporarily overshoot its 2% target if that helps workers stay in or join the workforce [29].

The Fed is not alone in placing greater emphasis on employment. In 2019 the Reserve Bank of New Zealand, the pioneer of the inflation target, switched to a “dual mandate”, promising to see to maximise employment as well. Japan was considering following suit. The Bank of England is less likely to make a change in interest rate to suit a targeted rate of inflation, allowing the actual inflation to exceed the target, giving it more space to consider other targets. None of this suggests that central bankers no longer care about inflation, but that they are heightening their concern with employment. In so doing they place more emphasis on the interests of the poor [29].

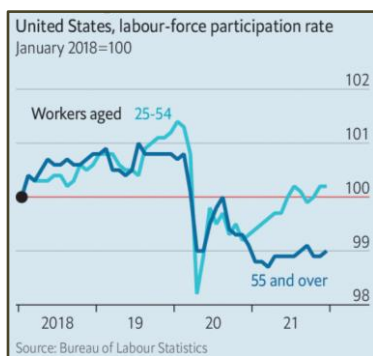
Fiscal policy is being rethought. Across the rich world the response to the pandemic has been massive and sustain fiscal support for economies. Moreover, unlike after the GFC almost all governments delayed moves to reduce fiscal stimulus to as to rein in gaping budget deficits and rising public debts. The pandemic has reshaped welfare policy. The US spend trillions to protect households’ incomes and reduced poverty rates even as economic activity collapsed [29].

The pandemic was the next shock to hit labour markets, prices, wages and employment. When covid-19 first struck, analysts expected bosses to slash bonuses and pay rises, or even to cut basic pay, as they did after the GFC. The expected higher rate of unemployment would help to ensure these outcomes. However, Oxford Economics, a consultancy, found that pay in the rich world grew at a rate well above its pre-pandemic average. When lockdowns were imposed poorly paid people in service jobs dropped out of the workforce, for instance, which had the effect of raising average pay as measured by statisticians. Even so, wage growth seemed stronger than the scale of the economic downturn alone would have suggested [30].

<sup>8</sup> Susskind, D., *A World Without Work: Technology, Automation and How we Should Respond*. UK: Penguin publishers, 2020.

A fair assumption was that as the pandemic ebbed, people would go back to work in droves. That did not occur. The shrinking labour pool was a drag on growth. Those who left the jobs market can be divided into three groups: people in their prime working years who, for various reasons, would rather be at home; older people who were heading towards retirement and who speeded up their departures; and immigrants, whose flow through legal channels dried up [31].

Unsurprisingly the quickest return to the jobs market was the 25-54-aged workers (see chart, labour-force participation). In person schooling freed up parents, especially for women who carried out the extra childcare duties. The expiry of generous unemployment benefits, provided at the height of the pandemic, helped to coax people back to work. As pandemic savings decrease, more pressure to find work was expected [31].



Some workers benefit more than others. Analysis by *The Economist* of British wage data by industry suggests that annual pay growth was twice as dispersed in 2021 as it was before the pandemic. Wages in the accommodation and food-service sector, which struggled to attract workers, rose by 8% in the year to July 2021; increases in manufacturing were more modest. In the US the wages of the least-paid quartile of workers grew 70% faster than those at the top (see chart, US hourly wages).



Underlying pay rose three times as quickly in Anglo-Saxon countries as in continental Europe. That could be because places such as the US and Canada rely more on the consumer-facing industries experiencing the worst labour shortages. And France and Italy, where annual pay growth was below 1%, probably did not face the same immigration crunch as the UK, which Brexit, or Australia and New Zealand, which closed their borders to keep out covid-19 [30].

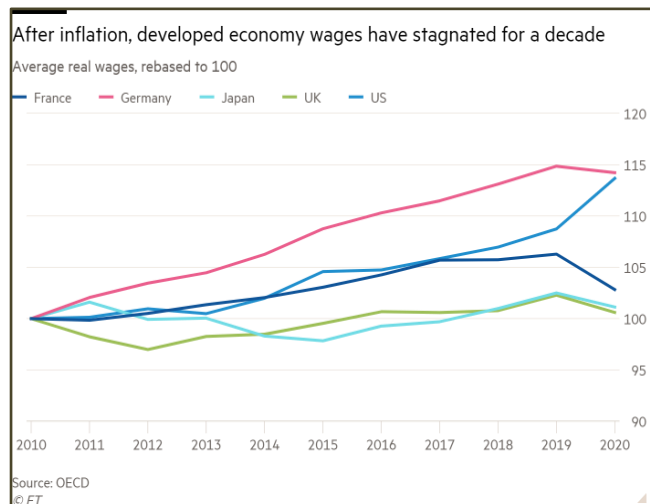
But labour markets can become too strained creating worker shortages that stop production and cause wages to spiral, which can feed into overall inflations. Labour markets in the rich world strained at the seams in 2022. Canada and Germany were among the countries with record employment rates. The same was true of France, known for its high joblessness. Across the OECD rich countries the number of unfilled vacancies was the lowest it has been in decades (see chart, employment rate). Even with pricey energy and rising interest rates provoking concern

about the economy, there was little sign from “real-time” indicators that demand for labour was dropping [32].

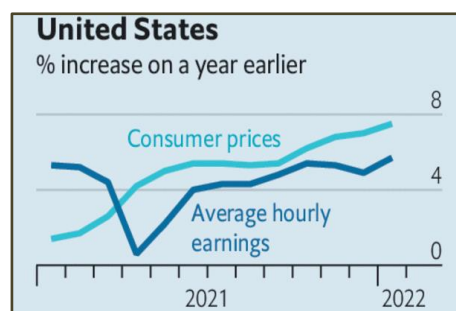


Emboldened by staff shortages, rising energy prices and living costs, employees increasingly butted heads with their employers over salaries. Some worried that growing wage pressures could unleash a 1970s-style wage-price spiral. Others saw it as an overdue boost to stagnant wages, and a rebalancing of income towards labour after years of rising asset prices and higher returns to capital [22].

The clearest pressures in 2021 were in the US, where wages increased since 2010. But by 2019 with higher inflation wage growth only just outpaced consumer price inflation. Real wages fell in real terms from 2019 (see chart average real wages) [22].



The recovery from the pandemic brought about startling changes: prices and wages both surged (see chart, % change in prices and earnings). The US hourly pay rose by 4.6% in the year to September while consumer-price inflation of 5.4% more than wiping out those gains. In Germany inflation reached 4.1% and the main public-sector union asked for a pay increase of 5%. Wages and prices even picked up modestly in Japan [33].



The causes of higher prices are clear: rampant demand for goods met bottlenecks in supply chains, and energy prices soared. Wage growth was more mysterious. In most places

employment was lower than it was before the pandemic. Yet workers seem unwilling or unable to take the abundant jobs that are on offer. The labour shortage may reflect how hard it is to move between professions and places as economies go through an unusual adjustment. Fear of the virus and the lingering effects of state support for household incomes could be what kept workers idle. The pandemic may even have led some people to put family and leisure above their careers [33].

In a tight labour market, strikers have more leverage than before. In Oct 2021, there was a wave of industrial action in the US known as “Striketober”. Partly it was the resumption of trends visible before covid-19. Nearly half a million workers were involved in work stoppages in both 2018 and 2019, the most in more than three decades. That reflected both dissatisfaction with pay and working conditions and the unions’ confidence that, in a tight labour market, they had leverage. The pandemic only reinforced these dynamics. Having been lauded as essential workers during covid, everyone from nurses to food-packers expected better treatment. And with companies struggling to find staff, workers were emboldened [34].

*Economist*, “Wages in Germany: Hard bargains”, 16 Oct 2021, p. 62.

A highly skilled workforce, harmonious labour relations and restrained wage growth: all have long underpinned Germany’s economic success. But, as the covid recovery continued, the three pillars looked wobbly. A shortage of skilled workers became more acute. Pay rose against the backdrop of higher inflation. Disgruntled unions even threatened to strike.

Average wages in Germany rose by 5.5% in the second quarter of 2021, compared with 2020. That may in part reflect a base effect: pay fell by 4% in the same period in 2020, when the economic shock from the pandemic hit. Still, workers in 2021 were in their strongest position in 30 years, says Gabriel Felbermayr of the Kiel Institute for the World Economy, a think-tank. Bosses chased skilled staff in particular. Automation and migration could not make up the shortfall, says Carsten Brzeski of ING, a bank.

Trade unions were not shy about using their increased power. Unions used to prefer preserving jobs to securing pay rises, and so tended to come to an agreement with bosses who were unable to afford higher wages. Things were more fractious in 2021. Some workers went on strike demanding a fairer share of a surge in profits in sectors benefiting from covid-19. The boss of IG Bau, a union representing construction workers warned of a first nationwide strike in 20 years if employers did not meet demand for a wage increase of 5.3%. [In the end it agreed to a pay increase of 3.3% in 2022 and 2% in 2023].

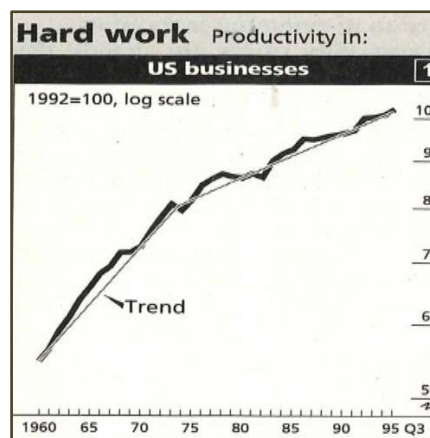
### Productivity

Productivity is the magic elixir of economic growth. Increases in the size of the labour force or the stock of capital can raise output, but the effect of such contributions diminishes unless better ways are found to make use of those resources. Productivity growth – wringing more output from available resources – is the ultimate source of long-run increases in income. It is not everything, as Paul Krugman, a Nobel economics laureate, once noted, but in the long run it is almost everything [35].

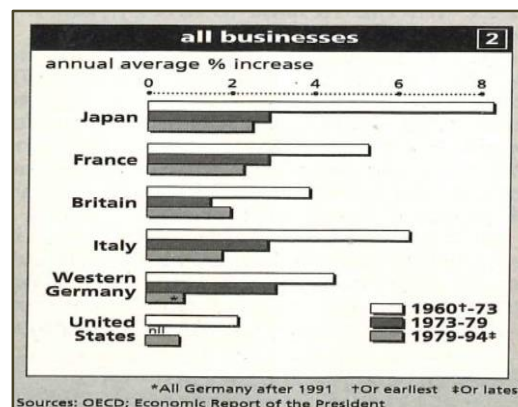
Economists know less about how to boost productivity than they would like, however. Increases in labour productivity (i.e., more output per worker per hour) seem to follow improvements in education levels, increases in investment (which raise the level of capital per worker), and adoption of new innovations. A rise in total factor productivity – or the efficiency with which an economy uses its productive inputs – may require the discovery of new ways of producing goods and services or the reallocation

of scarce resources from low-productivity firms and place to high-productivity ones [35].

Over the long run, nothing affects average workers’ pay-packets more than labour productivity. The principle is simple: divide the total output of goods and services in different sectors by the number of hours worked that it took to produce them. Rising productivity is a sign that workers churn out more per hour than in the past. This implies that their total hourly compensation (wages plus other benefits such as health care and pensions) should rise. As chart 1 (US productivity) shows, average productivity of US non-labour (farming is excluded because of the effect weather plays on output) grew by almost 3% a year between 1960-73 but by an annual rate of 1.1% from 1973 to 1995.



For comparison, chart 2 (productivity across all business sectors in selected OECD countries) compares the US performance with that of other rich countries. The US rate was the lowest. What explained this? Economists are not short of suggestions [36].



One is that these countries began the post-war period far behind the US and had been catching up. A second is that investment – whether in physical capital or in skills – tends to increase labour productivity, by making workers more efficient; and Europe and Japan had invested more heavily than the US. The first explanation suggests there was nothing much the US could do about its weak relative performance; the second suggests that policy changes might improve it [36].

A third possibility is that the US’s relative performance was not bad at all. Instead, it could be due to faulty measurement. In manufacturing output is relatively easy to gauge and US productivity performance has been impressive, but by the mid-1990s the sector only accounted for 17% of GDP, a lower share than in other developed countries. Much of the rest of the US economy was devoted to providing services, where output and hence productivity is trickier to measure. The CPI fails to take into account quality improvements, or the possibility that goods can be purchased more cheaply from discount stores. US output



measures fail to capture productivity gains, so the argument goes<sup>9</sup> [36].

In the service sector, Mr. Gordon, economist at Northwestern University, argues that that much of the US's poor performance stemmed from the structure of its labour market. Weak unions and low minimum wages allowed real wages at the bottom to fall. A US firm could hire relatively more (cheaper) workers than a European counterpart. (US restaurants hire more waiters and table-clearers than the European equivalent.) Slow overall growth in productivity in these US sectors was, in part, the mirror image of high unemployment in Europe [36].

Mr. Gordon highlights a crucial point: that it makes no sense to look for one general explanation of declining productivity growth. The shift to services, with its measurement problems, may explain much. But so may the fact that the US has a more efficient labour market, that it saves less than other economies, and that as a technology leader, it is likely to improve less fast than countries catching it up [36].

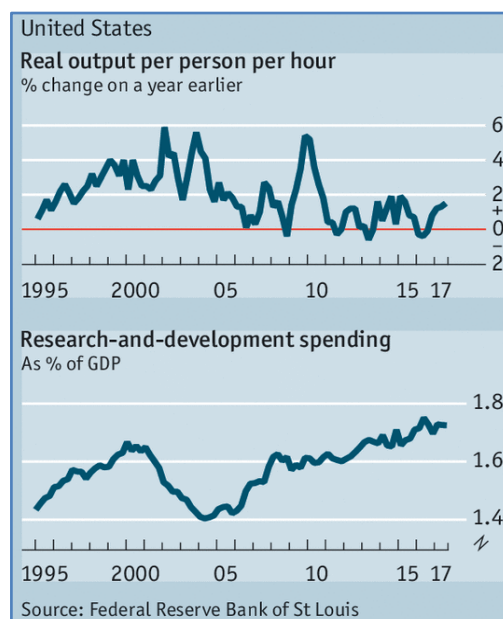
After the mid-1990s, information technology, as measured through research and development, was expected to be a driver of growth. Productivity questions began to heat up again in the 2010s. Why is productivity growth low if information technology is advancing rapidly? Its salience has grown as techies have become convinced that machine learning and artificial intelligence will soon put hordes of workers out of work (among tech-moguls, Bill Gates has called for a robot tax to deter automation, and Elon Musk for a universal basic income). A lot of economists think that a surge in productivity that would leave millions on the scrapheap is unlikely soon, if at all. The 2018 meeting of the American Economic Association showed they were taking the tech believers seriously. A session on weak productivity growth was busy; many covering the implications of automation were packed out [37].

Productivity pessimism returned. From 1995 to 2004 US output per hour worked grew at an annual average pace of 2.5%; from 2004 to 2016 the pace was just 1%. Elsewhere in the G7 group of rich countries, the pace was slower still. An obvious explanation is that the GFC led firms to defer productivity-boosting investment. Not so, say John Fernald, of the Fed Bank of San Francisco, and co-authors, who estimate that the US slowdown began in 2006. Its cause was decelerating “total factor productivity”—the residual that determines GDP after labour and capital are accounted for. Productivity stagnated despite swelling research spending (see chart, real output). This supports the popular idea that fewer transformative technologies are left to be discovered [37].

Others take almost the diametrically opposed view. Erik Brynjolfsson of MIT pointed to sharp gains in machines' ability to recognise patterns. They can, for instance, outperform humans at recognising most images—crucial to the technology behind driverless cars—and match dermatologists' accuracy in diagnosing skin cancer. Mr Brynjolfsson and his co-authors forecast that such advances would eventually lead to a widespread reorganisation of jobs, affecting high- and low-skilled workers alike [37].

Productivity pessimism remains the norm among official forecasters, but more academics are trying to understand how automation may affect the economy. In a series of papers, Daron Acemoglu of MIT and Pascual Restrepo of Boston University present new theoretical models of innovation. They propose that technological progress be divided into two categories: the sort that replaces labour with machines; and that which creates new, more complex tasks for humans. The first,

automation, pushes down wages and employment. The second, the creation of new tasks, can restore workers' fortunes. Historically, the authors argue, the two types of innovation seem to have been in balance, encouraged by market forces. If automation leads to a labour glut, wages fall, reducing the returns to further automation, so firms find new, more productive ways to put people to work instead. As a result, previous predictions of technology-induced joblessness have proved mostly wrong [37].



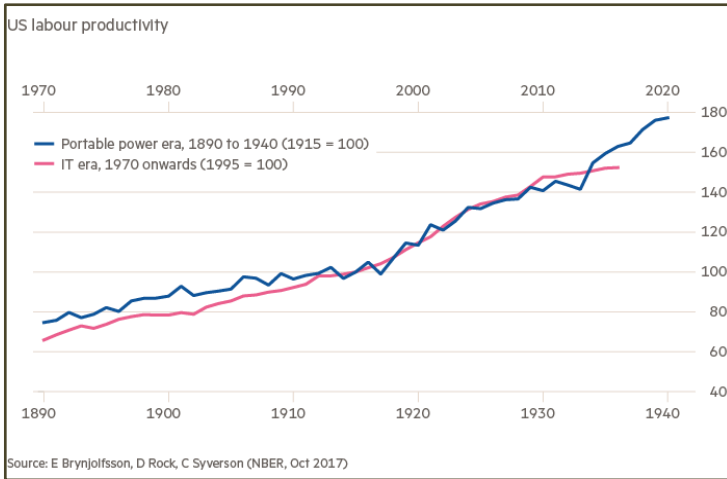
However, the two forces can, in theory, fall out of sync. For example, if capital is cheap relative to wages, the incentive to automate could prevail permanently, leading the economy to robotise completely. The authors speculate that, for now, biases towards capital in the tax code, or simply an “almost singular focus” on artificial intelligence, might be tilting firms towards automation, and away from thinking up new tasks for people. Another risk is that much of the workforce lacks the right skills to complete the new-economy tasks that innovators might dream up [37].

These ideas shed light on the productivity paradox. Mr Brynjolfsson and his co-authors argue that it can take years for the transformative effects of general-purpose technologies such as artificial intelligence to be fully felt.<sup>10</sup> If firms are consumed by efforts to automate, and such investments take time to pay off, it makes sense that productivity growth would stall. Investment has not been unusually low relative to GDP in recent years, but it shifted to research and development spending away from structures and equipment [37] [38].

If research in automation does start yielding big payoffs, the question is what will happen to the displaced workers. Recent trends suggest the economy can create unskilled jobs in sectors such as health care or food services where automation is relatively difficult. And if robots and algorithms become far cheaper than workers, their owners should become rich enough to consume much more of everything, creating more jobs for people [37]. It took time before powered machinery was able to improve labour productivity in the US economy, when levels increased more quickly after 1920 and again after 1930. The same tendency in labour productivity from IT adoption appears to be playing out (see chart, US labour productivity) [38].

<sup>9</sup> Gordon, R., “Problems in Measurement and Performance of Service-Sector Productivity in the US”, NBER Working Paper, No. 5519, Mar 1996, access at <https://www.nber.org/papers/w5519>.

<sup>10</sup> Brynjolfsson, E., D. Rock and C. Syverson, “Artificial Intelligence and the Modern Productivity Paradox: A Clash of Expectations and Statistics”, NBER, working paper No. 24001, Nov 2017, access at <https://www.nber.org/papers/w24001>.



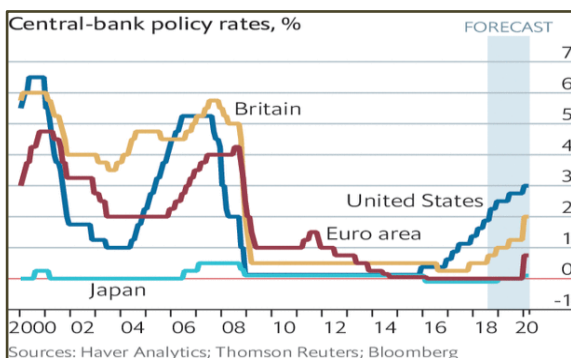
The risk is that without sufficient investment in training, technology will relegate many more workers to the ranks of the low-skilled. To employ them all, pay or working conditions might have to deteriorate. If productivity optimists are right, the eventual problem may not be the quantity of available work, but its quality [37].

## UNORTHODOX MONETARY POLICY AND ITS AFTERMATH

### UNORTHODOX MONETARY POLICY

In the late 1990s and early 2000s central bankers in the rich world had it easy, using monetary policy to smoothen the business cycle. By raising or lowering the official interest rate, they could stimulate or dampen the economy. Rate changes rippled fairly predictably through the banking system and bond markets, thereby affecting the price of borrowing across the economy [39] (encouraging saving with rate hikes and signaling to the market that the central bank wants to slow growth).

In 2001, after the dot.com bubble led to recession, the Fed cut rates from 6.5% to 1% in response. The rate rose to 5% when in early 2007, a collapsing housing market forced a return to cutting. In late 2008, as the full extent of the recession was becoming clear, rates dropped to near zero, leaving the Fed to combat the worst downturn in generations that damaged the financial system and caused deep recession (from a credit crunch that delivered a massive blow to demand), without its main weapon. Central banks in the US and UK were forced to push their official rates to close to zero in 2009 [39][40]. In July 2012 the ECB joined them, slashing its deposit rate to 0% and its main policy rate below 1% (see chart, central bank-policy rates [40]). The BoJ began setting rates near zero in the 1990s when it started fighting deflation after an asset-price crash [41] [38].



Central banks in developed economies faced a frightening collapse in output and soaring unemployment without recourse to the tool that had been the mainstay of monetary policy-making for a generation [42]. Monetary policymakers became

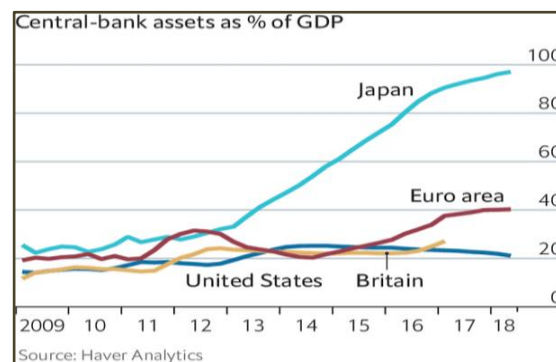
reliant on “unconventional” measures. The International Monetary Fund (IMF) noted that “central banks in advanced economies responded with unconventional tools to address two broad objectives: first, to restore the proper functioning of financial markets and intermediation, and second to provide further monetary policy accommodation. . . . The two objectives, while conceptually distinct, are closely related” [43] [41].

From the GFC until the pandemic’s return to inflation, central banks almost exclusively relied the much more contentious and less certain instrument of quantitative easing (QE) [40]. Unconventional monetary policy covers everything from negative interest rates to a change in inflation targets, but QE, the creation of (central bank) money on a large scale to buy assets, was most popular tool since the GFC [44]. Printing money to buy assets under a QE programme was first attempted in 2001 by the BoJ when it announced purchase plans in terms of a desired increase in the quantity of bank reserves. It promised to buy ¥400 billion-worth of government bonds a month to raise the level of reserves to ¥5 trillion [42].

### Quantitative easing

First, some definitions. In normal times central banks move short-term interest rates via “open-market operations”: by buying or selling securities, they supply or subtract reserves from the banking system. The quantity of reserves that banks hold is a secondary consideration; the real target is the interest rate. A lower rate encourages spending and investment to boost the economy. However, in times of severe economic distress, rates may fall to zero rendering this standard tool useless [44].

QE has now come to refer to several flavours of asset-purchase programmes designed to reinforce monetary policy [44][40]. Outright asset purchases held by central banks increased substantially as a % of GDP (see chart, bank assets) [40]. The US Fed had to be particularly imaginative because the US financial system was more complex and more dependent on “shadow banking” – intermediation outside the banking system – than were those of other advanced economies. Liquidity provision was extended to non-bank entities, for example, such as securities firms [44].



The Fed’s purchase of private assets was aimed at supporting markets and improving the impaired balance sheets of banks and other financial intermediaries. The purchase of government bonds was expected to persuade the holders to shift their portfolios towards riskier assets [45].

In one version of QE, “credit easing”, the aim is to support the economy by restoring a degree of normality to financial markets and institutions by boosting liquidity and reducing interest rates when credit channels are clogged. The Fed’s purchases of mortgage-backed securities, the demand for which weakened sharply during the GFC, fell into this category [44].

A second type of asset purchase aimed to boost the economy without creating new money. An example is the Fed’s

“Operation Twist”, where the Fed sold short-term debt and used the proceeds to buy long-term debt. Giving investors cash for long-term debt was intended to prompt them to invest more money in other assets [44].

QE proper is a third type. The most straightforward way this was meant to help the economy was through “portfolio rebalancing”. The investors who sold securities to the central bank then took the proceeds and bought other assets, raising their prices. Lower bond yields encouraged borrowing; higher equity prices raised consumption; both helped investment and boosted demand. To the extent that investors added foreign assets, portfolio rebalancing also weakened the domestic currency, and fueled exports [44].

If a central bank is expected to hold on to the government debt it buys, then QE can also support the economy by cutting government-borrowing costs and reducing the future burden of taxation. It can work by changing expectations, too. A promise to keep short-term interest rates low for a long time may be more credible if it is accompanied by QE, since the central bank is exposing itself through its holdings to the risk of a rise in interest rates [44].

QE is held to affect monetary conditions via a “scarcity channel”, a “duration channel” and a “signalling channel”. By reducing the availability of assets, QE causes investors to shift towards assets deemed close substitutes. This should raise prices and lower yields. By limiting access to long-maturity financial assets, QE lowers the riskiness of investors’ portfolios. That should increase prices and lower yields for all maturities, not just those of the assets the central bank purchases. Finally, QE puts the central bank’s money where its mouth is, thereby reinforcing credibility. For this reason, it is a complement to another unconventional policy, namely “forward guidance” on future short-term interest rates [45].

“Forward guidance” requires two policy tools working together: asset purchases and a credible commitment to keep future rates down. To illustrate, between 2009 and 2013 the Fed had made large-scale asset purchases by buying financial assets including government and corporate debt and pools of household mortgages. Over the same period the Bank of England (BoE) purchased £375 billion (\$585 billion) of government bonds. The asset purchases pushed up bond prices, pushing down the yields, or interest rates, on these assets. This cut the costs of finance across the economy. If asset purchases target the cost of borrowing now, the second tool targets the rates that people expect to pay and receive in the future. In 2008 the Fed indicated that its policy rate, then below 0.2%, would be low “for some time”. In 2011 it was more explicit, saying that low rates would be “warranted” until mid-2013. In 2012 it went further still, committing to keep rates low until unemployment, then at 7.6%, fell below 6.5% [39].

The idea behind “forward guidance”, a tactic since adopted by both the BoE and the European Central Bank (ECB), is that anyone considering a loan needs to take into account both the rate of interest today and the likely rates in the future. If central banks can make a credible commitment to keep rates in the future down, the expected payment on floating-rate mortgages and car loans will drop. Even those borrowing at fixed rates would be able to save money by refinancing at lower costs. Consumption and investment would be more attractive as a result [39].

Perhaps the best example of this combination of strong words and deeds comes from the ECB. In July 2012 Mario Draghi, its president, announced it would do “whatever it takes” to ensure that the euro area survived. His pledge was backed by a new scheme to buy up debt issued by troubled governments. The promise was enough: interest rates in Spain fell by 250 basis points in 2013. The commitment worked, despite the fact that

debt had yet to be bought. Central bankers may inhabit a new world, but they can still be as influential [39].

That’s the theory. Efforts to divine the actual results of these interventions are messy. Unconventional monetary tools were only rarely used before the crisis, which means the sample size of case studies is small. And events stubbornly refused to pause in the immediate wake of new QE, making it hard for economists to isolate its impact [44].

The BoJ pioneered QE’s use as a tool of monetary policy in 2001, but it used it in a relatively limited way. Its goal was to buy enough securities to create a desired quantity of reserves hoping to raise asset prices and end deflation. In the 2007 crisis, however, the Fed, the BoE and, from 2013, the BoJ used it extremely aggressively [45].

*Economist*, “Monetary policy: Today’s arsenal”, Special report, *The World Economy*, 13 Oct 2018, p. 7-9.

How it works?

QE is thought to work in several different ways. Banks hold bonds as a safe but better-yielding alternative to cash. When central banks buy bonds, it is assumed that banks, rather than keep the cash, will buy better-yielding replacements. Those purchases should raise asset prices and reduce borrowing costs across the economy, making it more attractive to borrow and invest. By lowering rates on long-term government bonds, QE can also loosen borrowing constraints on the government and perhaps allow it to ease fiscal policy. And QE might encourage the economy’s “animal spirits”, persuading people that the central bank is committed to growth.

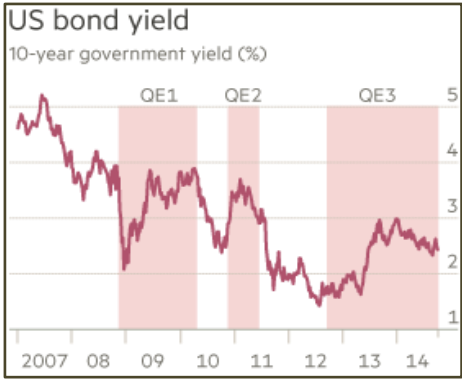
Yet the effectiveness of asset purchases depends on whether markets believe the central bank purchases will continue or whether they will be unwound in due course. If the central bank allows its balance sheet to shrink, declining to redeploy all of the cash it was paid when bonds matured, it can undermine the effectiveness of future QE by indicating that most purchases are likely to be temporary.

QE can also be undermined by the low level of long-term rates. The smaller the difference between the yield on the new money, credited to bank reserves, that the central bank uses to purchase bonds and that on the bonds being purchased, the less of an incentive private banks will have to hunt for other assets to replace their government bonds. Central banks could deal with this by buying more exotic assets, on which yields remain high. That would expose them to a greater risk of financial losses, which could invite political scrutiny. US law explicitly authorised the Fed to buy debt securities with government guarantees, as well as foreign exchange and gold. Corporate bonds and stocks were not specifically authorised. If the Fed tried to buy them, it might face a court challenge.

The ECB faced its own constraints. In Dec 2018, the ECB’s balance-sheet grew from around €1.5trn (\$1.8trn) before the crisis to roughly €5trn. In March 2015 the ECB intended to buy no more than 25% of an issuer’s outstanding bonds, to avoid becoming the primary creditor to euro-area governments. The threshold was raised to 33%. Germany’s shrinking debt (a result of its persistent budget surpluses) posed a particular problem; earlier in 2018 the ECB began buying bonds issued by state-owned German banks to keep up the German share of purchases. A new downturn that required the resumption of purchases, could quickly threaten to make the ECB the main creditor of several member states and important financial institutions, or else lead to a wildly disproportionate share of purchases flowing to the most troubled states, or both.

QE was politically controversial. When it was first introduced in the US, members of congress accused the Fed of courting hyperinflation. Germany saw the ECB's asset-purchase programmes as debt monetisation: a backdoor bail-out of governments that lacked the moral courage to balance their budgets. The rub for central banks is that what makes asset purchases most effective—a promise not to reverse them, paired with a commitment to reflate a sagging economy—was also most likely to rile politicians worried about fiscal moral hazard and runaway inflation.

From Nov 2008 to Nov 2009, the Fed purchased Treasuries worth \$300bn, as well as debt of government-sponsored mortgage agencies valued at \$175bn and mortgage-backed securities worth \$1.25tn. This came to be called QE1 (see chart US bond yield). It was more credit easing than QE proper. The Fed put QE2 into effect from November 2010 by purchasing \$600bn of Treasuries by June 2011 [45].

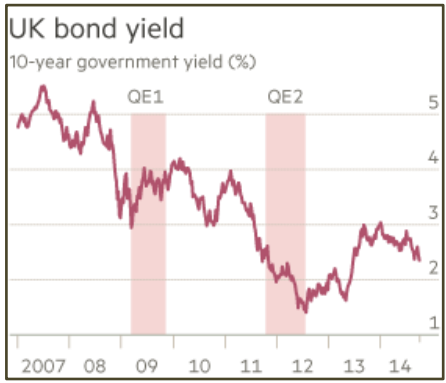


The Maturity Extension Programme – known as “Operation Twist” and worth \$667bn – ran from September 2011 to December 2012. In this the Fed sold short-term Treasuries in return for longer-term ones. The final stage, QE3, began in September 2012. Initially, it focused on the mortgage-backed securities of government-sponsored enterprises. It followed up with purchases of Treasuries from December 2012. This had a predominantly monetary purpose: it was no longer to restore the financial sector to health. Its aim was to prevent excessively low inflation and restore the economy to health [45].

In the UK, the BoE launched its first QE programme, worth £200bn, in January 2009, adding a second, worth £175bn, in October 2011. Under these programmes, the BoE bought only government bonds, or gilts. These QEs were monetary. Credit easing in the UK began in July 2012 with Funding for Lending, organised with the Treasury. The expansion of the BoE's balance sheet, relative to the size of the economy, was almost identical to that of the Fed (see chart, UK bond yield) [45].

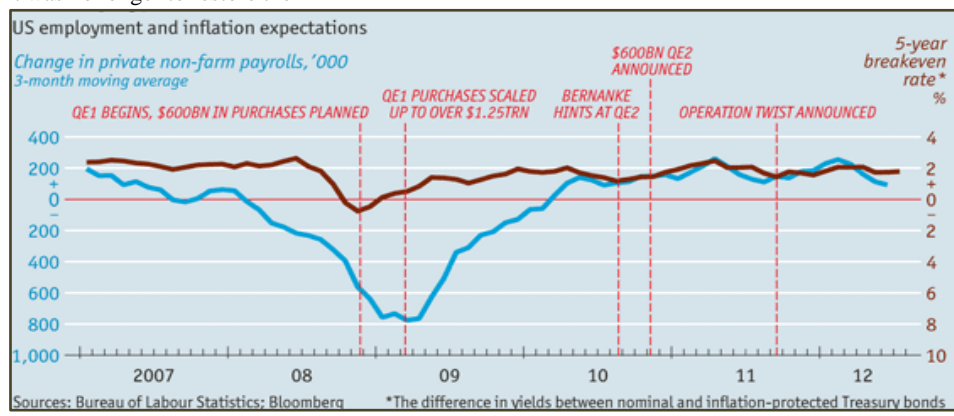
The BoJ introduced its “comprehensive monetary easing” in October 2010, intended to be worth ¥76tn by the end of 2013. After the election of Shinzo Abe as prime minister, it launched its “quantitative and qualitative easing” (QQE), in April 2013.

This aimed to increase the monetary base by between ¥60tn and ¥70tn annually [45].



With QE increasingly pivotal to monetary policy, how much bang for the buck (or yen or euro) does it deliver? Credit easing played a role in restoring US financial markets to health, but how has QE worked? This question is hard to answer. QE is far from the only reason long-term interest rates remained low. In the UK, for example, long-term rates stayed low after it ended. The explanation is the belief that the economy would stay weak and so accommodative policies would prove long-lasting [44].

Empirical studies<sup>11</sup> generally turn up positive results from central-bank asset purchases. They appeared to move interest rates, for example. The BoJ's QE in 2001 quickly cut short-term rates to zero and is generally thought to have had a small but meaningful downward impact on medium- and long-run interest rates. Early reviews of crisis-era asset purchases were likewise modestly positive. The trillion-dollar question is whether QE boosted the broader economy. Before leaving the Fed in 2014, Chairman Bernanke was asked if he was confident that QE would do the job. He replied: “The problem with QE is it works in practice but does not work in theory.” The chart (US employment and inflation expectations) shows a boost in non-farm payrolls (a proxy for job growth) and an uptick in inflation (end of deflation) [44].



Estimates from the San Francisco concluded that \$600bn of asset purchases took 1.5 percentage points off of the US jobless rate (payroll employment could have been as much as 3m workers higher than would otherwise have been) and tended to lower the yield long-term (10-year Treasury) rates by 15-25 basis points. Real output by late 2012 may have been 3% higher than it would have been in the absence of QE1 and QE2. Research by some BoE economists on the impact of its first £200 billion in QE purchases suggested that it may have raised

<sup>11</sup> F. Kydland and E. Prescott (1977). “Rules rather than discretion: The inconsistency of optimal plans”, *Journal of Political Economy*.  
M. Woodford (2012), “Methods of Policy Accommodation at the Interest-Rate Lower Bound”, Columbia University.  
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Beltran, D., M. Kretchmer, J. Marquez and C. Thomas (2012). “Foreign Holdings of U.S. Treasuries and U.S. Treasury Yields”.  
Warnock, F. and V. Warnock (2009). “International Capital Flows and U.S. Interest Rates”, *Journal of International Money and Finance*.  
Kaminska, I., D. Vayanos and G. Zinna (2011). “Preferred-habitat investors and the US term structure of real rates”, Bank of England Working Papers, 2011.

the UK's real GDP by as much as 2% and inflation by 1.5%, an impact equivalent to a 3-percentage-point cut in the main interest rate. Although a different BoE study found a more modest impact, the data suggested that QE helped the real economy [41] [38].

Causation was harder to discern for equity prices. Some of the expected impact may have been priced in before QE was announced, as happened when Chairman Bernanke, hinted at QE2 in the summer of 2010. Yet QE programmes in Japan, the UK and the US appear to have been associated with rising equity prices [45].

The IMF argued that the signalling channel was most important, at least in the US, although the portfolio balance channel seems to be important in the UK, perhaps because markets are more segmented from one another. What effect did this have on economies? Economists largely agree that QE raised asset prices, including equity prices, and affected economies positively. For this reason, the IMF recommended aggressive QE, including purchases of government bonds, by the ECB. Moreover, there was some evidence that these effects, too, were strongest via the signalling channel, probably because QE was seen to cut off the tail risks of a still deeper slump. Thus, QE proved itself to be a useful instrument under slump conditions, the view of most policy makers and academics [45].

To critics, even the gains suggested by the studies did not justify the risks, great and small, of large-scale asset purchases. Three dangers stand out. The first threat is to the function of some financial markets. The Bank for International Settlements (BIS) argued in an annual report that huge growth in bank reserves was driving overnight-lending rates to zero, causing the market for unsecured overnight lending to atrophy. Since the unsecured overnight rate has been the principal policy lever for central banks, this development could, the BIS warned, make it hard for them to rein in inflation in the future [45].

A second risk from QE is of distortions in the market for government debt. The borrowing costs of some governments were extraordinarily low—an auction of ten-year Treasuries in 2012 produced record-low yields. A flight to safety was a contributing factor, but it seems that markets either anticipate decades of abysmal economic growth, or the risk premium for holding long-dated bonds was unsustainably low, thanks in part to central-bank purchases. Any adjustment may be sudden and have unpredictable consequences [45].

A related concern is that QE can reduce market pressure on sovereigns that would otherwise face higher interest rates and a corresponding need to deal responsibly with their public finances. This is not a concern to take lightly. A central bank can lose control over inflation if the market loses confidence in the sovereign and the bank is forced into buying government debt. On the other hand, a central bank that neglected its duties to play fiscal watchdog could risk its independence [45].

One line of criticism is that QE works mainly by distorting asset prices, particularly those of long-lived assets, such as equities. But as the distortions unwind, a new round of difficulties would be created. The argument against this is that it is an objection to active monetary policies, not QE alone. Another criticism is that buying bonds has adverse distributional consequences, benefiting rich owners but damaging subsequent returns on long-term savings. Yet, again, this effect is largely due to ultra-low interest rates. QE is just the icing on that cake. Moreover, if interest rates had been substantially higher, economies would have been far weaker, resulting in far more bankruptcies. That, too, would have created large losses, including for many savers [45].

A closely related line of criticism is that QE was preventing the deleveraging of the private sector and keeping “zombies” (both corporate and governmental) out of bankruptcy or default. More

broadly, these policies reduced the pressure for radical restructuring and reform necessitated by the unsustainable pre-crisis trends and post-crisis legacy. These are legitimate concerns, but they are not about QE per se but rather about ultra-easy monetary policy [45].

Yet another line of criticism is that QE, particularly by the Fed, guardian of the world's principal reserve currency, have disruptive global spillover effects. Emerging economies, notably Brazil and China, made these complaints strongly. Again this is more a criticism of the entire stance of monetary policy rather than of QE in itself. But the most important point by far is that another great depression or even a far weaker recovery would have been much worse. The early interventions were unquestionably of benefit to everybody. Moreover, in a world of floating exchange rates, countries have to prepare themselves for changing monetary policies and fluctuating exchange rates elsewhere. The hope was whether emerging economies were now properly prepared for the ending of QE [45].

According to the IMF, QE1 did raise asset prices, including those of foreign currencies. Later ones seem to have had a smaller effect. But, in the US, the case for a weaker dollar and an adjustment in its external balance was strong. Nor does it make any sense to expect the US or other crisis-hit countries to stick in recession for the (often imaginary) sake of other countries [45].

Part of what lies behind this set of criticisms is a struggle over the balance of financial power. Creditor countries believe they are morally entitled to dictate to deficit countries. But they cannot dictate to the country that issues the global reserve currency. So the US was able to force adjustment upon others, including China, by pursuing policies that were in its own interests. Inside the eurozone, the creditors have far more power: this has not gone well [45].

A far wilder, albeit popular, criticism is that QE must lead to hyperinflation or at least very high inflation. This misguided criticism is based on a mechanical application of the outmoded idea that bank lending is dictated by availability of banking reserves [45].

QE is an extreme version of traditional open-market operations of central banks. So it does increase banks' reserves. Yet no mechanical link exists between reserves and lending in a modern banking system. Institutions know the central bank will provide them with the money they need, to provide customers with cash or settle with other banks, so long as they stay solvent. The determinant of bank lending and so their creation of money is their perception of the risks and rewards of lending, not the size of their reserves [45].

If these criticisms were mostly misplaced or exaggerated, QE still created significant risks. Exit is the obvious one. Yet many ways of handling it exist. Interest rates can be increased, by raising rates paid on reserves. Term open-market operations (“reverse repos” or other liquidity absorbing instruments) can be used to drain excess reserves. Central banks do not have to sell the assets they have bought either: these can mature. The main risk is that raising rates from ultra-low levels might be disruptive [45].

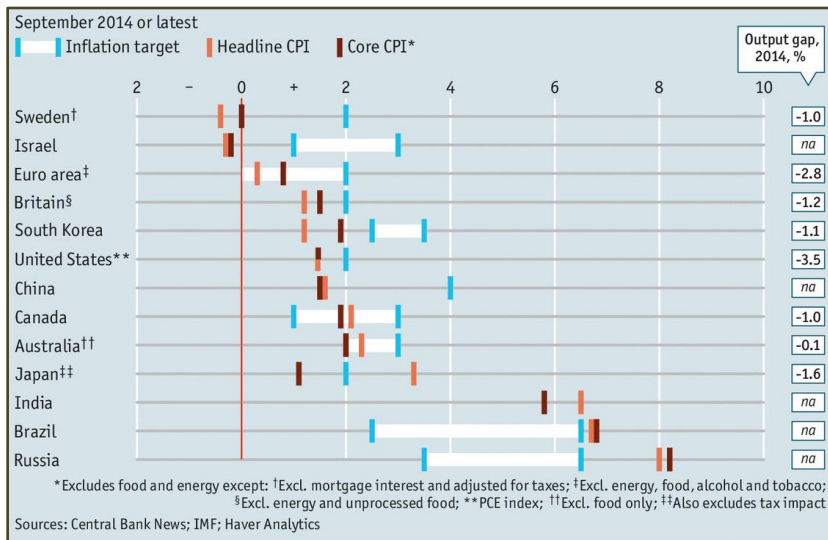
Central banks can also leave reserves permanently higher. This would turn QE into a form of “helicopter money”, retrospectively. By this is meant scattering money across the population, suggested by Milton Friedman. That option has not been employed. Yet, done on a suitably large scale, helicopter money would, as Willem Buiter, chief economist of Citi, argues, end deficient demand. In irresponsible hands it could also cause hyperinflation. But it need not do so [45].

## Deflation and negative interest rates

Economists widely thought that, in practice, the lowest possible interest rate was the “zero lower bound”. The alternative to keeping money in banks is holding it as cash. Below a zero interest rate, banks and their depositors have an incentive to switch to cash, which pays no interest but does not charge any either [42][43][44]. Depositors might tolerate small fees, to avoid the cost and hassle of making other arrangements—but most had assumed their tolerance would be limited [46].

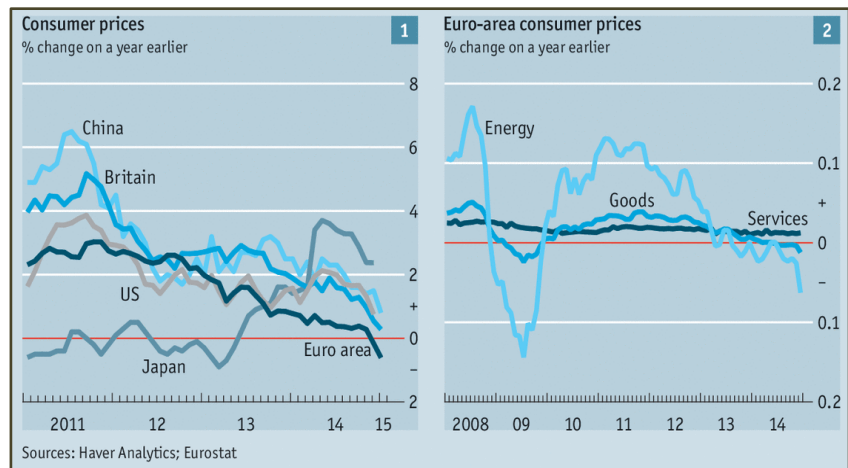
The “natural” interest rate is the level that would, in theory, cause inflation to neither rise nor fall. If rates are much lower (higher) than this, then a central bank tries to expand (contract) the economy. When an economy is struggling, the central bank usually cuts interest rates. The idea is to reduce the “real” (ie, inflation-adjusted) rate. As real rates fall, it becomes less attractive to save and more alluring to borrow. When real rates go negative, there is an extra potency: savers lose more money each year to inflation than they gain from interest. If saving is a losing proposition, investment and consumption should rise, buoying the economy [47].

Negative interest rates arrived in several countries, in response to the growing threat of deflation. To get negative real rates, the nominal interest rate must be lower than the rate of inflation; if inflation is negative, the nominal interest rate must also fall below zero [47]. The whiff of deflation was everywhere in 2014 (see charts, comparing CPI and inflation targets). The central banks of the US, UK and the euro zone had a 2% target for inflation, but inflation was below that target. The US, UK and Canada were all growing at more than 2% and still inflation was below the target. Japan, which escaped from deflation in 2013 after more than a decade of struggle, had a rate of 2.4% battled not to slip back into deflation. In China inflation was below 1%, compared with a 4% central government target [48] [49].



Oil explains a lot. The perversity of the low-inflation world was shown by the fact that the catalyst for the latest deflation scare was in itself a largely positive development. The price of a barrel of oil fell from \$115 at the end of June 2014 to about \$85 in October and to \$60 in February 2015, prompting a sharp drop in headline inflation (core inflation, which excludes energy, was not quite as low) as it trickled through economies. In the US, the price of gasoline fell 35% over the six months from February 2015, and the cost of diesel and heating oil was down, too. Across the board lower commodity prices were knocking down another 0.4 percentage points off global inflation, according to J.P. Morgan [41] [38].

The drop in oil prices was in part due to higher supply, but it also the product of slowing growth around the world. Higher supply—in itself—was not a bad thing. A fall in the oil price is a gigantic tax cut for oil importers. An IMF rule of thumb has it that a \$20 drop in the oil price adds about 0.4 percentage points to global growth [48]. Energy use is a necessity, and consumers and firms are better off with cut-price fuel. As well as lower energy bills, the cost of inputs, from plastic bottles to detergent, edge down. Some of the savings are passed on: food, which is costly to transport and requires a lot of packaging, is cheaper. These are the hallmarks of a positive supply shock: cheap oil means economies can provide more goods at lower prices. In the services sector, which relies much less on energy, transport and oil-based inputs, prices were still rising (see right-hand-side of chart, “euro-area consumer prices”) [49].



A short spell of deflation driven by cheaper oil would be tolerable in some situations. There are times when deflation can be a symptom of encouraging underlying developments, e.g., when brought about by advancing productivity it enables the economy to produce more goods and services at lower cost, raising consumers’ real incomes. However, deflation when accompanied by falling real wages can hurt workers in many sectors and cause a contraction in demand and further deflation [48]. Such was the seriousness of the situation that existed in 2014 that some central bankers were willing to give negative rates a shot at fighting deflation [47].

By 2016, almost a quarter of the world’s GDP came from countries (in Europe and Japan) with negative rates [50]. For a central bank cautious about unconventional measures, setting a negative interest rate was a bold move for the ECB. In June 2014, the ECB reduced its benchmark interest rate, at which it lends to commercial banks, to 0.15% and its deposit rate, which it pays to banks on their reserves, to -0.1%. By September, the ECB

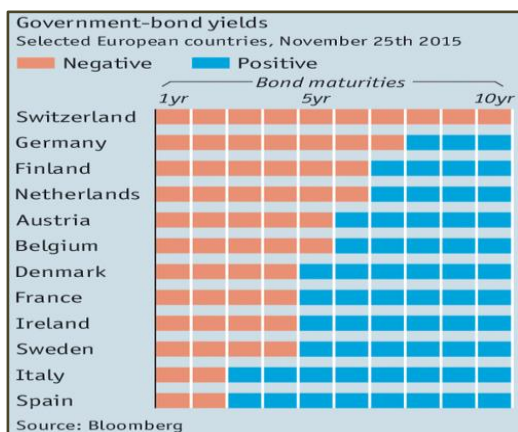
cut the deposit rate again, to -0.2% (see chart, deposit rates) [46] [51]. Sweden and Switzerland also had negative rates and Denmark since 2012. Central banks in effect began charging commercial banks to hold their excess deposits at the central bank, in the hope that it would drive down borrowing costs more generally. The intention was to spur banks to use “idle” cash balances, boosting lending, as well as weakening the local currency by making it unattractive to hold. Both effects, they hoped, would raise growth and inflation [47].

In a speech, Mr Draghi claimed that the ECB’s unconventional policies, including more QE, since 2014 had been a ‘dominant

force' in spurring the euro-zone economy and staving off deflation. Lending by banks was slowly reviving. Even so, he suggested, deficient inflation and lingering concerns about the strength of recovery justified the further action [46].



Though they defy convention, they have proved a useful addition to the central-banking toolkit. The lowest deposit rate set by the central bank acts as a floor for short-term interest rates in money markets (e.g., the cost of overnight loans) and for borrowing rates generally. This is why short-term money-market rates turned negative. Borrowing costs across Europe tumbled, helping the fight against deflation and driving down exchange rates [50]. Negative policy rates and money creation through central-bank purchases of bonds or foreign currencies dragged the yields on sovereign bonds into the red all over Europe (see chart, government bond yields). That in turn pulled down the interest rates charged by banks for new loans [46].



Advocates of negative returns pointed out that banks had huge sums stashed with central banks. These "excess" reserves—those above the minimum regulatory requirement—were the result of QE schemes (in which central banks print money to buy bonds, largely from banks). The Fed's enthusiastic bond buying helped swell excess reserves in the US from \$1.9 billion in August 2008 to \$2.6 trillion in January 2015. In the euro zone they climbed from €1.8 billion (\$2.7 billion) in 2008 to €158 billion in 2013. Paying a negative rate on that pile would impose a nasty cost on banks. To avoid it, the theory runs, banks would lend more, thereby reducing their reserves [47].

Yet deposits in Europe, where rates went negative in 2014, have been stable. For commercial banks, a small interest charge on electronic deposits proved to be bearable compared with the costs of safely storing stacks of cash—and were not yet onerous enough in 2015 to try to pass on to individual depositors [50].

As in Switzerland and Denmark, Japan's central bank shielded banks from the full effect by setting up a system of tiered interest rates, in which the negative rate applied only to new reserves. As interest rates went deeper into negative territory, profit margins would be squeezed harder—even in places where central banks have tried to protect banks [50].

That would put pressure on banks to charge their own customers for deposits. Such pressure had already started to tell. Banks in Europe started to pass on some of the cost of negative rates to big corporate depositors. Their only ready alternative to

stashing large pots of cash was safe and liquid government bonds, whose yields had also turned negative, for terms of up to ten years in Switzerland. Rich personal-account holders were next. The boss of Julius Baer, a Swiss private bank, said in February 2016 that if interest rates in Europe went further into the red, it might have to charge depositors [50]. Danske Bank, Denmark's biggest, only charged negative rates to a small fraction of its biggest business clients. For the most part Danish banks decided to absorb the cost [47].

Retail customers are more resistant to charges, because small stashes can easily be stored in a mattress or a home safe. Savers might stomach a modest fee for making bank deposits, but as rates go deeper into negative territory, they would find ways to avoid charges. Switching to cash is the obvious solution, which is why some have suggested getting rid of banknotes altogether, but it is not the only one. Small savers could use any available form of prepayment—gift vouchers, long-term subscriptions, urban-transport cards or mobile-phone SIM cards—to avoid the cost of having money in the bank [50]. Depositors, to safeguard their savings, could switch to foreign currency or precious metals. Depositors could also withdraw funds in the form of bankers' drafts (certified cheques) to use as a store of value. Such drafts might even become a form of parallel currency, since they are transferable [46].

In aggregate, the quest to diminish reserves is hopeless. As soon as one bank gets rid of some, by extending a loan to buy a car, say, the car dealer deposits the proceeds in another bank, boosting its reserves. However, as banks tried to palm these reserves off on one another, they increased lending, stimulating the economy. This whole picture, however, is dependent on finding lots of willing borrowers—something that was hard to come by when optimism about the prospects of new ventures was in short supply [47].

#### Sub-zero interest rates are neither unfair nor unnatural

Interest, in many people's minds, is a reward for deferring gratification. That is one reason why low interest rates are widely perceived as unjust. Suppose shipwrecked sailors had washed ashore with perishable figs. Any one of them who was willing to save figs for later consumption would have had less to consume in future – the rate of interest would have been steeply negative. "There is no absolutely necessary reason inherent in the nature of man or things why the rate of interest in terms of any commodity standard should be positive rather than negative," Fisher concluded in *The Theory of Interest* in 1930 [51].

In 2016, the Bank of Japan began charging financial institutions for adding to their reserves at the central bank. Its negative-rate policy was harshly criticised for unsettling thrifty households, jeopardising bank profitability and killing growth with "monetary voodoo". Behind this fear and criticism was perhaps a gut conviction that negative rates upended the natural order of things. Why should people pay to save money they had already earned? Earlier cuts below zero in Switzerland, Denmark, Sweden and the euro area were scarcely more popular [51].

But these monetary innovations would have struck some earlier economic thinkers as entirely natural. Indeed, in 1916 Silvio Gesell, in *The Natural Economic Order* favoured

negative interest rates on money. In it, he spins his own shipwreck parable, in which a lone Robinson Crusoe tries to save three years' worth of provisions to tide him over while he devotes his energies to digging a canal. In Gesell's story, unlike Fisher's, storing wealth requires considerable effort and ingenuity. Meat must be cured. Wheat must be covered and buried. The buckskin that will clothe him in the future must be protected from moths with the stink-glands of a skunk. Saving the fruits of Crusoe's labour entails considerable labour in its own right [51].

Even after this care and attention, Crusoe is doomed to earn a negative return on his saving. Mildew contaminates his wheat. Mice gnaw at his buckskin. "Rust, decay, breakage...dry-rot, ants, keep up a never-ending attack" on his other assets [51].

Salvation for Crusoe arrives in the form of a similarly shipwrecked "stranger". The newcomer asks to borrow Crusoe's food, leather and equipment while he cultivates a farm of his own. Once he is up and running, the stranger promises to repay Crusoe with freshly harvested grain and newly stitched clothing [51].

Crusoe realises that such a loan would serve as an unusually perfect preservative. By lending his belongings, he can, in effect, transport them "without expense, labour, loss or vexation" into the future, thereby eluding "the thousand destructive forces of nature". He is, ultimately, happy to pay the stranger for this valuable service, lending him ten sacks of grain now in return for eight at the end of the year. That is a negative interest rate of -20% [51].

If the island had been full of such strangers, perhaps Crusoe could have driven a harder bargain, demanding a positive interest rate on his loan. But in the parable, Crusoe is as dependent on the lone stranger, and his willingness to borrow and invest, as the stranger is on him [51].

In Japan, too, borrowers are scarce. Private non-financial companies, which ought to play the role, have instead been lending to the rest of the economy (see chart, previous page, Central-bank deposit rates), acquiring more financial claims each quarter than they incur. At the end of September 2017 they held ¥259trn (\$2.4trn) in currency and deposits [51].

Gesell worried that hoarding money in this way perverted the natural economic order. It let savers preserve their purchasing power without any of the care required to prevent resources eroding or any of the ingenuity and entrepreneurialism required to make them grow. "Our goods rot, decay, break, rust," he wrote, and workers lose a portion of their principal asset—the hours of labour they could sell—"with every beat of the pendulum". Only if money depreciated at a similar pace would people be as anxious to spend it as suppliers were to sell their perishable commodities. To keep the economy moving, he wanted a money that "rots like potatoes" and "rusts like iron" [51].

The BoJ shuns such language (and, in the past, has at times seemed determined to keep up the yen's value). But in imposing a negative interest rate in 2016 and setting an inflation target three years before, it is in effect pursuing Gesell's dream of a currency that rots and rusts, albeit by only 2% a year [51].

In fact, the downward march of nominal rates could actually impede lending. Some financial institutions had to pay a fixed rate of interest on their liabilities even as the return on their assets shrivels. The Bank of England expressed concerns about the effect of low interest rates on building societies, a type of mutually owned bank that is especially dependent on deposits. That makes it hard to reduce deposit rates below zero. But they have assets, like mortgages, with interest payments

contractually linked to the central bank's policy rate. Money-market funds, which invest in short-term debt, faced similar problems, since they operated under rules that made it difficult to pay negative returns to investors. Weakened financial institutions, in turn, are not good at stoking economic growth [47].

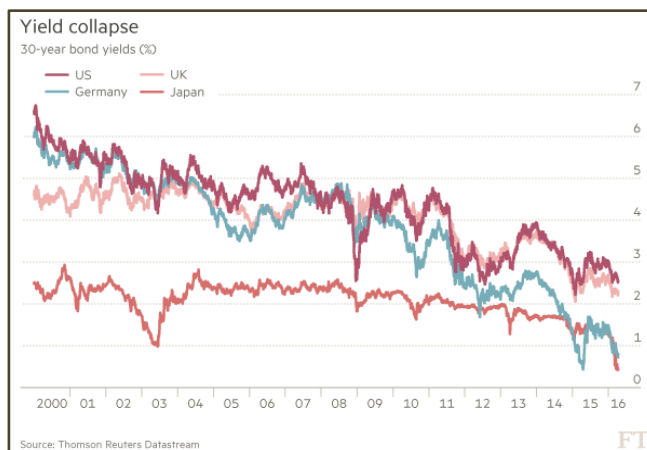
Small wonder, then, that negative rates did not seem to have achieved much. Commercial banks did not swap their reserves at the central bank for cash, as theory would suggest. The outstanding stock of loans to non-financial companies in the euro zone fell by 0.5% in the six months after the ECB imposed negative rates. That is because to do so would itself be costly. To settle payments, banks must move vast sums between themselves each day. The costs of counting, storing, moving and insuring lorry-loads of banknotes apparently trumps the smallish charge Europe's central banks are levying to hold electronic deposits [46]. In Denmark, too, both the stock of loans and the average interest rate changed little, according to data from Nordea, a bank. The only consolation was that the charges central banks levy on reserves were relatively modest: by one estimate, Denmark's negative rates cost banks just 0.005% of their assets [47]. The other possible use for banks' reserves would be to lend them to other banks, but they were already awash with the excess liquidity created by QE [46].

The biggest effect of negative interest rates may have been on currencies. Low interest rates help to pull down yields on all manner of local investments, encouraging both natives and foreigners to put their money elsewhere. As capital takes flight, the currency should fall. When the ECB introduced negative deposit rates, the euro fell against the dollar by nearly 20%.

After Sweden adopted negative rates, the krona fell to a six-year low against the dollar. It is no coincidence that the central bank with the greatest enthusiasm for negative rates was Denmark's: its sole objective is maintaining a fixed exchange rate with the euro [47]. Denmark's central bank set its main policy rate below zero for most of 2012-15 to repel capital inflows that had threatened its exchange-rate peg with the euro. In January 2015 the SNB abandoned its attempts to stop the franc from appreciating against the euro by printing and selling francs in vast quantities; instead it resorted to negative interest rates to deter investors from buying francs. Sweden's central bank, the Riksbank, took its main policy rate negative in February 2015, to weaken the krona, making imports more expensive and thus pushing inflation closer to its 2% target [46].

For all these countries, it is the exchange rate against the euro that matters most. To suppress their currencies, their central banks must offer interest rates that are further below zero than the ECB's. In November 2015, the deposit rate in Denmark and in Switzerland was -0.75%; in Sweden it was -1.1% [46].

For the critics of the use of negative interest rates, the issue is whether it was the monetary authorities hurting savers or whether the market itself is to blame, i.e., the global savings glut or investment dearth. This condition existed before and





after the crisis. Even before 2007, real long-term interest rates were in decline (see chart, yield collapse). Since then, weak private investment, reductions in public investment, a slowing trend growth of productivity and the debt overhangs bequeathed by the crisis interacted to lower the equilibrium real rate of interest [52].

Some will object that the decline in real interest rates was solely the result of monetary policy, not real forces. This is wrong. Monetary policy does indeed determine short-term nominal rates and influences longer-term ones. However, the objective of price stability means that policy was aimed at balancing aggregate demand with potential supply. The central banks merely discovered that ultra-low rates were needed to achieve this objective [52].

In brief, one must regard ultra-low interest rates as symptoms of the disease, not its cause. Yet it is right to question whether the monetary treatment employed was the best one. Here, three points can be made. One is that, given the nature of banking institutions, negative rates were unlikely to be passed on to depositors and, if so, would likely damage the banks. A second is that there is a limit to how negative rates can go without limiting the convertibility of deposits into cash. Finally, for these reasons, this policy might do more damage than good. Even supporters agree there are limits [52].

It is possible to answer such criticisms. Nevertheless, such an exceptional policy could undermine confidence more than strengthen it. Would this mean monetary policy is exhausted? Not at all. Monetary policy's ability to raise inflation is essentially unlimited. The danger is rather that calibrating monetary policy is more difficult the more extreme it becomes. For this reason, fiscal policy should have come into play more aggressively. Indeed, it is hard to understand the obsession with limiting public debt when it is quite as cheap as it was [52].

The best policies would be a combination of raising potential supply and sustaining aggregate demand. Important elements would have been structural reforms and aggressive monetary and fiscal expansion. The IMF argues that structural reforms work best in such an expansionary context. The US was more successful in delivering a more balanced set of policies than the eurozone [52].

Germany always had the option of abandoning the euro, but the outcome would be a huge appreciation of the recreated D-mark, losses on foreign assets, in domestic terms, a damaged financial sector, accelerated outward investment, deflation and hollowed-out manufacturing. Alternatively, Germany could stay inside the eurozone, understanding that its monetary policy cannot be for the benefit of creditors alone. A policy that stabilises the eurozone must help debtors, too. Furthermore, the overreliance on monetary policy is a result of choices, particularly over fiscal policy, on which Germany has strongly insisted. It is also the result of excess savings, to which Germany has substantially contributed. It should stop complaining about the ECB's attempts to deal with these dilemmas and help fix problems it has, in part, itself created [52].

Higher rates are not necessarily bad news for equities. In nine of the 12 most recent cycles, the stockmarket rose in the year following the first rate increase. Since the Fed tends to tighten when the economy is booming, profits are usually rising. In contrast, Treasury-bond yields rose in the first year of the cycle on all but one occasion [53].

A pertinent example might be the cycle that began in 1994. The Fed had kept rates low for a long time to help the financial sector, which was still recovering from the savings-and-loan crisis of the late 1980s. When it finally did begin to raise rates, the pace of tightening seemed to catch many investors by surprise, particularly those investing in mortgage-backed bonds. Askin Capital, a hedge-fund manager, went bust as a result.

Those who worry that the Fed might be moving too quickly point to policy mistakes elsewhere. As the Fed's chairman herself, Janet Yellen, remarked, "The experience of Japan over the past 20 years, and Sweden more recently, demonstrates that a tightening of policy when the equilibrium real rate remains low can result in appreciable economic costs, delaying the attainment of a central bank's price-stability objective" [53].

Japan was the first country to reduce rates to zero (hitting the "zero lower bound" in the jargon). In August 2000 the BoJ raised rates from zero even though prices were still falling; a recession started two months later. A second attempt at raising rates, in 2006, also had to be reversed two years later [53].

Similar problems bedevilled other central banks that attempted to raise rates in the wake of the financial crisis of 2007-08. The ECB pushed up interest rates in 2008 and again, twice, in 2011, as the euro-zone debt crisis was unfolding. Sweden's Riksbank went even further, pushing rates from 0.25% to 2% in 2010-11 in response to a surge in inflation; by late 2011 the bank had to change course and Sweden had negative interest rates [53].

The sluggish nature of the recovery in the rich world since the crisis, and the high levels of debt that remained, explained why it was so difficult for central banks to return to a "normal" level of interest rates. In the past, many central banks were usually raising rates at the same time. But any country that tightened policy in the 2010s would stand out from the crowd. Foreign capital would drive its currency higher, as investors took advantage of more attractive yields. That would act as a further tightening of policy, since a higher exchange rate reduces the price of imports, and so adds to deflationary pressures [53].

#### Unconventional monetary policy affecting currency markets

Emerging economies, led by Brazil's finance minister, Guido Mantega, first accused the US of instigating a currency war in Sep 2010 when the Fed created new money through QE. QE led investors toward emerging markets in search of better returns, lifting their exchange rates in the process. The implication was that QE was a form of protectionism, aimed at stealing market share from the developing world. Mr. Mantega, claimed that this was not just happening, but that it was deliberate and unwelcome: a currency war had begun between North and South. The Brazilians followed up his statement with taxes on currency inflows [54].

Those charges were also levelled at Japan in 2012 when Shinzo Abe, the prime minister, promised bold stimulus to restart growth and vanquish deflation. In 2013, the BoJ began QE, weakening the yen to bolster exports (falling 16% and 19%, respectively, against the dollar and euro) while boosting corporate profits and share prices. The complaints, however, were overdone. Rather than condemning the actions of the US and Japan, the rest of the world should have praised them—and the euro zone would follow suit [54].

The evidence for Mr Mantega's case was pretty shaky. The Brazilian real was lower than it was when he made his remarks (see chart, currencies against the dollar). The Chinese yuan gained value against the dollar since 2010 while the Korean won rallied once risk appetites recovered in early 2009. On a



trade-weighted basis (which includes many developing currencies in the calculation), the dollar was almost exactly where it was when Lehman Brothers, an investment bank, collapsed in September 2008 (triggering the US' QE programs) [54].

QE1 was in late 2008 at the time the dollar rose sharply (see chart, Fed \$ exchange rate index). The dollar is regarded as the "safe haven" currency; investors flock to it when they are worried about the outlook for the global economy. Fears were at their greatest in late 2008 and early 2009 after the collapse of Lehman Brothers. The dollar then fell again once the worst of the crisis had passed [54].



QE2, launched in Nov 2010, had more straightforward effects. The dollar fell by the time the programme finished in June 2011. However, that fall might have been down to investor confidence that the central bank's actions would revive the economy and that it was safe to buy riskier assets; over the same period, the Dow Jones Industrial Average rose while Treasury bond prices fell. After all this, though, the dollar remained higher against both the euro and the pound than it was when Lehman collapsed [54].

Nevertheless, QE did affect emerging economies. Many developing countries had export-based economic policies. So that their currencies did not rise too quickly against the dollar, thus pricing their exports out of the market, these countries managed their dollar exchange rates, formally or informally. The result was that loose US monetary policy ended up being transmitted to the developing world, often in the form of lower US interest rates. By boosting demand, the effect showed up in higher commodity prices. Gold more than doubled in price since Lehman collapsed and reached a record high against the euro in 2012. Some investors feared that QE's general tendency was the debasement of rich-world currencies that would eventually stoke inflation [54].

#### Echoes of the 1997-98 Asian financial crisis?

In the autumn of 2013 the fall in Asian currency values were strikingly similar to the months before the crisis in 1997, particularly for Indonesia, Malaysia and Thailand, which seemed at risk again. In 1997, as in 2013, US monetary policy was a preoccupation. In March 1997 the Fed raised interest rates, strengthening the dollar and sucking capital away from emerging markets. In 2013 the tapering of the massive bond-buying programme attracted money back to the perceived safety of rich-world assets.

In both instances, export growth in many Asian countries was sluggish. Both slowdowns could be attributed in part to China, but for different reasons. In the mid-1990s, China was establishing itself as the world's factory. Its exporting prowess was taking market share from countries that had industrialised earlier: not just the 'tigers' of Hong Kong, South Korea and Taiwan, but from Malaysia and Thailand too. China's phenomenal economic growth since 2000 has established it as the region's most important market. It is the biggest destination for exports from Indonesia, South Korea,

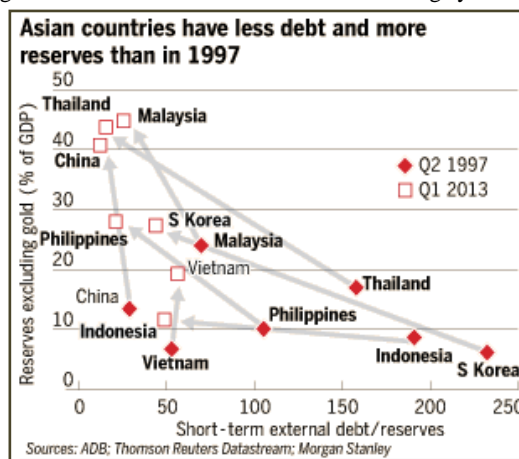
Malaysia, Thailand, Taiwan, among others. So, slowing growth in China has a big impact in its regional backyard.

Another parallel with 1997 may be that economic success created problems. Years of soaring growth in much of Asia created unsustainable booms that relied on undervalued currencies. In the late 1990s, Thailand, Indonesia and South Korea had to seek help from the IMF. Partly as a result of now largely discredited IMF austerity packages, they subsequently plunged into deep recession. Indonesia, the worst affected, lost 13.5% of GDP in a single year. Suharto, the dictator, was toppled.

Nevertheless, in some ways, Asian economies in 2013 had little in common with their 1997 incarnations. Back then, many countries had fixed exchange rates and their companies were heavily exposed to foreign debt. As currencies came under pressure, central banks desperately spent reserves to defend them. When the peg finally broke, currencies collapsed and companies' foreign-denominated debts soared.

*Economist*, "Banyan: Bad memories", 31 Aug 2013, p. 42.

In 2013, the picture was very different in terms of reserves (see chart, less debt and more reserves). Of the countries that suffered financial crashes in 1997-98, Malaysia, the Philippines, South Korea and Thailand all ran current-account surpluses. Asian economies have flexible exchange rates, abandoning hard-currency pegs and smoothing the adjustment to shifting capital flows, and accumulated much higher reserves and introduced sounder banking systems.

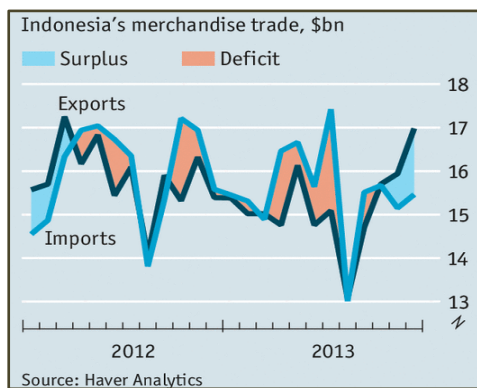


*Financial Times*, "Storm defences tested", by D. Piling and J. Noble, 29 Aug 2013, p. 5., <https://www.ft.com/content/bdbffc06-0fc2-11e3-a258-00144feabdc0>

In 2013 when Indonesia was struck by the financial storm that hit emerging markets, it was included in the naming of the "fragile five" economies (together with Turkey, India, South Africa and Brazil). As the Fed continued with its "taper" in 2014, central banks in Turkey, India and South Africa all had to hike interest rates to defend their battered currencies. Indonesia's rupiah, by contract, rallied 3.3% against the dollar and its main stockmarket valuation was hitting highs.

Indonesia owed its turnaround to timing. It earned its spot among the fragile five thanks to its large current-account deficit, which widened to a record \$10 billion, or 4.4% of GDP, in the summer of 2013. Its central bank abandoned efforts to prop up its currency and allowed it to float, leading to a depreciation of about 14% in real, trade-weighted terms. The weaker rupiah made Indonesia's exports cheaper in

foreign markets and imports more costly. The deficit dropped by more than half, to \$4 billion, or 2% of GDP, at the end of 2013. Indonesia recorded its biggest monthly trade surplus for two years; merchandise exports rose by 10.3% year-on-year (see chart, trade).



Other central banks waited too long to respond to market turmoil and then overreacted. Turkey raised rates by 5.5 percentage points in a single day, hoping to cow traders into laying down arms. Bank Indonesia raised rates earlier, by contrast, and more gradually: enough to cool domestic demand but not enough to touch off a recession. The combination of higher rates and a cheaper currency nurtured a rebalancing. Despite slower consumption growth, annual GDP growth accelerated to 5.7% in the fourth quarter, boosted by exports.

Indonesia's economic performance was due to orthodox economic policies. The central bank let market forces operate freely, allowing the rupiah to depreciate to the point where exports became competitive again.

*Economist*, "Capital flows in Indonesia: Fragile no more", 22 Feb 2014, p. 60

Thus, QE's effect on other currencies might not have been what traders at first expected. However, with the advent of all this unconventional monetary policy, foreign-exchange markets have changed the way they think and operate. Currency trading is, by its nature, a zero-sum game. For some to fall, others must rise. The unorthodox policies of developed nations have not caused their currencies to fall relative to one another in the way people might have expected. This could be because all rich-country governments have adopted such policies, at least to some extent. But it would not be surprising if rich-world currencies were to fall against those of developing countries [54].

In economic textbooks the old rule is that high inflation leads to weak exchange rates (to keep exports competitive) is much less reliable than it used to be. Currency movements counter the differences in nominal interest rates between countries so that investors get the same returns on similarly safe assets whatever the currency. Experience over the past 30 years has shown that this is not reliably the case. Instead short-term nominal interest-rate differentials have persistently reinforced currency movements; traders borrow money in a currency with low interest rates, and invest the proceeds in a currency with high rates, earning a spread (the carry) in the process. Countries with higher-than-average inflation rates tend to have higher-than-average nominal interest rates. Between 1979 and 2009 this "carry trade" delivered a positive return in every year bar three. With nominal interest rates in most developed markets close to zero in the 2010s, there was less scope for the carry trade. [54].

So instead of looking at short-term interest rates that are almost identical, investors paid more attention to yield differentials in the bond markets. D. Woo, a currency strategist at Bank of America Merrill Lynch, said that markets were moving on real

(after inflation) interest rate differentials rather than the nominal gaps they used to heed. Real rates in the US and UK were negative, but deflation in Japan and Switzerland meant their real rates were positive—hence the recurring enthusiasm for their currencies [54].

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