

WATER THOUGHTS

Part 2 of an ongoing Series of Discussions on Water.

LESSONS FROM THE VEXATIOUS GAS MARKET

SYNOPSIS

- 1. There is a lesson for participants in US water markets in the stresses and strains currently afflicting UK and European gas markets.** Those suppliers which failed to hedge their gas exposures are now unable to profitably supply energy to households at prices subject to the energy price cap imposed by the regulator. The possibility that energy firms may be required by the regulator to hedge their exposures is the subject of discussion.
- 2. Water markets and gas markets have quite similar properties,** in that they comprise a related network of regionally distinct markets.
3. Given the **importance of hydropower to energy supplies** to some European markets, **data on the availability of water has assumed a similar level of significance to the power market** as are attributed to levels of gas storage; both indicators are closely monitored by traders
- 4. A case can be made that inflation in both the US and other developed countries such as the UK is reviving.** While forecasting inflation is very difficult, rendering the outlook far from certain in either direction, what does seem to be the case is that the relatively predictable and assured environment in terms of inflation and interest rates that has been characteristic of the financial environment for many years may well have drawn to a close. This gives rise to greater uncertainties which increases the importance of hedging against unexpected and unwelcome price fluctuations.
- 5. The CPI Water and Sewer Index which includes the costs of water delivery displays** mildly countercyclical tendencies, which renders water itself an intriguing hedge against a more uncertain environment. Nevertheless the **cost of water delivery as depicted by the index bottomed out in December 2019 and has been on a rising path since then,** albeit at a rate of increase lower than the overall rate of inflation. Over time though there has been a **tendency for the cost of water supply to increase at a rate in excess of the overall rate of price inflation.**

Oil at \$190 per barrel?

The context in which financial trades are settled is in the process of changing in ways that renders the hedging of key inputs more vital than it was during the period of the “great moderation”, during which crucial variables such as inflation and interest rates were benign and quiescent and variability was slight. There is no better illustration of this than in current stressed conditions in the markets for gas especially, and spill over to oil. These have dominated the European business news cycle over the past week, and the appropriate policy response is now the subject of tense exchanges between HM Treasury and the Business Department in the UK. Although the markets for gas and oil are very different from one another – the market for gas is not global as is the oil market, instead there is a great deal more regional variation across prices, gas markets being regionally distinct – the price variations of the two track one another quite closely. Now, the surge in gas prices may spill over into the oil market. The pressure on gas prices has been attributed to a number of factors, including a lack of wind power over the European summer and therefore less electricity available from renewable sources.

Indeed water markets are very similar to gas markets in that they are regionally distinct from one another, and only partially related to one another via available infrastructure. This implies that quite significant discrepancies can arise between prices across water districts that may not be very far apart geographically if the infrastructure that would join them is missing.

According to reporters at a well-regarded UK daily paper *The Guardian* (18 Sept, 2021), “Slow wind speeds have reduced the UK’s renewable energy generation, and a string of outages at UK power plants and a major cable connecting the UK to France have forced up market prices.”

Couple these developments to the legacy of a cold winter during 20/21, and consequent unusually low gas storage levels, and the result has been to send gas prices spiralling upwards. Moreover, Europe purchases its gas on the spot market, as opposed to via long-term contracts, allowing Russia which supplies much of Europe’s oil via the oil pipeline to manipulate prices via variations in supply. According to Bloomberg, October 5th, “flows from top supplier Russia into Germany’s Mallnow via the key Yamal-Europe pipeline also dropped just as the heating season begins”.



Figure 1 – Oil and Gas Prices

Traders refer to the gas equivalent oil futures price, and, while this price has been highly volatile during the past few days, the level at which gas is trading is giving rise to a prediction in the futures market that oil could reach \$190/barrel – a significant oil price shock reminiscent of the 70s.

Although certain of the strident and superficial commentary has attempted to turn this into a debate about fossil fuels vs renewables, this is a relative sideshow to the main issues, which are deeper and more subtle than that. (For a reasoned account of the issues, including whether they portend developments in the US power market, see the article by **Brenda Schaffer**, with url at the end of this piece). Particularly apposite is the way in which renewable energy such as solar and wind sources, which are intermittent, have been incorporated into the grid which relies on gas and other fossil fuels to provide steady baseload generation. Moreover, the price of electricity generation is being set by the most expensive fuel used for generation, gas, rather than the marginal costs of renewable energy, which are minimal once the high upfront costs are accounted for.

Shortage of Hydropower

Water is also intriguingly linked to these developments. The UK imports gas from Norway, but also, crucially and along with Germany, hydropower, when available, via a new power cable. But there is pressure on Norwegian gas supplies as a result of heightened demand for gas from China, as well as lower than usual availability of hydropower. Following record warm conditions during August and September, which did not usher in the usual seasonal rainfall, reservoir levels in the Nordic region at 52.3 per cent have fallen to their lowest levels since 2006. According to Bloomberg, **“data on the availability of water is as significant to the power market as the aggregate number for European gas storage levels, which traders watch like hawks these days”**. The result is electricity prices in the Nordic region trading at levels 5x higher than they were a year ago.



This undated photo shows the Botsvatn reservoir in south Norway. (PHOTO / BLOOMBERG)

Figure 2: The Depleted Botsvatn reservoir in Norway

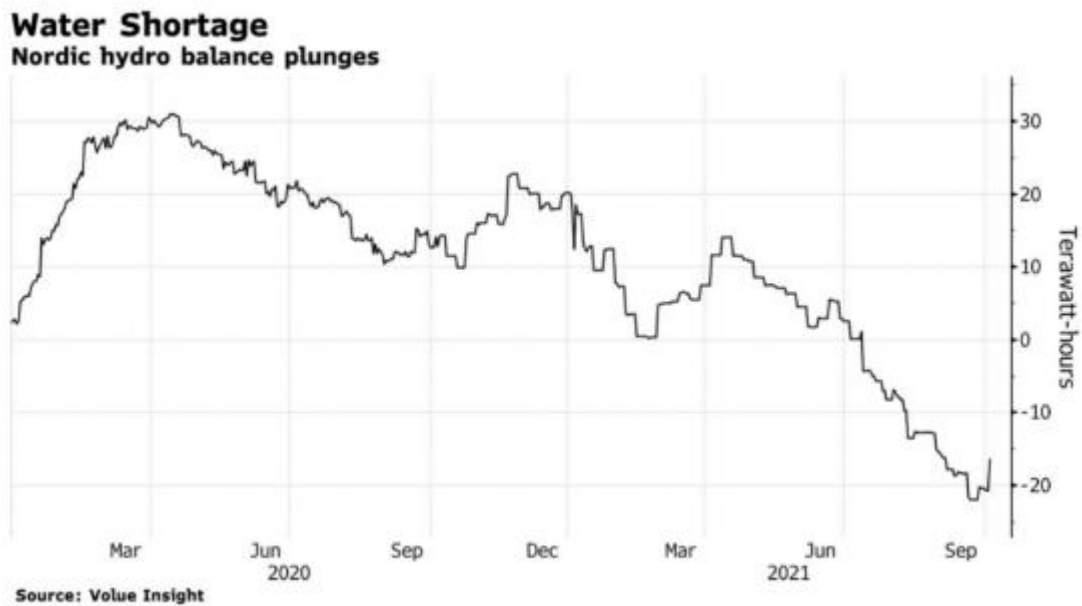


Figure 3 The “Green Battery” is this year drained and unable to compensate for shortfalls elsewhere in the System

Under normal service Norwegian hydropower serves as a kind of green battery; a stored resource that can be utilised to vary electricity supplies to offset fluctuations in energy demand and energy supplies as conditions elsewhere in the system fluctuate. Meanwhile, gas storage levels across Europe and the UK at 72 percent full are at their lowest levels in a decade, compared with 94 per cent at the same time last year, and average levels of 85 per cent. (Reuters, September 22)

UK Energy Suppliers going to the Wall

Against this background, a number of energy suppliers in the UK's private energy supply market have gone to the wall in recent weeks, with customers having to be transferred by the regulator to one of the big energy suppliers in order to ensure that their energy supplies are not interrupted as winter approaches.

The reason why many smaller suppliers have folded is to do with a failure on their part to hedge the price of crucial inputs. The UK's energy supply market is privatised but heavily regulated via Ofgem, the UK's dedicated energy regulator. There is a price cap in place on the standard variable tariffs charged to households for electricity and gas, and the regulator will not lift the cap each time the gas price advances, but will only review the price at which energy costs are capped at six monthly intervals. **Those companies which did not hedge forward their exposure to the gas price can only deliver energy at current prices at a loss**, which is why a number have ceased trading. In effect, not hedging the procurement cost of crucial inputs, especially gas, has been revealed as a form of speculation, that prices of key inputs will remain moderate; remaining uncovered and thus exposed to price fluctuations is a strategy that has backfired for many companies.

The latest twist in this saga is that energy intensive companies in sectors such as steel are also under intense pressure to the extent that their very survival is in question. For a steel company, energy costs account for roughly twenty five per cent of production costs. Although all manner of spokespersons from trades unions to the business secretary himself have called for government funding to bail out these companies from adverse trading conditions which are seen as temporary (see discussion on expectations below), the question which is not being asked is why these companies did not hedge their exposure to fluctuating costs of key inputs, especially energy, in the same way some energy companies had the foresight to do.

This development has fascinating parallels with an ongoing discussion in the water market. **Many of the organisations that would be natural participants in the Californian water futures market are utilities, which are under public control at the county or state level.** The question that often arises is **whether it would not be somehow irresponsible for these organisations which are stewards of public money to become involved in any kind of futures trading activity. These developments turn this argument on its head.** Those companies that have survived the turbulence in the UK energy market have used the futures market to hedge their gas price exposure one year forward, so as to not be exposed the present mayhem.

Futures Trading a requirement in the UK's regulated Energy Markets?

In essence, *not hedging gas exposure via forward contracts is in itself a kind of speculation. The energy companies that failed were, in effect, speculating that gas prices would remain at a level at which they could purchase gas wholesale on the spot market*, and profitably deliver gas and electricity they were contracted to supply via long-term contracts, and subject to the price cap. Now that gas prices have surged these energy companies cannot fulfil their obligations to customers, and are shutting up shop as a result.

While smaller energy suppliers that failed to hedge are finding themselves unable to supply electricity at all, **the counterpart as it applies to farmers who have been able to pre contract to secure the requisite supplies of water are sometimes unable to till all of their fields, but leave some of their land to lie fallow, with water a constraining factor in the amount and type of crops that can be grown.**

The major gas supplier, Russia, has itself questioned the wisdom of Europe's practice of buying gas wholesale on the spot market, as opposed to securing gas supplies by entering into long-term contracts. Perhaps this constitutes a form of denial; Europe does not want to acknowledge to itself the extent to which it is dependent on Russian gas supplies to provide baseload generation as it moves to increase the share of renewables in electricity generation.

Urgent talks have been held between Energy Suppliers and the UK government Business Secretary **Kwasi Kwarteng**. One point of view that is being aired is that since the business of energy supply to households and firms is so heavily regulated, further regulation should be introduced that would compel firms to hedge their exposure to gas price fluctuations. This would turn on its head the notion that it would be somehow irresponsible for heavily regulated or firms in receipt of public money to transact on the futures markets. Moreover, the point is also being made that it makes little sense to cap one aspect of the energy delivery supply chain – the price at which energy can be sold to households – but leave other prices in the supply chain essentially free to vary according to the dictates of market forces.

The Broader Context

The broader context to all of this is that inflation, which is a generalised and self-sustaining process via expectations by which prices rise across a range of goods and services, tends to make an initial appearance as some kind of specific price shocks. The price shocks we are witnessing in the UK relate to the soaring gas prices outlined above, wage pressures for HGV drivers owing to an acute shortage of drivers, disrupted supply chains caused by the shortage of drivers as well as by measures to curtail the spread of covid-19 and Brexit leading to shortages and empty supermarket shelves, a shortage of CO₂ (yes, really!), which is important in food supply chains for everything from soft-drinks to meat products. So the immediate reaction would be to address specific pricing pressures – import HGV drivers from abroad, hope that normal service from the wind is resumed and more wind energy is generated.

But what we may be witnessing instead is the early throes of a more generalised process of higher inflation. Monetary policy has for a while now been run with the monetary taps wide open in the US; emergency record low rates of interest in the UK.



Figure 4: Record low levels of interest rates in the UK

Those who (prematurely it turns out) warned of a resurgence of inflation as a consequence of the monetary stimulus that was applied after the financial crisis of 07-09 and were left chastened serve as a salutary lesson to those of us who are starting to see the seeds of a more generalised inflation in current developments. And yet, memorably, a few months ago I was at a meeting which included economists from Bloomberg as well as a distinguished former member of the Bank of England’s monetary policy committee (the MPC). People in this high-level meeting were openly discussing the **prospect of 30-40 percent inflation**, a forecast which one can easily arrive at via back of the envelope calculations. The former member of the MPC did not disagree, instead contending that while he had been on record as not viewing inflation as a significant risk following the monetary stimulus applied after the great recession, he does now view the prospect of wrenchingly high inflation with serious misgivings. In his comments at the meeting he implored a current member of the MPC to view the threat seriously.

Via globalisation there tend to be commonalities in Inflation patterns across major economies, as economic interdependencies have tended to deepen via supply chain linkages. By contrast to UK policy makers, the US Federal Reserve Board under **Janet Yellen** and then **Jerome Powell** did attempt to return interest rates to more normal less extraordinary levels, before being forced to reverse course as the economic slump occasioned by lockdown measures in response to the covid-19 pandemic took root.



Figure 5: The US Federal Funds Rate

There is some doubt regarding the realistic prospect of the Fed accomplishing a meaningful rise in interest rates targeting policy objectives. Given the massive increase in government spending during the pandemic, and expansion of the fiscal deficit, any increase in interest costs will cause an unwelcome deterioration in the Federal fiscal position. Interest rates do of course have an important impact on infrastructural spending. There has been the bipartisan infrastructure bill which includes \$550bn of new spending, following on the heels of the Biden Administration’s \$1.9trn American Rescue plan which was passed by congress in March. **We plan to examine the aspects of these measures which relate improvements and increases in the provision of water infrastructure in a future note.**

An Explosion of the Money Stock in the US

In the context of the US it is easy to see from a quick glance at the current chart of the US M2 money supply depicted as Figure 6 below, from whence concerns about the prospect of higher inflation might arise. Although the chart reflects the US money supply, such is the importance of the dollar as the pre-eminent reserve currency in the world that an expansion in the availability of dollars in the US permeates other markets as well. The dollar is central to the settlement of international trade; countries settle a far greater proportion of their international trades in dollars than the portion of trade that actually occurs with the US. The consequence of this is that countries from Turkey to Argentina strive to supply valuable goods and services to the US in order to obtain dollars in exchange, as an essential lubricant to their banking systems.

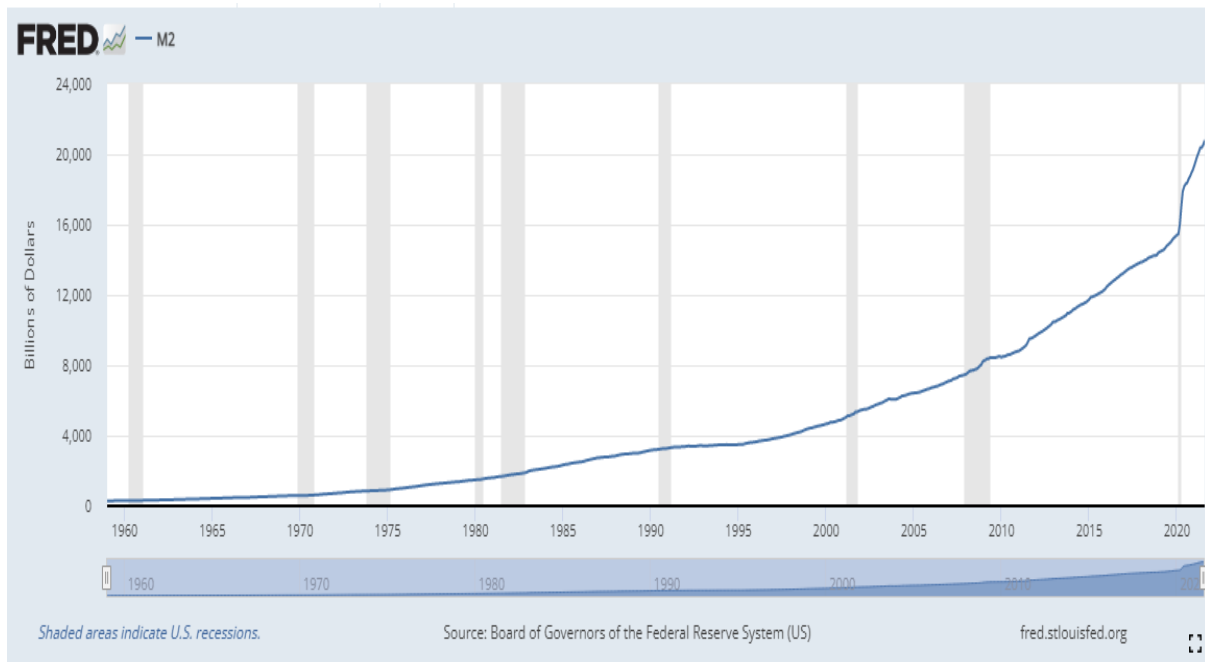


Figure 6 – US M2 money supply

We can explore the arithmetic suggested by the striking development depicted on Figure 6 quite simply. Starting with the quantity theory of money, which in textbooks was often claimed to be an identity, i.e. it has to hold true:

$$MV=PY \quad \dots(1)$$

Where M is the stock of money, here M2. One can argue indefinitely which is the right measure of the money stock; I will not get involved in this discussion now.

V is the rate at which that money is spent, the flow of transactions

P is prices, again various measures exist, such as the Personal Consumption Deflator, the CPI, Core Inflation, and so on, but these relatively arcane distinctions are not germane to the current argument

Y is the level of economic activity, usually GDP.

Treating this as an identity, from this, if V remains constant (we'll examine this shortly) and GDP in real terms is rising by 7 per cent per annum, with M2 money supply growth having peaked at 27.1 percent in February 2021, and growth having slowed to 12.1 per cent in July, but off a high base, that is a lot of money for the economy to absorb. To analyse the implications of money supply growth, I have previously found it best to track the trend rate of growth over a period of time. The trend rate of growth in US M2 money supply over three years is 13 percent ([site-stats.org, money supply growth M2](https://site-stats.org/money-supply-growth-M2)). If US GDP growth settles at 3 percent, that is just about consistent with double digit inflation as a trend basis, as opposed to a temporary aberration.

Following the return to something approaching normal business conditions after the pandemic, it is reasonable to accept that a portion of the leap in the money stock will be absorbed by the normal activities of commerce. Moreover, a fruitful approach to analysing stock markets I have found is to track excess money creation – that increase in the stock of money over and above that required financing trend economic activity – and assume that some of that money at least will find its way into financial markets and thereby drive up financial asset values. There has been an uptick in warnings about financial markets lately, particularly related to possible contagion emanating from the stresses of Evergrande in China’s overheated property markets. I have not done the detailed work needed to engage in this discussion, simply to note that if there is a significant correction in financial markets, the availability of excess liquidity will likely provide succour for any ensuing rebound.

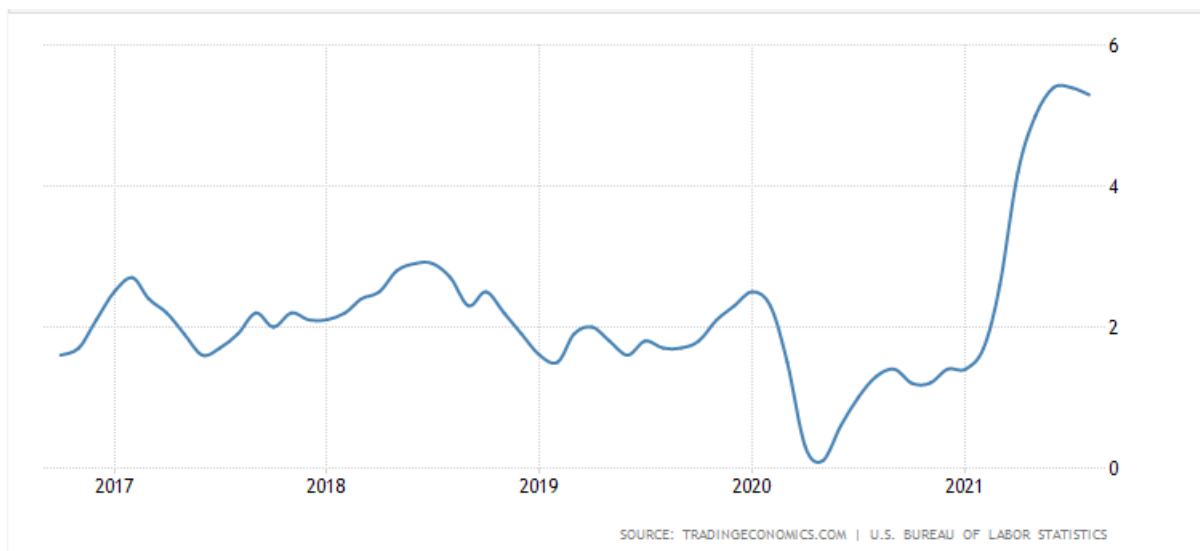


Figure 7 – The US Consumer Price Inflation Rate

In practice, forecasting inflation is not exactly a cinch. If it were, many more people would be successful and wealthy traders than is currently the case. Arguably, forecasting the first derivative of the inflation rate (is it accelerating? Is it slowing?) is the most important call made by an economist at an investment bank.

One reason why efforts to forecast inflation can involve economists tiptoeing around a minefield strewn with costly errors is that expression (1) above is not in practice a true identity. Firstly, we have already noted that, although the US economy is significantly more closed or self-contained than other major economies, a portion of the money created will find its way abroad, to foreigners eager to sell to the US in order to obtain dollars to lubricate their own financial systems. And secondly, for any surplus money in the system, the only outlet is not only to push up consumer prices, but it can also buoy asset prices in the financial markets and real estate. Nevertheless, the

behaviour of V , which we assumed for simplicity, is constant, is actually variable, as shown on Figure 7 below:

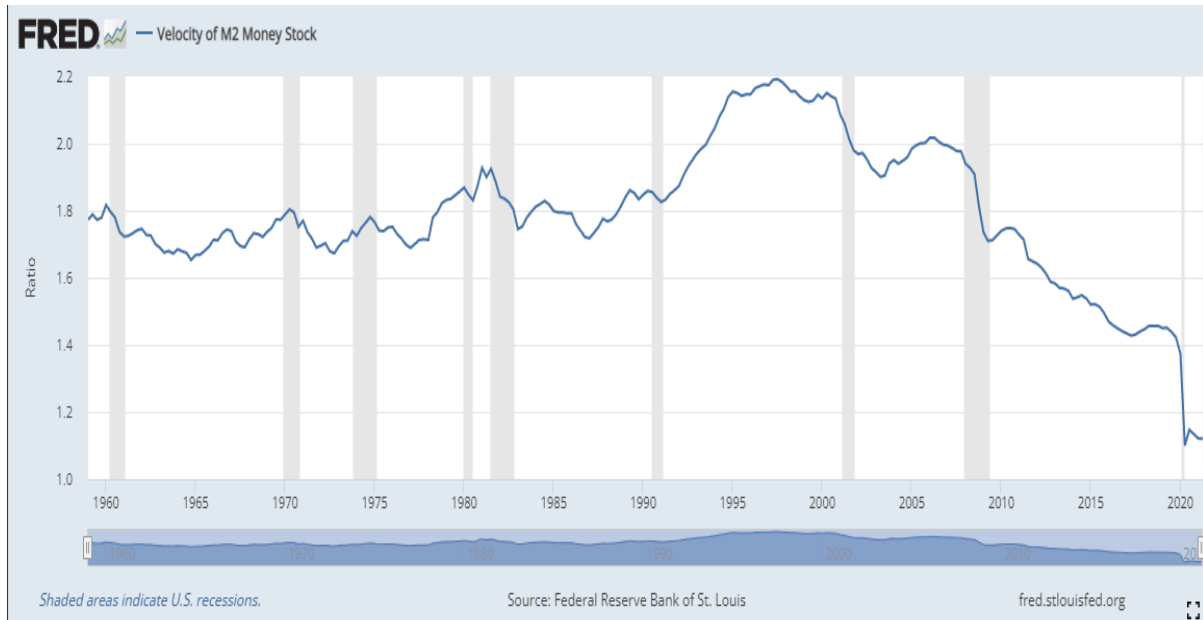


Figure 8: Velocity has slumped to accommodate the expansion of the money stock

As the money stock has taken a quantum leap, so the rate at which this money has been spent has plummeted. This is a major part of the explanation as to why the uptick in inflation has thus far been moderate.

But we suggested above, and this is widely acknowledged by Central Banks, that expectations play a pivotal role in any inflationary process. If agents start to anticipate higher prices, they tend to act in ways which render this expectation true.

There are at least three ways to model the formation of inflation expectations. One is to assume **regressive expectations**. We hear this approach a lot in public comment on elevated prices. Commentators predict that prices in overheated markets, for example for lumber, for used cars, will drop back, not in terms of percentage changes, but in absolute terms, to prices approaching their previous levels. And in respect of these two categories at least, commentators reasoning along these lines may well be proven right.

One may also model inflation expectations as an **adaptive expectations**, stochastic process. Agents who conform to this model; suppose they start with an expectation that inflation will run at two percent, and then be surprised by inflation suddenly igniting to five percent, might form a new expectation of inflation of three percent. In other words, some blend of current inflation outcomes and the previous expectation. A consequence of this approach to forecasting, which arguably even

some professional forecasters appear to employ, is that adherents are always behind the curve, playing catch-up, and never correctly identify all-important turning points.

The third approach earned economists that were proponents of the view much derision from members of the public, and even more so from rival economics practitioners. **It posits that to all intents and purposes, people walk around with econometric models in their heads, making statistically unbiased forecasts of future variables, including inflation, based on the reaction function of the Central Bank.** This view is not as improbable as it first seems. In Latin America – where getting your own inflation forecast wrong was at times a route to penury – it was sometimes said that everybody is an economist.

Just suppose that sufficient people in the US to make a difference walk around with implied econometric models in their heads. And conclude that inflation in the US and elsewhere is, indeed, starting to accelerate. Then they will accelerate their spending on goods and services on the expectation that their money balances they have hoarded will command less in terms of goods and services in the future. And those with adaptive expectations will observe prices rising and, after a lag, start to accelerate their own spending patterns as well.

The upshot is that V may not languish conveniently quiescent in the doldrums indefinitely. It might start to rise again, back to something like the trend value of 1.8 of yore (Now I'm demonstrating regressive expectations!). In which case, the expansion in the money stock, which has up until now been dampened by the swoon in V, will instead be *amplified* by an acceleration in V, with a given level of the money stock exerting a *greater* impact on prices.

The supply chain context is relevant to this discussion too. The wedge of money depicted on the chart has entered the system just when the smooth functioning of supply chains has been disrupted by a number of factors, including microchip shortages, covid-19 related travel delays, shortages of container capacity, and ongoing trade tensions between the US and the manufacturing hub of the world, China. The boost to spending is occurring just as there are a number of constraints acting to curtail supplies.

What we are left with then if we are inclined to contend that inflation is likely to prove transient, and subside to more familiar circa two percent territory, is that part of the quantum of money that households hold will not be spent, but simply hoarded. This would seem to involve some measure of faith, and I am not sure that this faith is well-founded in data or analysis.

To provide some balance here I suggest readers consult a note by a celebrated columnist, **Paul Krugman**, which sets out an opposite case to the one I am making, drawing on his own experience with intermittent fasting. (The url is available at the end of this paper). He makes the case, as many do, including the Fed, that the present surge in US inflation is transient. To his credit, for many years Krugman has been on the right side of any argument involving inflation, except insofar as he has tended to downplay asset price inflation. His current contention is that people were forced, via various lockdowns and restrictions, to curtail spending on services; travel, restaurant meals, theatre

bookings, haircuts, conferences, that sort of thing. That now that the restrictions have been eased, consumers don't splash out on these services as a result of accumulated pent-up demand, the way they might do if prevented from spending on goods for more than a year. Households don't generally eat out four times a week to compensate for being prevented from eating out twice a week during the lockdowns, nor do they indulge in more visits to the hair salon, or travel more. Since the lockdowns did not prevent households from purchasing goods, who instead migrated to online patterns of spending, there is no reason for goods purchases to ignite as restrictions are eased. His article is not as political as is his usual style of op ed column penned for the New York Times, and might even elicit a chuckle or two on the part of readers.

That this is complex issue to resolve to which there are no easy answers can be seen from a report on CNN Business, October 11. The highly respected Goldman Sachs Economics Team has downgraded its projected rate of economic expansion in 2022 to a still healthy 4.0% from 4.4%. Behind this forecast is a sense that spending on services in particular is remaining moderate, as shown by mediocre attendance at screenings of the new James Bond film, which garnered \$56 million at North American box offices over the weekend. If spending does moderate in the way the team is projecting, then this is likely to tamp down inflation pressures too. Against this, the same CNN report, notes that another respected outfit, the BofA team, on the basis of trends in credit card spending patterns it tracks, is more optimistic about signs of an upturn.

Overall, this suggests that trends in the external environment are far less certain and predictable, more subject to legitimate and well-founded differences of opinion than they have been for some time. This increases the importance of hedging the cost of key inputs via futures contracts, for those inputs that constitute a significant portion of costs, since to remain uncovered and subject to the vagaries of price fluctuations itself constitutes speculation of a kind that can go significantly awry, as we have seen from those UK energy suppliers that have been unable to withstand price pressures and tightening supplies in the market for European gas.

Overall Inflation Trends and Water Prices

How do overall inflation pressures relate to cost increases in water prices? From Figure 9 below, we can see that the price index of which the **supply of water constitutes a substantial part has tended to run at a faster pace than overall inflation**, by some significant margin. In particular, while overall inflation pressures subsided during the great recession of 07-09, **increases in the cost of water services ran at a relatively fast pace, peaking at a rate of increase of 6.8% in October 2008.** Water costs display some mild countercyclical tendencies and are relatively uncorrelated with overall inflation trends, which implies at first blush that holding a position in water has attractive diversification properties. In a future note we want to examine water as a hedge against stranded assets. The price increase in the category that largely measures **the cost of water services is currently rising at a rate of 3.5 per cent a little below overall inflationary trends, but at the same time not impervious to overall price pressures, having bottomed out at 2.2 per cent in December 2019.**

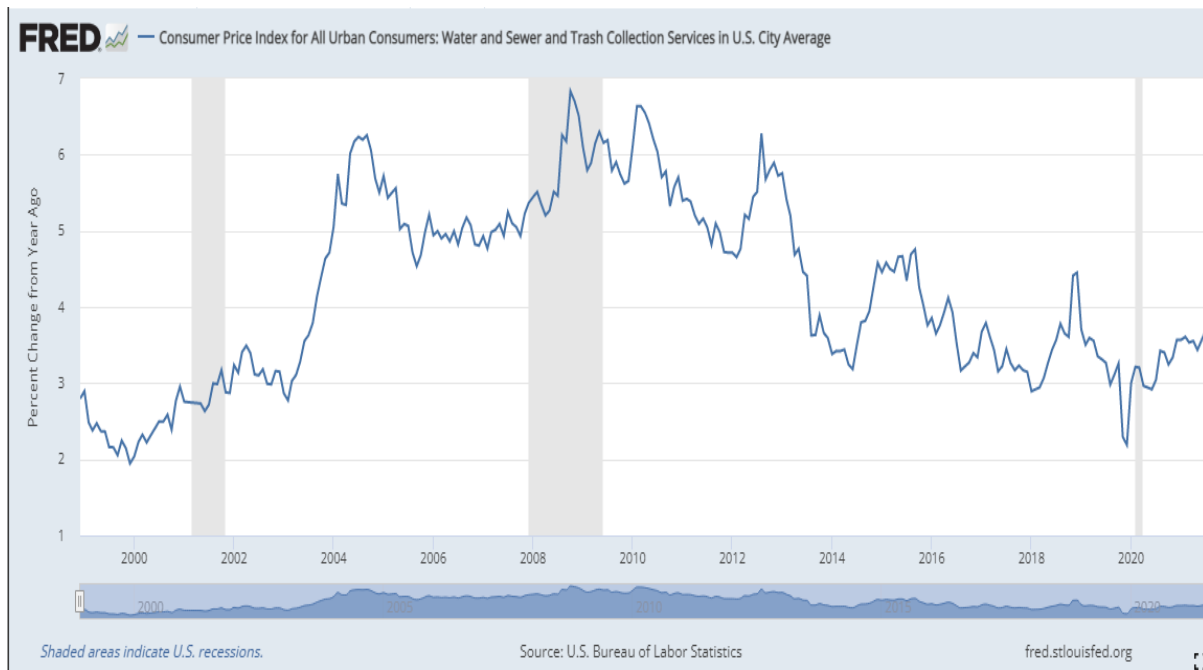


Figure 10: Inflation trends in the supply of water and sewer services in average US City

What I am driving at here is that for an extended period of time, Central Banks in the US and UK have been pursuing policies almost designed to achieve a burst of inflation, although they deny this of course, as they must to keep inflation expectations in check. Meanwhile financial markets have been on a steady upwards trajectory, inflation has been quiescent, and economies around the globe have demonstrated impressive rebounds from the covid-19 induced slump. Now, an increasing range of commodity markets are flashing red, signalling that the chickens spawned by the expansionary policy may finally be coming home to roost, the consequences of this policy may finally be reaching fruition. We won't explore this point in any further detail, as this is not a macroeconomics column; suffice it to say that **it is increasingly apparent that this environment is likely to spill over into trading conditions for water, that water is unlikely to be impervious to these developments.**

In other words financial markets have been characterised by conditions former Fed Reserve Board Chair Ben Bernanke famously referred to as “the great moderation”. And others have invented the catch-phrase of “lower for longer”. Inflation and interest rates that is. What we are suggesting here is that there are reasons to think that this period characterised by the “Great Moderation” is drawing to a close, if it has not already done so. And that quite different financial market strategies may be appropriate for the new era, compared to those that were successful in the past.

Graham Boyd

12/10/2021

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