Box A: Revisiting the 1970s Inflation Shocks

Introduction

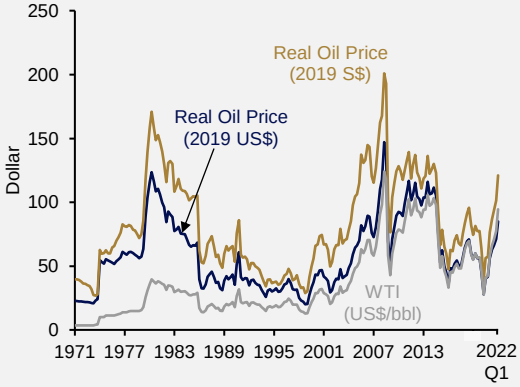
The Russia-Ukraine conflict led to a sharp increase in global oil prices, from US$76 per barrel[1] at the beginning of the year to US$124 in early March, moderating to US$101 at end-March **(Chart A1)**. In this box, the circumstances of the latest spike are compared to the "Great Inflation" of the 1970s, which was caused in part by two oil price shocks—the first in 1973–74, and the second in 1979–80 **(Chart A2)**.

Chart A1 Daily Prices of Crude Oil

Source: Federal Reserve Economic Database

* Data till 18 April 2022

Chart A2 Nominal and Real Prices of Crude Oil



Source: Federal Reserve Economic Database and EPG, MAS estimates

Kilian (2008) lays out three sources of shocks to the global oil market, which have varied impacts on the profile of inflation:

1. Unanticipated supply shocks, stemming from production capacity being temporarily affected;

2. Aggregate demand shocks, in which global growth drives the world demand for industrial commodities such as oil;

3. Oil market-specific demand shocks, whereby the precautionary demand for oil adjusts in the face of shifting expectations about global supply.

The current episode arguably contains features of all three types of shocks.

Supply shock: The punitive actions imposed on Russia, especially financial sanctions that discourage counterparties from purchasing Russian oil, have created a *de facto* negative supply shock to global oil prices. Supply shocks typically cause a surge in prices that fades quickly once alternative producers increase output. However, this time, a resolution to the ongoing supply shock does not appear imminent. OPEC+[2] has indicated it will only increase

[1] The global oil price referred to in this Box is based on the West Texas Intermediate (WTI) benchmark, which has a longer historical time series than the Brent benchmark.

[2] OPEC+ includes OPEC's 14 members as well as 10 other non-OPEC nations such as Russia, Mexico and Kazakhstan.

production modestly. At the same time, shale producers have little near-term spare capacity, and shale oil is not a good substitute for heavier Russian crude (Kilian and Plante, 2021).

Aggregate demand shock: By mid-January 2022, oil prices had already risen to around US$85 per barrel, driven by the post-pandemic recovery in aggregate demand. Even factoring in reduced demand as a result of the war and pandemic containment measures within Asia, the International Energy Agency (IEA) projects that global oil demand will still increase by nearly 2 million barrels per day in 2022 compared to 2021 (IEA, 2021).[3] Thus, firm aggregate demand conditions continue to be an important underlying factor supporting oil prices.

Oil-market specific shock: Precautionary demand for oil has risen, as countries build up their reserves, amid uncertainty over Russian energy supplies and the desire to diversify oil sources. While some countries may increase their purchases of Russian oil (at cheaper prices), Europe's shift to structurally reduce its dependence on Russian resources will keep precautionary demand for (non-Russian) oil strong in the interim.

The combination of these factors may keep global oil prices elevated for an extended period. Should the geopolitical crisis be resolved quickly, a return of the pre-war level of global aggregate demand will support oil prices. If precautionary demand remains strong while supply disruptions persist, oil prices will also be sustained at high levels, though with some attendant negative effects on growth. These factors are similar to the oil shocks of the 1970s, when strong aggregate demand and precautionary demand for oil accentuated the effects of the supply shocks that arose from conflicts in the Middle East.

1970s Oil Crises

1973–74 Oil Crisis

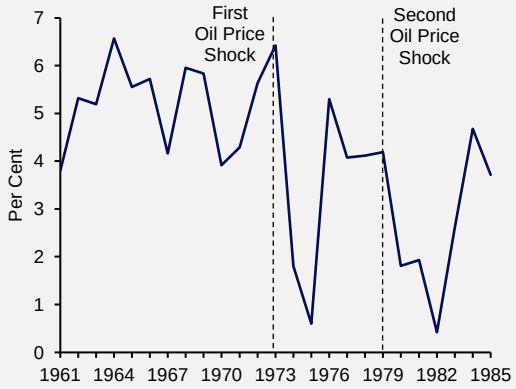
In the first oil crisis, the price of crude oil rose from US$3.56 per barrel to US$11.16 per barrel. The step up in nominal prices resulted in a 167% increase in the inflation-adjusted price of oil (based on 2019 US$). In October 1973, the Yom-Kippur War broke out between Israel and several Arab countries. The conflict did not damage major oil fields but resulted in a moderate *de facto* supply shock as OPEC cut production levels and imposed an embargo on the export of oil to countries supporting Israel in the conflict.

In the same month, many Middle Eastern producers also repudiated the Tehran/Tripoli agreements that fixed the price of oil on global markets. Geopolitical reasons aside, the depreciating US dollar meant that revenues in local-currency terms for oil exporters were declining, incentivising producers to raise prices. The increase was readily absorbed given firm global growth and rising precautionary demand. Global growth averaged 6.0% in 1972–73, higher than the average of 4.1% in the previous two years and the 5.3% recorded from 1961 to 1969 **(Chart A3)**. Kilian (2014) notes that the G3 economies experienced, for the first time in post-war history, a simultaneous peak in their business cycles in the early 1970s. While all three types of shocks came together and caused the sharp increase in oil prices, strong growth in global aggregate demand was a key underlying driver of the first oil crisis.

[3] This is a downgrade from projections at the start of the year as governments and consumers are expected to adjust their behaviour by reducing oil demand in the near term. Before the outbreak of war, IEA had projected global oil demand to increase by around 3 million barrels per day on the back of easing COVID-19 restrictions globally, bringing oil demand back to pre-pandemic levels.

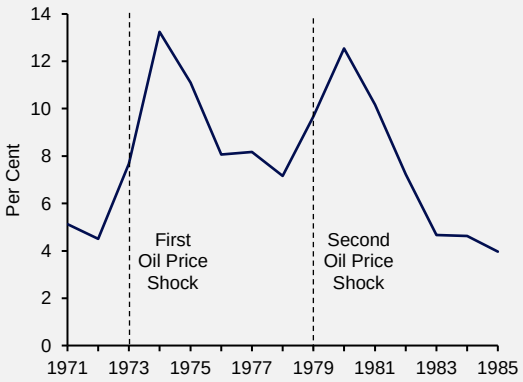
The oil shock contributed to global inflation (proxied by CPI changes in the G7 countries) rising to 7.7% in 1973 from 4.5% in 1972 **(Chart A4)**. Inflation peaked at 13% in 1974 but remained elevated even a year later. For the rest of the decade, the inflation rate did not return to pre-crisis norms. Compounding the inflationary pressures were various policy missteps by central banks, as well as difficulties presented by shifts in the Phillips Curve. To the extent that central banks did lean against inflation, monetary policy was undermined by mismeasurements of potential output and thus output gaps. This in turn translated into a consistent underestimation of the non-accelerating inflation rate of unemployment (NAIRU).

Chart A3 Global Growth



Source: World Bank

Chart A4 Global Inflation



Source: Haver Analytics

While formal data on inflation expectations prior to and during the oil shock is unavailable, Reis (2021) draws on information ranging from contemporary *ad hoc* consumer surveys, newspaper mentions of inflation or the central bank, as well as business surveys, to construct a useful proxy. His findings indicate that expectations began rising in the 1960s. The inflation anchor became loose between 1968 and 1971, and was fully "adrift" over the period from 1971–74. His analysis suggests, in retrospect, that the short-run Philips Curve was shifting, but this was not always recognised by central banks at that time. Policymakers expected the trade-off between inflation and unemployment (or wage growth) to be predictable when it was no longer the case. All in, monetary policy was too loose to effectively rein in inflation and anchor expectations.

In Singapore, during the three months prior to the imposition of the oil embargo in October 1973, domestic inflation already averaged 25% y-o-y, with food prices rising by 43% due to a series of weather-related disruptions that affected global food supplies. Several food-producing countries also imposed export bans, further curtailing supply. Inflation took another step up from October 1973. Between that date and the end of the embargo in March 1974, monthly headline inflation averaged 31% y-o-y. Food inflation averaged 52% over the same period, having peaked at 60% in November 1973. Transport prices also rose with a lag: inflation for this component of the CPI jumped to 40% in 1974, compared with close to 0% since the series began in 1962. In the absence of an explicit exchange rate policy centred on inflation, the S$NEER depreciated at various junctures in 1974, even though overall CPI inflation averaged 22% over the course of the year.

Apart from the rise in global inflation, the oil shock resulted in a significant slowdown in the global economy, with growth easing to 0.6% in 1975 from its pre-crisis pace (1971–72 average) of 5%. Singapore's GDP growth also slowed to a post-Independence low of 4% in

that year, from 13% p.a. in the pre-crisis years, which reflected some declines in the external-facing sectors such as manufacturing and wholesale trade.

1979–80 Oil Crisis

During the second oil price shock of the 1970s, the price of global WTI crude rose from just under US$15 per barrel in September 1978 to almost US$40 in April 1980, translating to a real price increase of 115%. While this crisis has traditionally been explained as a supply shock triggered by the Iranian Revolution, Barsky and Kilian (2002) point out that Iran's oil production rose from March 1979 while OPEC as a whole did not suffer any output shortfalls. Nevertheless, oil prices increased rapidly from May 1979. Their analysis suggests that the Revolution precipitated an oil market-specific demand shock, as countries were prompted to build up oil reserves as a buffer against future supply disruptions should geopolitical tensions break out anew in the Middle East. At the same time, an unexpectedly strong global economy (positive aggregate demand shock) was also driving oil prices higher (Baumeister and Kilian, 2016). The situation was aggravated by another supply shock in the form of the Iran-Iraq war in September 1980. As Iraq's oil production fell, global economic activity slowed sharply, culminating in a near-global recession in 1982 even as precautionary demand for oil persisted.

Global inflation did not rise by as much as in the aftermath of the first oil price shock, reflecting in part the more moderate oil price increase on a real US$ basis compared to the 1973–74 episode. The initial supply shock was also short-lived, as production was raised quickly. Macroeconomic policy thinking among the central bank community by then had shifted more decisively to focus on bringing inflation down. Policymakers had learnt the lesson from the early 1970s of the importance of anchoring inflation expectations. The Federal Reserve also ushered in an era of monetary policy tightening based on a more nuanced application of its dual mandate, which entailed the recognition that temporarily higher unemployment might be necessary to reduce inflation, so as to create the conditions conducive for sustained growth in output and employment in the longer term.

Growth in Singapore was stronger than expected in 1979–80, despite the slowdown in global growth, in part due to a steady pipeline of domestic infrastructure projects. Meanwhile domestic inflation picked up markedly from September 1979. In the first eight months of the year, inflation averaged 2.8% y-o-y. Inflation exceeded 5% in the final four months of 1979 and accelerated beyond 10% in H1 1980. The inflationary pressures were partly due to the transition of the economy to higher value-added activities and the resulting adjustments in the labour market.

At the same time, MAS had begun monitoring the trade-weighted Singapore dollar and allowed it to appreciate to mitigate the effects of the oil price shock. In 1981, MAS formally introduced the exchange rate-centred monetary policy framework. Inflation began to ease in early 1982, as aggregate demand pressures moderated amid falling global growth and a slowdown in the Singapore economy. Nevertheless, CPI inflation only fell to below its pre-crisis average (1977–78) in July 1982, more than three years after the onset of the oil shock.

Impact of Oil Shocks on MAS Core Inflation

To ascertain if the characterisation of oil supply shocks above applies to Singapore, EPG estimated a structural vector autoregression (SVAR). The SVAR approach allows the separate identification of oil supply and demand shocks that could drive fluctuations in oil prices, a

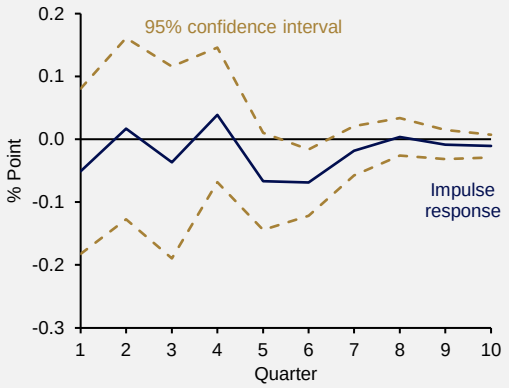
distinction that Kilian (2008) finds has important implications for the macroeconomic effects of oil shocks, including, importantly, the domestic inflationary impact.

$$\begin{pmatrix} \Delta Oil_t \\ \Delta GDP_t^{OECD} \\ \pi_t^{WTI} \\ \pi_t^F \\ \Delta GDP_t \\ \pi_t \\ \Delta NEER_t \end{pmatrix} = \alpha + \sum_{s=0}^{\infty} A_{t-s} \begin{pmatrix} \epsilon_{t-s}^{OIL\ SUPPLY} \\ \epsilon_{t-s}^{EXT\ DEMAND} \\ \epsilon_{t-s}^{OIL\ DEMAND} \\ \epsilon_{t-s}^{EXT\ SUPPLY} \\ \epsilon_{t-s}^{SUPPLY} \\ \epsilon_{t-s}^{DEMAND} \\ \epsilon_{t-s}^{MP} \end{pmatrix}$$

The endogenous variables in the model are global oil production ΔOil_t, OECD GDP growth ΔGDP_t^{OECD}, the change in oil prices π_t^{WTI}, weighted-average headline CPI inflation of several of Singapore's key trading partners π_t^F, Singapore's GDP growth ΔGDP_t, domestic CPI-All Items inflation π_t and changes in the level of the S$NEER, $\Delta NEER_t$. The identification restrictions are similar to those implemented in the SVAR model presented in MAS (2021).[4] Following the literature, several additional restrictions are imposed to distinguish between the two structural shocks that are new in this model—oil supply shocks $\epsilon_t^{OIL\ SUPPLY}$ and oil-specific demand shocks $\epsilon_t^{OIL\ DEMAND}$, which could reflect a rise in the precautionary demand for oil. The critical assumption is that neither external aggregate demand shocks $\epsilon_t^{EXT\ DEMAND}$ nor oil-specific demand shocks $\epsilon_t^{OIL\ DEMAND}$ have a contemporaneous impact on global oil production, a short-run exclusion restriction based on Kilian (2009).

Quarterly data for Singapore over the period Q1 1975 – Q4 2020 is used to estimate the SVAR and derive the effects of a negative shock to oil supply, as well as the impact of a positive shock to oil-specific demand, on MAS Core Inflation.

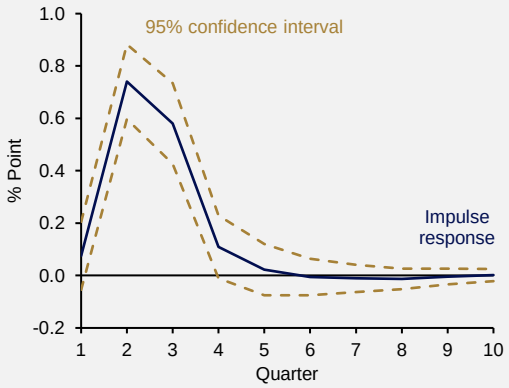
Chart A5 Impact of a negative global oil supply shock on MAS Core Inflation



Source: EPG, MAS estimates

Note: The chart plots the impulse response of MAS Core Inflation to a one-standard deviation negative global oil supply shock.

Chart A6 Impact of a positive oil-specific demand shock on MAS Core Inflation



Source: EPG, MAS estimates

Note: The chart plots the impulse response of MAS Core Inflation to a one-standard deviation positive oil-specific demand shock.

Charts A5 and A6 show, respectively, the dynamic effects of a negative oil supply shock and a positive oil-specific demand shock on MAS Core Inflation. Although the effects of a

4 For a description of the baseline SVAR model, including identification restrictions imposed and details on notation, refer to Special Feature A of the October 2021 *Macroeconomic Review*.

global oil supply shock on MAS Core Inflation are not statistically significant, a positive oil-specific demand shock has a statistically significant and positive impact. This result is in line with Kilian's (2009) finding that disruptions to global oil production have substantially smaller macroeconomic effects than demand shocks. The impact of a one-standard-deviation positive oil-specific demand shock peaks in the first quarter after the shock, when it leads to about a 0.8% point increase in MAS Core Inflation, and persists for two more quarters thereafter. These results suggest that, historically, the inflationary impact of oil shocks stems largely from oil demand responses to shifting expectations about global oil supply, rather than production disruptions themselves.

Sum-Up

This Box has reviewed the factors behind global oil price shocks, which can have different implications for the pass-through to, and persistence of, inflation. The current global shock is a complex combination of oil supply, aggregate demand, and oil market-specific factors. Central banks need to be vigilant under such conditions and ensure that the momentum of price increases does not become entrenched following the initial step-up in inflation, and that expectations are not unanchored.

References

Barsky, B and Kilian, L (2002), "Do We Really Know that Oil Caused the Great Stagflation? A Monetary Alternative", pp. 137–183, in *NBER Macroeconomics Annual 2001*, Vol. 16, January, MIT Press.

Baumeister, C and Kilian, L (2016), "Forty Years of Oil Price Fluctuations: Why the Price of Oil May Still Surprise Us", *Journal of Economic Perspectives*, Winter, Vol. 30(1), pp.139–160.

International Energy Agency (2021), *Oil Market Report*, April.

Kilian, L (2008), "The Economic Effects of Energy Price Shocks", *Journal of Economic Literature*, Vol. 46(4), December, pp. 871–909.

Kilian, L (2009), "Not All Oil Price Shocks are Alike: Disentangling Demand and Supply Shocks in the Crude Oil Market", *American Economic Review*, Vol. 99(3), pp. 1053–1069.

Kilian, L (2014), "Oil Price Shocks: Causes and Consequences", *Annual Review of Resource Economics*, Vol. 6, pp. 133–154.

Kilian, L and Plante, M D (2022), "The Russian Oil Supply Shock of 2022", Article for the Federal Reserve Bank of Dallas.

Monetary Authority of Singapore (2021), "50 Years of Inflation Experience in Singapore", *Macroeconomic Review*, Vol. XX(2), pp. 86–99.

Reis, R (2021), "Losing the Inflation Anchor", *Brookings Papers on Economic Activity*, BPEA Conference Drafts, September 9.