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Global Economics Analyst

Supply Chains, Global Growth, and Inflation (Bhushan/Struyven)

- Global manufacturing supplier delays have intensified further to extreme levels, especially in the US and Europe. Supply chain issues have substantially contributed to the downgrades to our 2021Q2 and 2021Q3 US growth forecasts, and have led to major global upside inflation surprises. What lies behind these supply chain stresses and how will their evolution affect global growth and inflation?
- We estimate that strong goods demand currently accounts for about two-thirds of the global manufacturing delays. While weak supply led to delays and depressed output last spring, the global manufacturing PMI output index remains firm now, indicating an overwhelming role for the demand side. The exception is Asia, where weakness in supply, partly related to virus disruptions, plays a larger role.
- A moderation in goods demand over the next year should sharply reduce manufacturing delays, although a decline in virus-related disruptions to global and especially Asian goods supply should help too. We expect goods demand to moderate as the global fiscal impulse turns negative, and as spending gradually rotates back from goods to services assuming the virus situation improves. That being said, structurally strong tech demand and the slow speed at which semiconductor production capacity can be increased suggest that the easing of shortages for chips (and therefore cars) will take longer than for other constrained goods.
- Assuming a gradual normalization in our GS effective lockdown index, we estimate a swing in the manufacturing supply impulse to global growth from roughly -1pp so far this year into slightly positive territory in coming quarters.
- The expected moderation in global goods demand and the virus-driven improvement in goods supply help bring down inflation to more normal levels. We expect core inflation to fall back by 2022Q4 to 2.5% in the UK, 2.0% in the US and Canada, and 1.1% in the Euro Area.

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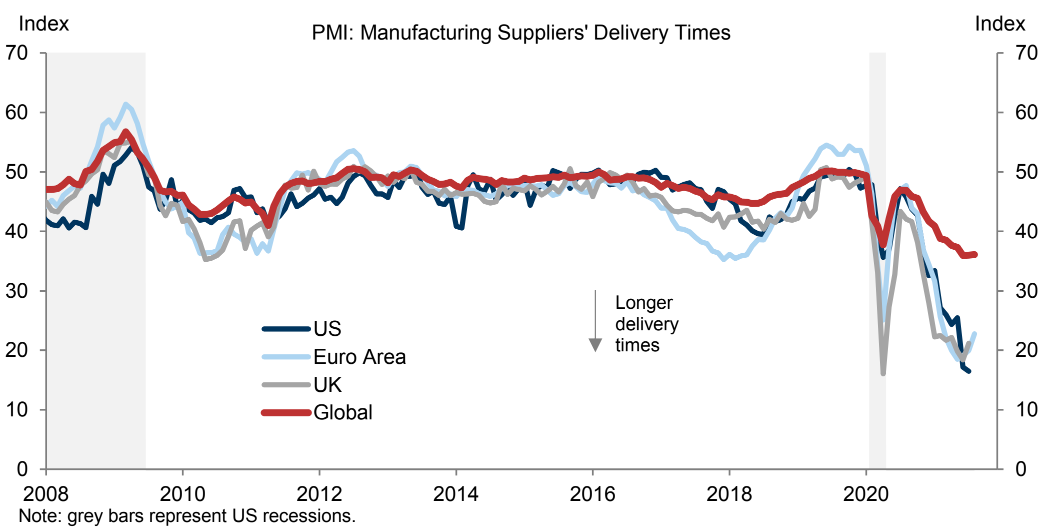
Supply Chains, Global Growth, and Inflation[1]

Supply chain stresses have become a serious challenge in the global economy, with large effects on both growth and inflation. Supply chain issues have substantially contributed to the downgrades to our 2021Q2 and 2021Q3 growth forecasts in both the US and Canada, and have led to major global upside inflation surprises.[2]

The global PMI manufacturing supplier delivery index has recently lengthened further (Exhibit 1). Delivery times have lengthened across North America, Western Europe, and Central Europe to fairly extreme levels (Exhibit 2). Delivery times are less extreme in much of Asia-Pacific, except for Taiwan, which is especially exposed to semiconductors, and Vietnam and Australia, where the virus situation deteriorated sharply in August. In this *Analyst*, we quantify the contributions from supply and demand to these manufacturing supply chain stresses, estimate how their evolution will affect global growth, and discuss the implications for inflation.

Exhibit 1: Manufacturing Supplier Delays Have Intensified Further

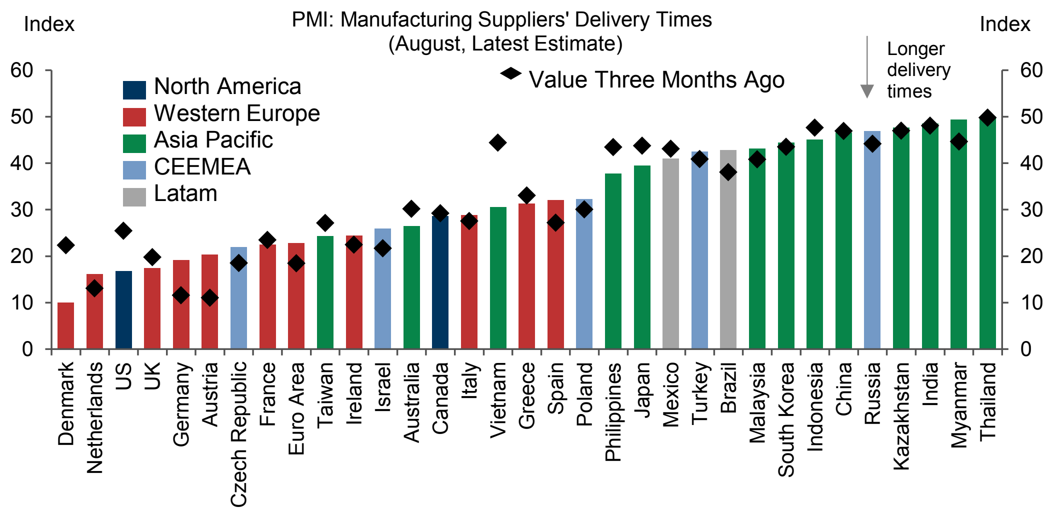


Source: IHS Markit, Haver Analytics, Goldman Sachs Global Investment Research

[1] The authors would like to thank Nikola Dacic for his contributions.

[2] For instance, disappointing inventory formation, in turn largely reflecting supply chain issues, has contributed 2.0pp of the 3.9pp downgrade to our US 2021Q2 annualized GDP growth estimate since the last week of May.

Exhibit 2: Delivery Delays Are Particularly Extreme in Europe and the US

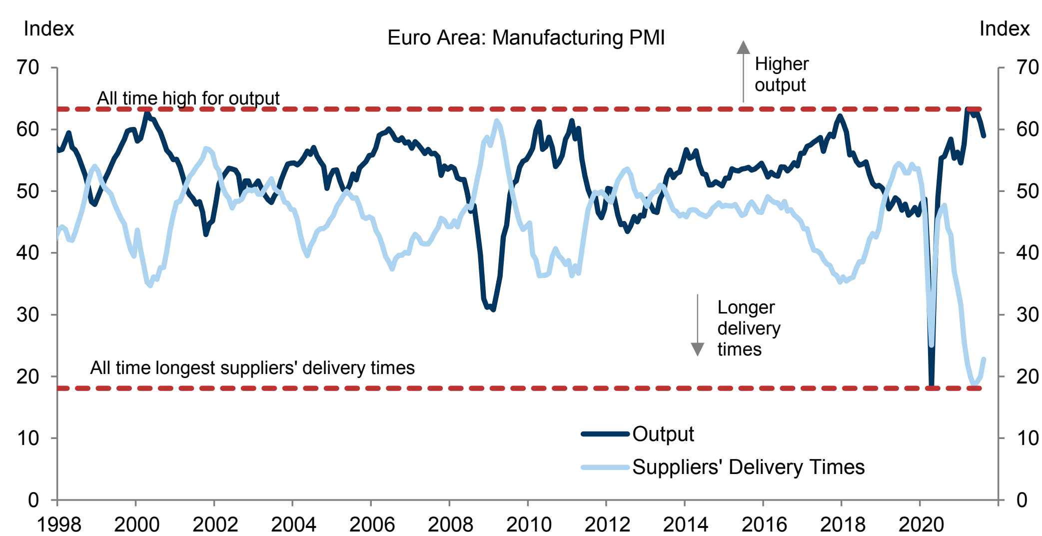


Source: IHS Markit, Haver Analytics, Goldman Sachs Global Investment Research

It's Mostly Demand

While supplier delivery times are at historically lengthy levels in many economies, manufacturing output indices generally also remain very elevated, including in the Euro Area (Exhibit 3). This suggests that delays are being mostly caused by strong demand rather than weak supply, because strong demand *pushes up* output and lengthens delivery times while weak supply would *push down* output and also lengthen delivery times.

Exhibit 3: Elevated Manufacturing Output Suggests that Delays Are Mostly Caused by Strong Demand Rather than Weak Supply



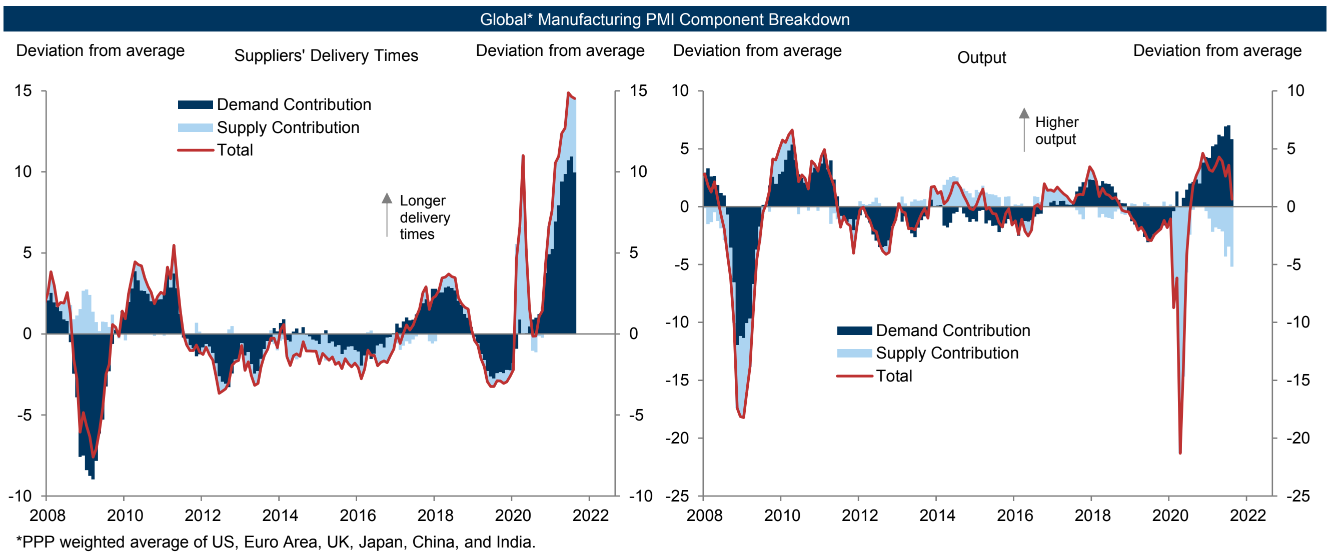
Source: IHS Markit, Haver Analytics, Goldman Sachs Global Investment Research

To quantify the contribution of supply and demand shocks, we estimate a Vector Auto

Regression (VAR) model using the manufacturing output and supplier delivery times components. We assume that a positive demand shock increases both output and lengthens delivery times, building on our European economists' work.[3]

We estimate that strong goods demand currently accounts for about two-thirds of the lengthening in global manufacturing delays relative to their historical average (Exhibit 4). In contrast, weak manufacturing supply essentially fully explained the delays and depressed output last spring.

Exhibit 4: We Estimate that Strong Demand Is Currently Driving About Two-Thirds of the Rise in Global Manufacturing Supplier Delays



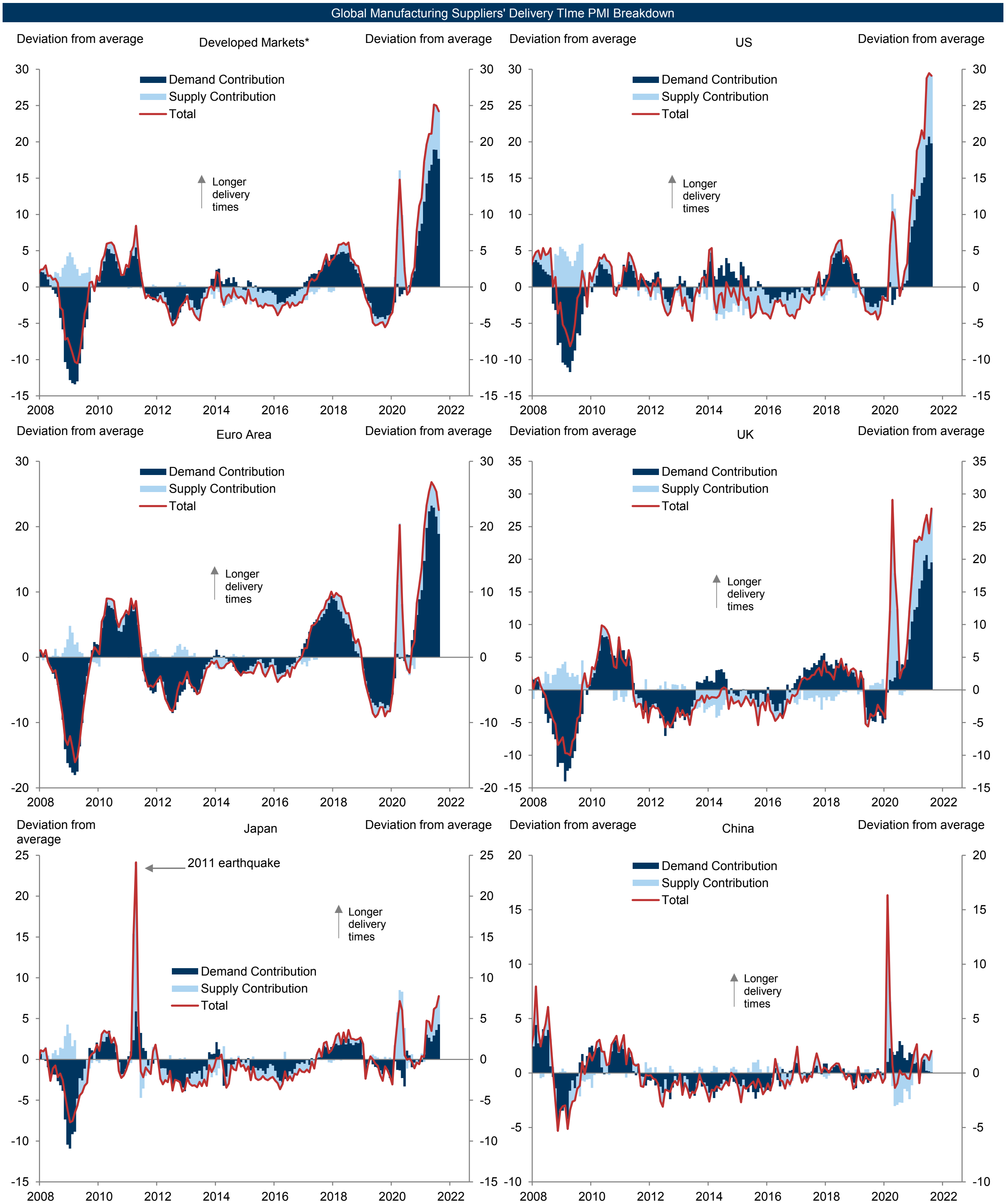
Source: IHS Markit, Haver Analytics, Goldman Sachs Global Investment Research

Looking across countries, we find an overwhelming role for the demand side in explaining current manufacturing delays. The exception is Asia, where weakness in supply plays a larger role, consistent with the deteriorating virus situation in much of Asia through August (Exhibit 5).

We next analyze the drivers of the softness in manufacturing supply and of the strength in manufacturing demand to understand how and when delays will ease.

[3] See Nikola Dacic, "The Cost of Supply Chain Disruption", European Daily, 12 March 2020.

Exhibit 5: The Delivery Delays Largely Reflect Strong Demand in Western DMs; Weak Supply Plays a Larger Role in Asia



*PPP weighted average of US, Euro Area, UK, and Japan.

Source: IHS Markit, Haver Analytics, Goldman Sachs Global Investment Research

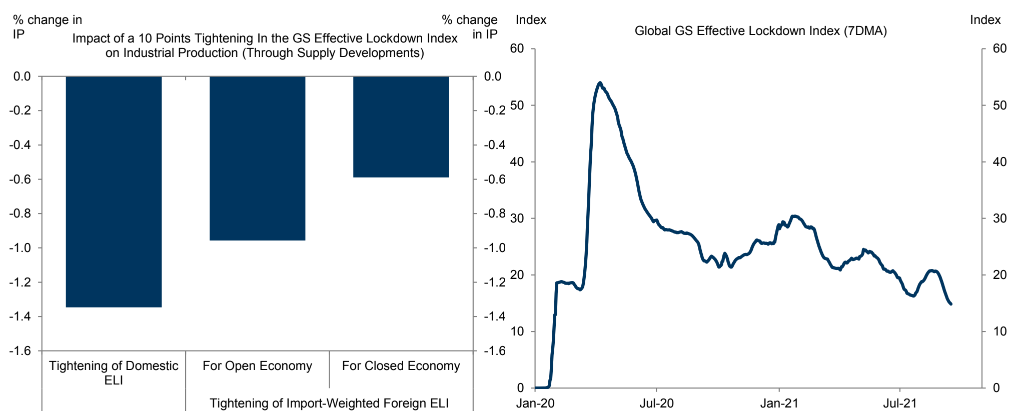
Less Virus, More Manufacturing Supply

Starting with supply, we find that virus-related disruptions are a key driver of manufacturing supply and industrial production, and expect improving virus situations to boost goods supply.

Building further on our Asia economics team's findings[4], we first find that our GS Effective Lockdown Indices (ELIs)—a combination of official restrictions and actual mobility data—are statistically significant drivers of the manufacturing supply shocks teased out from the PMIs in the previous section, and that these supply shocks are statistically significant drivers of monthly industrial production (IP) growth. Specifically, we estimate that a 10-point tightening in the domestic ELI reduces monthly IP growth by 1.3pp, while a similar tightening in the import-weighted international ELI reduces monthly IP growth by 1pp in open economies, and 0.6pp in closed economies (Exhibit 6, left).

The expected further easing in our global ELI—which has eased by nearly half since January (Exhibit 6, right)—should reduce virus-related disruptions to global goods supply.

Exhibit 6: The Expected Easing of Our ELI at Home or Among Trade Partners Should Boost IP Through Improvements to Goods Supply



Open Economies are those with above average import GDP share in our sample, all other economies are closed.

Source: Goldman Sachs Global Investment Research

Less Virus, Moderating Goods Demand

Although virus-driven improvements in goods supply should also sharply reduce manufacturing delays, a moderation in goods demand should account for most of the normalization over the next year. We expect global goods demand to moderate for two reasons.

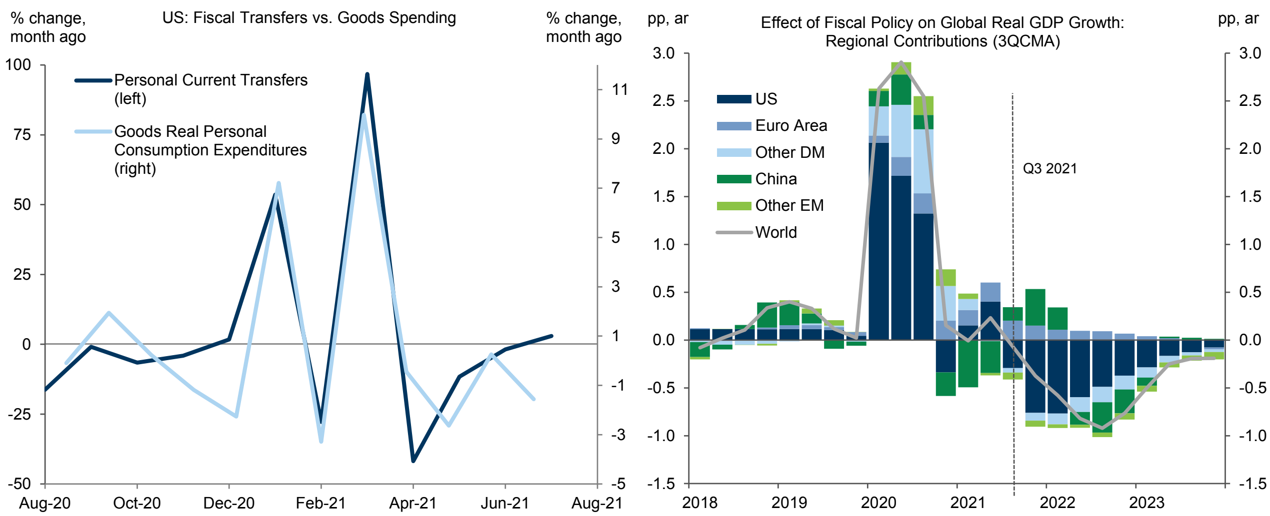
Factor 1: Global Fiscal Impulse Turns Negative

First, the decline in the fiscal impulse to global growth should contribute to a moderation in goods demand. The fact that US goods spending surged precisely when households received their second (in January 2021) and third (in March 2021) stimulus

[4] See Andrew Tilton, "Supply chain stresses", Asia in Focus, 15 September 2021.

checks highlights the role of fiscal policy (Exhibit 7, left panel). We also estimate larger demand contributions to delays in economies that provided more fiscal support. The right panel shows that we expect a swing in the global fiscal impulse from slightly positive in 2021H1 to nearly -1pp by next summer, with large declines in the US, and Canada, although the outlook is more positive in the Euro Area and China.

Exhibit 7: Fiscal Policy Has Contributed to Strong Goods Demand but Will Tighten

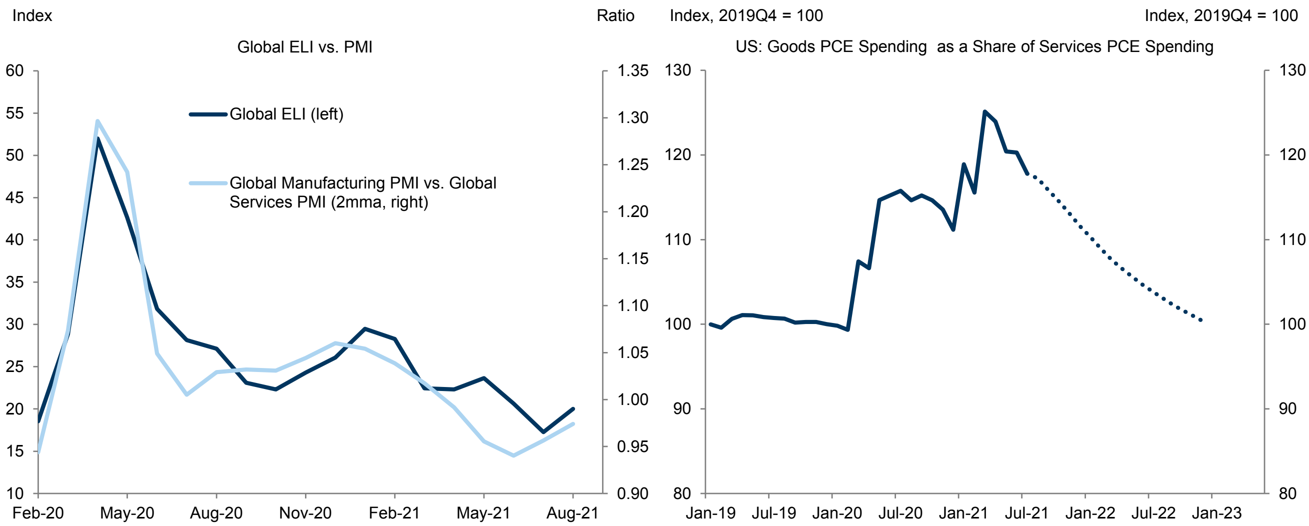


Source: US Bureau of Economic Analysis (BEA), Goldman Sachs Global Investment Research

Factor 2: A Shift Back to Services

Second, a gradual rotation of consumer spending back to services should also contribute to a moderation in goods demand, assuming the virus situation improves. The fact that goods outperform services in the global manufacturing PMI when our global GS ELI is tight, highlights the contribution from restrictions and virus fears to the pandemic rotation to goods (Exhibit 8, left). Already, the surge of US goods demand has subsided somewhat, and our US economists expect it to ease further, and nearly normalize relative to services spending by end-2022 (right panel). We expect the further rebound in services activity in other economies to also come in part at the expense of goods consumption.

Exhibit 8: We Expect Spending to Gradually Rotate Back from Goods to Services as the Virus Fades



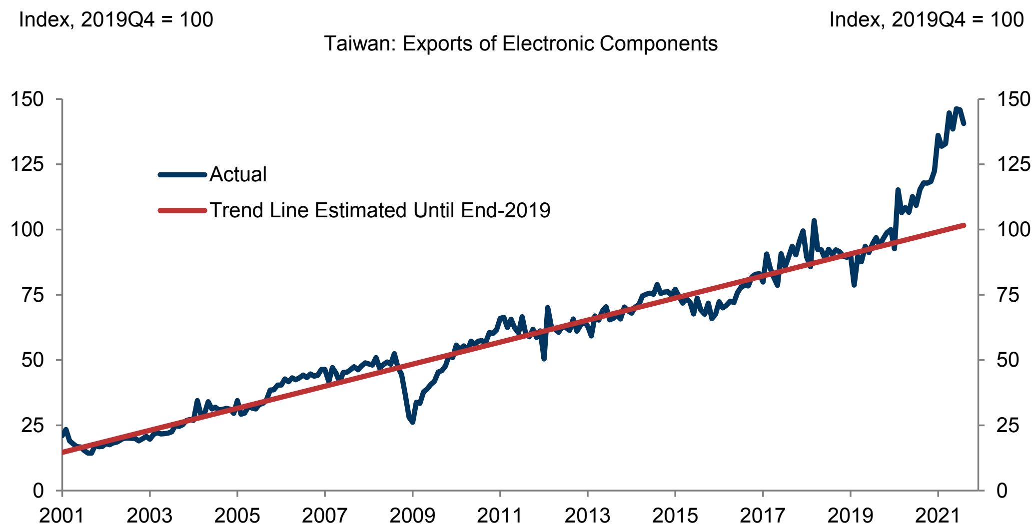
Source: IHS Markit, US Bureau of Economic Analysis (BEA), Haver Analytics, Goldman Sachs Global Investment Research

Caveat: A Semi-Persistent Tech Boom

One important caveat to this generally constructive view on the outlook for supply chain stresses is that demand for tech goods should remain structurally strong.

Exhibit 9 shows the surge in exports of electronic components from Taiwan, which manufactures 92% of advanced logic-chips. Although part of the surge in tech demand likely reflects pandemic factors (e.g. companies and households upgrading their internet- and network access and laptops to work from home), we expect tech demand to remain firm. Moreover, on the supply side, the speed at which semiconductor production capacity can be increased is quite slow given the multi-year investments. We therefore expect the easing of shortages for semiconductors and industries that use these critical electronic components, including car production, to take longer than for other supply-constrained goods. Our sector analysts see semiconductor foundry capacity as likely to remain tight into 2023.

Exhibit 9: The Pandemic Has Further Strengthened Demand for Taiwanese Semiconductors



Source: Ministry of Finance, Haver Analytics, Goldman Sachs Global Investment Research

Supply Shocks, Growth, and Inflation

We conclude by quantifying and forecasting the impact of manufacturing supply on GDP growth, and by discussing the implications for inflation.

We estimate the impact of manufacturing supply shocks on GDP growth by combining (1) our supply shocks teased out from the PMIs, (2) the relationship between IP growth and supply shocks, and (3) countries' manufacturing share of GDP. We forecast the growth impact of manufacturing supply by forecasting supply shocks, assuming that our ELI gradually normalizes by mid- to late next year.[5]

Assuming a gradual normalization in our GS ELI, we estimate a swing in the manufacturing supply impulse to global growth from roughly -1pp in the first three quarters of this year into slightly positive territory in coming quarters (Exhibit 10).

[5] Specifically, we assume that countries in the high risk aversion group (see Exhibit 6 here) reach an ELI of 5 by the end of 2022Q4, countries in the middle risk aversion group reach an ELI of 3.75 by the end of 2022Q3, and countries in the low risk aversion group reach an ELI of 2.5 by the end of 2022Q2. We interpolate linearly between current ELI levels and the end point.

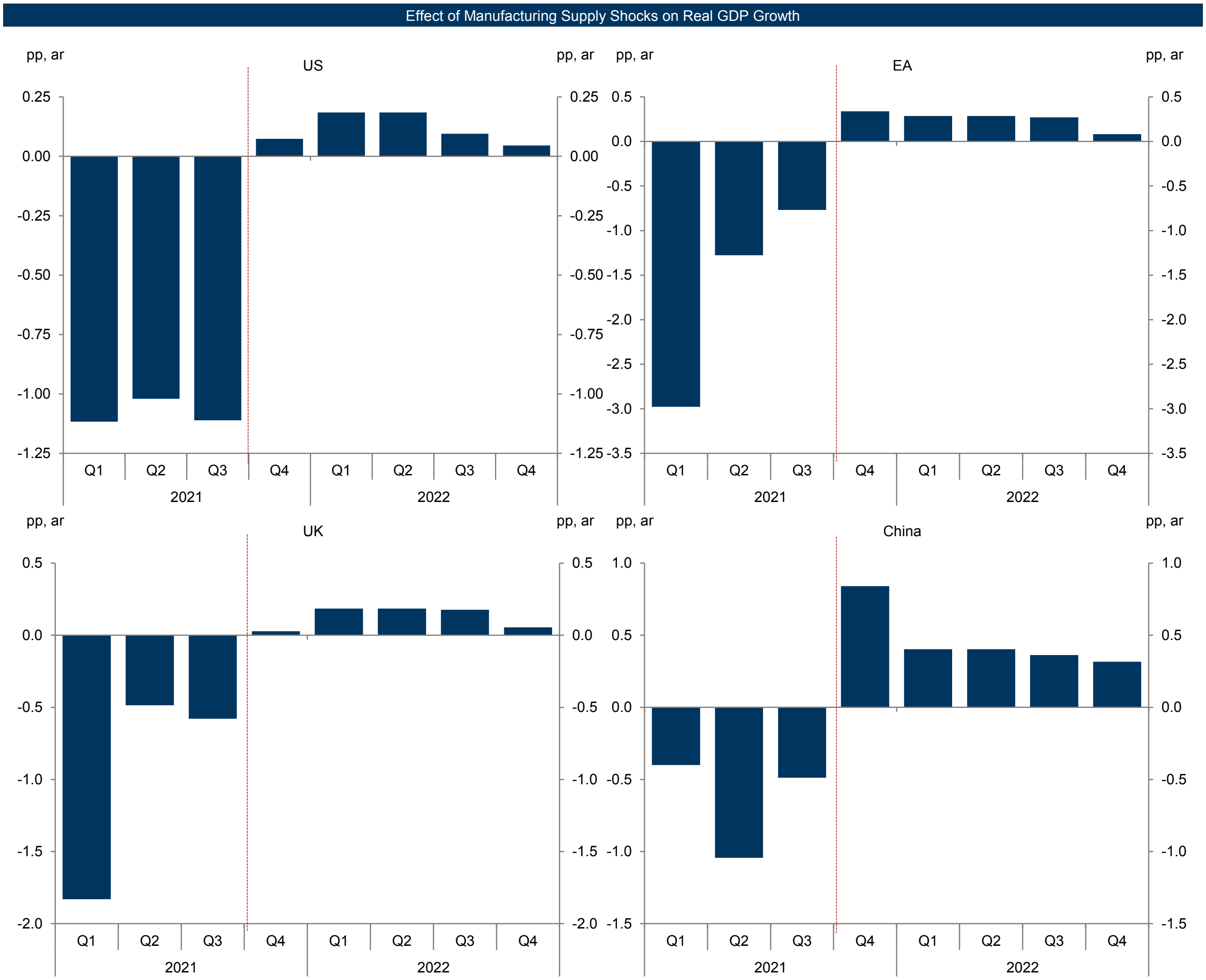
Exhibit 10: Assuming Gradual Virus Improvements, We Expect a +1pp Swing in the Manufacturing Supply Impulse to Global Growth

Source: Goldman Sachs Global Investment Research

The estimated manufacturing supply growth impulses follow a similar pattern across the US, the Euro Area, the UK and China, reflecting the assumed global virus improvements and the global nature of supply chains. The estimated swing in the manufacturing supply impulse to growth is larger in China, given its outsized manufacturing sector and the larger estimated contribution from recently negative supply shocks to its PMI.[6]

[6] The estimated improvement in the manufacturing supply impulse to Chinese growth reflects the assumed improvement in the global virus situation and does not capture the current stress in Chinese supply chains related to raw materials, driven by its more persistent decarbonization push.

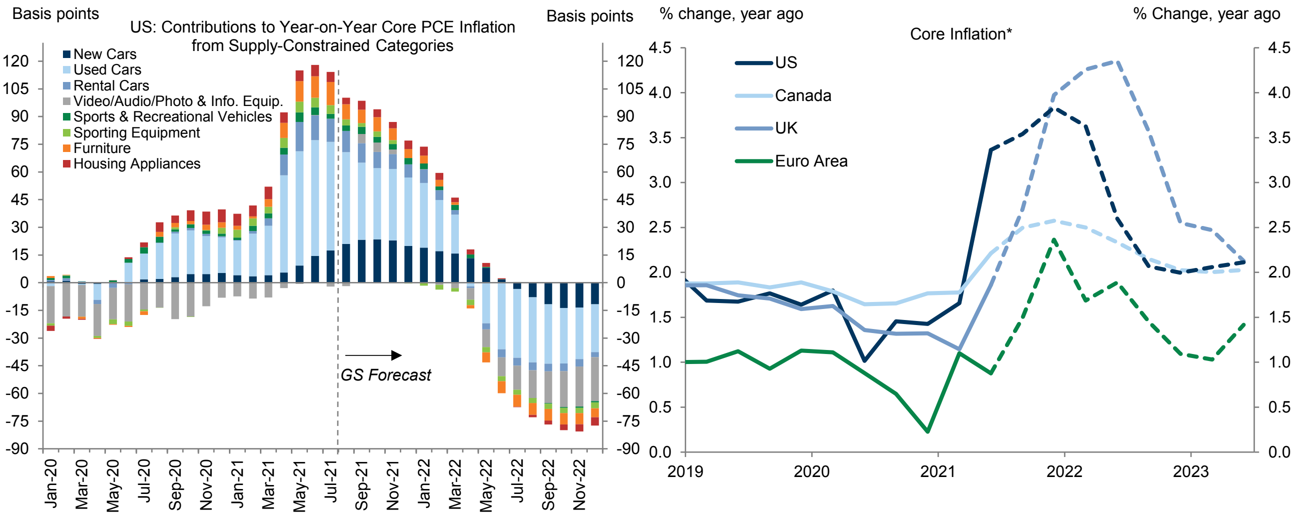
Exhibit 11: Assuming Gradual Virus Improvements, We Estimate a Rise in the Manufacturing Supply Impulse to Growth, Especially in the Manufacturing-Oriented Chinese Economy



Source: Goldman Sachs Global Investment Research

The expected moderation in global goods demand and the virus-driven improvement in goods supply should also help bring down inflation to more normal levels. In the US, we expect the total contribution to year-on-year core PCE inflation from supply-constrained goods to decline from +110bp today to -80bp by December 2022 as currently-elevated prices partially revert to pre-pandemic trends (Exhibit 12, left panel). The drag from these categories is the main reason that we expect core PCE inflation to decelerate to 2% by December 2022, even as highly cyclical categories such as shelter accelerate. Elsewhere, we similarly expect declining goods inflation to push core inflation back down by 2022Q4 to 2.5% in the UK, 2.0% in Canada, and 1.1% in the Euro Area.

Exhibit 12: A Sharp Drop in the Contribution From Supply-Constrained Categories to US Core PCE Inflation; We Expect Core Inflation to Moderate Across DMs in 2022H2



*US core PCE excl. food and energy, EA and UK HICP core excl. energy, food, alcohol and tobacco, Canada average of trimmed, median common BoC CPI measures,

Source: Goldman Sachs Global Investment Research

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