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IN THIS ISSUE:

## *Central Banks and Public Finance*

- 8 Interpreting Modern Monetary Reality  
Peter Stella
- 24 Was Deng Xiaoping Right? A 40-Year Assessment of  
China's Adoption of Western Capital Markets  
Carl E. Walter, Stanford University
- 39 [On Monetary Growth and Inflation in Leading Economies, 2021-2022:  
Relative Prices and the Overall Price Level](#)  
John Greenwood and Steve H. Hanke, Johns Hopkins University

### AMERICAN ENTERPRISE INSTITUTE ROUNDTABLE

- 52 Government Policies Reshape the Banking System  
Panelists: Charles Calomiris, Bert Ely, Alex Pollock, and Richard Sylla.  
Moderated by Paul Kupiec.
- 70 Will Fractional-Reserve Stablecoin Banking Replace Bitcoin  
and Some Traditional Banking Payments?  
Charles W. Calomiris, Columbia University
- 76 Looking for the Economy-Wide Effects of  
Stock Market Short-Termism  
Mark J. Roe, Harvard Law School
- 87 The GameStop Episode: What Happened and What Does It Mean?  
Allan M. Malz, Columbia University

# On Monetary Growth and Inflation in Leading Economies, 2021-2022: Relative Prices and the Overall Price Level

by John Greenwood and Steve H. Hanke, Johns Hopkins University

**T**here have always been two types of explanations for inflation: *ad hoc* explanations and monetary explanations. Historically, the *ad hoc* explanations have been in terms of special factors present on particular occasions: commodity price increases due to bad harvests, supply disruptions due to restrictions on international trade, profiteers or monopolists holding back scarce goods, or trades unions pushing up wages leading to a wage-price spiral or cost-push pressures, and so on in great variety. Even the widely used aggregate demand-aggregate supply model is a species of *ad hoc* explanation in the sense that it relies on idiosyncratic factors driving estimates of the output gap or special factors affecting the supply of labor or productivity. The monetary explanations for inflation have focused on increases in the quantity of money: either new discoveries of gold and silver in centuries past, or fiat money creation by the banking system or by the central bank in modern times.

Currently, in the United States and in numerous other economies, we are witnessing a flood of *ad hoc* explanations, this time focused on supply chain issues following the COVID-19 pandemic and the reopening of economies. There is a widespread view among officials at the Federal Reserve System, among economists in the Biden Administration, among academics (led by people like Paul Krugman, who claims to be a spokesman for “Team Transitory”) and even among large parts of the business community that the current bout of U.S. inflation is:

1. Largely the result of supply chain disruptions which
2. By their nature will turn out to be “transitory”; and
3. As a result, the inflation will melt away in 2022 as the supply chain issues are addressed and resolved.

In our view, these notions are fundamentally wrong, representing misstatements of the problem and its true causes. In this paper we will show that much of the consen-

sus makes the mistake of conflating relative price changes with changes in the overall price level. Instead, we argue that the U.S. and numerous other economies are facing two separate problems: (1) a big shift in the composition of demand which, in the short term, is leading to supply chain problems and consequent relative price movements; but (2) unlike other economies, the U.S. and a limited number of other economies have engineered a substantial excess of broad money growth over the past 18 months that is exacerbating the supply chain issues by inflating overall spending or demand. Equally important, the excess money growth will cause increases in the overall price level that have only recently become apparent due to the typical two-year lag in effect between accelerations in the rate of monetary growth and the emergence of higher inflation.

Based on monetary data, we anticipate that the U.S. and Israel are likely to see increases in their overall price levels of

approximately 28% and 20%, respectively, over the next few years, whereas the U.K. will likely see an increase of about 11% in the overall price level over a similar period. The projected price increases are a function of the amount of excess broad money that has been created during the past 18 months.

In contrast to the consensus view that price increases are due to supply chain disruptions, we argue that:

1. U.S. inflation is not the result of problems with the supply chain but is due to excess broad money growth;

2. The inflation will turn out to be “persistent,” not “transitory,” lasting through 2023 and 2024; and

3. As a result, the inflation will only subside when the underlying cause—excess broad money growth—is addressed and reduced to a rate more compatible with an inflation target (2% in the case of the Fed and the Bank of England, and 1%-3% in the case of the Bank of Israel).

In what follows, we begin by discussing the main relative price changes that have been observed in developed economies over the past three decades; and in so doing, we develop a key principle relating to the transmission of prices between economies that we believe has not been articulated so far in the economic literature. Unless two countries’ exchange rates are fixed one with the other, inflation cannot be exported. Inflation is a monetary and local phenomenon; only relative prices are exported. Second, we examine relative price trends over the pre-pandemic period 1990-2019, and contrast them with changes during and after the pandemic resulting from abrupt changes in expenditure patterns. Third, with the aim of highlighting the difference between relative price changes and overall price level changes, we provide three case studies of the inflation experience during the first and second oil crises—in Japan, the U.K., and the U.S. Together these three case studies provide compelling evidence that inflation is a monetary phenomenon and is not due to shifts in relative prices. Fourth and last, we make a simple quantitative assessment of the monetary excesses that have led to the current episode of inflation across ten economies, which enables us to identify those economies that will experience the greatest inflation, those that will experience more moderate inflation, and those that will experience negligible inflation or even renewed deflation in the period to 2024. We close with some thoughts about the influences we feel have combined over the past three or four decades to cause the broad consensus of the economics profession to focus on *ad hoc* instead of monetary explanations of inflation.

### Relative Price Changes over the Past Three Decades

Before discussing relative price changes during the COVID-19 pandemic, we consider relative price changes in the U.S., the eurozone, the U.K., and Japan over the 30 years from 1990

to 2019. Perhaps the two most important developments in the global economy over these three decades were these: (1) the market reforms in the Chinese economy starting with Deng Xiaoping’s Four Modernizations, which were launched in December 1978, and the subsequent opening of China to international trade; and (2) the widespread movement during the 1990s among developed economies to give central banks a degree of policy independence from their governments and to require them to pursue inflation targets.

The reforms in China and the opening of the economy to international trade produced a far-reaching labor market shock that eroded wage rates and reduced the level of manufacturing employment across the developed world. Suddenly, a huge workforce of several hundred million people was available to work on the production of relatively low value-added, manufactured goods in competition with factory workers in the advanced world. As we now know, this had a profound effect in restraining nominal and real wages in the advanced economies for the best part of two decades. This also had the effect of putting a “lid” on durable goods prices starting in 1985 (see Figure 1), just a few years after the introduction of Deng’s reforms.

The second development—the move to inflation targeting by relatively independent central banks—produced what Mervyn King has called the Great Moderation: an extended period of moderate price inflation and a reduction in the volatility of economic growth that lasted until the Global Financial Crisis of 2008-09. Together these two developments—China’s joining the world economy and the adoption of inflation targets by central banks—have meant that while overall price levels in the developed world increased more slowly than they had in the 1970s and 1980s, relative wage rates in the developed economies were severely restrained by competition from workers not only in China but elsewhere in the emerging world.

The popular narrative has been that China was “exporting deflation,” an idea sometimes repeated among economists who should know better. The problem with this kind of analysis is that it not only fails to explain adequately some of the issues of the 1990s and early 2000s (such as the variation in inflation rates among economies), but also leads potentially to a mistaken diagnosis of the world’s current inflation problem.

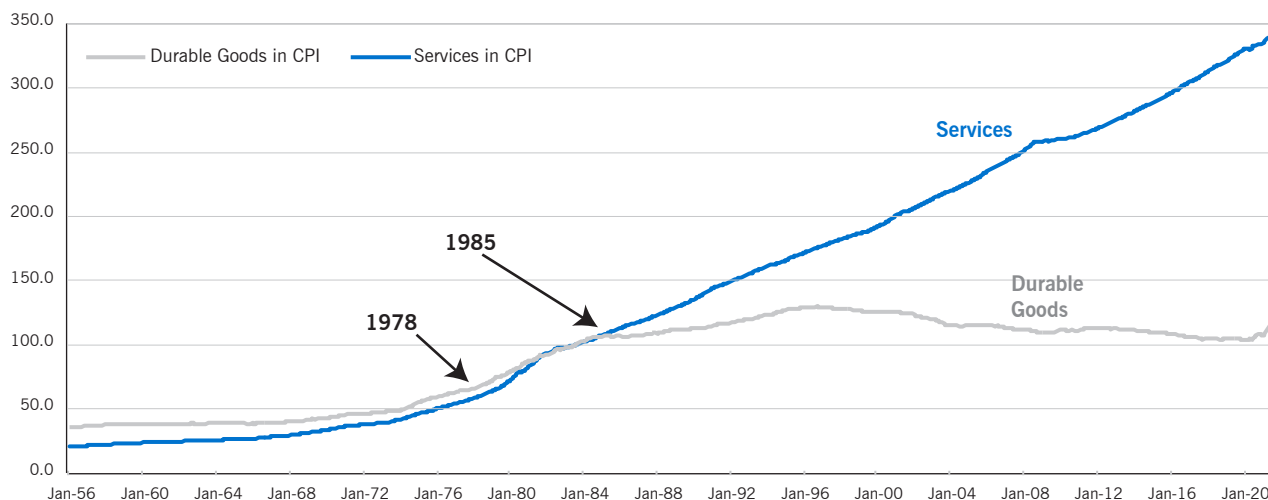
During the past three decades since 1990, the general pattern in the U.S., the U.K., the eurozone, and Japan has been for goods prices to rise very slowly or fall, while service prices have increased at a rate slightly faster than the overall consumer price index.

Starting with the U.S., for example, durable goods prices *fell* by an average of -0.2% per annum over the period 1990-2019 (as reported in Table 1). Conversely, service prices

Figure 1

China's Reforms and Opening from 1978 Put a Lid on U.S. Durable Goods Prices from 1985

Durable Goods & Service Price Components of US CPI, 1956-2021  
(1982-84=100)



Source: Refinitiv, to December 31, 2019

have tended to rise at faster rates, averaging more than 3% p.a. over the same period. Since the CPI is a weighted average of durables, non-durables (not shown in Figure 1 or Table 1), and services, the overall CPI is the result of the interaction of price movements in each of these three main components. But the critical insight here is that the movement of any single set of relative prices—whether durable goods, non-durable goods, or services—fails to convey information about the *overall* inflation rate.

The overall inflation rate and price level are determined by changes in the money supply broadly measured. The Quantity Theory of Money (QTM) and the equation of exchange confirms this relationship. On the other hand, changes in relative prices result from changes in demand and supply conditions in the real sector of the economy. Relative price changes are, therefore, independent of changes in the money supply. So, while a doubling of the money supply will result in a doubling of all nominal prices, relative prices in the economy will remain unaffected.

From this standpoint, the lower-priced goods exported from China had no causal connection with the inflation rate in the U.S. or anywhere else. This was a case of relative prices in China (for labor, land, production facilities, etc.) being substantially lower than in the developed West, giving China a large absolute and comparative advantage in the export of low value-added, manufactured goods, thereby enabling China to win market share at the

expense of manufacturing industries in developed western economies.

Similarly, the behavior of relative prices can be seen very clearly in the division of consumer price indices into goods prices and service prices for the U.K., the eurozone, and Japan shown in Table 1. In each case over these three decades, the price of goods increased on an average annual basis at a rate below the overall CPI, while service prices generally increased slightly more than the overall CPI.<sup>1</sup>

Importantly, service prices in these economies generally increased by 2%-3% p.a. Since the *overall* CPI inflation rate is a weighted average of goods prices and service prices, the resulting rate in many advanced economies was often close to 2% p.a. But, the *overall* inflation rate was a result of the monetary policy—specifically, the broad monetary growth rate—of the country concerned, not the import of cheap manufactured goods. This explanation indicates why there were lower inflation rates in Japan and the euro area and higher inflation rates in the U.S. and U.K.; the former two

1 Euro area data are for the period 1997-2019. We choose to start our U.K. data from 1995 to omit the 1990-92 episode of inflation following the Lawson boom. Moreover, U.K. monetary policy only became fully independent after sterling's departure from the ERM in September 1992. The Japanese data for goods prices are distorted upwards by a series of hikes in the Consumption Tax in 1997, 2014, and 2019 which are captured in the indices but ought to be excluded. An index of Japanese core CPI prices adjusted for consumption tax changes is available, but no adjusted index is available for the goods or services components.

have consistently had relatively lower rates of money growth than the latter.

**Table 1**  
**Average Annual % Changes in Goods Prices and Service Prices, 1990-2019**

	Average Annual Rates of Price Change (%)		
	Goods Prices	Service Prices	CPI - All Items
U.S.	-0.21%	+3.06%	+2.45%
U.K. (from 1995)	+1.01%	+3.36%	+2.02%
Eurozone (from 1997)	+1.50%	+1.89%	+1.67%
Japan	+0.23%	+0.69%	+0.48%

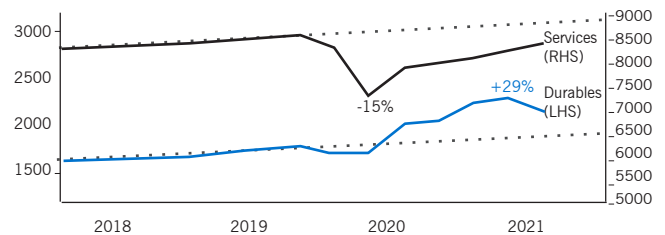
The key insight to grasp here is that, unless two countries' exchange rates are fixed one with the other, the *overall or average level of prices is never exported*—despite many people around the world repeating the mantra that China “exported deflation.” This is a case of confusing the *overall or absolute price level* with *relative* prices. What China exported was only the low *relative* wage rates embedded in the prices of goods such as toys, electronic gadgets, appliances, and all manner of other manufactured items.

Milton Friedman famously said, “Inflation is always and everywhere a monetary phenomenon.” But based on the logic and empirical findings above we can add, “Inflation is always and everywhere a *local* phenomenon” in the sense that countries choose their monetary policy (and their broad monetary growth rates), and the rate of inflation follows from the rate of monetary growth. Monetary policy—monetary growth—is a choice of the government or central bank of the country concerned. Of course, if a country chooses to peg its currency to another, it is by and large compelled to pursue a monetary growth rate that is compatible with the partner country's monetary policy to maintain the fixed exchange rate in place. Nowadays, all countries that are not colonies have freedom of choice in this area.

In summary, it is a mistake to say that China was “exporting deflation” or a falling *overall* price level in recent decades; at most it exported low *relative* wages reflected in the prices of manufactured goods for export. Other countries then selected monetary growth rates which translated those low wages and prices for manufactured goods into low *overall* inflation (as in Japan, Switzerland, and the eurozone), or moderate *overall* inflation (in the U.S., U.K., Australia, Canada, etc.), or very high *overall* inflation (as in Turkey, Argentina, and Venezuela). In short, overall inflation or the average price level for the economy is never exported, only relative prices are exported.

**Figure 2**  
**Pandemic Generated Huge Shifts in Demand—from Services to Goods**

US: Components of real personal consumption expenditure, 2018-2021—Billions of chained 2012 Dollars



Source: Refinitiv as of November 1, 2021

Notes: The percentage changes shown in the chart are compared to values in 2019 Q4.

### Relative Price Changes during the COVID-19 Pandemic

Turning to the present, the disruption to supply chains in the U.S. and elsewhere is both real and pervasive. In addition, during the past 18 months of the COVID-19 pandemic, we have the very interesting phenomenon that the long-established trend of the last 30 years of relatively lower goods price inflation and relatively higher service price inflation has been temporarily reversed.

The reason is that expenditure patterns shifted abruptly during the pandemic to increased spending on goods and reduced spending on services. With many people staying home during lockdowns to shelter from the pandemic, and unable to spend on travel, restaurants, and entertainment away from home, orders for goods or durables that could be delivered to their door increased massively. As Figure 2 shows, U.S. spending in real terms on durable goods (about 16% of total personal consumption expenditure) surged as people stayed home and purchased deliverable items online. In 2021 Q2, spending on durables had increased by 29%, as compared with 2019 Q4, just before the onset of COVID-19. Even after slipping in 2021 Q3, spending on durables had increased by 19.6% in real terms compared with its 2019 Q4 level.

Conversely, service industries, especially those dependent upon in-person services such as hospitality, travel, and entertainment, all saw abrupt declines in sales and output, falling by 15% in real terms in 2020 Q2 compared to 2019 Q4. As of 2021 Q3, service output was still 1.6% below its 2019 Q4 level in real terms.

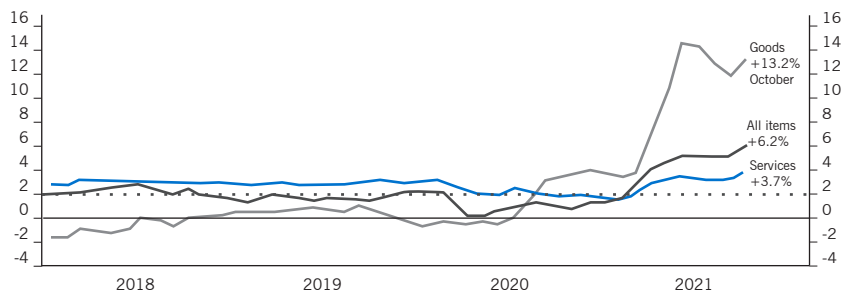
These huge shifts in consumer spending patterns prompted by the COVID-19 pandemic have played havoc with supplier deliveries of required components and final products by land, sea, or air. All this has disrupted supply chains as well as requiring output and employment levels in



Figure 3

### U.S. Reopening Has Seen a Reversal of Pre-COVID-19 Relative Inflation of Goods & Services

U.S.: CPI headline inflation by goods & services, 2018-2021 (% yoy)

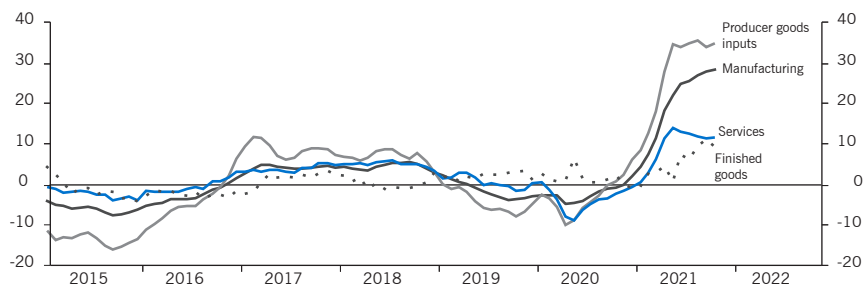


Source: Refinitiv as of November 19, 2021

Figure 4

### U.S. Reopening Has Seen a Reversal of Relative Producer Prices with Sharp Increases of Goods Price Inflation vs. Services Price Inflation

U.S. PPI: Inputs to Stage 1, Goods & Services, 2015-2021



Source: Refinitiv as of November 16, 2021

different sectors to be extensively reconfigured. Not surprisingly, these shifts in production, employment, and delivery services have led to parallel shifts in prices—with goods prices generally rising and service prices generally remaining weak or falling due to lack of demand—temporarily reversing the trends of the past three decades.

These trend reversals are clearly shown in Figures 3-7, which show year-to-year changes in goods and service prices between 2018 and 2021 for the U.S., the U.K., and the eurozone.

Figure 3 shows the breakdown of U.S. consumer prices into goods price changes and service price changes for 2018-2021. In contrast to the trends prevailing before the onset of COVID-19, goods prices have been the first to increase in response to the new situation. Service prices are lagging behind. When the supply chain issues are resolved, service prices should be expected to rise more rapidly restoring a pattern similar to their previous relationship with goods prices. However, in the interim, and subject to monetary growth over the next two or three years, the overall level of

U.S. prices must be expected to rise by about 28% between now and the return to normality, perhaps in 2024.

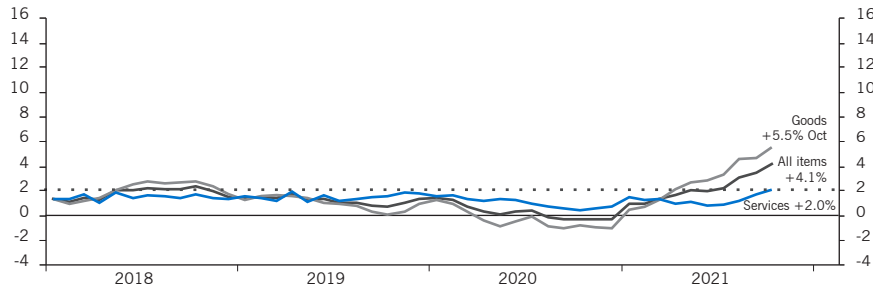
The same trends are evident, in even more exaggerated form, when we move upstream in the supply chain to examine the components of the U.S. Producer Price Index. As shown in Figure 4, prices of inputs to Stage 1 (producer goods) rose by 33.8% year-on-year in September 2021. Inputs of components and materials for the manufacturing sector rose by slightly less (+27.8%). The prices of inputs to the service sector increased by 11.3% over the same period. The overall producer price index for finished goods rose by 10.9%.

*The general rule, then, is that the narrower the price index and the closer the items are to the first or early stages of the production process, the variability of prices will tend to be greater. Conversely, the broader the price index and the closer the items included are to final consumer demand, the more stable prices are likely to be.*

Figure 5

### Eurozone Reopening Has Seen a Reversal of Relative Goods & Services Inflation Trends

Eurozone: CPI headline inflation by goods & services, 2018-2021 (% yoy)

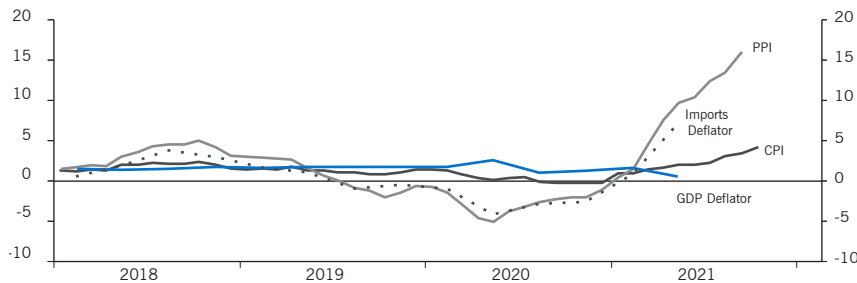


Source: Refinitiv as of November 19, 2021

Figure 6

### Eurozone Reopening Has Seen Steep Rises of Producer Input & Import Prices Relative to Consumer Prices

Eurozone GDP deflator, PPI, Import Prices & CPI, 2018-2021 (% yoy)



Source: Refinitiv as of November 16, 2021

However, this observation is subject to whatever else is driving the overall price level in the economy—usually monetary growth. Some have argued that natural disasters and typical pandemics must also be included since they can temporarily reduce output, but the scale of such overall output declines is likely to be far less significant than shifts in the rate of monetary growth from slowdown to expansion and vice versa.

Turning to the eurozone, we observe in Figure 5 the same general trends as in the U.S.—a shift from relatively lower goods price inflation pre-pandemic to substantially higher goods price inflation both absolutely and relative to service prices as the economy reopened in the aftermath of COVID-19. As in the U.S., this reversal is no doubt the result of the abrupt shift in demand from services to goods. In September 2021, goods prices in the eurozone increased by 4.6% year-on-year, while service prices (now available to October) increased at less than half that rate—by 2.1% year-on-year. The overall harmonized level of consumer prices—which is a weighted average of these two main components—increased by 4.1% in October.

The same broad observations apply to the eurozone Producer Price Index as we saw for U.S. producer prices, again with greater price movements higher up the supply chain and lesser price movements lower down the supply chain. As shown in Figure 6, prices of producer inputs (excluding construction goods) rose by 13.4% year-on-year in August. From a year earlier, import prices increased by 7.0% in 2021 Q2. The overall CPI was up by 3.4% in September (year-on-year), while the GDP deflator in 2021 Q2 was up by only 0.5% (year-on-year).

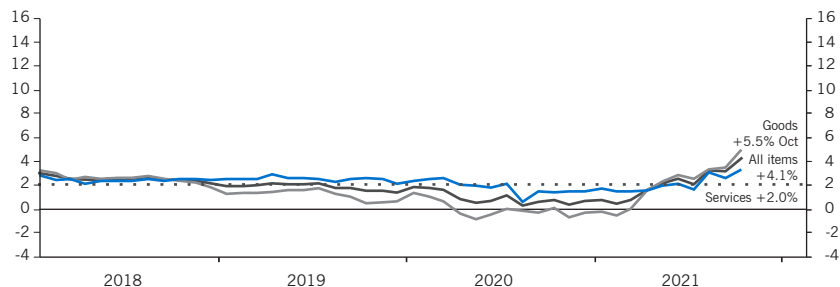
For completeness, we consider the situation in the U.K. in Figure 7. The breakdown of inflation between goods and service price inflation shows the same reversal that we observed in the U.S. and the eurozone between goods prices and service prices pre-pandemic and post-pandemic. However, in contrast to the U.S. or the eurozone, the U.K.'s overall consumer prices, goods prices and service prices are all rising at similar rates.<sup>2</sup> The overall

2 There are perhaps two main reasons for the greater convergence of current price trends in the U.K. versus the U.S. and the eurozone. First, the U.K. has a much larger trade sector (imports are close to 32% of GDP) which means that imported goods play a larger role in the first round or pass-through effects on pricing as compared with the

Figure 7

### U.K. Reopening Has Seen a Reversal of Pre-COVID-19 Relative Inflation of Goods & Services

U.K.: CPI headline inflation by goods & services, 2018-2021 (% yoy)

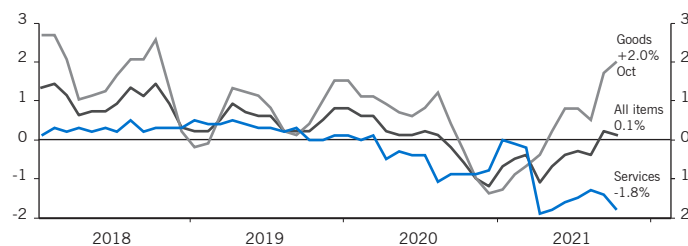


Source: Refinitiv as of November 19, 2021

Figure 8

### Japanese Reopening Has Seen Greater Inflation of Goods Prices Relative to Services, but the Key Difference with the U.S. Is That the Overall Inflation Remains Low

Japan: CPI headline inflation by goods & services, 2018-2021 (% yoy)



Source: Refinitiv as of November 19, 2021

or headline CPI was up by 3.1% in September while goods prices were up by 3.4%, and service prices were up by 2.6%.

Switching our attention from North America and Europe to Japan and China, we immediately find some striking contrasts. First, whereas in the three economies examined so far, goods prices tended to fall while service prices increased between 2010 and 2019, in Japan, the trends since 2010 were the opposite (see Figure 8). Goods prices during the same period increased on average by +0.8% p.a. while service prices increased on average by only 0.2% p.a. However, this period was distorted by two increases in Japan's consumption tax—in 2014 to 8% and in October 2019 to 10% although some items such as food products and newspaper subscriptions were

exempted and remained taxed at 8%. Over the same period (2010-2019), the overall CPI increased on average at 0.5% p.a., a figure which includes the two consumption tax hikes. Adjusting for the increases in Japan's consumption taxes would likely generate an annual decline in goods price inflation similar to that seen in the U.S., the U.K., and the eurozone.

Second, the overall level of consumer prices in Japan increased by just 0.2% (year-on-year) in September 2021, even though Japan is subject to many of the same global supply chain issues faced by the United States, the eurozone, and the U.K.—notably, shortages of electronic chips, cars, steel, coal, and natural gas, and higher container shipping and freight rates. How can it be that Japan's inflation experience during the pandemic deviates so much from that of its advanced economy competitors—the U.S., the U.K., and the eurozone?

Turning now to the recent history of China, we see very different trends in terms of the overall price level and the components of the CPI. First, Figure 9 shows China's CPI split into selected goods prices (including food) and selected service prices. The past three years have been dominated

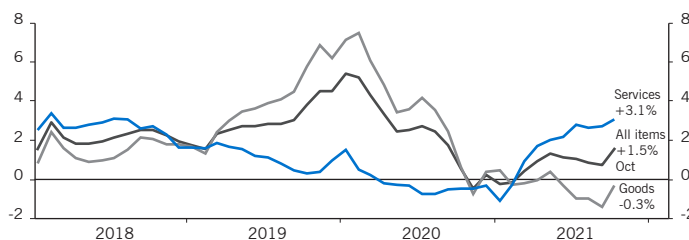
more continental economies of the U.S. and the eurozone where imported goods account for a much smaller share of GDP. Second, because of the U.K.'s large and highly integrated service sector (about 85% of GDP), the distinction between goods and services is sometimes less apparent than it might seem. All goods are sold with a degree of "bundled" services such as the service received at a department store or supermarket, while in the service sector, "goods" are also widely available wrapped around with services—think of meals at restaurants or hotels.



Figure 9

**Chinese Reopening Has Seen the Unwinding of the African Swine Flu Episode in 2019-20, Causing Goods Prices (including Food & Pork) to Fall Relative to Services. A Key Feature Is That Overall Inflation Remains Low.**

China: CPI headline inflation by goods & services, 2018-2021 (% yoy)



Source: Refinitiv as of November 19, 2021

by the effects of China's African swine flu outbreak, which required the culling of large parts of China's hog herd. Since pork constitutes China's staple meat, this led to a huge increase in food prices in 2019-20. Moreover, since food prices account for as much as 30% of China's consumer price index,<sup>3</sup> the impact of rising pork prices on measured CPI inflation was substantial—although strictly this is a relative price change not an overall price change.

However, pork prices are now declining on a year-to-year comparison basis and are likely to continue to do so well into 2022. Conversely, service prices, which had been generally sliding downwards in 2019-20, are now increasing at a greater rate than goods prices, in contrast to Europe and North America. This is surely evidence of a high degree of *relative price flexibility* in China.

But second, once more in marked contrast to what we see in the United States, the *average or overall level* of prices has remained very subdued, rising just 0.7% in September and 1.5% in October compared with a year ago. So again, how can it be that China's inflation experience during the pandemic, despite facing many of the same global supply chain problems, deviates so much from that of its advanced economy competitors?

**Case Studies from the First and Second Oil Crises of 1973-74 and 1979-80**

Before answering our two questions about stability of the overall price levels in Japan and China and returning to the issues of the current global economy, it is worthwhile to examine the

experience of Japan, the U.K., and the U.S. during the first and second oil crises of 1973-74 and 1979-80. These episodes from monetary and business cycle history demonstrate very dramatically the importance of the distinction between the absolute or overall price level and relative price changes.

To develop a proper understanding of the underlying forces at work today and in the past, consider first the experience of Japan in the first and second oil crises. These are both episodes where the popular narrative explains inflation as a result of OPEC curtailing oil supplies from October 1973—in effect restricting the operation of part of the global supply chain. Based on the evidence, we can dispel the widespread myth that these two oil crises first caused inflation and subsequently precipitated recessions. Nothing could be further from the truth.

First, consider the case of Japan in the first oil crisis of 1973-74. As shown in Figure 10, import prices (which included all Japan's oil requirements) increased by 72.3% year-on-year in 1974 Q2. Other wider price indices such as producer prices increased by lesser amounts, reaching a peak rate of 33.8% in February 1974 measured on a year-on-year basis. Similarly, consumer prices peaked at 25.0% (year-on-year) in February 1974, increasing by an average of 23.2% year-on-year during 1974. This was a virulent episode of inflation, but one which folk history widely attributes to the restrictions on oil output imposed by OPEC from October 1973 coinciding with the outbreak of the Yom Kippur or Ramadan War between Israel and Egypt.<sup>4</sup>

However, a more careful look at the data shows that from the break-up of Bretton Woods in August 1971, the Bank of Japan allowed or encouraged a rapid expansion of M2 money growth. The Japanese authorities did this out of

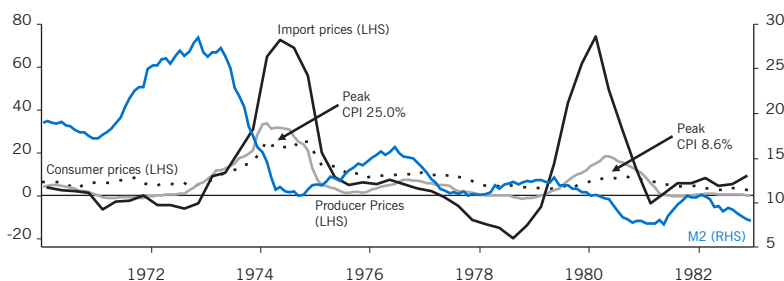
<sup>3</sup> According to Bloomberg estimates in 2019, the category of "food, alcohol and tobacco" accounts for about 30.2% of the CPI basket, the highest share. Within that, food accounts for around 19.9%—much lower than around 30% in 2015. In the food component, pork has the highest weight, followed by vegetables. The former accounts for slightly more than 2.5%, and the latter slightly less than 2.5% of the CPI basket.

<sup>4</sup> In response to U.S. support of Israel, the Arab members of OPEC, led by Saudi Arabia, decided to reduce oil production by 5% per month on October 17, 1973.

Figure 10

Relative Price Changes vs. Overall Price Changes—Japan in the Two Oil Crises of 1973-74 and 1979-80

Japan: Inflation in two oil crises, 1970-1982 (% yoy)



Source: Refinitiv as of October 22, 2021

fear that yen appreciation would produce a recession (“*endaka fukyo*”) in Japan’s export-dependent economy. As Figure 10 shows, the monetary expansion was large and sustained, with M2 growth averaging 25.2% year-to-year between June 1971 and June 1973—well before OPEC had raised the oil price. In this event, CPI inflation peaked in 1974 two years after the surge in M2—exactly the time frame a monetary analyst would expect for the lag between monetary acceleration and the outbreak of higher inflation. In our view, this was unquestionably a monetary inflation, not the effect of a disruption of the oil supply chain by OPEC.

As a result of the traumatic experience of inflation during the first oil crisis, the Bank of Japan announced a policy switch in July 1974 designed to control money growth with a goal of reducing inflation.<sup>5</sup> As shown in Figure 10, between July 1974 and July 1979, M2, Japan’s broad money measure, increased by an average of 12.6% p.a., almost exactly half of the 25.4% average annual growth in the two years from July 1971 to July 1973 before the first oil crisis. As a result, although in the second oil crisis Japan’s import prices increased by 73.7% (year-on-year) in 1980 Q1, an increase almost identical to the 1973-74 experience, the producer price index increased by only 18.4% (year-on-year) in April and May 1980 while consumer prices peaked at only 8.6% (year-on-year) in September 1980.<sup>6</sup> Japan’s success in dealing with the second oil crisis was due to monetary control, not due to any better management of global supply chains.

The U.K. had notably less success in managing the second oil crisis than Japan. As in Japan after the breakup of Bretton Woods in August 1971, the U.K. authorities—the Chancellor of the Exchequer and the Bank of England together—presided over very rapid broad money growth, averaging 19.4% p.a. between June 1971 and June 1973, with a peak growth of 23% year-on-year in 1973 Q2 and Q3. When OPEC raised oil prices in the first oil crisis of November 1973, the monetary damage had already been done. As can be seen in Figure 11, manufacturers’ input prices of raw materials and fuel peaked at an increase of 73% year-on-year in January 1974, import prices peaked at an increase of 49.3% in 1974 Q2 from a year earlier, and retail prices (the RPI) peaked at an increase of 26.9% in August 1975 from a year earlier. This was a disastrous episode of U.K. monetary mismanagement, one that was exacerbated by the steep deceleration in money growth in 1974 which triggered the deepest post-war recession on record to that time.

Ahead of the second oil crisis of 1979-80, the U.K. authorities were not nearly as successful as their Japanese counterparts in controlling money growth. Between mid-1977 and mid-1981 broad money as measured by the IMF increased by an average of 14.6% p.a. while the retrospectively constructed M4 increased by an average of 15.4% p.a. As a result, although manufacturers’ input prices increased by the comparatively modest amount of 27.4% in March 1980 from a year earlier, and import prices increased by only 11%-13% p.a. in 1979-80, inflation as measured by the RPI increased by 21.9% year-to-year in May 1980. In contrast to the Japanese government and especially the Bank of Japan, the U.K. government and the Bank of England<sup>7</sup> did

5 See Suzuki Yoshio, “Money and Banking in Contemporary Japan—The Theoretical Setting and Its Application” (1980), Yale University Press p. xv.

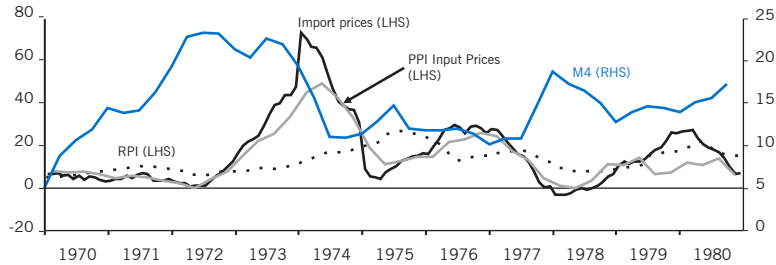
6 Although 8.6% CPI inflation may seem high to us today, it should be remembered that under the Bretton Woods system of fixed exchange rates (to August 1971) Japan regularly experienced consumer price inflation as high as 7%-8% p.a., much of it due to Balassa-Samuelson effects. Between 1960 and 1972, the average annual increase in consumer prices in Japan was 5.4%.

7 With no independence from the government at this time, the Bank of England had

Figure 11

**Excess Money Growth in U.K. Caused Inflation in U.K. at Time of the 1st and 2nd Oil Crises, not OPEC's Price Hikes**

U.K.: Inflation in two oil crises, 1970-1980 (% yoy)

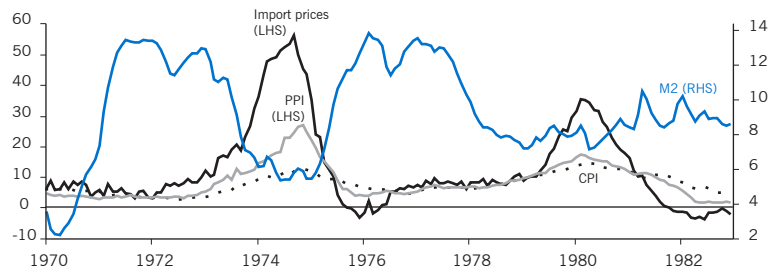


Source: Refinitiv as of December 31, 1980

Figure 12

**Excess Money Growth Caused Inflation in the U.S. at the Time of the 1st and 2nd Oil Crises, not OPEC's Price Hikes**

U.S.: Inflation in two oil crises, 1970-1982 (% yoy)



Source: Refinitiv as of December 31, 1982

not learn the lessons of the first oil crisis and the country was therefore compelled to repeat much of the previous trauma—political as well as economic—that was experienced during and after the second oil crisis.

Turning to the U.S., ahead of the first oil crisis, the U.S. monetary authorities, like those in Japan and the U.K., allowed double-digit broad money growth to build up for at least two years. Figure 12 shows how, between January 1971 and June 1973, U.S. M2 growth averaged 12.1% year-to-year. Import prices (including oil prices) peaked at an increase of 56.2% in September 1974 from a year earlier; the change in the producer price index for all commodities excluding farm products peaked at 26.9% also in September 1974 from a year earlier, while growth in consumer prices peaked at 12.3% in December 1974 from a year earlier, exactly two years after the secondary peak in M2 growth in December 1972.

no ability to conduct monetary policy other than in cooperation with the Chancellor of the Exchequer.

Having seen the effects of high money growth on U.S. inflation in 1973-74, one would have thought that the Federal Reserve could have prevented the recurrence of such an episode. However, as Figure 12 clearly shows, broad money was allowed to re-accelerate from the start of 1975, rising to a peak year-on-year growth rate of 13.8% a year later in 1976, and the double-digit money growth rate persisted through to the end of 1977. By now, it was too late to attempt to put the money genie back in the bottle, and inflation resumed rising in 1978. This time, growth in import prices peaked at 35.5% (year-on-year), the producer price index peaked at 17.5% (year-on-year) in February 1980 and increases in consumer prices peaked at 14.7% (year-on-year) in April 1980.

Interestingly, despite the relatively recent inflationary experience of 1973-74, the peak of inflation in 1980 lagged just over *three years* behind the secondary peak of M2 in January 1977. As Milton Friedman always said, the lags from money growth to inflation are long and variable.

Table 2

### Cumulative Broad Money Growth Rates, Adjusted for Real GDP Growth and Velocity Changes, Are a Guide to Future Price Level Changes and Inflation

Broad Money Aggregate	US M2	IS M3	UK M4x	AU M3	CN M3	EZ M3	NZ M3	JP M2	SW M3	CH M2
<b>Cumulative Broad Money Growth (%): Feb 2020 to Sept 2021* (<math>\Delta M</math>)</b>	36.4	33.3	18.9	18.5	16.9	15.6	15.0	11.3	7.6	15.4
<b>Normal Real GDP Growth Rate (%) ** (<math>\Delta y</math>)</b>	2.4	3.8	2.0	2.6	2.2	2.0	3.2	1.2	2.0	5.5
<b>Measured Average Annual % Change of Velocity, 1998-2019 (<math>\Delta V</math>)</b>	-1.7	-3.0	-1.9	-2.8	-2.6	-2.3	-2.1	-2.7	-1.4	-2.9
<b>Deduction for 2 years of <math>\Delta y</math> and <math>\Delta V</math> from cumulative money growth: <math>2*\Delta y - 2*\Delta V</math></b>	8.2	13.6	7.8	10.8	9.6	8.6	10.6	7.8	6.8	16.8
<b>Excess Money (%): <math>\Delta M - (2*\Delta y - 2*\Delta V) = \Delta P</math> Available to Raise Price Level (based on 2 years of potential real GDP growth and trend velocity change)***</b>	28.2	19.7	11.1	7.7	7.3	7.0	4.4	3.5	0.9	-1.4
<p>*US data is from 2019 Q4 to 2021 Q3; for Israel and Canada data is to August 2021.  **Based on selected 2010-19 real GDP growth rates.  ***From the Cambridge version of the Quantity Theory of Money: <math>MV = Py</math> hence <math>\Delta P = \Delta M + \Delta V - \Delta y</math></p>										

Source: Refinitiv as at November 8, 2021 and Invesco calculations

Country abbreviations: US = United States, IS = Israel, UK = United Kingdom, AU = Australia, EZ = Eurozone, CN = Canada, NZ = New Zealand, JP = Japan, SW = Switzerland, CH = China.

#### Application of Our Methodology to Ten Economies to Predict Price Level and Inflation Outcomes

As reported in Table 2, we have calculated for ten of the world's economies the cumulative percentage increases since February 2020 of the broad money aggregates.<sup>8</sup> Relying on the Quantity Theory of Money, we begin with the proposition that inflation is a function of changes in three main variables: (1) the growth of the quantity of money; (2) the amount of money absorbed by real economic growth; and (3) the amount absorbed by the annual increase in demand for money balances, or what amounts to the inverse of income velocity.

<sup>8</sup> It is never appropriate to make inflation forecasts based on the monetary base. Inflation results from spending by the public at large—households and firms—and therefore it is appropriate to use a monetary total that reflects “money in the hands of the public,” not “money on the books of the central bank.” Among the components of the monetary base, only the currency issued by the central bank and held by the non-bank public is ever used for spending; bank reserves and vault cash held by banks are not part of the spendable balances of the nonbank public.

When looking at Table 2, start with our estimates of cumulative money growth from the onset of the pandemic in February 2020 through the end of the third quarter of 2021. From this number—which for the U.S. M2 was 36.4%—the next step is to deduct (1) the amount of money that will be absorbed by the real GDP growth (2.4% in the U.S.) that must be financed and (2) the amount that is estimated to be absorbed by annual changes in the demand for money balances (1.7% in the case of the U.S., equivalent to velocity change of  $-1.7\%$ ).<sup>9</sup> Finally, since it is now nearly two years from the start of the pandemic and the move by central banks to highly expansionary monetary policies, we subtract

<sup>9</sup> When assessing the money required to finance real GDP, ideally one should use the potential growth rate of the economy, but in the absence of such data (except for the U.S.), we have used averages of recent real GDP growth rates during stable growth periods pre-COVID-19. In the case of money required to add to money balances, we have calculated the trend rate of change of velocity between 1997 and 2019 (to avoid the sharp downturns in velocity experienced in most economies on the outbreak of COVID-19), and we show that figure in row 5.

two years' worth of changes in these two variables from the cumulative increase in money to provide estimates of the amount of excess money currently in each economy.

The residual figures in row 7 give us point estimates of the excess money balances in each economy (as of September 2021)—28.2% for the U.S.—that still need to be worked off in real growth, changes in money holdings, or in inflation. Given the figures for excess broad money growth rates and recognizing both how little real GDP can be boosted in the short run and the long-run stability of the public's demand to increase their money balances, we conclude that the excess money growth will mainly show up in the form of inflation as households and firms in the ten economies seek to restore their preferred ratio of money balances to nominal income.<sup>10</sup>

The results of these simple calculations suggest that the ten economies fall into three groups. First, on the left side of the table, our prediction is that, in the next two or three years, the U.S. and Israel will experience 20%-28% increases in their overall price levels and/or the highest inflation rates among the ten economies. The U.K., although also assigned to this high inflation group, is expected to trail the U.S. and Israel with an overall price increase of about 11% and an increased inflation over the same period. Second, in the center of the table, Australia, the eurozone, and Canada form an intermediate group that will experience an uplift in their overall price level of 7-8%, which will be reflected in a moderate increase in the inflation rate. And shown at the right side of the table, the increases in the overall price levels of New Zealand, Japan, and Switzerland are expected to be very limited—and negligible in the case of China—translating into almost imperceptible increases in the respective inflation rates given all the other “noise” that affects price indices even in normal times.

Given our view of the broad profile of inflation for the U.S., the big concern for financial markets in 2022 is likely to be the reaction of the U.S. Fed. We know already that the Fed will be “tapering” its asset purchases over the next six months. If the Fed succeeds in bringing the M2 growth down slowly and gradually to 5%-6% year-on-year (from the September figure of 12.8% year-on-year, which is still about twice the rate required for reaching its chosen 2% annual PCE inflation target), the outcome could be benign. Such a deceleration of money growth would simply result in a slowdown of nominal GDP in 2023-24. However, if FOMC members start to lose patience on account of the persistence of above-target inflation and raise interest rates

suddenly and steeply (as happened in 1994-95), the sell-off in financial markets could be painful and the risks of a recession in 2023 or 2024 would rise substantially.

### Why Has the Economics Profession Been So Attracted to *Ad Hoc* Explanations of Inflation?

We began this paper by observing that there had always been two explanations of inflation—*ad hoc* explanations tailored to the particular situation and monetary explanations that relied on the growth of the quantity of money broadly defined. Since the 1980s, attention to money growth among professional economists has been relegated to the status of a historical aberration. In the current, neo-Keynesian consensus that dominates professional economic debate, there is seldom any mention of the quantity of money,<sup>11</sup> and no use is made of the Quantity Theory of Money (QTM) to forecast inflation. Indeed, most Keynesian models of the economy do not even contain money, and they seldom contain any representation of the banking system—at most only interest rates or other credit market variables. In the COVID-19 pandemic, therefore, the Fed ignored any consideration of managing the quantity of money, preferring to emphasize its role in “easing financial conditions” or “restoring credit market functioning.”

“

The rate of growth in the money supply is swept under the rug in the U.S. ... This attitude is comparable to maintaining that the law of gravity applies in every country except the United States.

”

The result of the Fed's aggressive asset purchases (of U.S. Treasuries and mortgage-backed securities) as well as the Fed's lending programs has been that the broad quantity of money—“money in the hands of the public”—increased at a rate unprecedented since 1943. The consequences of the excess money growth in 2020-21 have steadily become increasingly evident in the economy, starting with the huge upswing in asset prices (i.e., equities, commodities, and real estate), moving on to boosting economic activity, and, more recently, impacting goods and service price inflation—precisely in the order and with the time lags identified by

10 It should be noted that the price increases or inflation rates calculated in the table refer to a broad inflation measure such as the implicit deflator for GDP rather than a narrower consumer price or PCE concept of inflation.

11 The Bank of England's quarterly Inflation Report, recently rebranded as the Monetary Policy Report, has not mentioned the quantity of money or money supply since the August 2018 edition.



Milton Friedman and Anna J. Schwartz in their empirical studies as long ago as 1963 and as predicted by monetary theory.<sup>12</sup>

Yet, Jerome Powell, Federal Reserve Board Chair, has taken a strongly anti-monetarist stance, one that is almost Luddite in its disdain of monetary analysis. During Congressional testimony on February 23, 2021, he was asked by Senator Kennedy (of Louisiana):<sup>13</sup>

*“...M2, the money supply, is up 26%, the highest amount since 1943. What does that tell you?”*

Mr. Powell replied, “Well, when you and I studied economics a million years ago, M2 and monetary aggregates generally seemed to have a relationship to economic growth. Right now, I would say the growth of M2, which is quite substantial, does not really have important implications for the economic outlook.” And he also claimed, “We have had big growth of monetary aggregates at various times without inflation, so something we have to unlearn, I guess.”

Our response would simply be to ask what was the basis for his claim? Where and when has there been “big growth of the (broad) monetary aggregates...without inflation”?

Since Powell’s attitude is shared by such a large proportion of professional economists, it is not surprising that the current, neo-Keynesian consensus does not include money in its modeling or in their framework for thinking about the macro-economy. Any attempt to explain the exclusion of monetary analysis must include, but would not be limited to, the following:

(1) failure to study, understand, and apply the fundamental relation between money and nominal spending (income velocity) and, indeed, the equally important but seldom studied relation between money and nominal wealth or asset velocity;

(2) failure to define adequately the most appropriate money stock that is critical to the determination of national income and the cyclical behavior of the macro-economy (e.g., the Fed has long omitted large-sized CDs from M2, though why a deposit of \$99,000 should be included but not a deposit of \$100,000 or more is baffling);

(3) unwillingness to contemplate the existence of and justification for the long and variable lags between the growth

of money and the consequences for spending or inflation, casually dismissing such relationships as a “black box” that gives rise to the “doctrine of immaculate inflation”;<sup>14</sup> and

(4) an associated preference for relating symptoms of money growth (notably, commodity price changes or wage changes) to changes in price inflation—in other words, a preference for using reduced form models that focus on only part of the transmission mechanism so long as they generate higher short run correlations rather than understanding and elucidating the true, underlying relationships.

The result is a bizarre situation in which money growth is studied and followed in many developed economies and almost every emerging economy as a guide to future nominal income growth. Of particular note is the fact that money growth is the only factor that is studied and has accounted for every hyperinflation in world history.<sup>15</sup> But, the rate of growth in the money supply is swept under the rug and ignored or assumed to be irrelevant in the U.S. Aside from being utterly unscientific, this attitude is comparable to maintaining that the law of gravity applies in every country except the United States.

But experience is the best teacher. Just as it was not academic theorizing but the real-world experience in the U.S. of simultaneously high inflation and high unemployment in the 1970s that exposed the shortcomings of the Phillips curve relationship, the persistent inflation that is likely to prevail in the U.S. in 2022 and 2023 as a result of the egregious growth of broad money in 2020-21 may finally start to undermine at least some of the complacent assumptions of the neo-Keynesian consensus. In so doing, it might even restore much-needed credibility to the monetary theory of nominal national income determination.

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[JOHN GREENWOOD](#) is the Chief Economist at Invesco in London. He is a Fellow at the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise.

[STEVE HANKE](#) is a Professor of Applied Economics at The Johns Hopkins University. He is the Founder and Co-Director of the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise.

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12 See “Money and Business Cycles” first published in the *Review of Economics and Statistics* vol. 45, no. 1, part 2: supplement (February 1963) and reprinted as Chapter 10 in Milton Friedman, *The Optimum Quantity of Money and Other Essays* (1969), Aldine Publishing Company, Chicago.

13 Source: <https://www.govinfo.gov/content/pkg/CHRG-117shrg44741/pdf/CHRG-117shrg44741.pdf>.

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14 Paul Krugman, “Immaculate Inflation Strikes Again (Wonkish),” *New York Times*, March 27, 2018.

15 See Steve H. Hanke & Nicholas Krus, “World Hyperinflations” in: Randall E. Parker and Robert Whaples (eds) *Routledge Handbook of Major Events in Economic History* (2013), Routledge, London.



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