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Demand- and supply-side factors behind the higher inflation

The second draft
May 27, 2022
Comments welcomed

1. Introduction

In 2021 and the first four months of 2022, inflation increased rapidly worldwide (Figures 1 and 2). At the end of February 2022, the only exceptions among G20 economies were China, Japan, Indonesia, and Saudi Arabia (Figure 2), where inflation remained low. On the other end of the spectrum, annual inflation in Argentina and Turkey (which are not included in Figure 2 for presentation reasons) exceeded 50%. In advanced economies, inflation reached the highest level since the late 1970s/ early 1980s.

Among the leading advanced economies, the United States (US) was the first which experienced an inflation surge, already in the first half of 2021. In the European Union (EU) and European Economic Area (EEA), inflation started to pick up a bit later, in the second half of 2021 but gained a speed at the beginning of 2022. At the end of April 2022 (the latest data available at the time of writing this paper), it approached or even exceeded the 10% threshold in several European countries, regardless they are members of the Euro area (EA) or have their national currencies.

The observed price dynamics leave little doubt that two-digit inflation may soon become a reality in a substantial part of Europe, at least for some time. It would mean a severe challenge to macroeconomic, social, and possibly also political stability in Europe.

This paper argues that the recent inflation resurgence should not surprise anybody. Inflation has resulted from over ten years of ultra-soft monetary policies. In particular, the asset purchasing programs (APPs) led to building up a substantial inflationary 'overhang' in the form of historically record-high levels of central banks' (CBs) balance sheets (monetary base). Expansionary fiscal policies have also played an important role. That is, demand factors have been the main factor staying behind high inflation. While we do not want to neglect the contribution of adverse supply-side shocks in 2021-2022, in our opinion, they have had secondary importance.

To explain inflationary pressures, we will look at both demand-side (Section 2) and supply-side factors (Section 3). Then we will try to speculate on the potential impact of the war in Ukraine both in terms of demand-side and supply-side factors (Section 4). In section 5, we will analyse monetary policy responses of major CBs and assess whether they have been correct and sufficient. Section 6 will contain conclusions and policy recommendations.

2. Demand-side factors: monetary and fiscal expansion

Monetary policy has built up the potential for a sudden demand increase since the global financial crisis (GFC) of 2007-2009. The GFC of 2007-2009 produced a deflationary shock in major currency areas such as the US dollar, Euro, or Japanese yen. In the aftermath of the crisis, a far-going disruption in financial intermediation led to a collapse in the money multiplier (Figure 3) and decreasing money velocity (Figure 4). These effects were further magnified by new banking regulations (Basel-3), which increased capital adequacy and liquidity coverage ratios, tightened credit risk assessment methods, introduced countercyclical capital buffers, etc. CBs resorted to large-scale APPs, popularly called quantitative easing (QE), to fight deflationary pressures in the environment of interest rates close to zero. However, the latter has had an additional disintermediation effect because the increasing commercial banks' deposits in CBs (Figure 5) partly neutralized QE expansionary effect.

In the first quarter of 2020, the COVID-19 pandemic produced a new adverse shock different from the GFC. It was a combination of demand-side and supply-side shocks. It resulted from depressed aggregate demand caused by the self-restrained behaviour of both consumers and investors and administrative lockdown measures such as the prohibition of certain types of activities, restrictions on the movement of people, or closed borders and the resulting disruption of supply chains. In such circumstances, private spending decreased, and private saving increased. However, these were the forced (involuntary) savings/ monetary overhang, the phenomenon known from the history of centrally-planned economies (Cottarelli and Blejer, 1991).

CBs in AEs reacted to the COVID-19 crisis similar to the GFC despite their different characteristics. They further relaxed their monetary policies by intensifying APPs (Figure 6). Because fiscal deficits and public debts increased during the pandemic, government bonds became the main assets absorbed by CBs.

Relaxation of most lockdown measures and pandemic 'fatigue' (people became less eager to restrict their consumer behaviour) observed in 2021 and even more in 2022 led to a rapid unfreeze of the above-mentioned monetary overhang. Continuation of ultra-loose monetary and fiscal policies through 2021 and, in some instances, in early 2022, added fuel to the fire.

In particular, the large-scale fiscal stimulus packages approved by the US Congress at the end of 2020 and 2021¹ contributed to boosting an aggregate demand not only within the US economy (beyond the estimated output gap – see Blanchard, 2021) but also globally (Jensen et al., 2021), given the role of the US dollar as a global reserve and transaction currency.

3. Supply-side factors: lockdown effects, structural changes, and trade tensions

Supply-side factors have also played an essential role in boosting inflation.

¹ It included the Consolidated Appropriations Act of December 2020, and the American Rescue Plan of March 2021, the total amount of which was equal to 2.8 trillion US\$. In addition, in November 2021 the Infrastructure Investment and Jobs Act was signed into law, aimed at spending 1.2 US\$ trillion over 5-year period. Another proposal called the Build Back Better Act of 1.5 trillion US\$ (mostly the social policy spending) is currently discussed in the US Congress.

First, lockdown measures in 2020 and, to a lesser degree, in 2021, introduced by individual governments (in an uncoordinated way) led to disruption in global, regional, and even local supply chains that eventually limited the supply of certain critical goods and production inputs and contributed to their higher prices. The new round of such disruptions in March and April 2022 was caused by two factors (i) a lockdown in China, in particular, in the Shanghai region, as a result of a new wave of the COVID-19 pandemic (Garcia Herrero, 2022); (ii) the war in Ukraine (see Section 4).

The increasing tensions in the international trading system, such as the ongoing US-China trade conflict (Rogoff, 2021; Borio, 2021) and various protectionist measures taken as a reaction to the COVID-19 pandemic, have not helped to eliminate production and supply bottlenecks.

Pandemic-induced structural changes have produced similar effects. Some may have a temporary character (shifting consumer demand from services vulnerable to a pandemic like tourism and travel to durable goods). Others may be permanent, for example, effects of moving to remote work, online trade, and services. As a result, the demand for some goods and components increased above their production capacities. The shortage of semiconductors (Kaur, 2021) is a typical structural bottleneck example.

Finally, there were also supply disruptions and associated price increases caused by the non-competitive character of some markets and political factors. The rapid growth of the price of natural gas in Europe in 2021 (Nouicer and Piebalgs, 2021; Zachmann et al., 2022) can be a good example.

Furthermore, physical shortages and increasing prices of individual goods and services (or expectations of their increase) have led to their precautionary hoarding by economic agents, which have also increased the imbalance between growing demand and limited supply, at least in the short term. Again, this is a well-known phenomenon in centrally planned economies (Kornai, 1980).

It is also worth noticing that some supply-side factors (exogenous from the perspective of an individual national economy) result, in fact, from changes in global demand (Jensen et al., 2021). It concerns, for example, commodity prices (Figure 7), which increased in 2021 due to a rapid economic recovery and increasing global demand. For instance, between 2010 and 2013, high commodity prices did not lead to higher inflation because demand constraints were more substantial.

4. The potential impact of the war in Ukraine

The Russian invasion of Ukraine, which started on 24 February 2022, created a new political and economic reality in Europe and worldwide. When writing this paper, after more than three months of the war (with no perspective to be stopped soon), some macroeconomic consequences are already visible but problematic to quantify due to incomplete data and an unknown and uncertain future. Therefore, our analysis has primarily a narrative and partly speculative character.

Following the structure of the analysis adopted in this paper, we will distinguish between demand-side and supply-side factors.

On the demand side, the war could increase consumer demand in the European frontier states that hosted many Ukrainian refugees and granted humanitarian aid (food, medicines, etc.) to Ukraine. Perhaps this factor can help partly explain the acceleration of inflation in Central and Eastern Europe (CEE) in March and April 2022.

Stopping or decreasing a European export of some goods to Russia and Belarus due to sanctions and countersanctions (see below) and shrinking Russia's domestic demand may have a dumping price effect in the EU. However, due to the marginal macroeconomic importance of such exports, we do not expect their meaningful impact on EU inflation.

The war will most likely involve higher budgetary expenditure for humanitarian aid, accommodation of refugees, and military and security purposes. However, the macroeconomic effects (including inflationary pressure) of these additional expenditures will be seen later (there is a time lag between making such decisions and effective spending, especially in the military).

More powerful inflationary consequences of the war have already been seen on the supply side, and they will dominate in a short-to-medium term perspective.

First, the war, the unprecedented Western² sanctions against Russia, and Russia's retaliatory measures (see Box 1) led to further increased commodity prices (Figure 7). It concerns energy resources (oil, oil products, natural gas, coal, and electricity), food (especially grain, animal feeds, and cooking oil), metals, and several other inputs (chemicals, fertilizers, timber, cement, steel and aluminium products, etc.).

Before the war, Russia was a significant global producer and supplier of all these products. Reducing their imports from Russia (due to sanctions or Russia's export ban) impacted global markets and international prices. The strength and durability of this shock will depend on the availability of alternative supply sources, the flexibility of individual commodity markets, dependence on specific transportation routes (for example, pipelines in case of oil and natural gas), the possibility of substitution, etc.

Box 1: Summary of trade-related Western sanctions and Russia's countersanctions after 24 February 2022 (as of 15 May 2022)

This box concentrates on sanctions and countersanctions that impact trade, world commodity markets, supply chains, etc. We do not deal with diplomatic, personal, and media sanctions. We also omit financial and investment sanctions, which impact the Russian economy but have very little or no impact on price levels outside Russia.

Energy sanctions

The US banned all oil and natural gas imports from Russia, and the UK will stop oil imports from Russia by the end of 2022. The EU is discussing the same measure in its sixth sanction package. In August 2022, the EU will also stop coal imports from Russia. There is a broad

² Analysing the content of anti-Russian sanctions, we use the adjective 'Western' in a broad geopolitical (membership in US- and EU-initiated alliances) rather than precise geographical sense (for example, Japan, Australia, and South Korea who joined sanctions are not located west of Russia).

debate within the EU about a substantial reduction of its natural gas imports from Russia. Germany has suspended the opening of the Nord Stream 2 gas pipeline from Russia.

Trade sanctions

Apart from sanctions related to energy trade, the EU imposed an embargo on importing iron, steel, wood, cement, rubber products, seafood, spirits, and liquor from Russia. The UK has imposed a 35% duty on some imports from Russia, including vodka.

On the export side, the US, EU, and the UK have banned selling dual-use goods (which may serve both civilian and military purposes) to Russia. The EU and UK have also prohibited exporting some luxury goods to Russia.

On 15 March 2022, the EU, in cooperation with other G7 partners, stopped treating Russia as a Most Favoured Nation according to WTO rules.

Transportation sanctions

Transportation sanctions include the closure of EU, US, UK, and Canadian airspace to all Russian-owned, registered, or controlled aircraft. The airspace closure accompanies the ban on exports, sales, supply, or transfer of all aircraft, aircraft parts, and equipment to Russia and the provision of all related repair, maintenance, or financial services. Similar bans concern goods, technology, and services exports in the maritime and space sectors.

The countries mentioned above also closed their seaports to Russian vessels. The EU banned Russian road transport operators.

Russia's countersanction measures

Russian countersanctions are primarily targeted against 'unfriendly' states, countries that joined anti-Russian sanctions. However, many of them also hit economic agents from other countries. For example, Russia introduced an export ban on more than 200 products until the end of 2022, including telecoms, medical, vehicle, agricultural, electrical equipment, and timber. It also partly banned its grain and agriculture exports.

Russia closed its airspace and seaports to carriers and vessels from 'unfriendly' countries.

Sources:

<https://www.bbc.com/news/world-europe-60125659>

<https://www.consilium.europa.eu/en/policies/sanctions/restrictive-measures-against-russia-over-ukraine/sanctions-against-russia-explained/>

<https://home.treasury.gov/policy-issues/financial-sanctions/sanctions-programs-and-country-information/ukraine-russia-related-sanctions>

<https://www.bbc.com/news/business-60689279>

To a lesser degree, it also concerns Ukraine's exports, in particular, of grain and other agricultural products, ferrous and non-ferrous metals, and other minerals. Their production was either stopped or reduced due to the proximity of combat zones and war damages. Their exports suffered from injury or blockade of transportation routes (especially the Odesa seaport).

Second, given the importance of Russia and Ukraine as the transit territories from China and other Asian countries to Europe, the war, sanctions, and countersanctions (also concerning the transport sector) caused another round of global supply chain disruption. Such disruption must lead to higher input prices, similarly to disruption caused by COVID-19-related lockdowns.

Third, a geopolitical uncertainty caused by the war led to the depreciation of CEE currencies (in countries remaining outside the EA), which also has an inflationary impact (via a passthrough mechanism on domestic prices).

The longer the war continues, the more damaging its cumulative macroeconomic impact on global and European economies.

5. Reactions of central banks to increasing inflation

CBs in non-euro-area EU member states (Czechia, Hungary, Poland, and Romania) started to increase interest rates in 2021. However, looking at inflation statistics in Figure 1, it was too little and too late. Unfortunately, it did not happen in the euro area and other major currency areas. The UK, Norway, and South Korea were the only exceptions among advanced economies. The US Federal Reserve Board (Fed) and European Central Bank (ECB) claimed that higher inflation had a temporary character and would disappear in 2022 (Powell, 2021; Lagarde, 2021).

The Fed started to change its attitude and policies only in November 2021³. In December 2021, it accelerated tapering new asset purchases⁴. In January 2022, it decided to stop increasing its assets holding in March 2022⁵. In March 2022, it increased the Federal Fund Rate (FFR) by 0.25 percentage points,⁶ followed by the decision to further increase the FFR by 0.50 percentage points (up to 1%) taken on 4 May 2022⁷. At the Fed's Federal Open Market Committee (FOMC) meeting, the plan to reduce the Fed's balance sheet starting from 1 June 2022 was announced⁸. The coming months will answer whether the Fed's monetary policy response is sufficient to stop the mounting inflationary pressures.

So far, the ECB has been slower to change its monetary policy. First, in March 2022, it terminated net asset purchases under the Pandemic Emergency Purchase Programme (PEPP). However, the existing stock of assets purchased under the PEPP will be rolled over until at least the end of 2024. Second, the special conditions applicable under the third series of targeted longer-term refinancing operations (TLTRO III) will end in June 2022. Third, net purchases under the regular APP are expected to be terminated in the third quarter of 2022, but the existing stock of assets will continue to be reinvested. Fourth, ECB interest rates may increase only 'some time' after stopping the APP net purchases⁹. Overall, as seen when writing this paper, ECB monetary policy tightening will be very gradual (Panetta, 2022).

³ <https://www.federalreserve.gov/newsevents/testimony/powell20211130a.htm>

⁴ <https://www.federalreserve.gov/monetarypolicy/fomcminutes20211215.htm>

⁵ <https://www.federalreserve.gov/newsevents/pressreleases/monetary20220126a.htm>

⁶ <https://www.federalreserve.gov/newsevents/pressreleases/monetary20220316a.htm>

⁷ <https://www.federalreserve.gov/newsevents/pressreleases/monetary20220504a.htm>

⁸ <https://www.federalreserve.gov/newsevents/pressreleases/monetary20220504b.htm>

⁹ <https://www.ecb.europa.eu/press/pr/date/2022/html/ecb.mp220414~d1b76520c6.en.html>

The Bank of Japan (BoJ) has not changed its monetary policy stance yet¹⁰, but as shown in Figure 1, Japan's annual rate of inflation remains below 1%.

The Monetary Policy Committee of the Bank of England (BoE) started hiking its interest rate in December 2021 (to 0.25%), and then, in three further steps (each by 0.25 percentage points), to 1% in May 2022¹¹. The last round of asset purchases ended in December 2021, and from March 2022, the stock of assets held by the BoE started to diminish because the maturing bonds are not rolled over¹²

Over three decades of low inflation and strengthening CB independence helped anchor low inflationary expectations in advanced economies. It was one of the reasons why inflation continued to stay at a level close to zero in the 2010s and the first stage of the COVID-19 pandemic despite a rapid expansion of CBs' monetary base and broad money. In terms of monetary arithmetic, it was demonstrated by decreasing money velocity and money multiplier (see Figures 3 and 4).

Building stable and low inflationary expectations should be considered the historical achievement that made monetary policy easier and more credible and decreased economic and social costs. Now, this achievement may be lost (Barro, 2021; Rogoff, 2021) as a result of three factors:

- Lack of timely response of CBs to an inflation surge in 2021 and 2022 and their misjudged opinions on the temporary character of inflation (see above)
- Changes in the Fed (FOMC, 2020) and ECB (2021) strategies mean tolerating inflation above 2% as the compensation for past inflation below this level. It increases uncertainty regarding the timing and strength of their reactions to higher inflation and raises suspicions that changes in the strategy serve as an excuse to tolerate higher inflation for a more extended period (McCracken and Amburgey, 2021; Hoffmann et al., 2021; Demertzis, 2022).
- The increasing fiscal dependence of CBs, in the environment of expansionary fiscal policies in most advanced economies (Dabrowski, 2021b).

This last question (fiscal dependence, also called 'fiscal dominance' – see Landau, 2021) has fundamental importance and will determine the prospects of effective anti-inflationary policies and CB independence (Dabrowski, 2021a). As a result of more than a decade of QE, CBs' balance sheets expanded (Figure 6) and became dominated by government bonds on their asset side (Figure 8). Such an effect of QE, even if initially unexpected and undesired, seems to be unsurprising and unavoidable. QE absorbed the bulk of commercial papers and securities of sufficient quality and liquidity acceptable to CBs. Hence, a continuation of QE required more reliance on government bonds, which led to an increasing share of CBs in the stock of GG debt holdings (Figure 8).

In practice, CBs may become hostages of fiscal authorities and their inability or unwillingness to carry out a necessary fiscal adjustment on time. It may create a severe obstacle to monetary policy tightening and reversing QE in the situation when inflation pressure comes back. Stopping inflation requires CBs to reduce their balance sheets and hiking interest rates (We do not discuss the sequence of these measures here, which is another policy issue). Both actions

¹⁰ https://www.boj.or.jp/en/announcements/release_2022/k220428a.pdf

¹¹ <https://www.bankofengland.co.uk/monetary-policy/the-interest-rate-bank-rate>

¹² <https://www.bankofengland.co.uk/monetary-policy/quantitative-easing>

will cause increasing the governments' interest payments and further deteriorate their fiscal position, other things being equal. It will unavoidably lead to a conflict between CBs and governments, which may undermine CB independence (Goodhart and Pradhan, 2020).

On the other hand, giving in to fiscal pressures would lead to even higher inflation and further undermine inflationary expectations (Landau, 2021; Borio, 2021; Weber, 2021).

The monetary policy dependence on the fiscal situation is already visible in the EA and may explain the ECB's reluctance to start a tightening cycle. The yields on government bonds in the highly indebted EA countries were kept thanks to the very accommodative character of ECB monetary policy and large-scale QE and its addressed interventions on the bond market when spreads increased. Such interventions have been conducted under the financial stability mandate with the declared goal to avoid financial 'fragmentation' in the EA and smooth monetary policy transmission mechanism (Panetta, 2022).

It is even a more significant potential challenge to the BoJ once it tightens its monetary policy. The size of public debt to GDP in Japan is much larger than in the EA. At the same time, the share of public debt held by the BoJ is also higher than in the case of the ECB (Figure 8).

6. Conclusion and policy recommendations

Inflation, which exceeds the CB target by a large margin, is no longer a hypothetical threat in most advanced economies; it is a real threat. It is a result of several past policy mistakes and adverse shocks experienced by the global and European economies since early 2020. Among the former, one can mention a too long period of lax monetary and fiscal policies after the GFC, the failure to build sufficient budgetary and monetary buffers in the second half of the 2010s, the wrong monetary and fiscal response to the COVID-19 pandemic, chaotic management of pandemic related restrictions, incorrect diagnosis of inflationary pressures observed in 2021 and 2022 and delayed decision to withdraw crisis-related monetary and fiscal stimuli. Among the latter were the pandemic itself and its consequences, most recently, the war in Ukraine.

Our analysis presents the hypothesis that the demand-related shocks generated by excessive monetary and fiscal expansion, going too long, are the main factors responsible for the current inflation surge. Of course, supply shocks such as disruption of supply chains, structural changes in the economy, trade protectionism, consequences of the war in Ukraine, economic sanctions against Russia, and Russia's countersanction have also played a negative role. However, two caveats should be made here. First, some adverse shocks seen as supply-side shocks from a perspective of a single national economy have resulted from the excessive global demand (global economic overheating). It concerns, in the first instance, increasing commodity prices. Second, in more substantial demand constraints, some supply-side shocks would be less easily transmitted on the domestic price level in individual economies.

Our hypothesis requires further empirical verification by, foreign example, statistical analysis of demand-supply imbalances in individual product and service markets.

The critical question arises of how to stop the mounting inflationary pressures and make sure that more than 30 years of price stability and low inflationary expectations in advanced economies will not be lost for good. Looking at the inflation dynamics in 2021 and 2022 and

on monetary and fiscal accounts, it becomes clear that the current inflation is not a temporary phenomenon, which will disappear soon without significant policy intervention.

Effective disinflation requires both monetary and fiscal policy tightening. It should be done quickly to avoid building higher inflationary expectations and inertia and a stagflation scenario (Roubini 2022a), as happened in the 1970s.

Given a high public debt level and increasing fiscal dependence of CBs, budgetary adjustment can be even more urgent than monetary policy tightening. It would widen monetary policy's room for manoeuvre and help defend CB independence. Fiscal adjustment measures must be country-specific and, in most cases, include both increases in revenue and a reduction in expenditure. Ideally, they should help in addressing long-term development challenges. For example, higher retirement age and green taxation could reduce fiscal deficits, mitigate the adverse effects of population aging and limit carbon emissions.

The governments should also avoid counterproductive populist measures such as direct or indirect subsidisation of those goods and services (for example, energy), which prices overgrow, or price controls.

Returning to trade liberalisation policy, globally and regionally, avoiding protectionist and import-substitution temptations, deregulation of national markets, and similar actions could help mitigate supply-side shocks, supply, and production bottlenecks, and put downward pressures on domestic prices. For example, Hufbauer et al. (2022) proposed a trade liberalisation package that could offer a one-off reduction of the US inflation by ca. 1.3 percentage points.

Fighting inflation in the environment of the adverse supply shocks must involve economic and social costs (Roubini, 2022b) but postponing disinflation or adopting half-measures will be even more costly.

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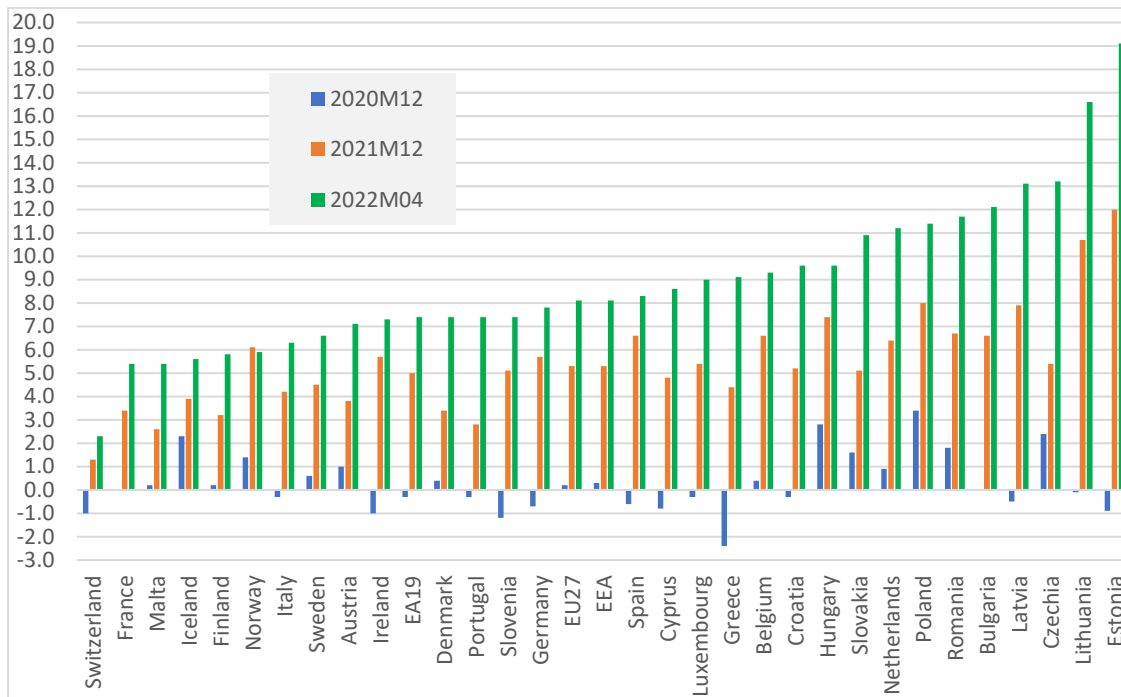
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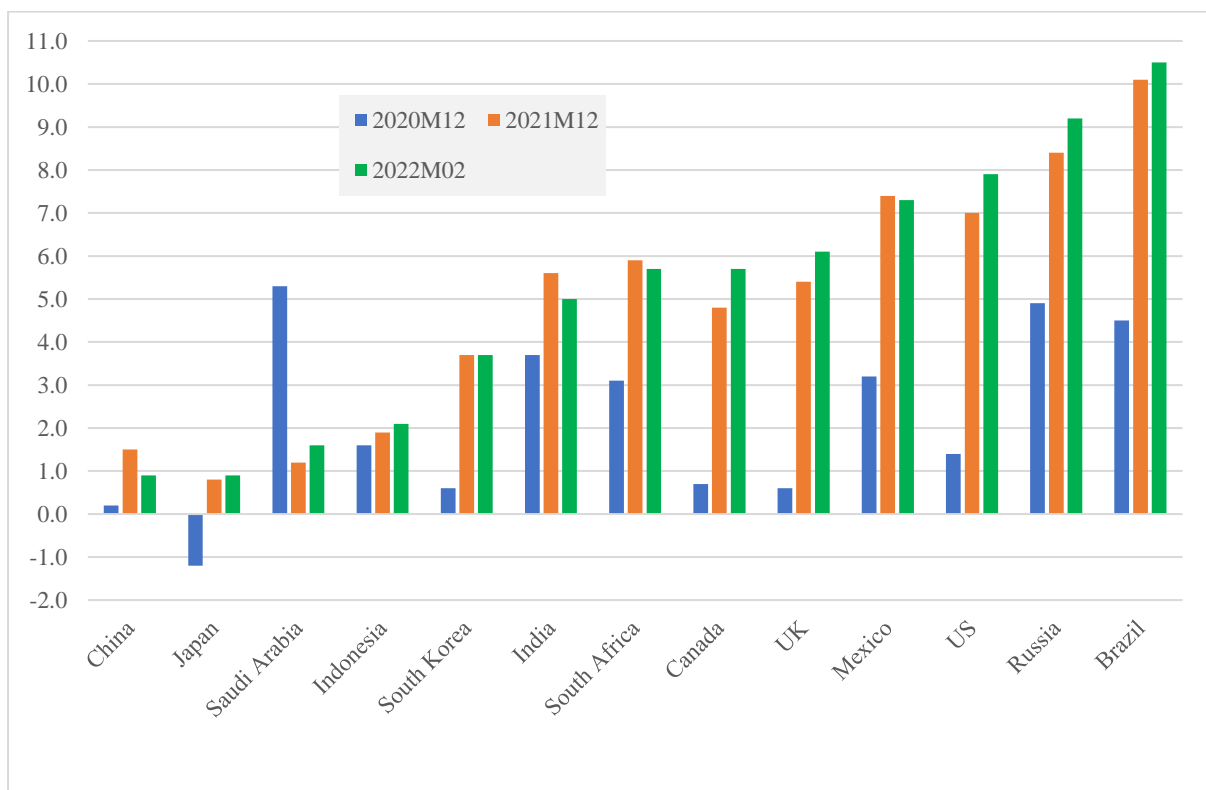
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Figure 1: Annual HICP inflation in Europe, in %, XII.2020-IV.2022



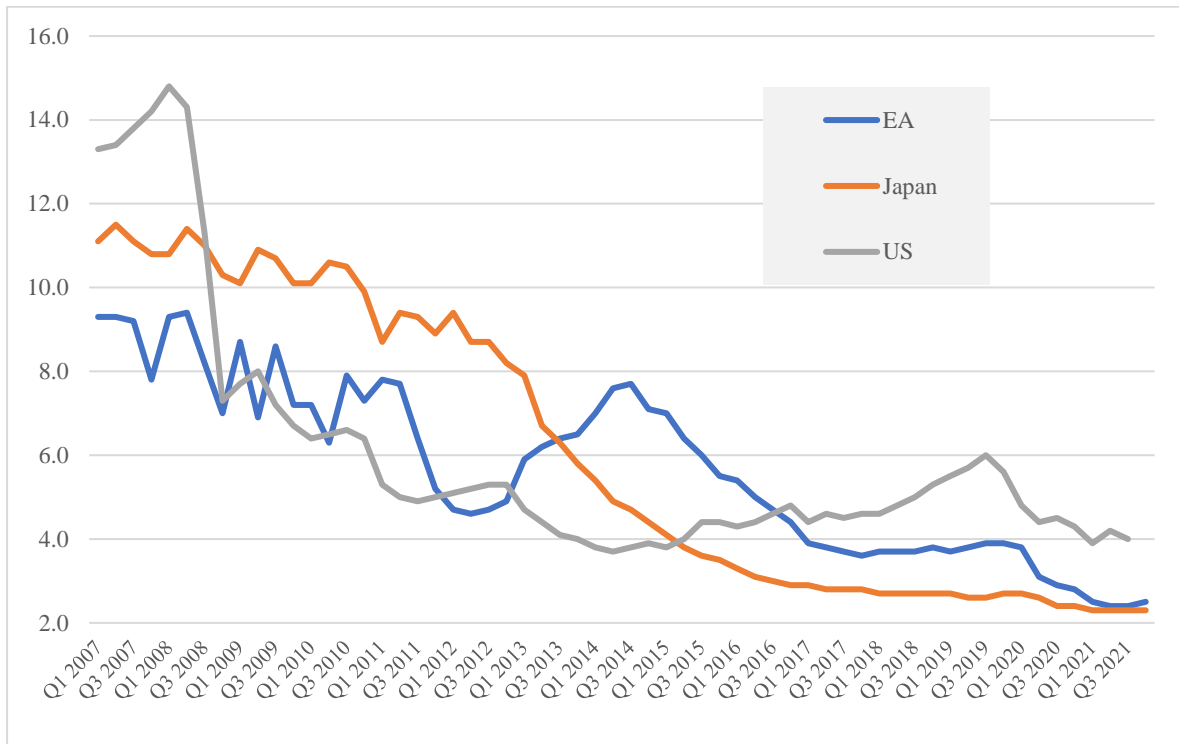
Source: Eurostat

Figure 2: Annual CPI inflation in selected G20 economies, in %, XII.2020-II.2022



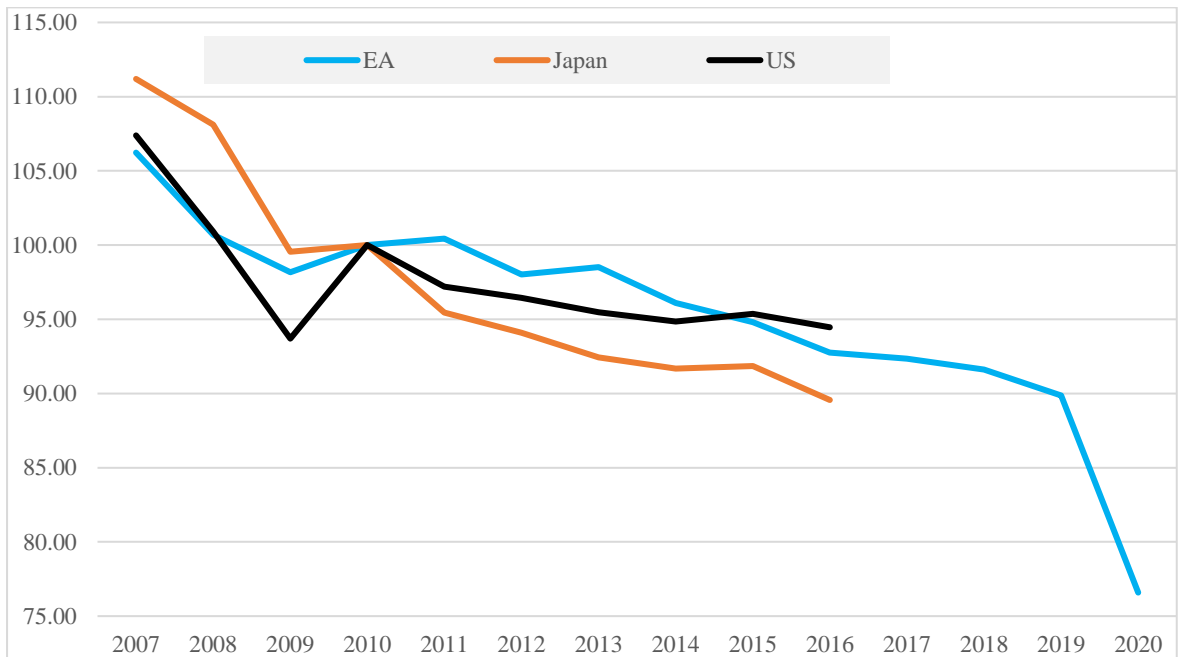
Source: Eurostat

Figure 3: Money multiplier in major currency areas, 2007-2021 (broad money/base money)



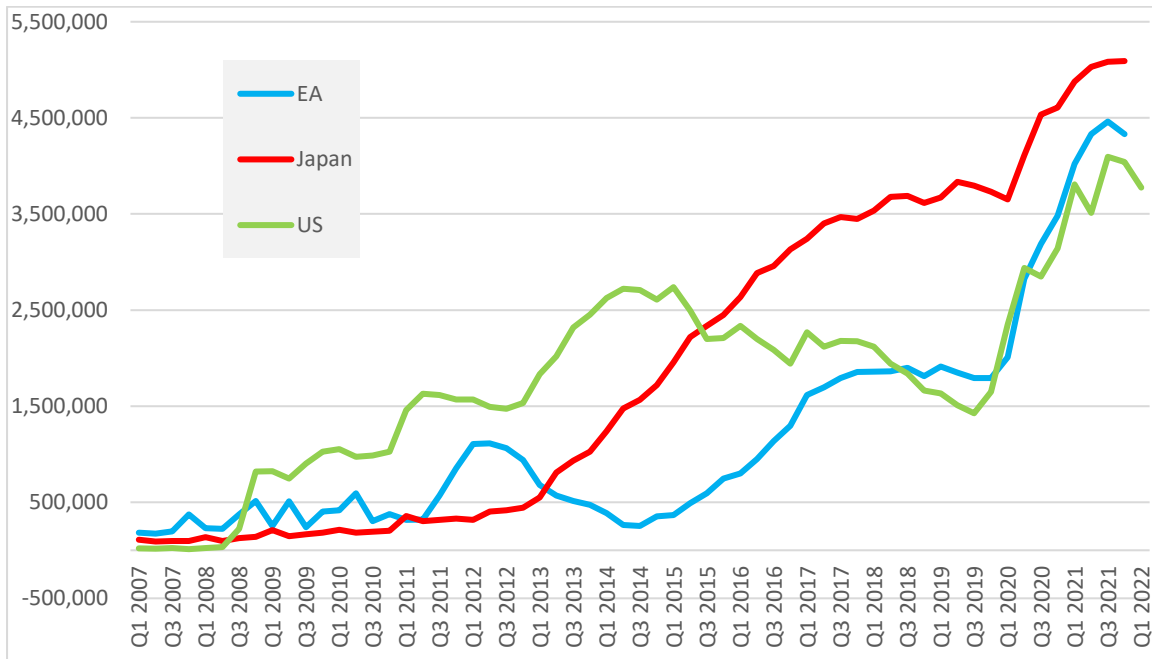
Source: IMF International Financial Statistics (<http://www.data.imf.org>) and author's calculation

Figure 4: Income velocity of broad money in major currency areas, 2007-2020 (nominal GDP/broad money), 2010=100



Source: IMF International Financial Statistics (www.data.imf.org)

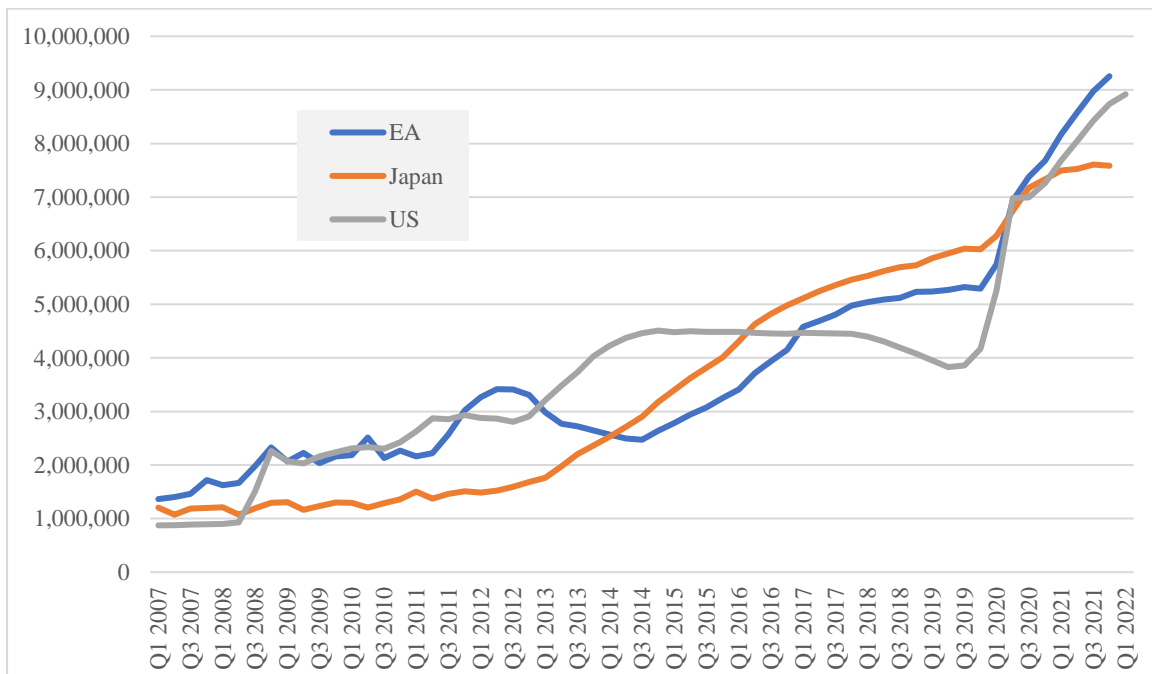
Figure 5: Central bank liabilities to other depository financial corporations (commercial banks deposits in CB) in key currency areas, 2007-2020



Note: European Central Bank (ECB) in EUR million, Bank of Japan (BoJ) in JPY hundred million, US Federal Reserve System (Fed) in USD million

Source: IMF International Financial Statistics (<http://www.data.imf.org>) and author's calculation

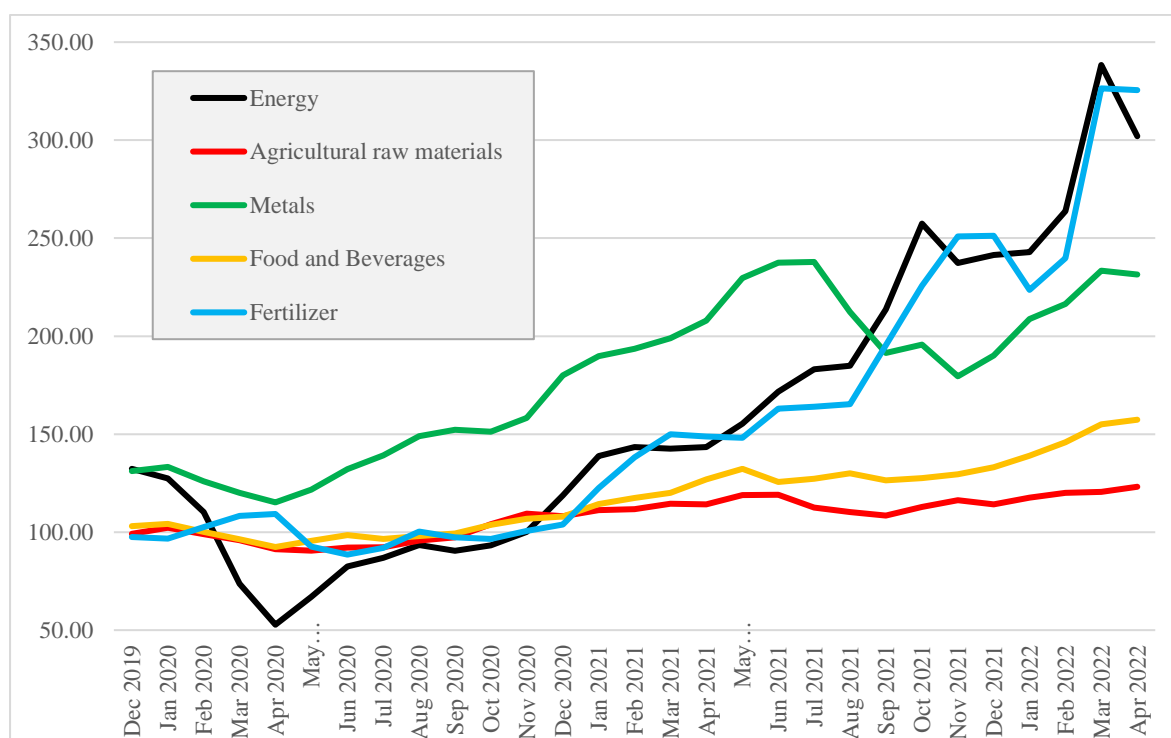
Figure 6: Key currency areas: CB total assets, January 2007 – April 2022



Note: European Central Bank (ECB) in EUR million, Bank of Japan (BoJ) in JPY hundred million, US Federal Reserve System (Fed) in USD million

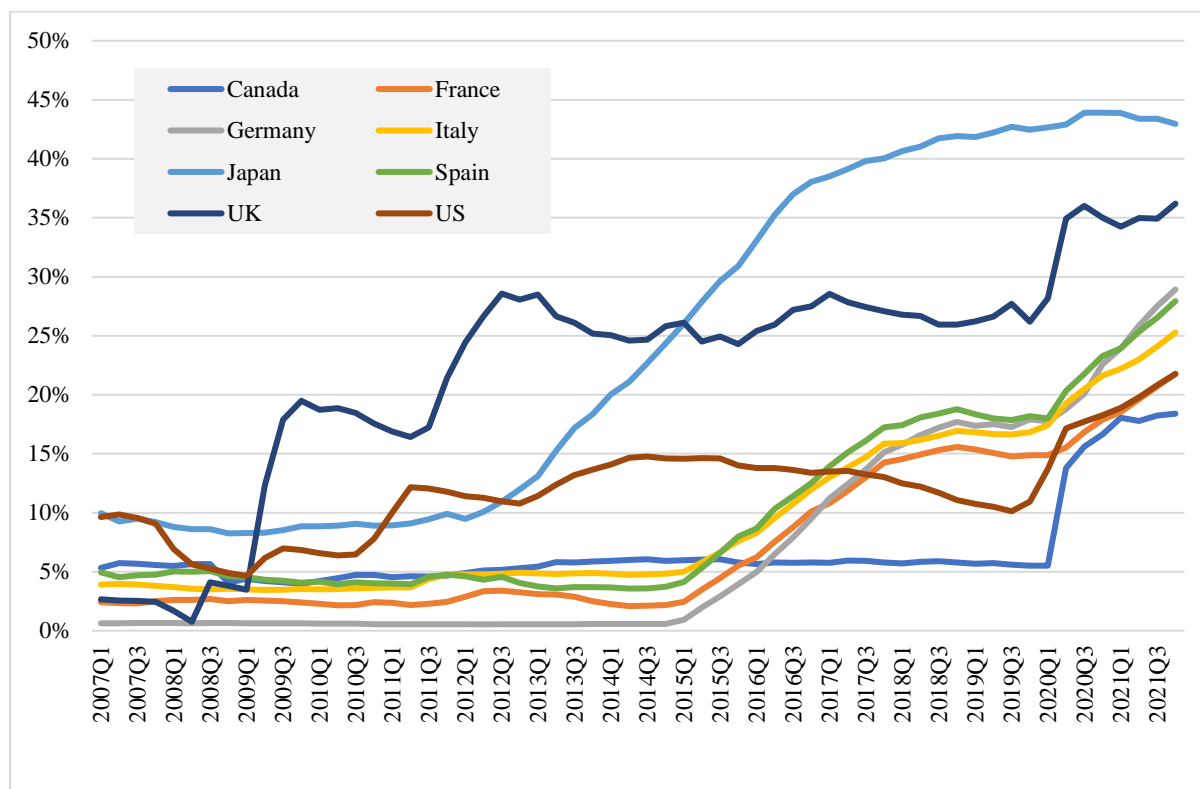
Source: IMF International Financial Statistics (<http://www.data.imf.org>)

Figure 7: Commodity Price Indexes, 2016 = 100, XII.2019 – V.2022



Source: IMF's Primary Commodity Price System, updated on 28 May 2022

Figure 8: The share of general government gross debt in selected advanced economies held by domestic CBs, 2007-2021, in % of total



Source: IMF Sovereign Debt Investor Base for Advanced Economies (version of 29 April 2022)

