DISCUSSION PAPER SERIES

DP14734

COVID-19, HELICOPTER MONEY & THE FISCAL-MONETARY NEXUS

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INTERNATIONAL MACROECONOMICS AND FINANCE

MONETARY ECONOMICS AND FLUCTUATIONS

CE PR

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Abstract

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6/5/2020

COVID-19, Helicopter Money & the Fiscal-Monetary Nexus

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ABSTRACT

The huge actual and prospective expansionary fiscal policies triggered by the corona crisis are expected to substantially raise debt/GDP ratios. This led a number of economists to reconsider the taboo on using seignorage (or more colorfully helicopter money (HM)). Following a brief documentation of the economic impact of the crisis and the responses of aggregate demand policies the paper surveys the views of economists and policymaker in the past and present on HM. Optimal taxation considerations imply that the decision on allocating deficit financing between debt and HM falls within the realm of fiscal authorities – a fact that infringes on central bank (CB) autonomy.

The paper explores ideas aimed at improving the tradeoff between implementation of the optimal taxation principle and CB autonomy. Implication of cross-country variations in the need to use seignorage are discussed. Comparison of the indirect contribution of quantitatve easing (QE) to deficit financing with the direct contribution of HM implies that the latter can be implemented under central bank dominance without much change in existing monetary institutions. Empirical evidence from the US during the global financial crisis with the post WWI German inflation supports the view that for countries experiencing deflationary pressure HM is more potent in moving inflation toward its target than QE. Given the current outlook temporary use of HM where badly needed does not appear to involve a substantial risk of inflation.

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1. Introduction

The corona crisis is the most serious crisis since the great depression (GD). It was totally unanticipated leaving medical establishments unprepared in face of the COVID-19 virus. It is disrupting aggregate supply, aggregate demand and is inflicting painful arbitrary losses of income on large segments of consumers and businesses. Like the GD and the global financial crisis (GFC) of 2007/2009 it calls, among other, for substantially larger fiscal and monetary measures as well as tax relief.

Unlike the GD and the GFC whose origins were financial the origin of the corona crisis is on the real side creating a tradeoff between averting a plague and a major economic downturn.[2] The absence of a vaccine against the virus is forcing most governments to impose widespread confinement of workers and businesses leading to disruptions in employment, production, supply chains, and aggregate demand. Furthermore, the high level of uncertainty with respect to both the intensity and duration of the crisis are leading to familiar problems in financial markets such as liquidity shortages, and credit restrictions.[3]

Policymakers in most countries responded by deploying hefty fiscal and monetary packages leading to large deficits and substantial increases in debt/GDP ratios. The huge financing needs triggered by those policies along with the tameness of inflation and the frequently reached zero lower bound (ZLB) on the policy rate led many economists to seriously consider temporary lifting of the existing taboo on seignorage financing of deficits by the central bank. Once seignorage (or more colorfully, helicopter money (HM)) is admitted as a legitimate source of deficit financing along with national debt optimal taxation theory implies that the

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[2] A succinct discussion of this tradeoff appears in Gourinchas (2020)

[3] As of the writing of this paper some countries are partially lifting lockouts following some leveling in new cases and corona fatalities curves. In parallel their leaders clarify that should those curves return to accelerated contagion rates lockouts will be tightened again.

contribution of those two sources of funds should be determined by weighting the marginal distortions associated with each source of funds. Although, under current institutions the central bank (CB) has the sole authority to increase the monetary base this is a task that is naturally within the realm of elected fiscal policymakers.

This raises the following non trivial dilemma: How to implement an efficient use of seignorage during serious emergencies without opening the spigot for monetary financing of fiscal deficits during normal times. The paper considers possible solutions to this dilemma and the associated risks including in particular the, currently remote, risk of inflation and of upward unanchoring of inflationary expectations.

The need to resort to seignorage varies across countries in line with their initial debt/GDP ratios and access to the bond market. Although seignorage is probably superfluous for countries with good credit ratings and relatively low debt/GDP ratios it may be essential for heavily indebted countries with poor access to capital markets. The paper documents substantial variations in debt/GDP ratios across country groups and discusses their implication for the desirability of using seignorage to finance budgetary deficits.

There is an important technical similarity between quantitative easing (QE) and HM in that they both are implemented by creating new base money to buy government securities. The main difference between them is that under quantitative easing the CB is allowed to buy only seasoned government bonds to maintain price and financial stability whereas under HM the CB is allowed to buy new public securities at source in order to provide direct seignorage finance to government. Unlike QE each $ of HM contributes a full $ toward deficit financing. Although smaller the contribution of a $ of QE to deficit finances is non zero since it provides a deeper market for government securities lowering governmental debt service costs.

The paper organization follows. Section 2 briefly documents the economic impact of the COVID-19 virus and the response of aggregate demand policies to date. Section 3 surveys the views of economists and central bankers in the past and present about the use of HM during emergency periods. Section 4 places HM within

the theory of optimal taxation and explores some ideas aimed at improving the tradeoff between implementation of the optimal taxation principle and CB autonomy. Implication of cross-country variations in the need to use seignorage is discussed in in section 5.

HM and QE are compared in section 6. One implication of this comparison is that HM can be implemented temporarily under CB dominance without much change in existing institutions. Section 7 evaluates the case for limited use of HM in light of the current inflation outlook. It notes that for groups of countries affected by deflation, such as the Euro area and Japan, some limited amount of HM is beneficial also because it is more effective than QE in generating inflation. Empirical evidence on the higher effectiveness of HM in raising inflation is provided by means of a comparison of substantial QE operations through base expansion practiced in the US during the GFC with base expansion of the same size used for HM operations during part of the post WWI German hyperinflation. This is followed by concluding remarks.

2. Economic impact of the corona crisis and the response of aggregate demand policies

Unlike the GFC and the great depression the corona crisis originated in the real economy and was totally unanticipated. The absence of vaccine against the COVID-19 virus and its speedy contagiousness prompted medical and political authorities to curtail mobility by imposing lockdowns, quarantines, social distancing and an almost complete standstill of international air travel. By forcing large portions of the work force to into segregation and closing down businesses this inevitable policy reaction transformed the impact of the virus from a pure medical emergency into a major real negative supply shock.

Mobility restrictions led to a substantial shut down of the economy, reduced production, layoffs, income losses, disruption of supply chains, and elevated personal and aggregate uncertainty. Those effects were amplified by the universality of the medical cum economic crisis and the associated reduction in world trade. The

actual and expected GDP shrinkages quickly spilled over to financial markets leading to credit restrictions and capital outflows from developing markets. Sectors relying on social interactions such as travel, entertainment, and tourism took a particularly heavy toll. In parallel international demand for producers of medical supplies soared. The drastic reduction in air and car travel along with production stoppages led to the collapse of the price of crude oil creating serious problems for government finances in some oil producing countries like Russia and Saudia.

Table 1 shows actual rates of growth by major country groups and selected countries as well as projections for 2020 and 2021. Except for China, India and Low Income Developing countries all the countries in the table are predicted to experience negative rates of growth in 2020 reflecting the global reach of the virus and its economic ramifications. Rates of growth are more negative in developing than in emerging markets and developing countries. Within developed economies there are substantial differences in the adverse growth effects on GDP ranging from a minimum of -4.6 for other advanced economies to a maximum of -9.1 for Italy.

Although not uniform the response of fiscal and monetary policies over the world has been swift. Panel A of Figure 1 shows actual and budgeted deficit /GDP ratios for a select group of advanced economies based on information available in mid-April 2020. The totality of fiscal packages behind those figures has not been fully spent yet but has been committed through appropriate legislation. Budget deficits range from a minimum of about 5 percent of GDP in Switzerland to a maximum of almost 15 percent in the US. Particularly striking is the over 2.2 trillion $ CARES act that was passed at the end of March 2020 in the US. Unprecedented in size and scope, the legislation was the largest-ever economic stimulus package in U.S. history, amounting to 10% of total U.S. gross domestic product. The bill was much larger than the $831 billion stimulus act passed in 2009 as part of the response to the GFC. The bill provides health care funds, relief to business and organizations in the form of loans, tax credit, tax deferrals and deductions, relief to individuals in various forms such as tax rebates, unemployment benefits, student grants and loans as well as help to defense contractors.

Table 1: World Yearly Growth Projections from the April 2020 IMF World Economic Outlook

	2019 actual	2020 projection	2021 projection
World Output	**2.9**	**-3.0**	**5.8**
Advanced Economies	**1.7**	**-6.1**	**4.5**
US	**2.3**	**-5.9**	**4.7**
Euro Area	1.2	-7.5	4.7
Germany	0.6	-7.0	5.2
France	1.3	-7.2	4.5
Italy	0.3	-9.1	4.8
Spain	2.0	-8.0	4.3
Japan	0.7	-5.2	3.0
UK	1.4	-6.5	4.0
Canada	1.6	-6.2	4.2
Other Advanced	1.7	-4.6	4.5
Emerging Markets and Developing Countries	**3.7**	**-1.0**	**6.6**
China	**6.1**	**1.2**	**9.2**
India	**4.2**	**1.9**	**7.4**
ASEAN-5	4.8	-0.6	7.8
Russia	**1.3**	**-5.5**	**3.5**
Latin America and the Caribbean	0.1	-5.2	3.4
Saudi Arabia	0.3	-2.3	2.9
Nigeria	2.2	-3.4	2.4
South Africa	0.2	-5.8	4.0
Low Income Developing Countries	5.1	0.4	5.6

In parallel the CBs of most advanced economies have stepped up open market purchases in both size and scope. As shown in panel B of Figure 1 the increases range from a minimum of about 4 percent of GDP for the UK to a maximum of over 10 percent in the US. The Fed injected huge amounts of liquidity by extending its open operations beyond government debt to include various corporate bonds including bonds with rankings below investment grades as well as stocks. Nonetheless the large negative rates of growth predicted for 2020 by the IMF (Table 1) suggests that the prevailing view is that the extraordinarily large fiscal and monetary measures committed to date do not suffice.

Large fiscal responses financed by budgetary deficits were not limited to advanced economies. Figure 2 shows sizable increases in debt/GDP ratios in all groups of countries in the world. In parallel the ratio of interest payments to tax collections also increased in all groups of countries. However both the initial levels and the increases in 2020 were not distributed uniformly across country groups. In 2019, at the eve of the crisis, the average debt/GDP ratio was over 100% in advanced economies, about 50% in emerging market and middle-income economies and less than 25% in low-income developing countries. This ratio increased by about 15% in the first two groups and by less than half of that in low-income developing countries in 2020.

Figure 1: Budget deficits and central bank balance sheets: Advanced economies

A. General government budget deficits as % of GDP
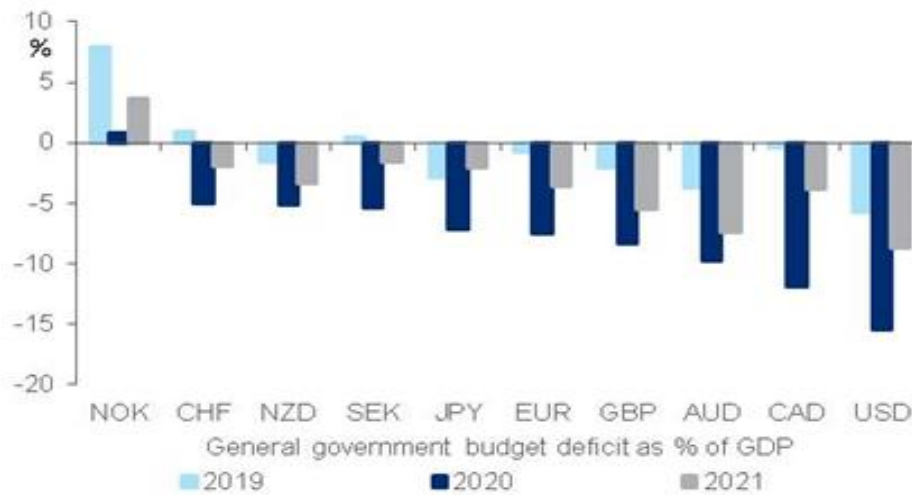
Source: CitiFX, Haver Analytics, IMF

B. Increases in central bank balance sheet since end of 2019

Figure 2: General Government Gross-Debt-to-GDP and Interest-Expenditure-to-Tax-Revenue Ratios, 2007–20

1. Advanced Economies

2. Emerging Market and Middle-Income Economies

3. Low-Income Developing Countries
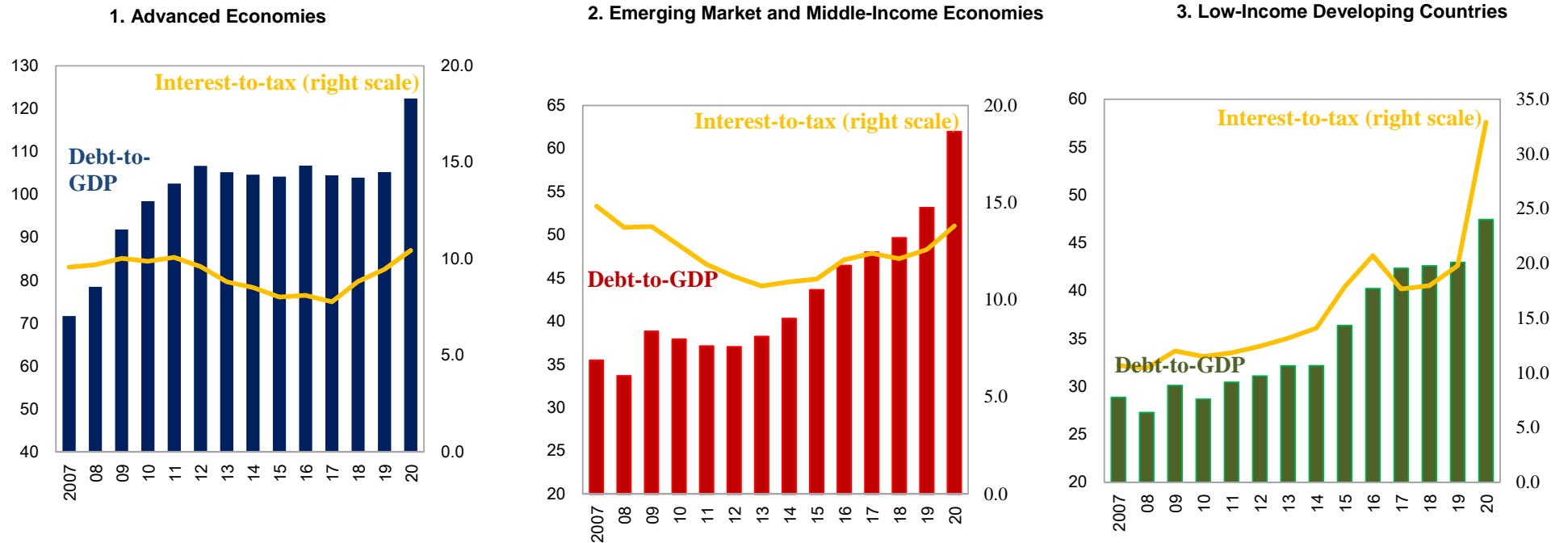
Source: IMF, World Economic Outlook database.

Note: Interest-to-tax ratios are weighted averages among countries in the income group. The rise in the average interest-to-tax ratio of low-income-developing countries in 2020 is largely driven by a few countries, such as Nigeria and Zambia, that are expected to experience sizable increases in their ratios.

The initial differences in levels largely reflect the differences in access to capital markets with advanced economies having the easiest access, the low-income having the poorer, with emerging markets in between. Since they have poor credit ratings interest on the debt of low income countries is relatively high and their debt is more difficult to place. Although their need for fiscal expansions is no smaller than that of other countries, low-income countries are limited by their fiscal capacities resulting in a smaller increase in debt/GDP ratios in 2020. This also explains why the increase in the ratio of interest-to-tax increased the most in those countries in spite of the fact that their debt/GDP ratio increased the least.

3. Helicopter money, seignorage and the role of CBs - past and present

The huge disruptions caused by the corona crisis and the actual and looming deficits created by extraordinary large fiscal packages led to a recent revival of the view that HM should be considered as one of the financing options on the table (Gali (2020), Yashiv (2020))[4]. But other economists and central bankers strongly oppose such a move for fear that the anti-inflationary institutions erected after long past battles with inflation will be quickly eroded by governments also during non-crisis times if HM is allowed. HM is a euphemism due to Friedman (1969) in which the CB prints new money and distributes it to the population like mana from heaven. Under the current institutional setting the practical counterpart of this label is a fiscal expansion financed by loans from the central bank that, somewhat less colorfully, is known as seignorage. Seignorage (or HM) is the real value of goods and services that the seignorage recipient acquires with new money created by the CB.

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[4] Caballero (2010) advocated the use of HM to finance public infrastructure investments during the early phase of the GFC. Bernanke (2016) discusses some institutional aspects of HM but refrains from endorsement of its use.

Institutionally, seignorage can be extracted in one of the following two ways: (i) By law or custom the CB periodically remits parts of its profits to the recipient; (ii) the CB credits (directly or indirectly) the account of the recipient against new debt with unspecified maturity date issued to the CB. The first method is used to routinely transfer the Fed yearly profits beyond some level to the US Treasury and by the Swiss National Bank (SNB) to distribute some of its profits to the cantonal governments who own the SNB. The second method has been used to fund some of the great hyperinflations of the twentieth century. A well-known case is the post WWI German hyperinflation during which the CB created new base money by discounting fixed nominal interest governmental bills that were never repaid (Bresciani-Turroni (1937)).

It is important to note that under the second method each $ of base money created against government debt issued to the bank is equivalent to a full $ of seignorage only if the debt is never repaid – either because it does not specify a maturity date - or because it is understood that this debt will be frozen in the books of the CB or rolled over indefinitely. But if the debt sold to the CB carries a maturity date and pays some interest, and if, come normal times, the CB is under no obligation to roll it over one $ of government debt yields less than one $ of seignorage. Thus, the degree of seignorage involved in purchases of new government debt by the CB is a continuous variable. It ranges from one (full seignorage) when the debt is never serviced and tends to zero when the debt is very short term and has to be repaid without any rollovers. Within the intermediate range the degree of seignorage rises with maturity length and diminishes with the interest rate paid on the debt.

The inflationary experiences of the twentieth century led to the erection of institutional barriers against deficit financing and the financing of deficits by means of HM. Those barriers took the form of fiscal rules, central bank independence (CBI) and inflation targeting (IT).[5] CBs were given instrument independence in setting short term interest rates and the monetary base and directed to focus their

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[5] A detailed survey of the CBI revolution and its roots appears, among other, in Cukierman (2008).

policies mainly on price stability. Most importantly, CBs were prohibited from lending to government by buying new government bonds in order to prevent the use of seignorage by fiscal authorities. [6] Those institutional measures along with the GFC wiped out inflation altogether.[7] The traumatic memories of the previous century cemented those institutions to such an extent that they managed to survive even in the face of extended deflationary periods and the, (frequently observed during the GFC) zero lower bound (ZLB) on interest rates.

4. Helicopter money (seignorage) as a source of public finance within the theory of optimal taxation and the tradeoff between implementation of optimal taxation and central bank autonomy

Starting with Ramsey (1927) and Mirrlees (1971) the theory of optimal taxation recommends allocating tax burdens across different tax instruments so as to minimize tax distortions for a given level of government expenditures.[8] Regular taxes are distortionary for well-known reasons and so is seignorage not the least because of its consequences for the level and the distribution of inflation. Applying this approach to the optimal choice of seignorage Mankiw (1987) proposes and tests a theory in which seignorage is determined along with other taxes in a manner designed to maximize social welfare for a given level of government expenditures. [9]

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[6] Some limited exceptions are discussed later.

[7] However fiscal discipline was not implemented uniformly across countries. As a consequence different countries entered the corona crisis with substantially different levels of debt to GDP ratios implying different future tax burdens for debt servicing.

[8] See also Helpman and Sadka (1979).

[9] Mankiw (1987) reports some support for a revenue motivated creation of seignorage. This finding is not as surprising as might appear at first blush since the period he investigates is characterized by fiscal dominance. During the early stages of the GFC Caballero (2010) proposed to use seignorage/HM provided it is earmarked for public infrastructural investments.

Once HM (or seignorage) is allowed as a legitimate source of funding deficits it should be recognized that, although under current monetary arrangements the CB has full authority to create new money for monetary purposes, it does not possess the authority to engage in HM operations since this decision is clearly in the realm of elected legislative and/or executive officials.

Since the optimal choice of debt and seignorage finance requires trading off the distortions of future taxes with those of HM this choice has to be made either by a single authority or through coordination of fiscal and monetary policies between fiscal and monetary policymakers. The natural authority for such decisions is the sovereign through democratically elected government officials. This implies that some encroachment on CBI and an increase in fiscal dominance in comparison to the current institutional setting may be necessary in order to allocate deficits financing in an efficient manner between debt and seignorage. The main problem is how to optimally allocate deficit financing between new debt and seignorage while assuring that the second source of finance is used only under exceptional circumstances. Bernanke (2016) proposes to achieve this objective by letting the CB use its base money creation authority to create a new government account that government would be free to use up to a certain limit for financing fiscal expenditures under exceptional circumstance subject to parliamentary or congressional approval. The decision about the total amount in the account would be left to the CB. Within the context of the current crisis Yashiv (2020) proposes a legislated suspension of the prohibition to lend to government by the CB for ninety days leaving the ultimate decision about the amount of lending to government to the CB in order not to compromise CBI during normal times.

Interestingly both proposals leave the ultimate decision as to the amount of seignorage finance to the CB. Such an arrangement does not necessarily take into consideration the tradeoffs between debt and seignorage that are crucial for the optimal choice of those two sources of finance. In addition it saddles the CB with the choice of seignorage which is basically a fiscal decision. It appears therefore that coordination between fiscal and monetary authorities under duress is inevitable. One

way to do that would be to consider the enactment of emergency times under which the prohibition to lend to government would be lifted as in Yashiv (2020). But the fiscal authorities through the treasury or a similar body would negotiate with the CB the total amount of seignorage to be used for fiscal purposes rather than leave this decision solely to the CB.

Another possibility is to create an emergency committee composed of representatives of the Treasury and of the CB and endow it with the authority to choose the amount of seignorage to be created. During the committee deliberations both sides would have to consider both the total amount of funds needed as well as the state of the national debt and its costs. In most developed economies both the Treasury and the CB have research departments that are well informed about those variables so their deliberations would be based on a sufficiently broad common ground while still leaving room for useful exchange of information prior to decision. Under this proposal the total amount of fiscal needs would be taken as given by the committee. A possible variant would also endow the committee with some influence on the determination of total fiscal needs.

5. Deployment of fiscal policies during the corona crisis and cross-country variations in the need to use seignorage

The supply and demand disruptions caused by the corona crisis have already prompted many governments to enact large fiscal packages designed to maintain the economy and the health system afloat in the face of workers' confinements, persistent closures of businesses, and mass unemployment. The recently approved US 2.2 trillion fiscal package (about ten percent of GDP) discussed in section 2 is one example. The frequent attainment of the ZLB along with the fact that inflation has not been a concern during the last decade and a half imply that fiscal policy and seignorage finance in particular are relatively effective when the ZLB is reached (Gali (Forthcoming)).

However this does mean that the large actual and prospective world fiscal expenditures should be financed only by seignorage. Financing solely by seignorage

is not even optimal within the framework of optimal taxation due to monotonically rising distortions involved in using only one instrument. But this does not mean that seignorage should not be considered.as a potential supplementary device for deficit financing.

Although open minded economists would agree with Gali (2020) that the current crisis and circumstances call for reconsideration of the taboo on seignorage the ultimate conclusion whether to use is likely to differ across countries due to different debt to GDP ratios along with the associated different interest rates on the public debt. As a consequence the tradeoff between debt and money finance differs substantially across countries (further details for country groups appear in Section 2, Figure 2 above) The upshot is that the optimal combinations of debt and seignorage finance differ across countries. A crucial parameter to watch when deciding whether to use seignorage within a given country, and if so how much, is the elasticity of the demand for the bonds of that country with respect to the interest rate on government bonds

Optimal financing of fiscal deficits implies that countries whose treasuries face lower elasticities will have to rely more heavily on seignorage. If the use of seignorage by countries with low elasticities persists long enough this may ultimately lead to a divergence of inflation rates across countries. In view of the persistently low world inflation and the anchoring of long term inflationary expectations this risk appears to be remote at the current juncture. But it should be kept in mind if, following widespread emergency use of seignorage, countries with relatively poor credit ratings decide to engage in relatively persistent seignorage financing. This is most likely to be the case for emerging middle and low income economies that, to date, experienced capital outflows of about 100 billion $ since the beginning of the crisis.

The risk of divergent inflation rates due to persistent use of seignorage financing by weaker countries is also important for the Euro area whose CB is committed to maintain a relatively uniform inflation rate across member states. One way to reduce the risk of divergent inflation rates within the Eurozone (EZ) under HM is to

centralize the creation of seignorage at the ECB and to distribute the proceeds across countries according to pre-established criteria like GDP and the size of population or adjust the distributional scheme in a way that would favor weaker countries. Another option is to engage in some fiscal redistribution across countries. An operational way to implement such a scheme even without HM is to have the ECB issue Eurobonds and use the proceeds to lend more to the treasuries of countries with relatively poor credit ratings. French president Macron has called for such a scheme but, unsurprisingly, this is being resisted by Germany.

6. Helicopter money versus quantitative easing and central bank dominance

With the onset of the GFC quantitative easing (QE) started to be used on a large scale. It is currently the main monetary instrument used by CBs to address the liquidity and even some of the solvency problems created by confinements of the work force and forced inactivity of large parts of the economy.

There is an important technical similarity between QE and HM in that they both are implemented by creating new base money to buy government securities. The main difference between them is that under QE the CB is allowed to buy only seasoned (and possibly other public and private) bonds whereas under HM the CB is allowed to buy new public securities at source providing direct seignorage finance to government. Thus QE is a device that enables CBs to ease government finance subject to the so called "no printing" component of CB autonomy. Although it does not involve direct financing of the deficit QE supports government finances by assuring a smooth market for seasoned government bonds and the associated reductions in the cost of new issues.

In this sense QE is a weaker form of HM for two reasons. First QE does not necessarily induce additional government expenditures while HM is by definition new money spent by government for goods and services. Second, even if QE induces at the margin larger government expenditures they most likely are lower than the expenditures financed by a similar amount of HM. As is the case with HM

the stimulatory impact of QE is larger the longer the assets purchased to implement it are held by the CB. Interestingly, to this day the Fed still holds a substantial amount of assets created during the GFC and its aftermath. Just prior to the onset of the corona crisis the balance sheet of the Fed was in the vicinity of 4 trillion $.[10] Following the massive QE operations recently deployed in reaction to the shrinkage of economic activity due to the corona virus the balance sheet jumped to about six trillion $.

By extending QE operations to long term maturities during the GFC the Fed managed to influence the level and slope of the yield curve. Similarly, by relieving some of the pressure on the supply of bonds by government HM could lower the yield curve and extend the range of maturities that government can borrow at. Hence it is also likely to flatten the governmental yield curve and ease the access of corporation and households to credit. Generally, both QE and HM may have permanent or temporary effects on the monetary base depending on whether the CB decides to maintain the monetary base that was created by those operations in the future. To date the Fed keeps the bloated balance sheet created by the QE operations performed during the GFC. Similarly, CBs may or may not decide to do the same in the future with the additions to the monetary base resulting from HM operations in case such operations are implemented during the COVID-19 crisis.

In summary, an important advantage of QE over HM is that it can be deployed within the existing framework of CBI and IT. On the other hand it's stimulatory impact per $ is lower than that of seignorage. An interesting question for future research is how many $ of QE are required to achieve a stimulatory impact identical to one $ of HM.

This section concludes on an historical note. QE like operations were conducted by the Fed long before the GFC but under a different label in order to support public finances. The US emerged from WWII with a debt to GDP ratio of about 120

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[10] Just prior to the onset of the GFC the Fed's balance sheet was about a fifth of this figure. Details appear in Cukierman (2019).

percent. Between the end of the war and 1951 one of the main policy objective of the Fed was to support the price of seasoned government debt in order to maintain a low interest cost to government and prevent capital losses to holders of this debt. This arrangement known as the "Accord" was implemented by the Fed buying seasoned governmental securities when their price would have decreased otherwise (details appear in Meltzer (2008)). In modern terminology this was a standing QE operation aimed at facilitating public finances. However it is important to note that QE under the accord was dictated to the CB by the political authorities whereas the modern QE operations are within the discretion of the CB.

7. Should HM be used in view of the current inflation outlook?

Given current information (end of April 2020) it is not evident that the unusually large fiscal and monetary responses to the economic crisis in major advanced economies such as the US and the Euro area are inflationary. The reason is that the the huge original shocks to both aggregate supply and demand triggered by the crisis operate in the opposite direction. Some forecasters even predict that, in the absence of additional stimulus the outlook for the Euro area and the US is deflationary rather than inflationary. For example Citi (April 2020) economists judge that the deflationary impact of the negative real shocks is larger than the inflationary impact of the large fiscal and monetary expansionary measure deployed to this date because, on balance, there is slack in the economy. Noting that in the US and the Euro area about half of inflation is slack sensitive they conclude that firms markup are likely to be compressed for a while contributing to deflation rather than to inflation. The dramatic reduction in the price of oil and other commodities, as well as solid anchoring of long run inflationary expectations operates in the same direction. In particular long run inflationary expectations in the Euro area are anchored well below the 2 percent standard target.

It appears that under such circumstances the inflationary risk of financing appropriate parts of the deficits by means of seignorage are moderate to negligible.

It is nonetheless prudent to also consider policy options in case persistent use of seignorage leads to unanchoring of inflationary expectations on the upside. Given the behavior of inflationary expectations during the last decade this risk appears remote at the current juncture. If anything expectations in Europe and some other countries tended to be unanchored in the opposite direction during the recent past. Relatedly, Blanchard and Pisany-Ferri (2020) note that there is no evidence that CBs have given up on their price stability mandate in spite of huge QE operations undertaken in the US and other advanced economies. At the beginning of April the UK Treasury and the Bank of England (BoE) even agreed on a direct credit line from the CB to the Treasury in order to alleviate short run pressures in the bond market. But the April 9 joint press release by the BoE and her majesty Treasury explicitly states that any use of the direct financing scheme will be short-term and temporary.

Nonetheless in case HM becomes a legitimate source of finance for a while in a sufficient number of countries this is a risk that should be recognized. In addition price adjustments will not remain the same for two reasons. First supply shortages will lead to some price increases. But those are largely self-limiting and do not necessarily cause permanent inflation unless supply deteriorates continuously. On the side of demand large liquidity and reserve injection may stimulate lending. But this is offset by large uncertainty about the duration of the crisis and in any case is desirable in order to stimulate activity and provide more potent support to the economy than an equivalent amount of QE.

As a matter of fact for regions like the Eurozone (EZ) and Japan in which deflation rather than inflation is a problem HM is desirable not only because of optimal taxation considerations but also because it can lift inflation toward the target more effectively than QE operations. The relative advantage of a $ of HM over a $ of QE is illustrated in Figure 3 by a comparison of rates of inflation in the six years following Lehman's downfall with a bit over half of the post WWI German hyperinflation for **identical cumulative rates of base money expansion.**

Base expansion in Germany took the form of HM and the form of QE in the US. Since, in both episodes the cumulative rate of monetary expansion is the same the figure provides an indication of the relative potency of HM versus QE in generating inflation. Note that the solid lines indicate the levels of the monetary bases and the broken lines the price levels in the two countries. US and German data are marked in blue and red respectively.

The comparison in the figure shows that: 1. after a while HM induces substantially higher inflation than QE, 2. in the initial phases of German HM expansion inflation lags behind the base expansion and really pick up only after a period of almost a year as initially lagging inflationary expectations and the speed of price adjustment rise (further details appear in Cukierman (2017). 4. By contrast in the US, during the six years of substantial QE operations following Lehman's downfall inflation stagnated.

In interpreting those results it should be kept in mind that the QE operations of the Fed were conducted under CB dominance cum inflation targeting while the HM operations of the Reichsbank during the German hyperinflation were conducted under full political dominance. Obviously, anchoring of expectations in the second case was inexistent – a fact that contributed to a dramatic acceleration of inflation once those expectations started to catch up with actual inflation.

In addition there also is a substantial difference in the behavior of the narrow money supply between the two episodes. In the US the money supply increased much less than the monetary base as the banks refrained from using their large excess reserves to increase credit (Cukierman (2019), Figure 7). In Germany practically all the increase in the monetary base took the form of an increase in narrow money since government quickly used the new funds to finance its budget (Bresciani-Turroni (1937)).

Figure 3: The behavior of the monetary base and the price level in the US since Lehman's collapse and during the German Hyperinflation: A comparison[1]
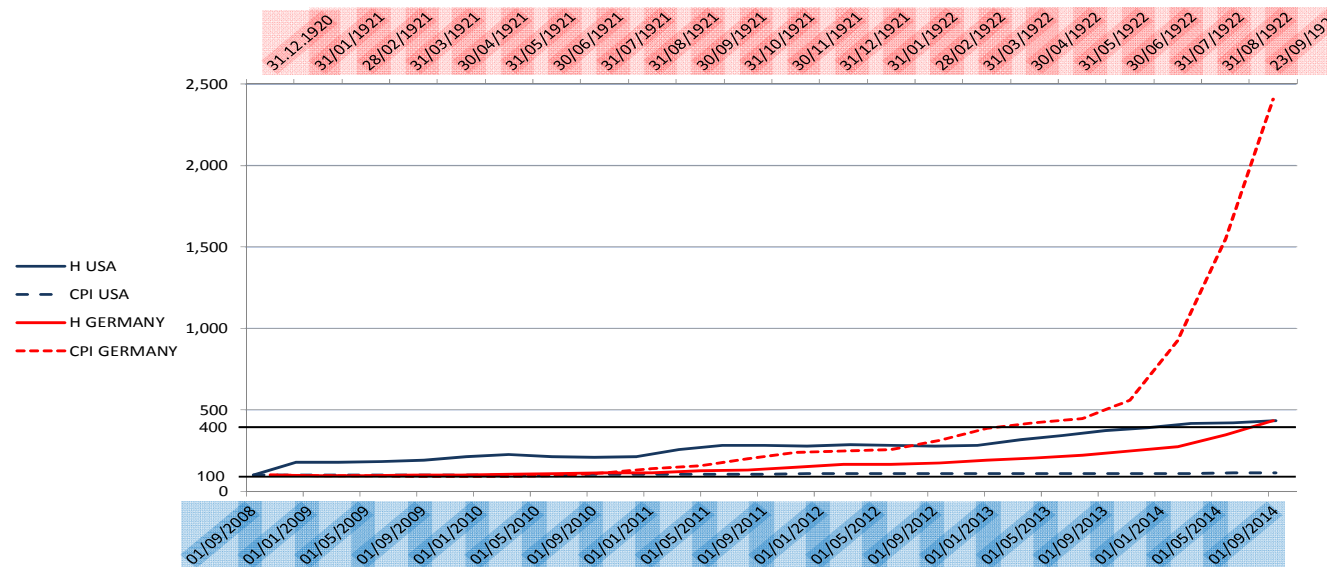
[1]The values of the monetary bases and of the price levels in the US and Germany are all normalized to 100 at the beginning of each of the two periods (Sept 2008 for the US and December 1920 for Germany). (H is base money and CPI is the consumer price index).
Source: Figure 1 in Cukierman (2017).

The hyperinflationary experiences of Germany and other countries during the twentieth century contributed a lot to the current institutional taboo on using HM. They convincingly demonstrated the havoc that uncontrolled use of HM by short sighted dominant fiscal authorities to finance budget deficits can do. But, as argued above, at the current juncture appropriately limited HM can be beneficial for some countries for more than one reason. In such a case preannouncement of a limited period for the duration of HM is probably the most effective measure against an upward unanchoring of expectations.

But, even if the severity and duration of the corona crisis extends the period of seignorage finance beyond prior plans in some countries, policymakers always have the option to terminate it should upward unanchoring of expectations turn out to be a serious problem. The evidence from the post WWI German inflation suggests that, following a period of relative price stability inflation expectations lag behind initially accelerating inflation and HM expansion leaving enough time for policymaker to take corrective action should the need arise.

8. Concluding remarks

The inflations, hyperinflations and deficits of the twentieth century led to the CB independence (CBI) revolution along with a taboo on HM as well as restrictions on government expenditures, deficits and debt to GDP ratios.[11] The severe economic impact of the corona crisis led policymakers to ignore fiscal restrictions and deploy extraordinarily large fiscal packages leading to huge deficits and large actual and prospective increases in debt/GDP ratios. CBs contributed to this effort by engaging in large QE operations.

To date those policy responses strictly adhered to the existing taboo on using HM or seignorage to finance deficits. This taboo, which is one of the pillars of CBI, has served the world well by providing an effective nominal anchor against inflation

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[11] Details appear, among other, in Cukierman (1998).

during normal times following the demise of the Bretton-Woods system. But current circumstances are substantially different than forty years ago when the main concern was inflation and the absence of a nominal anchor. First, inflation has not been a concern for over a decade. As a matter of fact in the Euro area and Japan deflation appears to be a main concern. Second, there is evidence that, when the ZLB is binding, fiscal expenditures financed by seignorage are particularly effective in stimulating the economy (Gali (Forthcoming).

Last, but not least, the current huge budgetary financing needs call for a temporary use of a wider set of funding instruments. By contributing funds to deficit financing seignorage alleviates some of the burden on future generations and moderated the increase in the cost of debt that would occur otherwise. As a matter of fact optimal taxation theory implies that deficits should be financed by both debt and seignorage implying, at first blush, that this is a matter that falls entirely within the realm of fiscal authorities (section 4). The downside is that this infringes on CBI cum IT creating a potential tradeoff between optimal taxation and the safeguard of price stability by short-sighted politicians.

The paper has explored a number of schemes designed to allow temporary lifting of the taboo on HM during emergency times while preserving full institutional independence of the CB in normal times. A common thread of those schemes is to assure cooperation between fiscal and monetary authorities to achieve the goal of efficient public financing of stimulatory fiscal packages during extreme downturns without opening the spigot for use of seignorage during normal times. One possibility is to have a joint committee of fiscal authorities and the CB decide whether economic circumstances justify lifting of the taboo, and if so, on the allocation of deficits between debt and seignorage. In some cases this cooperation can be achieved without the creation of a formal institution[12].

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[12] For example, in the US, Secretary of the Treasury Mnuchin and Fed's Chair Powell coordinated their actions through numerous daily consultations. Yashiv (2020) explores a scheme in which the CB alone decides on the amount of seignorage

The need to use seignorage varies across countries inversely with their access to capital markets, their initial debt to GDP ratios and the interest elasticity of demand for their sovereign debt. Thus, while HM is likely to be unnecessary for the US and Germany it is essential for poor and middle income countries whose access to international capital markets has been restricted in the first place and that experienced a further deterioration with the onset of the crisis. It is also likely to be essential for some countries within the Euro area with poor credit ratings such as Italy and Spain. This heterogeneity within the Euro area is likely to complicate the task of the ECB.

Both QE and HM are implemented by increasing the monetary base. The main difference between them is that under QE the CB buys only seasoned government obligation whereas under HM it also can buy them at source. QE eases government finances by maintaining a market for government bonds but less than an equivalent amount of HM. For the same reason, the inflationary impact of HM is stronger than that of QE. However given the currently depressed level of aggregate demand allowing temporary seignorage financing does not appear to be a major inflationary risk. As a matter of fact it may help lift the negative or extremely low inflation rates in some countries toward the inflation target.

By inducing hefty increases in the value of financial assets the large QE operations deployed during the global financial crisis raised the inequality in the distribution of wealth.[13] There is little doubt that the even larger QE operations that have already been deployed to date augmented by the upcoming ones will have similar and even larger effects. Other things the same, a largely overlooked side benefit of financing part of budgetary deficits by HM rather than by QE is that it mitigates the increase in the distribution of wealth induced by QE.

As of the end of April a number of countries are planning a gradual release of lockouts during May. Due to the lag between the tightness of confinement and the

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[13] In the US households with incomes below the median have hardly any financial assets and the top 10 percent own 70 percent of US wealth.

spread of the virus the impact of those actions will be known only after about two to three weeks. In case the number of corona cases resumes at a steeper rate lockouts will have to be tightened again triggering demands for additional fiscal relief. If this unfortunate scenario realizes the case for HM in financially weaker countries may become stronger at the margin.

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