Who Should Make Kroner?

A Review of Danmarks Nationalbank's Analysis of CBDC

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Abstract:

This paper is a review of Danmarks Nationalbank's recent analysis of the prospects of implementing a Central Bank Digital Currency (CBDC) in Denmark. We concur with Nationalbanken's conclusion that CBDC does not add efficiency or further functionality to existing payment solutions. We argue, however, that their analysis fails to take into account the potentials for increased financial stability given the fact that CBDC carries no credit risk. We also find that Nationalbanken's dismissal of CBDC on the grounds that it does not provide new monetary policy tools, since interest rates are bound by the fixed exchange rate regime, fails to consider the value of CBDC in the event of a future crisis. Finally, we argue that the Nationalbanken's views may reflect a primary concern with the preservation of the existing banking sector in its current form over and above the needs of the general public.

Keywords: Central banks, money creation, digital currency, monetary policy, CBDC

JEL: E40, E41, E42, E50, E51, E52, E58, E61, G21

Introduction

A hot topic in contemporary central banking is the idea of Central Bank Digital Currency (CBDC). This is the idea that central banks should offer a public alternative to, or even a substitution for, commercial bank deposit money, which is currently the only form of digital money denominated in national currencies available to ordinary money users. CBDC would be implemented by opening the balance sheet of the central banks to private individuals and non-financial companies thus allowing them to hold an account directly with the central bank. This idea is being researched and debated internationally by central banks and other stakeholders.[1]

Danmarks Nationalbank has entered into the debate with the recent publication of their analysis 'Central bank digital currency in Denmark?'.[2] The publication stands out in the debate by being the most conclusive opinion voiced by any central bank so far. Danmarks Nationalbank seems to be the first central bank to have made up their mind on the question of CBDC. The publications and speeches made by other central banks at the moment are much more hesitant,

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1 John Barrdear and Michael Kumhof, 'The Macroeconomics of Central Bank Issued Digital Currencies', Staff Working Paper (Bank of England, 2016); Morten Linnemann Bech and Rodney Garratt, 'Central Bank Cryptocurrencies', BIS Quarterly Review, 2017; Ole Bjerg, 'Designing New Money: The Policy Trilemma of Central Bank Digital Currency', CBS Working Paper (Copenhagen: Copenhagen Business School, 2017); Michael D. Bordo and Andrew T. Levin, 'Central Bank Digital Currency and the Future of Monetary Policy', Working Paper (National Bureau of Economic Research, August 2017); Ben Broadbent, 'Central Banks and Digital Currencies', Speech at London School of Economics (Bank of England, 2016); Ben Dyson and Graeme Hodgson, 'Digital Cash: Why Central Banks Should Issue Digital Currency' (London: Positive Money, 2016); Walter Engert and Ben Fung, 'Central Bank Digital Currency: Motivations and Implications', Discussion Paper (Bank of Canada, 2017); Salomon Fiedler et al., 'Financial Innovation and Monetary Policy: Challenges and Prospects', Monetary Dialogue - In-Depth-Analysis (European Parliament, 2017); Juan Antonio Ketterer et al., 'Digital Central Bank Money and the Unbundling of the Banking Function', Discussion Paper (Inter-American Development Bank, 2016); Cecilia Skingsley, 'Should the Riksbank Issue E-Krona?', Speech by the Deputy Governor, FinTech Stockholm (Stockholm: Sveriges Riksbank, 2016).

2 Kirsten Gürtler et al., 'Central Bank Digital Currency in Denmark?', Analysis (Danmarks Nationalbank, 2017).

questioning and explorative as they call for more research and debate on the subject.[3]

The argument of Nationalbanken's analysis is rather unambiguous as it amounts to a clear dismissal of any plans to implement CBDC. The sentiment of the paper is perhaps best expressed by a speech made by Governor Hugo Frey Jensen a few weeks prior the publication of the analysis. The title of the speech sums up the conclusion: 'Central Banks and Digital Currencies - A solution without problems?'[4] Danmarks Nationalbank does not hesitate to conclude that the idea of central banks creating digital money is irrelevant to a country like Denmark because the existing payment system provided by private commercial banks does not present any problems that would be solved by a public alternative: 'In a Danish context, it is unclear what central bank digital currency would be able to contribute that is not already covered by the current payment solutions.'[5]

The specifics of the argument behind Nationalbanken's dismissal of CBDC are explored in the following.

What is the problem?

> Should central banks issue digital currency to households and businesses, as a supplement to physical cash and deposits with commercial banks?[6]

The purpose of the current paper is to review the analysis and arguments presented by Danmarks Nationalbank on the topic of CBDC. But before we dive into the pros and cons, it is worth dwelling on the framing of the problem at hand. The above passage constitutes the very beginning of the main text of the paper and it is how Nationalbanken formulates the question of their inquiry. While this is indeed a clear and concise formulation of the problem, we should also be careful to not let ourselves be absorbed by the seemingly technical nature of this question. On the one hand, the introduction of CBDC is merely an ad-

3 Stefan Ingves, 'Do We Need an E-Krona?', Speech by Governor (Sveriges Riksbank, 2017); Jon Nicolaisen, 'What Should the Future Form of Our Money Be?', Speech by Deputy Governor Jon Nicolaisen at the Norwegian Academy of Science and Letters (Norges Bank, 2017).

4 Hugo Frey Jensen, 'Central Banks and Digital Currencies - A Solution without Problems?', Speech by Governor (Danmarks Nationalbank, 2017).

5 Gürtler et al., 'Central Bank Digital Currency in Denmark?', 1.

6 Gürtler et al., 1.

justment to the existing payment infrastructure. On the other hand, CBDC constitutes nothing short of an entirely new form of money.

In contrast to Danmarks Nationalbank, which seems to treat the question of CBDC as largely just a technocratic matter, the Swedish Riksbank uses the question as an opportunity to investigate, debate and reflect upon the role of central banks in contemporary society. In a speech titled 'Do we need and e-krona?' the governor of Riksbanken says: 'The question ... touches on almost philosophical musings as to why the need for central banks arose once upon a time.' And he proceeds to speculate: 'What is money, and what is required for money to function as such? What is the difference between various types of money? Why have central banks gained such a central role in the monetary system?'[7]

The original founding of central banks such as Svenska Riksbanken, the Bank of England, and also Danmarks Nationalbank was intimately connected with the emergence and proliferation of a new kind of money, which was paper money.[8] Contrary to earlier forms of money, the issuance of paper money is not materially constrained by the availability of precious metals. Therefore central banks were given the mandate to administer a monopoly on the issuance of this new kind of money thus imposing a legal constraint on the supply of money.

In this light, the question of CBDC has much more profound implications than what is immediately suggested by the question posed by Danmarks Nationalbank. The greatest monetary innovation since the introduction of paper money and the original founding of central banks is the emergence and proliferation of digital money. Just as paper money gradually diminished the role of precious metal coins as circulating currency, so has digital money replaced paper money as the dominant form of money. But the difference between paper money and digital money is not only one of convenience, functionality and material constitution. While the issuance of paper money is still subject to central bank monopoly, digital money is created by private commercial banks.[9] This means that as notes and coins are being phased out the central bank is losing the capacity to create money, which can be held by the general public.

Even though this pivotal shift in the way that money is created has had tremendous consequences for our financial systems as well as our economies in gen-

7 Ingves, 'Do We Need an E-Krona?', 1, 3.

8 Ole Bjerg, *Vores Penge i Vores Bank* (Informations Forlag, 2017).

9 Michael McLeay, Amar Radia, and Ryland Thomas, 'Money Creation in the Modern Economy', *Quarterly Bulletin* 54, no. 1 (2014): 14–27.

eral, it was never brought about by a deliberate political and democratic decision. In Denmark and Sweden, for instance, we have had referendums on whether we wanted to substitute our national currencies for the Euro or not. But neither Denmark, Sweden nor any other country has ever had a referendum on whether the people wanted commercial banks rather than central banks to create the money that we depend upon for our daily shopping, receiving salary, paying taxes, paying bills, paying debts, etc. Nor have we seen public disputes between major political parties on this question. Money creation is rarely if ever an issue in parliamentary elections.

We should not underestimate the importance of the emergence of the question of CBDC on central bank agendas around the world. Beyond, or perhaps rather behind, the seemingly technical nature of the question is the opportunity for opening public debates around a series of more political and even constitutional questions about money. These are questions such as: Who should create the money in our economy? What is the role and responsibility of central banks today? Should the central bank monopoly on paper money be extended to digital money? Danmarks Nationalbank's analysis of CBDC and its conclusion on the issue should be read in light of these more fundamental questions. The purpose of our review of this analysis is thus not only to evaluate the arguments for and against CBDC but also to put the argument into a broader political and constitutional context. As we shall see, the analysis is also informative in terms of the way that Danmarks Nationalbank thinks of itself and its role in society.

The responsibility of Danmarks Nationalbank as well as comparable central banks is divided into three policy objectives: payment system provision, financial stability and monetary stability. The three policy objectives roughly correspond to the three conventional functions of money: 1) Payment systems provision is about making sure that money functions as a convenient and efficient *medium of exchange*. 2) Financial stability amounts to maintaining money as a stable *store of value*. And 3) monetary stability amounts to maintaining the currency as a stable *unit of account*.

The three functions of the central bank are applied in Danmarks Nationalbank's analysis as the background against which the pros and cons of CBDC are evaluated: 'the effect of central bank digital currency on Danmarks Nationalbank's core tasks with regards to payment systems, financial stability and mone-

tary policy is examined.'[10] In the first part of our review, we shall be replicating this structure and thus begin with payment system provision.

Payment System Provision

The payment system is the user interface of the monetary system. It includes the notes and coins, which we use for cash payments, as well as the various digital payment systems used in the transfer of bank deposit money. Here is how Danmarks Nationalbank presents the system:

> Denmark has a modern and well-functioning payments market. Besides cash, there are a number of electronic payment solutions offered by private operators. The solutions include the Dankort (national debit card), international credit and debit cards, and the MobilePay mobile payment solution that makes it possible to use a smartphone to transfer money electronically to both persons and retailers.[11]

While Danmarks Nationalbank is responsible for the functioning of the payment system, the actual provision is largely undertaken by various private operators. Some services such as the issuance of cash or the performance of some forms of interbank clearing are executed directly by the central bank. With respect to other services such as the creation of bank deposit money, the distribution of cash or the execution of payments in digital money, the central bank merely acts as a facilitator for private companies. Danmarks Nationalbank thus exercises its responsibility for payment system provision largely by making sure that there is an efficient market in which private agents may compete:

> On the one hand, many users of the same [payment] solution is a benefit for society, yet on the other hand, if the lack of competition means that a payment service provider can set artificially high prices, this could lead to monopoly-like conditions in the market. It is therefore important that the relevant authorities continuously monitor the terms of competition and intervene if a market failure is observed. But if the market is well-functioning, society will benefit from private agents competing for customers. This will also encourage innovation.[12]

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10 Gürtler et al., 'Central Bank Digital Currency in Denmark?', 2.

11 Gürtler et al., 6.

12 Gürtler et al., 10–11.

The Act on Payments adopted by the Danish Parliament and entered into force in 2018 is intended to improve the efficiency of this market.[13] The Act separates two functions in the provision of payments: 1) The management of accounts, where money users store their money. This function is by definition performed by banks, since the money stored consists in bank deposits. 2) The initiation of payments, which is the user interface that allows money users to transfer money between accounts. This function has traditionally also been performed by banks through personal service, online-banking services, mobile apps, etc. The Act on Payments, however, obliges banks as account managers to allow third-party providers to initiate payments on behalf of account holders thus making it possible for non-banks such as Apple or Facebook to provide payment applications without holding money user accounts.

There are different ways to implement CBDC but it seems likely that the role performed by the central bank in such a system is that of an account manager rather than a payment solution provider. In similar fashion as banks are now obliged to do with the Act on Payments, Danmarks Nationalbank would provide third party access to the CBDC accounts of money users, which means that they would be accessible by means of a Dankort, a form of MobilePay, ApplePay or some other application.

In terms of efficiency, functionality, convenience, reliability and security, the implementation of CBDC would thus not constitute any significant change for the experience of the individual money user. Danmarks Nationalbank would be nothing but an alternative account manager in addition to the existing deposit banks, where money users may choose to store some of their money. From the narrow perspective of payment system provision, there is thus little reason to disagree with the conclusion of the analysis of Danmarks Nationalbank:

> It is difficult to see what central bank digital currency would be able to contribute that is not already covered by the payment solutions which exist today. Denmark has a secure and effective payments infrastructure and digital currency, in the form of bank deposits, already exists.[14]

At the same time, this quote also captures the main problem of the analysis. CBDC is not first and foremost a payment solution and the most important ar-

13 Gürtler et al., 10.

14 Gürtler et al., 1.

guments for its implementation are not that it would constitute an improvement in terms of payment system provision. Therefore, we should also not dismiss it on the grounds that it does not improve the efficiency or the security of the payment system. The significant changes implied by CBDC are within the domains of financial stability and monetary policy. We shall now turn to these issues.

Financial Stability

Financial stability is first and foremost related to the functioning of money as a store of value. Central bank responsibility for financial stability may be summarized as the maintenance of parity between the different kinds of money circulating as kroner. This implies that the value of bank deposit money circulates at par with cash. Money users should be able to purchase the same amount of goods for 100 kroner in bank deposit money as for 100 kroner in cash and they should be able to exchange 100 kroner in bank money for 100 kroner in cash.

The challenge in maintaining financial stability and parity is that cash and bank deposit money are quite different forms of money. There is the obvious difference that the former is tangible while the latter is intangible. But more importantly cash is issued by the central bank and thus subject to laws governing the state monopoly on money creation. In contrast, deposit money is created as banks expand their balances typically in the process of lending. This means that the state is responsible for the relative value of cash and bank deposit money, while the creation of the latter is left to private agents.

As illustrated in chart 2 in Danmarks Nationalbank's analysis, cash is a claim on the central bank and bank deposits are a claim on commercial banks. By definition cash carries no credit risk. Even if the central bank were to become insolvent, cash would maintain its value as it is by law defined as legal tender. Sellers of goods and services are obliged by law to accept cash as payment at the nominal value. The same applies to creditors, who are also obliged by law to accept cash at the nominal value in the settlement of debts. Finally, the government should also be prepared to accept cash in the payment of taxes and other debts to the state even though it may be difficult to find a government office that is actually able to receive the money.

Even though bank deposit money is today much more convenient than cash and it can readily be used for all kinds of payments and debt settlements, it does, nevertheless, carry a credit risk. If a private bank becomes insolvent or even just illiquid it may not be able to raise the funds required to settle balances with counter parties and clear payments. This means that customers cannot use the

money in their deposit accounts nor can they exchange them for cash. They will have lost their money.

In sum, money users today have a choice between two kinds of money for storing value. They can hold cash, which is inconvenient but risk-free. Or they can hold bank deposit money, which is convenient but carries a credit risk. The key feature of CBDC is that it takes the best of both of these kinds of money and combines them. CBDC is both convenient and risk-free. For a public institution devoted to providing the best possible service to the population, the implementation of such kind of super money should be an obvious choice. This is, however, not the way that Danmarks Nationalbank views the matter. Here is a key formulation in their analysis:

> The fact that CBDC is a claim on Danmarks Nationalbank means that, like cash, it is risk-free. However, the Danish depositor guarantee scheme entails that deposits with commercial banks of up to euro 100,000, or around kr. 750,000, are covered by the Guarantee Fund. The Guarantee Fund, previously the Depositor Guarantee Fund, is the Danish Depositor and Investor Guarantee Scheme. Its purpose is to cover depositors and investors if a Danish bank fails. The Guarantee Fund's target level is 0.8 per cent of the deposits covered. If this amount is not sufficient to fulfill the Guarantee Fund's obligations, it can raise a state-guaranteed loan. Net deposits exceeding kr. 750,000 are not covered by the Guarantee Fund, and depositors with larger deposits may therefore risk losses.[15]

In order to unlock the logic of this argument, we need to invoke the distinction between *de jure* and *de facto*. As we have explained in the above cash is *de jure* risk-free. By definition it carries no credit risk by virtue of being a claim on the central bank. Now it is true, as explained in the quote, that there are different schemes put in place in order to guarantee the value of bank deposit money and to make it circulate as *de facto* risk-free. The first line of defense is the Guarantee Fund, which is a form of mutual insurance provided by the banking sector itself. While this fund may be able to taper over problems in an individual small or medium-sized bank, it is grossly insufficient to handle a larger systemic crisis. Such crisis would invoke the second line of defense, the 'state-guaranteed loan', which is the technical term for government bail-out.

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15 Gürtler et al., 2–3.

Under normal circumstances there is no difference between *de jure* and *de facto*. Since everyone relies on the government eventually stepping in to secure the value of bank deposit money in the case of a crisis, we can all afford to treat this money as if it were risk-free. But the definition of a crisis is exactly the end of 'normal circumstances' and the occurrence of the unexpected. The credit risk in bank deposit money has not been eliminated by deposit insurance and state guaranteed loans. It has merely been displaced or suppressed. A crisis may cause it to reappear in an unexpected place.

First, if the government bails out the banks in a new systemic crisis, money users are still going to pay for it. Only this time they will be paying in their capacity as tax payers rather than depositors. Secondly, money users may find that in the event of a systemic crisis the government changes its mind and retracts its guarantee. It may, for instance, decide to make depositors bail-in the banks rather than offer a bail-out.

A government backed depositor guarantee is like a gold standard. A gold standard makes money circulate *as if* it is gold. But the nature of a gold standard is that it is there until one day it isn't. And curiously, this day is often exactly the day when money users want to use the gold standard. Similarly, depositor guarantee also makes bank money circulate *as if* it is risk-free, until one day the guarantee may not be there anymore. Depositor guarantees as well as gold standards tend to work best, when we don't need them, and not work very well, when we really need them.

Another way of thinking about the maintenance of parity between cash and bank money is through the notion of the bank run. Bank runs happen, when money users doubt the value of bank money and thus 'run' to the bank in order to convert their deposits into cash. Providing money users with the opportunity to hold risk-free CBDC means that they no longer have to go down to the bank to make a bank run:

> One of the greatest risks to financial stability from introducing CBDC is the increased risk of systemic bank runs. /.../ With CBDC, households and businesses would have an incentive to transfer their bank deposits to CBDC in a systemic crisis situation, unless there were a ceiling on the outstanding amount of CBDC. In step with declining confidence in the banking sector, this might happen, despite the depositor guarantee scheme and any higher interest rate on bank deposits. Today, deposits can in principle be converted to cash, but the practical challenges concerning cash make this less attractive. Furthermore, the general conversion of bank deposits to cash would

> take time, whereas conversion to CBDC could take place immediately. CBDC might therefore increase the risk of bank runs.[16]

On the one hand, it makes perfect sense for the central bank to do whatever it takes to prevent bank runs as such events create massive financial instability. On the other hand, a bank run is nothing but the response of the free market in a situation of financial instability. In a situation of 'declining confidence in the banking sector' money users are simply factoring credit risk into the pricing of different kinds of money. As cash and bank money carry different credit risks, they are priced differently in the market, and parity breaks down.

If Danmarks Nationalbank were to implement CBDC, it would provide money users with a convenient way of acting on the real market price of different kinds of money. This would improve the natural mechanisms of price discovery in the money market. It would also create more market pressure on the banking sector to make sure that they are financially robust because money users would have a competitive alternative to bank money. As we can see from the quote above, the reasoning of Danmarks Nationalbank is the complete opposite. Rather than providing money users with a risk-free digital alternative to bank money, the solution is to force money users to absorb the risk of the banking system by not giving them any other choice than using the liabilities of private companies as money.

Danmarks Nationalbank is confusing cause and effect. Bank runs are not the cause of financial instability but rather the effect of the market reacting to problems in the banking sector. Therefore you cannot solve problems of financial instability by simply preventing bank runs. This backwards logic is similar to the former DDR, where the government thought they could solve the problems of the country by simply preventing people from escaping to the West. If a bank cannot persuade money users to hold bank deposit money by running their business in a way that minimizes credit risk or at least by offering interest rates corresponding to any credit risk, it should probably not be in business in the first place.

With respect to financial stability and CBDC Danmarks Nationalbank concludes:

> It is not part of Danmarks Nationalbank's objectives to make unlimited claims on the central bank available to the general public, but

16 Gürtler et al., 16.

instead to support stable prices, financial stability and secure payments, cf. above.[17]

What Danmarks Nationalbank seems to be supporting, first of all, by depriving money users of the opportunity to hold risk-free CBDC is the business model of the existing banking sector. The first official announcement by the Royal Governor of Nationalbanken, Lars Rohde, on CBDC was made at the annual meeting of the Danish financial industry association, Finans Danmark, in December 2017. In his speech, Rohde dismissed the idea of a central bank issued e-krone with the following words to the bankers: 'So I can set your minds at ease: Danmarks Nationalbank has no plans to compete directly with the banks.'[18] In other words, the privilege to create digital money in Denmark shall remain exclusively in the hands of commercial banks.

If Danmarks Nationalbank believes that the creation of CBDC is an illegitimate form of state competition with private banks, we might ask why they maintain their monopoly on the issuance of physical money. Isn't this also a form of competition with private banks, which could also potentially issue our notes and coins? Conversely, we might also ask why Nationalbanken voices forceful warnings and critique against Bitcoin and other cryptocurrencies?[19] Should private banks also be protected from competition from other agents in the financial industry?

Monetary Policy

The third issue in the evaluation, monetary policy, is concerned with price stability. This implies the maintenance of the krone as a stable unit of account for the pricing of goods and services in the Danish economy. Price stability is commonly defined as a stable inflation rate of approximately 2% measured by the Consumer Price Index (CPI). Before we get to the actual discussion of CBDC, we need to look at the current situation of monetary policy because this is the benchmark against which the implementation of CBDC is evaluated.

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17 Gürtler et al., 13.

18 Lars Rohde, 'Speech by Governor Lars Rohde at the Annual Meeting of Finance Denmark 2017' (Danmarks Nationalbank, 2017).

19 Casper Schrøder, 'Nationalbanken sammenligner bitcoin med tulipan-krakket i 1600-tallet', *DR.dk*, 2017.

The following quote from the analysis is very informative, because it demonstrates how the fixed exchange rate against the euro is so ingrained in the monetary policy of Danmarks Nationalbank that it is more or less conflated with price stability:

> By maintaining a fixed exchange rate against the euro, Danmarks Nationalbank ensures stable price development in Danish kroner terms. This means that the amount of goods and services that can be purchased for kr. 100, for example, does not fluctuate much from year to year. In other words, money issued by Danmarks Nationalbank maintains its real value. The same applies to bank deposits, since they are also denominated in kroner.[20]

While price stability is measured as the value of krone denominated money relative to goods and services, the fixed exchange rate policy is concerned with the value of krone denominated money relative to euro denominated money. Price stability and currency pegging are thus two very different things. The pegging of the krone to the euro is not a statutory mandate of Danmarks Nationalbank. It is thus not an end in itself but rather a means adopted by Danmarks Nationalbank to achieve the goal of price stability.

The key tool in the maintenance of the fixed exchange rate against the euro is the setting of the monetary policy interest rate specifying interest rates for commercial bank deposits and borrowing at the Danmarks Nationalbank. Today commercial banks are net depositors at Danmarks Nationalbank and the deposit rate is close to and sometimes even below zero. As Nationalbanken explains in the analysis, this is due to the fact that in response to the financial crisis, central banks around the world, including the ECB, have decreased interest rates to historically low levels. Given the fixed exchange rate policy Danmarks Nationalbank has been forced to follow through and also lower its interest rates. Furthermore, major central banks have engaged in Asset Purchase Programs or Quantitative Easing. These programs amount to massive expansions of central bank balance sheets as central bank reserves are used to purchase bonds and other financial securities to prevent deflation. Globally the balance sheets of central banks have expanded by 15-20.000 bn dollars since the financial crisis. The ECB alone accounts for approximately 3.000 bn dollars of this expansion. While Danmarks Nationalbank has not participated directly in Quantitative Easing programs, the

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20 Gürtler et al., 'Central Bank Digital Currency in Denmark?', 3.

effects of this expansive monetary policy has created an upward pressure on the krone to which Danmarks Nationalbank has had to respond by purchasing foreign currency. By committing itself to the fixed exchange rate against the euro, Danmarks Nationalbank is essentially just importing the monetary policy of the ECB.

Standard monetary policy theories followed by central bankers suggest that a lowering of central bank interest rates are transmitted through various channels into the general economy, where it leads to inflation and eventually economic growth. While the practical monetary policy of the ECB and thus also by proxy Danmarks Nationalbank still seems to adhere to this idea, researchers at Danmarks Nationalbank have in fact on several occasions questioned and dismissed the theoretical underpinnings of several of its elements. The effects of the so-called investment channel have been dismissed as it was impossible to observe a long term influence on investments from monetary policy.[21] Similarly the effects of the so-called bank lending channel, whereby credit issued by private banks is influenced by the policy rate, have also been severely questioned.[22]

This leaves only the so-called wealth channel as the only effective way for the current interest rate policy to influence the general economy. The idea is that lower interest rates increase the prices of assets such as stocks, bonds and real estate thus increasing the wealth of the owners of these assets, which then translates into increased consumption, inflation and growth. While empirical studies support the effects of this monetary policy transmission channel, they also highlight how the mechanism produce 'collateral damage' in the form of rising inequality, asset price inflation and increasing default risk default risk in pension savings.

Observing the development of the world economy in general and the European economy in particular, where low levels of interest rates go hand in hand with low CPI inflation and an overhanging risk of deflation, the standard theory of monetary policy is indeed becoming more and more difficult to defend. Departing

21 Danmarks Nationalbank, 'Monetary Politics in Denmark' (Danmarks Nationalbank, 2009); Paul Lassenius Kramp and Jesper Pedersen, 'Why Is Investment so Weak?', Monetary Review (Danmarks Nationalbank, 2015).

22 Anders Mølgaard Pedersen, 'The Credit Channel in Monetary-Policy Analyses', Monetary Review (Danmarks Nationalbank, 2003), 97; Peter Askjær Drejer et al., 'The Effects of Monetary Policy in Denmark', Monetary Review (Danmarks Nationalbank, 2011), 59.

FED chairman Janet Yellen has dubbed the situation a 'mystery.' Danmarks Nationalbank Governor Lars Rohde has said: 'We are now probably at a stage, were monetary policy has no large general effect any longer.'[23] And a recent study has even demonstrated a positive correlation between interest rates and GDP growth in Germany, Japan, United Kingdom and USA.[24]

The general diagnosis of the monetary policy situation in Europe and Denmark is relevant to the discussion of CBDC because it provides the benchmark against which we are evaluating the possible implications of implementing this new kind of money. It decides whether we are: (1) evaluating the possible extra features that CBDC might make to a monetary system, which is already functioning almost perfectly, or whether we are: (2) evaluating how CBDC may help reform a monetary system that is inherently unstable and provide the central bank with new monetary policy tools in exchange for the old ones that seem to have become blunt.

The general sentiment in Danmarks Nationalbanks analysis clearly points to the former notion and there is little hesitation in their rejection of CBDC on the grounds of monetary policy. We shall be looking into four arguments provided in the analysis:

The first is that '[t]he interest rate on CBDC could not be used as a monetary policy instrument in Denmark' because of Danmarks Nationalbank's commitment to the fixed exchange rate.[25] The argument along these lines is interesting because it admits how CBDC might be able to solve some of the problems with the inefficiency of existing transmission channels for central bank monetary policy discussed in the above:

> As the CBDC interest rate would affect households and businesses directly, it might be seen as a strong instrument to regulate the private sector's demand, and thereby stabilise the economy. As a consequence of the fixed-exchange-rate policy, the level of Danmarks Nationalbank's interest rates is determined solely by what is compatible with

23 Lone Andersen, 'Lars Rohde: Centralbankernes bazookaer løber tør for ammunition', *Finans.dk*, 2016 [our translation].

24 Kang-Soek Lee and Richard A. Werner, 'Reconsidering Monetary Policy: An Empirical Examination of the Relationship Between Interest Rates and Nominal GDP Growth in the US, UK, Germany and Japan', *Ecological Economics* 146 (2018): 26–34.

25 Gürtler et al., 'Central Bank Digital Currency in Denmark?', 18.

> a stable krone exchange rate. This would also apply to the interest rate for CBDC. In a Danish context, interest on CBDC would therefore not present any new monetary-policy opportunities, since the interest rate on CBDC would be set to keep the krone exchange rate fixed.[26]

We see here, how the fixed exchange rate is elevated from being a means to stabilize the economy to being an end in itself. Even if CBDC would open a new and more direct transmission channel between central bank interest rates and growth and inflation rates in the general economy, this potential is dismissed with reference to the fixed exchange rate commitment. Therefore the matter of course, with which price stability by definition is made out to follow from the fixed exchange rate policy, is misleading. If forced to choose between the two, Danmarks Nationalbank remains committed to the latter. We see this illustrated in the current situation, where low interest rates are once again inflating prices in Danish housing markets beyond pre-crisis levels.

This is, however, not a new situation brought about by an implementation of CBDC. As stated in the above quote, it already applies to the existing situation. We might argue that even if Danmarks Nationalbank currently did not wish to use CBDC interest rates as a proactive monetary policy tool due to the fixed exchange rate commitment, it might still be a useful option to have in hand in a future situation of crisis. When Draghi's QE 'bazooka' runs out of ammunition and the rest of Europa is caught up in a deflationary spiral, a Danish e-krone could be the Holger Danske sword that is picked up to save the country.

The second argument is that '[t]he interest rate on CBDC would constitute a lower bound.' This is closely related to the discussion of bank runs in the previous section. In order to persuade money users to hold bank deposit money with credit risk instead of risk-free CBDC, Danmarks Nationalbank would have to keep interest rates on CBDC lower than the bank deposit rates. Since bank deposit rates today are already close to zero and in some instances even negative, Nationalbanken would probably also have to charge negative interest rates. Or the banks would have to raise their deposit interest rates. The implementation of CBDC, according to Danmarks Nationalbank, thus interferes with the mechanics of the market:

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26 Gürtler et al., 18.

> Issuing CBDC could thus have consequences for interest rate formation in the financial markets. The markets are characterised by how liquidity, risk and other conditions enter into the formation of prices, thereby contributing to the best possible allocation of capital.[27]

The invocation of an ideological free-market argument to dismiss CBDC is paradoxical as the monetary policy of Nationalbanken is all about controlling interest rates, preventing credit risk to be factored into the pricing of bank money, providing liquidity, and intervening in ForEx market to peg currency rates. Current money markets are hardly 'free' as it is and it is thus not clear whether the introduction of CBDC would make them more or less subject to state interference.

The third monetary policy argument against CBDC is that it 'could intensify international capital movements.' In this argument, Danmarks Nationalbank shifts to a scenario, where it issues non-interest bearing CBDC. This would be a true digital version of cash, which is also by definition interest free. The problem here is a variety of what is discussed in the above. If foreign investors can hold risk-free, zero-interest CBDC, while relying on Danmarks Nationalbank to maintain a fixed exchange rate, they are provided with an arbitrage opportunity, if interest rates in the euro-zone move below zero. This would increase demand for the krone and create upward pressure on the exchange rate. If the euro-zone interest rate were to move away from negative interest rates, this would create a reverse movement:

> CBDC could thus, in the longer term, lead to greater capital movements both into and away from kroner, in step with changes in the relevant interest rate spreads. This could make it necessary to have a larger foreign-exchange reserve than today, to ensure an adequate buffer if households and businesses sell kroner.[28]

While this argument makes sense, it is also worth noting that Danmarks Nationalbank has already increased its foreign exchange reserves by kr. 300 bn. since the financial crisis and in 2015 momentarily by another kr. 200 bn. thereby exposing itself to exchange rate risk. CBDC is thus hardly creating a monetary policy problem that does not already exist. In light of the previous references to

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27 Gürtler et al., 19.

28 Gürtler et al., 20.

'the market', 'price formation' and 'allocation of capital', it is worth speculating whether the introduction of a risk-free, zero-interest CBDC constitutes a distorting state intervention in an otherwise free market, or whether it is actually a sound form of money in limited supply that would provide a stable anchor point facilitating the free formation of prices on assets as well as on other forms of money.

The final monetary policy argument against CBDC is concerned with the problem of 'higher seigniorage'. Seigniorage is the profits derived from the creation and issuance of money. Seigniorage profits in excess of the operational costs of Danmarks Nationalbank are transferred to the state. Today Danmarks Nationalbank earns seigniorage on the issuance of cash and central bank reserves. In so far as CBDC increases the aggregate demand from central bank money it would lead to increasing seigniorage profits.

In our current times of austerity, where most public institutions are required to cut their spending, it is curious to see how Danmarks Nationalbank is worried about earning too much money and thus perceives higher seigniorage as a problem. But as they state 'it is not Danmarks Nationalbank's objective to achieve the highest possible profit.' It is of course true that Danmarks Nationalbank should not just make new money to earn more money. At the same time, the fact that Danmarks Nationalbank abstains from creating digital money that can be held and used by ordinary money users means that seignorage profits on the creation of this kind of money is left to be appropriated by the commercial banking sector, whose 'objective' is exactly 'to achieve the highest possible profit.' A conservative estimate of the value of the privilege to create our electronic money, which allows the commercial banking sector to appropriate seigniorage, is an average of kr. 11.7 bn per year over the period 1991-2015.[29] When we take it for granted that Danmarks Nationalbank and thus by proxy the state appropriates seigniorage on the issuance of physical cash, why do we not extend this logic to apply to electronic money as well? The implementation of CBDC would allow Danmarks Nationalbank and the state to reclaim at least some of these seigniorage profits.

29 Ole Bjerg et al., 'Seigniorage in the 21st Century', CBS Working Paper (Copenhagen Business School, 2017).

Central Bank Independence and Democracy

Independence if often hailed as a virtue of central banks. The idea is that if kings or governments are allowed to interfere with the conduct of monetary policy, they are likely to abuse this power for political gains by pressuring the central bank to print more money or provide other forms of short-term stimulus to the economy. Independence protects the central bank from this kind of influence and thus allows it to retain a focus on long term financial and monetary stability.

The question of CBDC is essentially a question about who should have the right and opportunity to create the money of a sovereign realm. Therefore the analysis of CBDC also provides an insight into the way that Danmarks Nationalbank perceives its role in society at large and understands its mandate as an independent institution. Towards the end of the analysis, we find the following concern:

> Issuing CBDC would increase the direct contact between Danmarks Nationalbank and households and businesses. This would increase the risk of dissatisfied customers for Danmarks Nationalbank. This might be due to system failure, or if the facilities offered in relation to CBDC – for example the user interface which enables households and businesses to access their CBDC – were not considered to be sufficiently user-friendly. The extent to which this type of criticism of Danmarks Nationalbank would influence Danmarks Nationalbank's credibility with regard to the task of ensuring financial stability and stable prices is an open question.
>
> Depending on how a CBDC is designed, this could also exert political pressure on Danmarks Nationalbank. In the event of financial unrest, there might be pressure from politicians or the media for the CBDC ceiling to be raised, even if the ceiling were to be fixed beforehand.[30]

If we think of money users as potentially obnoxious customers, politicians as irresponsible tyrants, and the media as a catalyst for collective hysteria, the concern of Danmarks Nationalbank makes sense. If, however, we think of money users as citizens, whom Nationalbanken has an obligation to serve in the best possible manner, if we think of politicians as the elected representatives of the democratic society, and if we think of the media as the domain of public debate

30 Gürtler et al., 'Central Bank Digital Currency in Denmark?', 21.

and critique, the statement leaves the impression of an institution that does not seem to think that it has to answer to anyone.

Which other public institution could afford to express such lack of respect for the citizens as well as the democratic system that it is obliged to serve? Imagine the Danish State Railways, DSB, refusing to engage with customers in order to avoid possible criticism. Imagine the Danish public schools being screened from any interference from democratically elected politicians. Or imagine the police not having to consider critique raised in the media. Of course politicians, journalists or private individuals should not be able to interfere with the day-to-day operations of Danmarks Nationalbank. But using this as argument for not implementing a system, which could be beneficial for money users and could turn out to be an efficient monetary policy tool in the event of a future crisis, seems to be throwing out the baby with the bathing water.

It is interesting to contrast this self-perception and the implied idea of independence with the approach of two other Nordic central banks. Not only are both Svenska Riksbanken and Norges Bank much more exploratory and much less conclusive in their study of CBDC, they also do not want the decision on this important matter to be made in a closed technocratic forum. Here is how the Governor of Riksbanken accompanies his preliminary thoughts on the e-krona with an invitation to debate:

> These are our initial thoughts and the reason why we published the report before we have thought it all through is that we want to have a dialogue with the market and other interested parties, as it is such a complex issue. The dialogues have now been initiated.[31]

Deputy Governor of Norges Bank, Jon Nicolaisen, displays a similar amount of humility and respect for democracy in his speech on CBDC:

> Choosing the direction our future monetary system and payment system will take requires not only economists, but also technologists, lawyers and other social scientists. And political decisions will ultimately need to be made by our elected representatives. It devolves upon the Storting to supervise the monetary system of the realm. The questions are numerous, but we already have one of the answers. Central banks were established to build confidence in the monetary system. That is still our primary task. We cannot leave the monetary

31 Ingves, 'Do We Need an E-Krona?', 6.

> system entirely in the hands of private entities. There will be a role for central bank money. We must have a legislative framework and a means of payment backed by the authorities to ensure trust in our money – as history has shown. [32]

For comparison this is how Danmarks Nationalbank concludes their analysis:

> Danmarks Nationalbank assesses that the central bank must continue to be the banker to the banks, rather than the bank for all of Denmark's population.[33]

Conclusion

In this paper, we have reviewed the arguments against the implementation of CBDC in Denmark put forward in the recent analysis by Danmarks Nationalbank. The analysis by Danmarks Nationalbank is interesting for two reasons. First of all, it is the most conclusive dismissal of CBDC put forward by any central bank so far. In this sense, it provides a very honest expression of the way that the most critical and conservative central bankers view CBDC. The boldness of the analysis makes it a fruitful object for intellectual engagement. And second, the question of CBDC inevitably opens up a set of more fundamental questions about the role and responsibility of central banks in society as well as the nature and purpose of money itself. While the analysis by Danmarks Nationalbank does not address these questions explicitly, their thinking about CBDC implicitly provides a rare insight into the self-perception of Danmarks Nationalbank and its purpose and loyalties in Danish society.

As we have seen, there are three elements in the dismissal of CBDC corresponding to the three mandates of Danmarks Nationalbank: payment system provision, financial stability and monetary policy. With respect to payment system provision, CBDC is dismissed on the grounds that it does not add efficiency or further functionality to existing payment solutions. From a narrow user perspective, this argument seems perfectly reasonable. It does, however, fail to recognize that money users are not only interested in whether they can use their mobile phone to pay for groceries or use online banking to pay their bills in the middle of the night. Money users may also be concerned with risks building up in the banking sector and thus have a legitimate need for a risk-free place to store

32 Nicolaisen, 'What Should the Future Form of Our Money Be?'

33 Gürtler et al., 'Central Bank Digital Currency in Denmark?', 21.

digital money, even if credit-risk on bank money currently seems to be merely theoretical.

When Danmarks Nationalbank then proceeds to discuss CBDC in the context of financial stability, the money users' need for the opportunity to store risk-free digital money is not only neglected. It is even invoked as an argument *against* CBDC as it constitutes a risk of a digital bank run. The implementation of CBDC would put market pressure on banks to manage their business in a way that does not expose customers' money to more risk than justified by the interests paid on deposits, since money users would have a risk-free alternative. The approach of Danmarks Nationalbank is, however, to force money users to use bank deposit money by not providing a risk-free alternative. This solution also forces money users to absorb the risks of the banking sector either as depositors or ultimately as tax payers.

On the grounds of monetary policy, the idea of CBDC is dismissed by the argument that it would interfere with the fixed exchange rate policy of the krone against the euro. It is, however, difficult to see how the implementation of CBDC creates new problems that do not already exist. The policy rate of Danmarks Nationalbank is already dictated by the interest rate of the ECB, which forces Denmark to import the monetary policy of the Eurozone. And Danmarks Nationalbank has already been forced to expand its reserves of foreign currency to counter the upward pressure on the krone due to quantitative easing and other inflationary policies of the ECB.

Furthermore, Danmarks Nationalbank fails to consider the opportunities in having a CBDC infrastructure in place, which would provide a wider arsenal of monetary policy tools in a future situation of crisis. Even if it is currently not feasible to use proactive interest rate adjustments or sheer money creation (helicopter money) to stimulate the economy, they might turn out to be valuable options in case something unexpected happens. Just like an army cannot afford to organize on the assumption that a current state of peace will continue eternally into the future, so must a central bank also design the monetary system to be resilient even in the event of the unexpected. A preemptive implementation of CBDC might constitute a display of due diligence ('rettidig omhu') by Nationalbanken.

Although some of the concerns of Danmarks Nationalbank with regards to the possible implementation of CBDC are perfectly reasonable and sensible, the general line of the argument may be summed up through the notion of 'kettle logic'. This notion is derived from Freud, who tells the story of a man accused by his neighbor of having returned a borrowed kettle in a broken condition. The man

refuses the accusation by making three arguments: (1) He had returned the kettle intact. (2) The kettle was already broken when he borrowed it. And (3) he had never borrowed the kettle in the first place. The peculiar 'kettle logic' is of course constituted by the fact that each of the individual arguments undermines the premises of the other two.

The kettle logic of Danmarks Nationalbank's dismissal of CBDC becomes visible if we boil it down to three claims: (1) CBDC does not contribute anything to the payment system that is not already provided by existing commercial bank deposit money so its implementation would provide no additional benefits for money users. (2) If money users are provided with the opportunity to hold risk-free money at the central bank they will use it to avoid the inherent risk in the commercial banking sector thus causing a digital bank run as they convert their bank deposit money into CBDC. And (3) Danmarks Nationalbank is the banker to the banks rather than the bank for all of Denmark's population, so even if CBDC did benefit the general money user, it would not be implemented anyway as long as it posed a threat to the existing business model of the banks.

As this review has shown, Danmarks Nationalbank appears rather adamant in their dismissal of CBDC. But in the very last paragraph of their analysis a window of opportunity is opened, albeit ajar:

> If another central bank were to decide to introduce a CBDC, this would be of significance to Danmarks Nationalbank and the financial system. This makes it important to monitor developments.[34]

Behind the skepticism in Danmarks Nationalbank's approach to CBDC is probably a genuine desire to create stability by making sure that things stay more or less as they are. The paradox of stability is, however, that sometimes the best way to make sure that some things stay the same is to change other things. Two leading scholars in the debate on CBDC warn:

> Central banks have generally been renowned as conservative institutions - staid, cautions, and inertial. /.../ [A] passive and inertial approach towards CBDC may not be the most prudent strategy. Rather, many central banks are now moving expeditiously in considering CBDC and in investigating its logistical and technical details.[35]

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34 Gürtler et al., 21.

35 Bordo and Levin, 'Central Bank Digital Currency and the Future of Monetary Policy', 19, 21.

As Danmarks Nationalbank proceeds to 'monitor developments' we can hope that they pay close attention to what is happening in Sweden. Even though Danmarks Nationalbank is probably not going to be the one making history this time, they could still find inspiration in the following quote by the Governor of Riksbanken:

> I would like to conclude my speech by reminding you that it was in Stockholm that the first modern banknote was created more than 350 years ago, and that it is here, in Sweden, that cash is currently taking its last breaths. Perhaps the Riksbank will be writing history again.[36]

36 Ingves, 'Do We Need an E-Krona?', 6.

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