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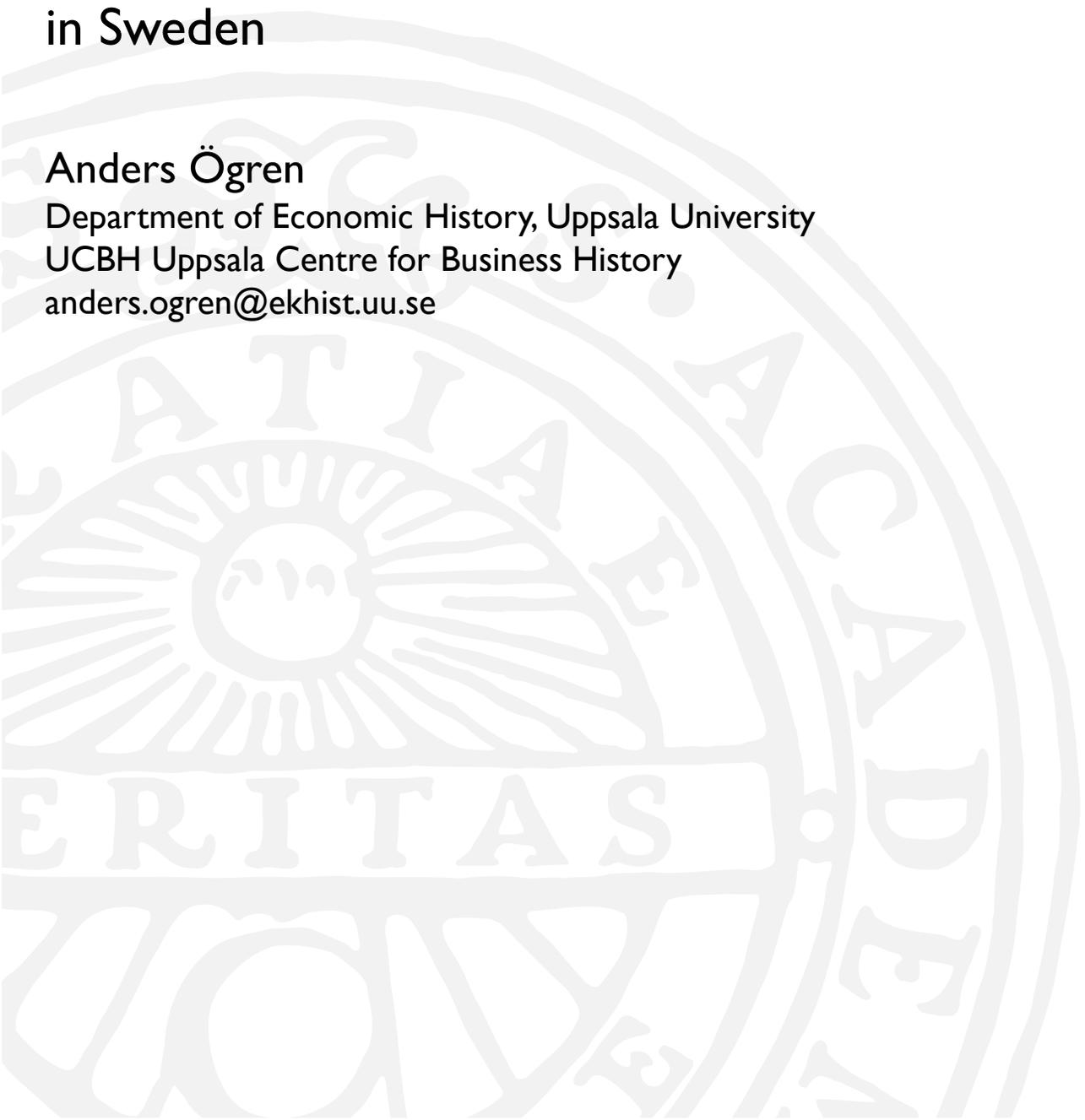
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Replacing bank money with base money: Lessons for CBDCs from the ending of private banknotes in Sweden

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Abstract

A number of central banks have started to investigate the possibility of issuing so-called Central Bank Digital Currencies (CBDCs). The aim may be to compete with cryptocurrencies of different kinds but also to replace digital commercial bank money with central bank issued digital money, i.e. replacing bank money with central bank-issued base money. In this paper we study a similar experiment when the Swedish central bank, the *Riksbank*, in 1903 replaced private banknotes with their own notes. The result of this policy was a massive increase in commercial bank credit due to the increase in base money, spurring the ongoing boom even further. A boom that worsened the 1907 crisis. The result is thus questioning the notion that increased monetary issuance by a monetary authority to replace other financial assets as private money or cryptoassets should lead to increased financial stability – as, in fact, it led to the opposite.

Keywords: : Central banking, Commercial banks, Crises, Cryptoassets, Financial stability

JEL: N13, N23, E42

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Replacing bank money with base money: Lessons for CBDCs from the ending of private banknotes in Sweden

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ABSTRACT

A number of central banks have started to investigate the possibility of issuing so-called Central Bank Digital Currencies (CBDCs). The aim may be to compete with crypto-currencies of different kinds but also to replace digital commercial bank money with central bank issued digital money, i.e. replacing bank money with central bank-issued base money. In this paper we study a similar experiment when the Swedish central bank, the *Riksbank*, in 1903 replaced private banknotes with their own notes. The result of this policy was a massive increase in commercial bank credit due to the increase in base money, spurring the ongoing boom even further. A boom that worsened the 1907 crisis. The result is thus questioning the notion that increased monetary issuance by a monetary authority to replace other financial assets as money should lead to increased financial stability – as, in fact, it led to the opposite.

Keywords: Central banking, Commercial banks, Crises, Cryptoassets, Financial stability

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1. Introduction

Projects attempting to create Central Bank Digital Currencies (CBDCs) are taken on by central banks in many countries. In June 2021 BIS stated on their homepage that a recent central bank survey had shown that 86% of all central banks were researching the potential for CBDCs, 60% were experimenting with the technology and 14% had started pilot projects.

So what is a CBDC? BIS definition of the CBDC would be as a ‘digital bank note’: *In simple terms, a central bank digital currency (CBDC) would be a digital banknote.* (BIS, 2021) The same definition is stated by the ECB: *The digital euro would be like euro banknotes, but digital. It would be an electronic form of money, issued by the Eurosystem (the ECB and the national central banks of the euro area), and would be accessible to all citizens and firms.* (ECB 2022). The Bank of England extends the vision of what a CBDC is somewhat by also acknowledging that it actually also can be regarded as a deposit: *CBDC is sometimes thought of as equivalent to a digital banknote, although in some respects it may have as much in common with a bank deposit.* (BoE 2022). Although the statements about what a CBDC is in terms of traditional views on money (digital bank notes, deposits) may be a way of illuminating the public by referring to what the public may think of when thinking of money, this may in reality be more obfuscating of the truth than anything else.

There is one thing that is agreed upon when it comes to defining the CBDC and that is that it is a claim on the issuing central bank in question: the reasons to implement CBDCs according to BIS would be to give the public increased access to ‘*the safest form of money – a claim on the central bank*’. (BIS 2021). Similarly the Head of ECB, Christine Lagarde markets the ECB’s CBDC project ‘A digital Euro’ on the ECB homepage [A digital euro](#)

[europa.eu](https://www.europa.eu)) with the wording: “*Our work aims to ensure that in the digital age citizens and firms continue to have access to the safest form of money, central bank money.*” And Bank of England, rightly so, admits that they already issue a lot of digital currency in the form of reserves for the financial system. The CBDC of the BoE would provide everyone with access to such digital central bank money: *We already produce digital currency for banks and some other financial institutions to use (these are known as reserves). But we could produce a digital currency that everyone could use.* (BoE 2022) The direct conclusion of what any CBDC would be is thus a claim on the central bank, which by definition is potential reserves in the financial system (c.f. Officer 2002).

The question is what functionality the CBDCs will provide that do not already exist in the present monetary system? And what item in the financial and/or monetary system, if anything, is the CBDC meant to replace? Clearly ECB and BoE are afraid that the public will think that the CBDC is issued to replace other central bank issued money, i.e. cash. ECB claims that: *A digital euro would not replace cash, but rather complement it.* (ECB 2022). Similarly BoE states: *Any UK CBDC would work alongside - not replace - cash and bank deposits. We will continue to provide cash for as long as the public still want it.* (BoE 2022). So if not to replace cash or bank deposits what is the purpose?

The stated purpose it is to provide the public with the possibility to make payments. BIS states: *It could be used by individuals to pay businesses, shops or each other (a ‘retail CBDC’), or between financial institutions to settle trades in financial markets (a ‘wholesale CBDC’).* (BIS 2021). Or in the words of Bank of England: *You would be able to use it to pay for things digitally. For example, you could transfer an amount of it to make a payment to someone.* (BoE 2022). ECB means that it will facilitate payments and financial inclusion but does not mention how or in what way: *A digital euro would give*

people an additional choice about how to pay and make it easier to do so, contributing to accessibility and inclusion. (ECB2022). To conduct payments is in reality what commercial banks and card companies are already equipping us with through the possibilities of using computers, bank cards, smartphones etc. for payments also digitally which is the way we already tend to make payments. If the purpose is increased inclusion, as stated by ECB above, by allowing individuals and firms to open accounts and access credit through the CBDCs that are not allowed to do so by the commercial banking system, this may not be the best plan for financial stability.

And the purpose of financial stability is already given above by the reference in all cases to central bank money (including CBDCs) as the safest kind of assets/money. One important rationale for CBDCs is their claimed stability in comparison to other financial assets due to the fact that CBDCs at heart are claims on the central bank – at difference from the bank money we use today.¹ While BoE may exclude bank deposits from their idea of replacements they do focus on cryptoassets as a reason for issuing their CBDC: *The value of a cryptoasset can move up and down very quickly. They are a risky investment and anyone buying them should be prepared to lose all their money. If we produced a UK central bank digital currency, that would not happen. Our currency would be reliable and retain its value over time.* (BoE 2022). BoE is the most cautious of the central banks regarding the role of CBDCs by stating that they have no intention to replace bank deposits. But a reasonable alternative to investing in cryptoassets is of course to instead keep the money as deposits in the banking system.

¹ We use the term bank money throughout the paper as most of our payments are conducted using bank money, but a more appropriate term that would include also cryptoassets etc, would be ‘non-central bank issued money’ or ‘private money’.

Hence, whether the central bank has as an objective to replace deposits – bank money – or not may not be of importance. As is commonly known ‘unintended consequences’ is a central theme in economics developed by Adam Smith in his *Wealth of Nations* (1976 [1776]) (c.f. Fiori 2014). A theme that underpins how markets work no matter what policy makers aim to design, or as stated in the famous quote by Hayek (1988, p.76): “*The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design.*”. As any CBDC is a claim on the central bank it means that it at its core is a reserve currency regardless of what objective that is stated by the issuer (the central bank). In this paper we thus focus on the issue of stability when bank money is replaced with central bank money.

Sweden has one of the most digitalized monetary systems in the world and consequently the Swedish Central Bank, the *Riksbank* early, in 2017 launched a project to issue a CBDC. One of the aims of the CBDC of the *Riksbank* is to replace the inside money, or bank money, issued by the banking system. The argument for this is twofold: first it is viewed as the mission of the monetary authority to provide means of payments to the public (‘the end users’). If so it implies that this should not be left to the commercial banking system. Second it is argued that replacing the digital money issued by the banking system with CBDCs issued by the *Riksbank* is important for financial stability. The responsible for the project to implement the CBDC of the *Riksbank* stated in a leading Swedish newspaper (*Svenska Dagbladet*) that it is urgent to implement such a central bank-issued e-currency from the point of view of financial stability as central bank-issued money unlike bank money cannot be subject to a run in case of suspected bank insolvency. Even claiming the need to be ‘alarming’ (SVD, 2019). A claim which was repeated by Stefan Ingves, the Head of the Board of the *Riksbank* in a public talk in September 2021 (SvD 2021). Thus, the *Riksbank*’s arguments for the CBDC are basically

the same as those that are promoted by the BIS, ECB and BoE – that they are more stable than other financial assets including cryptoassets and bank money.

All this provides a rationale for empirical studies of episodes when monetary authorities try to seize control over bank-created money by replacing bank-created money – or, in short, when bank money is replaced with base money. Such an attempt to concentrate the money issuance to the Swedish central bank at the expense of the commercial banks has been made before. The *Riksbank* Act of 1897 (SFS, 1897, p. 27) included the objective of replacing the notes issued by the then 28 existing unlimited liability commercial banks (ULBs) with central bank notes – an event which could provide important lessons for the current ideas to replace commercial bank money with CBDCs. Especially so as the above-stated arguments about increasing financial stability that are put forward for the implementation of the CBDC by BIS, BoE, ECB and the *Riksbank* are more or less the same as the arguments that were voiced as reasons for ending the ULB note-issuing right and replace them with *Riksbank* notes. In his aforementioned speech in September 2021, the Head of the Board of the *Riksbank* claimed that private money usually collapses, he even referred to this episode of private bank notes in Sweden that lasted from 1831 until 1903 as a case in point (SVD 2021). But as the empirical historical record shows it is evident that these private bank notes did not end due to instability but because of the above-mentioned political decision to end their existence (Ögren 2006; 2021). Thus, in this paper we study this similar historical event when the monetary authority, the *Riksbank*, replaced this bank-issued money, ULB notes, with its own issued base money, central bank notes.

To analyse the causes and consequences of replacing the private banks' note issuance with the central bank's we study: 1) The arguments for ending the private banks' note

issuance – that is, the economic and political discourse including the policymakers’ visions on money and monetary systems that paved the way to this decision; 2) how the private banks’ note issuance affected the monetary policy of the monetary authority in practice – which turns out to be not at all in the way envisioned by policymakers and central bank representatives; 3) what the authorities, especially the monetary authority, thought would be the consequences of ending the private banks’ note issuance – and how it affected the policies employed in relation to the ending of the private banks’ note issuance; 4) what consequences these policies had in practice for the central bank, the banking system, the credit market and the economy in general in terms of increasing or decreasing stability.

For our qualitative study (points 1 and 3) we have used the Swedish parliamentary prints (*Riksdagstryck*), especially those on the Standing Committee on Banking (*Bankoutskottet*), as well as minutes and correspondence of the Board of the *Riksbank*. The quantitative material (points 2 and 4) consists mainly of the Summary of the Banks’ Reports (*Sammandrag af Bankernas Uppgifter*) and the *Riksbank*’s statistical volume V (1931). We have used these to construct necessary series on the ULBs as well as limited liability non-note-issuing commercial banks (LLBs) that existed in parallel (see Kenny and Ögren, 2021; Ögren, 2021) reserves, public liabilities and lending, as well as the *Riksbank*’s assets, deposits and note issuance (the latter also per denomination), reserves and components of the reserves. These series are annual from 1834 until 1913, and monthly from 1878 until 1913.

With regard to point 1, our findings are that policy makers and central bank representatives did not take into account the difference between central bank issued base money and bank money, just as is seen in many more present-day discussions on money

and credit (c.f. Benes and Kumhof, 2012 Dowd, 1992; Positive Money 2021; Selgin, 1988; Selgin and White, 1994). Because of this confusion it was argued that the possibility for the ULBs to issue notes was a source of financial and economic instability. Even if these views on the impact of the ULBs' note issuance were often repeated, they were not based on empirical observations but on a general theoretical discourse concerning the instability of banks, banknotes notes and, in particular, private banknotes. Even in the absence of empirical evidence concerning the unstable nature of the ULB notes, these ideas were powerful enough to lead to the decision to end the ULBs' right to issue notes.

The empirical study of point 2 shows that, in practice, there was indeed a hierarchy of money as the *Riksbank's* notes served as base money being utilized as reserves by the banking system. The ULB notes, on the other hand, were bank money largely in the same manner as deposits both then and today. They were issued on the basis of the *Riksbank's* issuance of notes and not utilized as reserves by other commercial banks (ULBs or LLBs). Contrary to making the *Riksbank's* monetary policy inefficient, as was argued by policymakers and central bank representatives, the ULBs' note issuance followed suit and amplified the effects of it, hence speeding up the effects of the monetary policy. The actual change brought by the ending of the ULBs' note issuance was cosmetic, as the change only made the private banks change from issuing one form of bank money for another by substituting the issuance of deposits for notes.

Due to the lack of understanding among policymakers of the hierarchical difference between the notes from the *Riksbank* and the ULBs (point 3), the policy employed by the *Riksbank* at the ending of the private banks' note issuance was to simply replace the ULB notes with *Riksbank* notes. This was done to the extent that the same amount in the same

denominations as what had been circulated by the ULBs was issued by the *Riksbank*. This policy was driven by a fear of a lack of liquidity due to the ending of ULB note issuance. As a consequence, between the years 1900 and 1903 the *Riksbank* more than tripled its issuance of banknotes. But as policymakers had not grasped the different roles between the *Riksbank* notes as base money and the previously circulating ULB notes as bank money, the *Riksbank* notes ended up as reserves held by the commercial banks instead of circulating as liquidity among the public as the former ULB notes had.

Regarding point 4, there were many unforeseen consequences of this policy. First, the *Riksbank*, tied by the gold standard, initially funded this increase of base money issuance by accepting a decreasing reserve coverage and then by getting access to foreign funds as capital was imported by the National Debt Office (NDO) – deteriorating the *Riksbank*'s balance sheet and increasing Sweden's foreign debt. Second, from the year 1895 until 1907 the number of commercial banks almost doubled (from 43 to 83), illustrating that this policy was carried out during a boom when demand for credit was high and commercial banks were competing for market shares. Consequently, the commercial banks did not sterilize this flood of base money by increasing their reserve ratio, instead the swelling reserves were transmitted into an expansion of commercial bank lending serving to increase the ongoing boom even further. This was amplified as the ending of the ULBs' note issuance relieved the ULBs from holding gold reserves as legal reserves, shrinking from 9.5 MSEK in 1898 to only 0.25 MSEK in 1903 (Kenny and Ögren, 2021 p. 8). Consequently, the action taken by the *Riksbank* to mitigate the believed lack of liquidity due to the ending of the ULBs' banknotes led to a direct, and almost linear, upsurge in the broad money supply and in bank credit, which was not intended nor in line with economic fundamentals but further feeding the boom, which was one of the reasons behind the severity of the 1907 crisis (Grodecka-Messi, Kenny, and Ögren, 2021).

2. The theoretical discourse on banknotes

The issuance of notes has historically been seen as a source of monetary and financial instability, a fact that is well illustrated by Adam Smith's famous quote:

The commerce and industry of the country, however, it must be acknowledged, though they may be somewhat augmented, cannot be altogether so secure, when they are thus, as it were, suspended upon Daedalian wings of paper money, as when they travel about upon the solid ground of gold and silver. (Smith, 1976 (1776) p. 341)

The argument is that debasements of coins are bad enough but with the printing press this problem becomes more severe as it is easier to print out of debt. A way out of this problem was to anchor the money supply to a fixed value in specie. The Swedish monetary system upheld by the *Riksbank* was, from 1834 until 1914, based on specie with a silver standard until 1873 and thereafter a gold standard. Even though a differential reserve was used from the 1840s, the cover ratio of legal reserves was kept to around 40 per cent of issued notes (Ögren, 2012).

The bulk of circulating banknotes in the latter half of the nineteenth century came, however, to be issued by private unlimited liability commercial banks (ULBs). These ULBs started to appear from the 1830s. While initially the expansion of the commercial banking system was slow due to the limited right to bank establishment; it increased past due to regulatory changes in 1864 that opened up the possibility to establish banks, and took away the law against interest rates above 5 per cent (Ögren, 2021).

In an international context, the Swedish money stock to a large extent consisted of notes and less of coins, which at the time was seen as an illustration of Swedish financial backwardness by policymakers and representatives of the *Riksbank*. Also, notes were

issued in comparably low denominations: until 1880 the lowest denominations were 1 SEK (0.055 GBP) for the *Riksbank* and 5 SEK (0.274 GBP) for the ULBs – compared with 5 GBP in the UK. In 1880, as a step to increase the usage of coins instead of notes among the public, the lowest denomination was set to 5 SEK for the *Riksbank* and 10 SEK (0.55 GBP) for the ULBs. The *Riksbank*'s lowest denomination note of 1 SEK was thus banned in 1879 in accordance with this view that the high reliance on notes was seen as a remnant of an unstable, disorganized and backwards monetary system, or, as stated by the Head of the Board of the *Riksbank* in a letter to the Standing Committee on Banking:

...that it would not be healthy to keep this remnant from a disorganized monetary system, that the one-crown note, that in Sweden fulfils the function of the token coin, contributes to reinforcing the public's perception that the note is coin, ...² (RbReg Rbnr 429. 20/2-1879 § 11, p. 3)

This view that notes were destabilizing, and especially so the ULBs banknotes, was present in the Swedish parliamentary debate during the nineteenth century (Ögren 2021). In parliament, certain groups strongly opposed the ULBs' right to banknote issuance and legal restrictions were imposed. The law on ULBs of 1864 forced the banks to redeem their notes, but implemented an option clause in case they could not meet it on demand.

² '... att det ej vore nyttigt att behålla denna kvarlefa från ett oordnadtt penningeväsen, att enkronerssedlarna, som i Sverige fullgöra skiljemyntets funktion, bidra att hos allmänheten bibehålla det föreställningssätt att sedeln är mynt,' (Registratur Rbnr 429. 20/2-1879 No 11 s.3.) Author's translation.

The underlining is in the original.

From the 1860s, taxes on note issuance started to be levied and in the 1870s legal steps were taken to further limit the possibility of issuing notes in the smallest denominations. Thus, the banking law of 1874 (SFS, 1874, p. 44) prepared for the above-mentioned raising of the minimum denomination for the ULB banknotes from 5 SEK (0.274 GBP) to 50 SEK (2.74 GBP), with the stated purpose of promoting the circulation of coins. In 1880 the 5 SEK ULB banknote was banned – to be effective from 1881 – making the 10 SEK (0.55 GBP) note the smallest denomination for the ULBs.³ To prepare for the impact of this limit to the ULBs' note issuance, the *Riksbank* instigated a special credit to be drawn upon by the ULBs (Ögren 2021). A solution that would be deployed again in relation to the complete ending of the ULBs note issuance in 1903.

As was the case in parliament, the members of the *Riksbank*'s board repeatedly viewed the ULBs' banknotes as sources of instability that, in addition, was constraining the possibility for the *Riksbank* to run monetary policy. They also emphasized the risk for the fixed exchange rate as the ULBs' note issuance, it was argued, ultimately was based on the *Riksbank*'s reserves (BaU 1840/41; Ögren, 2006, 2021; Registratur Rbnr 428. § 1; § 29 1873).

The discourse regarding regulations and risks in banking during the entire nineteenth century was thus preoccupied with the risks in relation to the note issuance. The focus on note issuance also had a large impact on the legal framework, which meant that the ULBs from the outset of the system had to publish their positions in relation to their note issuance and its backing. Legally, ULB notes had to be backed by *Riksbank* notes, certain

³ 'Banksedlar få enbart lyda å Femtio, Hundra, Femhundra och Tusen kronor samt tillsvidare och intill dess wi annorlunda förordne jemväl å Tio och Fem kronor.' SFS, 1874, §27 p. 44.

bonds deemed as secure and gold or silver. Before 1874, there was quite a large freedom on how the private banks backed their note issuance as, in addition to the other three assets, they could also include collaterals for granted credits, making it possible to adjust their note issuance after demand. After 1874 in relation to the adoption of the gold standard, *Riksbank* notes lost their status as legal backing; instead, the ULBs had to hold gold to at least 10 per cent of the equity capital to cover for their note issuance. In theory, this was meant to decouple the liabilities and thus the reserves of the *Riksbank* from the ULBs' note issuance. The practical result of this legal change was that the ULBs steadily kept their gold holdings at this 10 per cent limit. Also after 1874 *Riksbank* notes continued to be the item that the ULB banknotes were redeemed for and thus the main part of the reserves in practice. The implementation of the law of 1874 that denied the ULBs the possibility of counting *Riksbank* notes as formal backing for their note issuance was based on the idea that the ULB notes functioned like the *Riksbank* notes, as currency, and as such should be based on specie in order to increase financial stability and not burden the reserves of the *Riksbank* (Kenny and Ögren, 2021; Ögren 2006; 2021).⁴

If any bank had experienced a run on notes, the option clause included in the law of 1864 (SFS, 1864, p. 31) gave the banks the possibility to delay note redemption with up to six months (against 5 per cent interest), making notes a kind of time demand liability as well. Deposits were not considered risky and subsequently regulations only targeted how banks should back their issued notes and not their deposits. This despite the fact that demand deposits outgrew notes in the early 1860s and that the crisis in 1878/79 led to a run on deposits (not notes) at the *Stockholm Enskilda Bank* – an ULB but which chose to operate

⁴ As a consequence of the law of 1874, there were also demands in Parliament to make private banknotes legal tender, but this was never realized (see Ögren, 2006).

almost exclusively on deposits. This run was logical in the sense that *Stockholm Enskilda Bank* carried a comparably high portion of systemic risk in its portfolio in the form of private railroad bonds (Gasslander, 1956; Larsson and Lönnborg, 2014; Ögren, 2018). The special committee on banking that was instigated in 1881 as a result of this 1878/79 crisis, however, somehow reached the conclusion that the ULBs should be banned from issuing notes in order to increase banking stability (Bankkomitén, 1883). This 1881 special committee on banking is interesting as it presupposed that the *Riksbank* would take over the note issuance of the ULBs. From a stability point of view, it focused on the issue of how the *Riksbank* could secure the backing of these ULB notes that at present were not backed by the ULBs' gold reserves (Bankkomitén, 1883, pp. 263–4). Again, based on the idea that ULB notes and *Riksbank* notes were similar in the eyes of the liability holder, they were seen by policymakers as perfect substitutes in the sense that one could replace the other.

Despite the obvious similarities between notes and deposits in the 1878/79 crisis, deposits remained untouched by reserve requirements in regulations until the enactment of the extensive regulatory package in 1911 (SFS, 1911, p. 74), when note issuance by ULBs had already been abolished (Larsson, 2010; Ögren, 2021).

This line of argument that money (and credit) issued by the central bank and money (and credit) issued by commercial banks is the same goes hand in hand with more recent arguments to deprive banks of their possibility to create credit and thus to create money, such as in the Chicago plan revisited (Benes and Kumhof, 2012) and in 'Positive Money' (2021). But all these oppositions against banks' possibility to create credit and thus money fail to recognize the *different monetary hierarchies*, such as the different roles of bank money and base money in the economy (c.f. Bell, 2001; Goodhart, 1998; Knapp, 1924;

Trautwein, 2003). Based on the case of England, the ‘Positive Money’ movement argues that there is no such hierarchical distinction as there is no reserve or capital requirements for banks in the UK (Positive Money, 2021). Somewhat paradoxically, the same view of perfect substitution between central bank-issued versus commercial bank-issued money is found concerning banknotes in the monetarist based free-banking literature (Dowd, 1992; Selgin, 1988; Selgin and White, 1994; White, 1984, 1985, 1989). As seen above, this view that ‘money is money’ and hence all banknotes are the same regardless of the issuer was also dominant in the nineteenth-century monetary discourse in Sweden and elsewhere.

But that view is mixing up two different questions: one is about *legal* reserve demands and the other about reserve demands in *practice*, i.e. what practically is held as reserves in case a commercial bank liability holder wants to *redeem* the bank’s liabilities by withdrawing deposits or, historically, to redeem the banknotes. In short, the argument today from the Swedish central bank as well as BIS, BoE and ECB fall into the same trap as ‘Positive Money’ (2021) and the ‘Free Banking School’ when it does not take into account the role of the state and the hierarchies of money. What the hierarchy of money underlines is that all monetary liabilities of a central bank is base money, unlike the money created by commercial banks (c.f. Officer, 2002). And that these forms of credit and money, as similar as they may seem to the holder of these liabilities, are in fact not at all performing the same function in the monetary system.⁵

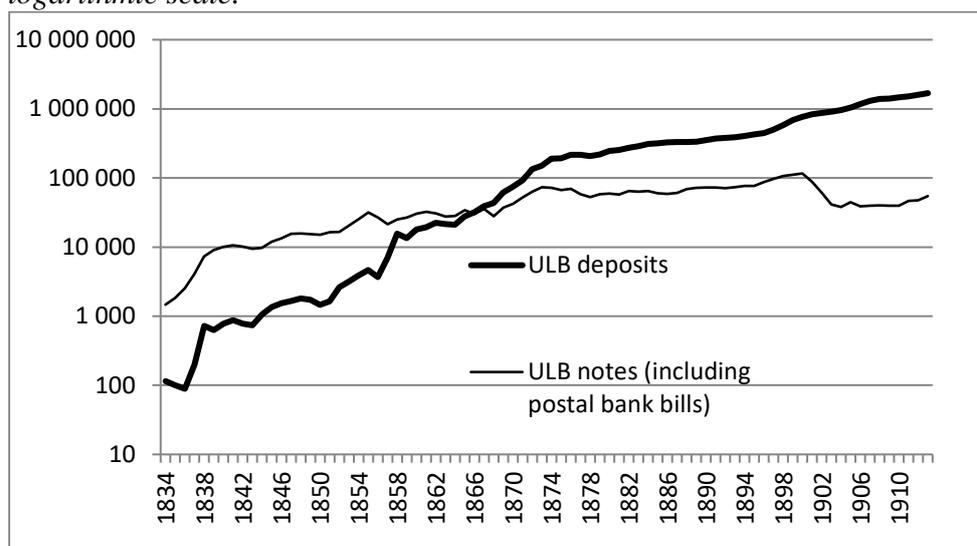
⁵ With regard to ‘Positive Money’ and the *Riksbank* (SvD 2019; 2021). It is also based on the questionable assumption that central bank-issued money and credit is stable, unlike what is the case for commercial bank issued money and credit. But as we know from uncountable historical episodes, as well as recent cases,

3. The hierarchy of money – banknotes in practice

With this focus on banknotes it may seem surprising that it was possible to end the ULBs' right to issue notes without it being a major problem for them and the credit system as a whole, especially as the peak of ULB note issuance in absolute terms occurred in the year 1900 – that is three years after the *Riksbank* Act of 1897 had declared that ULB notes should be out of circulation by the end of 1906 and no new notes could be issued after 1903. The answer as to why this was possible without any major disturbances for the ULBs is because this absolute increase in note issuance was not matched in relative terms. When this 1897 Act was instigated, notes were of marginal importance as a source of funds for the ULBs. As seen in Figure 1 below, deposits already surpassed notes as a source of public funds for the ULBs by the mid 1860s. Another public liability, so called 'postal bank bills', which were a kind of cashier's cheque and that, unlike the ULB notes, did not imply any reserve requirement, also continued to circulate to a large extent after the ending of the ULB notes.

over issuance of central bank credit and money in any form also leads to financial and monetary instability. Not least by upsurges in credit leading to high asset prices, bubbles, inflation, in some cases even hyper-inflation, and/or a rapidly falling exchange rate or even banking and/or currency crises (twin crises).

Figure 1: Deposits and notes issued by ULBs, 1834–1913 (1000's SEK). Semi-logarithmic scale.



Sources: Ögren, 2003; Sveriges Riksbank, 1931, pp. 172–85; Sammandrag af Bankernas Uppgifter, 1871–1911; Post and Inrikes Tidning 1835–1871.

Given the theoretical focus on the ULBs' note issuance, a common interpretation is that the transformation of the *Riksbank* to a central bank occurred with the implementation of the *Riksbank*'s note-issuing monopoly through the enactment of the 1897 law.⁶ The idea behind this interpretation is that the ULBs' note-issuing right prevented the *Riksbank* from running efficient monetary policy as the ULBs could undo it by using their own right to issue notes. In the free-banking literature, the fact that more ULB notes than *Riksbank* notes circulated among the public has been interpreted as meaning that the ULB notes were preferred by the market and thus were deemed as superior to the *Riksbank* notes (see Jonung, 1989; Schuler, 1992). But Ögren (2006) has shown, based on the balance sheets of the ULBs and LLBs, that the commercial banks sucked up the *Riksbank* notes and utilized them as reserves, thus in practice rendering them status as base money.

⁶ In the words of Sven Brisman: 'the great modernisation process of turning the *Riksbank* into a central bank was finally accomplished.' (1931, pp.193–196). In the history of the Bank of Sweden, the period 1897–1904 was labelled 'The Bank of Sweden as a Central Bank' (Simonsson, 1931).

ULB notes on the other hand were never held as reserves by other commercial banks. As a result, the *Riksbank* notes were not competing on an equal footing with the ULB notes as they fulfilled different functions; that is, as base money and bank money, respectively.

To test to what extent ULB note issuance was based on holding *Riksbank* notes as reserves, we make two basic ordinary least squares (OLS) regressions (summarized in Table 1 below).

- (i) $\ln\Delta(ISSULBNOTES)_t = c + \ln\Delta\beta(RESRBNOTES)_t + \ln\Delta\beta(GDP)_t + \ln\Delta\beta(CPI)_t + \varepsilon_t$
- (ii) $\ln\Delta(ISSULBNOTES) = c + \ln\Delta\beta(RESRBNOTES)_t + \ln\Delta\beta(RESGOLD)_t + \varepsilon_t$

The first regression (i) tests the correlation between the logarithmic changes in ULBs' holdings of *Riksbank* notes (*RESRBNOTES*) and the ULBs' issuance of notes (*ISSULBNOTES*) controlling for logarithmic changes in GDP and inflation (consumer price indices, CPI). This is based on annual data and we test three periods, the full period of note issuance 1835–1900, the silver standard period 1835–1873 and the gold standard period 1874–1900 (see Equations 1–3 in Table 1). The reason for this periodization is, however, tied to regulatory changes concerning the ULBs' note issuance, as the implementation of the gold standard increased the transaction costs for the ULBs by demanding that they should hold at least 10 per cent of their equity capital in gold to be allowed to issue notes at the same time as *Riksbank* notes lost their status as legal reserve coverage for ULB note issuance (Kenny and Ögren, 2021; Ögren, 2021).

The second regression (ii) is because we have monthly data on the monetary and banking variables from 1878 when all ULBs were subject to the law of 1874, which declared that ULBs officially could not base their note issuance on *Riksbank* notes (Equation 4 in Table

1). Hence, we are testing the correlation between the logarithmic changes of ULB holdings of *Riksbank* notes (*RESRBNOTES*) as well as their gold holdings (*RESGOLD*) and the ULBs' issuance of notes (*ISSULBNOTES*) for the period 1874–1900 using this monthly data.

Table 1: OLS regressions on the determinants of ULBs' note issuance (dependent variable). Variables in logarithmic changes

Dependent variable: Enskilda Bank Note Issuance DLOG(ISSULBNOTES)	Eq. 1: annual data 1835 1900 (66 obs.) Silver and Gold standards		Eq 2: annual data 1835 1873 (39 obs.) Silver standard		Eq. 3 annual data 1874 1900 (27 obs) Gold standard		Eq. 4: monthly data 1878 1900 (275 obs.) Gold standard	
Independent Variables	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.	Coeff.	Prob.
C	0.03	0.10	0.03	0.28	-0.00	0.82	0.00	0.59
DLOG(RESRBNOTES)	0.38	0.00	0.48	0.00	0.05	0.29	0.06	0.00
DLOG(RESGOLD)	NA	NA	NA	NA	NA	NA	0.14	0.48
DLOG(GDP)	0.69	0.11	0.88	0.14	0.44	0.27		
DLOG(CPI)	-0.08	0.81	0.05	0.92	-0.79	0.01		
R-sq.	0.45		0.55		0.40		0.03	
Ad.R-sq.	0.42		0.51		0.32		0.03	

Sources: Ögren, 2006; Edvinsson and Söderberg, 2012; Krantz and Schön, 2012.

As seen in the results of the regressions that are summarized in Table 1 above, even if there were other factors influencing the ULBs' note issuance, the part of the reserves that was the practical basis of the ULB notes was *Riksbank* notes, and not gold. As the sign of the coefficient for issued *Riksbank* notes is positive, the ULBs did not sterilize the effect of the *Riksbank* note issuance – if anything they served to amplify it through the money multiplier. Thus, the practice and the theory on which the law of 1874 was based were in clear conflict – the note holders were not interested in exchanging the ULB notes for gold, either in the form of bullion or as coins. They were, as is the case today, happy to utilize

bank money for their transactions. And the fact is that, from their beginning in 1831, the ULBs had had the possibility to base their note issuance on specie but that was never practiced by the banks nor demanded by the note holders (Ögren, 2006, 2021).

An important feature of the Swedish system with private note-issuing banks was that the notes circulated at par value, thus there was no discount on the market between different ULB notes or between ULB notes and *Riksbank* notes. This is in line with the argument that the ULB notes were endogenous bank money based on *Riksbank* notes, just as was the case with private bank deposits – and which is also the case today (see for instance Lukas and Feund, 2019).

4. Policy responses to the ending of the ULBs' note issuance

Even before the the *Riksbank* law of 1897 granted the *Riksbank* monopoly on note issuance, the focus on ending the ULB notes had led to propositions to increase the *Riksbank*'s possibility to issue notes above its specie holdings. The above-mentioned 1881 special committee on banking assumed that the *Riksbank* successively would take over the ULBs' note issuance and thus proposed a new more generous legislation concerning the *Riksbank*'s possibilities to issue notes besides its specie holdings to facilitate the *Riksbank* to do so. In 1887 Parliament granted the *Riksbank* the right to issue notes also based on domestic assets such as bonds and bills of exchanges up to 35 MSEK. With the *Riksbank* law of 1897 it was deemed necessary to further increase this contingency part of the *Riksbank*'s monetary liabilities as '*all note issuance was transferred to the Riksbank*' (SOU, 1955, p.14). The contingency part was thus raised from 45 MSEK to 100 MSEK to make this transfer of note issuance possible and included as legal backing was a credit offered to the ULBs by the *Riksbank* to promote this transfer. This way the *Riksbank* could directly monetize the credit it offered to the ULBs to cover

for their lost note-issuing right. The logic was that as more *Riksbank* notes now would circulate as liquidity instead of being redeemed, lower reserve coverage was not necessarily the same as increased pressure on the *Riksbank*'s reserves. In 1901 the law was amended to encourage the ULBs to end their note issuance before the end of 1903, with more generous loan conditions and further increase in the *Riksbank*'s possibility to issue notes besides its specie holdings (Davidsson, 1903; SOU, 1955, pp. 12–16).

The response by policymakers and representatives of the *Riksbank* to the decision to end the ULBs' note issuance was thus a direct result of the theoretical view that *Riksbank* notes and ULB notes were on the same hierarchical level, i.e. performed the same monetary function. The *Riksbank* acted on this expected effect the withdrawal of ULB notes would have on the demand for liquidity, and in extension, on economic activity. As a first step, the volume of ULB notes circulating in different denominations was estimated by the *Riksbank*, with the outspoken need for the *Riksbank* to replace these ULB notes on a one-to-one basis to avoid the gap of liquidity in notes that was feared due to the ending of the ULB notes.

Figure 2: The Riksbank's calculation in 1897 of the average number and amount of notes issued by the ULBs for the two most recent years (1895–1896).

1897 den 22 Juli

489

Kommers antaglygen till succer.
not stöpa

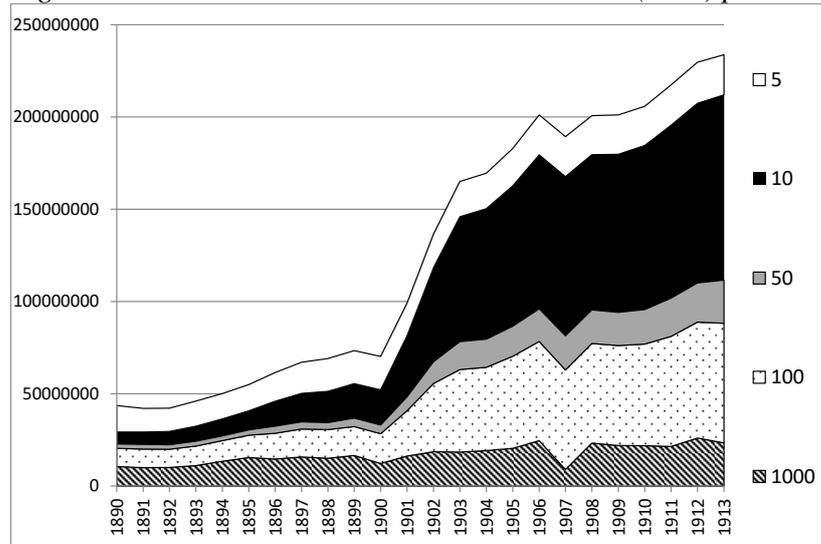
1895	Sällerbanks noter		Sällerbanks noter	
	Santal	Belopp	Santal	Belopp
100	16800	1680000	4176	417600
50	66300	6630000	58788	5878800
10	46000	4600000	30338	3033800
5	684000	6840000	608700	6087000
<i>Summa</i>	275000	2750000	301360	3013600
<i>1896</i>			7527	752700
100	101100	10110000	57586	5758600
50	112800	11280000	79858	7985800
10	150800	15080000	803570	8035700
5	466800	46680000	3018570	30185700
<i>Summa</i>	460000	46000000	3018570	30185700
<i>1895</i>			7101	710100
100	65300	6530000	40654	4065400
50	57500	5750000	29401	2940100
10			440500	4405000
5	490000	49000000	1576300	15763000
<i>Summa</i>	2578500	257850000	2088350	208835000

Tid beräkning af medeltal för
50 stycken fridlösa noter af 10 och 5
kronor vald 8 mån
av 10 kronor noter samt utsläppta till försäljning
5

Source: RbProt, 1897, July 22 §11 p. 489.

Moreover, a big inquiry was launched into what extent the manufacturer of the Bank of Sweden notes, *Tumba bruk*, could manage to print all the notes the *Riksbank* needed to replace the ULB notes in circulation (RbProt, 1897, July 22 §11 pp. 487–495). The printing capacity became an issue as more than half of the amount of ULB notes in circulation was issued in the lowest legally admitted denomination, that of 10 SEK (0.55 GBP). As seen in Figure 3 below, the *Riksbank* also provided this money, not least through the ULBs that were given generous credit lines to cover for their loss of note-issuing right. To deploy this credit line, however, the ULBs had to ask for *Riksbank* notes to replace the notes the ULBs had circulated before, that is mainly in small denominations (10 SEK). We see this in the development of the *Riksbank*'s issued notes where the by far largest increase in issuance after 1900 was in the *Riksbank*'s 10 SEK notes, not only in number of notes but also in total amount.

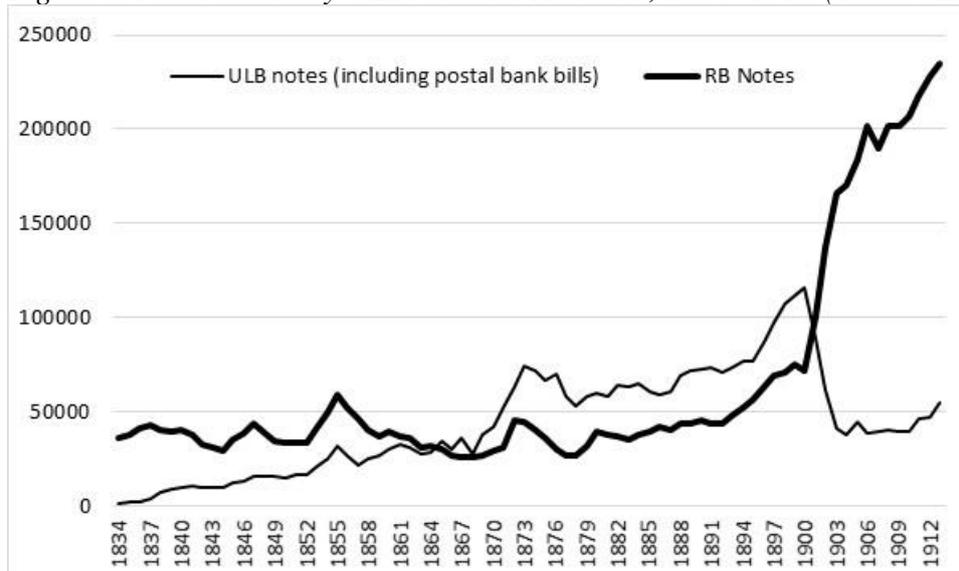
Figure 3: The Riksbank's note issuance in value (SEK) per denomination 1890–1913.



Source: Sveriges Riksbank (1931).

As a result of the ending of the ULBs' note issuance, the *Riksbank* increased its note issuance rapidly (see Figure 4 below). During the years 1900 to 1906 it almost tripled the amount of base money driven by this idea that it needed to replace the private ULB notes in order to avoid liquidity shortage. This increase in base money was an important reason why the commercial banking system (ULBs and LLBs) continued to expand. The international 1907 crisis led to a temporary halt in this expansion as the commercial banks (ULBs and LLBs) were forced to a sudden stop in this expansion as the *Riksbank*, even if it increased its discounting activities, refused to take on the role of Lender of Last Resort. Estimates have shown that 20 per cent of all commercial banks were distressed during this crisis and another five per cent were liquidated (Grodecka-Messi, Kenny, & Ögren, 2021). From 1910 the *Riksbank's* supply of base money continued to increase, although at a slower pace.

Figure 4: Notes issued by ULBs and the Riksbank, 1834–1913 (1000s SEK).



Sources: Ögren 2003; Sveriges Riksbank 1931, pp. 172–185; Sammandrag af Bankernas Uppgifter 1871–1911; Post and Inrikes Tidning 1835–1871.

Figure 4 shows how the replacement of the ULB notes as bank money led to a clear structural break in the form of an upsurge in *Riksbank* notes from less than 60 MSEK in 1901 to 200 MSEK in 1906. As seen below, this base money expansion had several direct consequences as it not only weakened the *Riksbank*'s balance sheet, it also helped to push the credit expansion among the commercial banks (ULBs and LLBs) adding to the severity of the 1907 crisis.

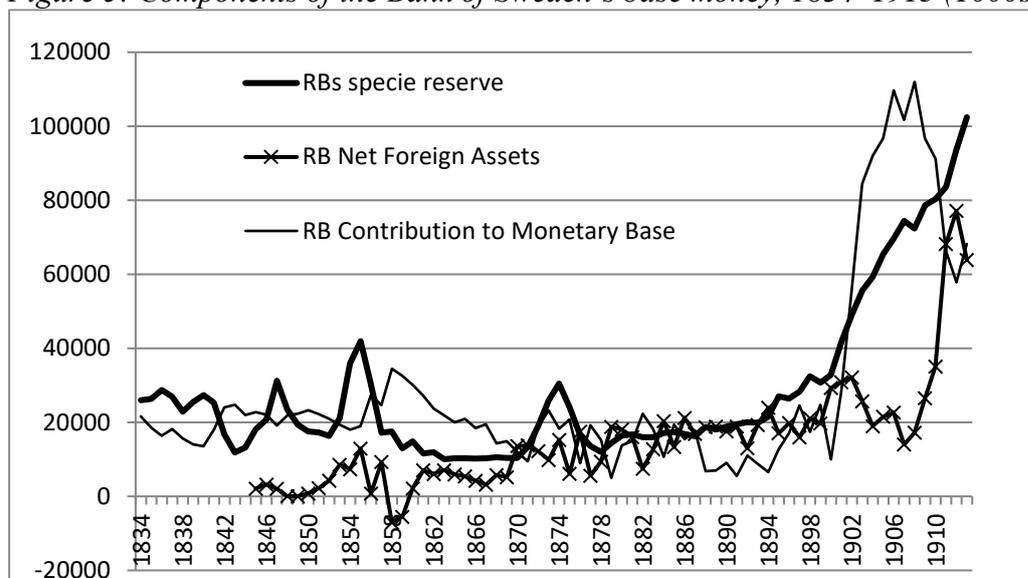
5. The consequences of replacing bank money with base money

5.1 Foreign debt, reserves and the base money expansion

Given the gold standard, the *Riksbank* was limited in its ability to create base money, or at least should have been. By looking at the different components of the base money issued by the bank, we can see how they chose to fund this increase in base money issuance. As seen in Figure 5, from 1900 until 1907 the most important part of the base money expansion was done by the *Riksbank* simply increasing its fiduciary issue, i.e. its contribution to the monetary base without increasing reserves to cover – weakening its balance sheet. In addition to this, from the year 1900 the *Riksbank* also filled up its specie

reserves, which during the crisis years from 1907 until 1911 was complemented with a sharp increase in the *Riksbank's* net foreign assets. When these net foreign assets again decreased this was met by another increase in the bank's contribution to the monetary base.

Figure 5: Components of the Bank of Sweden's base money, 1834–1913 (1000s SEK).

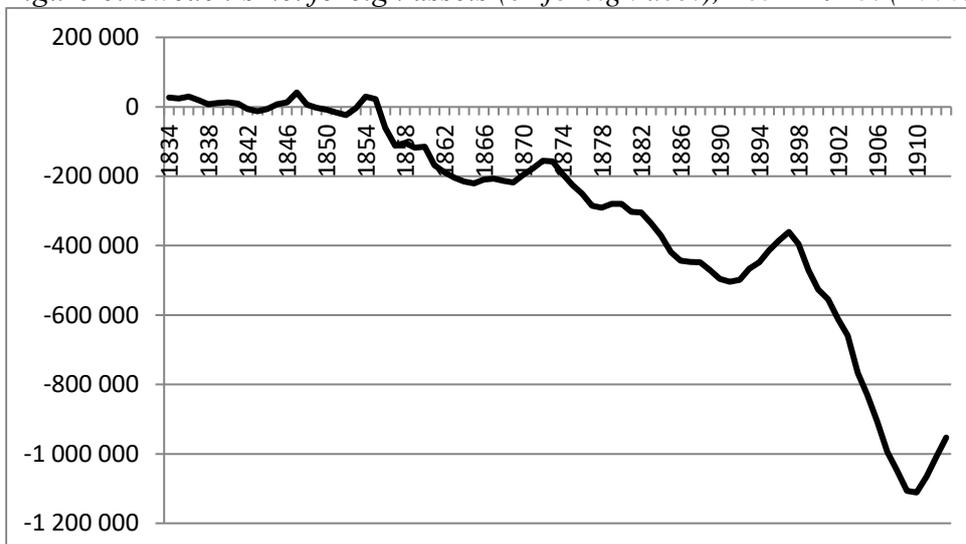


Sources: Ögren, 2003; Sveriges Riksbank, 1931.

As there was a steady increase in the *Riksbank's* specie reserves, in addition to the sharp increase in the net foreign assets, this covered to some extent the base money expansion. An issue related to the *Riksbank's* policy to increase the base money supply is how this development was funded. In Figure 6 below, we see that the foreign debt rose with a remarkable speed from the year 1898 – thus the increase in specie reserves and net foreign assets were the results of the increased foreign debt and not funded by positive current account balances. The policy to increase base money issuance by 400 per cent from 1900 until 1913 was thus covered by weakening the central bank's balance sheet by a massive

increase in the *Riksbank*'s unbacked liabilities coupled with a large increase in foreign debt.⁷

Figure 6: Sweden's net foreign assets (or foreign debt), 1834–1913. (1000s SEK).



Sources: Based on calculations from Schön (1999), Ögren (2012).

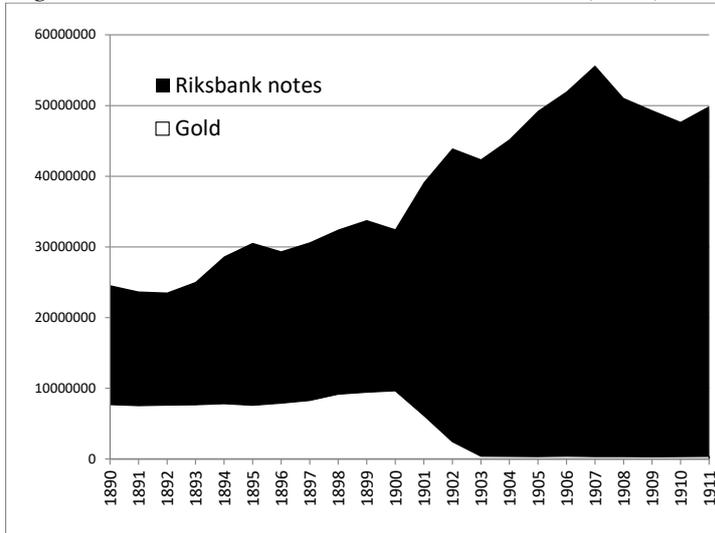
5.2 The effect of the 1897 Act on the banking system

The ending of the ULBs right to issue notes meant a de facto ending of the reserve requirements for these banks as it was tied to their note issuance. Most importantly for the ULBs was the possibility to get rid of their costly gold holdings that did not yield any pay-off and was not demanded by the holders of ULB liabilities as reserves. As a result, the ULBs quickly replaced these gold holdings with *Riksbank* notes, diminishing from a

⁷ The total Swedish foreign debt (FD) is calculated as the sum of the annual current account (CA) plus the changes in the foreign exchange reserves (ΔFE), i.e. the reserves of the *Riksbank* from the year 1834 when the silver standard was established until 1913. What has not been covered by changes in the foreign exchange reserves by definition must be covered by imported (or exported) capital. This can be written as the following equation: $FD = \sum_{t=1834}^{1913} (CA_t + \Delta FE_t)$.

total of around 9.5 MSEK in 1900 to 0.25 MSEK in 1903 (see Kenny and Ögren, 2021; Ögren, 2021). The main buyer of this gold was the *Riksbank*, which in this way could directly swap issued notes as liabilities for gold holdings as assets.

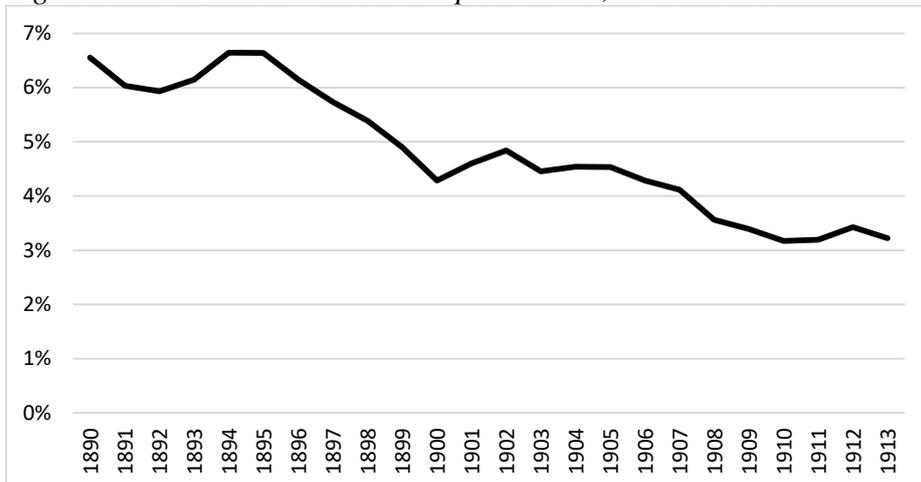
Figure 7: ULB reserves in absolute amounts (SEK) 1890–1911.



Source: Sammandrag af Bankernas Uppgifter 1890–1911.

Figure 8 below also underlines that this increased access to base money for the ULBs was not sterilized by the ULBs in the sense that it increased the reserve holdings in relation to the ULBs' public liabilities (notes and deposits). Besides a small increase in this ratio between the years 1900 until 1902, the reserve coverage was back at the level of 1900 in the year 1905 and the general trend thereafter was a falling reserve coverage.

Figure 8: The ULBs reserves-to-deposits ratio, 1890–1913.



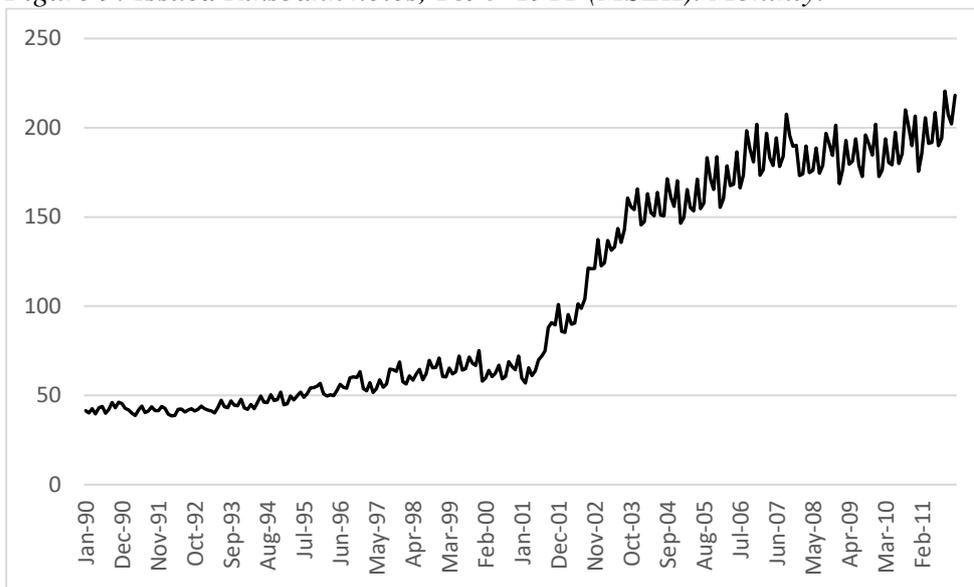
Source: Sammandrag af Bankernas Uppgifter, 1890–1911.

Before the implementation of the 1897 *Riksbank* Act, the ULBs had been forced to hold costly reserves tied to their note issuance. This differed from the non-note issuing LLBs that operated solely with deposits. When these transaction costs were lifted from the ULBs it meant that the ULBs should compete with the LLBs on an equal footing, i.e. without any legal reserve requirements (Kenny and Ögren, 2021). This change came at a time when the commercial banking system was expanding rapidly. From 1895 to the 1907 crisis the number of commercial banks increased from 43 to 83; none of these new banks were established as ULBs, and the expanding banking system meant a fierce competition for market shares among all banks (Grodecka-Messi, Kenny and Ögren, 2021; Söderlund 1964). The dramatic increase in base money through the *Riksbank*'s note issuance in order to replace ULB notes helped fuel the flames of this expansion in accordance with Minsky's crisis anatomy (Kindleberger, 2005).

To sort out the effects of the increased issuance of base money by the *Riksbank* that was a result of the enactment of the law of 1897, we estimate the money multiplier. This identity is usually related to a fractional banking system with a stipulated legal reserve requirement. We argue, however, that because of the *different hierarchies of money* the money multiplier is indeed in effect in practice even if there are no legal reserve requirements. This was the case for the Swedish commercial banks after the ending of the ULBs' note issuance until the enactment of the 1911 law when a capital requirement for deposits was introduced (Larsson, 2010; Ögren 2021). In accordance with the endogenous money approach, the process starts with the creation of bank loans, which in turn means

that the bank also issues deposits (McLeay, Radia, and Thomas 2014).⁸ After a while, however, the need to be able to redeem the issued deposits will make banks hoard central bank-issued money (claims on the central bank) as practical reserves – in this specific case, *Riksbank* notes and deposits at the *Riksbank*. By focusing on the practical reserves, we can compare the period with a stipulated reserve requirement for the ULBs with the period after, i.e. before and after the ending of the ULBs’ note-issuing right.

Figure 9: Issued Riksbank notes, 1890–1911 (MSEK). Monthly.



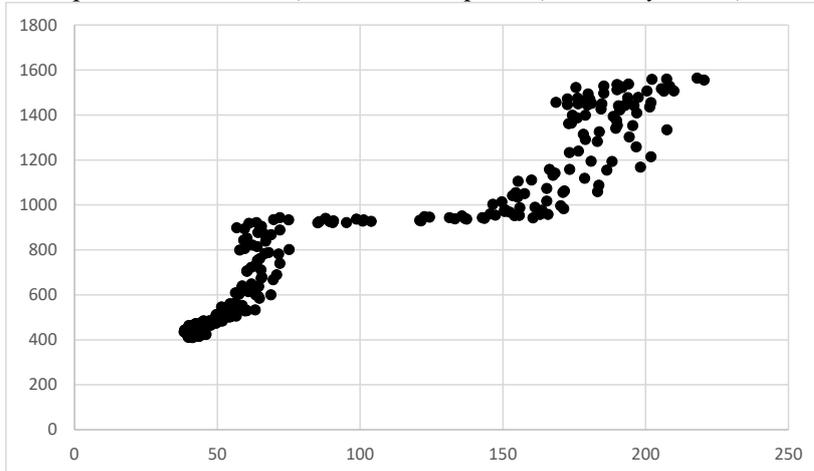
Source: Sammandrag af bankernas Uppgifter, 1890–1911.

Figure 9 shows the monthly amount of base money issued as *Riksbank* notes from January 1890 until December 1911. The structural break in issuance takes place in

⁸ The term ‘modern’ implies that this would be specific for monetary systems today. Historical monetary records from vastly different economies, however, underlines that monetary systems have worked in the same manner since at least the Middle Ages and probably before this. Whatever monetary theory postulates, the empirical record shows that credit instruments have always constituted the bulk of transactions by the use of bills of exchange, commercial bills, promissory notes, assignats and all kinds of IOUs (more or less formally issued).

August/September 1901 when the *Riksbank's* note issuance increased from 75 to 88 MSEK and then kept on rising until September 1903 when it reached 160 MSEK. The increase after this shift in base money issuance continued but at a slower pace until the 1907 crisis. The question is how this sudden increase in base money affected the commercial banks. By looking at the correlations between issued *Riksbank* notes with issued commercial bank public liabilities (notes and deposits), as well as with total commercial bank credit, we can follow the effects of this policy.

Figure 10: Monthly data on issued *Riksbank* notes on the x-axis to issued commercial bank public liabilities (notes and deposits) on the y-axis (MSEK), 1890–1911.



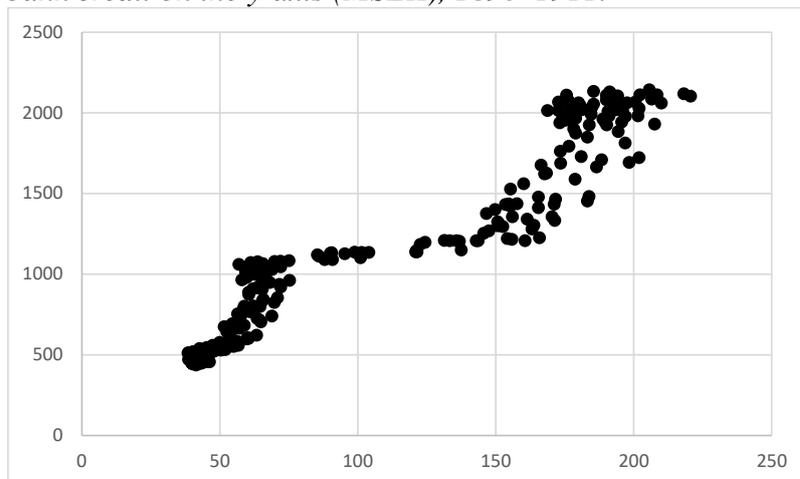
Source: Sammandrag af bankernas Uppgifter, 1890–1911.

In Figure 10 we see the amount of *Riksbank* notes on the x-axis and the amount of public liabilities (notes and deposits) issued by the commercial banks (ULBs + LLBs) on the y-axis. From 40 to 75 MSEK of *Riksbank* notes there is a strong positive correlation between the *Riksbank* issued base money and the commercial banks' issued public liabilities. But between 75 and 150 MSEK in issued *Riksbank* notes there is more or less no correlation at all. Above 150 MSEK in issued *Riksbank* notes, there is again a positive correlation. This shows that this rapid base money increase by the *Riksbank* to replace the ULB notes from 1901 to 1903 was not called for, or at least that it was not endogenously created by being demanded by the banks. It took the commercial banks time to adjust to

this shift in the access of base money that was exogenously forced upon the banks within these two years. Coming out of this period, in late 1903, the amounts of base money as well as issued commercial bank liabilities (now only deposits) had shifted to a much higher level than before.

The same pattern is visible for the correlation between *Riksbank* notes and commercial bank lending (Figure 11 below). The issued *Riksbank* notes, base money, that was meant to replace the ULB notes, bank money, in circulation, ended up in the commercial banks as reserves. Clearly, again, the increase in base money from 75 to 150 MSEK, or rather between 1900 and 1903, was not part of an endogenous credit and money creating process as it took time before it spurred further bank money and credit creation.

Figure 11: Monthly data on issued *Riksbank* notes on the x-axis to issued commercial bank credit on the y-axis (MSEK), 1890–1911.



Source: Sammandrag af bankernas Uppgifter, 1890–1911.

Given this, the question is the mechanism by which the exogenous flood of base money was put into the economy to eventually serve as base money, i.e. bank reserves. There were two factors behind this: First, remember that the ULBs were entitled to an interest free credit line with the *Riksbank* provided that they deployed it by demanding small denomination *Riksbank* notes. Because of this, representatives of ULBs demanded that the *Riksbank* supplied notes in small denominations to meet this expected demand in line

with the *Riksbank's* idea. Newspaper articles bear testimony to how expectations on public demand for small denomination *Riksbank* notes for liquidity purposes made those responsible for the ULBs order massive amounts of small denomination notes (Dalpilen, 1901; Folkets Tidning, 1901; Södertälje Tidning, 1901). Second, also recall that this took place during a boom in bank establishments. The number of commercial banks rose from 43 in 1895 to 67 in 1901 and peaked at 83 in 1907. This means that a large part of the commercial banking system consisted of recently established banks. None of these banks had been established as ULBs. That the demand for reserves mainly came from the non-note issuing LLBs also explains why it took time for the claims on the central bank in the form of *Riksbank* notes to be deployed as reserves. In short ULBs had longer history and were generally competing less for market shares than the more recently established LLBs – something that became visible in the 1907 crisis when ULBs in general had less leverage than LLBs (Grodecka-Messi, Kenny & Ögren 2021). With an increase in reserve holdings and an increase in the number of commercial banks it is likely that a Minsky scenario with decreasing debt quality (Kindleberger, 2005) took place in the competition for market shares among the banks – especially among the more recently established LLBs.

The immediate conclusion is that the sudden increase in the supply of base money in relation to the ending of the private banks' note issuance was not demanded by the ULBs as reserves nor by the public to be held as liquidity. But after a while, this domestic 'capital bonanza' – to borrow a term from Reinhart and Rogoff (2011) – in access to base money served to increase the money supply and the amount of bank credit many times over. It is likely that this affected the banks' leverage when entering into the international 1907 crisis when 20 per cent of all banks came under distress and another 5 per cent were liquidated due to the crisis. Had the policymakers understood the hierarchical difference

between central bank-issued money and commercial bank-issued money it is possible that this boom would have been milder and the crisis less severe.

Conclusions

Based on these more recent technological advancements, a common theme among many central banks today is to start issuing a Central Bank Digital Currency (CBDC). This may seem puzzling as by far the largest part of the money issued by central banks is already issued digitally as transfers or drawing rights for banks and firms. Still, the bulk of the broad money supply consists of commercial bank-issued money. The arguments for the CBDCs are vague but a common theme is that they as central bank money are more secure than commercial bank money and other assets especially cryptoassets, and that this may provide financial stability.

Those arguments are, however, not based on empirical observations but on theoretically based assumptions about the functioning of the monetary system. The problem is that these assumptions are flawed as they assume that money issued by the central bank and by the commercial banks is a more or less perfect substitute in the economy and thus that central bank-issued money can replace commercial bank-issued money (or other private actors as different forms of cryptoassets) without problems; in short, it does not take into account the fact that there is a hierarchical difference between money issued by the monetary authority and private commercial banks. In particular, the fact that, unlike commercial bank issued money, central bank-issued money is potential bank reserves, is not considered.

In this paper we studied a similar historical episode, when the Swedish central bank replaced the notes issued by the private unlimited liability banks (ULBs) at the beginning of the twentieth century. Not understanding the different functions of central bank- and

commercial bank-issued money, the policy of the central bank was to replace circulating ULB notes in order to keep up liquidity. This policy made the central bank almost triple the amount of base money between the year 1901 and 1903, and quadruple it from the period 1901 until the 1907 crisis broke out. This central bank-issued money, however, as potential bank reserves ended up in the reserves of the commercial banks. Hence commercial bank credit effectively tripled from 1901 until 1907. This rapid surge in commercial bank credit was a result of the policy to replace commercial bank-issued money with central bank-issued money, or in other words to replace bank money with base money. Had this attempt to replace commercial bank-issued money not have been made, the 1907 crisis – when 20 per cent of all commercial banks fell into distress and another five per cent were forced to liquidate – would probably have been less severe.

We all know the power of theories in policy making and that decisions and policies that are based on a theoretical conception that is not backed up by empirics often leads to unintended and negative consequences, or in the famous wording of Keynes: *“The ideas of economists and political philosophers, both when they are right and when they are wrong, are more powerful than is commonly understood. Indeed the world is ruled by little else.”* (Keynes (1936) [2007], pp. 383-4). Thus, the most important policy lesson for CBDCs from this experience of replacing endogenously created bank money with base money is that once issued, a claim on the central bank per definition is ‘potential bank reserves’ and may well come to serve as such, regardless of the intention of the monetary authority.

Another outcome of this policy decision to replace bank money with base money in this historical context was related to the gold standard as a monetary regime based on fixed exchange rates. As a result, the central bank drastically deteriorated its balance sheet and

then increased the foreign debt as capital was imported to fill up its reserves. In a scenario with a floating exchange rate it will probably to a larger extent be funded by a deteriorated balance sheet for the central bank.

Conflicts of interest

The author declares none.

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