SSE/EFI Working Paper Series in Economics and Finance, No 613
November, 2005

The Provision of Liquidity in the Swedish Note-Banking System*

Per Hortlund*

The working of the"asset currency" provided by the Swedish note banking system in 1878–1901 is described. Natural and institutional conditions caused the demand for currency to peak in March and September, with troughs in July and January. The paper investigates how the Enskilda banks provided liquidity to solve the problem. This is done by describing how the volume of notes varied over the year, and how other balance sheet items co-moved with them. Strong seasonal co-variation is found particularly between lending and foreign payments media, varying like communicating vessels over the sailing season in May–October (when the sea was ice free and shipments were made).

Keywords: Free banking, Elastic currency, Asset currency, Clearing mechanism, Note competition, Needs of trade, Lender of last resort, Sailing season.
JEL codes: G21 N13 N23

---

* Financial support from the Bank of Sweden and the Earhart Foundation is gratefully acknowledged. I have benefited from comments by Magnus Henrekson, Mikael Stenkula, Daniel Waldenström, Eugene N. White, and seminar participants at the Stockholm School of Economics and the Bank of Sweden.
* Stockholm School of Economics; and The Ratio Institute, P. O. Box 5095, SE-102 42 Stockholm, Sweden. Tel: +46 8 587 05 406. E-mail: per.hortlund@ratio.se.

1 Introduction

Modern central banks largely emerged as a means to provide liquidity in times of crises. In the 19th century liquidity crises were common, with bank runs and panics. Received wisdom holds that they ended when central banks acting as lenders of last resort were set up. Yet it can be argued that the crises were actually caused by legal restrictions that hindered banks from responding to increased demands for currency – if the restrictions had not been there in the first place there would have been no need for a lender of last resort.

Liquidity crises were most famously a problem in England and in the United States. In England, the Peel's Act imposed a 100 percent marginal gold reserve requirement on Bank of England notes, which created an inelastic note stock unable to accommodate increased demands for currency in 1847, 1857 and 1866, when runs and panics occurred. From these events the Bank of England eventually evolved into becoming a central bank-lender of last resort, in the spirit of Bagehot (1873). Likewise, in the United States the 110 percent bond collateral requirement on National Bank notes created an inelastic note stock unable to meet peak demands for currency, for example in the falls during "crop moving season". The Federal Reserve System was created in 1913 with the set purpose to "furnish an elastic currency" (Miron 1986). In particular, the new central bank was expected to provide much needed "form-seasonal" elasticity to the money stock, that is, a money stock that was able to change form seasonally (from deposits into notes), particularly in the month of October (Timberlake 1993, p. 254).

In the United States some reformers pushed for what they called an asset currency (Selgin and White 1994). To provide an elastic currency, the National Banks should be allowed to back their notes with any assets they saw fit. Asset currency reformers looked to Canada as the model to emulate. Canadian banks did not suffer from runs and panics. Since Canadian banks were not subject to binding legal restrictions, they could expand and contract their note issues with the "needs of trade", particularly in October.

Since central banks were largely set up to provide liquidity in times of need, the alternative – unrestricted note banking systems able to provide "asset currencies" – should be of interest. The last two decades have seen an increased interest in the experience of "free banking". Banks in these systems did not face binding legal restrictions on entry, size and branching, and particularly on their issuing of notes. The new research has modified the previously negative assessments of competitive note banking regimes. Dowd (1992) documents about sixty instances of free banking. Most of them occurred in the British dominions. Many other countries, for example Belgium, France, Italy, Spain and Germany, had experience with free banking in the nineteenth century, but during relatively brief periods of time. In view of the combination of country size, freedom of systems, and length of experience, the most important instances were arguably Scotland, Canada and Sweden. However, until now there are no quantitative studies of how these historical "asset currencies" really worked. That is: how exactly were the banks able to provide liquidity and accommodate the "needs of trade"? Selgin and White (1994) show how elastic the Canadian note stock was in contrast to the rigid American one,

but do not cover what happened with the rest of the balance sheet. Scottish free banking ended already in 1845 – finding good bank data for the Scottish free banking period may be difficult.

Therefore the Swedish experience is of interest. Between 1831 and 1904, commercial banks called Enskilda banks issued notes. About twenty-five Enskilda banks competed with the Bank of Sweden, until this bank gained a note monopoly in 1901–1904. From 1878 monthly data from the banks' balance sheets have been collected, with detailed information on balance sheet items. The purpose of this paper is to use this data to provide a quantitative examination of the workings of the asset currency provided by the Swedish note banking system in 1880–1901.[1] The focal question is this:

> What was the liquidity problem of the Swedish economy in the late 19th century, and how did the Enskilda banks act in order to solve it?

The answer is given by investigating the seasonal variation in the stock of bank notes, and how other balance sheet items co-moved with them.

The monthly data used have previously not been presented. To my knowledge this is the first quantitative exami-

[1] Although much research has been done on Swedish banking in the nineteenth century, not much has been done from the free banking perspective. Jonung (1989) and Lakomaa (2004) give comprehensive accounts of the free banking question in Sweden 1830–1903, with focus on the institutional setup and the debates. Ögren (2003) investigates long run trends in money and credit supply during the whole period with note issuing banks 1834-1913, but does not address the elasticity question.

nation of the inner workings behind the (seasonal) provision of liquidity in an unrestricted note banking system. Ögren (2003) also studies the provision of liquidity in the Swedish note banking system in the 19th century, but with end-of-year data, and with focus on long-term trends.

2 Preliminaries

This section reviews three preliminary issues. First, the liquidity problem faced by the Swedish economy in late 19th century is addressed. Second, the institutional background is reviewed. Third, the methodology used to estimate seasonal variation is discussed.

2.1 The liquidity problem

In the 19th century, the annual variations in the demand for currency were larger than they are today. Currency was the dominant medium of payment. Transactions were concentrated to specific times of the year, when currency demand peaked. Two great peaks were set by the forces of nature. Like in other countries, most people worked in agriculture, and payment media were needed during "crop-moving season", in harvest-time, in September–October. Then there were the needs of industry and forestry, which were constrained by "the sailing season". Because the sea was frozen, there was no shipping of goods in the winter period. The sailing season, when the sea was open and exports and imports were made, lasted from May to October. This condition created a liquidity problem for the exporting industry, since they could not receive payment for their products before the sailing season started, but nevertheless would have to pay

for inputs. André Oscar Wallenberg, the founder of the Stockholms Enskilda Bank, the most important note-issuing commercial bank, wrote that

> Twice a year the quantity of outstanding notes rise, namely in September–October, when they reach their maximum, due to the needs of agriculture for transactions media to pay for the costs of gathering the harvest, and in March, when the last debentures are extended to the industry before shipment starts. Minimum occurs in July, before harvest. (Wallenberg 1886, p. 25)

In addition to the nature-generated seasonal effects on currency demand, there were those generated by institutional conditions. Traditionally, the "legal moving days" (*lagliga fardagar*) were days when many contracts were made and paid. The legal moving day for land leases (*jordarrenden*) was the 14th of March. Rental contracts expired on the 1st of April and on the 1st of October. The moving day for servants was the 24th of October, and in Stockholm also the 24th of April. Taxes were paid in June and December. Many companies also paid dividends in June and December.

2.2 Institutional background

Two types of banks issued bank notes. *Enskilda banks* (Private banks) were chartered commercial banks with unlimited liability. *The Bank of Sweden* was the bank of the parliament, which also acted as a commercial bank. The constitution of 1809 granted legal tender status to the notes of the Bank of Sweden. In addition, the commercial banking system was

comprised of the *Aktiebolagsbanker* (Joint Stock banks), which had limited liability but did not issue notes.

The Enskilda banks were regulated by *the Bank Law of 1874.* The law stated cash and capital requirements that were linked to the note-issuing rights. To be allowed to issue notes, an Enskilda bank had to hold gold reserves amounting to at least 10 percent of paid-in capital. Enskilda bank notes were to be redeemed into gold coin only. Outstanding notes could not exceed the sum of the bank's holdings of: Collateral for equity; Claims up to fifty percent of paid-in capital; and Gold exceeding ten percent of paid-in capital (SFS 74:44).

In addition to the quantitative rules, the Enskilda banks faced other restrictions. From 1880 Enskilda banks were not allowed to issue five-crown notes, which became a monopoly of the Bank of Sweden. This restriction was important, since small notes were more popular and circulated longer. The loss of the five-crown notes was partly compensated by an increased circulation of ten-crown notes. Wallenberg (1886, p. 19) claims that the Enskilda banks were able to compensate two thirds of their loss of five-crown notes by issuing ten-crown notes. Another restriction was that the Enskilda bank notes were taxed by 0.5 percent, calculated on the highest circulation during the year.

The note-issuing right of the Bank of Sweden was simpler. The bank was allowed to issue notes up to its reserves (specie + foreign exchange) plus a stipulated quantity. During the note competition period this quantity did not alter much: in 1879–1887 it was 35 million, and in 1888–1898 it was 45 million. By contrast, after note monopolisation it rose steadily each year.

The clearing function of the Swedish banking system was peculiar, in that it was performed by two commercial banks. In 1856 the Stockholms Enskilda Bank was started. It immediately began to act as a clearing bank for other note-issuing banks. However, the Skandinaviska Kreditaktiebolaget, a non-issuing bank, largely took over the clearing function in the 1860s, mainly because it offered better terms. There were thus two clearing banks in the period 1878–1901, one of which did not issue notes.

In 1897 a new bank law was promulgated that prescribed the monopolisation of notes by the Bank of Sweden. The transfer of the Enskilda banks notes to the Bank of Sweden occurred between January 1901 and January 1904. Clearing was now also taken over by the Bank of Sweden. After monopolisation, commercial banks acquired notes mainly by rediscounting bills with the Bank of Sweden.

Was the Swedish note banking system free from intervention?

In 1878–1879 a severe crisis hit the Swedish economy. A boom, fueled by railroad construction and international demand for Swedish iron and timber, turned into a bust when prices fell. The Stockholms Enskilda Bank had invested heavily in railroad bonds. This bank was also more leveraged than other banks – while capital-asset ratios of other banks were around 20 percent, the Stockholms Enskilda Bank was operating on a ratio around 10 percent (Summary of the Bank Reports). When two ironworks that the Stockholms Enskilda Bank was heavily invested in suspended payments, rumours spread that the bank would become insolvent. In December 1878, there was a run on the Stock-

holms Enskilda Bank. In February 1879, the finance minister Hans Forsell made pronouncements that government support to the banks would relieve capital markets. In May 1879, a special fund called the Railroad Mortgage Fund was created, administered by the National Debt Office, from which banks could borrow on railroad bonds as security (Lindgren 1994).

This incident, it can been argued, shows that the Swedish note banking system was not able to stand on its own without the government intervening and acting as a lender of a last resort. However, this reading is open to debate. It is important to remember that when the government assumes a role as guarantor of the solvency of the banking system, it does not act as a lender of last resort. The classical lender of last resort provides liquidity to all illiquid but *solvent* banks, in order to quench bank runs and panics. By contrast, the activities of the Swedish government in 1879 was very much about saving one important possibly insolvent bank from bankruptcy, in order to avoid larger damage to the financial system. Apart from the Stockholms Enskilda Bank, banks made marginal use of the fund.[2] The Swedish situation in 1878–1879 was clearly different from the general panics that hit England in 1847, 1857 and 1866, when lender of last resort-response was called for. Apart from limited runs on the Stockholms Enskilda Bank, other banks were not subject to runs or panics. The difficulties of the Stockholms Enskilda Bank did not spill over into a general distrust of the banking

[2] From a total of 42 commercial banks, 13 made use of the fund. Of the 7.56 million lent, over half (4 million) was borrowed by the Stockholms Enskilda Bank (Ögren 2003, p. 262).

system. There is also evidence that bank support for the fund was lukewarm – with the exception of the Stockholms Enskilda Bank, banks did not see themselves in trouble and the fund was therefore not felt to be necessary (Nilsson 1994, p. 288). In sum, it is not clear what contribution the government intervention made to relieve the crisis, and it is conceivable that the banks would have weathered the storm without it.

2.3 Methodology

Seasonal (monthly) averages for balance sheet items were estimated by maximum-likelihood on logged series, with monthly dummies, and four lags as independent variables. The strategy was to test for stationarity by means of the augmented Dickey-Fuller test for unit roots. For variables deemed stationary, seasonal coefficients were estimated by regression on levels.[3] In case of non-stationarity, differenced variables were used.[4] To estimate the significance of the seasonal variation (monthly changes), *p*-values for the regression coefficients were used in the case of differenced variables. In the case of level-variables, Wald tests on the equality of subsequent regression coefficients were performed. Regression and test results are available upon request. Regression specifications are shown in the Appendix.

Seasonal averages were estimated on a sample from January 1880 to January 1896. This period was chosen because *ceteris paribus* conditions were then fairly present.

[3] Enskilda Bank Notes, Bank of Sweden Notes, Post Bills, Cash.

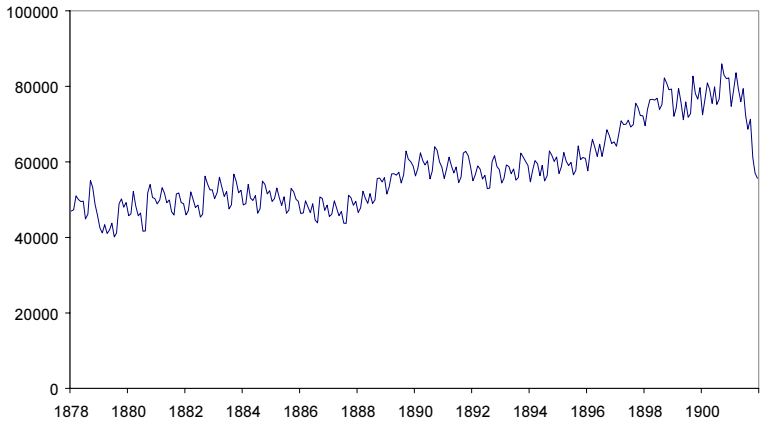
[4] Liquid Claims, Bills, Foreign Bills, Cash Credit, Loans, Loans on Commodities, Time Deposits, Demand Deposits.

Variables were fairly stationary (an international monetary expansion started in 1896 which also affected Sweden). Also, the period 1878–1879 saw financial turbulence, and the Enskilda banks lost the right to issue five-crown notes. Institutional changes also occurred in 1897 with the promulgation of the new bank law.

3 The note circulation

This section describes the annual and seasonal variation in the note stocks of the Enskilda banks and the Bank of Sweden, 1878–1901. Figure 1 depicts the behaviour of the Enskilda bank notes.

Figure 1 Enskilda bank notes, 1878–1901 (kSEK).

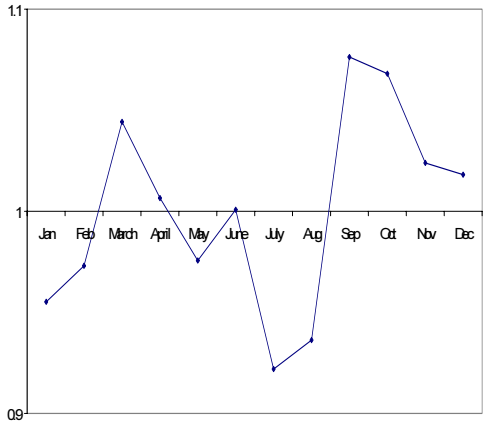


Source: Summary of the Bank Reports.

The note stock seems to move with remarkable seasonal regularity. An exception is perhaps in 1878–1880. There was an industrial crisis in 1878–79. Also, in January 1880 the Enskilda banks lost their right to issue five crown notes. Figure

2 displays seasonal (monthly) averages for the note stock in 1880–1895. Levels have been normalised to show each month's average note circulation as a ratio of the average (monthly) circulation over the year.

Figure 2 Average seasonal note stocks of the Swedish Enskilda banks, 1880–1895.



	Δ	p
Jan	−0.063	0.000
Feb	0.018	0.004
Mar	0.071	0.000
Apr	−0.038	0.000
May	−0.031	0.000
Jun	0.025	0.000
Jul	−0.079	0.000
Aug	0.014	0.028
Sep	0.14	0.000
Oct	−0.008	0.12
Nov	−0.044	0.000
Dec	−0.006	0.23

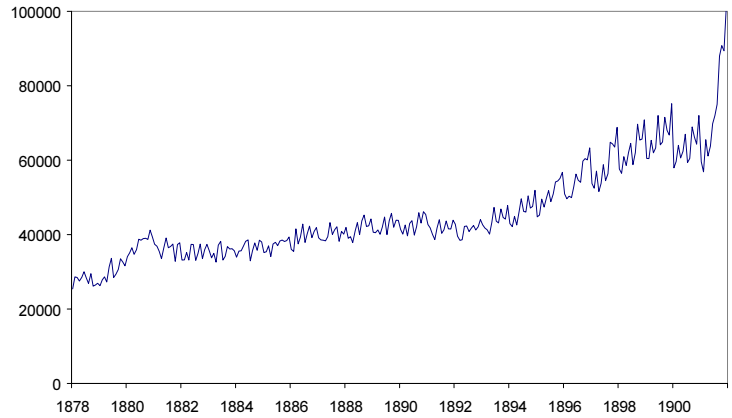
Source: Summary of the Bank Reports.

Demand for notes peaked twice a year, namely in March and in September–October. The biggest troughs were in July and in January. The expansion between August and September is most conspicuous. Then the note stock expanded by about 14 percent. A. O. Wallenberg's description of the seasonal fluctuations quoted above corresponds exactly to the pattern in Figure 2. His comment suggests that the peak in March was related to the needs of industry, whereas the peak in September–October was related to the needs of agriculture. Figure 2 also indicates that the seasonal changes are statistically significant (except for the small contractions in October and December).

The note stock of the Bank of Sweden

The note stock of the Bank of Sweden exhibited a seasonal pattern distinct from that of the Enskilda banks. This is seen in Figure 3.

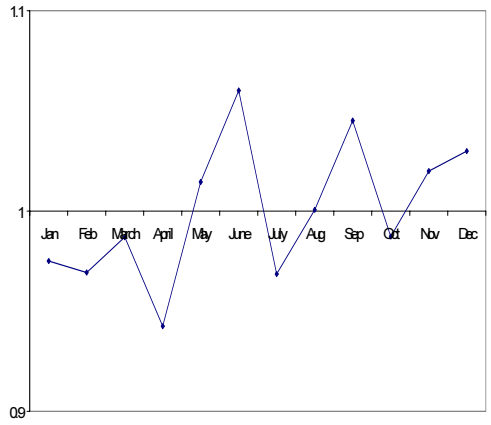
Figure 3 Note stock of Bank of Sweden 1878–1901 (kSEK) .



Source: Summary of the Bank Reports.

Figure 4 pictures the average seasonal note stock of Bank of Sweden, 1880–1895.

Figure 4 Average seasonal note stocks of the Bank of Sweden, 1880–1895.



	Δ	p
Jan	−0.054	0.000
Feb	−0.006	0.53
Mar	0.018	0.038
Apr	−0.044	0.000
May	0.072	0.000
Jun	0.046	0.001
Jul	−0.091	0.000
Aug	0.032	0.006
Sep	0.044	0.004
Oct	−0.057	0.000
Nov	0.033	0.006
Dec	0.009	0.51

Source: Summary of the Bank Reports.

Whereas for the Enskilda banks, the highest peaks occurred in March and September, the notes of the Bank of Sweden peaked in June, September and (to a lesser extent) December. Also, whereas the Enskilda bank notes had their lowest circulation in July, the Bank of Sweden notes bottomed out in April. Potential causes to the difference have been sketched above. In March the last debentures to the industry before shipment were extended, which increased the demand relatively more for Enskilda bank notes. The Enskilda banks' main task was to provide for the financial needs of the industry, which was not the case with the Bank of Sweden. On the other hand, many companies paid dividends twice a year, at the end of December and June, when taxes were also paid. These transactions were possibly mostly paid in Bank of Sweden notes.

4 Assets of the Swedish asset currency

This section describes the balance sheet of the Enskilda banks, and how its components changed in relation to the note stock. Three questions are addressed:

1. Which items were overall most strongly correlated with the note stock?

2. Which items correlated with the note stock in the months of the greatest expansion and contraction, namely in March and September, July and January?

3. What was the proportion between quantitative and qualitative (or form-seasonal) changes in money demand, that is, how much of the change in note demand was due to a change in the total demand for money, and how much was due to a change in the currency-deposit ratio – particularly in September?

Table 1 shows the aggregated balance sheet of the Enskilda banks in December 1890, in the middle of the studied period.

Table 1 Aggregated balance sheet of the Enskilda banks, December 1890 (MSEK).

Assets	441	Liabilities	441
Cash	12	Post Bills	11
Liquid claims	32	Notes	59
Bonds	31	Demand Deposits	40
Bills	142	Time Deposits	222
Loans	95	Equity	72
Cash Credit	51	Other	38
Other	78		

Source: Summary of the Bank Reports.

On the liabilities side, demand liabilities were about 110 million (post bills, notes and demand deposits). Notes were larger than demand deposits. The cash-to-demand liabilities ratio was about 10 percent, while the liquidity ratio – (liquid claims + cash)-to-demand liabilities – was about 40 percent. On the assets side, bills were the dominant form of credit. Lending (domestic bills, loans, and cash credit) was about 280 million, somewhat larger than deposits, 260 million. Table 2 depicts correlations between monthly changes in balance sheet items and the note stock in 1880–1895.

Table 2 Correlations between monthly changes in Enskilda bank notes and balance sheet items, 1880–1895.

Assets		Liabilities	
Cash	0.19	Post Bills	0.58
Liquid claims	0.36	Demand Deposits	–0.33
Bonds	0.08	Time Deposits	–0.40
Domestic Bills	0.43		
Foreign Bills	0.15		
Loans	0.13		
Cash Credit	0.08		

Source: Summary of the Bank Reports.

Overall, post bills were the item that correlated the most with the note stock. Post bills correlate positively with notes. Balance sheet logic implies that, all else equal, an increase in the volume of notes should be accompanied by an increase in assets, and/or a decrease in other liabilities. Changes in the volume of post bills cannot therefore be considered a "source" of changes in the volume of notes. The correlation with deposits, however, is of the "right" sign. On the asset

side, domestic bills hade the strongest correlation with notes, followed by liquid claims.

The big months

Of particular interest is the behaviour of the balance sheet in "the big months" when notes expanded or contracted sharply. Because notes and post bills expanded and contracted together, they are counted together in this section. The greatest expansions of notes and post bills occurred in March and in September. The greatest contractions occurred in July and in January. Table 3 shows mean and standard deviation for monthly changes in (notes + post bills) for the period 1880–1895. It also shows mean and standard deviation for changes in balance sheet items, expressed as a ratio of the change in (notes + post bills). Bonds and Equity are not reported, since they hardly exhibited seasonal varation. Ratios for liabilities are defined so that a change in opposite direction to the change in (notes + post bills) gives a positive sign [thus, for deposits, the ratio is: $-\Delta$ *Deposits* / Δ (*Notes* + *Post Bills*)].

Table 3 Mean and standard deviation for the change in (Notes + Post Bills), and for ratios of change in balance sheet items and change in (Notes + Post bills), in March, July, September and January, 1880–1895.

	March		July		September		January	
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
Notes + Post Bills	0.076	0.024	–0.085	0.019	0.15	0.040	–0.079	0.015
Cash	–0.10	0.22	0.18	0.17	–0.01	0.07	0.17	0.27
Liquid Claims	–0.27	0.41	–0.08	0.47	0.27	0.22	0.38	0.35
Domestic Bills	0.72	0.41	0.41	0.20	0.17	0.13	0.08	0.36
Foreign Bills	–0.21	0.12	–0.29	0.26	0.16	0.13	0.40	0.28
Loans	0.49	0.25	0.21	0.20	0.02	0.06	–0.21	0.24
Cash Credit	0.13	0.24	0.20	0.18	0.05	0.08	–0.59	0.39
Demand Deposits	0.14	0.36	0.21	0.29	0.16	0.13	0.17	0.15
Time Deposits	–0.05	0.45	0. 29	0.33	0.13	0.17	0.56	0.43
Total	0.86	0.53	1.13	0.45	0.93	0.16	0.99	0.40
Lending	1.35	0.67	0.82	0.34	0.24	0.17	–0.73	0.60
Deposits	0.09	0.49	0.50	0.41	0.28	0.18	0.75	0.49

Note: Ratios for liabilities are defined as: $-\Delta$ *Liability* / Δ (*Notes + Post Bills)*.

The co-movers differed over the year. The note expansion in March occurred mainly through an expansion of domestic lending – mainly through domestic bills and loans. The contraction in July is on the other hand mostly associated with an expansion of deposits (but domestic bills are also important). The large September expansion is the one where co-movers are most evenly distributed, with liquid claims, domestic and foreign bills, and demand and time deposits taking a relatively equal share. The variance of the co-movers is also smallest in September. In this month, deposits account for about one third of the change in notes. Lending represents a relatively small factor. The relative role of domestic bills and loans expansion was much smaller in the Septem-

ber, compared to their role in the March expansion. In January, increasing time deposits was the largest factor behind the contraction. It is also noteworthy that lending actually expands in this month, despite the fact that notes contract (loans and cash credit expands, while bills slightly contract).

Question 3 aked how much of the note expansion was due to qualitative changes in money demand, particularly in September. Table 3 shows that the role of demand deposits was fairly equal in all the big months. Demand deposits accounted for between 14 and 21 percent of the change in notes. This figure represents the qualitative, or form-seasonal, change in money demand, the change in the relation between currency and demand deposits. The figure may be considered low. However, if we include time deposits, then about one third of the increase in notes and post bills in September was due to a withdrawal of deposits. This quantity could be considered non-negligible, and may explain the historic need for erecting institutions able to provide form-seasonal elasticity to the currency.

Liquid claims and foreign bills seem to co-move in a peculiar manner. They both contract in March, in spite of notes expanding. In July they both expand, in spite of notes contracting. On the other hand they co-move positively with notes in September and in January. This pattern of movement should be related to the sailing season. In the winter period November–March, exporters were short on foreign payments media. The quantities of liquid claims and foreign bills therefore decreased in these months. In the sailing season from May to October, exporters received foreign payment media, which were deposited or discounted with the

commercial banks. Liquid claims and foreign bills therefore increased in those months.

Table 3 contains substantial information on how the Enskilda banks were able to solve the liquidity problem of the Swedish economy in the late 19th century. It provides insights into how the co-movements of notes with other balance sheet items were dictated by the needs of industry and agriculture – needs which depended on conditions for sowing and sailing that were set by nature. In March, when exports were low, banks extended currency to the industry by means of domestic lending. In July, currency demand was at its lowest. There was a contraction of notes, associated mostly with an increase in deposits. At the same time the sailing season made the volume of foreign payment media swell. September saw the greatest need for currency. From harvest and exports, income flowed into both agriculture and industry, and the need for loans was therefore limited. Notes were issued with backing from a variety of sources, as well as through the withdrawal of deposits.

5 The co-movers

This section describes the seasonal changes of the co-movers in more detail, as was done with notes in section 2. The following items are covered: post bills, lending (bills, loans and cash credit), deposits (time and demand), liquid claims and cash.

Post Bills

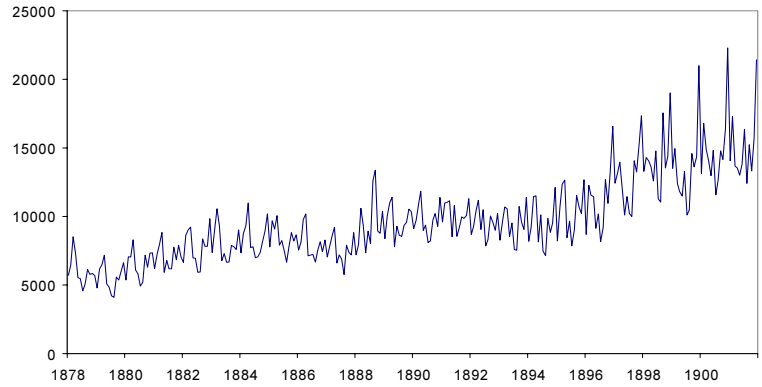
The post bill was a form of cashier's check that was unique to the Swedish payment system. It was invented by André Oscar Wallenberg, the founder of the Stockholms Enskilda

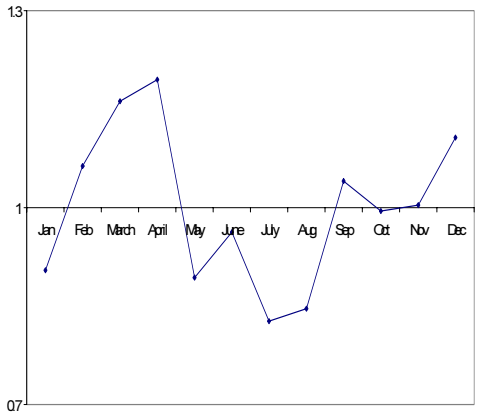
Bank, the most important note-issuing bank, which also served as a clearinghouse for the banking system. The post bill was intentionally invented to facilitate the clearing process. The provincial banks held clearing accounts at the Stockholms Enskilda Bank. For out-of-town payments, instead of sending notes by registered mail, a person could buy a post bill at the Stockholms Enskilda Bank free of charge, ordering the Stockholm Enskilda Bank to pay a stipulated sum on demand to the payee. The bill was then sent by regular mail. The receiver would then cash it, again free of charge, at his provincial Enskilda bank, which would pay with its own notes. The provincial bank would then send the post bill to Stockholms Enskilda Bank, which would credit the provincial bank's clearing account.

All Swedish banks issued post bills free of charge, which were accepted and cashed by all other banks at sight and free of charge. This was in contrast to corresponding bills of foreign banks, which were payable with eight to ten days notice, and bought and sold at a charge. According to Wallenberg (1886), the reason was the Enskilda banks' right to issue notes, by which they could pay out with their own notes instead of using costly reserves. That the freedom to issue notes in this way lowers transaction costs has scarcely been noticed in the free banking literature. Wallenberg (1886, p. 27) claims that it saved one million crowns per year in transaction costs.

The post bill thus filled an important role in the Swedish payments system. Figure 5 shows how the post bills of the Enskilda banks varied.

Figure 5 Post bills of the Enskilda Banks 1878-1901 (kSEK), and average monthly circulation, 1880-1895.





	Δ	p
Jan	–0.20	0.000
Feb	0.16	0.000
Mar	0.10	0.000
Apr	0.033	0.21
May	–0.30	0.000
Jun	0.069	0.003
Jul	–0.14	0.000
Aug	0.019	0.43
Sep	0.19	0.000
Oct	–0.046	0.10
Nov	0.009	0.71
Dec	0.10	0.000

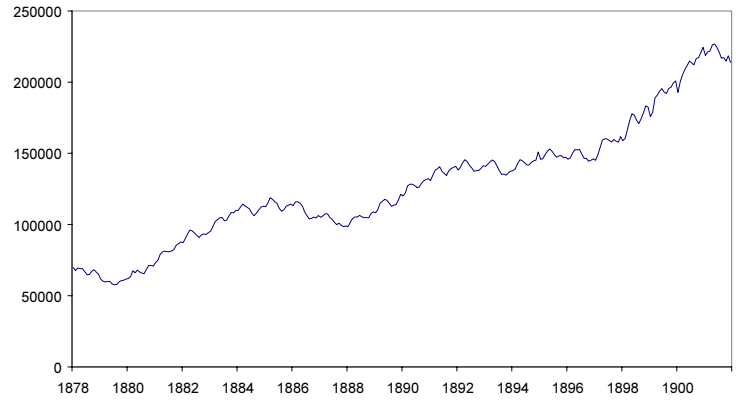
Source: Summary of the Bank Reports.

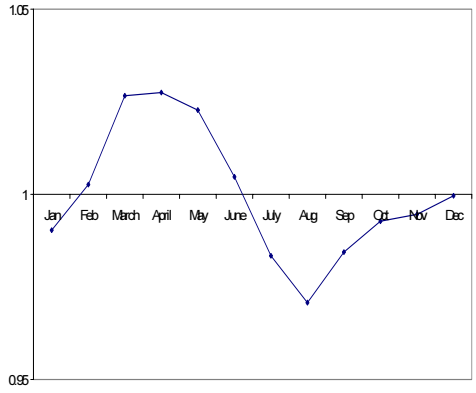
Post bills were a highly elastic payment medium. Figure 8 confirms the strong positive co-movement between notes and post bills. Post bills peaked in March–April, June, September and December, and bottomed in July and in January. In contrast to notes, they increased also in April (although this change is not significant).

Bills

Bills should be of prime interest as a co-mover of notes. First, as Table 1 showed, they were the most important form of credit on the balance sheet, accounting for 30 percent of total assets in 1890. Second, they were the most liquid form of credit. The quantity of domestic bills held by the Enskilda banks is shown in Figure 6.

Figure 6 Domestic bills of Enskilda banks 1878-1901 (kSEK)





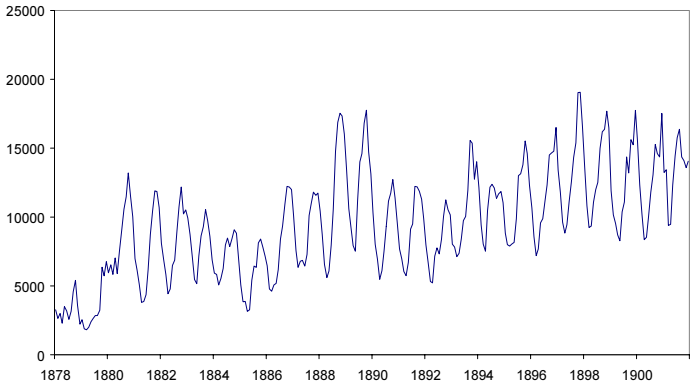
	Δ	*p*
Jan	–0.009	0.092
Feb	0.012	0.000
Mar	0.024	0.000
Apr	0.001	0.20
May	–0.004	0.76
Jun	–0.018	0.000
Jul	-0.021	0.000
Aug	–0.013	0.036
Sep	0.014	0.000
Oct	0.008	0.007
Nov	0.002	0.10
Dec	0.004	0.062

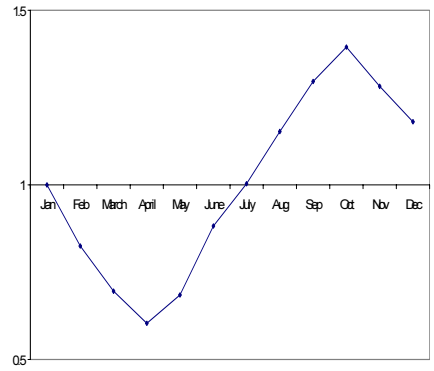
Source: Summary of the Bank Reports.

The volume of bills moved with strong cyclical and seasonal regularity. Cyclically, they moved in periods of eight to nine years. The movement is so regular that it conveys an impression of "econo-rhytms" at work. Seasonally, bills surged in volume at the beginning of the year, to reach a maximum in March–May. They then subsided to reach a low point in August, from which they again increased.

If we look at foreign bills, they moved in seasonal cycles with great regularity and amplitude, in a pattern highly different from that of domestic bills. This is shown in Figure 7.

Figure 7 Foreign bills of Enskilda banks, 1878–1901 (kSEK), and their seasonal average, 1880–1895





	Δ	p
Jan	–0.18	0.000
Feb	–0.18	0.000
Mar	–0.13	0.004
Apr	–0.091	0.001
May	0.081	0.004
Jun	0.20	0.000
Jul	0.12	0.000
Aug	0.15	0.036
Sep	0.14	0.004
Oct	0.099	0.002
Nov	–0.11	0.031
Dec	–0.10	0.003

Source: Summary of the Bank Reports.

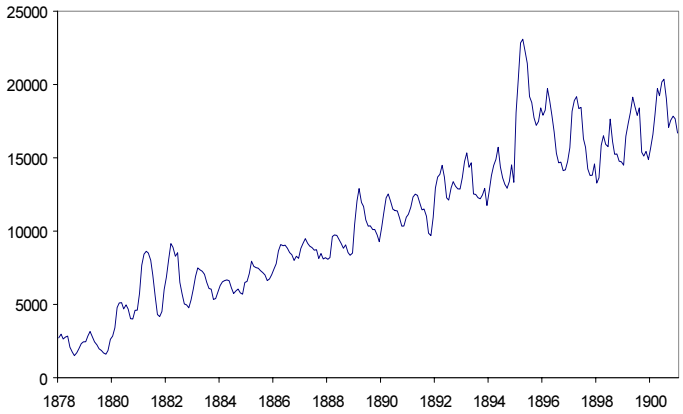
Foreign bills steadily decreased from November until April. They then steadily increased between May and October – during the sailing season. In May–October shipments were made and Swedish exporters received payments in foreign bills. These were discounted with the Swedish Enskilda banks. Likewise, in wintertime when no exports were made,

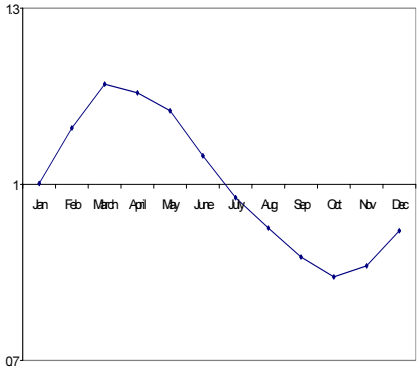
foreign bills were hardly presented for discounting with the banks, wherefore their holdings fell.

Loans

Loans against promissory notes (*reverslån*) were the traditional and most common form of credit in Sweden, even between merchants, before the 1860s, when bills were beginning to be more widely used. In the Summary Reports, loans were divided into six categories, namely loans on (security in): fixed assets; bonds; stocks; commodities; name security; and surety. Of these, loans-on-commodities can be expected to correlate most strongly with the "needs of trade". In fact, this form of loan shows a remarkably stable and accentuated seasonal pattern, as Figure 8 shows.

Figure 8 Loans-on-commodities of the Enskilda banks 1878–1901 (kSEK), and their seasonal averages, 1880–1895





	Δ	p
Jan	0.080	0.000
Feb	0.094	0.000
Mar	0.074	0.000
Apr	–0.015	0.79
May	–0.030	0.59
Jun	–0.077	0.002
Jul	–0.071	0.001
Aug	–0.052	0.049
Sep	–0.049	0.042
Oct	–0.034	0.28
Nov	0.019	0.21
Dec	0.059	0.000

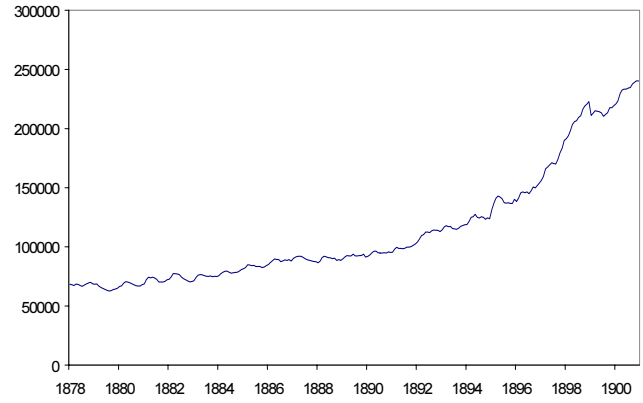
Source: Summary of the Bank Reports.

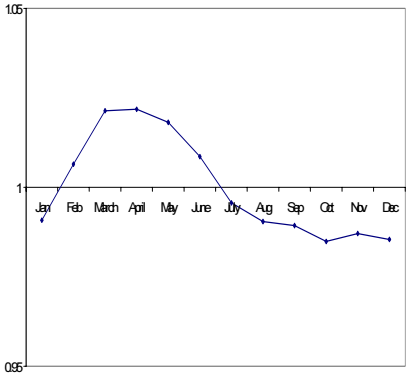
Interestingly, the seasonal pattern for loans-on-commodities is exactly reverse to the one for foreign bills. It is as if loans-on-commodities are the reverse coin of foreign bills, and the seasonal pattern should therefore be related to the sailing season. The volume of loans-on-commodities surged steadily at the beginning of the year, until it peaked in March. It then steadily decreased during the sailing season in May–

October, bottoming in this last month. From then it again begin to rise. Loans-on-commodities were likely granted to export manufacturers, who would repay the loans with foreign bills during the sailing season. Thus, loans-on-commodities seem in a certain sense to be self-liquidating.

Total loans show a pattern that is similar but not as distinct as the one for loans-on-commodities. This is seen in Figure 9.

Figure 9 Total loans of the Enskilda banks 1878-1901 (kSEK), and average seasonal total loans, 1881–1895





	Δ	p
Jan	0.005	0.005
Feb	0.016	0.000
Mar	0.015	0.000
Apr	0.0	0.20
May	–0.004	0.83
Jun	–0.009	0.033
Jul	–0.013	0.002
Aug	–0.005	0.32
Sep	–0.001	0.68
Oct	–0.004	0.60
Nov	0.002	0.27
Dec	–0.002	0.78

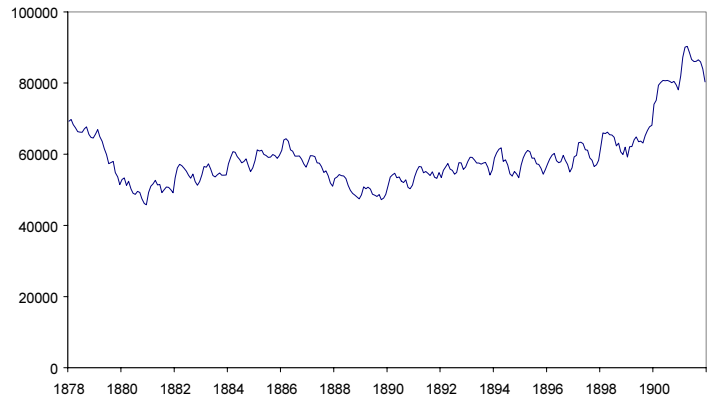
Source: Summary of the Bank Reports

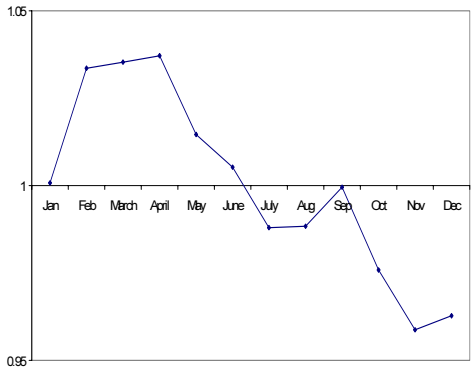
Total loans also increased at the beginning of the year, peaking in March–May. It then steadily dropped in the second half of the year. The changes from August to December are not significant, however.

Cash credit

Cash credit, the third form of lending, shows a similar seasonal variation to loans and bills, in that it increased in the first half of the year and decreased in the second half of it. This is seen in Figure 10.

Figure 10 Cash credit lent by Enskilda banks, 1878–1900, (kSEK), and seasonal averages, 1880–1895.





	Δ	p
Jan	0.038	0.000
Feb	0.033	0.000
Mar	0.002	0.76
Apr	0.002	0.78
May	–0.022	0.000
Jun	–0.009	0.053
Jul	–0.017	0.000
Aug	0.0	0.90
Sep	0.011	0.026
Oct	–0.024	0.000
Nov	–0.017	0.000
Dec	0.004	0.41

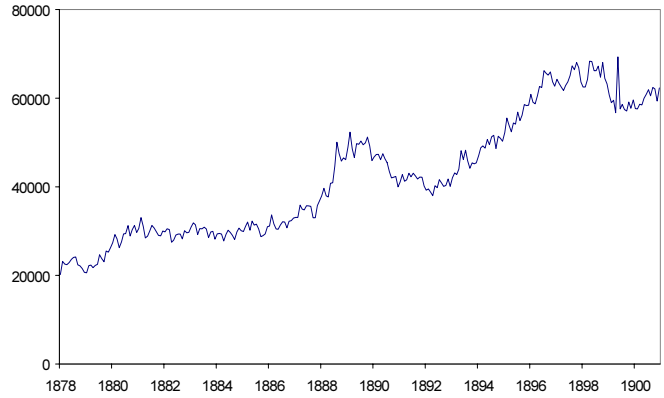
Source: Summary of the Bank Reports.

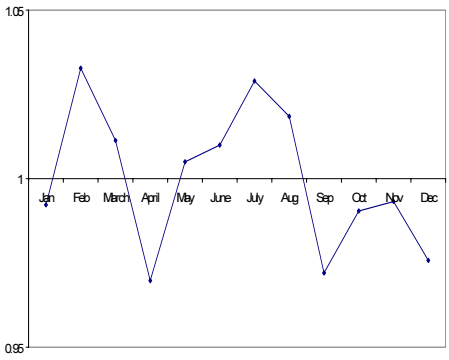
Again, the volume increased at the beginning of the year, peaking in February–April, after which it dropped. Like bills but unlike loans, cash credit increased in September, thus contributing to the note expansion in this month. It then dropped again to bottom in November–December.

Deposits

Figure 11 depicts the behaviour of demand deposits.

Figure 11 Demand deposits of the Enskilda banks, 1878–1901 (kSEK), and seasonal averages, 1880–1895.



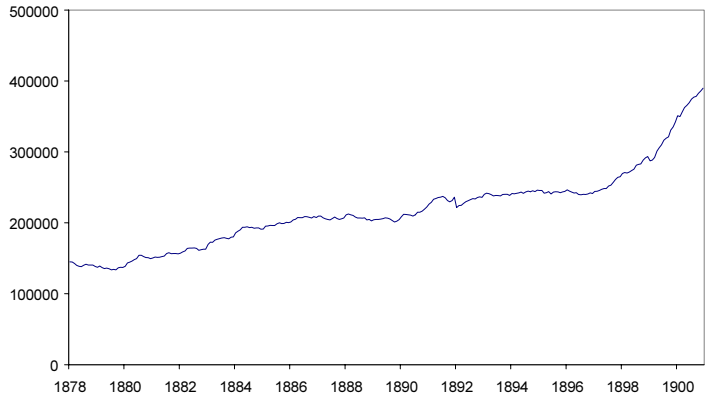


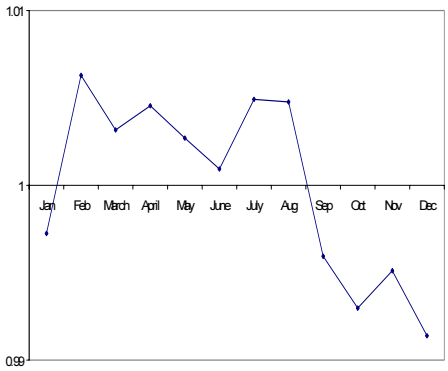
	Δ	p
Jan	0.017	0.064
Feb	0.041	0.000
Mar	–0.021	0.029
Apr	–0.042	0.000
May	0.035	0.000
Jun	0.005	0.32
Jul	0.019	0.007
Aug	–0.010	0.46
Sep	–0.046	0.000
Oct	0.018	0.004
Nov	0.003	0.46
Dec	–0.018	0.044

Source: Summary of the Bank Reports.

As expected, demand deposits moved seasonally in a pattern that is inversely related to the one for notes. Demand deposits decreased when note demand peaked, in March, June, September and December. Demand deposits peaked in July, when note demand was bottom low. However, a deviation occurs in April, when demand deposits decrease when notes also decrease. Time deposits are depicted in Figure 12.

Figure 12 Time deposits of Enskilda banks 1878-1900 (kSEK), and seasonal averages, 1880–1895.





	Δ	p
Jan	0.006	0.000
Feb	0.009	0.000
Mar	–0.003	0.88
Apr	0.001	0.11
May	–0.002	0.85
Jun	–0.002	0.89
Jul	0.004	0.013
Aug	–0.0	0.52
Sep	–0.009	0.099
Oct	–0.003	0.91
Nov	0.002	0.38
Dec	–0.004	0.67

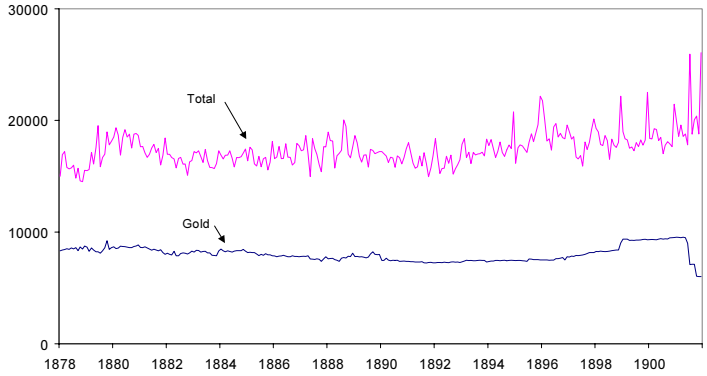
Source: Summary of the Bank Reports.

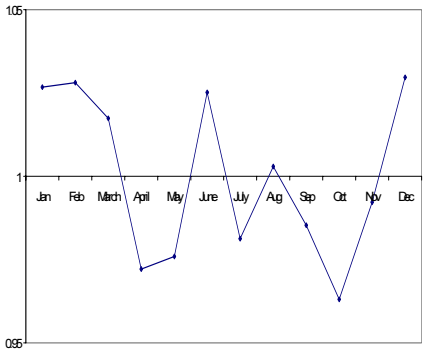
Time deposits rapidly took off in 1897. As in the case of demand deposits, the seasonal pattern correlates negatively quite well with that for notes. Time deposits decreased when notes increased in March, June, September and December. Time deposits increased when notes decreased in April and July. However, except for the increases in January–February and July (and weakly, in April), and the drop in September, the changes are not statistically significant.

Cash and Liquid Claims

The Summary Reports divide the banks' cash holdings into four categories: Swedish gold coin; other gold; silver, bronze and copper coin and Bank of Sweden notes held by the Enskilda banks; and Enskilda bank notes. Figure 13 shows total gold holdings, and total cash (excluding Enskilda banks' holdings of other Enskilda banks' notes).

Figure 13 Gold and total cash held by the Enskilda banks, 1878–1901 (kSEK), and seasonal averages for total cash, 1880–1895.





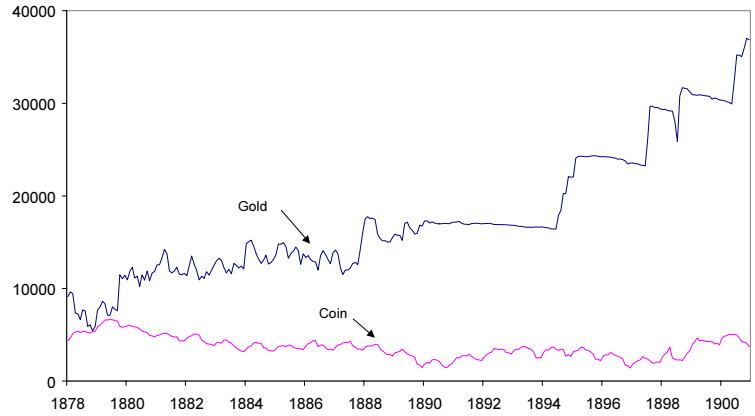
	Δ	P
Jan	–0.003	0.83
Feb	0.001	0. 94
Mar	–0.011	0.45
Apr	–0.045	0.010
May	0.004	0.78
Jun	0.049	0.000
Jul	–0.044	0.003
Aug	0.022	0.073
Sep	–0.018	0.23
Oct	–0.022	0.077
Nov	0.029	0.053
Dec	0.038	0.038

Source: Summary of the Bank Reports. Total cash includes gold, silver, bronze and copper coin and Bank of Sweden notes (but not Enskilda bank notes).

Cash holdings were exceptionally stable. Gold holdings did not vary at all. Total cash mostly co-moved negatively with notes. Except for the increase in June, cash decreased in March and in September–October when notes increased. This is probably because coin and Bank of Sweden notes

were demanded in those periods, and hence Enskilda cash holdings decreased. The cash of the Enskilda banks may be contrasted with those of the Bank of Sweden. These are shown in Figure 14.

Figure 14 Gold and coin held by the Bank of Sweden, 1878-1901 (kSEK)



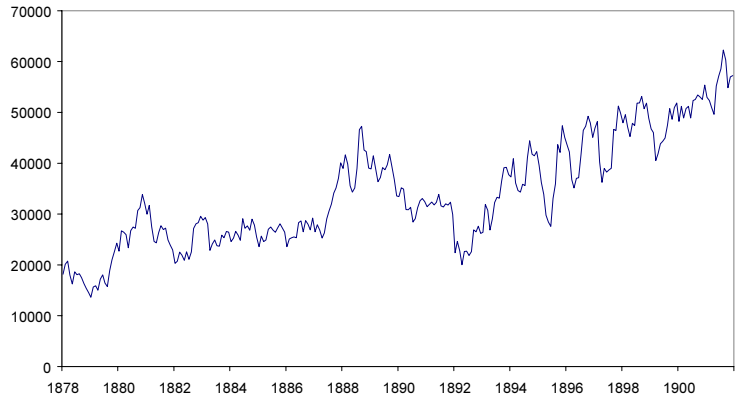
Source: Summary of the Bank Reports.

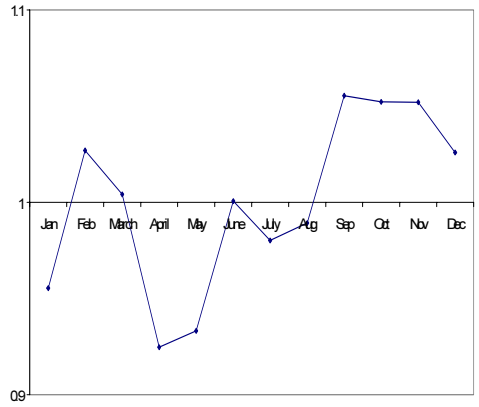
Three things are noteworthy. First, in contrast to the Enskilda banks, gold reserves increased from the mid 1890s. Second, the pattern changed remarkably from 1890. Up until then, gold reserves showed seasonal variability, with a peak in March. After 1890 gold reserves became flat with sudden discrete jumps. This is a reflection of policy changes. From 1890, the Bank of Sweden began to use foreign exchange rather than gold for monetary operations (Brisman 1931, p 185).

Liquid claims

Liquid claims are here defined as the Enskilda banks' holdings of: clearing accounts; accounts at foreign and domestic banks; and foreign notes, checks and bills payable at sight. Figure 15 shows the Enskilda banks' holdings of liquid claims in 1878–1901, and the seasonal average in 1880–1895.

Figure 15 Liquid claims of the Enskilda banks 1878–1901, and average seasonal liquid claims, 1880–1895.





	Δ	p
Jan	–0.07	0.000
Feb	0.071	0.000
Mar	–0.023	0.23
Apr	–0.079	0.000
May	0.008	0.34
Jun	0.067	0.000
Jul	–0.02	0.28
Aug	0.009	0.45
Sep	0.066	0.000
Oct	–0.003	0.97
Nov	0.0	0.85
Dec	–0.026	0.14

Source: Summary of the Bank Reports.

Liquid claims tended to increase from April to October, but tended to decrease during the winter months. They thus show similarities to the seasonal movements of foreign bills. This is not surprising, since they largely consisted of foreign payment media, such as foreign bank accounts, notes, checks and bills payable at sight. These items surely moved with the sailing season.

6 Conclusions

This paper described the workings of the asset currency provided by the Swedish note banking system, and how it solved the liquidity problem of the Swedish economy in the late 19th century. Natural and institutional conditions increased the demand for currency particularly in March and in September-October, while it bottomed in July and in January. The demand for Bank of Sweden notes was somewhat different, peaking in June, September and December, but with little demand in March.

The liquidity needs of industry were to a large extent dictated by the sailing season. In the winter season, currency was supplied by means of domestic lending. In contrast, lending was not needed during the sailing season in May–October, when exporters received foreign payments media, such as foreign bills and liquid claims. These moved inversely to lending, decreasing in the winter season and increasing in spring and summer. In particular, loans-on-commodities seem to have communicated perfectly with foreign bills, suggesting that the former might be self-liquidating.

Overall, domestic bills were the most important instrument used for the supply of notes. They showed a greater

elasticity to currency needs than did the other forms of lending. Deposits were particularly important in September, where they accounted for about one third of the note supply, and in the contraction months in July and in January. The role of demand deposits for note supply was fairly stable over the year, accounting for about 14–21 percent of the change in notes in the "big months". This figure represents the qualitative change in money demand. The month of September saw the greatest demand for notes, and a mixture of agricultural, industrial and institutional needs saw the notes supplied from a variety of sources, with liquid claims, domestic and foreign bills, and demand and time deposits contributing roughly equally to the expansion of notes. In this month, withdrawal of deposits accounted for about a third of the expansion of notes. This figure does not seem trivial, and helps to understand the historic need for institutions able to provide "form-seasonality " to rigid currencies.

The general impression of this study is that the Swedish note banking system was able to provide an elastic currency that responded well to the seasonal "needs of trade". The seasonal demand varied with utmost regularity, and the balance sheet of the Enskilda banks worked like a clockwork to meet it, where various items contributed at different times of the year. The unrestricted discretion of the Enskilda banks to use a variety of assets with which to back their notes was surely necessary to accommodate the seasonal needs. The result of this study complements that of Ögren (2003) who concludes that the note-issuing activity of the Enskilda banks was crucial in providing liquidity to the Swedish capital market in the late 19th century. The experience of the asset currency provided by the Swedish note banking system in-

dicates that central banks-lenders of last resort were not strictly needed to solve the liquidity problems that haunted economies in the late 19th century.

It could be worthwhile to compare the liquidity provision in Sweden with those of the other Nordic countries. External conditions were similar. The Scandinavian countries were also joined in a currency union. However, the other Nordic countries had central banks that enjoyed note monopoly. Were the other Nordic countries as effective in solving the liquidity problems of the late 19th century as was the Swedish note banking system? This should be an interesting topic of future research.

Refererences

Bagehot, Walter ([1873], 1999) *Lombard Street. A Description of the Money Market.* New York: John Wiley & Sons.

Brisman, Sven (1931) "Den stora reformperioden 1806–1904." [The Great Reform Period, 1806–1904.] in Brisman, Sven (ed.) *Sveriges Riksbank 1668–1918–1924. Bankens tillkomst och verksamhet* [The Bank of Sweden 1668–1918–1924. Founding and Operations], Vol. 4. Stockholm: Norstedt & Söner.

Dowd, Kevin (1992) *The experience of free banking*. London: Routledge.

Jonung, Lars (1989) "The Economics of Private Money: Private Bank Notes in Sweden 1831–1902." Research Report, Stockholm School of Economics.

Lakomaa, Erik (2004) "Free Banking in Sweden 1830–1903 – Experience and Debate." Unpublished manuscript, Stockholm School of Economics.

Lindgren, Håkan (1994) "Att lära av historien: några erfarenheter av bankkrisen." [To Learn from History: Some Lessons from the Banking Crisis.] in *Bankkrisen*. Stockholm: Fritzes.

Miron, Jeffrey A. (1986) "Financial Panics, the Seasonality of the Nominal Interest Rate, and the Founding of the Fed." *American Economic Review*, Vol. 76, No. 1, pp. 125–140.

Miron, Jeffrey A. (1996) *The Economics of Seasonal Cycles.* Cambride, Mass.: MIT Press.

Nilsson, Göran B. (1994) *André Oscar Wallenberg. III. Ett namn att försvara 1866–1886.* [André Oscar Wallenberg. III. A Name to Defend 1866–1886.] Stockholm: Norstedts.

Rodriguez, Enrique (1980) *Offentlig inkomstexpansion. En analys av drivkrafterna bakom de offentliga inkomsternas utveckling i Sverige under 1900-talet.* Lund: C W K Gleerups.

Selgin, George and White, Lawrence H. (1994) "Monetary Reform and the Redemption of National Bank Notes, 1863-1913." *Business History Review* 68 (Summer 1994): pp 205-243.

SFS 1874:44 [Swedish Code of Statutes].

Summary of the Bank Reports [Sammandrag av bankernas uppgifter] 1878–1914.

Thunholm, Lars-Erik (1962) *Svenskt kreditväsen*. Stockholm: Rabén & Sjögren.

Timberlake, Richard (1993) *Monetary Policy in the United States. An Intellectual and Institutional History.* Chicago: University of Chicago Press.

Wallenberg, André Oscar (1886) *Sista uttalande i bankfrågan*. Stockholm.

White, Lawrence H. [1984] (1995) *Free banking in Britain. Theory, experience and debate 1800-1845.* London: Institute for Economic Affairs.

Ögren, Anders (2003) *Empirical Studies in Money, Credit and Banking.* Doctoral Dissertation. Stockholm: Institute for Research in Economic History at the Stockholm School of Economics.

Appendix

Specifications of regressions and calculations of seasonal components.

The following model was estimated for stationary balance sheet items (here notes):

$$Log\ Notes = \beta_0 + \beta_1 Feb + ... + \beta_{11} Dec + u\ ,$$
(A1)

where

$$u_t = u_{t-1} + u_{t-2} + u_{t-3} + u_{t-4} + \varepsilon_t\ .$$
(A2)

The constant β_0 , representing January was normalised to 0. A value v_i for each month i was then calculated as

$$v_i = 1 + \beta_i\ .$$
(A3)

The seasonal component s_i for each month was then calculated as

$$s_i = v_i - \frac{1}{12}\sum_{0}^{11} v_j + 1\ .$$
(A4)

For differenced balance sheet items (such as Bills), the regression model was

$$\Delta \, Log \; Bills = \beta_0 Jan + \beta_1 Feb + ... + \beta_{11} Dec + u \; .$$

(A5)

A value for each month v_i was then calculated as

$$v_0 = 1$$

$$v_i = 1 + \beta_i + \frac{1}{12} \sum_{0}^{11} \beta_j \quad .$$

(A6)

The seasonal component s_i was then calculated as

$$s_i = 1 + v_i - \frac{1}{12} \sum_{0}^{11} v_j \; .$$

(A7)