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Making Money, Creating Credit
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Swedish commercial banking and lending against shares 1870-1938

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ABSTRACT

This paper explores the formalization of the Swedish financial market, through an analysis of the commercial banks' lending, in the late 19th and early 20th century. Official bank statistics from 1870 to 1938 are used to analyze the lending on an aggregate level. We find that commercial bank lending indeed became more formalized over the period. We also find that commercial banks were able to create credit when demanded and thus were not only limited to the role of financial intermediaries. The analysis shows that the incorporation of Swedish business around the turn of the century led to a shift from lending primarily backed by name security to an increased use of mortgage and shares as collateral. This institutional change is interpreted as an important part of the formalization process of the financial system, as it standardized the valuation process and opened up the possibility for creditors to exit on a secondary market. Two factors which made more long term lending available without increasing the vulnerability of the commercial banks, and thus helped to spur the banks part in the Schumpeterian growth process. Increased financial wealth represented by the broad money supply and urbanization were the main forces behind this formalization.

I. Introduction

Research in economic history as well as in economics acknowledges the importance of financial development for economic growth. The causality implying that economic growth is finance-led is more significant for emerging economies. There is also research which shows the economic growth of Sweden to have been finance-led at least in the period prior to the World War I.[1]

Still, financial development is, as pointed out by among others Paul Wachtel, far from always beneficial for economic growth.[2] Thus there are certain requirements that are needed for the financial system to have a positive impact on growth. In the growth and finance literature the financial system is usually analyzed in the sense of solely function as financial intermediaries. Thus its role is to as efficiently as possible allocate resources from savers and channel these to investors.[3] A survey on the literature in the field of financial systems actually starts off with the sentence: "The purpose of a financial system is to channel funds from agents with surpluses to agents with deficits."[4]

In our view this assumption of the working of a financial system is not only too shallow, it is directly misleading. It is misleading as it denies one of the most important tasks and characteristics of a financial system: The task and possibility of creating capital through credit creation (or capital formation as it is often labeled). The finance and growth literature mentions this, but do not really analyze it in its own right. It is, however, our firm conviction that this part of the activities of financial agents should not be underestimated in its importance for economic growth.

As a point of departure for this argument we draw on Joseph Schumpeter's writing on the dynamics of structural transformation.[5] The "primus motor" of economic change, according to Schumpeter, is the entrepreneur. Crucial for the success of an entrepreneur is the ability to finance innovations through credit creation. Credit is needed because innovations cannot generate any income before they are launched. Hence, economic growth will depend on the ability of a society to provide entrepreneurs with credit. This

[1] Hansson, P. & Jonung, L. (1997), Ögren, A. (2009).
[2] Wachtel, P. (2001).
[3] Levine, R. (1997), Wachtel, P. (2001). Levine and later Wachtel points out four ways in which the financial system (in its role as intermediary) contributes positively to economic growth: 1) Providing more efficient screening and monitoring of the recipients of funds. 2) Encouraging pooling of capital (savings) by providing more attractive investment opportunities. 3) Economies of scale lower the costs of project valuation. 4) Providing liquidity and thus more efficient risk management through diversification. The fourth point can be interpreted as an acknowledgement of the banks' possibilities to create credit.
[4] Allen, F. & Gale, D. (2001), p. 1
[5] Schumpeter, J. (1934).

credit creation process takes many forms, but Schumpeter emphasizes the pivotal role played by commercial banks because their position enables them to establish claims against themselves which are injected into the payment system.[6]

The role of banks in the industrialization process has been a much debated topic in the research on universal/deposit banking.[7] In this discussion Sweden is usually placed somewhere in the middle between the two ideal types; commercial banks provided traditional saving/lending functions, but to some extent they were also involved in long-term financing of industrial enterprises.[8]

However, this dichotomy between different types of banks is in reality not that clear. We know from empirics that in practice anything that has a value could work as collateral – it could be goods, mortgages, financial instruments or even a good reputation. In other words, depending on what kind of collateral banks accept, they can be more active in the credit creation process than is commonly acknowledged. Hence, equipped with this tool for capital formation commercial banks can influence the entrepreneurs' ability to realize innovations and possibly the direction of the more general economic development.

But, acknowledging the financial agents possibility to create credit also means acknowledging the instability of financial agents, and of the financial system as a whole. If we assume that financial agents can create credit, what would stop them from doing so? And how can it be possible to contradict this apparent, to use the words of Kindleberger and Minsky, instability of the banking system[9] without depriving the commercial banks of the possibility to create credit when needed for projects that are beneficial for economic growth? This dilemma of banking efficiency versus vulnerability is well documented in economic research.[10] It is also well known in historical research, especially from the times in direct relation to financial crises.

So, if one of the fundamental tasks of a well functioning financial system is credit creation and this credit creation is important for the entrepreneurs, and thus economic growth, the question is how this provision of credit can be created in a manner that does not lead to an enlarged instability of the financial system. As far as we know there are few, if any, empirical studies that looks onto the process of how financial agents managed to overcome the problem of expanding credit without increasing financial vulnerability.

[6] This dynamic view on the origin of credit/money has later been developed by proponents of the endogenous monetary theory, see for instance Bell, S. (2001), Wray, R.L. (1990).
[7] Tilly, R.H. (1989), Teichova et al (1994).
[8] Larsson, M. (1998). Gårdlund, T. (1947), Sjögren, H. (1991).
[9] Kindleberger, C.P. (2001)
[10] Diamond, D. W. (1997), Diamond, D. W. & Rajan, R.G. (2001)

One such process should be the development of more formalized lending on collaterals which are at all times possible to sell on a secondary market. This requires two things: 1) that there in fact exists what can be regarded as formal collaterals; i.e. collaterals that are possible to transfer on a secondary market and that can be submitted to a more standardized valuation process, and 2) that there exists a secondary market for such collaterals, the more liquid it is the larger the possibility to exit at will.

In this paper we look at how formalization of lending by the use of more standardized and transferable collaterals took place in Sweden. We look at how this meant a possibility for banks to provide credit on longer term. Before this formalization, lending was usually based on name, which meant that the screening process was costly as banks had to have personal knowledge of the people involved. It also meant that banks could not get out of long term commitments by transferring the collateral; instead the loans had to be foreclosed. Loans that were not based on name security were mainly on short term through the use of discounting bills of exchange. This means that the banks possibility to create credit on long term with lesser risk should have increased with the use of more formal collaterals that were transferable on a secondary market. Hence, the formalization of lending can be assumed to have been positive for the banks' credit creation without increasing the disruptive effects of this. And, in turn, this should have been positive for the finance of entrepreneurs and economic growth.

As described in this paper, commercial banks in Sweden changed their portfolio of securities in the late 19th and early 20th century. The direction of change could be summed up as a process of formalization – as seen above this process is defined as a move towards more standardized valuation procedures and securities with a higher degree or transferability.

The aim of the paper is to describe and analyze the formalization of the Swedish commercial banks' lending, 1870-1938. This ambition requires both gathering of statistics from the Banking Inspection and analysis on how these data relate to macro-economical and institutional factors. It all boils down to four questions: 1) Did the lending pattern change over the period in a manner that would mean an overall increased formalization of the commercial banks' credit creation process? 2) To what extend did the industrial breakthrough in Sweden relate to this formalization a) directly by the creation of assets to be used as collaterals, i.e. shares, or b) indirectly by the increased use of mortgage lending as a result of the urbanization? 3) What other economical and institutional factors can explain the process of formalization over time? 4) Was the development evenly distributed over time or were there any specific discontinuities?

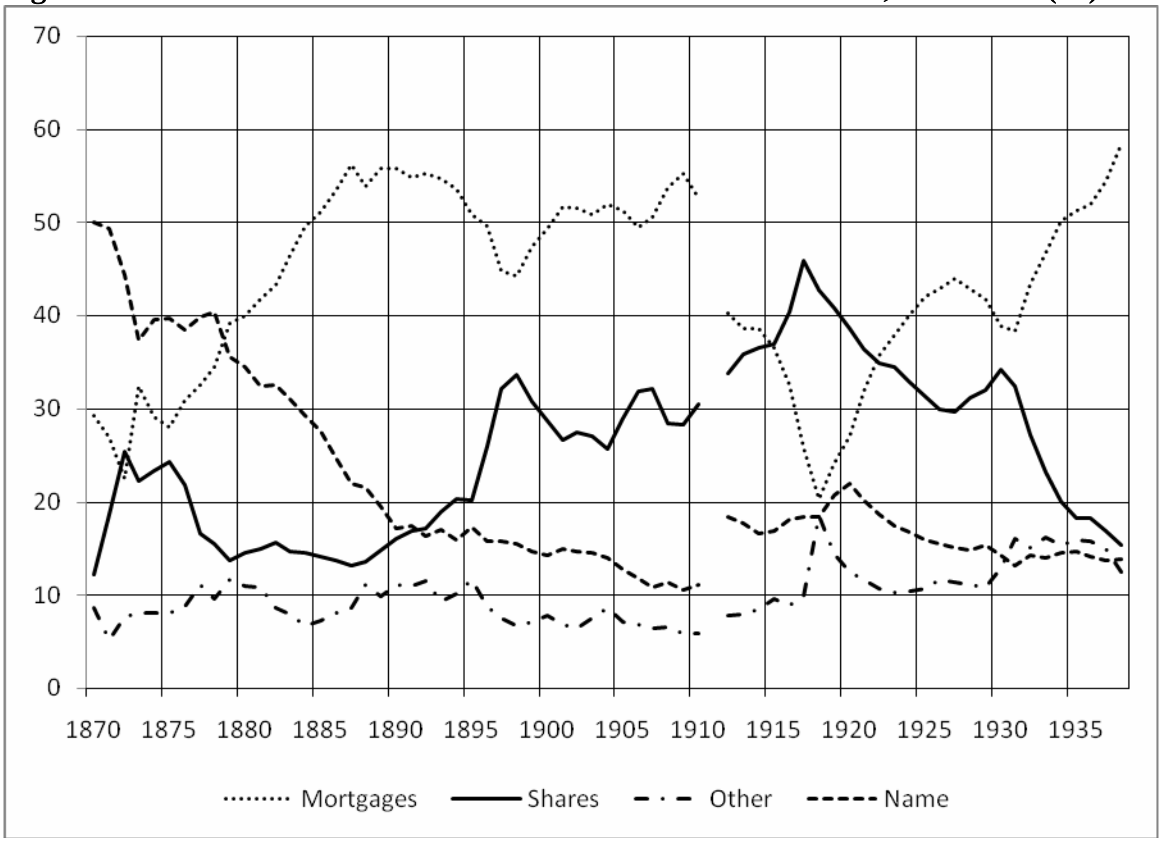
The paper is divided into three parts. First, we estimate the total formalization of the commercial banks' lending for the period 1870 – 1938. Data from the Bank Statistics are used, showing a time-series with the commercial banks' portfolio of collateral. Second, we deepen the analysis on this formalization, why it came about and what the results of it were. In this analysis we focus on three main factors: The incorporation process, which provided the banks with an increased possibility to use shares as collateral and, thus, directly feed the industrialization with capital; the mortgage lending and its interdependence with the industrialization process and demographic changes; the structural transformation of the financial markets and the possibility to transfer formal collaterals. In the third section, we statistically assess what factors contributed to this formalization of the commercial bank lending. Finally there are conclusions.

II. Commercial Bank Formalization

In this section we look specifically on the issue of formalization of lending, i.e. to what extent Swedish commercial banks based their lending on formal collaterals. Our definition of formalization is, as stated in the introduction, the relative increase in the use of standardized and transferable collaterals in long term lending. This should be beneficial for the banks' since it is assumed to both lower the cost of estimating the value of the collaterals as well as decreasing the risks involved by providing the possibility to exit these collaterals on a secondary markets, if needed. Thus, we regard non-formalized lending as lending with a private person's wealth as collateral – i.e. on name.

In order to assess the formalization of commercial bank lending in Sweden, we compiled the Swedish bank statistics according to the distribution of collateral for the years 1870 to 1938. The result is presented in Figure 1, but the data is also available in Appendix A.

Figure 1. Distribution of collateral in Swedish commercial banks, 1870-1938 (%).



Source: Sammandrag af Bankernas Uppgifter 1868-1911, Uppgifter om Bankbolagen 1912-1938 [Summary of Bank Reports, Official Statistics]

Figure 1 above shows that there indeed was a formalization of commercial bank lending over the period. In the 1870s lending with name as collateral, that is un-formalized lending, was the largest part of the lending. The trend for this form of lending, however, was decreasing and it continued to do so until 1911 when it had fallen from more than fifty percent to just above ten percent. The jump upwards in lending on name in 1911/1912 is because short term lending, such as á vista credit to be utilized on demand by the borrower, was then included in these figures. This change is the reason for the jump in all the relative figures on lending during these years. In other words, the drop in name security would have been even larger, without the change in statistics.

Lending backed by shares was of minor importance at the outset, but then it quickly increased during the economic boom and peaked just before the crisis in 1878/79. The lending stagnated until the late 1880s when it, once again, started to increase. This pattern of rising relative figures in times of economic booms continued, with peaks in 1897-98, 1906-07, 1917-18, and 1929-30. The severe financial crisis of the 1920s became a watershed, after which a secular downward trend set in. In 1938 the lending backed by shares was down to fifteen per cent, but the trend actually continued all the way to 1980 – when the lending backed by shares only amounted to three per cent. There are two general observations to be made from the lending with shares as collaterals: First it seems to have followed the pattern of industrialization, and second, it was clearly positively linked to the economic trends.

Some caveats should be made about the figures concerning shares. First shares as collaterals were categorized with the use of goods until 1877, after which goods were put in its own category. Thus, it is possible that the decline in the use of shares as collaterals from 1877 were due to this administrative change. But it is more likely that it is a result of the economic downturn that began in 1875 since shares and goods started to decline this year. It should also be noted that shares were almost six times as important as goods as collaterals in 1877.

Another form of formalized lending that had been part of the commercial banks' portfolios since they emerged was mortgage lending. However, the latter part of the nineteenth century saw a dramatic increase in such lending. Unlike lending against shares mortgage lending actually moved in a contra cyclical manner. During booms it fell and picked up again during recessions or more normal times. The fact that real estates were less volatile in value than shares made mortgage lending the prime force of formalization over the long run. That is the use of real estates as collaterals increased credit creation on formal basis. It is likely that this phenomenon was based on the industrialization and the demographic changes it led to, primarily the increasing urbanization.

The times that shares as collaterals outgrew mortgage lending was either in relation to economic booms bordering to what Kindleberger would label "manias" – the 1870s and during the WWI – or in relation to the rapid increase in the number of corporations in the 1890s (see below). The latter observation suggests that commercial banks credit creation indeed was positively related to the quick formation of companies and second industrial wave in the 1890s. Thus the breakthrough for the joint-stock company went hand-in-hand with the modernization of the Swedish financial system.

Finally the category "other" actually includes a formal financial asset on long term; that is bonds. From 1877 it also includes goods. The lending part of these collaterals is both stable and comparably small over time.

From studying the lending categorized on different collaterals we immediately see two factors that should be important in the formalization of the commercial banks' lending: First, the increased use of shares as collaterals, made possible by the emergence and expansion of joint-stock companies. Second, the increased use of mortgage as collaterals that may be explained by demographic factors which were a result of the industrialization since more and more businesses moved into cities and thus increased urbanization. And, as we have argued in the introduction, a secondary market is not important unless it provides the possibility to exit at will. And for this to do so liquidity and capital must be at hand. Thus a third factor should be the modernization of the financial system itself and its ability to provide capital and liquidity.

III. Incorporation, urbanization, and new legislation

Around 1850, the Swedish economy entered a high-growth trajectory which continued for more than a century and during the 'industrial breakthrough' – the decades before and after 1900 – the yearly GDP growth was 2,4 per cent per capita. In the early phases of the industrialization, the export of iron, agricultural products, and timber was important. In the early 20th century the balance of the Swedish economy had shifted substantially; the exports contained more processed goods and at the same time the demand from the domestic market became more important as an engine of growth.[11] In order to realize this growth it had been necessary to establish economic institutions that could accommodate the forces exerted by the shifts in relative prices on labour, land and energy. In the following, we look into a couple of these changes and how they related to the formalization of the Swedish financial market.

Incorporation

The rise of the corporate form and its importance for economic development from the late 19th century onwards has gained renewed interest in recent years.[12] However, while these authors differ in details they share two characteristics: firstly they stress the importance of incorporation and secondly none of them mention how shares were used as a basis for extending bank credit. In their study of financing of small- and medium-size enterprises during the industrial breakthrough, Cull et al give several examples on how local credit markets found their own solution to the challenge of capital procurement. However, the fact that shares could be used as collateral to facilitate an expansion of bank credit is not mentioned.[13] Along the same line of thought Stefano Battilossi discusses international banking and financial innovation 1890-1931.[14] Instead, the use of shares as collateral for credit expansion has mostly been referred to in negative terms, because it has been related to speculative booms and fraudulent behavior.[15]

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[11] Schön, L. (2000).

[12] Rousseau, P.L. & Sylla, R. (1999), Pearson et al (2006), Lipartito, K. & Sicilia, D.B. (2004), Guinnane et al (2007).

[13] Battilossi, S. (2000).

[14] Cull et al (2006).

[15] Baskin, J.B. & Miranti, P.J. (1997). Sjögren, H. (1991). Larsson, M. (1998). A notable exception is Söderlund, E. (1964), p. 197.

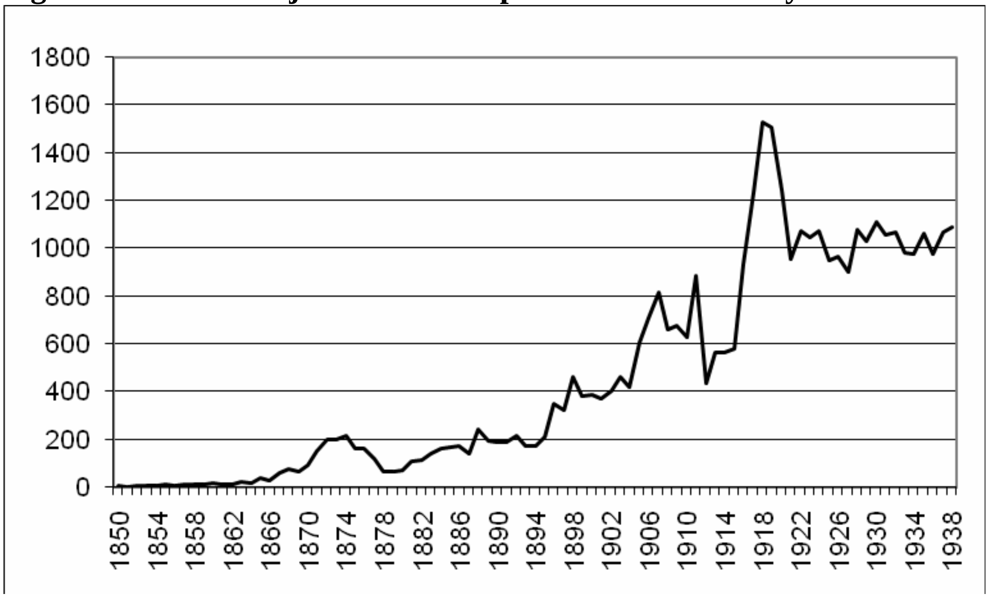
At the same time, the use of shares as collateral is a recurrent theme in several monographies of the history of Swedish banks.[16] Especially in times of industrial restructuring, the banks used the possibility to grant credit on the basis of shares as a way to participate, but still keeping within the limits of the bank law. Furthermore, when proper balance sheets had to be constructed hidden assets soon caught the interest of speculators. This enabled a new generation of financial agents to channel resources through credit creation, into the expanding sectors of the industrialized economy – amplifying a process of creative destruction. Hence, the incorporation process transformed the capital stock and altered the relationship between the financial and the industrial sectors of the economy.[17]

In this paper, we argue that the formation of joint-stock companies made it possible to standardize valuation procedures of firms and transferable shares were more attractive to use as collateral than its predecessor. Hence, an acknowledgement of the role played by share-backed lending would strengthen the conclusions of the above mentioned research.

In Sweden the incorporation process stretched from the breakthrough for liberal ideas in the 1840s to the 1920s, when corporations had become a widely accepted form of economic organization. In 1848 a new company law was passed in Sweden, which made the principle of limited liability accessible in Sweden. The number of incorporations remained low during the first two decades, but from the late 1860s large firms – predominantly in heavy industry and in the transport sector – started to adopt the new corporate form on a wider scale, see figure 2. The period from the 1840s to the 1890s was characterized by institutional formation; the legislation was debated and the business owners' attitudes towards incorporation were slowly changing in favor of the joint-stock company. The formative years resulted in the modern company law of 1895 and the law was followed by a surge in company formations. By the 1920s the number leveled out, as incorporation now had spread to all sectors of the economy and to all sizes of companies.

[16] Söderlund, E. (1964), Hildebrand, K-G. (1971), Gasslander, O. (1962).
[17] For details on the incorporation process, see Broberg, O. (2006).

Figure 2. Number of joint-stock companies founded each year in Sweden 1850-1938



Source: Broberg, O. (2006).

It is clear that the pattern in figure 2 resembles the pattern of the share-backed lending; there is a rising secular trend up until 1920 and the peaks coincide with the booms of the Swedish economy.

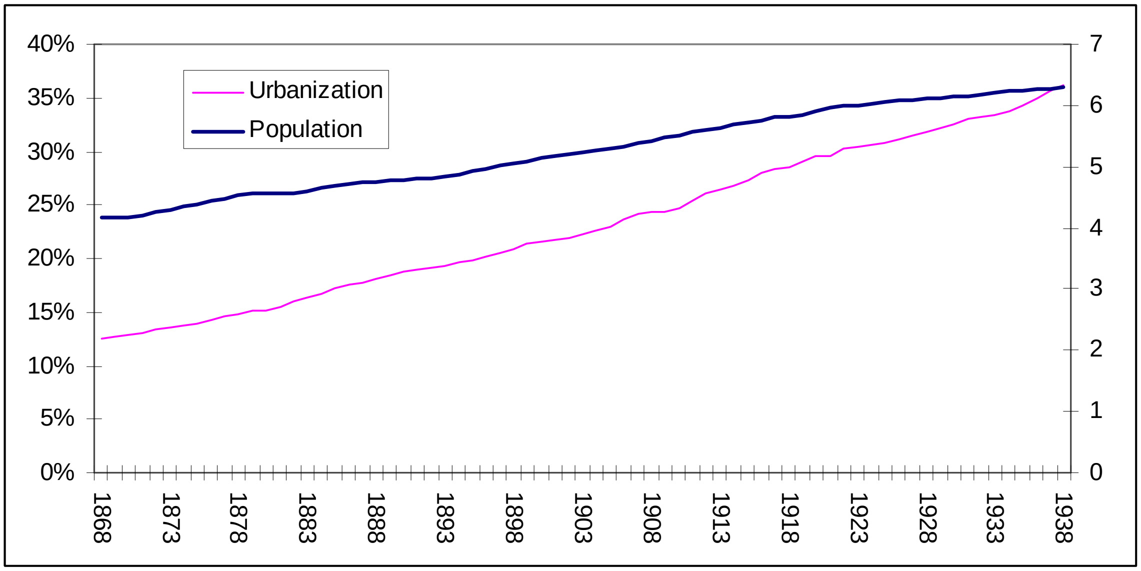
Urbanization and the emergence of a real estate market

Part of the explanation for the increased possibility to formalize the business of the commercial banks was probably lying in the changing structure of society that the industrialization led to. Apart from the fact that population was growing quite rapidly it also meant an increased rate of urbanization. Given that industries and most businesses would not only increase in number, they would also locate in the cities, real estates both for commercial as well as for living would be easier to use as collaterals for bank lending. Between 1870 and 1910 the total amount of mortgages rose from 768 million to 4 591 million SEK. The largest part of this increase came from cities; mortgages from urban real estate grew from 193 million to 2 235 million SEK. A sizeable part of the new mortgages were held by corporations: In 1885 real estate to a value of 237 millon SEK was registered on joint-stock companies and in 1910 this figure had risen to 1 443 million SEK.[18] Furthermore, it has been shown that the growth in industrial real estate was even stronger than the growth of industrial machinery during the period 1879-1913.[19] This quantitative growth was accommodated by institutional changes, which liberalized the

[18] Statistical Yearbook (1917), pp. 68-71.
[19] Holmquist, S. (2003).

real estate market – such as the Building Statute (1875) and the Law on Parceling-out (1895).[20]

Figure 3. Population in million (right scale) and degree of urbanization (town population in percent of total population (left scale)), 1868 – 1938.



Source: SCB (1955), pp. 4-5.

As seen in figure 2, above, there was a steady process of migration to the cities from the beginning of the period 1868 until its end in 1938. While population grew with more than fifty percent (from less than 4.2 million to more than 6.3) urbanization was tripled. The latter means that from the original half a million inhabitants living in cities, the number increased gradually to around seven hundred thousand in 1880, one point one million in 1900, one point seven million in 1920, and finally two point three million in 1938 – i.e. an increase of more than six percent annually during the whole period.

Given this development it is not surprising that mortgage lending increased. The most illustrative example of this change was the development of *Stockholm Inteckningsgaranti Aktiebolag (SIGAB).* SIGAB was a limited liability bank that focused solely on mortgage lending in Stockholm. Its lending grew quickly as the immigration to Stockholm became particularly hectic 1870s onwards; the city increased its share of the total Swedish population from four to eight per cent from 1870-1910.[21] In 1871 the company launched installment loans for real estate owners and in two years time SIGAB was responsible for 30 per cent of the total Swedish credits backed by mortgages.[22]

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[20] Fälting, L. (2001).
[21] Bladh, M. (2002).
[22] SIGAB (1919) and Sammandrag af Bankernas Uppgifter [Summary of Bank Reports]

The increase in real estate capital was also connected to the modernization of the financial market. In the 1870s there were only a handful real estate companies and they were all focused on administering individual estates. Around the turn of the century this was all changed, when almost 1 000 real estate corporations were founded and more than 50 per cent of these had “trading in estates” written in their articles. 64 of these companies were also trading in shares and other financial securities. In other words, the most important feature of the transformation of the real estate sector was the massive transformation of real estate property into transferable share capital.[23]

Financial transformation and institutional change

We know that Sweden during the latter half of the nineteenth century experienced what can be considered as a financial revolution. Vital institutional and organizational changes spurred rapid financial development, and this in turn encouraged overall economic growth and not least the industrial transformation. The by far largest part of the financial system during the period was the commercial banking system.[24] This can be seen in the growth of the commercial banks’ balance sheet. In the far right column in table 1 the balance sheet of the banks are compared to GDP. Despite the rapid concurrent GDP-growth, the banks’ balance sheet rose from 12 per cent of GDP in 1860, to 75 per cent in 1910.

An important contribution by the commercial banking system was the overall increase in liquidity and financial wealth, which was injected into the economy through both note issuance and regular bank loans. Throughout the nineteenth century the commercial banking system was dominated by note issuing unlimited liability banks, the so called *Enskilda banker* (literally meaning private banks). Both the credit as well as the means of payments provided by these banks replaced many informal credit institutions.[25]

[23] Broberg, O. (2006).
[24] Ögren, A. (2009)
[25] Lindgren, H. (2002), Ögren, A. (2006), Perlinge, A. (2005).

Table 1. The development of the commercial banks in Sweden, 1860-1938.

Year	Banks, number of	Branches, number of	Total savings, million SEK	Note issuance, million SEK	Turnover, million SEK	Turnover in per cent of GDP
1860	30	50	23	30	103	12
1870	36	136	79	39	203	20
1880	44	205	247	50	476	35
1890	43	190	352	59	651	43
1900	67	269	772	82	1370	59
1910	80	625	1465	-	2526	75
1920	41	1410	4854	-	7662	62
1930	30	1045	3631	-	5707	62
1938	28	1028	4260	-	6031	53

Source: Brisman (1932), Sammandrag af Bankernas Uppgifter, Sveriges Riksbank (1931)

The law that guided the business of the *Enskilda* banks was the act of 1864. It was an important part of the financial revolution since it meant increased possibilities to establish *Enskilda* banks as well as to renew their charters.[26] When the gold standard was adopted changes were made to the basis of these banks note issuance, changes that have been described as restricting the possibility of the *Enskilda* bank note issuance.[27] At the same time, the total right to issue notes for these banks actually increased after 1874.[28] With the banking act of 1897, the *Enskilda* banks lost their right to issue notes effectively after 1903 and consequently the peak in private bank notes in circulation was reached in the year 1900.[29] We have included both the law of 1874 and the law of 1897 (effective from 1903) in the statistical test.

Limited liability banks without the right to issue notes, so called *Aktiebanker* (literally meaning limited liability joint stock banks) started to appear in the major cities from the middle of the 1860s. However, these banks did not outgrow the *Enskilda* banks until at the turn of the century, when the latter lost their right to issue notes. The expansion of the commercial banking system around the turn of the century took place within limited liability banks – either newly founded or prior *Enskilda* banks transformed into *Aktiebanker*. The number of banks peaked in 1908, after which a concentration process started. Local and regional banks were successively bought up by an emerging league of banks struggling for national hegemony. The changing structure of the commercial

[26] Ögren, A. (2008).
[27] Söderlund, E. (1964) p. 179.
[28] Ögren, A. (2006).
[29] Ögren, A. (2003)

banking system also was accompanied with institutional changes, most notably the important banking act of 1911. Sweden was not unique in this sense, as banking concentration occurred simultaneously also in several other European countries.[30] By the 1920s there were about 30 banks left, but in practice the market was dominated by four banks – with a total market share of 60 per cent.

The large limited-liability banks also took a leading role in the formalization of the secondary market for securities.[31] The trade in financial securities had increased during the latter half of the 19th century, but only a fraction of the trade took place within the official stock exchange, since it was only opened one day a month. However, the turnover ten-folded during the 1890s and the stock exchange suddenly became an important financial market place. This resulted in an institutional tug-of-war around the turn of the century between the old stockbrokers [*stadsmäklare*] and the commercial banks. The large commercial banks could draw on their emerging national network of branches to channel funds in and out of the stock exchange. The stockbroker could not match this and the old monopoly was definitely broken in 1907, when Parliament allowed the commercial banks to become members of the stock exchange. During the 1910s, the expansion continued and several organizational changes strengthened the position of the stock exchange as the center for price formation of stocks. Some independent brokers continued or established new businesses, but they could not compete with the commercial banks. On the contrary, the banks' hegemony became even more profound when the legislation of 1911 – see below – enabled them to establish bank-controlled venture capital companies [*emissionsbolag*].

The structural transformation of the Swedish financial system was accommodated by successive changes in the legislative framework.[32] The act of 1864 has already been mentioned, but of particular importance for this paper is the changes which could alter the type of collateral that would be accepted by the commercial banks. Apart of the changes in 1874 and 1903 we have found four such changes, which we include as dummy-variables in the subsequent analysis.

Firstly, the modern company law of 1895 (implemented 1897) standardized the corporate form and made it more accessible to a wider set of businessmen. The corporate form also became more transparent as new rules on information disclosure were instigated and formal accountants became mandatory.

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[30] Cottrell, P. (1993); Fredeman (1993)
[31] For details on the development of the secondary market, see Algott, S. (1963) and Broberg, O. (2006).
[32] For details of the laws, see Fritz, S. (1990), Söderlund (1964) and Broberg (2006).

Secondly, the new company law of 1910 and the new bank law of 1911 were important institutional changes. Like the law of 1895, these two changes further strengthened the position of the joint-stock company. The new company law formalized the information duties and the valuation procedures of the companies' assets. The new bank law extended, for the first time, the right to own (a limited amount of) shares to the commercial banks.

Thirdly, in the wake of the deflation-crisis, a law was passed in 1921 (implemented 1922), which limited banks' right to own shares. The boom of the late 1910s was partly blamed on the commercial banks' speculative activity and, in order to secure the stability of the financial system, banks entitlement to own shares in financial companies were removed by the new law – unless granted a special permission.

Fourthly, a new bank law was passed in 1933 (implemented 1934). This time it was another crisis – caused by the 1932 Kreuger crash – which shook the regulative framework of the Swedish financial system and the fear of a breakdown united the legislators. The banks right to own shares was definitely removed and for the first time the use of shares as collateral was regulated in the law. It was specified that banks had to make sure that their lending was covered by the market value of underlying shares and shares of financial corporations were not allowed at all as collateral.

All in all, four institutional changes have been identified. The first two (1895/97 & 1910/11) accommodated the shift towards more formalized lending and the use of shares as collateral. However, the other two changes (1921/22 & 1933/34) went in the opposite direction and limited the scope for credit creation based on shares.

IV. Testing the formalization

In this section we statistically test what parameters that affected the formalization of the commercial banks' lending and in what way. Since we define formalization of lending as lending with standardized and transferable collaterals our dependent variables are: Loans with shares as collaterals (SHARES), Mortgage loans (MORTGAGE) and finally as a measure of formalization we add the two together so that we have loans based on shares plus loans based on real estates (FORMAL). We make two different tests, one based on the absolute values of the dependent variables and one with their relative size; i.e. in percent of total commercial bank lending.

With this division we hope not only to capture the formalization at large but also its dynamics over time, given that the commercial banks altered their lending portfolio during different economic trends and political regimes.

As independent variables, we choose variables that could affect the commercial banks possibility to formalize their business. We divide these into three kinds: 1) Macro variables that concerns macro economic (including monetary and financial) as well as overall societal changes over the period. 2) Institutional variables that concerning changing legal framework concerning the business of the banks, or corporations. 3) Endogenous variables concerning the banking system which means the effects of the commercial banks choices to alter their portfolios, their consolidation etcetera.

Macro variables

The most basic macro economic variable is overall economic growth (GDP). This is the crudest test on the interdependence between formalization of the financial market and economic performance. According to basic reasoning of this paper, we assume that positive changes in economic growth positively affected the formalization of lending. The reason for this is that feed-back from experiences with formalized lending would make commercial banks more inclined to use formal collateral in

Growth in the industrial sector (INDUSTRY) is also included as a macro variable. As we refer to the Schumpeterian process of creative destruction in our argument for why commercial banks' credit creation was of utmost importance for economic growth we assume that growth in the industrial sector should be positively related to formalization of lending, and not least lending with shares as collaterals.

As measure of financial deepening and as broad money supply we use the public's holdings of liquidity plus the public's holdings in commercial and Savings banks (M3). This measure should be positively linked to the formalization.

Formation of limited liability joint stock corporations should also be positively linked to formalization, especially the use of share-backed lending. We use to measures, the annual number of corporations formed (CORPEST) and the annual amount of subscribed shares (CORPCAP) in newly formed corporations

Finally, we also assume that growth in population (POPULATION) and especially the degree of urbanization (URBAN) were positive for the formalization of commercial bank lending, and this especially in the case of mortgage lending. Urbanization is measured as percentage of the total population living in towns.

Institutional variables

Institutional changes are incorporated in the regressions as dummy variables. We have identified three institutional changes of importance for the commercial banking system and three in relation to corporations and the use of shares. One of the most important institutional changes for the commercial banks was taken already in 1864 and thus is outside of the scope of this paper. We should thus bear in mind that this Banking Act increased the both the scale and the scope of commercial banking and thus paved the way for the growth in commercial banking that occurred thereafter.

The first change of this law occurred already in 1874 and was a response to the adoption of the gold standard (D1874). The changes mainly concerned the possibility of note issuance. Since the law started to rule the behavior of the banks when their charters ran out it was gradually implemented between the years 1874 and 1878. If it is true that this law overall did not restrict the credit creation of these banks it should not have had any major impact on the formalization of lending. Later the banking act of 1897 denied the private banks the right to issue notes from 1903 and since this directly restricted the flexibility in credit creation of the banks it should have been negative for the formalization (D1903).

The modern company law was implemented in 1897 (D1897) and was renewed in 1910. In relation to this renewal of the company law also a new banking act was launched in 1911. These two important institutional changes are not possible to separate so we will have to regard them as one integral change (D1911). The effects of these changes should have been possible since they meant increased transparency and standardization.

The bank law of 1921 that occurred as a result of the deflation crisis limited the commercial banks right to issue shares. This law was implemented in 1922 (D1922). Following on the Kreuger crash another suppressing bank law was implemented in 1934 (D1934). This law was directly aiming at the use of shares as collaterals. The effects of these laws should unlike the prior have been negative since they directly aimed at limiting the use of shares.

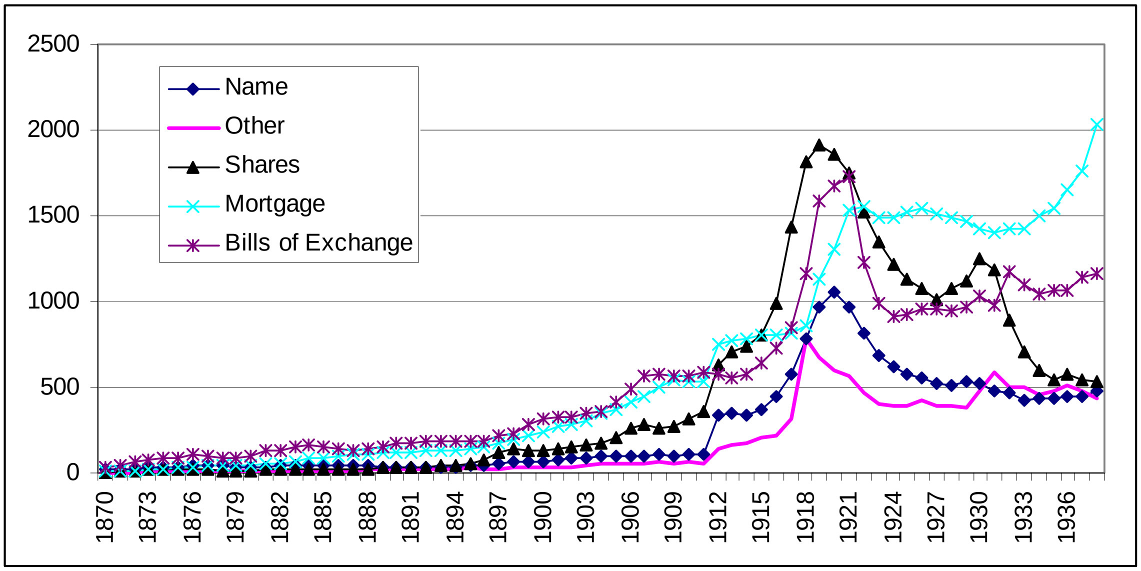
Banking variables

As banking variables we look on other forms of lending in absolute terms. To look on different forms of lending in absolute terms makes it possible to investigate to what extent one form of lending has to crowd out another or if banks really did have the possibility to create credit when demanded by increasing all forms of lending in harmony.

What caused formalization: Absolute values

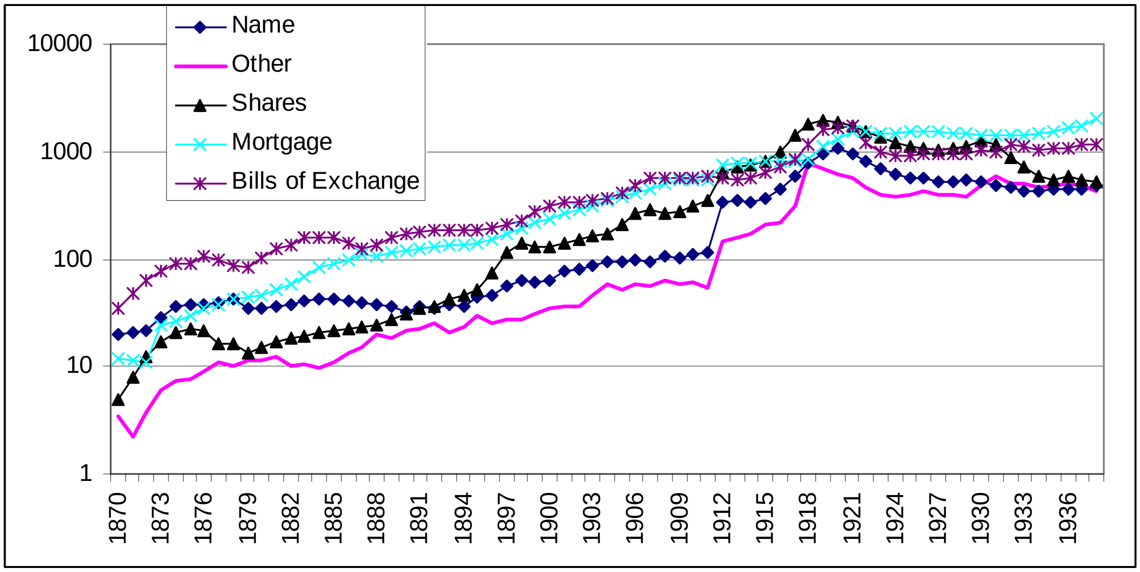
Commercial bank lending of all types increased in absolute values over the period (figure 4 below). We can roughly divide the development into three periods: First a period of steady growth until the mid-1890s. Second a rapid increase in lending especially with formal collaterals such as shares, mortgage and bills of exchange until around the time of the outbreak of WWI. Third the time of WWI and after reflects the booming economy and the decline thereafter when all kinds of lending increase significantly, but only mortgage ending continues to keep the levels reached during the WWI and even to grow.

Figure 4. Lending per collateral in millions of SEK, 1870 – 1938 (MSEK)



The size of the lending in absolute values at the end of the period is of such magnitude that it makes the prior periods almost significant in size. However, using a semi-logarithmic scale the development is somewhat clearer (figure 5). First we clearly can see the increase in lending with shares and bills of exchange in relation to the boom in the 1870s and the fall in relation to the bust. Second we can see the increase with the use of shares in relation to the increased establishment of joint stock corporations in the mid 1890s. Third we can see a shift upwards in mortgage lending in 1873 which was the peak of the boom in Sweden and the continuing comparably steady increase in this type of lending. Fourth we can see that the growth in lending in relation to the booms, and especially the WWI boom, took place within all forms of lending. Fifth, short term lending on bills of exchange and long term on shares seems to share the same characteristics by positively following the economic trend.

Figure 5. Lending per collateral in millions of SEK, 1870 – 1938 (semi-logarithmic scale)



We use differenced logarithmic values when we test the statistical relationship between the variables. The series have been differenced since we otherwise encounter problems of un-stationarity. The use of logarithmic values allows us to interpret the size of the coefficients since these will be in percentages. Our independent variables are lending with shares as collaterals, mortgage and the two added together as a represent for overall formalization.

Table 2. OLS-regressions on the causes of formalization, 1870 – 1938 (absolute values)

DLOG(SHARES)	Coeff.	Prob.	DLOG(MORTGAGE)	Coeff.	Prob.	DLOG(FORMAL)	Coeff.	Prob.
C	-0.07	0.01	C	0.00	1.00	C	0.13	0.00
DLOG(GDP)	-0.84	0.02	DLOG(M3(-1))	0.44	0.00	DLOG(M3(-1))	0.32	0.01
DLOG(INDUSTRY)	0.55	0.03	DLOG(M3)	-0.67	0.00	DLOG(URBAN)	2.35	0.02
DLOG(CORPCAP)	0.06	0.06	D(CORPEST)	0.00	0.03	D1874	-0.11	0.01
DLOG(M3)	1.12	0.00	DLOG(POPULATION)	3.55	0.06	D1911	-0.04	0.01
DLOG(URBAN)	4.26	0.02	DLOG(URBAN(-3))	2.85	0.00	DLOG(NAME)	0.37	0.00
D1934	-0.12	0.02	DLOG(NAME)	0.19	0.00			
DLOG(NAME)	0.50	0.00	DLOG(BOE)	0.20	0.01			
Adj. R2	0.68		Adj. R2	0.64		Adj. R2	0.73	

We can first conclude that lending with shares as collaterals (first column in table 2) was mainly driven by the urbanization (URBAN). Also the creation of financial wealth represented by the broad money supply was of importance (M3). This signals the need for a liquid secondary market as well as the relationship between the economic trend that might be captured by the broad money supply. Growth in the industrial sector influenced the use of lending on shares positively (INDUSTRY). We can also see that as lending on shares increased it did so in harmony with nonformalized lending on name (NAME). The establishment of new limited liability corporations measured as newly subscribed share capital (CORPCAP) was also positively related to the use of shares as collaterals but to a lesser extent than expected. The repressive law of 1934 was as expected negatively related to lending against shares (D1934). A puzzling outcome is the fact that changes in the growth of GDP was negatively related to shares as collaterals. The explanatory value, adjusted R2, for this model is a quite high sixty-eight percent.

Mortgage lending (second column in table 2) was clearly driven by the growth in population and urbanization. The interesting observation here is that the use of mortgage lending lagged three years behind the urbanization which means that people moved first and then mortgage lending increased. Second most important was again the growth of financial wealth represented by the broad money supply (M3), but again this affected mortgage lending with a time lag. The broad money supply of the same year was negatively related to mortgage lending, probably because this was more related to the current economic trend. Both nonformalized lending on name and short term lending on bills of exchange followed the pattern of mortgage lending and thus mortgage lending increased when these fors of lending did as well. The number of limited liability corporations established (CORPEST) was significantly related to mortgage lending, but not the amount of shares subscribed (CORPCAP). The explanatory value was for this model sixty-four percent.

Formalized lending (third column in table 2), that is lending using shares or real estate as collaterals, was thus not surprisingly most driven by the urbanization. The formalized lending was done in harmony with non-formalized lending on name. Again growth in the broad money supply was of importance, this time with a one year lag. Finally both the laws of 1874 and 1911 were negative for the formalization, although it is difficult to know if this indeed were the results of these laws. The explanatory value was again quite high; seventy-three percent.

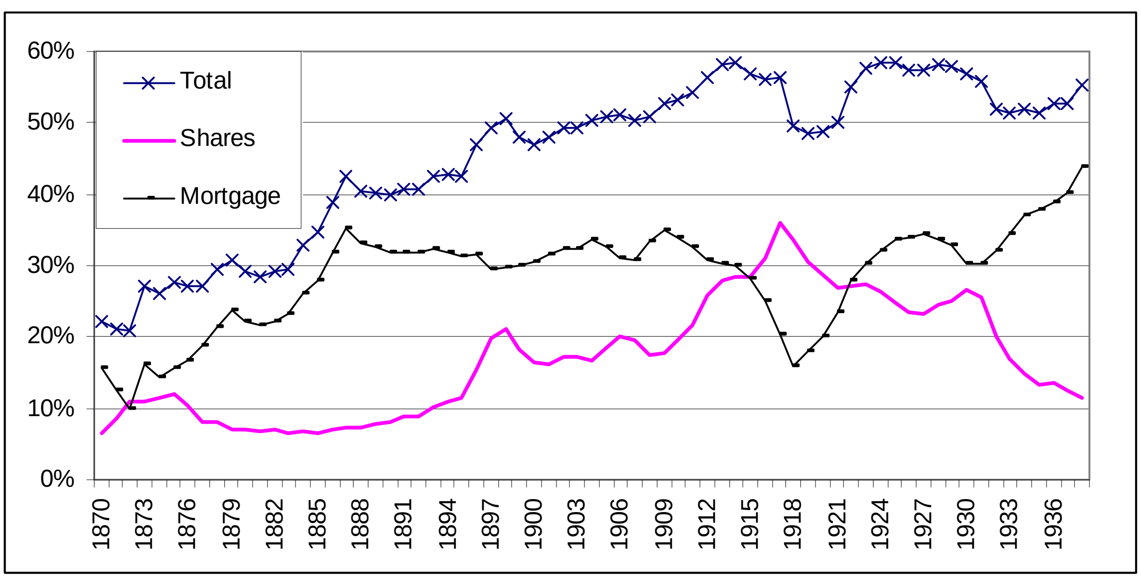
There are some conclusions to be drawn from the tests in absolute values: First the harmony in the growth of different kinds of lending underscores the commercial banks possibility to create credit when demanded. Thus if banks or other financial agents find investment opportunities of interest they will create credit based on these. And this observation is in line with one of the basic assumptions of this paper. Second urbanization was of utmost importance for the formalization, both as creating the basis for mortgage lending and not least by reflecting the process of industrialization and formation of limited liability corporations, and thus positively affect the use of shares as collaterals. Third, economic growth was surprisingly not visible in promoting formalization, perhaps it instead was a result of this formalization (a question which has to be studied later). Fourth that liquidity and the public's financial wealth, represented by the public's holdings of liquidity and deposits in the banking system, was of importance for growth in formalized lending.

What caused formalization: Relative values

Analyzing relative values show to what extent the commercial banks chose to increase or decrease one kind of lending in relation to its total lending portfolio. Thus we can see what variables that affected the commercial banks' choices to alter their portfolios to more formal lending. In figure 6 below we can see that formalized lending started to increase in the mid 1870s and continued to climb steadily up to a level of forty percent of total lending in the mid 1880s where it remained until the next shift upwards in the mid 1890s. From the late 1890s it reached fifty percent and remained above with the exception of the boom in relation to the WWI when formal lending temporarily decreased to below fifty percent.

This shows that during booms and manias also commercial banks utilizes less formal collaterals to be able to meet the demand for credit, as postulated by Kindleberger and Minsky. We can also see that lending with shares as collaterals followed the economic trend more than what was the case with mortgage lending. This is a result of the fact that shares are more liquid and possible to create on shorter notice than physical real estates; and thus shares are quicker to use in the credit creation process when demand is soaring as is the case during manias.

Figure 6. Formal long term lending in percentage of total lending, 1870 – 1938.



For the same reasons as above we use differenced and logarithmic values. The dependent variables are respectively lending with shares as collaterals (SHARES), mortgage lending (MORTGAGE) and the two added together (FORMAL) in percent of total commercial bank lending. The results of the OLS-regressions are illustrated in table 3 below.

Table 3. OLS-regressions on the causes of formalization, 1870 – 1938 (relative values)

DLOG(SHARES)	**Coeff.**	Prob.	**DLOG(MORTGAGE)**	**Coeff.**	Prob.	**DLOG(FORMAL)**	**Coeff.**	Prob.
C	-0.02	0.20	C	0.03	0.04	C	-0.09	0.02
DLOG(GDP)	-0.84	0.01	DLOG(INDUSTRY(-1))	-0.12	0.07	DLOG(GDP)	-0.37	0.01
DLOG(INDUSTRY)	0.57	0.02	DLOG(M3)	-1.22	0.00	DLOG(INDUSTRY)	0.23	0.02
DLOG(M3)	0.63	0.01	DLOG(M3(-2))	0.46	0.00	DLOG(M3)	-0.22	0.07
DLOG(CORPCAP)	0.05	0.05	DLOG(URBAN(-3))	1.96	0.02	DLOG(POPULATION)	4.71	0.00
D1934	-0.09	0.04				DLOG(URBAN(-3))	1.42	0.05
						D1874	0.07	0.05
Adj. R2	0.29		Adj. R2	0.69		Adj. R2	0.38	

Beginning again with shares as collaterals (first column in table 3) the pattern is similar to the results for absolute values. The difference is however that for the relative choice to use shares as collaterals urbanization was not of importance. Instead liquidity and industrial growth promoted the use of shares positively. Again, however, changes in GDP growth was negatively related to the use of shares. And the law of 1934 was repressive towards shares as collaterals in the banks' choice of lending portfolios. Explanatory value for the factors explaining the relative choice of shares as collaterals is twenty-nine percent.

Mortgage lending (second column in table 3) on the other hand was still highly dependent on urbanization in prior periods. The same peculiarity with the broad money supply exists, that it is that it was negatively related to mortgage lending in the same period but positive with a lag. The explanatory value is still a high sixty-nine percent.

Total formalization, i.e. the overall choice to lend on long term with shares or real estate as collateral in relation to all lending (column 3 in table 3) again stressed the importance of urbanization and population growth; the values of the coefficients are high showing the large impact of these variables on formalization. The impacts of the economic variables were again somewhat more complex with industrial growth promoting formalization but overall GDP growth being negatively related to it. The latter was the case also for the broad money supply. The banking act in relation to the adoption of the gold standard seems positively related to the formalization but it is probable that this is a coincidence in time. Overall explanatory value is thirty-eight percent.

V. Conclusions

Research in economic history as well as in economics acknowledges the importance of financial development for economic growth. However, this importance is not self-evident and certain requirements are needed for the financial system to have a positive impact on growth. In this paper, we stress the importance of the formalization process of the financial market, because it expanded the financial agents ability to engage in long-term financing

More specifically, we have studied how Swedish commercial banks transformed their lending in the late 19th and early 20th century. In the 1860s discounting bills of exchange and lending with name security dominated, but by the late nineteenth century lending backed by mortgages and shares had taken over as the primary forms of credit. This change is interpreted as part of a formalization process because mortgages and shares could be submitted to a more standardized valuation process and because of the possibility to exit on a secondary market.

While both mortgages and shares were part of the formalization process, they filled partly different roles. The lending backed by shares followed the pattern of industrialization and it was clearly positively linked to the economic trends; in the five biggest booms the share of share-backed-lending peaked, relative to the other forms of collateral. Prior to 1911, Swedish banks were prohibited to own shares, but the share-backed-lending was a way to get around this limitation. Thus, the data supports the Schumpeterian notion of the banks pivotal role in entrepreneurial finance. Unlike lending against shares mortgage lending followed a more steady growth path, and it actually moved in a contra cyclical manner, relative to other forms of collateral. The increased use of mortgages could be ascribed to two main shifts. Firstly, the number of mortgages linked to companies rose heavily. Furthermore, the demographic transition combined with heavy urbanization changed the conditions for the Swedish real estate. The large building projects in the cities required a lot of capital, but was also part of the capital formation process.

From the preliminary statistical tests we find evidence that the developed financial system represented by the broad money supply (M3) and especially demographic factors as population growth and urbanization drove the formalization in lending in general. The use of shares was more closely linked to the industrial sector and to the establishment of limited liability joint stock corporations. It is also clear that the commercial banking system indeed could provide credit when demanded, and this explains why all kinds of lending in absolute terms grew in harmony. It also explains the different roles played by lending against shares and mortgages in this process. Institutional variables, laws and regulations, played a minor role. The exception seems to have been the oppressive law against the use of shares as collaterals in 1934, and it is possible that this law partly can explain why the market for shares was more or less asleep until late in the twentieth century.

In this paper we have showed that commercial banks in Sweden formalized their portfolio of collaterals in the late 19th century and we have argued that this change enabled commercial banks to more actively finance the industrial breakthrough in Sweden. However, we do have to extend and deepen the statistical analysis before any major conclusions can be done. Furthermore, since we have only used aggregated data, the paper raises several issue for further research. Lastly, of course, remains the question whether the Swedish case is representative in an international context or if the rise in share-backed lending is an example what Cull et al discussed as the mulitplicity of financing solutions.[33] This comparative work remains to be done.

References

Algott, S. (1963) *Stockholms Fondbörs 100 år*. Stockholm

Allen, F. & Gale, D. (2001) “Comparative Financial Systems: A Survey” Working Paper April 2001

Battilossi, S. (2000) ’Financial innovation and the golden ages of international banking: 1890-1931 and 1958-81’, *Financial History Review*, 7, 141-175.

Bell, S. (2001) ‘The role of the state and the hierarchy of money’, *Cambridge Journal of Economics*, 25, 149-63.

Bladh, M. (2002), ”Stadshypotek och bostadsfinansieringspolitiken” in *I takt och otakt med tiden: Stadshypotek mellan marknad och politik,* Sjögren, H. (ed.). Stockholm.

Brisman, S. (1924) *Sveriges Affärsbanker. Grundläggningstiden.* Stockholm

Broberg, O. (2006) *Konsten att skapa pengar. Aktiebolagens genombrott och finansiell modernisering kring sekelskiftet 1900.* Göteborg.

Cottrell, P. (1993*) Industrial Finance 1830-1914: the finance and organization of British manufacturing industry*. London.

[33] Cull, et al (2006).

Cull, R., Davis, L.E., Lamoreaux, N. & Rosenthal, J-L. (2006) "Historical financing of small- and medium-size enterprises" *Journal of Banking & Finance* **30**, pp. 3017-3042.

Diamond, D. W. (1997) "Liquidity, Banks, and Markets." *Journal of Political Economy* **105**, pp. 928-956

Diamond, D. W. & Rajan, R.G. (2001) "Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking." *Journal of Political Economy* **109**, pp. 287-327

Fälting, L. (2001) *Småhusfinansiering: en studie av kommunens, satens och enskilda aktörers riskhantering i Nyköping 1904-1948.* Uppsala.

Guinnane, T., Harris, R., Lamoreaux, N.R., Rosenthal, J-L. (2007) "Putting the Corporation in its Place" *Enterprise and Society* **8**, pp. 687-729.

Gasslander, O. (1962) *The history of Stockholm enskilda bank to 1914*. Stockholm.

Gårdlund, T. (1947) *Svensk industrifinansiering under genombrottskedet 1830-1913*. Stockholm.

Hansson, P. & Jonung, L. (1997) "Finance and economic growth: the case of Sweden 1834-1991" *Research in Economics* **51**, pp. 275-301

Hildebrand, K-G. (1971) *I omvandlingens tjänst: Svenska Handelsbanken 1871-1955*. Stockholm.

Holmquist, S. (2003) *Kapitalbildning i svensk industri*. Lund.

Charles P. Kindleberger (2001) *Manias, Panics, and Crashes: A History of Financial Crises*

Larsson, M. (1998) *Staten och kapitalet*. Stockholm.

Levine, R. (1997) "Financial Development and Economic Growth: Views and Agenda" *Journal of Economic Literature* **35**, pp. 688-726

Lindgren, H. (2002) "The Modernization of Swedish Credit Markets, 1840-1905: Evidence from Probate Records" *Journal of Economic History* **62**, pp. 810-32.

Lipartito, K. & Sicilia, D.B. (2004) *Constructing Corporate America. History, Politics, Culture.* Oxford.

Ögren, A. (2003) *Empirical Studies in Money, Credit and Banking: The Swedish Credit Market in Transition under the Silver and Gold Standards, 1834 – 1913.* Stockholm

Ögren, A. (2006) "Free or Central Banking? Liquidity and Financial Deepening in Sweden, 1834 – 1913." *Explorations in Economic History* **43** pp 64-93.

Ögren, A. (2007) "Lender of Last Resort in a Peripheral Economy with a Fixed Exchange Rate: Financial Crises and Monetary Policy in Sweden under the Silver and Gold Standards, 1834 – 1913" in Cottrell, P., et al. (Eds.) *Centers and Peripheries in Banking: The Historical Development of Financial Markets* Ashgate pp. 225 – 252

Ögren, A. (2008) "The Rationale of Private Note Issuance: Note Issuing Commercial Banks in the Economic and Financial Development of Nineteenth Century Sweden" *Working Paper 2008:8* EconomiX/Université de Paris X – Nanterre

Ögren, A. (2009) "Financial Revolution and Economic Modernization in Sweden" Forthcoming in *Financial History Review*

Pearson, R., Taylor, J. & Freeman, M. (eds.) (2006) *The history of the company. The development of the Business Corporation 1700-1914*. London.

Perlinge, A. (2005) *Sockenbankirerna: kreditrelationer och tidig bankverksamhet: Vånga Socken i Skåne 1840-1900*. Stockholm.

Rousseau, P.L. & Sylla, R. (2003) "Financial systems, economic growth and globalization" in Bordo, M.D., Taylor, A.M. and Williamson, J.G. (Eds.) *Globalization in Historical Perspective.* University of Chicago Press.

Rousseau, P.L. & Sylla, R. (2005) "Emerging financial markets and early US growth" *Explorations in Economic History* **42** pp 1-26

Sammandrag af Bankernas Uppgifter [Summary of Bank Reports]: 1871-1877, 1878-1880, 1881-1883, 1884-1886, 1887-1889, 1890-1892, 1893-1895, 1896-1898, 1899-1901, 1902-1904, 1905-1907, 1908-1910, 1911

Sandberg, L. G. (1978) "Banking and Economic Growth in Sweden before World War I" *Journal of Economic History* **38**, pp. 650-680

SCB (1955) *Historisk statistik för Sverige. Part I. Befolkning.* [Historical Statistics of Sweden I. Population] Stockholm

Schumpeter, J. A. (1934 [1911]) *The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle*. Cambridge, MA.

SIGAB (1919*) Stockholms Intecknings Garanti AB 1869-1919*. Stockholm.

Sjögren, H. (1991) *Bank och näringsliv. Tvärsnittsanalyser och longitudinella studier av relationen mellan svenska företag och affärsbanker inom det bankorienterade finansiella systemet 1916-1947.* Uppsala.

Söderlund, E. (1964) *Skandinaviska banken i det svenska bankväsendets historia 1864-1914*. Stockholm.

SFS [Swedish Code of Statues]: 1846:1, 1864:31, 1874:44

Sveriges Riksbank (1931) ”Statistiska tabeller” [Statistical tables] in *Sveriges Riksbank 1668-1924. Bankens tillkomst och verksamhet. Part V*. Stockholm

Teichova, A., Gourvish, T. & Pogany, A. (eds.) (1994) *Universal Banking in the Twentieth Century*. London.

Tilly, R.H. (1989) “Banking institutions in historical and comparative perspective: Germany, Great Britain and the United States in the nineteenth and early twentieth century.” *Journal of Institutional and Theoretical Economics* **145**, pp. 189-209.

Wachtel, P. (2001) “Growth and Finance: What Do We Know and How Do We Know It?” *International Finance* **4**, pp. 335-362

Wray, R. L. (1990) *Money and credit in capitalist economies: the endogenous money approach.* Aldershot.

APPENDIX A

Swedish Commercial Bank Lending 1870-1938, distributed on type of collateral.

	Share	Mortgage	Name	Other
	mSEK	*mSEK*	*mSEK*	*mSEK*
1870	4,9	11,8	20,2	3,5
1871	7,8	11,3	20,7	2,2
1872	12,4	11,0	21,7	3,8
1873	16,8	24,5	28,3	6,1
1874	21,1	26,4	36,0	7,4
1875	22,7	26,1	37,1	7,6
1876	21,7	30,8	38,3	8,8
1877	16,6	32,6	39,8	11,1
1878	16,1	36,1	42,3	10,1
1879	13,1	37,5	34,1	11,2
1880	14,8	40,9	35,3	11,3
1881	16,8	46,9	36,5	12,3
1882	18,2	50,8	38,1	10,2
1883	18,9	60,1	40,1	10,4
1884	21,1	72,7	42,8	9,9
1885	21,2	77,3	41,8	11,0
1886	22,3	87,4	40,4	13,3
1887	22,9	98,3	38,5	15,3
1888	23,9	95,7	38,2	19,8
1889	27,5	103,8	36,3	18,4
1890	30,5	106,8	32,7	21,4
1891	34,5	112,5	35,6	22,6
1892	36,8	118,9	35,0	24,8
1893	42,4	122,6	38,0	21,1
1894	46,7	123,4	36,7	23,6
1895	51,3	130,0	44,2	29,9
1896	75,1	144,1	45,6	25,5
1897	115,1	160,5	56,4	27,0
1898	137,7	181,4	63,7	27,8
1899	129,8	200,2	61,9	30,5
1900	127,4	219,0	63,4	34,7
1901	139,2	270,3	78,5	35,9
1902	151,9	285,7	81,6	35,7
1903	163,1	308,0	88,2	46,2
1904	172,1	349,5	93,6	58,1

1905	211,4	374,2	93,4	52,0
1906	264,2	410,3	97,7	57,5
1907	283,6	446,5	95,8	56,8
1908	266,2	504,9	106,8	62,5
1909	276,6	540,9	103,0	58,4
1910	310,4	537,5	112,3	59,9
1911	357,6	537,2	112,9	53,6
1912	627	749	341	145
1913	710	767	352	158
1914	740	783	336	173
1915	808	801	370	211
1916	990	800	444	221
1917	1440	812	579	311
1918	1811	859	781	787
1919	1913	1132	968	678
1920	1855	1300	1052	602
1921	1746	1528	966	563
1922	1519	1558	815	467
1923	1343	1484	681	402
1924	1217	1492	624	387
1925	1128	1520	575	390
1926	1074	1542	558	421
1927	1015	1510	519	390
1928	1078	1489	515	388
1929	1123	1468	537	384
1930	1253	1427	522	475
1931	1183	1398	479	590
1932	889	1419	467	495
1933	707	1427	427	495
1934	597	1496	434	460
1935	546	1545	440	480
1936	580	1657	450	506
1937	544	1759	443	483
1938	530	2029	479	436