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Does Inflation and High Taxes Increase Bank Leverage?+

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Does the combination of inflation and high corporate taxes explain the increase in bank leverage in the 20th century? Inflation automatically increases bank debt, while high corporate taxes hinder capital accumulation. Capital ratios therefore drop, until leverage-induced returns are sufficient to uphold them at constant levels. This theory was confronted with Swedish bank data 1870–2001. Bank capital ratios dropped when inflation and corporate tax rates were high, during WWI and in 1940–1980. The theory can explain the sinking bank capital ratios during these periods, but also their relative stability since the early 1980s. High corporate taxes and inflation were estimated to account for half of the drop in Swedish bank capital ratios since WWII.

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Introduction

For any country, the leverage of its commercial banking system is a point of concern. Because banks are central to the financial system and to the whole economy, an inadequately capitalised banking sector may become a source of instability that could provoke serious financial harm. Low capital levels arguably contributed to the severeness of the banking crises in Asia and Europe in the 1990s. In Sweden, bank capital was barely able to sustain the credit losses of the crisis years in 1991–1993, in such a way that practically the whole commercial banking system was balancing on the verge of bankruptcy. For this reason, substantial effort both in academia and in practical policy-making is devoted to devising rules and systems that will ensure that capital ratios of banks are adequate. A recent example is when major countries endorsed the new Basel Capital Accords (Bank for International Settlements 2004).

In view of this, there are surprisingly few studies on what drives long-term changes in bank leverage. Berger *et al* (1995) present data on the capital-asset ratio (CAR) of the US banking system in 1840–1990. They find a secular drop through the whole period. The drop is particularly sharp during the periods 1914–1920 and 1933–1940. The authors suggest that these drops may have been due to the introduction of the Federal Reserve System in 1914, and the invention of federal deposit insurance in 1933. Both these inventions lowered banks' need for precautionary capital. Saunders and Wilson (1999) compare changes in the CAR of the banking systems in Canada, the United States and the United Kingdom. They report a particularly sharp drop in the CAR of Canadian and British banks between 1900 and 1920 – a period of rapid consolidation when the number of banks substantially decreased. By contrast, the drop in the CAR in the US started later, after 1933, and they link this drop to the invention of federal deposit insurance. Kroszner (1999) instead suggests that the secular drop in the CAR may be a consequence of increasingly more liquid financial markets, as a result of financial innovation.

In this paper I explore an alternative hypothesis, namely whether two fundamentals of post-WWII macropolicy in many countries – high corporate taxes and inflation – have had the unintended consequence of increasing bank leverage. At the end of WWII, Gunnar Myrdal wrote an

essay entitled "High Taxes and Low Interest Rates" (Myrdal 1944). The subject was postwar policy. In countries like the US, the UK and Sweden, interest rates had dropped while corporate taxes had been raised to "previously unthinkable" levels in the decade preceeding and during the war. Although this development had been more or less unplanned, the process was ultimately driven by the growth of government. Myrdal analysed how low interest rates and high taxes depended on each other, and argued that both must be maintained after the war (along with the wartime regulatory system, such as credit regulations and foreign exchange controls), if the political demands of the time were to be met. Influential interests in farming, housing, business and government demanded low interest rates. However, the main function of the interest rate was to act as a regulator of investment. A below-equilibrium interest rate would set in motion a Wicksellian cumulative process – therefore, high corporate taxes were needed to "fill the shoes" as a regulator of investment demand. Conversely, high corporate taxes were needed to meet political goals of equalising incomes and aid in the expansion of government. However, to keep after-tax profits at acceptable levels to business owners, low interest rates were required as compensation.

The eight-page essay, published in a *Festschrift* to Eli F. Heckscher on his 65th birthday, was to have a large influence. Short, concise, intelligible, it seemed to suggest how all policy goals could simultaneously be attained. According to Krister Wickman, former Governor of the Bank of Sweden, Myrdal's analysis became the intellectual basis for Swedish monetary policy after the war (Wickman 1958, Jonung 1990). This policy was instituted in the so-called Interest Rate Regulation Act (*räntereglerings*lagen), in 1951.

However, did the analysis miss something? Could the combination of low interest rates and high taxes have unintended consequences on bank leverage? Low interest rates normally mean monetary expansion and inflation. Banks are special in that inflation automatically tends to swell bank deposits and hence bank debt. To be able to keep their capital ratios constant, banks must actively add to their equity in step with inflation. However, high corporate taxes hinder capital accumulation. Bank capital ratios will therefore decrease. But decreasing capital ratios means increasing leverage, which means increasing returns. After a while these become sufficient to uphold capital ratios at constant levels.

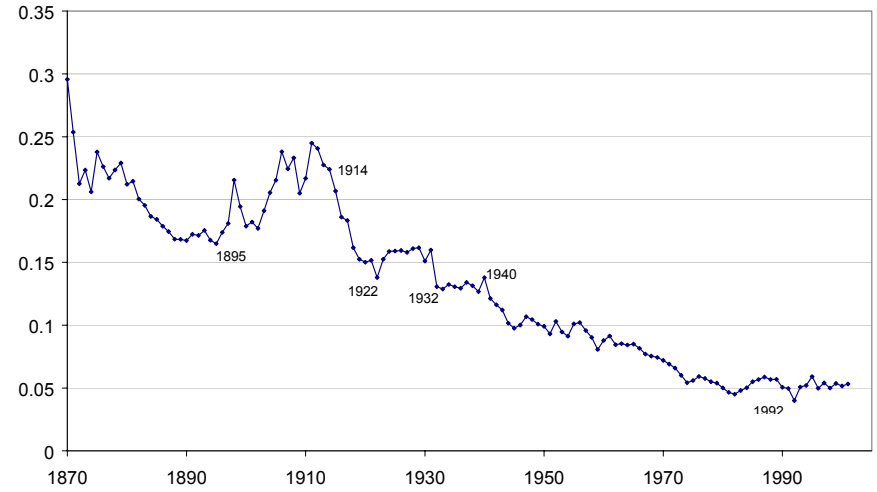
As shown in Hortlund (2005), the leverage of the Swedish commercial banking system mainly increased during two periods in the 20th century, namely during WWI and in 1940–1980. Both were periods of inflation and high corporate taxes. Does inflation and high taxes increase bank leverage? This question is here confronted with Swedish bank data 1870–2001. Over the period 1882–2001, the combination of high corporate taxes and inflation, which is here called excess inflation, was found to be a statistically significant factor for the decrease in the CAR. For smaller sample periods excluding WWI, the relationship was statitically weaker. With regard to economic significance, excess inflation could have accounted for half of the postwar drop in Swedish bank capital ratios, or even more. Since capital ratios were inadequate to cope with the Swedish banking crisis in 1991–1993, it may be asserted that postwar macropolicy of inflation and high corporate taxes (within a framework of regulations) contributed to the severeness of the crisis.

To my knowledge, there is as yet no study that investigates the long-run effects of high corporate taxes and inflation on bank leverage. These two should be of interest as potential factors behind decreasing bank capital ratios also in countries like the US, the UK and Canada. The period 1895–1920 was a period of worldwide monetary expansion – in particular 1914–1920, when the international gold mechanism became inoperative, and governments made use of the printing presses to finance wartime needs. Inflation may therefore be an alternative to consolidation in explaining a particularly rapid decrease in the CAR during this period. Likewise, the year 1933 saw the invention of federal deposit insurance in the US, but also the abandonment of the gold standard, and governments thereafter engaged in monetary expansion – particularly after 1940 when again wartime financial needs became imperative.

1 Leverage, inflation and corporate taxes, 1870–2001

To render credible the idea that inflation and high corporate taxes might increase bank leverage, this section presents figures on bank leverage, corporate tax rates, and inflation, in Sweden 1870–2001. Figure 1 shows the capital-asset ratio (CAR) of the Swedish commercial banks in 1870–2001.

Figure 1 Capital-asset ratio of the Swedish commercial banks, 1870–2001.



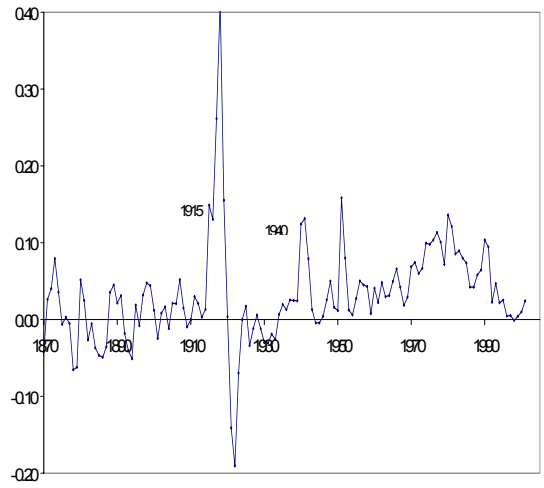
Source: Summary of the Bank Reports. Hortlund (2005).

Data are taken from the Summary of the Bank Reports. The calculation of the CAR is explained in Hortlund (2005, Essay 1 of this volume). In 1870–1890 the CAR dropped substantially, although there was no inflation in this period. The reason was rather a rapid expansion of the deposit business. People were now increasingly depositing their savings with the banks. From 1895 to 1910 the CAR *increased*. The reason was a large entry of new banks, and hence the infusion of new equity capital into the banking system – new banks start with equity, but have not yet acquired debt. The number of banks increased from 45 in 1895 to 81 in 1909 (Summary of the Bank Reports). Then a rapid decline in the CAR followed, particularly during and after WWI, 1915–1920. After the war in 1921–1922 there was a recession, caused by a contractionary monetary policy. In 1922 bank profits for the first time turned negative, which explains the large drop in the CAR this year. The CAR was then highly stable in the 1920s. The next large drop occurred in 1932, the year of the Kreuger crash, and the year after Sweden left the gold standard. For the second time bank profits turned negative – the CAR again spectacularly dropped. For the rest of the 1930s, the CAR was very stable. In 1940 a secular decline in the CAR begins, which lasts until the beginning of the 1980s. In 1991–1993 Sweden experienced its most severe bank crisis ever. For the third time in history, profits turned sharply negative, The

CAR dropped in 1992, but not in 1991 and 1993. After the crisis, the CAR has been exceptionally stable.

The drops during WWI and in 1940–1980 are of particular interest. That these were times of high inflation is shown in Figure 2.

Figure 2 Annual percentage change in the Consumer Price Index, 1870–2001.



	Mean	S. D.
1870–1914	0.6	3.4
1915–1920	19	14
1924–1939	–0.2	2.2
1940–1950	4.1	5.0
1950–1960	4.4	4.4
1960–1970	4.1	1.7
1970–1980	9.0	2.4
1980–1990	8.2	3.0
1990–2000	3.1	3.6
1940–1980	5.5	4.2

Source: Statistics Sweden.

Before WWI, average inflation was almost zero, although volatility was quite high.[1] Then came the high inflation period of WWI, 19 percent on average in 1915–1920. This coincides with the large drop in the CAR, which decreased from 22 to 15 percent in 1914–1920. In the 1920s and 1930s, inflation was again non-existent. From 1940 until 1990, inflation has been consistently high, at least compared to the situation before WWI. Between 1940 and 1970 it was about 4 percent (Bretton Woods), and in 1970–1990 it was about 8–9 percent. In 1993, it became official monetary policy to keep inflation at 2 percent. Since then, inflation has been low.

The periods of falling CAR thus seem to coincide with periods of high inflation. It is interesting that Lars-Erik Thunholm, one of the most

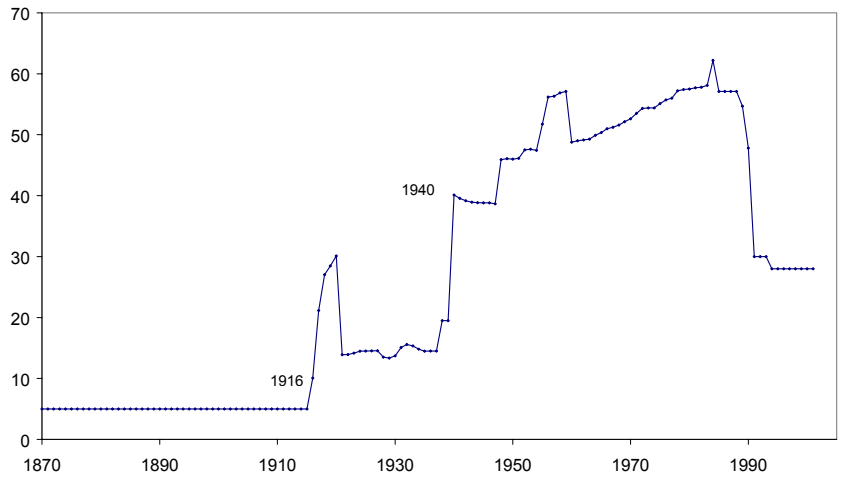
[1] Price-indices before WWI are not wholly commensurate with those of later periods, however. Because they were constructed on the basis of a smaller number of goods, they tended to fluctuate more. See Romer (1986), Bergman and Jonung (1988), Bohlin (2003).

influential Swedish bankers in the 20th century, has suggested that inflation was the main cause behind the decreasing CAR of the Swedish banks:

> [The 20 percent capital requirement of the Bank Law of 1911] has since then repeatedly been subject to change, mainly due to a continuous inflationary development, that has caused bank deposits to expand, while it has not been possible to increase equity at the same rate (Thunholm 1962, p. 78).

The periods of decreasing capital ratios were not only periods of inflation, but also of high corporate tax rates. This is seen in Figure 3.

Figure 3 Corporate tax rate in Sweden, 1870–2001.



Sources: 1870–1920: Summary of the Bank Reports (taxes paid). 1921–2001: calculations by Gunnar Du Rietz (Johansson and Du Rietz, 2005).

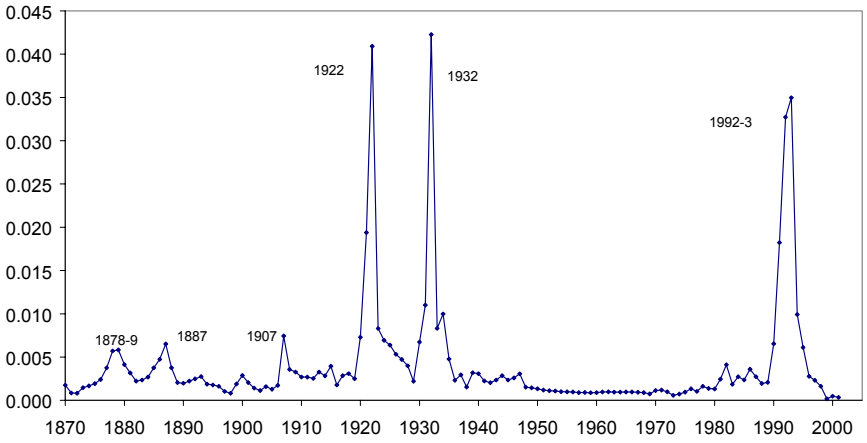
Before WWI, corporate taxes were low. Corporate taxes were paid to the local municipalities, and not to the government. Here they have been set to 5 percent (see Johansson and Du Rietz, 2005). During the war, so called "war-boom taxes" were imposed, whereby banks paid taxes of about 30 percent. After the war, corporate taxes were made permanent, although at relatively low levels. The tax rate was stable until WWII, when taxes were raised to 40 percent. Taxes were from then on high. They exceeded 50 percent most of the time after the war, until a tax re-

form in 1990 lowered them to 30 percent, and then to 28 percent, which is the current level.

Did high leverage aggravate the 1990s crisis?

We saw that postwar capital ratios dropped from levels around 13 percent in 1940 to levels around 5 percent in the 1980s, and that inflation and high corporate taxes potentially contributed to this development. One may ask if sinking capital ratios was and is a problem. Could not on the contrary the development have enhanced economic efficiency, since banks previously may have been capitalised in excess of modern-day needs? While capital ratios above 10 percent were suitable at the turn of the 20th century, perhaps 5 percent is fully adequate at the end of it? However, figures for historic credit losses 1878–2001 indicate that postwar capital ratios dropped to levels that were too low from a stability point of view. Although credit losses in the crisis in 1991–1993 were not particularly high historically, the low capitalisation made them endanger the whole banking system. Figure 5 shows credit losses (including realised losses on sales) as a percentage of assets for the Swedish commercial banks in 1870–2001.

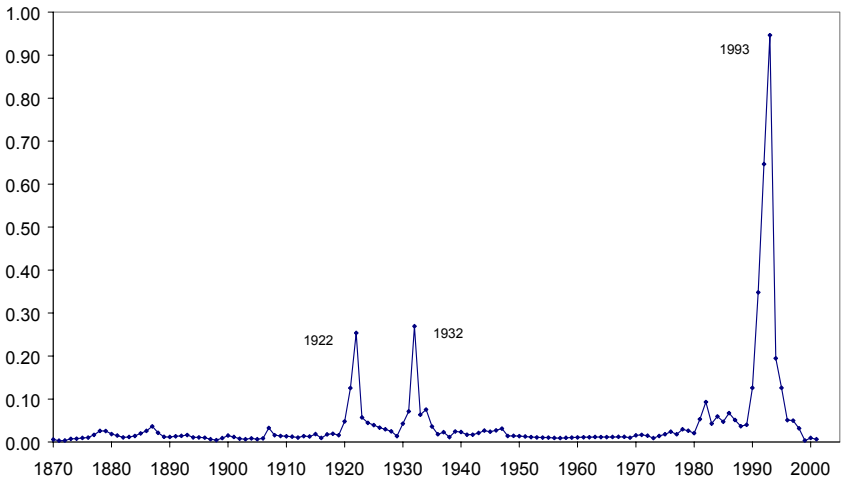
Figure 4 Credit losses as a percentage of assets for the Swedish commercial banks, 1870–2001.



Source: Summary of the Bank Reports. Average assets over the year.

While losses as a percentage of assets were lower post-WWII in "normal" times compared to what they were pre-WWI, this was not the case during crisis years. Swedish banking has suffered three great crises, namely in 1921–1922, 1932 and 1991–1993. Figure 4 shows that losses as a percentage of assets were actually higher in 1922 and 1932 than they were in 1992–1993. The losses in the 1990s were not greater – although one could argue that this crisis was special in that there were more crisis years (with two years when losses were extremely high, compared to one year each in the crises of the 1920s and 1930s). However, if we look at losses as a percentage of equity, the picture becomes different, as Figure 5 shows:

Figure 5 Credit losses as a percentage of equity for the Swedish commercial banks, 1870–2001.



Source: Summary of the Bank Reports.

Figure 5 reveals that in "normal" times, credit losses as a percentage of equity were slightly higher after WWII than they were prior to WWI (see also Table 1 below). Most importantly, the losses during crisis years were much higher. These losses were at all time high in 1993 – a staggering 90 percent of equity. Even if one disregards this "extra-year", losses were about 70 percent of equity in 1992, which is more than twice the amount of the crises in 1922 and 1932. Thus it can be argued that because of high leverage, the 1990s crisis became the most severe in the history of Swedish banking. The aggregate equity of the whole banking

system was in danger of being wiped out. The credit losses materialised when the overheated economy of the 1980s was radically brought to a halt. Factors were: 1) a major change in the tax code, where interest subsidies were slashed from 80 to 30 percent; and 2) a change in the goal of monetary policy, from full employment to low inflation. Combined, these factors increased real interest rates from negative numbers to positive ones of 5–10 percent. An additional factor was: 3) the financial turmoil of the ERM crisis in the autumn of 1992, during which the Bank of Sweden raised its "margin rate" to 500 percent. On the roots and consequences of the Swedish banking crisis, see Englund (1999). Table 1, showing mean and standard deviation of losses as a percentage of assets and equity for three different time periods, underscores what have been said.

Table 1 Mean and standard deviation of credit losses to assets and equity for Swedish commercial banks, 1871–2000.

	To assets		*To equity*	
	Mean	*S.D.*	*Mean*	*S.D.*
1871–1914	0.0027	0.0015	0.014	0.0071
1940–1980	0.0013	0.00066	0.016	0.0062
1980–2000	0.0067	0.0099	0.15	0.23

Source: Summary of the Bank Reports. Average assets over the year.

2 Other explanations

This section discusses some alternative explanations to secular increases in bank leverage. Some of these will be used as control variables in the regression analysis below.

Financial innovation

A powerful argument holds that bank capital has secularly dropped because of financial innovation (Kroszner 1999). Financial markets are deeper and more diversified today than was the case in the 19th century, wherefore banks' need for precautionary capital has decreased. Ögren (2003) studies the Swedish commercial banks in 1834–1913, and suggests that the note-issuing activity of the Swedish Enskilda banks created liquid financial markets which lowered the need for precautionary capital. Taking a "functional" approach, Merton (1995) sees equity as a historically conditioned instrument whose task is to guard against un-

certain events. With financial innovation, new instruments emerge that offer companies better opportunities to hedge against risk, and the historic role of equity decreases.

Frame and White (2004) argue that despite the fact that financial innovation is prominently discussed in the modern literature, there is relatively little empirical testing of the claims involved. Surveying the empirical literature on financial innovation, they find only 24 such studies, most of them conducted after the year 2000. There seems to be no empirical studies of the long-term (century-long) role of financial innovation on bank performance.

In any case, financial innovation seems incapable of explaining the decreasing capital ratios of the Swedish banks after WWII. There was a well-functioning financial market in the 1920s and 1930s. At the outbreak of WWII financial markets virtually stopped to function. Heavy regulations and foreign exchange controls were in place 1940–1980. There was no money market, and the stock exchange lived a slumbering existence. Emission controls prohibited firms from issuing bonds. Deregulation started in the early 1980s, and financial markets revived. New instruments were introduced. An option exchange started. Thus, data do not support the financial innovation hypothesis. Bank capital ratios were stable in the 1920s and 1930s when financial markets were active, decreased in 1940–1980 when financial markets were shut down, and once again stabilised in the early 1980s when financial markets revived. The financial innovation hypothesis predicts the opposite: bank capital should have decreased in the 1920s and 1930s, stabilised or increased in 1940–1980, and decreased from 1980 and onwards.

Market substitution

A more promising argument is that the revival of financial markets in the early 1980s may have stabilised the CAR because financial markets are a substitute to banks. In the regulated environment of the period 1940–1980, firms and investors were restricted to banks for funding. With the reactivation of financial markets, investors could raise capital directly on the market – this should tend to lower the market share of banks and hence their volume assets, and put upward pressure on the CAR.

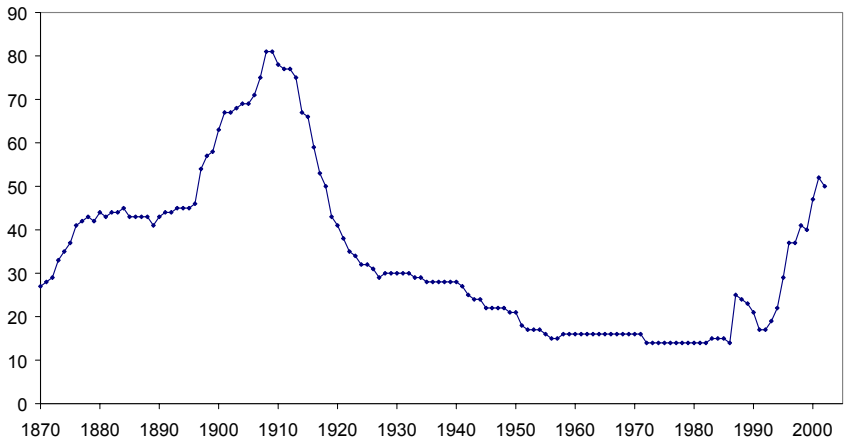
Market discipline

Market discipline is increasingly emphasised as an important mechanism that discourages banks from taking excessive risks. It has recently been incorporated as the "Third Pillar" of the new Basel Capital Accord (Bank for International Settlements 2004). The deregulated, increasingly competitive environment since the early 1980s could possibly have imposed market discipline on the Swedish banks and thus stabilised their capital ratios. In a competitive environment, financial strength becomes a means for banks to attract customers. The views of international credit rating agencies matter. Flannery and Rangan (2002) show that bank capitalisation increased in the US in the latter half of the 1990s, beyond the capital requirements stipulated by the Basel accords. They attribute this extraregulatory capitalisation to market discipline: banks with higher default risk need higher capital ratios to convince investors. The market discipline argument can potentially explain the 20th century movement in the CAR of the Swedish banks.

Consolidation

Consolidation may affect leverage in two ways. First, new banks start with equity but have not yet acquired debt. A time of "disconsolidation" when new banks enter the market should therefore see an increase in the aggregate CAR of the banking system. Second, consolidation means that banks may take advantage of economies of scale. A larger bank can diversify assets and thus decrease overall portfolio risk. These scale effects may however rapidly decrease and become negligible beyond a certain size. Saunders and Wilson (1999) suggested consolidation as the prime mover behind increasing leverage in the Canadian and British banking systems in the early 20th century. It could be of importance also in the Swedish case, as Figure 4 reveals:

Figure 6 Number of commercial banks, 1870–2001.



Source: Summary of the Bank Reports, Statistics Sweden.

The number of banks rose in the early 1870s, but was then stable 1876–1896. In the boom period of the late 19th and early 20th century, the number of banks grew rapidly. In 11 years they doubled, peaking in 1908. A time of consolidation then started, coinciding with the new Bank Law of 1911 and accelerating during WWI. The downward trend bottomed in 1927. In the 1930s the number of banks were stable. Then in 1940 a new period of consolidation started that lasted until 1957. The number of banks then remained stable until 1986, when deregulation and a more liberal chartering policy saw new banks, domestic and foreign, enter the market. The number of banks has increased substantially during the last decade and are now as many as they were in the 1890s.

Comparing with the UK and Canada, the increase in Swedish banks 1896–1908 seems to be unique. The consolidation in Sweden 1910–1920 also seems to have been more rapid – perhaps in part a consequence of the previous bank boom.

Obviously, there appears to be a close connection between changes in the CAR and the number of banks. Figure 4 may be compared to Figure 1. The rise in the number of banks in the late 1890s coincides with the increase in aggregate CAR. The rapid decrease in aggregate CAR in the period 1910 to 1925 coincides with the rapid decline in the number of banks. Both the CAR and the number of banks are stable in the 1930s. The CAR and the number of banks decline slowly together 1940–1980.

Legal restrictions: deposit insurance

Deposit insurance is widely held to increase bank leverage (Berger *et al* 1995, Saunders & Wilson 1999). Deposit insurance create moral-hazard incentives for banks to lower their capital ratios. The literary prominence of the deposit-insurance argument is largely due to the American experience of the 1930s with the founding of the Federal Deposit Insurance Corporation in 1933. However, deposit insurance is largely an American phenomenon. Most other countries did not have deposit insurance before the 1990s, and hence deposit insurance cannot explain sinking post-WWII capital ratios in the world outside the US. This is the case of Sweden, where deposit insurance did not exist before 1996.[2]

Capital requirements

Legal capital requirements entered for the first time with the Bank Law of 1911. According to this law, equity had to be at least 20 percent of deposits. The capital requirements were consistently lowered whenever banks were in trouble of not fulfilling them. The 20 percent rule was suspended during WWI. From 1921, the equity ratio for large banks was 12.5 percent – from then on, the capital requirement was lower for large banks. In 1923–1925, debenture loans were accepted as eligible capital. From 1938, deposits backed by cash (giro accounts at the Bank of Sweden) were exempted from capital requirements. With the new Bank Law of 1955, "riskless deposits" – deposits backed by cash and government and other eligible bonds – were exempted from requirements. In 1968 new principles for calculating capital requirements were adopted. From then on, capital would have to be sufficient relative to assets, rather than to deposits. Assets were weighted by their relative riskiness, where cash and government- and equivalent bonds were perceived as riskless and excluded from capital requirements. Capital requirements were again modified and lowered in the 1980s, when debenture loans were allowed as eligible capital (Wallander 1994, p. 137).[3]

Since the Bank Supervisory Authority would always be willing to modify the rules in times of trouble, capital requirements imposed from

[2] However, Ljungqvist (1995) argues that an "implicit" insurance existed before that date.

[3] On bank legislation and legal requirements from 1880 and onwards, see Frits (1988), Larsson (1988) and Söderlund (1978).

1911 and onwards cannot be said to have been binding. Binding capital requirements emerged for the first time with the Basel accords in 1988. However, since the capital requirements from 1921 were lower for larger banks, the legislation may have enforced the movement towards consolidation.

The Bank of Sweden regulations

The period of decreasing CAR in 1940–1980 occurred in a time when financial markets were almost completely regulated. As mentioned in the introduction, Swedish credit markets were heavily regulated at the outbreak of WWII. The regulations were temporary wartime measures, but were *de facto* continued after the war. They were abolished in the 1980s. The main instrument of postwar regulations was the so-called Interest Rate Regulation Law (*räntereglеringslagen*), which was passed in November 1951. It was an "enabling act" that gave the Bank of Sweden the option to control the emission of bonds, and to regulate interest rates. Empowered by this act, the Bank of Sweden was able to make "voluntary" agreements with the commercial banks (known as the "Bank of Sweden regulations"). At monthly meetings, so called liquidity ratios were agreed upon, which meant that cash plus government- and construction bonds should be a certain percent of deposits. The purpose of the liquidity ratios was to facilitate fiscal policy, and to channel credit into the public sector and into housing construction. The largest banks were required to have a higher liquidity ratio. In February 1952 the liquidity ratio was set to between 15 to 33 percent (the latter for the largest banks). The liquidity ratios increased by time; in 1959 to an interval of 20 to 40 percent, and in 1960 to an interval of 25 to 45 percent. In addition to liquidity ratios, the Bank of Sweden controlled the emission of bonds, which in practice meant that firms outside the construction sector were prohibited to issue them. In addition, the Bank of Sweden at times imposed lending ceilings to control the credit policies of the banks.

In the late 1970s the government sector ran large budget deficits. It became increasingly difficult to finance these through the banking system, wherefore a market for government bonds was created, which revived financial markets that had been dormant since the end of WWII (Henrekson 1995). The government also began to lend abroad, and this

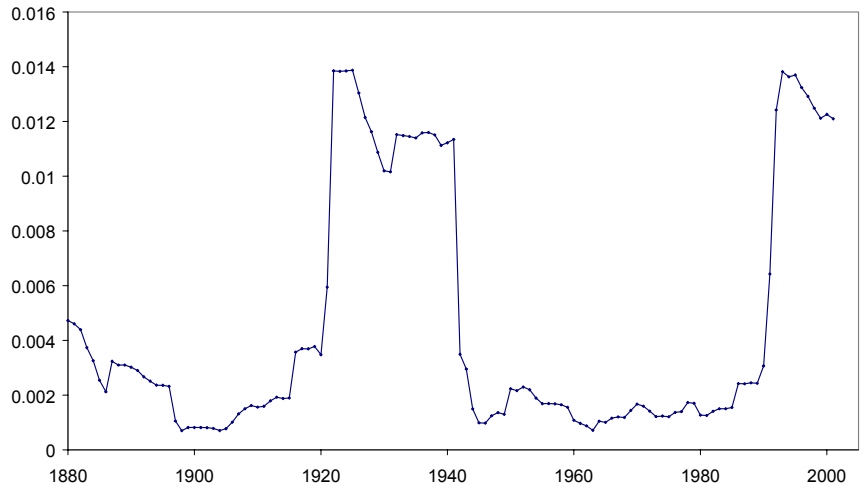
lending tended to weaken the effectiveness of the foreign exchange controls. In addition, there was an international trend that favoured deregulation of financial markets. In the early 1980s, financial markets in general and the banking sector in particular were rapidly deregulated. In September 1983 the liquidity ratios were abolished. In November 1985 lending ceilings and bond emission controls were abolished. Foreign ownership of banks was allowed, and new banks chartered. Finally, in 1989 the foreign exchange controls were abolished.

It is interesting that the regulation period coincides with the period of decreasing CAR, from 1940 to the early 1980s. This suggests that a regulated environment may have been necessary for inflation and high corporate taxes to effectively cause changes in bank leverage.

Risk

Decreasing risk can potentially explain increasing leverage particularly in 1940–1980, when banks were shielded from competition and government bonds became their main asset. How should historical bank risks be measured? The standard practice in economics is to model agents as maximising their risk-return trade-off, where risk is taken to mean the volatility of returns. Volatility is normally measured by the standard deviation. Figure 7 shows the standard deviation of the profit margin (operating profits divided by assets) for ten-year periods (the value for 1980 is thus the standard deviation for profit margins in 1970–1979).

Figure 7 Profit volatility of the Swedish commercial banks, 1870–2001.



Source: Summary of the Bank Reports.

Measured in this way, profit volatility decreased from 1880 to 1900, but then it started to increase. It increased even more during WWI, and particularly in the crisis year 1922. From 1942 it decreased rapidly. This pattern is due to the ten-year window. The crisis years with large negative returns in 1922 and 1932 will have large effects on the standard deviation, and the effect lasts ten years. In the 1950s and 1960s, prfit volatility dropped slightly. It then increased in the 1980s, to rise sharply after the crisis in 1991–1993. Overall, the pattern for profit volatility seems to correlate with the pattern for the CAR in Figure 1. The variable seems to have explanatory power.

3 Tax-inflation-leverage dynamics

This section presents a formal model on how inflation and high corporate taxes may interact to increase bank leverage. Inflation automatically increases bank debt, while high corporate taxes make it hard for banks to increase equity in step with inflation. This means that the CAR will drop (i.e., leverage increase). However, increasing leverage also means higher returns (on equity). After a while they become high enough for banks to add to their equity in step with inflation, and thus uphold a constant capital-ratio. Thus, the tax-inflation logic can explain not only why the CAR began to drop in 1940, but also why it stabilised

around 1980. The logic may be illustrated by a numerical example. Imagine a bank with the following balance sheet at the beginning of the year.

Table 2 A bank balance sheet, beginning of year.

Assets	1100	Deposits	1000
		Equity	100

At the beginning of the year the bank has a debt-equity ratio $D/E \equiv L$ equal to 1000/100 = 10, and a capital-asset ratio equal to 100/1100 ≈ 9.1 percent. During the year an inflationary development takes place. There is a monetary expansion, and some of the new money is deposited with the bank. At the end of the year, deposits have increased by 100 to 1100. The bank lends at a (fixed) lending rate l = 0.05, and borrows at a (fixed) borrowing rate b = 0.04. In accordance with the "leverage formula", the bank's return-on-equity should increase linearly with the debt-equity ratio according to the formula

$$r = l + (l - b) \cdot L . \qquad (1)$$

Calculated with the average debt-equity ratio over the year, return-on-equity in our numerical example is equal to 0.05 + (0.05–0.04) * 10.5 ≈ 0.16. The banks pay corporate taxes at a rate t = 50 percent. The after-tax return is thus 0.50 * 16 percent = 8 percent. In order to keep leverage constant, the bank must increase its equity by 10. However, after taxes it has only got 8 left to increase equity with. The bank is therefore unable out of retained earnings to keep its leverage konstant. Moreover, it might be the case that stock owners require a certain dividend to be paid each year. Assume that they require an annual dividend d = 0.05. Then only 8–5 = 3 will be available for the purpose of increasing equity. At the end of the year, the banks balance sheet will then be the following.

Table 3 A bank balance sheet, end of year.

Assets	1203	Deposits	1100
		Equity	103

The debt-equity ratio has increased from 10 to 1100/103 ≈ 10.7. Corollary, the capital-asset ratio has decreased from 9.1 percent to 103/1203

≈ 8.6 percent. In our numerical example, the combination of inflation and high corporate taxes led to a development where bank leverage increased. The example rested on the following implicit assumptions:

1. Lending and borrowing rates were exogenously determined in that they were
   a. not dependent on the rate of inflation; and
   b. not dependent on the corporate tax rate.

2. Banks increase equity only through retained earnings (and not through new issues of shares).

Relaxing these assumptions would tend to weaken the link between inflation, corporate taxes, and bank leverage.

An operational model.

It would be of benefit to present an operational model that can be quantitatively tested. The logic is that if leverage is to be kept from increasing, after-tax returns must be greater or equal to the sum of debt-inflation and required dividends. Inflation, it has been said, is always and everywhere a monetary phenomenon. Since newly printed money is normally deposited with the banking system, a monetary-driven inflationary process tends to swell bank deposits, and hence increase their debt. Assume that bank debt increases percentually at the rate of inflation:

$$\dot{D} = p\,. \qquad (2)$$

With regard to dividends, it is of interest to know the motives behind banks' dividend policy. [4] Do actual dividends paid reflect deliberate risk-return trade-offs, or are they paid because they are a form of "cost of capital" that banks must pay in order to stay in business? The latter kind of dividends would tend to make leverage more sensitive to changes in inflation and corporate taxes. Thus, assume that total dividends d paid may be divided into two parts: one "required" part $d_f + ap$, and one part d_r reflecting risk-return trade-offs. The quantity d_f is the *minimum* dividend rate that banks must pay – dividends actually paid may be larger (which are paid according to risk-return trade-offs). d_f

[4] A survey of the literature on various motives behind dividend policy is Allen and Michaely (2003)

may also be zero. In addition to d_f, bank owners want compensation for inflation ap, where p is inflation and a is a number equal to or greater than zero. If a is zero then bank owners only care about nominal dividends; if it is one bank owners want a full "real" dividend. Total dividends paid are thus: $d = d_f + ap + d_r$.

If banks shall be able to keep leverage constant and at the same time pay the cost of capital, then after-tax returns must be sufficient to pay both the required dividend and add to the capital at the rate of inflation. For leverage not to increase, the following condition must hold:

$$\dot{L} \le 0 \Leftrightarrow \dot{E} \ge \dot{D} \Rightarrow (1-t)r \ge d_f + ap + \dot{D}, \tag{5}$$

which may be written

$$p \le p^m \equiv \frac{(1-t)r - d_f}{1+a}. \tag{6}$$

p^m (p-max) represents the maximum value that inflation is allowed to take if leverage is to be held constant. p^m is increasing in r [in l, (l–b) and L], and decreasing in t, d_f and a. For leverage not to increase, a *necessary* condition is that actual inflation p must be smaller than p^m. If p is larger than p^m, leverage vill increase, that is,

$$p > p^m \Rightarrow \dot{L} > 0. \tag{7}$$

Asymmetry

We saw that if leverage is to be kept from increasing, actual inflation p must be smaller than the threshold value p^m. One may ask: is the relation symmetric? If p is smaller than p^m, will leverage then *decrease*? That is, does the following condition hold:

$$p < p^m \Rightarrow \dot{L} < 0 \text{ ??}$$

$p < p^m$ means that returns are sufficient to pay required dividends and add to equity in step with inflation. Depending on their risk-return trade-offs, the banks choose how much of after-tax returns to pay in dividends, and how much to add to equity. If actual dividends d paid is equal to the minimum d_f required by owners, that is, if $d = d_f$, then leverage will decrease in the case of negative excess inflation. On the other hand, if the whole of after-tax returns is paid in dividends, that is, if $d =$

(1–t)r, then leverage will actually *increase* (if price-inflation and hence debt-inflation is positive). Thus, symmetry does not necessarily apply – it depends on the dividend policy of the banks. As long as some part of the "extra-returns" are paid as dividends (d_r), the quantitative effects on leverage from positive and negative "excess inflation" (p–p^m) would be asymmetric: leverage would increase relatively more from positive excess inflation of a given size, than it would decrease from negative excess inflation of equal size.

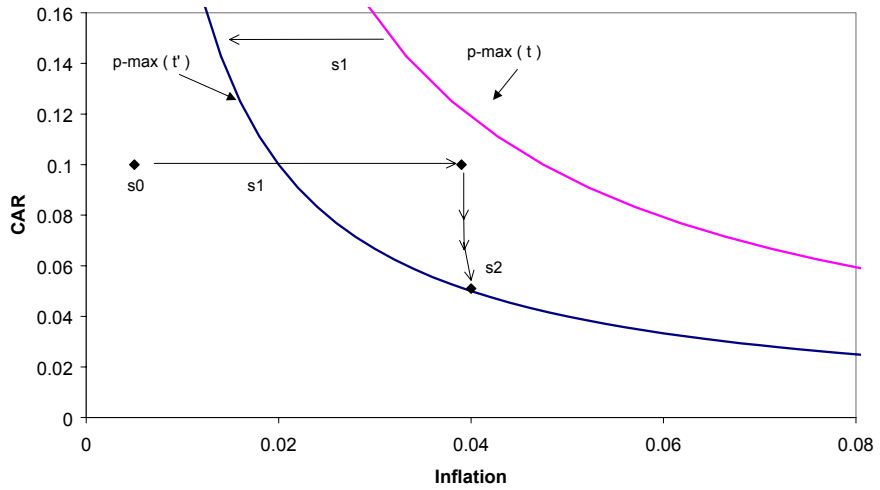
The plot

For given values of l, (l–b), d, a, and t, we may plot p^m as a function of leverage L. This is done in Figure 4, but with the CAR instead of L as the (inverse) measure of leverage. The relationship

$$L = \frac{1}{CAR} - 1 \qquad (7)$$

is thus used. Parameter values deemed reasonable from data have been chosen. l is assumed to be constant and not affected by inflation. An alternative specification would be to assume that inflation is fully reflected in interest rates, such that $l' = l + p$. It can then be shown that the threshold value will be $p^{m\prime} = (1/t) * p^m$. Thus, leverage would become less sensitive to inflation, and more sensitive to changes in the corporate tax rate, but the logic of the theory would not be affected. In the regulation period 1940–1983, when interest rates were set by the authorities, and "real" interest rates were low or negative (Ståhl 1980), the assumption that changes in inflation changes interest rates one for one is probably not reasonable. However, after deregulation in 1983 bank rates became more endogenous to market forces, and the assumption might be valid. Since in the regression analysis below actual returns are used, this discussion does not affect the empirical results.

Figure 8 Tax-inflation-leverage dynamics.



Note: $l = 0.05$, $g = 0.01$, $d_f = 0.04$, $a = 0$, $t = 0.05$, $t' = 0.60$.

The two curves depict the threshold value p^m as a function of the CAR, for two different tax rates $\{t,t'\}$. l and g are constant and thus not sensitive to the tax rate, which means that the p^m-curve shifts to the left when the corporate tax rate is raised. This means that corporate taxes cannot be perfectly passed on to lenders and borrowers. This is reasonable, perhaps particularly in the regulation period in 1940–1983, when interest rates were administratively determined by the authorities. Time is denoted by the letter s. Points to the left of the p^m-curve might be stable or not, depending on the dividend policies of the banks. We might assume that they are stable. However, points to the right of the p^m-curve are definitely unstable. For a given CAR, if inflation is larger than p^m, the CAR will decrease. Figure 4 schematically describes the possible post-WWII interaction between bank leverage, corporate taxes and inflation. At time s_0 the banking system is at the point represented by s_0. The corporate tax rate is t. Since s_0 is to the left of $p^m(t)$, the banking system is at rest. At time s_1, two things happen. First, inflation goes up (from 0.5 to 4 percent). In itself, this change would have no effect on the CAR, since the banking system would still be at a point to the left of $p^m(t)$. However, the tax rate has also increased, from t to t'. This has caused the p^m-curve to shift to the left. The banking system is then at a point to the right of $p^m(t')$. The CAR decreases. While the CAR decreases, leverage and hence

returns increase. At a certain point, returns are sufficient to uphold a stable CAR. This occurs at point s_2. The banking system is once more at rest.

4 Determining required dividends

The previous section developed a model on how inflation and taxes may interact with leverage. In the next section the model will be confronted with real-world data. But first, the size of the dividend requirement needs to be assessed. The parameter values for d_f and a must be determined. We are interested in required dividends in relation to equity. The estimation of these is complicated by the existence of hidden reserves. Since a substantial part of equity after 1940 was in the form of hidden reserves, the question how equity owners looked upon these funds becomes important. Therefore, the dividend and capitalisation policies of the banks over the studied period are briefly reviewed. The section draws on talks with Jan Wallander, CEO and board chairman of major Swedish banks, 1960–1991.

During the time of the classical gold standard, things were relatively simple. Banks did not systematically increase their capital. There was no inflation, no taxes and no hidden reserves. Net profits were almost completely paid out in dividends – about 7 percent on average in 1870–1914 (see Figure 7 below). With the advent of inflation and high corporate tax rates, banks started to increase their capital through retained earnings. This became important from 1940 and onwards. Up until the 1970s, stock ownership was controlled by a relatively small group of families. With the Kreuger crash in fresh memory, and with high income taxes on top of the high corporate taxes, they favoured consolidation – particularly in the form of transfers to untaxed reserves – over dividends. Stock owners did not much concern themselves with dividends in relation to equity, but were happy as long as they got a nominal dividend raise. For these reasons, banks tried to stow away as much profits as possible into hidden reserves, the so called valuation reserve accounts. The limit to these operations was set by the tax authorities.[5] Since, credit losses were low, the capital ratio was not of great

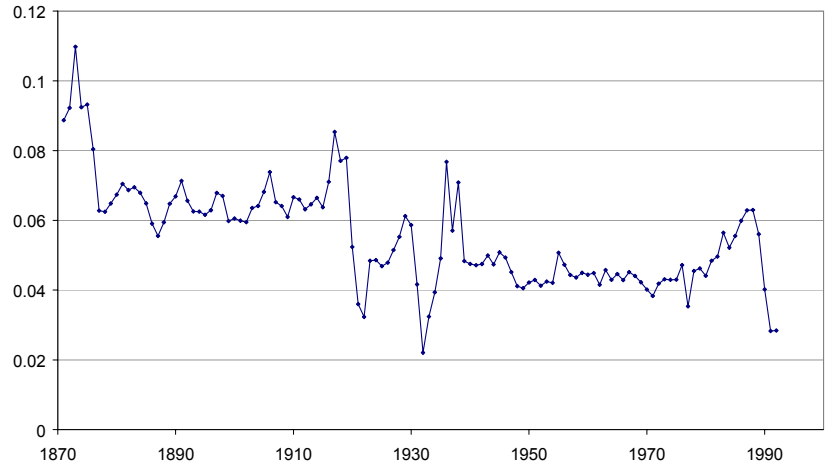
[5] High corporate taxes could in this way tend to *increase* capitalisation, by a form of "substitution effect". However, if the reservation possibilities set by the

concern. Although there were formal capital requirements, these were in practice not binding, since the Bank Supervisory Authority (*Bankinspektionen*) would always modify the rules so that the banks would be formally able to comply with them.

At the beginning of the 1980s, the business environment changed. Stock ownership became more widespread. The foreign exchange controls became less effective. Banks increasingly raised funds abroad, and the ratings of international credit rating agencies became important, wherefore capital ratios became a concern. Finally, from 1988, the Basel accords put binding capital requirements on the banks.

Despite these observations, data suggest that the banks followed a policy of paying dividends at a constant ratio to their capital. It is "as if" the banks paid a fixed (nominal) dividend-equity rate, where equity is book equity plus 70 percent of untaxed reserves. This is seen in Figure 7.

Figure 9 Dividends-to-equity ratio, 1871–1992.



Source: Summary of the Bank Reports.
Note: Equity = book equity plus 70 percent of untaxed reserves.

Despite the growth in untaxed reserves, dividends were stable in the period 1940–1980 at around 4.5 percent of total equity in nominal terms.

tax authorities are restrictive, the "income effect" of high corporate tax rates should dominate the substitution effect, such that higher corporate tax rates causes capitalisation to decrease.

In real terms, dividends decreased over the period. From 1980 dividends increased, perhaps reflecting a changed environment where stock owners demanded higher compensation for inflation. In view of Figure 7 it seems reasonable to put a "floor" on dividend payments at 4 percent. Dividends fell below this floor only during the crisis years of the 1920s, 1930s and 1990s. Thus, d_f is set to 0.04 and a is set to 0.

5 Testing the model

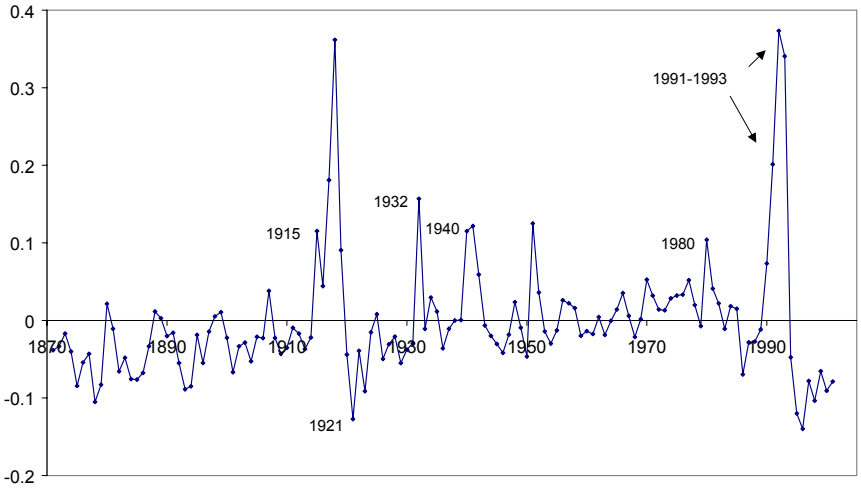
Excess inflation

Define the excess inflation x as the actual inflation p minus the maximum inflation p^m:

$$x = p - p^m. \tag{10}$$

p^m is defined by formula (6a). Figure 12 depicts excess inflation for the years 1871–2001.

Figure 10 Excess inflation, 1871–2001.



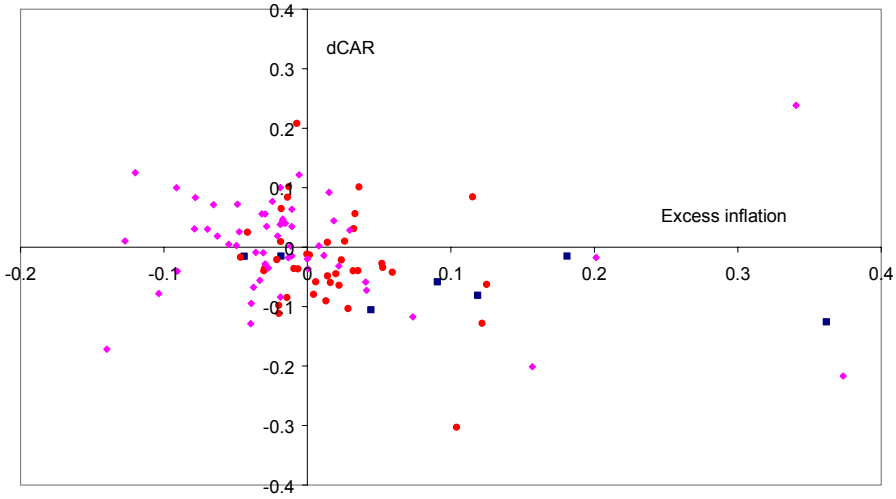
Source: Summary of the Bank Reports.

There was virtually no excess inflation in 1871–1914, as should be expected. But during WWI, excess inflation skyrocketed. In the interwar period 1920–1939, excess inflation was again negative. In 1940–1980, excess inflation was 1.6 percent on average. From the peak in 1980, excess inflation was brought down in the beginning of the 1980s. From

1983 – the year of deregulation, when liquidity ratios were abolished, excess inflation was mostly negative, especially in the boom years in the latter half of the decade. Excess inflation was high in the crisis years in 1932 and in 1991–1993 (but not in 1922). This is natural: negative profits means that banks are unable increase their equity even if inflation is zero. From 1994, excess inflation has been well below zero – probably a reflection of lower corporate taxes and a low-inflation policy.

Figure 12 suggests that excess inflation was positive in the years when the capital-asset ratio decreased, at least in the 20th century. Figure 13 depicts dCAR, the change in the logged CAR, and excess inflation, in the years 1871–2001.

Figure 11 Change in logged CAR, and excess inflation, 1871–2001.



Source: Summary of the Bank Reports.
Note: Squared dots for the years 1914–1920, round dots for the years 1940–1980.

The tax-inflation-leverage dynamics predicts two things. First, when excess inflation is positive, the CAR should decrease. This means that points in the right side of the diagram should tend to be centered in the lower square. Indeed, this seems to be the case. In particular, the dots of WWI are clearly recognisable. Second, if asymmetry is present, then when excess inflation is negative, the CAR should not necessarily increase, but rather be stable, or at least increase at a low rate. This means that dots in the left side of the diagram should be more fairly spread in

the upper and lower squares. From eye-ball econometrics it is not clear whether this is the case. Formal testing is called for.

Regressions

The following model is estimated:

$$dCAR_t = \beta_0 + \beta_1 X_t + \beta_2 dPROFVOL_t + \beta_3 dNUMBER_t + \\ + \beta_4 BASEL_t + \beta_5 REGUL_t + [crisis\ dummies] + u_t \quad , \qquad (11)$$

where

$$u_t = \rho u_{t-1} + \varepsilon_t \, . \qquad (12)$$

The variables are the following:

dCAR: The change in the log of the capital-asset ratio.
X: Excess inflation
dPROFVOL: The change in the log of the profit margin.
dNUMBER: The change in the log of the number of banks.
BASEL: A dummy variable for the Basel accord, 1990–2001.
REGUL: A dummy variable for regulations, 1940–1983.

The variable X has been defined as in formula (6), with d_f = 0.04, and a = 0. *dPROFVOL* is calculated as in section 2, namely as the standard deviation of ten-year returns.[6] With regard to the Basel dummy, 1990 is chosen as the starting year. Although the agreement was made in 1988, it did not come into effect until two years later (Flannery and Rangan 2002). The year 1983 is chosen as the end year for the regulation dummy. This was the starting year of the deregulation process, when the liquidity ratios were abolished. In addition, dummy variables for the crisis years 1922, 1932, 1991–1993 are used.

Regressions are performed on differenced variables rather than on levels, for three reasons. First, the underlying theory expressed in Fig-

[6] Regressions were also performed on *dPROFVOL* calculated with returns for 5 and 15 years. The coefficients for these variables were statistically insignificant. The value and significance of the x-coefficient was marginally affected by the choice of time period for *dPROFVOL*. Also, since consolidation should affect the CAR over several years, and not only in the year of occurrence, regressions were performed with lagged values of *dNUMBER*. These lags were statistically insignificant, however. Results are available upon request.

ure 8 is inherently a theory of differences: the CAR shold decrease if the inflation rate is larger than a certain threshold value. Second, the augmented Dickey-Fuller test for unit roots reveals that the variables *CAR*, *NUMBER* and *PROFVOL* are non-stationary on levels, but stationary on differences. Third, the x-variable, the difference between the inflation rate and its threshold value, cannot easily be expressed in terms of levels. Both autocorrelation and heteroscedasticity can be detected. To grind out these, regressions are performed with one lag in the disturbance term (by maximum likelihood), and with Huber-White standard errors.

Testing for asymmetry

The tax-inflation-leverage dynamics of Figure 8 suggests that the effect of excess inflation on the capital-asset ratio should be asymmetric, in that while positive excess inflation should mean that the CAR decreases, negative excess inflation should not necessarily mean that the CAR increases. Figure 9 also indicates that this may have been the empirical case. Therefore asymmetry is formally tested. This is done by splitting the x-variable into two variables; one that takes the value of x for positive x-values and zero otherwise, and one that takes the value of x for negative x-values and zero otherwise. In other words, the following two variables are defined:

$$\begin{aligned} XPOS &= X \; if \; X > 0 \; and \; XPOS = 0 \; if \; X \le 0 \\ XNEG &= X \; if \; X \le 0 \; and \; XNEG = 0 \; if \; X > 0 \end{aligned} \tag{13}$$

The variables are then regressed in the same regression. If asymmetry is present, then the coefficient for *XPOS* should be statistically significant and negative, while the coefficient for *XNEG* should be neither economically nor statistically significant. Moreover, a t-test should reveal that the coefficients are not equal.[7] Table 2 shows regression results for the two different specifications of x – the unsplitted and splitted ones – and for three different sample periods, 1882–2001, 1920–2001, and 1940–2001. The starting year is 1882 in the full sample regression because of the ten-year window for the volatility variable. The CAR decreased mainly during WWI and in 1940–1980. Three sample periods are there-

[7] The method has previously been employed for example by Nannestad and Paldam (1997), who use it to test for asymmetries in voter preferences.

fore chosen: one for the whole period 1882–2001, one for 1920–2001 that excludes WWI, and a period 1940–2001.

Table 4 Regression results.

	Dependent variable: dCAR					
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
X	***–0.29***	–0.33	–0.45			
	(0.000)	(0.080)	(0.055)			
XPOS				***–0.49***	–0.64	–0.66
				(0.000)	(0.067)	(0.078)
XNEG				0.21	0.070	0.012
				(0.37)	(0.80)	(0.98)
XPOS=XNEG				(0.023)	(0.16)	(0.35)
dPROFVOL	**7.8**	***9.8***	10.3	**9.0**	***10.8***	9.9
	(0.039)	(0.009)	(0.16)	(0.024)	(0.005)	(0.14)
dNUMBER	0.063	0.004	–0.056	0.055	0.001	–0.032
	(0.36)	(0.96)	(0.57)	(0.44)	(0.98)	(0.70)
BASEL	0.029	0.033	**0.057**	0.002	0.009	0.029
	(0.19)	(0.081)	(0.037)	(0.93)	(0.68)	(0.37)
REGUL	–0.010	–0.017	–0.037	–0.019	–0.019	–0.038
	(0.36)	(0.17)	(0.10)	(0.14)	(0.14)	(0.098)
CONSTANT	–0.034	–0.031	–0.034	0.010	0.005	0.004
	(0.10)	(0.13)	(0.11)	(0.70)	(0.84)	(0.93)
AR (1)	–0.22	**–0.34**	–0.34	–0.24	**–0.32**	–0.32
	(0.086)	(0.044)	(0.052)	(0.064)	(0.041)	(0.073)
Sample	1882–2001	1920–2001	1940–2001	1882–2001	1920–2001	1940–2001
DW	2.03	2.12	1.99	2.04	2.10	1.94
Obs.	120	82	62	120	82	62

Note: Dependent variable: *dCAR*. Dummies for crisis years 1922, 1932, 1991–93. Huber-White standard errors. *p*-values in parentheses. Bold-italics and bold denote statistical significance on the one-percent and on the five-percent levels, respectively.

In the unsplitted regressions (i–iii), the *X*-coefficient is of the expected sign. It is statistically significant at the one-percent level in the full-sample regression, but only at the ten-percent level when regressed on the smaller samples. In the splitted regressions (iv–vi), *XPOS* is of the expected sign. It is statistically significant at the one-percent level in the full-sample regression, but only at the ten-percent level with the smaller samples. The coefficient value increases in these regressions, from –0.49

to –0.64 (–0.66). Thus, while statistically less significant when the time before and during WWI is excluded, the economic significance of the variable increases.

As predicted, the variable *XNEG* is close to zero and not statistically significant in any regression. The coefficient values of *XPOS* and *XNEG*, and associated *p*-values, indicate that asymmetry might be present. Asymmetry also passes the *t*-test at the five-percent level in the full sample regression. However, the effect is not strong enough to pass the test in the smaller sample regressions.

With regard to the other variables, the coefficient for *dROEVOL* is of the expected sign, and statistically significant at the one-percent level for the sample period 1920–2001, and at the five-percent level for the full sample and for the period 1940–2001. That *dPROFVOL* is more significant for the 1920–2001 sample than for the full sample is due to the fact that volatility was decreasing at the end of the 19th century, when the CAR was increasing. This increase should reasonably be due to an increase in the number of banks in this period. However, *dNUMBER* is far from being statistically significant. Thus, in this analysis and contrary to Saunders and Wilson (1999), consolidation appears to have performed a limited role in the decrease of the CAR of the Swedish commercial banks. With regard to the dummy variables, the *BASEL*-coefficient is of the expected sign, and statistically significant at the five-percent level on the 1940–2001 sample. The coefficient for *REGUL* is of the expected sign, but not statistically significant. Neither is the constant statistically significant. Its value in regression (i) indicates a trend by which the CAR has decreased secularly by three percent per year in the period 1882–2001.

Economic significance

It could be of interest to try to estimate the economic significance of the x-coefficients, particularly for the period since WWII. In 1940–1980, the CAR dropped from 13 to 5 percent, which is a decrease of about 60 percent. How much of this drop may be attributed to excess inflation? The coefficient value of the unsplitted X is –0.53 for regression (vi) with sample period 1940–2001. In this period, excess inflation was 1.6 percent on average. Because of excess inflation, the CAR should have dropped by 41*1.6*0.45 percent ≈ 30 percent. Since the CAR actually dropped 60 per-

cent in 1940–1980, about half of the postwar drop may be attributed to excess inflation. One may also use the coefficients of the splitted regression. In 1940–1980 there were 24 years with positive excess inflation, which was 4.1 percent on average. Using the coefficent for *XPOS* in regression (vi), the CAR should have decreased percentually in 1940–1980 with the amount 24*4.1*0.66 ≈ 65 percent. According to this calculus, virtually the entire decrease in the CAR after 1940 could be attributed to excess inflation. In sum, depending on which regression coefficients one prefers to use, excess inflation could have decreased the CAR in 1940–1980 with 30/60 percent, which is about 50/100 percent of the actual decrease in this period. These numbers could be considered economically significant.

6 Conclusions

The paper explored whether inflation and high corporate taxes had the unintended effect of increasing the leverage of the Swedish banking system in the 20th century. By a simple logic, inflation automatically increases bank debt, while high corporate taxes make capital accumulation difficult. Bank capital ratios will therefore tend to drop, until leverage-induced increasing returns become sufficient to uphold them at constant levels. This tax-inflation-leverage theory was confronted with Swedish bank data for 1871–2001. The theory seems capable of explaining the sinking capital ratios of the Swedish banks during WWI and in 1940–1980. The theory also seems capable of explaining the relative stability of the CAR since the early 1980s. Regression analysis showed excess inflation to be a statistically significant variable. However, the variable was not as statistically strong in smaller samples excluding WWI. Another statistically significant variable was changing risk, as measured by the change in profit volatility. As predicted by theory, asymmetry between positive and negative excess inflation was detected – while positive excess inflation decreased the capital-asset ratio, negative excess inflation did not necessarily increase it. With regard to economic significance, it was estimated that about half of the postwar drop in the CAR of Swedish banks, or even more, may be attributed to excess inflation.

Which way forward? One path would be to improve the quantitative analysis. More refined variables for risk and consolidation could be

employed. In particular, it would be interesting to see if bank concentration measured by a concentration index can significantly explain the decreasing CAR in the 20th century. Another venue would be international comparisons. Swedish bank leverage increased during periods roughly similar to the cases of the US, UK and Canada. Swedish postwar policy was not radically different from that of those countries, the general philosophy of state control over the banking system and monetary expansion through the Bretton Woods system. It would be interesting to see whether the factors of this study – inflation, corporate taxes and regulations – have explanatory power also in other countries. A third road would be to study more closely the impact of deregulation. Excess inflation turned negative in the 1990s when inflation was brought down from 10 percent to 2 percent, and corporate tax rates were slashed from 60 to 30 percent. An additional factor may have been deregulation itself. For example, in a deregulated environment, inflation may be more easily transmitted to interest rates, which would raise bank returns and hence weaken inflation's detrimental effect on leverage. Is inflation detrimental to bank leverage also in a deregulated environment?

The last question should be of relevance to contemporary policy discussions. With the benefit of hindsight, Swedish postwar bank capital ratios dropped to levels that were inadequate to sustain the credit losses of the early 1990s, in such a way that the whole banking system was in danger of bankruptcy. If the calculus is correct that excess inflation accounted for over half of the postwar drop in the CAR, then analysis of this kind could profitably be incorporated into monetary and fiscal policy, in order to guard against large-scale, system-threatening banking crises in the future.

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