

Does Rising Interest Rates Affect the Profitability of Canadian Banks?

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Summary

In this paper, we will be exploring the relationship between the increasing interest rate and the bank profitability in Canada. In the first section, we reviewed recent literature on the impact of rising interest rates on banks. We then looked at historical events in other countries about rising interest rates. After that, we analyzed the bank structure and how banks make money. Before the final words, we carefully went through the theory and the application of the Fisher Effect, which gives a better understanding of the real world economy. Then we conclude this paper by stating a positive relationship between a rising interest rate and Canadian bank profitabilities.

Section 1: Literature Reviews

The financial sector and the real economy are interdependent. The central bank plays a pivotal role in ensuring financial stability. There are many studies done of the macroeconomic shocks and the impact of which on banks' profitability in countries other than Canada.

Banking structures are universal. We can peek at other countries' experience to get familiar with how Canadian banks might cope with the rising interest rate.

In 2006, Hansjörg Lehmann and Michael Manz demonstrated their findings in a working paper regarding the identification of macroeconomic factors on Swiss National Bank's profitability. Their study ran on a panel data set that covers the entire Swiss banking sector from 1987 to 2004. Swiss National Bank has 3 main fields of earning - "the net income from the interest-differential business, provisions and write-offs, and earnings from the trading and commission business (Lehmann, Manz, 2006)". Interest-differential business is probably the most important business banks run, many banks are heavily dependent on this sector earning. In this field, banks take advantage of high interest rates generated by their assets to pay off their liabilities. Lehmann and Manz introduced the net interest margin as an indicator for bank profitability.

The net Interest margin refers to the difference between interest expenses and interest income, which shows how much it is earning on loans and deposits. It is one of the most important factors that a bank can consider when it comes to its growth and profitability. Normally, the net interest margins tend to decrease with a rising short interest rate but is reduced by a less proportion in the long run. There seems to be a negative relation between interest rate and bank's profitability, yet what regression analysis reveals tends to be counter-intuitive. To find out the impact of interest rate changes on the net interest margin, Lehmann and Manz regressed the net interest margin on "the change in the 3 month interest rate (Δi_{rt}), the spread between 10 year and 3 month interest rates (spread_t) and some controls (Lehmann, Manz, 2006)." The regression result is as shown in figure 1. The coefficient of the change in the 3 month interest rate (Δi_{rt}) is significant at 95% confidence interval level but not significant in the dynamic model. In other words, there is no strong relation between the interest rate and the net interest margin. In real terms, the impact of interest rate changes on profitability is not as large as we thought. Figure 2 illustrates percentage changes in the net interest profit if the interest rate were to increase by 100 basis points. Overall, it is not the end of the world as many people would think that a 100 basis point increase in the interest rate could create chaos. On the integration level, the net interest profit only goes down by 3.5% per 100 basis point increase. Big banks and private banks are less impacted. An underlying reason might be that big International banks are less dependent on the interest rate dependent business. By contrast, cantonal and regional banks and foreign are more negatively related to the interest rate change. This might be a consequence of structures that are dependent on interest-differential business. Finally, given the facts above, Lehmann and Manz came to a conclusion that "the maturity mismatch between assets and liabilities matters less than traditionally suggested (Lehmann, Manz, 2006)". Moreover, they also noted how the trend results in increasing in interest rate hedging with interest rate swaps and other instruments. The related topic will be addressed in the later session.

Moreover, more evidence shows that the variance of banks activities indeed affect the profitability and spreads of banks given a rising interest rate. Demircuc-Kunt and Huizinga (1999) used bank data from 80 countries from 1988 to 1995. They regressed interest margins and bank profitability on different determinants respectively, such as macroeconomic conditions, bank characteristics, overall financial structure, etc. One finding is that banks with high non-interest earning assets tend to be less profitable (figure 3). This argument aligns with Lehman and Manz's finding in 2006 that banks rely on interest-differential business are subjected to changes in interest rates, yet the relationship is flipped to be positive related but still monotonic. In other words, banks with high interest earning assets are more profitable when interest rates rise. Also, when it comes to sources of funding banks are less profitable when they rely on retail funding (figure 3), as the funding approaches tend to carry higher expenses if interest rates rise and are unlikely to be adequate compared to wholesale funding. On the other hand, even though wholesale fundings allow banks to raise a large amount of money in a short period of time for both short-term and long-term maturities, they have many downsides. For example they make banks more fragile because wholesale funding providers can easily withdraw the funding given false market signals.

A similar study in HongKong by Jiang et al. (2003) agrees with Demircuc-Kunt and Huizinga's (1999) finding of relationship between interest rates and banks profitability. Jiang et al. (2003) points out that a lower interest rate boosts banks profitability. Asian financial crisis laid some profound impacts on the HongKong market and weakened the economy. To counter the aftermath, HongKong Monetary Authority underwent a series of regulatory changes, including the deregulation of the interest rate rules. As a result, banks' asset quality has steadily improved since 2000, as lower interest rates have boosted households' ability to finance their debts, decreasing mortgage defaults and the number of loans rescheduled as economic growth slows. Hence, increases in HongKong bank profits are observed.

Demircuc-Kunt and Huizinga's (1999) also found several macroeconomic factors that have a profound impact on bank profitability. For example, it is common to have rising interest rates as a policy against inflation. Demircuc-Kunt and Huizinga's (1999) research showed that inflation is positively related to both net interest margins and bank profitability (figure 4). On one hand, inflation brings higher costs - more transactions and a wider branch network, but higher revenue from bank floats, in which money is counted twice due to the time gap between fund register and withdrawal. Obviously, the positive relation between inflation and bank profitability suggests increased incomes outweigh induced costs and brings a net benefit. Furthermore, there will be an increase in net interest margins and bank profitability if the real interest rate were to increase, particularly in developing countries (figure 4). The underlying reason is that deposits frequently pay zero or below-average interest rates in developing countries.

It is worth noting that not only Demircuc-Kunt and Huizinga's (1999) pinned a positive relationship between interest rates and bank profitability. The similar relationships are found in a number of studies done in other countries and areas such as European countries (Staikouras, Wood, 2004), Macao, China (Nicholas Cheang, 2005) and the United State (Hancock, 1985).

Staikouras and Wood's (2004) conducted a study across 356 commercial banks, 135 savings banks and 151 co-operative banks in European countries. They didn't include the mortgage banks for the reason that there are too few of them, among which there are only 43 mortgage banks. They came to a

conclusion that there is a “significant positive effect of the level of interest rates on profitability (Staikouras, Wood, 2004)”.

Similar to the Swiss banks, Macao’s banking industry which follows the simplistic structure under the financial sector is dependent on traditional deposit and lending business. Namely, interest incomes on loans and costs of deposits play an important role in banking profitability in Macao. As a result, Nicholas Cheang (2005) also took the net interest margin as an indicator for banks profitability in Macao. The fitted regression model of estimation in this study supports the contention that changes in the net interest margins are being positively dependent on the interest rates on loans and deposits.

Furthermore, Hancock discussed a new indicator that can possibly nail down the relationship between interest rates and bank profitabilities — interest spreads. The interest spread is the difference between loan interest rates and deposit interest rates. It is useful as an appropriate explanatory variable if the effect of interest rate changes on lending and deposit is the same in percentages, even though it might occur with different signs, and also if interest rates are prices for financial services. However, it turned out to be the case that the spread is upheld as a summary statistic as other monetary variables change profit through prices and user costs.

In conclusion, there are more cases showing that increasing interest rates lead to profit expansions in the banking sector while we observe a negative relationship between the interest rate and the bank profitability in a few cases. The determinant factor that pins the characteristic of the relationship is the bank operating structure. If a bank is heavily dependent on interest-differential business then increasing interest rates will reduce the room of profit, yet the reduction is not as destructive as the public would have thought of, which only accounts for a small loss. A straightforward example is that a 100 basis point decrease only results in a 3.5% decrease in the net interest margin. On the other hand, a low interest rate could boost bank profitability for the reason that the low interest rate reduces the default rates. By contrast, if a bank holds a lot of interest earning assets on its balance sheet it benefits from an increase in the interest rate. The positive relationship can also be explained simply as that the increase in net income outweighs the loss due to inflation, which is a contributing factor to a policy that increases the interest rate. Thus, we observe more evidence supporting a positive relationship between the interest rate and the bank profitability.

Section 2: The History of Rising Interest Rates in Other Countries

After reviewing contemporary work, we can take a look at the history of how other countries' interest rates affected their bank profitability in the past. Firstly, let’s talk about China. On October 29th in 2004, The People’s Bank of China – the central bank of China, decided to raise the bank interest rate for the first time in nine years. China decided to raise interest rates in 2004 in order to prevent the economy from overheating and moderate the continuous growing pressure from rising inflation due to excess speculative investment. Both one-year lending rate and one-year deposit rate rose 0.27 percent. The one-year deposit rate increased from 1.98 percent to 2.25 percent. The one-year lending rate rose from 5.31 percent to 5.58 percent. In 2004, the central bank also announced that they would expand the floating degree of the lending interest rate of Chinese currency RMB, and let the RMB deposit interest rate to float downward at the same time. In terms of expanding the floating degree of the lending rate, The People’s Bank of China ended years of regulations of strictly limiting the maximum

interest rates that Chinese banks could charge on loans. According to one of the press releases posted on the central bank of China's official website in 2004, they said the adjustment margin for medium and long-term interest rate would be bigger than short-term rate. In most of the cases, when interest rates hike, bank's profitability will be increased, because the bank usually uses short term and cheap liability(deposit) to fund the long term assets(mortgage loan). Hence, as the central bank raised both benchmark one-yuan lending rates and deposit rates, it allowed the banks charged above the benchmark of borrower's preference and gave room for banks to cut deposit rates. As a result, the profitability of the Chinese central bank increased in 2004.

Second case to bring up here is the Dot-com bubble crisis that happened in the United States from 1995 to 2001. The 1990s was an era of fast growth of technology in many fields. In 1994, the debut of Mosaic Browser and World Wide Web grabbed public attention on the Internet. In 1996, a public website had become a necessity for the majority of publicly listed companies in the U.S. The internet brought varieties of new business models that were impossible to exist several years ago, and that brought out virtual capital investment. The bubble was formed from an instant rise in the U.S technology stock equity valuations caused by overhyped investors' speculative investing- the abundance of risky investment funding for startup companies and failure of Internet companies making profit. The technology-dominated Nasdaq Composite Index rose from less than 1000 to more than 5000 from 1995 to 2000. Nasdaq composite index is a stock market index that includes all the stocks listed on the Nasdaq stock exchange, which is one of the most followed stock market indices in the U.S. Low interest rates from 1998 to 1999 facilitated an increase in startup companies. The impact of the dot-com bubble on the U.S economy was critical. It led to a mild recession and it shook confidence in the startup Internet industries. Between 2001 and 2002, after one after another investors aimed for the Internet industries to try to earn a huge amount of return and followed by a gigantic rise in stock prices, the bubble burst and stock price fell about 78 percent and created recession. Between 1995 and 2000, the U.S stock market capitalization tripled, which was followed by a fairly high interest rate and low budget deficit. According to Figure 6 and Figure 7 at the final page of the paper, the U.S started off with a high interest rate of 3 percent and low budget deficit first when the bubble was first formed in 1995, and it kept increasing until it was almost 2000. The rise of the bubble was able to displace the overwhelming insufficient investments and rise in interest rate. While the bubble was created and kept growing, the budget deficit was low so bank profitability was positive. The change of investors' expectation led to the burst of the bubble and then the government reacted to this by running huge budget deficits and enlarging public debts completely. The bubble burst caused the stock market to crash and then due to higher budget deficit, the bank profitability decreased.

Thirdly, the Great Depression. The Great Depression was a global economic downturn that happened between 1929 and 1939. It was the longest and most serious depression that was ever experienced by the industrialized Western countries. It mainly originated in the U.S and it also caused significant unemployment, acute deflation and drastic decline in output in almost every country around the world. The economic impact of the Great Depression was gigantic, such as extreme human suffering and deep changes in economic policy. Economic output fell in the U.S due to factors of the following – decrease in consumer demand, misguided government policies and financial panics. From late 1929 to early 1933, the real output and prices decreased abruptly. Between the summit and the trough of the downturn, the real GDP decreased about 30 percent and industrial production decreased about 47 percent in the U.S. The prime cause of the Great Depression in the U.S was a decline in spending(also known as aggregate demand). This also caused a decrease in production because merchandisers and manufacturers observed an unintended rise in inventories. The first decline in the U.S output was in the summer of 1929 which originated from the tightening monetary policy that tried to limit stock

market speculation. The stock prices had also risen more than quadrupled from the bottom in 1921 to the peak in 1929. The stock price was so high that by the fall of 1929, it reached the level where people could not predict reasonable expectations of earning in the future. Thus, eventually the stock market bubble burst, followed by panic selling which began on 'Black Thursday'. Many stocks had been using loans that were secured by a small portion of the stocks' value. The result of that was the price decreased and it forced investors to liquidate their holdings, then worsen the fall in prices. Eventually, the U.S stock prices declined by 33 percent. This was called the Great Crash of 1929. In 1928 and 1929, the Federal Reserve had raised interest rates in order to slow down the severe rise in stock prices. This change discouraged interest-elastic spending in categories such as mobile purchases and construction which led to less production. The U.S also experienced banking panics in 1930 during the depression. The banking panics arose while lots of depositors lost confidence in the bank's ability to repay and they demanded that the banks would pay them the deposit in cash. By 1933, there were about $\frac{1}{3}$ of existed banks failed at the beginning of 1930. The banking panics caused a significant rise in the amount of money that people were willing to hold in their hands compared to their bank deposit. This was the main reason why the money supply in the U.S decreased by 31 percent between 1929 and 1933. By following the reduction in money supply, the Fed also raised interest rates in September 1931. Due to rapid decline in price and money supply, consumers and investors expected deflation to come, which means they expect wage and price to decrease in the future. Therefore in the end, although nominal interest rates were relatively low, people were not willing to borrow because they were afraid of profits and wages in the future wouldn't be enough to cover their loan payment. This led to severe reductions in both consumer spending and business investment. The panics surely worsen the decline in spending by generating loss of consumer and investor confidence. The general price deflation was distinct in the U.S, and so were other countries as well. Almost all industrialized countries endured a decrease in wholesale prices for about 30 percent from 1929 to 1933. During this period, the prices of primary commodities traded in global markets decreased more drastically. Prices of primary commodities such as coffee, rubber, silk and cotton were reduced by about half. Foreign lending from the U.S to countries like Germany and Latin America had broadened greatly during the mid-1920s. However, the U.S lending abroad fell in 1928 and 1929 due to high interest rates and a flourishing stock market in the U.S. This phenomenon may have led to declines in output in other borrowers' countries. During the Great Depression, the U.K strived for recession and low economic growth in the second half of the 1920s. All the way until the early 1930s, its decline in industrial production from the highest to the lowest was about $\frac{1}{3}$ of the U.S. In the early 1930s, France experienced a short downturn and its prices and industrial production fell between 1933 and 1936. In Germany, its decrease in industrial production was about the same as in the U.S. Its economy experienced a downturn in the early 1928 and then it stabilized before it experienced a downturn again at the end of 1929. The overall price deflation not only existed in the U.S, but in other countries as well. Deflation was rapid in Japan from 1930 to 1931 due to the flexibility of its price level structure. In early 1933, the U.S started to recover from the damage due to the Great Depression. From 1933 and 1937, output in the U.S began to grow really fast and its real GDP increased at an average of 9 percent a year. Eventually, output in the U.S returned to its long-run trend in 1942. Overall, since the Great Depression started, one bank after another went bankrupt because of bank panic and the interest rate declined. Multiple banks couldn't keep up to take in deposits and loan out money to businesses and savings were lost. Hence, banks' profit declined during the Great Depression.

Section 3: How Banks Make Money.

As Emily Oster once said, “One of the big takeaways from a lot of economic theory is that people should engage in consumption smoothing”. The Life cycle hypothesis theory proposed by Franco Modigliani and Richard Brumberg explains the reasoning behind consumption smoothing (Hayes, 2021). The following theory focuses on the changes in consumption and saving behavior that occur over an individual’s lifetime (Kenton, 2021). The theory illustrates that the spending pattern of an individual is based on the expectation of future income. Furthermore, the life cycle hypothesis theory explains how fresh graduates and young individuals take on debt from commercial banks and other lending institutions, as they believe their income will increase with time; thus, enabling them to pay off their debt in the future (Hayes, 2021).

Additionally, businesses depend on commercial banks to grow their firms. For example, start-up companies may require initial capital to start up their business (Parker, 2022). While existing firms may take out loans to purchase real estate to grow their business operations (Kagan, 2022). Both start-up firms and existing businesses believe that in the future they will generate greater profits which would enable them to pay out their debt obligations.

As commercial banks main operation involves issuing loans, it constitutes a major segment of commercial banks assets (Wagner, 2021). According to the 10k statement, the value of loans issued by Bank of America was approximately 979 billion dollars in 2021, which represents almost 30 percent of assets (Bank of America , 2022). The loans being issued in the market enable both economies and commercial banks to grow. The reason for the aforementioned is that the process of issuing loans creates a multiplier effect, increasing the money within an economy (Ganti, 2021). Another pivotal factor in commercial banks assets include the cash reserves which are set by Basel agreements. According to Basel 3, banks are required to keep a “capital adequacy ratio” of at least 8 percent (Bloomenthal, 2022). These capital reserves exist to avoid bank runs, which involve situations where the bank's liabilities exceed its assets (Kenton, 2022). Hence, when such situations arise, the bank would default on its financial obligation, and it would face liquidity issues (Wirija, 2020). Therefore, these reserves ensure that commercial banks have enough capital on hand so that liquidity risks are minimized. According to Bank of America (2022), the cash reserves were equivalent to 348 billion dollars in 2021; thus, representing 10.9 percent of the bank's total assets. Finally, the last major part in commercial banks assets include securities (Wagner, 2021). This mainly involves government issued securities with short maturities (Wagner, 2021). According to Bank of America (2022), the value of securities was approximately 983 billion dollars in 2021. Therefore, this consisted of 31 percent of the bank's assets. Through these security investments, commercial banks can earn a steady profit, especially in periods with low loan take ups (Sametz et al., 1979). Overall, loans, cash reserves and securities represent a significant percentage of commercial banks assets, which are useful for the growth of commercial banks.

Another pivotal factor on the balance sheet is the liabilities of commercial banks. These liabilities are a major source of funds that enable commercial banks to conduct their daily business activities, including issuing mortgage loans, personal loans and business loans (Kagan, 2021). According to Wagner (2021), the most important liability is deposits which can take three forms including checking account, money market account and saving account. On one hand, a checking account earns no interest on funds deposited (Frankenfield, 2021). On the other hand, both money market accounts and savings accounts earn low interest rates (Kagan, 2022). Additionally, another major source of liabilities include borrowing from other commercial banks (DePersio, 2021). This occurs in situations when the cash reserves, commercial banks have on hand, are limited. Therefore, banks take loans from each other to ensure stability in the financial industry. These loans can take two forms including

repurchase agreement (repos) and interbank markets. To begin with, repos occur when one commercial bank, who is in need of capital, sells a government security to another commercial bank and promises to pay a higher price when buying the security back (Reiff, 2022). This agreement is collateralized by the government security. Therefore, repos enables commercial banks to access immediate capital. Another form of lending between banks is the interbank market (Hayes, 2021). The latter is a network where banks agree to trade between one another on a short term basis. The major difference between repos and interbank markets is that when lending occurs in the interbank market no collateral is used (De Fiore et al., 2018).

Commercial banks make money by issuing loans from deposits. Since banks charge higher rates on loans than provide to deposits, they earn an interest income (Kagan, 2021). Commercial banks set interest rates depending on the borrower's credit rating (Kagan, 2022). For example borrowers that have a low credit rating are considered risky borrowers, thus banks charge these individuals with higher interest rates. Additionally, interest income provides commercial banks with steady cash flows. Furthermore, commercial banks also profit from non-interest income. In fact, according to DeYoung and Rice (2004), non-interest income accounts approximately 50 percent of commercial banks operating income. For example, in the United States the non interest income was equivalent to \$42.6 billion in 2017 (Wagner, 2021). These can include charges on monthly fees, overdraft fees, transaction fees and interchange fees (Chen, 2020).

Overall, commercial banks allow individuals to smoothen consumption while enabling business to grow their firms. They earn money from charging different interest on loans and deposits, with the former being higher than the latter. Additionally, commercial banks earn some of their profits by charging customers fees on their daily activity.

Section 4 : The Fishers Effect

As Milton Friedman once said “When they so-called ‘target the interest rate’, what they’re doing is controlling the money supply via the interest rate. The interest rate is only an intermediary instrument”. Central banks around the world influence the money supply by setting an overnight interest rate to control the level of inflation in an economy (Segal, 2022). Hence, when inflation is high, central banks raise the nominal interest rate levels to curb inflation (Team, 2021). This correlated relationship between inflation and interest rate is referred to as the fisher’s effect (Hayes, 2022). This section will shed light on real world application of the fisher’s effect.

The fisher relationship was observed two years ago in March 2020, when the economy faced the covid recession. During that period, due to fear and uncertainty faced, many individuals reduced their spending (Milstein et al., 2021). In fact, this issue of reduced spending further exacerbated the economic conditions of many economies. Moreover, consumer prices declined by 0.4 percent in 2020 compared to 2019, thus alluding to a deflating economy (Government of Canada, Statistics Canada, 2021). Additionally, fear of contracting the virus along with government restrictions, resulted in reduced mobility and travel, which decreased the demand for oil by 19.2 percent (Government of Canada, Statistics Canada, 2021). Therefore, oil prices during that period declined (Johnston, 2022). As a result of the decrease in demand for many products causing a decline in prices, the Canadian economy experienced a 23 percent decline “on an annualized basis” in March 2020 (Kirby , 2020).

As the economy was shrinking, central banks had to take swift action by increasing the money supply to decrease the nominal interest rates (Hayes, 2022). Additionally, money supply further increased because of quantitative easing, where central banks buy government bonds by issuing money into the economy (Milstein et al., 2021). According to Milstein et al (2021), significant changes in the money supply pushed the nominal interest rates down to 0.25 percent. By decreasing the interest rates, central banks hoped to stimulate the economy. According to Evans (2020), house prices declined during the recession. Thus, the central bank believed that with lower mortgage rates, more individuals would buy houses due to the decreasing cost of financing a house (Evans, 2020). The fiscal and monetary policies put in place during March 2020, caused the recession to be short lived. Therefore, when a country experiences deflation, interest rates fall to stimulate the economy.

Over the past year, many economies have been experiencing great economic growth due to loosening covid related restrictions. This economic boom has resulted in significant inflation across the world. According to Evans (2022), the inflation level in Canada rose to a “31 year high of 6.8 %”. The increase in inflation is noted with pasta prices increasing by 19.6 percent, coffee prices increasing by 13.7 percent and bread prices increasing by 12.2 percent (Evans, 2022). These exponential increases in prices are mainly due to two factors including significant economic growth over the past two years and global issues and conflicts. The latter issue revolves around the on-going conflict between Russia and Ukraine. These issues not only caused significant increase in food prices, but they also caused a rapid increase in oil prices (The Canadian Press, 2022). The oil price in March 2020 was 32 dollars per barrel. Currently, according to the Canadian press (2022), oil prices have crossed 100 dollars per barrel. Therefore, oil prices have increased by 212.5 percent over the past two years. Another sector in the economy that also witnessed significant increase in prices is the real estate industry. For example, the average house price has increased by 20 percent from last year (CBC News, 2022).

As the economy experiences a significant increase in prices, central banks have decreased the money supply in order to raise the interest rates (Hayes, 2022). For example, interest rates have currently increased from 0.25 percent to 1 percent. Additionally, the central bank further plans to increase the interest rate to 1.5 percent as the inflation further raises (Green, 2022). Therefore, the increase in interest rates curb high inflation and decrease the impact of an overheating economy.

In conclusion, the central banks set interest depending on economic conditions and inflation levels. As the level of inflation declines and the economy experiences a recession. Therefore, the central bank increases the money supply to reduce the interest rates. These policies are intended to stimulate the economy. While, when inflation levels exponentially increase, the central banks decrease the money supply to increase the nominal interest rates. These policies are intended to reduce the impact of an overheating economy.

Section 5 :Interest rate Impact on Banks profitability

Now, as we understand how banks make money, we must come to understand the impact of interest rates on banks' profitability. First, we must discuss the interest rate spread. As mentioned, banks' greatest asset comes in the form of loans whilst their greatest liability is customer deposits. Further, banks charge a specific interest rate to borrowers (APR) whilst mostly giving depositors a lower rate. The gap between the interest rate given on loans and the interest rate depositors receive is the interest rate spread. The interest rate spread is often used to measure banks' profits; the greater the spread the higher the profits (Hayes, 2021). The greater the volume of deposits, the more loans a bank can issue,

as it realizes an increase in capital. Banks need deposits, deposits are asset generating liabilities; the more the bank has the better off it is. Thus, we realize the need for banks to include an interest rate for depositors in order to encourage them. The better the rate is the more depositors the bank will receive. However banks need to be careful, as there is an interest rate risk attached which will be discussed later on. Now, it is evident the rate given to depositors must always come to be less than that of a loan, as the bank is now the one taking on more risk and must account for that risk through the higher interest rate on the loan (Hall, 2021). Commercial banks can come to charge a full percentage point or more on loans in comparison to what they pay depositors (Hall, 2021). In doing so, the bank will come to realize a greater interest rate spread, signifying higher profits.

Banks' profits are sensitive to interest rate fluctuations. Economists Koech and Maina's research concluded that volatility of interest rates hindered borrowers' abilities to meet loan payments and significantly reduced their ability to repay the full loan amount (Tuna, 2021). Furthermore, this significantly intensifies the banks' exposure to credit risk, ultimately limiting their profitability (Tuna, 2021). Although the interest rate gap may come to return to its initial position when the loan was issued, the borrower has already faced the consequences of fluctuation. Ultimately impacting the bank's profitability due to spillover as there will be an increase in borrowers' default probability and missed payments (Tuna, 2021). As mentioned interest income is a significant source of income for banks, for example, in 2021 54% of Scotiabank's income was interest income (Scotiabank Annual Report, 2021). Thus, if a borrower is to miss payments due to influences on their finances resulting from fluctuations in interest, we see an impact on the banks' profits. However, during economic times in which interest rate fluctuations are derived from expectations, we see a more positive impact. For example, in Q2 of 2022 Scotiabank experienced a growth in profits as interest increased when compared to Q1 (Scotiabank Annual Report, 2022). Further, ScotiaBank experienced a 7% (\$185 million) increase in net interest income as the change in interest rates took place. It is clear through figure 5, that as changes in interest rates take place and we see an increase, commercial banks' profits tend to go up. This is in fact true as Canada's top five banks experienced a 39% increase in profits in the 2021 fiscal year alone as rates rebounded from 2020 (Johnson, 2021). Thus, we realize a positive correlation amongst the interest rate and banks profitability.

Again, as mentioned, when interest goes up banks' profits tend to follow as loans become more profitable and an increase in spread occurs. Further, we also see an increase in the spread between long-term and short-term interest rates, since long-term interest rates tend to increase faster and further than short-term rates (Hall, 2021). This is the ideal scenario for commercial banks since they mainly manage short-term liabilities whilst managing longer-term assets (Hall, 2021). This is due to deposits being short term whereas loans tend to be long-term (ex: Mortgage), which in turn creates a long-term asset for the bank (Zhao, 2022). An example of this is a mortgage. The average lifespan of mortgages in Canada is approximately 5 years, meaning the bank will receive interest payments for the life span of the mortgage (Canada, 2021). If interest rates rise and a mortgage renewal or reevaluation is upcoming, the bank will see a rise in profits as they can come to offer a higher rate. Another example is that investors are willing to invest more if the long-term interest rate is higher, meaning the bank will see an increase in its commissions and fees (Oswal, 2021). The bank will also receive an increase in indirect profits (fees such as advisory fees) due to this increase (Oswal, 2021). Thus, when long-term interest rates are higher than those of short-term ones, the bank is receiving payments derived from a higher rate than the one which it must pay. Ultimately signifying that this interest rate increase will come to increase the bank's profits due to the manner in which liabilities and assets are managed. However, the management process these institutions maintain is rather difficult and possesses a great deal of risk. As mentioned banks face interest risk, also known as maturity

mismatch, which is the situation where short-term liabilities exceed short-term assets (Kenton, 2021). A situation of maturity mismatch may occur for several reasons (ex: in developed nations due to corruption) however, usually it is due to changes in the interest rate. Let us exemplify this through interest rates rising to high. If the interest rate increases and potentially becomes too high, borrowers may feel that the cost of borrowing is not ideal and delay their request for a loan (Kenton, 2021). However, depositors will be incentivized to deposit as they would see a higher interest payment. Thus, we realize a great deal of increase in risk for commercial banks as interest increases. Furthermore, if the bank were to experience a situation in which they see a maturity mismatch, their profits are likely to decrease as a result of the interest change. As mentioned this is due to short-term assets falling below short-term liabilities as the issuance of loans would decrease and deposits would increase. Oftentimes this occurs in times when economic activity is hindered and or when inflation expectation/presence is higher. Moreover, banks use short-term liabilities (deposits) to finance long-term assets (loans), hence why a decrease in the demand for loans as a result of an increase in the interest rate would impact the bank's profitability as it would potentially face a situation in which its payouts exceed the payments they receive; due to the magnitude of the volume deposits occur in. Thus we realize the true magnitude interest rate has on banks' profitability. Moreover, if expected inflation is to increase, so will the interest rate; this is known as the fisher effect. Thus, banks must consider individual concerns and illuminate their response through higher rates. Banks ideally would seek a higher interest rate, however, they must do so carefully in order to avoid situations in which they would face maturity mismatch.

The Canadian Commercial Bank was Canada's last bank failure. This bank is a great example of a bank failure which was derived from poor management and maturity mismatch (The Canadian Encyclopedia, 2014). As mentioned, if the interest rate is driven to a level that is deemed too high, banks increase their risk to situations of maturity mismatch. However, banks can also face these situations when facing a recession. Through a theoretical framework interest changes are exogenous, however when applied into real world cases we realize that these changes are actually endogenous. This is because an interest rate change will influence consumer choices. Further, if interest rates change it impacts deposits and loans; these impacts are a result of the variable being endogenized as changes may hinder attractiveness of loan or deposits to consumers. If the interest rate is too high depositors will be attracted whilst loan demand will vanish. On the other, if the interest rate is too low, loan demand will soar whilst deposit supply will diminish. Oftentimes a drop in interest which drives it too low is due to a recessionary period. This makes banks more vulnerable to risk, as deposits are likely to decrease a great deal; endogenize effect. This was the case for The Canadian Commercial Bank. A fall in the interest rates during 1985 was the Canadian Commercial Banks' final strike after countless swing attempts to rescue it by the provincial and federal governments. Further, Mismanagement of assets and an inability to forecast interest levels aided in the bank's failure (The Canadian Encyclopedia, 2014). As discussed, banks predominantly make money by issuing loans. However, in times of recession demand for loans typically declines (Anderson, 2022). Ultimately meaning that banks will face a decline in revenues and their profits. Further, a decline in deposits will take place, signifying that banks have lower asset-generating liabilities. This was the case for the Canadian Commercial Bank. As the recession in western Canada began, everything seemed manageable, but with a decrease in deposits, deposit outflows, and repayments the bank realized a lot of outstanding loans (Bank of Canada, 2010). As a result, the bank collateralized more than half of its assets in order to receive liquidity (Bank of Canada, 2010). With a sudden increase in short-term liabilities (borrowings) and a drastic decrease in short-term assets, the bank found itself 'underwater' within a maturity mismatch scenario (Bank of Canada, 2010). The Estey Commission's investigation concluded that due to the impacts of the recession hindering Canadian markets and poor management,

ultimately led to the bank ceasing its operations (The Canadian Encyclopedia, 2014). Thus, it is evident the significant impact interest rates possess on banks and their profitability. Banks must come to adequately forecast interest rate trends, in order to minimize unforeseen consequences. Moreover, they must also come to manage their assets and liabilities in a manner in which they can ensure that interest rate risk is minimized without limiting operations.

Section 6: Conclusion

We began this paper by reviewing contemporary works, showing how the past research was done. Past literacy showed both cases can be true, the positive relationship between the rising interest rates and bank profitability exists as well as the negative one. It is found in many European countries, Macao SAR, and Hong Kong SAR that the existence of a positive relationship is heavily dependent on the bank structure.

In section 2, we discussed the purpose of China's central Banks' decision to raise interest rates in 2004. Further, we concluded that the profitability of the Chinese central bank increased in 2004. Moreover, We additionally discussed the Dot-com bubble which took place throughout the U.S from 1995 to 2001. The crash occurred specifically due to a sudden increase in the U.S technology stock equity valuations caused by overwhelming investor confidence and speculative investing. Lastly, section 2 discussed how countries such as the United States, Japan, France and Germany went through the Great Depression between 1929 and 1939.

Section 3 began by explaining the life cycle hypothesis to illustrate the underlying reasons individuals and firms take out loans. Specifically, individuals take out loans in order to smoothen their consumption. while firms take out loans to grow their business operations. Both firms and individuals believe higher income and revenues will be generated by taking out loans which would enable both parties to pay for their debt in the future. Additionally, we discussed the important aspects included in the bank's balance sheet including assets and liabilities. Assets enable a firm to stay operational by generating revenue. whilst the liabilities are the major source of funding for the firm. . Further, we discussed two main sources of revenue including interest income and non-interest income. Interest income includes the difference between interest charged to borrowers and interest charged to depositors. On the other hand, non-interest income includes overdraft fees, transaction fees and interchange fees.

Section 4 discusses the fisher effect. It comes to exemplify a deflating 2020 economy. The covid recession caused the central banks to act swiftly by increasing the money supply to decrease interest rates. When an economy is experiencing deflation, interest rates decline. On the other hand, nowadays with economies reopening and ongoing conflicts with major exports of oil and natural gas, inflation has skyrocketed to 6.9 percent. This exponential increase in inflation has led to a decline in the money supply to increase the nominal interest rates. Thus, when an economy experiences inflation, the central banks increase the nominal rates.

Section 5 exemplified the nature of the relation of banks profitability and the interest rate. As interest rates increase, banks profitability tends to follow. However, banks must ensure they do not face a maturity mismatch (short term assets < short term liabilities). The Canadian Commercial Bank was exemplified to represent a mismanagement of risk and a lack of interest rate knowledge. Theoretical frameworks present consumer choices and reactions to interest rates as exogenous variables.

However, when placed in the real world, these variables are endogenous as consumer behaviors regarding deposits and loans will change a great deal.

Thus, we realize a clear connection between interest rates, bank development and profitability. Today, we face record-high levels of inflation and rising interest rates. With a higher inflation expectation, we will expect the interest rates to further increase. Speculation surrounding the Fed has intensified as a rise in interest rates is due. However, as we do expect interest rates to rise, the Fed and banks must adequately communicate in order to ensure no maturity mismatch takes place. We expect banks' profitability to increase as interest rates continue to increase. However, once a recession dawns upon us, banks' profits will quickly fall.

Reference

Anderson, S. (2022, April 11). What happens to Interest Rates During a Recession.

Investopedia. Retrieved on June 13, 2022, from

<https://www.investopedia.com/ask/answers/102015/do-interest-rates-increase-during-recession.asp>

Bank of America . (2022). *Annual reports & proxy statements*. Bank of America Corporation.

Retrieved June 13, 2022, from

<https://investor.bankofamerica.com/annual-reports-and-proxy-statements>

Bank of Canada (2010). *The Bank Failuers of September 1985*. Bank of Canada. Retrieved

June 13, 2022, from

<https://www.bankofcanada.ca/wp-content/uploads/2010/07/bank.pdf>

Bloomenthal, A. (2022, February 8). *What is basel III?* Investopedia. Retrieved June 13,

2022, from <https://www.investopedia.com/terms/b/basel-iii.asp>

Bradsher, K. (2004, September 9). China poised for decision on raising interest rates. The

New York Times. Retrieved June 5, 2022, from

<https://www.nytimes.com/2004/09/09/business/worldbusiness/china-poised-for-decision-on-raising-interest-rates.html>

The Canadian Press. (2022, May 11). *Gas prices push record highs as demand surges, supply*

constrained | CBC News. CBCnews. Retrieved June 13, 2022, from

<https://www.cbc.ca/news/canada/toronto/gas-prices-canada-toronto-1.6448930>

The Canadian Encyclopedia. (2006, February 6). *Canadian Commercial Bank*. Canadian

Encyclopedia. Retrieved June 13, 2022, from

<https://www.thecanadianencyclopedia.ca/en/article/canadian-commercial-bank>

CBC News. (2022, March 15). *Average house price up 20% in past year - and new listings*

are surging | CBC News. CBCnews. Retrieved June 13, 2022, from

<https://www.cbc.ca/news/business/crea-housing-february-1.6385274>

Chen, J. (2020, December 8). *Non-interest income*. Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/n/noninterest-income.asp>

China raises interest rates for first time in a decade. China Raises Interest Rates for First Time in a Decade | Congressional-Executive Commission on China. (n.d.). Retrieved June 15, 2022, from <https://www.cecc.gov/publications/commission-analysis/china-raises-interest-rates-for-first-time-in-a-decade>

De Fiore, F., Hoerova, M., & Uhlig, H. (2018). Money markets, collateral and monetary policy. <https://doi.org/10.3386/w25319>

DePersio, G. (2021, October 26). *Why do commercial banks borrow from the Federal Reserve?* Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/ask/answers/072815/why-do-commercial-banks-borrow-federal-reserve.asp>

DeYoung, R., & Rice, T. (2004). How do banks make money? the fallacies of fee income - Federal Reserve Bank of Chicago. Retrieved June 13, 2022, from <https://www.chicagofed.org/publications/economic-perspectives/2004/4qtr2004-part3-deyoung-rice>

Evans, P. (2020, June 23). *How covid-19 has changed Canada's economy for the worse - but also for the better* | CBC news. CBCnews. Retrieved June 13, 2022, from <https://www.cbc.ca/news/business/covid-economy-changes-1.5618734>

Evans, P. (2022, May 18). *Inflation hits 6.8%, the highest in 31 years* | CBC News. CBCnews. Retrieved June 13, 2022, from <https://www.cbc.ca/news/business/canada-inflation-april-1.6457520>

Flannery, M. J. (1983, August). *Interest Rates and Bank Profitability: Additional Evidence*.

Journal of Money, Credit and Banking. Retrieved June 13, 2022 from

<https://doi.org/10.2307/1992486>

Frankenfield, J. (2021, October 22). *How does a checking account work?* Investopedia.

Retrieved June 13, 2022, from

<https://www.investopedia.com/terms/c/checkingaccount.asp>

Ganti, A. (2021, December 9). What is the multiplier effect? Investopedia. Retrieved June 14,

2022, from <https://www.investopedia.com/terms/m/multipliereffect.asp>

Ganzel, B. (n.d.). *Bank failures during the 1930s Great Depression*. Bank failures during the

1930s Great Depression. Retrieved June 15, 2022, from

https://livinghistoryfarm.org/farminginthe30s/money_08.html

Government of Canada, Statistics Canada. (2021, May 19). *A year into the pandemic, this*

article summarizes the impacts of covid-19 on consumer inflation and highlights the important consumption factors that have shifted in the lives of Canadians. The

Consumer Price Index and COVID-19: A One-Year Retrospective. Retrieved June 13, 2022, from

<https://www150.statcan.gc.ca/n1/pub/62f0014m/62f0014m2021010-eng.htm>

Green, K. (2022, May 31). *Interest rate hike expected Wednesday in move to quell inflation*.

Calgary. Retrieved June 13, 2022, from

<https://calgary.ctvnews.ca/interest-rate-hike-expected-wednesday-in-move-to-quell-inflation-1.5926737>

Hall, M. (2021, March 4). *How Interest Rate Changes Affect the Profitability of Banks*.

Investopedia. Retrieved June 13, 2022, from

<https://www.investopedia.com/ask/answers/041015/how-do-interest-rate-changes-affect-profitability-banking-sector.asp>

- Hancock, D. (1985). *Bank Profitability, Interest Rates, and Monetary Policy*. Journal of Money, Credit and Banking, 17(2), 189–202. <https://doi.org/10.2307/1992333>
- Hayes, A. (2021, July 22). *Life-cycle hypothesis (LCH)*. Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/l/life-cycle-hypothesis.asp>
- Hayes, A. (2021, March 30). *Net Interest Rate Spread*. Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/n/net-interest-rate-spread.asp>
- Hayes, A. (2021, June 9). *Interbank market definition*. Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/i/interbankmarket.asp>
- Hayes, A. (2021, October 21). What ever happened to the dotcom bubble? Investopedia. Retrieved June 15, 2022, from <https://www.investopedia.com/terms/d/dotcom-bubble.asp>
- Hayes, A. (2022, June 2). *What is the Fisher effect?* Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/f/fishereffect.asp>
- Jiang, G., N. Tang, E. Law and A. Sze (2003), *The Profitability of the Banking Sector in Hong Kong*, Hong Kong Monetary Authority Quarterly Bulletin, September, 5-14. <https://www.hkma.gov.hk/media/eng/publication-and-research/quarterly-bulletin/qb200309/fa1.pdf>
- Johnston, M. (2022, February 22). What happened to oil prices in 2020. Investopedia. Retrieved June 14, 2022, from <https://www.investopedia.com/articles/investing/100615/will-oil-prices-go-2017.asp>
- Kagan, J. (2021, October 6). *Understanding commercial banks*. Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/c/commercialbank.asp>
- Kagan, J. (2022, February 24). *How credit rating works*. Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/c/creditrating.asp>

- Kagan, J. (2022, February 7). *What is a savings account?* Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/s/savingsaccount.asp>
- Kagan, J. (2022, March 28). *Take-out loan definition.* Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/t/take-out-loan.asp>
- Kenton, W. (2021, August 31). *What is consumption smoothing?* Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/c/consumption-smoothing.asp>
- Kenton, W. (2022, January 17). *The reserve ratio explained.* Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/r/reserveratio.asp>
- Kenton, W. (2021, May 31). *Maturity Mismatch.* Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/m/maturityismatch.asp>
- Kirby, J. (2020, April 6). *Coronavirus plunges Canada's economy into the abyss.* Macleans.ca. Retrieved June 13, 2022, from <https://www.macleans.ca/economy/economicanalysis/coronavirus-plunges-canadas-economy-into-the-abyss/>
- Kraay, A., & Ventura, J. (2007). The dot-com bubble, the Bush deficits, and the US current account. In *G7 Current Account Imbalances: Sustainability and Adjustment* (pp. 457-496). University of Chicago Press. Retrieved June 15, 2022, from <https://www.nber.org/system/files/chapters/c0124/c0124.pdf>
- Lehmann, Hansjuerg, Manz, Michael (2006, January 1). *The Exposure of Swiss Banks to Macroeconomic Shocks—An Empirical Investigation.* Swiss National Bank, Working Papers. Retrieved June 1, 2022, from https://www.snb.ch/n/mmr/reference/working_paper_2006_04/source/working_paper_2006_04.n.pdf
- McCullough, B. (2018, December 4). A revealing look at the dot-com bubble of 2000 - and how it shapes our lives Today. ideas.ted.com. Retrieved June 15, 2022, from

<https://ideas.ted.com/an-eye-opening-look-at-the-dot-com-bubble-of-2000-and-how-it-shapes-our-lives-today/>

McGee, S. (2021, May 13). *How bank failures contributed to the Great Depression*.

History.com. Retrieved June 15, 2022, from

<https://www.history.com/news/bank-failures-great-depression-1929-crash>

Milstein, E., & Wessel, D. (2021, December 17). *What did the Fed do in response to the*

COVID-19 crisis? Brookings. Retrieved June 13, 2022, from

<https://www.brookings.edu/research/fed-response-to-covid19>

Nicholas Cheang(2005), *How Do Interest Rate Movements Affect Interest Margin of Macao*

Banks. University of Macau Retrieved June 1, 2022, from

<https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.559.7536&rep=rep1&type=pdf>

Oswald, P. (2021, April 11). *Why Rising Interest Rates Are Great For Long-Term Investors*.

Deccan Herald. Retrieved June 13, 2022, from

<https://www.deccanherald.com/business/family-finance/why-rising-interest-rates-are-great-for-long-term-investors-973246.html>

Parker, T. (2022, April 10). *The basics of financing a business*. Investopedia. Retrieved June

13, 2022, from

<https://www.investopedia.com/articles/pf/13/business-financing-primer.asp>

PBOC raises interest rate(2004, Oct, 29)_Embassy of the People's Republic of China in the

United States of America. (n.d.). Gov.Cn. Retrieved June 15, 2022, from

http://us.china-embassy.gov.cn/eng/xnyfgk/200410/t20041029_4508500.htm

Pells, R. H. and Romer, . Christina D. (2021, October 11). Great Depression. Encyclopedia

Britannica. <https://www.britannica.com/event/Great-Depression>

- Reiff, N. (2022, March 5). *Repurchase agreement (REPO) definition*. Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/r/repurchaseagreement.asp>
- Romer, C. D. and Pells, . Richard H. (2021, October 11). Great Depression. Encyclopedia Britannica. <https://www.britannica.com/event/Great-Depression>
- Sametz, A. W., Keenan, M., Bloch, E., & Goldberg, L. (1979). SECURITIES ACTIVITIES OF COMMERCIAL BANKS: AN EVALUATION OF CURRENT DEVELOPMENTS AND REGULATORY ISSUES. Retrieved from <https://scholarship.law.upenn.edu/cgi/viewcontent.cgi?article=1028&context=jil>
- Segal, T. (2022, April 6). *Central Bank Definition*. Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/terms/c/centralbank.asp>
- Team, T. I. (2021, July 14). *How central banks affect interest rates*. Investopedia. Retrieved June 13, 2022, from <https://www.investopedia.com/ask/answers/031115/how-do-central-banks-impact-interest-rates-economy.asp>
- Thomson Reuters. (2013, July 19). *Timeline-China's interest rate reforms*. Reuters. Retrieved June 15, 2022, from <https://www.reuters.com/article/china-economy-rates-idUKL4N0FP33B20130719>
- Tucci, L. (2014, August 26). What is dot-com bubble? - definition from whatis.com. SearchCIO. Retrieved June 15, 2022, from <https://www.techtarget.com/searchcio/definition/dot-com-bubble>
- Tuna, G. (2021, June 8). *Does interest rate and its volatility affect banking sector development? Empirical evidence from emerging market economies*. Elsevier. Retrieved June 13, 2022, from https://www.sciencedirect.com/science/article/abs/pii/S027553192100057X?fr=RR-2&ref=pdf_download&rr=7141833b8af2543d#page=10&zoom=100,0,0

Wagner, H. (2021, September 13). *Analyzing a bank's financial statements*. Investopedia.

Retrieved June 13, 2022, from

<https://www.investopedia.com/articles/stocks/07/bankfinancials.asp>

Wirija, J. (2020, July 20). *Liquidity risk: Measurement and management - 8020 consulting posts*. 8020 Consulting. Retrieved June 13, 2022, from

<https://8020consulting.com/principles-of-measuring-and-managing-liquidity-risk/>

Wowa.(2022, May 31). *Bank of Canada Interest Rate*. Wowa Leads Inc. Retrieved June 13, 2022, from <https://wowa.ca/bank-of-canada-interest-rate>

Ash Demirgüç-Kunt, Harry Huizinga(1999), *Determinants of Commercial Bank Interest*

Margins and Profitability: Some International Evidence, The World Bank Economic Review, Volume 13, Issue 2, May 1999, Pages 379–408,

<https://doi.org/10.1093/wber/13.2.379>

ScotiaBank. *Annual Reports*. ScotiaBank. Retrieved June 13, 2022, from

<https://www.scotiabank.com/ca/en/about/investors-shareholders/annual-reports.html>

Staikouras, C. K., & Wood, G. E. (2004). The Determinants Of European Bank Profitability.

International Business & Economics Research Journal (IBER), 3(6).

<https://doi.org/10.19030/iber.v3i6.3699>

Appendix

figure 1:

TABLE 2: REGRESSION RESULTS FOR INTEREST RATE MARGIN				
dependent var.: im_{it}	STATIC MODEL		DYNAMIC MODEL	
	Coefficients	P-values	Coefficients	P-values
im_{it-1}	-	-	+0.4404	0.001
Δir_t	-0.0004	0.047	-0.0001	0.996
$spread_t$	-0.0006	0.068	+0.0021	0.027
sav_{it}	+0.0190	0.018	+0.0317	0.208
private* Δir_t	-0.0013	0.000	-0.0021	0.376
foreign* Δir_t	-0.0026	0.000	-0.0013	0.312
private* $spread_t$	-0.0082	0.000	-0.0181	0.000
foreign* $spread_t$	-0.0039	0.000	-0.0100	0.001
cons	+0.0334	0.000	-0.0017	0.000
number of obs (number of id)	3690 (258)		3711 (258)	
Wald test of joint coeff: Prob > F	0.0000		-	
Arellano-Bond test of AR(2) (H0: no autocorrelation): Prob > z	-		0.9558	

Sources: *The Exposure of Swiss Banks to Macroeconomic Shocks – an Empirical Investigation*

figure 2:

TABLE 3: MARGINAL EFFECTS ON NET INTEREST INCOME IN % OF PROFITS*					
	all banks	cantonal and regional banks	big banks	private banks	foreign banks
Δir : +100bp	-3.5%	-6.4%	-1.9%	-5.1%	-6.3%

Sources: *The Exposure of Swiss Banks to Macroeconomic Shocks – an Empirical Investigation*

figure 3:

Table 5. *Determinants of Bank Profitability*

Independent variable	Regression results				
	(1)	(2)	(3)	(4)	(5)
<i>Bank characteristics</i>					
Equity/lagged total assets (E/TA_{t-1})	0.047*** (0.009)	0.051*** (0.009)	0.055*** (0.009)	0.058** (0.010)	0.015*** (0.006)
Equity/lagged total assets interacted with GDP per capita	0.002 (0.001)	0.002*** (0.001)	0.003*** (0.001)	0.002*** (0.001)	0.003*** (0.001)
Loans/total assets	-0.013*** (0.005)	-0.024*** (0.005)	-0.023** (0.005)	-0.015*** (0.005)	-0.018*** (0.004)
Loans/total assets interacted with GDP per capita	0.001*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.003*** (0.000)	0.001*** (0.000)
Non-interest earning assets/ total assets	-0.005 (0.010)	-0.010 (0.010)	-0.011 (0.010)	-0.014 (0.010)	-0.033*** (0.007)
Non-interest earning assets/ total assets interacted with GDP per capita	-0.007*** (0.001)	-0.007*** (0.001)	-0.007*** (0.001)	-0.008*** (0.001)	0.002** (0.001)
Customer and short-term funding/total assets	-0.029*** (0.006)	-0.017** (0.007)	-0.014*** (0.008)	-0.031*** (0.001)	-0.051*** (0.005)
Customer and short-term funding/total assets interacted with GDP per capita	0.002*** (0.000)	-0.000 (0.001)	-0.000 (0.001)	0.001 (0.001)	0.002*** (0.000)
Overhead/total assets	-0.023 (0.025)	-0.006 (0.026)	-0.004 (0.026)	-0.024 (0.026)	-0.114*** (0.019)
Overhead/total assets interacted with GDP per capita	-0.030*** (0.003)	-0.049*** (0.003)	-0.049*** (0.003)	-0.048*** (0.003)	0.007*** (0.002)

Sources: *Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence*

figure 4:

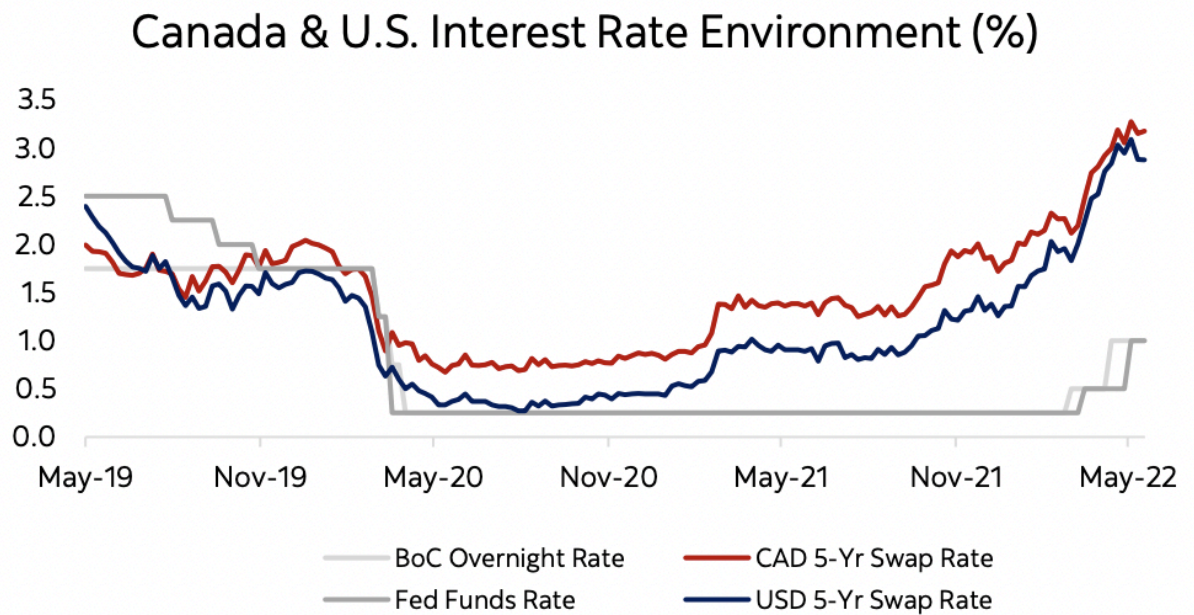
Table 5. (continued)

Independent variable	Regression results				
	(1)	(2)	(3)	(4)	(5)
Foreign ownership dummy	0.005*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
Foreign ownership dummy interacted with GDP per capita	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	0.000*** (0.000)
<i>Macroeconomic indicators</i>					
GDP per capita	0.008*** (0.001)	0.008*** (0.001)	0.008*** (0.001)	0.007*** (0.002)	0.000 (0.002)
Growth rate	0.002 (0.010)	-0.006 (0.011)	-0.007 (0.011)	-0.019 (0.011)	0.004 (0.007)
Inflation rate	0.011 (0.008)	0.015* (0.008)	0.014* (0.008)	0.009 (0.008)	0.011* (0.005)
Real interest rate	0.023*** (0.009)	0.029*** (0.010)	0.029*** (0.010)	0.023*** (0.009)	0.026*** (0.006)
Real interest rate interacted with GDP per capita	-0.000 (0.002)	-0.001 (0.002)	-0.001 (0.002)	-0.000 (0.002)	-0.003** (0.002)
<i>Taxation</i>					
Reserves		-0.126*** (0.021)	-0.129*** (0.021)	-0.106*** (0.023)	-0.091*** (0.016)
Reserves interacted with GDP per capita		0.029*** (0.004)	0.031*** (0.004)	0.032*** (0.004)	0.005*** (0.004)
Tax rate		0.022*** (0.003)	0.022*** (0.003)	0.021*** (0.003)	0.017*** (0.002)
Tax rate interacted with GDP per capita		-0.000 (0.000)	-0.000** (0.000)	-0.003** (0.000)	0.000*** (0.000)
<i>Deposit insurance</i>					
Deposit insurance dummy			-0.005 (0.004)		
<i>Financial structure</i>					
Bank assets/GDP				-0.028* (0.014)	
Bank assets/GDP interacted with GDP per capita				0.002* (0.001)	
Stock market capitalization/GDP				0.010 (0.007)	
Stock market capitalization/ GDP interacted with GDP per capita				0.000 (0.001)	
Stock market capitalization/bank assets				-0.001 (0.001)	

(Table continued on following page.)

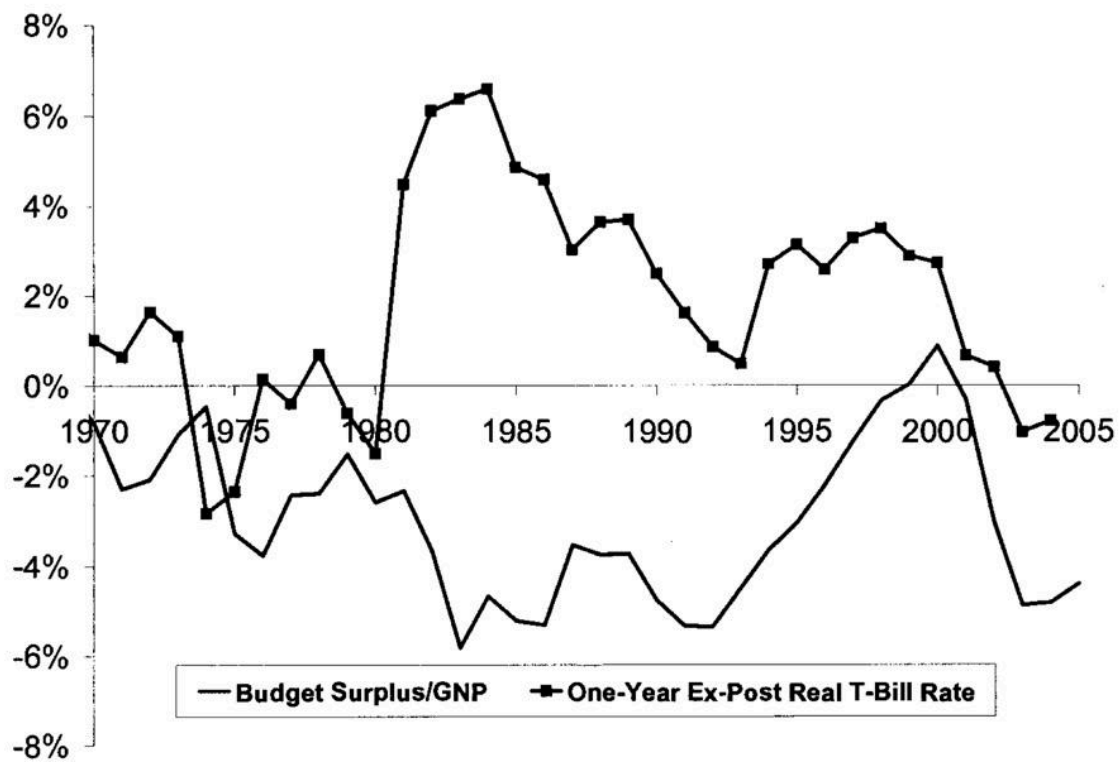
Sources: Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence

figure 5:



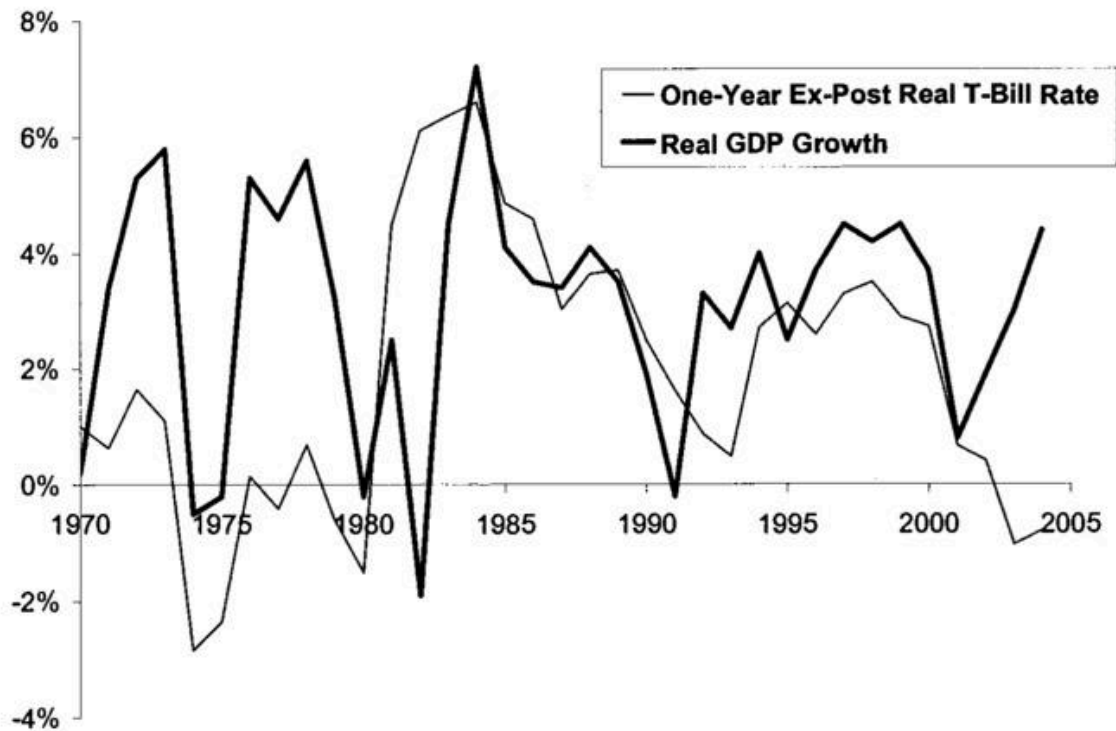
Source: ScotiaBank Annual Report 2022

figure 6:



Sources: Congressional Budget Office and Board of Governors of the Federal Reserve System

figure 7:



Sources: GDP growth is from U.S. Bureau of Economic Analysis, and interest rates are from the Board of Governors of the Federal Reserve System