

The Interrelationship Between Futures Contracts and Credit Risk: Analytical study for Royal Bank of Canada

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Abstract: This paper reviews the importance of using futures contracts to hedge against credit risk. According to this trend, the financial market of Australia was chosen as a research community because of the presence of a large number of transactions for derivative financial instruments, and it was found that the best sample for research is the Royal Bank of Canada (RBC) due to the availability of the necessary data for the application of the current research for the period (2010-2020) the study reached to a set of conclusions the most significant is the possibility of using futures contracts as tools for hedging of credit risk. It also recommended the need to adopt financial engineering tools, especially futures contracts, to reduce credit risks in the Iraqi banking sector in line with the nature of the country's economic situation.

Keywords: Futures Contracts, Hedge, Credit Risk, Royal Bank of Canada.

1. Introduction:

Financial engineering has gained a wide range of interest from researchers and businessmen, especially after the breakdown of the agreement (Bretton Woods, 1973) and the resulting exposure of financial institutions and banks are exposed to many types of risks (Madura, 2011:56). which led to a loss of accuracy and objectivity in its ability to predict the volume and direction of financial variables affecting the work of companies (Frejee, 2001:5). which in turn, paved the way for the emergence of an urgent need for modern financial tools to manage these risks and use scientific methods to formulate and solve complex financial problems (Akhmedov et al, 2021:100). in light of this, financial engineering has been able to offer new financial instruments that are characterized by a high level of flexibility enabling clients to hedge, speculate, and invest and all revolve around risk management. As a result, the derivatives market has become increasingly important in hedging and is used as a key position on many exchanges around the world over the past few decades. At present, derivatives trading is the largest trading activity in the world and is estimated at more than (\$2.5 trillion) per day and is growing at around (14%) annually (Huang&Yao, 2021:3278). The efficient use of derivatives is beneficial for financial institutions to achieve more control over the risks they are exposed to, whether those risks are systemic or unsystematic. Therefore, one of the most exciting developments in finance over the past 40 years is the growth of derivatives markets (Hull, 2015:18). The banking system is one of the financing systems that face

many financial risks, especially credit risks, which are considered one of the most important risks to which banks are exposed because it reflects the credit activity, which is one of the most important banking activities and a major source for achieving future returns. Therefore, banks seek to credit derivatives market to reduce the impact of those risks on banking activities (Calistru,2021:554).

2. Literature Review:

2.1 Futures Contracts :

Financial engineering includes a set of new financial tools and has gained a wide part of the interest and thinking of researchers and investors, which are called derivatives and which can be defined as are financial contracts whose value is derived from the asset value subject of the contract and can be used for various purposes such as hedging, investment, and speculation and to be the volatility of its value is greater than the volatility of the value of the asset subject of the contract (Hull,2015:8). Along the same lines, (IMF) has introduced an also definition of financial derivatives: they are contracts its value depends on the prices of the financial assets subject to the contract but they do not require or it's not necessary to invest capital in these assets and as a contract between two parties to exchange payments on the basis of prices or returns and any transfer of ownership of the asset of contract and cash flow becomes unnecessary. so it's neither tangible nor financial assets but it is contracts like other types of contracts that represent arrangements between two parties, one of whom is the seller and the other is a buyer(Frejee,2001:4). So the concept of financial derivatives is considered contracts that are settled at a future date and don't require initial investments or require a small initial amount compared to the contract's value, while the value of (gains/losses) depends on the value of the underlying asset. The contract includes determining the execution price in the future, the quantity to which the price will be applied, the time in which the contract will be valid, and defining the contract type. stated(Madur,2022: 355). that financial engineering includes a wide variety of new financial instruments the most important of which are options, forwards, swaps, and futures. but the current study will focus on future contracts. futures contract is defined as a standardization contract that involves an agreement between two parties: the first party is called the seller (the owner of the short position) and the other party is the buyer (the holder of the long position). Where this agreement requires the seller to deliver to the buyer a tangible or financial asset at an agreed later date (the delivery date) on the basis of the price agreed upon when they contracted between them and the obligation of contract implement includes both parties, regardless of whether the party is (buyer or seller). (Hindi, 2004:460). While (Gitman &Flanagan, 2015:838) also adds It is a standard contract established by a stock exchange that includes an agreement between a seller and a buyer in a specific period of time to exchange an asset for cash at a later date but determined at its current price in the market. but both parties to the contract must deposit with the broker that deals with him, a cash amount or government securities such as treasury bills, which represent a small percentage of the contract price, which is called the initial margin in a clearinghouse. the purpose of this margin is to prove the goodwill of the two parties and is also used for daily settlement purposes to monitor price movements in the market on a daily basis and accordingly adjust the contract price every day according to the prevailing price in the market thus one of the parties will be exposed to profit and the other party to loss (Frejee,2001:6). Consistent with these studies, (Hull,2015:27)(Brealey, 2020: 691) stated that futures contracts are subject to a set of unifying characteristics, which are as follows :

1. Buyer and seller make gains or losses on a daily basis, the daily resettlement feature in futures contracts is called "marking-to-market."

2. The seller and the buyer must maintain an account with the broker representing (5 - 10%) of the contract value and it is managed by the clearinghouse to guarantee the contract implementation (Ross et al,2019:773).
3. The futures contracts are sold Within the limits of the stock exchange instead of an over-the-counter market and are imposing the limits of minimum and maximum for daily price changes, and the contract price during one day cannot exceed those limits (Ross et al,2022:73).
4. The specifies a standard size for the number of futures contracts to be exchanged on a specific settlement date. Therefore, it is often used to limit the speculative operations taken by some of the dealers(Ross et al,2022:136).
5. Futures contracts are easy to trade because the contract size and its date are standardized and the futures markets enjoy high liquidity Because any contracting party can liquidate its position by entering a position opposite to its original position (Madura,2022:138-139).

2.2 Credit Risk:

Financial risks are the main factor affecting the performance and profits of financial institutions. Therefore, the effective management of these risks is necessary in order to reduce their effects on financial and banking institutions. In light of this, the concept of risk must be clarified as it is defined by (Gitman,2015:362) as a measure of the uncertainty surrounding the return that an investor will earn or the volatility of the returns level associated with a particular asset. either (Ross,2019:394) added also that risk means the possibility of the difference between actual result and expected or planned result. Financial risk is generally divided into two types (systematic and unsystematic risk) Systematic risk arises from external environmental factors and inherently affects almost all companies unevenly. Because systemic risk has market-level effects, it is sometimes called a market risk that cannot be compensated by diversification It includes interest rate risk, exchange risk, and inflation risk. while the unsystematic risks are related to a small number of companies or assets that can be offset by diversified investments and include credit, financial, management and liquidity risks (Ross,2022:437_438). Since there are many types of risks, the current study will focus on the credit risk that exposed are financial institutions and especially banking transactions. Credit risk is the possibility that borrowers or parties of derivative transactions will default on their financial obligations (Hull,2015:544). It also means that the bank's customers in the market are stopped meeting their debts on their due date(Elliott,2006:179). This risk arises from the unfulfillment of one of the parties to the contract to its contractual obligations specified in the derivative contract. This type of risk is the most prevalent in unregulated markets(Madura,2008:111). In line with these studies, he added (Saunders& Cornett) that financial institutions that make loans or buy bonds with long maturities are more exposed to credit risk than those that provide loans or buy bonds with short maturities and further added If the capital is paid on all matured financial claims were deposited in the financial institutions and the interest payments are paid on the predetermined dates. this in turn will avoid them the credit risk. Accordingly, the active role of financial institutions is to check and monitor loan applicants to ensure that loans are granted to the most creditworthy(Saunders& Cornett,2011:186-187).

2.3 The futures contract use in hedging of credit Risk.

Financial Institutions are exposed to large losses due to their exposure to many financial risks wherefore they resort to using financial derivative contracts as a tool for risk management through hedging operations which allows them to replace existing risks with new risks that are more flexible enabling them to avoid losses. Where hedging is

considered one of the most important successful methods that are used to compensate or protect against financial risks (Gitman, 2012:701). Along the same lines (Barton et al, 2002) pointed out that the process of selecting an optimal strategy of hedging is considered a daunting task because it requires an accurate measurement of the extent to which the firm's exposure to risks. in parallel with these studies confirmed (Hull,2015:1) that financial derivatives have become increasingly important in the finance sector, especially Futures and options are actively traded on many exchanges throughout the world in order to hedge form risk. Among those risks is the credit risk which means the failure of the borrowers or one of the parties to the contract to pay the financial dues(Hull,2015:545). but through the daily resettlement feature in futures contracts by the clearinghouse, these risks can be significantly reduced. Perhaps the real reason is that regulated trading is more common in futures than in futures contracts (Ross et al., 2019:772). Futures contracts are traded through a clearinghouse which in turn protects the parties to the contract from credit risk with an initial margin that is charged to both the seller and the buyer (Huang & Yao, 2021: 3278). This margin ranges between (5-10%) of the contract value and is managed by the clearinghouse. The purpose of this margin is to perform a daily settlement of contracts where the contract is closed at the end of each day at the current market price and then the contract is opened on the second day at the current price. Thus, it will result in either an addition or deduction from the margin level of each party depending on the location of the seller or buyer and the nature of the market movement (Madura, 2022: 138)(Huall,2015:44). So if hedging programs are to be effective, companies that use derivatives should have less exposure to credit risk than those that don't use derivatives.

3.Methodology:

3.1 Study problem :

The study problem has represented the weak interest of financial institutions and banks in developing countries, especially Iraq in employing financial engineering tools to hedge against risk, which leads to the fluctuation of their profit margin and then the possibility of them being exposed to large losses or losing profits.

3.2 Study Importance :

The importance of the study stems from what it presents from a cognitive aspect of the role of futures contracts in hedging credit risks for financial researchers and bankers who specialize in the work of financial and banking institutions, especially with the increase and diversity of risks resulting from the growth of banking activities, which must be taken into account in order to reduce the severity of its effects.

3.3 Study Objectives :

The study aims mainly at diagnosing the real role that futures contracts play in hedging financial risks, especially credit risks in banks .

1. Determining the impact of futures contracts on impaired loans.
2. Determining the impact of futures contracts on the annual reserve for loans loss.
3. Determining the impact of futures contracts on the credit risk of the bank.

3.4 Study Hypothesis:

Futures contracts are used as tools for hedging credit risk .

The following sub-hypotheses are derived from it:

1. Futures contracts are used as tools leading to a decrease in the ratio of non-performing loans to the total loans of the Bank.
2. Futures contracts are used as tools leading to a decrease in the ratio of loan losses reserves to total loans.

4.5 Data collection and analysis methods:

The data of the Practical side were collected related to (the total value of the futures contracts, total assets, total loans, total impaired loans, and total allowance for loans losses) from the Annual Financial Reports of "Royal Bank of Canada" From the year (2010 to 2020) published on its official website: www.annualreports/royal-bank-of-Canada.com.

The credit risk to which banks are exposed can be measured through a set of financial indicators and measures, (Rose; 2005: 182) are follows:

$$1 = \frac{\text{Total loans}}{\text{Total Assets}}$$

$$2 = \frac{\text{Impaired loans}}{\text{Total loans}}$$

$$3 = \frac{\text{Total allowance for loans losses}}{\text{Total loans}}$$

5: Empirical Analysis

5.1 Analysis the total of futures contracts for a bank (RBC Bank).

Table (1) shows the total values of financial derivative contracts for the research sample bank and the direction of its movement compared to the research period (from 2010-to 2020).

Table (1): State The Total values of futures contracts for (RBC Bank)

Years	Contracts traded on the stock exchange	foreign exchange contracts	Total
2010	208,960	168	209,128
2011	253,136	48	253,184
2012	186,624	471	187,095
2013	51,820	39,838	91,658
2014	102,809	2,127	104,936
2015	91,943	1,035	92,978
2016	95,395	738	96,133
2017	112,151	516	112,667
2018	116,803	617	117,420
2019	710,286	28	710,314
2020	650,911	75	650,986
Average	234,622	4,151	238,773

Source by author

we note that the movement of these contracts was volatile throughout the study period and both of types are traded contracts in the stock exchange and foreign exchange contracts, whose total average value during the research period amounted to (238,773) billion dollars. Due to the expansion of the volume of the bank's activity and the significant increase in contracts traded on the stock exchange, which amounted to (710,286) billion dollars which clearly contributed to the increase of the total value of futures contracts despite the clear decline in foreign exchange contracts, which reached its lowest level during the study period, with a value of (28) billion dollars. But it did not affect the increase of the total contracts and the reason for this is that the increase in contracts traded on the stock exchange was greater than the decrease that occurred in foreign exchange contracts at large rates which did not clearly affect the total futures contracts this year. whereas achieved of the lowest value of these contracts was in (2013) reaching (91,658) billion dollars the reason for this decline is the apparent weakness in the activities related to the trading of contracts traded on the stock exchange for that period where we note that the decline of these contracts which amounted to (51,820) billion dollars and Its the lowest value recorded during the study period and despite the apparent rise in foreign exchange contracts that value rose significantly to reach (39,838) billion dollars recording the highest value during the study period but this rise did not affect the value total of the futures contracts because the decrease rates for the contracts traded in the stock exchange was the rates were greater than the increase rates in the foreign exchange contracts. whereas achieved of the lowest value of these contracts in (2013) reaching (91,658) billion dollars the reason for this decline is the apparent weakness in the activities related to the trading of contracts traded on the stock exchange for that period where we note that the decline of these contracts which amounted to (51,820) billion dollars and Its the lowest value recorded during the study period and despite the apparent rise in foreign exchange contracts that value rose significantly to reach (39,838) billion dollars recording the highest value during the study period but this rise did not affect the value total of the futures contracts because the decrease rates for the contracts traded in the stock exchange was the rates were greater than the increase rates in the foreign exchange contracts.

5.2: Analysis of the credit risk of (RBC Bank).

1- Ratio of total loans to total assets.

Table (2) states that the general average of this percentage amounted to (44%) during the study period from (2010 - to 2020) for (RBC Bank).

Table(2): States the Ratio of total loans to total assets

Years	Total Loans	Total Assets	% Ratio
2010	282,415	726,206	0.38
2011	357,186	751,702	0.47
2012	389,626	823,954	0.47
2013	420,578	859,745	0.48
2014	448,685	940,550	0.47
2015	487,705	1,074,208	0.45
2016	536,682	1,180,258	0.45

2017	561,235	1,212,853	0.46
2018	595,392	1,334,734	0.44
2019	640,042	1,428,935	0.44
2020	685,245	1,624,548	0.42
Average	491344.63	1087063	0.448

Source by author

The table results also showed that the highest percentage was in the year (2013) reaching (48%) and the reason for this is the increase in the total loans in that year compared to the total assets, as the value of the loans reached (420,578) billion dollars. The increase in total loans was greater than the increase in total assets, which led to an increase in this indicator. When observing the table, we see that the value of the loan in the year (2013) was not the highest in the total loans during the study period but the credit risk was the highest and this means that the assets covering the loans were low during the study period reaching (859,745) billion dollars which this led to an increase in credit risk. while the lowest percentage of credit risk was achieved in (2010) at a rate of (38%), and this means that the percentage increase in total assets was greater than the percentage increase in total loans which led to a decrease in credit risk to its lowest level during the study period. The results of the table also showed that the percentage of credit risk began to rise after the year (2010) and until the year (2013). The reason for this rise is the decrease in the increase rates in the bank's assets compared to the levels of increase in the volume of loans. We also note that the percentage of credit risk started to decline at a few rates after In (2014) the reason for this decrease is due to the increase in total assets from their levels despite the increase in total loans but the increase in total loans was less than the increase in total assets.

2. Ratio of impaired loans to total loans.

Table (3) shows that the general average of this percentage amounted to (40.1%) during the study period from (2010 - to 2020) for the bank(RBC) sample of the study.

Table(3): States the Ratio of impaired loans to total loans.

Years	Impaired Loans	Total loans	% Ratio
2010	1,958	282,415	69.3
2011	1,741	357,186	48.7
2012	1,613	389,626	41.3
2013	1,602	420,578	38.0
2014	1,345	448,685	29.9
2015	1,631	487,705	33.4
2016	3,094	536,682	57.6
2017	1,839	561,235	32.7
2018	1,483	595,392	24.9

2019	2,144	640,042	33.4
2020	2,246	685,245	32.7
Average	1881.45	491344.63	40.1

Source by author

The table shows that the highest percentage of credit risk amounted to (69.3%) specifically in the first year of the study period. The reason for the rise of this indicator is due to the significant increase in the value of impaired loans from their levels as their value amounted to (1,958) billion dollars, although it was not the highest during the duration of the study this percentage was achieved compared to the total loans for that year and this means that the increase in the value of impaired loans is greater than the increase in the value of the total loans. The table also shows that this bank achieved the lowest credit risk according to this indicator in (2018) at a rate of (24.9%) this decrease is due to the retreat in the total impaired loans to low levels during the study period with a value of (1,483) billion dollars compared to the size of the bank's total loans in this year. This means that the significant decrease in the value of impaired loans was greater than the increase in the total loans provided to customers by the bank. When following up on the data in table (3) we note that the percentage of credit risk began to decrease from (2010 until 2014) and this decline is because of the decrease in the total impaired loans of the bank compared to the volume of loans. we also note from the table that the credit risk began to rise after the year (2014) and this rise is a natural result of the increases in total impaired loans and the change in the volume of loans and the accompanying change in impaired loans, but after (2016) the credit risk started declining to reach its lowest level in (2018) to rise again until the end of the study period.

3. Ratio of the annual reserve for loan losses to total loans.

Table (4) shows the annual total allocated to loan losses for the research sample bank during the study period (2010-2020) where the average percentage was (5.1%).

Table(4): States the Ratio of Total allowance for loans losses to total loans.

Years	Total allowance for loans losses	Total loans	% Ratio
2010	2,038	282,415	7.2
2011	1,967	357,186	5.5
2012	1,997	389,626	5.1
2013	1,959	420,578	4.6
2014	1,994	448,685	4.4
2015	2,029	487,705	4.1
2016	2,235	536,682	4.1
2017	2,159	561,235	3.8
2018	2,933	595,392	4.9

2019	3,124	640,042	4.8
2020	5,746	685,245	8.3
Average	2561.90	491344.63	5.16

Source by author

The bank in the year (2020) achieved the highest rate of credit risk which amounted to (8.3%) and the reason for this rise is the increase in the value of the annual reserve for loan losses to its highest level during the study period as it amounted to (5,746) billion dollars despite the presence of an increase in the value of loans provided to customers but the increase in the value of the reserve was greater than the increase in the value of the loans granted which led to an increase in the credit risk. The table also shows that the lowest percentage of credit risk was achieved in (2017) at a rate of 3.8%. The reason for this decrease is the retreat in the value of the annual reserve for loan losses, which amounted to (2,159) million dollars compared to the volume of loans granted. The table results also indicate that the credit risk started declining in (2011) until it reached its lowest level in (2017) despite the increase in the total loans provided to customers and that the reason for this decrease in the value of the annual reserve for loan losses is due to the adopted policies by the bank in the process of granting loans. We also note that the credit risk ratio has risen again to reach its highest level in the last year of the study. The main reason for this rise of this indicator in the year (2020) is the increase in the value of the annual reserve for loan losses to its highest level during the study period.

5.3 Analysis of the impact of futures contracts on the credit risk of (RBC Bank).

The data contained in Table (5) shows the relationship between futures contracts and the credit risk of the research sample bank as the percentage of credit risk was different according to each indicator that was used to measure this risk and certainly this is normal because the measurement variables differ from one indicator to another. The current study sought to use more than one indicator to measure credit risk with the aim of accuracy and diversification in measurement and in order for the results to be more realistic and not rely on one indicator in the measurement methods.

Table(5): Impact of futures contracts on the credit risk.

Years	Futures Contracts	Ratio of total loans to total assets %	ratio of impaired loans to total loans %	Ratio of net loan losses to total loans %
2010	209,128	0.38	69.3	7.2
2011	253,184	0.47	48.7	5.5
2012	187,095	0.47	41.3	5.1
2013	91,658	0.48	38.0	4.6
2014	104,936	0.47	29.9	4.4
2015	92,978	0.45	33.4	4.1
2016	96,133	0.45	57.6	4.1
2017	112,667	0.46	32.7	3.8

2018	117,420	0.44	24.9	4.9
2019	710,314	0.44	33.4	4.8
2020	650,986	0.42	32.7	8.3
Average	238,773	0.448	40.1	5.16

Source by author

The table results show that futures contracts contributed to reducing credit risk, especially when using the ratio of loans to total assets and that the credit risk began to rise with the retreat of futures contracts use. In (2010) the bank recorded a credit risk Its percentage was (0.38) It was the lowest percentage recorded by the bank during the study period but we also note when use decreased of futures contracts to their lowest percentage in (2013) which amounted to (91,658) billion dollars, the bank recorded the highest credit risk ratio for the same year which amounted to (0.48) this means that futures contracts had a clear impact on credit risk, along with other factors that would contribute to increasing and decreasing this risk so that the levels of this risk-return to a decrease with the increase in the volume of futures contracts. When using the ratio of impaired loans to total loans in measuring credit risk, we note that the first two years of the study life witnessed a clear explanation of the impact of the size of futures contracts on credit risk.

When using the ratio of impaired loans to total loans in measuring credit risk, we note that the first two years of the study life witnessed a clear explanation of the impact of the size of futures contracts on credit risk. The year (2010) recorded a risk ratio of (69.3). but this is a risk decreased significantly in (2011) to reach (48.7). This applies perfectly to the credit risk ratios when using the ratio of net loan losses to total loans. as the year (2011) witnessed a decrease in the credit risk ratio to reach ratio (5.5) compared to what it was in (2010), by a ratio of (7.2).

This explains the effect of futures contracts on credit risk, because the risk ratios change as a result of changes in the volume of futures contracts, as well as other factors related to the work of the research sample bank.

Referring to what has been mentioned and by results, it became clear to us that futures contracts had a clear impact on the credit risk of the bank appointed for research during the study period.

6. Conclusions and Recommendations.

6.1 Conclusions:

This paragraph includes the most important conclusions that have been reached and that can contribute to enriching the knowledge aspect namely:

1. The volume of futures contracts for the bank of the research sample was subject to change during the study period and this is a result of the economic and financial developments that govern the global financial system.
2. The volume of transactions in trading contracts in the stock exchange was greater than the volume of transactions in foreign exchange contracts at high levels, and this means that most of the bank's activities were directed to the purpose of trading in futures contracts.
3. The results showed that the bank follows a good policy in collecting impaired loans, as witnessed in most years of study a decrease in impaired loans despite the clear increase in the volume of loans.

4. The results showed that the allowance for net loan losses increases with the increase in the volume of loans and this means that the bank in the research field follows a clear policy on how to deal with loan losses that it may be exposed to.
5. discern that the activity of futures contracts had a significant impact on credit risk and increased with the clear increase in the volume of these contracts and the effectiveness of futures contracts and their impact on risk rates were more clear when using the indicator the total loans to total assets in the measurement of credit risk.

6.2 Recommendations:

This paragraph reviews the recommendations based on the conclusions that have been reached through the research.

1. The bank's credit risk ratio can be mitigated by relying on futures contracts because the risk is the main determinant of financial behavior and all banks are affected by cases of non-payment or default.
2. The bank should take into consideration the nature and size of loans and the creditworthiness of borrowers, which will contribute to reducing the credit risk ratios that the bank will be exposed to.
3. The bank should determine an appropriate combination of futures contracts to suit the nature of its work which in turn will contribute to achieving good levels of returns in addition to its contribution to reducing the credit risk of the bank.
4. Adoption of the results of the current study that showed the existence of a relationship between the volume of futures contracts and credit risk.

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