CME Group

Hedging Foreign Exchange Rate Risk with CME FX Futures

Canadian Dollar vs. U.S. Dollar

CME FX futures provide agricultural producers with the liquid, efficient tools to hedge against exchange rate risk and its potential impact to farm profits.

Grain and livestock producers regularly turn to CME Group's suite of agriculture futures and options to manage commodity price risk effectively and protect their profits. But there is another important factor that Canadian producers should consider to preserve their profits – exchange rate risk.

The Canadian dollars to U.S. dollars exchange rate is significant for a number of reasons: The high level of trade between Canada and the United States (the largest importer of Canada agriculture exports; see sidebar); most ag-related trade that takes place globally is priced in U.S. dollars; and many of the related hedging tools are denominated in U.S. dollars.

Suppose that a Canadian producer signs a contract to sell hogs in six months for a payment of $500,000 U.S. dollars at delivery. During those six months, the producer's profits may be at risk of a declining U.S. dollar vs. the Canadian dollar, as that translates to fewer Canadian dollars received once the U.S. dollars are converted back into the producer's local currency.

CME FX futures – and in this case, CME Canadian dollar futures — are ideally suited for constructing hedges to protect against exchange rate risk that can impact farm profits.

Hedging exchange rate exposures with futures is relatively straightforward. The most important thing is to assess the amount of risk exposure to which one is subject and to identify the appropriate "hedge ratio" or number of futures needed to offset that risk.

For Canada in 2013, over 90 percent of livestock exports and 18 percent of grain and oilseed exports went to the United States *(number one in both categories)*.

Following are two examples illustrating how to use CME Canadian Dollar (CAD/USD) futures to construct the proper hedges for your needs to manage rate risk.

EXAMPLE: Hedge CAD/USD Exchange Rate Risk on a Live Cattle Delivery to a U.S. Firm

Assume it is April 1. You are a Canadian farmer and have just signed a contract to sell 800,000 pounds of live cattle to a U.S. firm, deliverable on the following September 1. You will be paid on the delivery date in U.S. dollars, at an agreed-upon price of $1.650000 USD per pound ($1,320,000 U.S. dollars).

On April 1, the USD-CAD exchange rate is 1.1111 Canadian dollars per one U.S. dollar. So between April 1 and September 1, you will be "long" the $1,320,000 U.S. dollars (USD/CAD) that you have agreed to take as payment for your cattle, and "short" the $1,466,652 CAD that you could expect to receive if your were exchanging USD for CAD on April 1.

Live Cattle Sale Details	
Dates	Contract entered on April 1: Payment due on delivery September 1 in U.S. dollars
Price	Rate: $1.6500000 USD per pound, for 800,000 lbs. of Live Cattle). =$1,320,000 USD
Spot exchange rate on April 1	**USD/CAD spot value:** 1.1111 CAD per 1.0 USD, or
	CAD/USD spot value: 0.9 USD per 1.0 CAD
Value of Contract in CAD on April 1	1.1111 CAD x. $1,320,000 USD = C$1,466,652 CAD, your risk exposure

CME Canadian Dollar (CAD/USD) Futures	Standard and E-micro Contract Sizes	
Two Contract Sizes	**Standard CAD/USD futures:** 100,000 Canadian dollars /contract	
	E-micro CAD/USD futures: 10,000 Canadian dollars/contract (1/10th of the standard contract)	
Contract Months	March quarterly cycle (March, June, Sep, Dec)	
Contract Value	If USD/CAD = 0.9524, then: **Standard:** Contract = $95,240 USD	**E-micro:** Contract = $9,524 USD
Minimum Tick Size	**Standard:** 0.0001 per CAD (=$10.00 USD)	**E-micro:** 0.0001 per CAD (=$1.00 USD)

The exchange rate could fluctuate a great deal during those five months. CME Canadian dollar (CAD/USD) futures can be used to help mitigate risk of an unfavorable move. Start by calculating the hedge ratio. The formula for this is:

Hedge ratio = Value of Risk Exposure / Futures Contract Size

In this scenario, the value of your risk exposure is 1,466,652 CAD, and the size of CME one CAD/USD contract is 100,000 CAD. Plug these numbers into the formula to get:

Hedge ratio = 1,466,652 CAD / 100,000 CAD

= 14.67

It would take 14.67 standard CME CAD/USD futures to hedge the risk exposure, if only standard-size contracts were available. In this case, however, CME offers CAD/USD futures in two sizes: Standard (100,000 CAD) and E-micro (10,000 CAD), valued at 1/10th of the standard contract. With this in mind, take another look at the 14.67 hedge ratio:

Hedge ratio = 14.67

Rounded up to nearest 10th = 14.70 (14 and 7/10ths)

= 14 standard CME CAD/USD futures and

7 E-micro CME CAD/USD futures

To hedge your exposure risk, you will need 14 CME CAD/USD and 7 E-micro CAD/USD futures.

How the Hedge Plays Out: Two Scenarios

Consider the results of this hedge in two different market scenarios:

Scenario 1: CAD has rallied 5 cents vs. (declining) USD

	Spot CAD/USD	USD/CAD rate	C$ value of $1,320,000 USD payment	Sep CAD/USD Futures	
April 1	0.9000	1.1111	C$1,466,652	Buy	14 Standard @ .9000 7 E-micro @ .9000
Sep 1	0.9500	1.0526	C$1,389,432	Sell	14 Standard @ .9500 7 E-micro @ .9500
			(C$77,220)	500 point increase: $73,500 USD, or C$77,366.10	
Future position gain in C$77,366.10 - C$77,220 spot value loss = Net Gain of C$146.10					

In Scenario 1, the CAD/USD rate has moved up by 5 cents vs USD, from 0.9000 on April 1 to 0.9500 on September 1. That equals a 500 point move ($0.0001 per CAD increments).

500 x $10 per contract for Standard CAD/USD x 14 standard contracts =$70,000 USD

500 x $1 per contract for E-micro CAD/USD x 7 E-micro contracts =$3,500 USD

Total gain on your futures position =$73,500 USD

Converted into CAD (at Sep 1 conversion rate of 1.0526) = **C$77,366.10**

So although the underlying spot market value of your contact payment has declined by C$ 77,220, by hedging the exchange rate exposure, you have negated the relative value loss and come out ahead by C$146.10, ensuring the value of your original contract.

Scenario 2: CAD has fallen 5 cents vs. (appreciating) USD

	Spot CAD/USD	USD/CAD rate	C$ value of $1,320,000 USD payment	Sep CAD/USD Futures	
April 1	0.9000	1.1111	C$1,466,652	Buy	14 Standard @ .9000 7 E-micro @ .9000
Sep 1	0.8500	1.1765	$1,552,980	Sell	14 Standard @ .8500 7 E-micro @ .8500
			+ C$ 86,328	500 point decline: ($73,500 USD), or (C$ 86,472.75)	
C$ 86,328 spot value gain – C$ 86,472.75 futures position loss = Net Loss of C$144.75					

In Scenario 2, the CAD/USD rate has fallen 5 cents vs. USD, from 0.9000 on April 1 to 0.8500 on September 1. As in the previous scenario, that again equals a 500 point move ($0.0001 per CAD increments) in the futures position, this time in the other direction

500 x $10 per contract for Standard CAD/USD x 14 standard contracts =$70,000 USD

500 x $1 per contract for E-micro CAD/USD x 7 E-micro contracts =$3,500 USD

Loss in value for futures position =$73,500 USD

Converted into CAD at Sep 1 conversion rate of 1.1765 = **C$86,472.75**

The loss on the futures position is mostly offset by the increase in spot market value of the payment, resulting in a small loss of C$144.75. But compared to the risk of a C$77,220 loss in an unhedged position had the spot market turned against you, the amount is relatively minimal.

EXAMPLE: Hedge CAD/USD Exchange Rate Risk on Sale of Wheat to a U.S. Firm

It is April 1. You are a Canadian wheat grower and have just sold 900,000 bushels of wheat to a U.S. firm for delivery on September 1. The price is $5.00 USD/ bushel, or $4,500,000 USD total, and you will be paid upon delivery.

The USD-CAD exchange rate on April 1 is still 1.1111 (Canadian dollars per one U.S. dollar), making the value of your contract at signing C$4,999,950 CAD. Therefore, between April 1 and September 1, you will be "long" U.S. dollars ($4,500,000 USD) and exposed to fluctuations in the Canadian dollar vs. U.S. dollar.

Sale Details	
Dates	Contract signed April 1: Payment due upon delivery September 1,in U.S. dollars
Price	$5.00 USD per bushel, 900,000 bushels of wheat =$4,5000,000 USD
Spot exchange rate on April 1	**USD/CAD spot value:** 1.1111 CAD per 1.0 USD, or
	CAD/USD spot value: 0.9 USD per 1.0 CAD
Value of Contract in CAD on April 1	1.1111 CAD x. $4,500,000 USD = C$4,999,950 CAD, your risk exposure

CME Canadian Dollar (CAD/USD) Futures	Standard and E-micro Contract Sizes
Two Contract Sizes	**Standard CAD/USD futures:** 100,000 Canadian dollars /contract
Contract Months	$5.00 USD per bushel, 900,000 bushels of wheat =$4,5000,000 USD
Contract Value	If USD/CAD = 0.9524, then standard contract = $95,240 USD
Minimum Tick Size	**Standard:** 0.0001 per CAD (=$10.00 USD)

You can use CME CAD/USD futures to help lock in the value of your contract and mitigate exchange rate risk. To start, calculate the hedge ratio:

Hedge ratio = Value of Risk Exposure / Futures Contract Size

Hedge ratio = C$4,999,950 CAD / 100,000 CAD

= **49.99**, rounded up to 50

To hedge your risk exposure, you will need 50 standard CME CAD/USD futures contracts.

How the Hedge Plays Out: Two Scenarios

Consider the results of this hedge in two different market scenarios:

Scenario 1: CAD has rallied 5 cents vs. (declining) USD

	Spot CAD/USD	USD/CAD rate	C$ value of $4,500,000 USD payment	Sep CAD/USD Futures Position*	
April 1	0.9000	1.1111	C$4,999,950	Buy	50 Standard @ .9000
Sep 1	0.9500	1.0526	C$4,736,700	Sell	Sell 50 Standard @ .9500
			(C$ 263,250)	500 point increase: +$250,000 USD , or +C$ 263,150	
Future position gain in C$ 263,150 – C$263,250 loss in spot value = Net Loss of C$100					

In Scenario 1, the CAD/USD rate has risen by 5 cents vs. USD, from 0.9000 on April 1 to 0.9500 on September 1. That equals a 500 point move ($0.0001 per CAD increments).

500 x $10 per contract for Standard CAD/USD x 50 standard contracts =$250,000 USD

Converted into CAD (at Sep 1 conversion rate of 1.0526) = **C$263,150**

By hedging your exchange rate risk with the futures, even though the underlying spot market value of your contact payment has declined by C$263,158, you have minimized the loss to C$ 0.11 CAD. That's much more desirable than the $263,158 dent to farm profits that you would have otherwise sustained.

Scenario 2: CAD has fallen 5 cents vs. (appreciating) USD

	Spot CAD/USD	USD/CAD rate	C$ value of $4,500,000 USD payment	Sep CAD/USD Futures	
April 1	0.9000	1.1111	C$4,999,950	Buy	50 Standard @ .9000
Sep 1	0.8500	1.1765	C$5,294,250	Sell	14 Standard @ .8500
			+C$294,300	500 point decline: ($250,000 USD), or (C$ 294,125)	
C$ 294,300 spot value gain – C$294,125 futures position loss = Net Gain of C$196					

In Scenario 2, the CAD/USD rate has fallen 5 cents vs. USD, from 0.9000 on April 1 to 0.8500 on September 1. As in the previous scenario, that again equals a 500 point move ($0.0001 per CAD increments) in the futures position, this time in the other direction

500 x $10 per contract for x 50 standard CAD/USD futures =$250,000 USD Loss

Converted into CAD at Sep 1 conversion rate of 1.1765 = **C$ 294,125**

The loss on the futures position is offset by the increase in spot market value of the payment. You've preserved the relative value of the payment from the original date of the agreement. Although the spot market value increased in your favor in this particular scenario, the real value of the hedge is in the assurance that you've protected your profit against a potential loss due to unfavorable exchange rate moves like the one in Scenario 1.

Comparing Futures Prices and the Forward Rate

For simplicity, in the examples used to illustrate the benefits of the futures hedge, the FX futures prices used were the same as the spot rate at the time of the transaction.

In practice, there is likely to be a slight difference between the CAD/USD futures price and spot rate. The difference between the spot rate and the future or forward represents the "basis," essentially the futures price minus the spot price of the currency pairing. The basis is driven by the same factors that affect the price of forwards in the interbank markets – the relationship between short-term interest rates associated with the term and base currency. (See sidebar for more on the difference between a future and a forward.)

Over time, the basis will tend to converge towards zero because the impact of differential short-term rates becomes less relevant as the futures contract expiration approaches. Once the futures contract becomes deliverable, it becomes a direct proxy for the spot delivery of the currency, and the basis is said to "converge to zero."

EXAMPLE: CAD/USD Futures basis on November 13, 2014

- USD/CAD spot rate: 1.1370
- Converted to CAD/USD equivalent spot rate: 87.95

What is the difference between a Futures and a Forward Contract?

A future is a standardized contract and is traded and cleared on an Exchange. The time to expiration, contract amount as well as delivery places and dates are set for the particular futures contract. Credit risk is mitigated through daily mark-to-market settlements and margining which are automatically required, reducing credit risk.

A forward carries both market risk and credit risk; in other words, the exposure is to the default by the counterparty who may fail to perform on a forward – the exchange is not there to guarantee the trade as a cleared transaction. Forwards are traded on the OTC market and can be customized in terms of expiration and value of the contract, whereas a futures trade takes place on an organized exchange.

A forward contract is a private transaction. Forwards are basically unregulated, unlike a future contract which are regulated at the government level.

If the terms of a forward contract matched a future contract, they would behave exactly the same as they reached expiration. Essentially, the bespoke terms and trading venue are what differentiate a forward from a future.

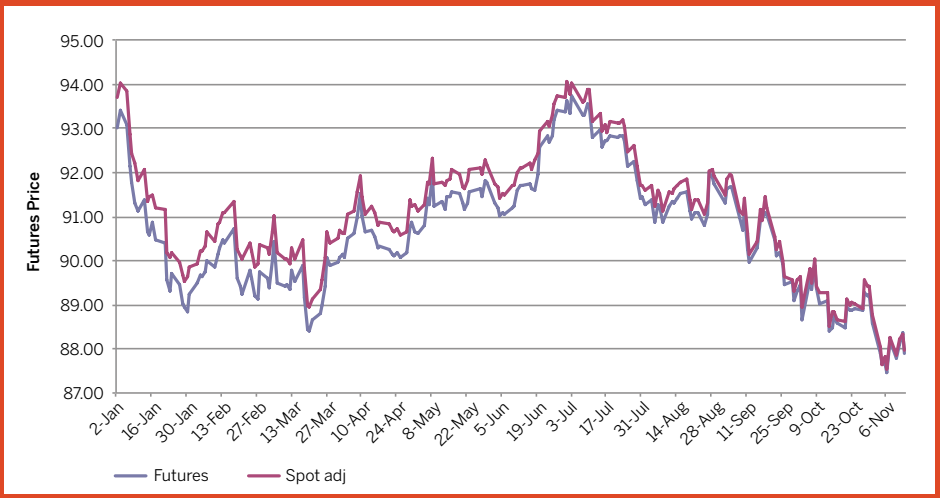
CAD/USD Futures Contract Month	Days until Contract Expiration	Futures Price on November 13	Spot – Futures price = Basis
Dec '14	34	87.94	87.95 – 87.94 = 0.01
Mar '15	125	87.69	87.95 – 87.69 = 0.26
Jun '15	216	87.50	87.95 – 87.50 = 0.45

Source: Data from Bloomberg and CME Group.

Despite some "noise," these basis relationships are really quite predictable, as dictated by the relationship between short-term interest rates associated with the two currencies that comprise the transaction. The reason is that arbitrageurs monitor and promptly act upon situations where the futures and spot prices are misaligned, quickly bringing them back in line. As futures expiration draws closer, the basis converges towards zero, or parity.

The following chart illustrates the prices the Dec Ð14 Canadian dollar futures price from January 2, 2014 - November 13 alongside with the Canadian dollar spot rate and their respective settlements. As you can see, they trade in parallel, and the gap between the two (basis) narrows as the futures contract approaches expiration.

Canadian Dollar Basis



Source: Data from Bloomberg and CME Group.

Your broker can help you to accommodate for any basis-related risk in your futures hedge.

Summary

CME Canadian Dollar (CAD/USD) futures provide liquid, effective tools that Canadian producers can use to tailor hedges to their needs to mitigate their foreign exchange rate risk.

For more information, contact a member of the CME FX team at fxteam@cmegroup.com or visit cmegroup.com/fx.

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