

MONTREAL EXCHANGE

Currency Options (USX)

Reference Manual



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Introduction

This manual has been prepared as an introduction to the basics of trading options on the U.S. dollar (USX) as listed on the Montréal Exchange. Options on currencies, stocks, exchange traded funds (ETF) and indices have similar benefits and risks. [The Equity Options Reference Manual](#) may also be useful, as many options strategies can be used for more than one financial asset class.

The foreign exchange (FX) market is one of the most liquid financial markets in the world, with an average daily turnover of almost US\$5.1 trillion in 2016 (source: Bank for International Settlements).

The FX market is primarily driven by macroeconomic factors, political events, central bank interventions, economic releases and international monetary flows. For example, if there is extensive selling of currency A to buy currency B, the value of currency A will depreciate with respect to currency B. As in all markets, the matching of supply and demand determines the prices of currencies, relative to each other. There are also equally large trading flows in the FX market from speculators hoping to profit from a change they expect in a particular exchange rate.

The high liquidity of this market means that a large number of positions can be opened or closed out quickly.

Currency options allow Canadian investors to implement both speculation and hedging strategies, with the same ease of execution as buying stocks and ETF options.

Most transactions in the FX market are speculative trades that directly impact exchange rates. If speculators expect a currency to rise in value and demand more of that currency to make a profit in the near future, its value and exchange rates will rise as a result of increased short-term demand.

From an economic perspective, the USD/CAD exchange rate is highly correlated with the expected inflation and interest rates in both countries. When the central bank sets higher interest rates, it offers lenders a higher return relative to other countries. Therefore, higher interest rates attract foreign capital and cause the exchange rate to rise, whereas lower interest rates tend to lead to lower exchange rates. However, the impact of higher interest rates is mitigated if the country's inflation rate is much higher than inflation in other countries.

Finally, the exchange rate is also strongly influenced by the country's current account and balance of payments. If the volume of a country's exports rises at a faster pace than that of its imports, its terms of trade will favourably improve. This will increase demand for the country's currency, and subsequently its value will rise against foreign currencies. On the other hand, if the price of its exports rises at a slower pace than that of its imports, the currency's value will decrease in relation to its trading partners' currencies.

How currencies are quoted in the spot market

In the foreign exchange market, an exchange rate is expressed relative to two currencies, called a “pair.” For instance, the USD/CAD currency pair refers to the number of units of CAD currency that are equal to one unit of USD currency. This currency quote translates into a situation where an appreciation in the USD will reflect a depreciation in the CAD.

There are two quoting conventions: direct and indirect.

1. Direct quote

A direct quote is the number of domestic currency units that can be purchased with one foreign currency unit. For example, an exchange rate of C\$1.34725 per U.S. dollar is a direct quote from the perspective of a Canadian.

However, from an American’s perspective, this is an indirect currency quote (representing the number of foreign currency units that can be purchased with one domestic currency unit).

2. Indirect quote

An indirect quote expresses how much a domestic currency is worth in terms of the foreign currency. For example, it would be displayed as US\$0.74225. This is equivalent to a direct quote of C\$1.34725, which is the Canadian dollar value of one U.S. dollar. To convert a direct quote into an indirect quote, you simply divide 1 by the direct quote ($1/\text{C}\$1.34725 = \text{US}\0.74225). In other words, an indirect quote is simply the reciprocal of a direct quote.

How currency options work

Currency options use the same parameters as stock and ETF options (contract type, strike price, expiration). The main difference is the underlying asset (also called, “underlying issue”, which in this case is a foreign currency instead of a stock, ETF or an index. Currency options on the Montréal Exchange, for example, are quoted, traded and cleared in Canadian dollars.

Underlying currency

The USX option’s underlying currency is the U.S. dollar.

Trading unit

The trading unit for a currency option represents how many units of the underlying currency are controlled by one option contract. Currency option contracts (USD/CAD exchange rate) on the U.S. dollar have a trading unit of US\$10,000, indicating that the option gives the holder the right to 10,000 units of the underlying currency.

Strike prices

The strike price of a currency option is expressed as the number of units of the Canadian dollar required for one unit of the U.S. dollar on the expiration date. The strike price is expressed in cents Canadian per unit of U.S. dollar.

Example

A call option on the U.S. dollar with a strike price of 134 cents Canadian would give the option buyer the right to buy U.S. dollars at 134 cents Canadian per U.S. dollar.

Option premiums

Currency option premiums are expressed in cents Canadian per U.S. dollar.

Example

If a USX option is purchased at a premium of 0.12 cents Canadian per U.S. dollar, the holder would pay C\$12.00 (0.12 cents Canadian/US\$1 x the unit of trading of US\$10,000 x C\$1/100 cents Canadian).

The minimum tick represents 1/100th of a cent equivalent to C\$1 and is determined as follows:

$\frac{0.01 \text{ cent Canadian}}{1 \text{ unit of foreign currency}} \times \text{the unit of trading } 10,000 \times \frac{\text{C}\$1}{100 \text{ cents Canadian}}$

Example

If the U.S. dollar appreciates from 130.10 cents Canadian to 131.10 cents Canadian, the currency call option will increase in value by C\$100 (1 cent Canadian/US\$1 x the unit of trading US\$10,000 x C\$1/100 cents Canadian).

Trading and settlement

Currency options on the Montréal Exchange are European-style options, meaning that they may be exercised only at expiration. Currency options are cash settled. They are priced and traded in Canadian currency, which means that the payout is always a Canadian dollar cash amount, and are automatically exercised at expiration if they are 0.01 cent Canadian or more in-the-money. As such, if a call option (put option) is held to expiration (the third Friday of the contract month), the option holder will automatically receive a cash payment in Canadian currency if the exchange rate is above (below) the strike price.

> **Reference rate:** **Bloomberg FX Fixings (BFIX)** at 12:30 p.m. New York time rate, expressed in Canadian cents for the designated currency vis-à-vis the Canadian dollar on the expiration date.

As currency options are cash settled at expiration, investors do not need to worry about delivery procedures for the underlying value.

Guarantee

The Canadian Derivatives Clearing Corporation (CDCC) is the issuer, guarantor and clearer of USX currency options. The CDCC is the intermediary between every buyer and seller, serving as the counterparty to every trade and removing counterparty credit risk.

How to calculate the cash settlement of a currency option

The settlement formula for a currency option at expiration is as follows:

$\text{Call option} = \frac{(\text{Exchange rate} - \text{Strike price})}{1 \text{ unit of the underlying}} \times 10,000 \text{ units of the underlying} \times \frac{\text{C\$1}}{100 \text{ cents Canadian}}$
$\text{Put option} = \frac{(\text{Strike price} - \text{Exchange rate})}{1 \text{ unit of the underlying}} \times 10,000 \text{ units of the underlying} \times \frac{\text{C\$1}}{100 \text{ cents Canadian}}$

Selecting a currency options trading strategy

The following table represents some basic option strategies, based on the investor's forecast for the U.S. dollar:

Option strategies based on a U.S. dollar forecast	Forecasting a rise in the U.S. dollar	Forecasting a stable U.S. dollar	Forecasting a drop in the U.S. dollar
Option strategy	Buy calls Write puts	Write calls Write puts	Write calls Buy puts

Trading strategies for currency options

For the sake of simplicity, options are held to expiry in the examples that follow. As well, the examples do not account for commissions, transaction fees and margin requirements.

1. Directional trading

Buying call options to profit from a rise in the U.S. dollar

The value of a call option tends to rise as the value of the underlying currency increases. As a result, the holder will realize a profit if the value of the call option at expiry is higher than the premium paid for the call. In other words, the strategy delivers a profit if the reference rate is above the strike price plus the premium paid. If the reference rate is lower, the holder's loss is always limited to the premium paid.

Consider the investor who anticipates that the U.S. dollar will strengthen against the Canadian dollar, and assume that the USD/CAD is trading at 130.00 cents Canadian per U.S. dollar. The investor purchases 10 November 130.00 USX call options for a premium of 1.53 cents Canadian per U.S. dollar.

$$\begin{aligned}\text{Total premium} &= 1.53 \text{ cents Canadian/US\$1} \times \text{US\$10,000} \times \text{C\$1/100 cents Canadian} \\ &= \text{C\$153} \times 10 \text{ options} \\ &= \text{C\$1,530}\end{aligned}$$

Assume that on expiry, the USD/CAD has risen and the Bloomberg FX Fixings (BFX) at 12:30 p.m. New York time rate is 132.00 cents Canadian per U.S. dollar. The investor will realize a profit of:

$$\begin{aligned}\text{Call option settlement} &= \frac{(132 - 130) \text{ cents Canadian}}{\text{US\$1}} \times \text{US\$10,000} \times \frac{\text{C\$1}}{100 \text{ cents Canadian}} \\ &= \text{C\$200} \times 10 \text{ options} \\ &= \text{C\$2,000}\end{aligned}$$

The investor has turned his C\$1,530 investment into C\$2,000. This represents a return of 30.72% compared with a rise of only 1.54% in the underlying.

If, however, at expiration the USD/CAD exchange rate has declined to below the strike price of 130.00 cents Canadian per U.S. dollar, the options will be worthless on expiry, and the investor cannot lose more than C\$1,530 (the premium paid).

Writing call options to profit from a fall in the U.S. dollar

If you have a bearish outlook on the underlying currency, you can either buy a put option or write call options. Although the latter is a riskier strategy than buying put options, some investors prefer it in a bear market, since they can act on their bearish view without any cash outlay and collect premiums.

An investor anticipates that the U.S. dollar will weaken against the Canadian dollar. The investor decides to write call options, since a drop in the U.S. dollar would result in a drop in the value of the call options written, enabling the investor to repurchase the same call options at a lower premium, or keep the entire option premium if at expiration the USD/CAD exchange rate is below the strike price of the call options written.

Assume that the USD/CAD exchange rate is 130.00 cents Canadian. After determining the maximum exposure he can tolerate, the investor writes 10 November 130 USX call options for a premium of 1.52 cents Canadian per U.S. dollar.

$$\begin{aligned}\text{Option premium collected} &= \frac{10 \times 1.52 \text{ cents Canadian}}{\text{US\$1}} \times \text{US\$10,000} \times \frac{\text{C\$1}}{100 \text{ cents Canadian}} \\ &= \text{C\$1,520} \\ &= \text{C\$152} \times 10 \text{ options} \\ &= \text{C\$1,520}\end{aligned}$$

At expiration on the 3rd Friday of November, the USD/CAD has dropped to 128.50 cents Canadian per U.S. dollar and the call options expire, worthless, since the investor's forecast for a weaker U.S. dollar against the Canadian dollar has come true. As a result, the investor gets to keep the entire C\$1,520 premium on the call options written.

However, if at expiration the U.S. dollar had appreciated and the USD/CAD exchange rate had increased from 130.00 to 132.50, the investor would have been assigned and would have had to pay the holder C\$2,500 (10 x [132.50 - 130.00] cents Canadian/US\$1 x US\$10,000 x C\$1/100 cents Canadian).

2. Hedging

Currency options are effective tools that Canadian investors and companies can use to hedge currency exposures. The owner of a non-Canadian dollar asset, such as a U.S. equity portfolio, stands to lose money in Canadian dollar terms if the U.S. dollar depreciates against the Canadian dollar. Currency risk can be hedged by buying a put option on the U.S. dollar, as the value of the option should rise as the U.S. dollar falls.

Conversely, the holder of a non-Canadian dollar liability (e.g. a Canadian investor who plans to buy a property in the United States) faces the risk of the U.S. dollar rising against the Canadian dollar, which would increase the liability in Canadian dollar terms. An investor can hedge this risk with a call option on the U.S. dollar, which should increase as the U.S. dollar rises.

The number of options needed to hedge a given amount of foreign exchange is calculated as follows:

$$\text{Number of options} = \frac{\text{Foreign exchange amount to hedge}}{\frac{\text{Contract size of the option}}{\text{Delta } (\Delta) \text{ of the option}}}$$

$$\text{Cost of the options in Canadian dollars} = \text{Number of options} \times \frac{\text{Option premium}}{1 \text{ unit of the underlying}} \times 10,000 \text{ units of the underlying} \times \frac{\text{C\$1}}{100 \text{ cents Canadian}}$$

Note: Option premium is expressed in cents Canadian per unit of foreign currency

Hedging a U.S. stock portfolio

Consider, for example, a Canadian investor who holds a U.S. equity portfolio worth US\$100,000. With an exchange rate of USD/CAD 130.00, the portfolio is worth C\$130,000. However, if the U.S. dollar depreciates, the investor will incur a loss in terms of a depreciation in the value of the portfolio in Canadian dollars.

$$\text{Number of put options to buy} = \frac{\text{US\$100,000}}{\frac{\text{US\$10,000}}{|0.50|}} = 20 \text{ put options are needed to hedge the currency exposure}$$

***0.50 being the delta of at-the-money put option**

The investor buys 20 USX 130.00 put options at a price of 1.40 cents Canadian.

$$\begin{aligned} \text{Cost of the options} &= \frac{1.40 \text{ cents Canadian}}{\text{US\$1}} \times \frac{\text{US\$10,000}}{\text{US\$1}} \times \frac{\text{C\$1}}{100 \text{ cents Canadian}} \\ &= \text{C\$2,800} \\ &= \text{C\$140} \times 20 \text{ options} \\ &= \text{C\$2,800} \end{aligned}$$

The hedge represents an investment of C\$2,800 in the put options, which can be thought of as the investor paying 2.15% as an insurance premium on the equivalent C\$130,000 portfolio.

Consider the following scenarios at expiration:

1. A 4% drop in the U.S. dollar. At expiry, the Bloomberg FX Fixings (BFX) at 12:30 p.m. New York time rate is 124.80. In this case, the US\$100,000 portfolio is worth just C\$124,800—a loss of C\$5,200. Following exercise of the option, the investor’s account will be credited in an amount of:

$\text{Put option settlement} = \frac{(130 - 124.80) \text{ cents Canadian} \times \text{US\$10,000} \times \text{C\$1}}{\text{US\$1} \times 100 \text{ cents Canadian}}$ $= \text{C\$520} \times 20 \text{ options}$ $= \text{C\$10,400}$
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Therefore, the investor’s 20 put options are now worth C\$10,400, which largely offsets the loss of C\$5,200 in the value of the portfolio of U.S. stocks because of the change in the exchange rate and the investor’s cost of C\$2,800 for the purchase of the options.

2. A 4% rise in the U.S. dollar. At expiry, the Bloomberg FX Fixings (BFX) at 12:30 p.m. New York time rate is 135.20. In this case, the US\$100,000 portfolio is worth C\$135,200. However, the put options expire worthless and the investor will lose the C\$2,800 premium, but this loss is more than covered by the gain on the exchange rate and in the value of the portfolio.

There is no obligation to hold the options until expiration; they can be sold in the market at any time if the investor’s strategy changes.

Hedging an overseas cash flow (from a Canadian exporter’s perspective)

Firms of all sizes are increasingly buying and selling goods across national borders. Often payments are made using a foreign currency. Depending on the time it takes to pay or receive the money, what was once an economically viable transaction often becomes less profitable due to an adverse currency movement. The problem is how to take out insurance on the transaction, while benefiting from any profitable currency movement.

For example, a Canadian exporter sells goods to an American distributor with payment due in U.S. dollars in 3 months. The exporter will benefit if the U.S. dollar appreciates against the Canadian dollar, but he will receive less if the Canadian dollar appreciates. The problem is how to protect the exporter from a drop in the value of the U.S. dollar.

Put options can be used for protection or to provide insurance against currency price declines. For example, a Canadian exporter of goods to the United States may well find it profitable to buy put options on U.S. dollars in connection with a specific sale of goods. The Canadian seller of goods will be at risk of incurring losses on any decline in the value of the U.S. dollar relative to the Canadian dollar. Ideally, the exporter would like to avoid this risk and still be able to receive more Canadian dollars for the goods if the U.S. dollar rises in value.

The exporter can also enter into a synthetic position by buying an at-the-money put option and writing an at-the-money call option to reduce his insurance cost and, at the same time, to fix a floor rate.

Example of a currency hedge (from a Canadian exporter’s perspective):

Let us consider a Canadian exporter who, in March, wants to lock in an exchange rate for two months to protect a US\$1,000,000 payment to be received from an American client in May. The current USD/CAD exchange rate is 130.00 cents Canadian.

The synthetic position is established as follows:

- Purchase 100 USX May 130.00 put options at 1.40 cents Canadian
- Write 100 USX May 130.00 call options at 1.13 cents Canadian
- Net cost: 0.27 cents Canadian

The net cost of the fixed exchange rate for US\$1,000,000 is C\$2,700, which corresponds to a cost of insurance of 0.23% (C\$2,700/C\$1,170,000). If the spot rate decreases from 130.00 to 128.00, the exporter would lose C\$20,000 without the hedge. Since a hedge has been established, the drop in the spot rate will only cost him C\$2,700.

In May, the exporter receives his payment of US\$1,000,000, which he converts into Canadian dollars at a spot rate of 1.255 (125.50 cents Canadian) for an amount of C\$1,255,000.

At expiry of the options in May, the Bloomberg FX Fixings (BFX) at 12:30 p.m. New York time rate is 1.2533 or 125.33 cents Canadian. Since the put options are in-the-money, the exporter receives a credit of:

$$\begin{aligned} \text{Credit} &= \frac{(130 - 125.33) \text{ cents Canadian}}{\text{US\$1}} \times \text{US\$10,000} \times \frac{\text{C\$1}}{100 \text{ cents Canadian}} \\ &= \text{C\$46,700} \\ &= \text{C\$467} \times 100 \text{ put options} \end{aligned}$$

The total revenues for the synthetic position are:

$$= \text{C\$1,255,000} + \text{C\$46,700} - \text{C\$2,700}$$

$$= \text{C\$1,299,000}, \text{ corresponding to a USD/CAD exchange rate of } 129.90$$

Ultimately, the synthetic position allowed the exporter to buy insurance at a lower cost and to reduce any losses arising from adverse fluctuations in the U.S. dollar.

Conclusion

This booklet has been prepared as an introduction to the basics of trading options on currencies. Options on currencies, equities and stock indices have similar benefits and risks. [The Equity Options Reference Manual](#) may also be useful to the interested investor.

The four basic currency options trades—buying calls, writing calls, buying puts and writing puts—combined with the variety of strike prices and expiration months give the investor an almost unlimited number of strategy alternatives. Most of the more advanced strategies employed by options traders (spreads, straddles, etc.) are also feasible with currency options. The advantages of limited risk and high leverage make currency options an attractive vehicle for the option buyer interested in trading on the basis of his views of future exchange rates.

Contract Specifications: Options on the U.S. Dollar (USX)

Underlying issue	U.S. Dollar.
Trading unit	One contract represents 10,000 U.S. dollars.
Expiry cycle	At a minimum, the nearest three expiries plus the next two expiries in the designated quarterly cycle: March, June, September, December. Annual expiry of January for long-term options.
Premium quotation	Option premiums are quoted in Canadian cents per unit of foreign currency. For example, a premium quotation of 0.75 Canadian cents for an option on the U.S. dollar represents an aggregate premium value of $0.75 \text{ Canadian cents/US\$} \times \text{US\$}10,000 \times \text{C\$}1/100 \text{ Canadian cents} = \text{C\$}75$.
Aggregate premium value	The aggregate premium value for a contract is the premium quotation multiplied by the trading unit of the contract.
Minimum price fluctuation (tick size)	The minimum price fluctuation of the premium is 0.01 Canadian cent or a tick value of C\$1.00 per unit of foreign currency. That is: $0.01 \text{ Canadian cent/US\$} \times \text{US\$}10,000 \times \text{C\$}1/100 \text{ Canadian cents} = \text{C\$}1.00$.
Strike prices	At a minimum, five strike prices bracketing the current spot rate.
Contract type	European style.
Last trading day	Trading ceases at 12:30 p.m. on the third Friday of the contract month, provided it is a business day. If it is not a business day, trading will cease at 12:30 p.m. on the first preceding business day.
Expiration day	The last trading day of the contract month.
Final settlement price	Cash-settled. The amount to be paid or received as a final settlement of each option contract is determined by multiplying the trading unit by the difference between the exercise price and the exchange rate fixed by Bloomberg FX Fixings (BFIX) at 12:30 p.m. New York time rate expressed in Canadian cents for the designated currency, vis-à-vis the Canadian dollar on the expiration date. Bloomberg BFIX available at: https://www.bloomberg.com/markets/currencies/fx-fixings
Position reporting threshold	500 contracts on the same side of the market, in all contract months combined.
Position limit	Information on position limits can be obtained from the Bourse as they are subject to periodic changes. See Circulars.
Trading hours	9:30 a.m. to 4:00 p.m.
Clearing corporation	Canadian Derivatives Clearing Corporation (CDCC).
Trading procedures	Please refer to the Rules of the Bourse.

For further information on currency options or any other Montréal Exchange derivatives, please contact

1800 – 1190, avenue des Canadiens-de-Montréal, P.O. Box 37
Montréal, Québec H3B 0G7 Canada
equityderivatives@tmx.com



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