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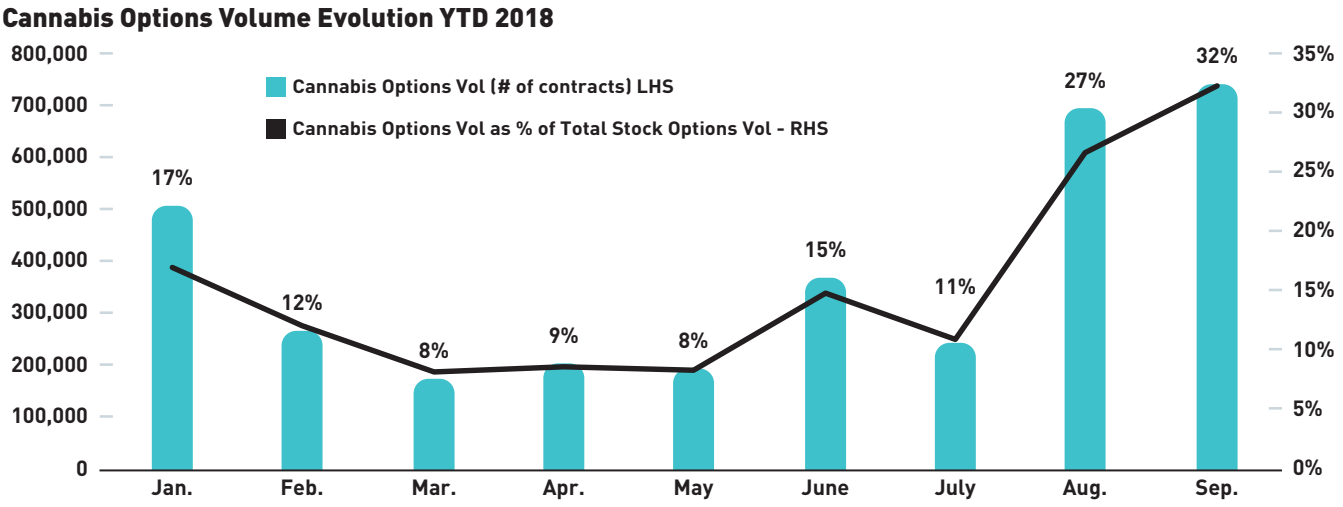
Equity Options

MONTRÉAL EXCHANGE

High volatility: the case of cannabis stocks

The Montréal Exchange listed options on cannabis stocks for the first time in May 2017. Since then, and despite being a "newly" listed sector, activity on option on cannabis stocks has been impressive and trading volume has consistently increased specially since mid-2018. Figure 1 highlights this trend.

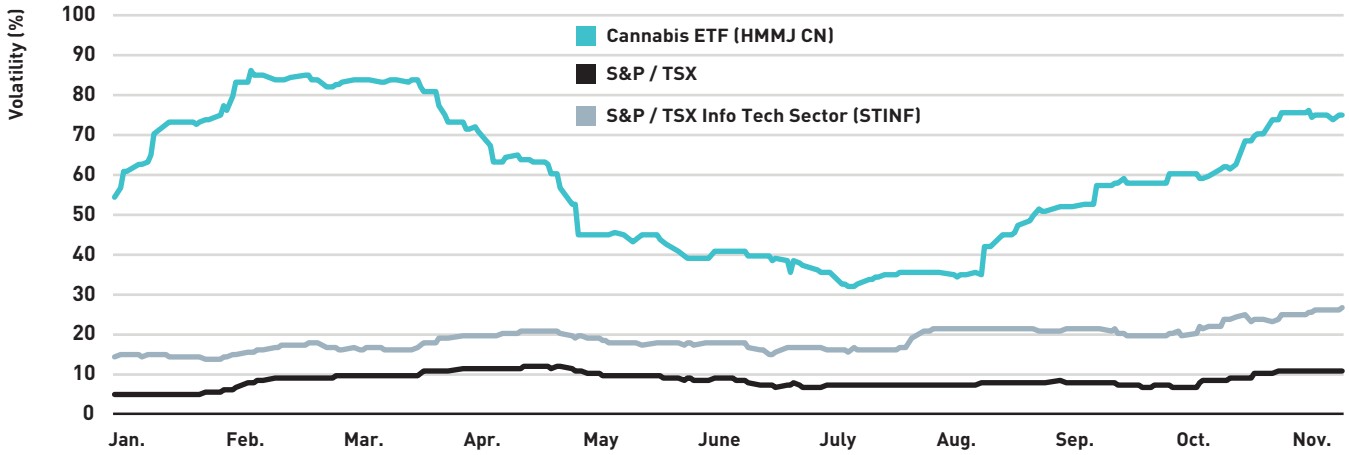
FIGURE 1
Evolution of cannabis option volume trading on Montréal Exchange



A main driver of this growth is the fact that cannabis stocks are volatile, both in absolute and relative terms. As Figure 2 shows, the volatility of cannabis ETF (HMMJ) over any two-month period since the start of 2018 (i.e. 60-day realized volatility) has been above 35% and reaching as high as 85%. In the same period, the S&P/TSX two-month volatility never exceeded 10%. Even when compared to a sector traditionally considered as volatile such as information technology, cannabis stocks are quite volatile. The S&P/TSX information technology sector volatility varied between 15% and 28% throughout 2018.

FIGURE 2
Cannabis sector is volatile (in absolute terms)

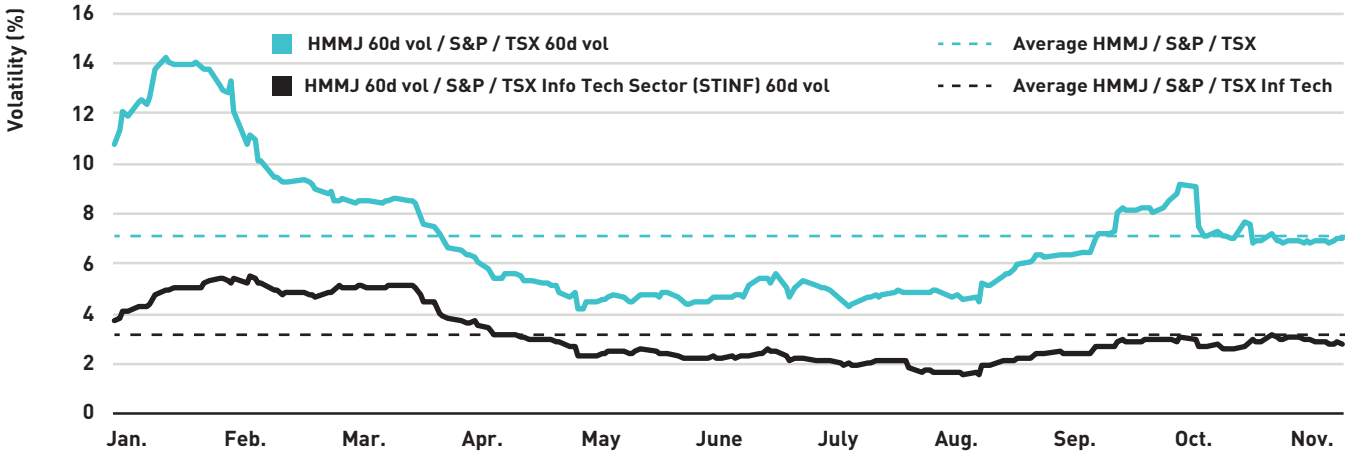
Volatility of cannabis ETF compared S&P/TSX and S&P/TSX info tech sector



As Figure 3 shows, the cannabis sector—approximated by its ETF (HMMJ)—has been seven times more volatile on average in 2018 than the S&P/TSX and three times more volatile than the S&P/TSX information technology sector (on the basis of two-month realized volatility).

FIGURE 3
Cannabis sector is volatile (in relative terms)

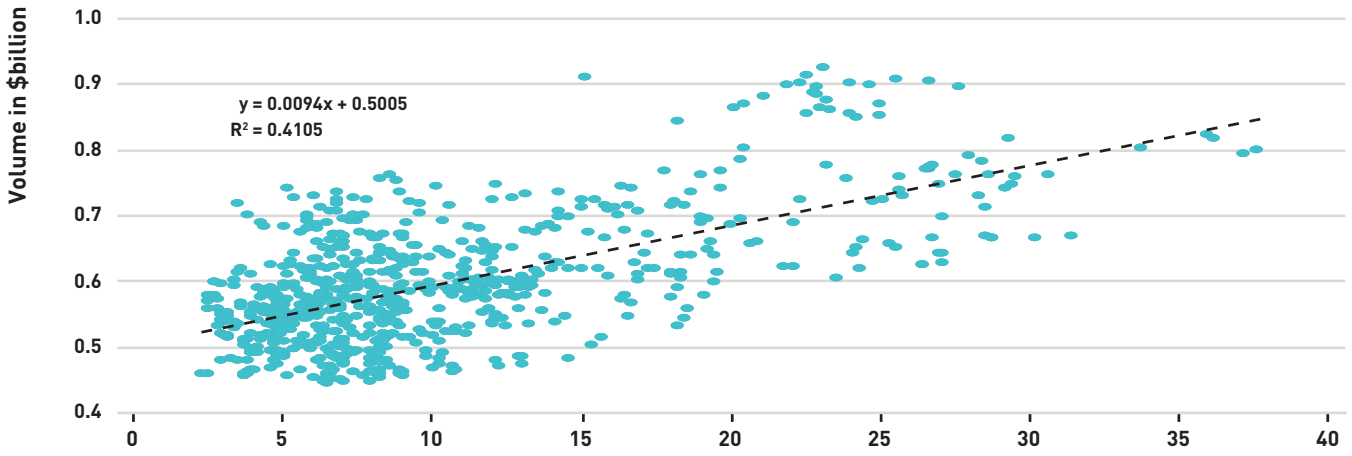
Ratio of volatility of cannabis ETF over S&P/TSX and S&P/TSX info tech sector



Volatility and volumes are friends

Empirically and intuitively, volatility is closely related to trading volume. A great number of studies have looked at the positive relationship between volatility and trading volumes and validated it. Figure 4 illustrates very well this relationship. It represents the 10-day average trading volume on S&P500 as a function of 10-day volatility of S&P500 index since December 2015. The positive link and strong correlation (of about 64%) between volatility and trading volume is clearly visible.

FIGURE 4
Trading volume of S&P500 as function of 10-day volatility (%)



During the recent prolonged period of low volatility in equity markets, especially prior to September 2018, the listing of cannabis stocks and their options has been great news for many investors. In fact, a great number of short-term trading strategies—among others: high frequency, systematic & quantitative strategies—favour securities that exhibit wider price movements (i.e. volatile securities). These strategies often have a statistical approach: based on proprietary signals, they consist of buying/selling a security with an expectation that they are more often right than wrong (for example, each trade has 60% probability of being a winning trade). As a result, these strategies require putting in as many trades as possible to make sure that, in the long term, they converge towards their winning ratio. So, the more movements in the price of a security, the more opportunities for these types of investors to trade and be involved in the markets.

To use an analogy, if you are a chess player and you think you have a small edge against your adversary, you would look to play as many games and as often as possible against that player.

In a very similar manner, volatile stocks offer more opportunities for option traders. A volatile stock offers more opportunities to take short-term directional views on the stocks using options or to try and monetize the movement of the stock against an existing option position: this is called "gamma trading" in option-trading jargon.

But why do cannabis stocks exhibit higher levels of volatility?

In what follows, we will first have a short discussion on what the potential drivers of this volatility are, followed by a review of some interesting characteristics of options on high volatility stocks and some related strategies.

Uncertainty begets volatility

To purchase or to sell a security, an investor inherently defines the "value" of that security in his view. If the price he observes is sufficiently different from his estimate of the "value", he then proceeds to buy (for an undervalued security) or to sell (for an overvalued security). These aggregate actions of investors result in the price movements of a security.

Naturally, the more the views of investors on "what a stock is worth" (its value) differ from each other and the wider the range of their estimates, the more volatile the stock will be as a result. Similarly, the more often investors change their views and estimates of "what a stock is worth", the more volatile the stock tends to be.

Wide valuation range + increased frequency of change in valuation > higher volatility

In the case of cannabis stocks, like most other nascent industries such as information technology in the 1990s or the automotive industry in early 1900s, investors have of a wide array of views about what a stock can or will be worth, therefore causing a significant trading range and volatility.

This is due to the fact that for a new product or industry, the potential for growth and the estimates of market size vary greatly. The operational set-up and costs and as a result the estimates for the costs of running a business can also be subject to noticeable variations. As a consequence, the range of future outcomes can vary significantly and cause volatile trading and price action.

Additionally, when a sector or industry is in its early development phase, it faces many types of uncertainties on an ongoing basis. In the case of cannabis stocks, some of the sources of uncertainty have been:

- Legislative uncertainty, in particular in some US jurisdictions;
- Licensing uncertainty;
- Implementation uncertainty: after uncertainties around the "implementation" calendar, today uncertainties remain around provincial or municipal regulations and their specifics (for example with regards to store locations and/or numbers, etc.);
- Operational uncertainty: as an example, in many cases, operators need to secure a lease on a location before applying for a retail license and incur the risk of being locked in a lease and not obtain a license.

We do not intend to discuss the many other potential sources of uncertainty as we do not specialize in the fundamentals of this sector specifically. But there is definitely enough of them to ensure that the price action for these stocks remains volatile.

Things get further complicated and bring about further volatility, as these "structural" uncertainties can also be time-varying. For instance, rules can change through time as they are not finalized and might be going through various public or legal consultation processes.

To sum up, uncertainty begets volatility and volatility brings on trading opportunities.

Options on high volatility stocks

Not surprisingly, the high (realized) volatility of a stock will also be reflected in options prices via higher implied volatility, a main input of the option pricing formulas.

All else constant, the higher the implied volatility the higher the option price. The higher option premia on these stocks attract traders for a variety of reason.

In particular traders are attracted to out-of-money options on higher volatility stocks. Why?

A. Out-of-the-money options

To answer this question, we need to take a closer look at option pricing. For an at-the-money option, the relationship between implied volatility and option prices is simple and linear.

Figure 5 shows the price of a one-month option as % of stock price (2% interest rate and 0% dividend) for different strikes and different levels of implied volatility.

FIGURE 5
One-month options prices as % of stock price (2% interest rate, 0% dividend rate)

Implied Volatility	Put 80.0%	Put 90.0%	Moneyness 100.0%	Call 110.0%	Call 120.0%
15%	0.00%	0.01%	1.64%	0.02%	0.00%
30%	0.01%	0.43%	3.37%	0.65%	0.06%
45%	0.20%	1.42%	5.09%	1.87%	0.53%
60%	0.71%	2.68%	6.81%	3.36%	1.45%
90%	2.47%	5.55%	10.24%	6.63%	4.08%

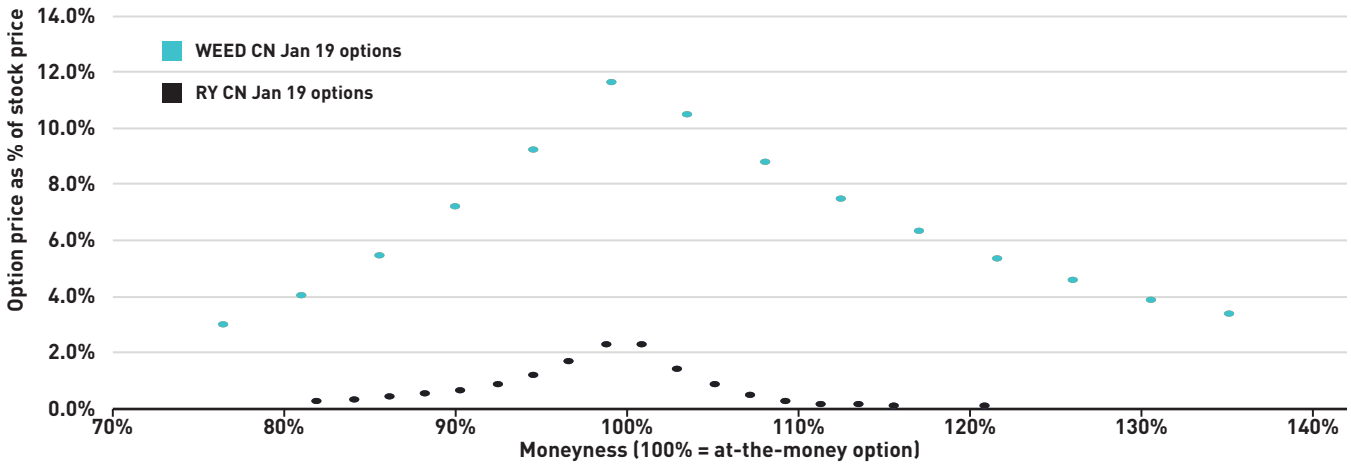
We can see that for an implied volatility of 30%, an at-the-money put (100% moneyness) is worth 3.37%. If we double the implied volatility to 60%, the option price essentially also doubles to 6.81%.

However, things get interesting for out-of-money options. A 10% out-of-the-money put (i.e. 90% moneyness) is worth 6.5 times more when implied volatility doubles from 30% to 60%. A 20% out-of-the-money put is virtually worthless when implied volatility is 30% but is worth 0.71% when implied volatility doubles to 60% (that would mean that it is worth 71 times more!).

Figure 6 highlights this in "real life". We have plotted the option prices for Royal Bank (RY CN) and Canopy Growth (WEED CN) for Jan 2019 expiry as a function of their moneyness. While the premium for at-the-money options on WEED CN is about 6 times that of RY CN for at-the-money options, that ratio increases very quickly and is about 15 times for 15% out-of-money puts (85% strike puts).

FIGURE 6

Prices of Jan 2019 options as a percentage of stock price by moneyness



The high premium of out-of-money options (though from an option pricing perspective, it is their "fair" price) provide investors with opportunities. For instance:

- Fundamental investors can translate their views on the value of the stock by selling out-of-money puts (calls) in order to enter a long (short) position in the stock at substantially lower (higher) level if they are assigned at expiry. Whereas if they are not assigned, they would keep the option premium which for this type of investors, can be quite significant. For example: an investor in WEED CN can sell a January 2019, 10% out-of-money put on WEED CN and receive 7% premium. Should the investor be assigned at expiry, he will have a long position in WEED CN at 17% lower than today's price (10% for the lower strike plus 7% premium received). And should the option expire worthless, he will collect 7% (the sold premium) over the one and half month period.
- Overwriting and systematic option selling strategies can also be active in these options as they are attracted to these higher volatility stocks in light of the premia they collect.

Far out-of-money options on high volatility stocks such as cannabis stocks can be used for directional, fundamental and overwrite strategies, whereas they are virtually worthless for low-volatility stocks.

B. Short-term options

Higher implied volatility results in higher option premia across all maturities including short-term options, which we will define here as options with one month or less left to maturity.

FIGURE 7
Option premium as % as stock price (2% interest rate, 0% dividend rate)

	Price of at-the-money put			
Implied Volatility	**1-week**	**2-week**	**3-week**	**1-month**
15%	0.81%	1.14%	1.38%	1.64%
30%	1.64%	2.31%	2.82%	3.37%
45%	2.47%	3.48%	4.25%	5.09%
60%	3.30%	4.65%	5.68%	6.81%
90%	4.96%	6.99%	8.54%	10.24%

As we can see in Figure 7, a one-week at-the- money option with 60% implied volatility is worth 3.30% while a one-month option of similar strike on the same stock is worth about twice more (6.81%). The fact that very short-term options (e.g. 1 week) on high volatility stocks have high level of premia compared to slightly longer dated (e.g. 1 month), once again, attracts different types of premium sellers.

Note: Let us be reminded that from an option pricing perspective, even these high premia are considered "fair" as they reflect the expected future volatility of the stock, but a fundamental investor or a premium seller does not necessarily view "fair" pricing through the same lens as an option market maker and finds opportunities in line with his own thesis.

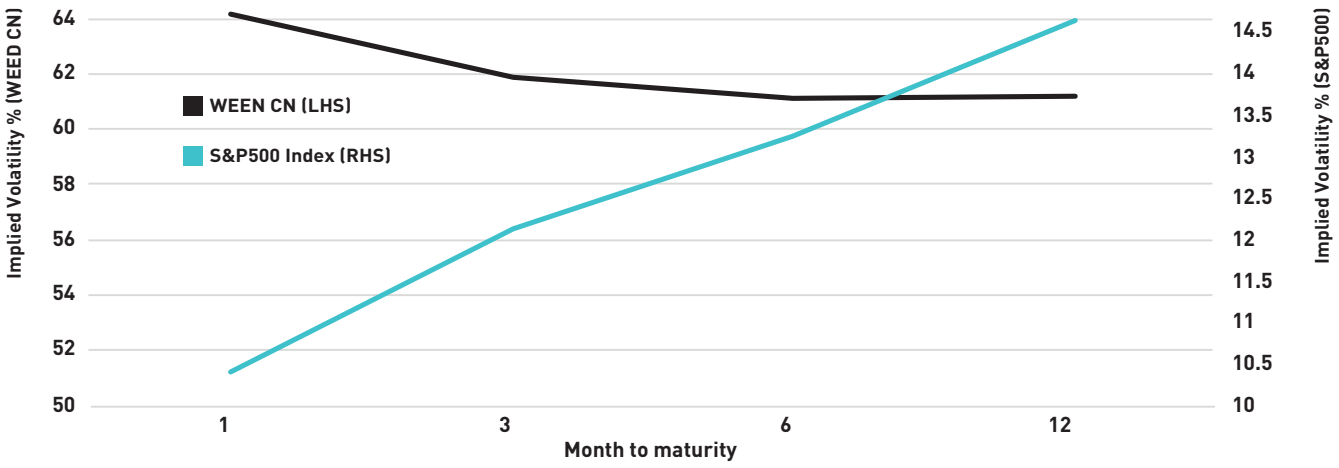
Additionally, another noticeable feature of cannabis stocks is that short-term implied volatility is often as high (or higher) than longer-dated implied volatility. Figure 8 shows the implied volatility as of Aug 15, 2018 for options maturing from one to twelve months on WEED CN compared to those on the S&P500 index.

This graph is called the term structure of implied volatility. In normal market conditions, the term structure of most stocks and stock indices is in contango (i.e. upward slopping) similar to that of the S&P500 in this graph.

But the term structure of implied volatility for cannabis stocks is most often—even in normal and calm market conditions—nearly flat or at times inverted as is the case of WEED CN in Figure 8.

FIGURE 8
Implied volatility of at-the-money options by maturity as of Aug 15, 2018

Term strcuture of implied volatility (on Aug 15th, 2018)



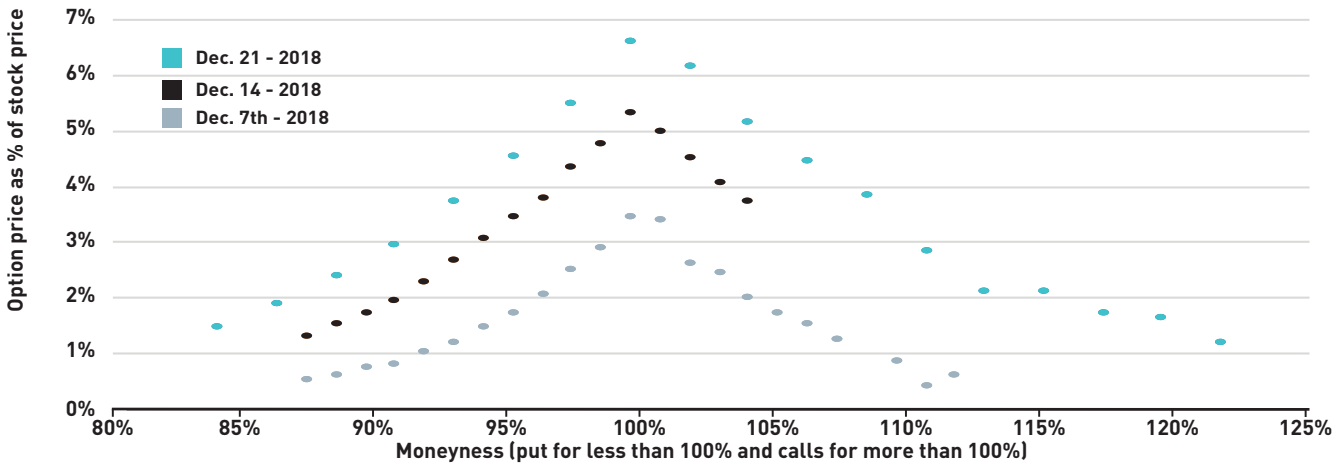
Why? Intuitively speaking, in normal or calm markets, uncertainty increases as the forecast period (of implied volatility) increases. We can think of it as the fact that market makers have a better grasp of what one-month horizon uncertainties are than what awaits them over the next six months. Therefore, they need less compensation to take on the short-term risk than the longer-term risk, resulting in an upward sloping term structure of implied volatility.

However, as discussed previously, when it comes to new industries such as cannabis, short-term uncertainties are also great. There are risks of violent movements as well as gaps in these stocks, and short-dated implied volatilities are marked higher by market makers to account for them.

The combination of a flat (or even inverted) term structure and high levels of implied volatility accentuate the level (elevated) of premia on very short-term out-of-money options.

FIGURE 9

WEED CN option prices as % of stock price for short-term maturities as of Dec 3, 2018



While for stocks with low implied volatility very short-term out-of-money options are virtually valueless, cannabis stocks and other high volatility stocks, short-term option premia offer opportunities to both fundamental and premium seller investors.

Figure 9 highlights the double effect of high volatility and inverted term structure: for instance, 10% out of money options with only four days left to expiry on WEED CN can be worth almost 1%!

However, it is important to point out that liquidity can be at times a challenge in implementing very short-term option strategies. These options are very sensitive to price movements (via higher delta and gamma), and market makers need to hedge their positions using the underlying stock which is quite volatile, resulting in wider quoted prices.

To partially circumvent this risk and the hedging risk for the market markets and in order to obtain a tighter bid/ask spread while allowing the investor to tailor strategies that are short premium (i.e. selling premium) and/or take directional, an interesting strategy is the use of calendar spreads. Detailed information on put and call calendar strategies can be found on the Montreal Exchange website in the **Guides and Strategies** section.

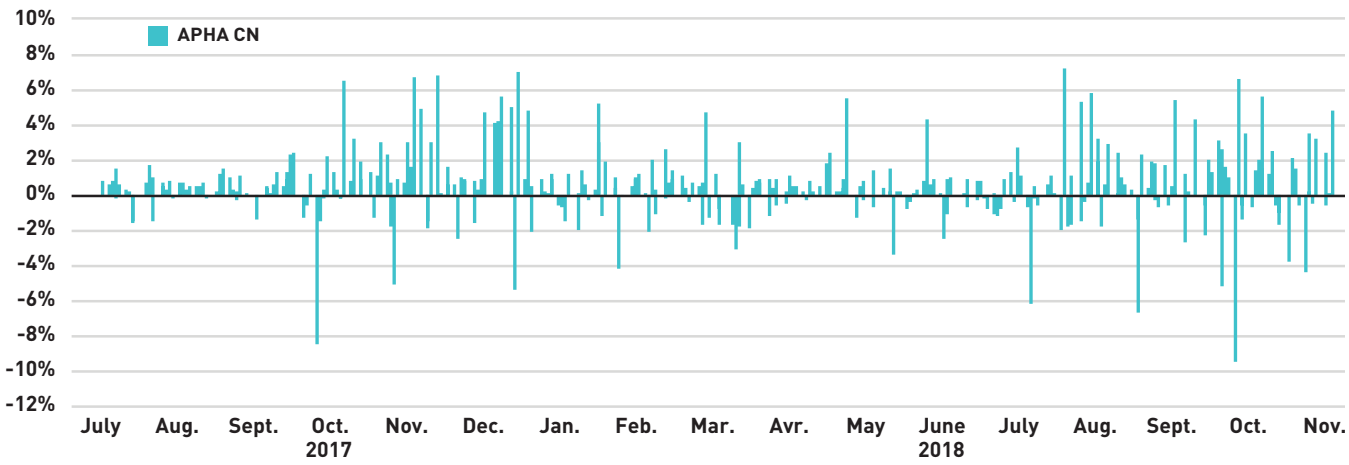
Very short-term options on high volatility stocks such as cannabis can be particularly interesting for translating fundamental views and for implementing overwrite strategies. In particular calendar strategies which use as their first leg (i.e. nearest dated expiration) very short-term options allow investors to take a view simultaneously on both the future direction of the (cannabis) stock and its implied volatility, while being able to control for the gap risk.

Beware of the gap risk

We would like to end this note with a word of caution: there is a reason why implied volatility is high on these stocks. While option premia might seem high, they are so because they reflect the inherent risk of these stocks gapping down or up and one must avoid being solely lured by the appeal of selling them unless the strategy is built on a strong theme or rationale and implemented with proper risk management.

To add some perspective, over the last year and half, APHA CN (Aphria Inc.) has gapped 21 times by more than 5% overnight (i.e. the open price of the day was up or down by more than 5% from yesterday's close), that is around once in 16 day! By comparison, in the same period, AAPL US (Apple) only gapped twice by more than 5%. High volatility is to be traded (and treated) with care!

FIGURE 10
Overnight price change (close to open) for APHA CN, Jul. 2017 to Nov. 2018



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