securities lending times

Technology Annual 2020

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Delta One talks Revcon trades

Investors want nothing more than to enhance securities lending liquidity and revenue with a transparent peer-to-peer marketplace, Delta One explain how they have developed the technology to make this possible

The Chicago Board Options Exchange opened its doors to stock options trading in 1973, establishing the world's first marketplace for standardised, exchange traded stock options. Like everything in the global economy, US options markets have evolved significantly over the past 47 years, as has their role in equity finance.

Before the advent of multiple exchange listing and electronic trading, all options trades were manually priced and executed in a centralised physical location. To get a quote for an options structure, a broker had to physically walk out to a crowd and get a price from the market makers assigned to that stock. Each stock's options traded at a single location. Investors who wanted to exchange synthetic securities lending could meet in only one place for liquidity. The advent of multiple exchange listing and electronic trading decentralised liquidity across 16 exchanges, most of which do not have physical floors with dedicated market makers. The exchanges that have maintained physical locations generally don't have dedicated market makers standing ready to make prices.

Options are used to increase profits, hedge market risk, manage counterparty risk, and leverage views, but the use case that has exploded over the last ten years is their ability to create synthetic securities lending. Investors have dreamed of enhancing securities lending liquidity and revenue with a transparent peer-to-peer marketplace for a long time, and the options market can serve that need. Delta One has developed the technology that makes this possible.

Referring to Figure 1 and 2, overleaf synthetic loans and borrows can be created using options structures called reversals and conversions, or 'Revcons' for short. An investor that wishes to lend shares enters into a reversal transaction. The shares are sold alongside a put, and a call is purchased with the same strike and expiration. An investor wishing to borrow shares executes a conversion. The shares are purchased alongside a put and call is sold. Regardless of where the stock is trading at the expiration, the shares will return to their original owner. The economics and mechanics of this trade look almost identical to a term stock loan. A fixed fee is paid or received, borrow is secured for the entire life of the trade and a 'synthetic loan' has been created. There are some subtle differences that we will address later, but Revcon trades are an established method of creating a term synthetic loan in a transparent marketplace. Listed options have many characteristics that are attractive to securities lending managers and the securities lending marketplace: liquidity, transparency and a counterparty that effectively eliminates counterparty risk, the Options Clearing Corporation (OCC).

Strike and expiration selection

There are two major types of option exercise types: American and European. An American option can be exercised by the long holder at any time during its life, while a European option can be exercised only at its expiration. Most single name listed options in the US are American, which brings us to the major difference between trading a Revcon and a direct lending term borrow: early exercise risk.

To synthetically lend or borrow stock through the options market a securities lending professional would need to choose a strike and expiration. It's imperative to select the correct strike to minimise an adverse early exercise. An early exercise would not only end the synthetic loan earlier

Figure 1

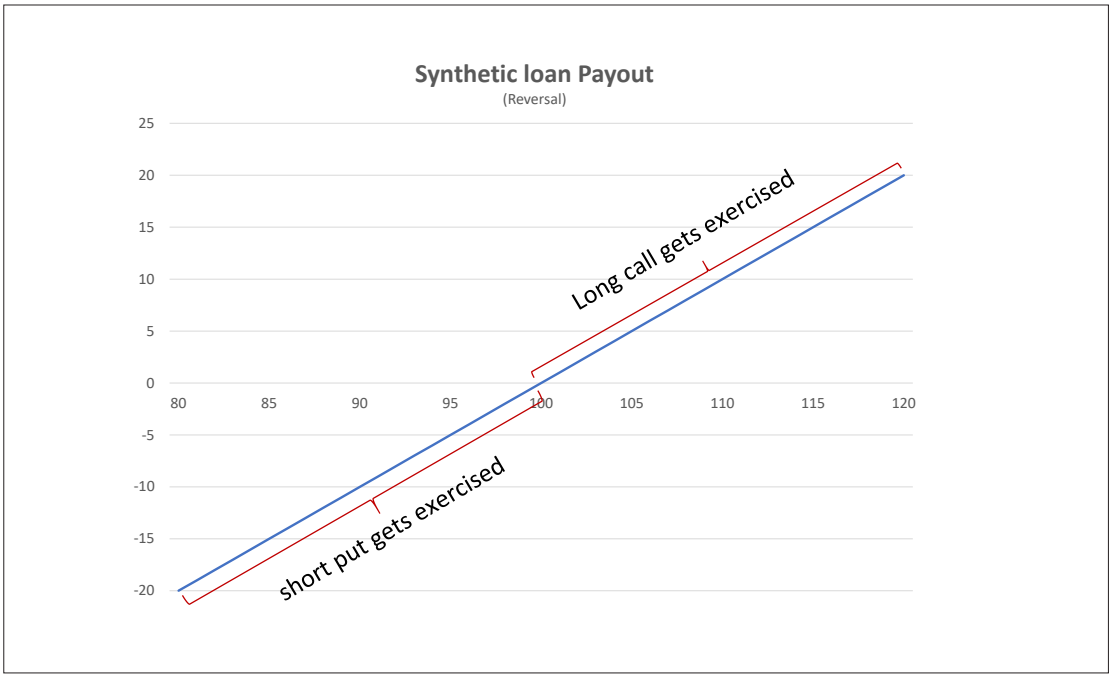
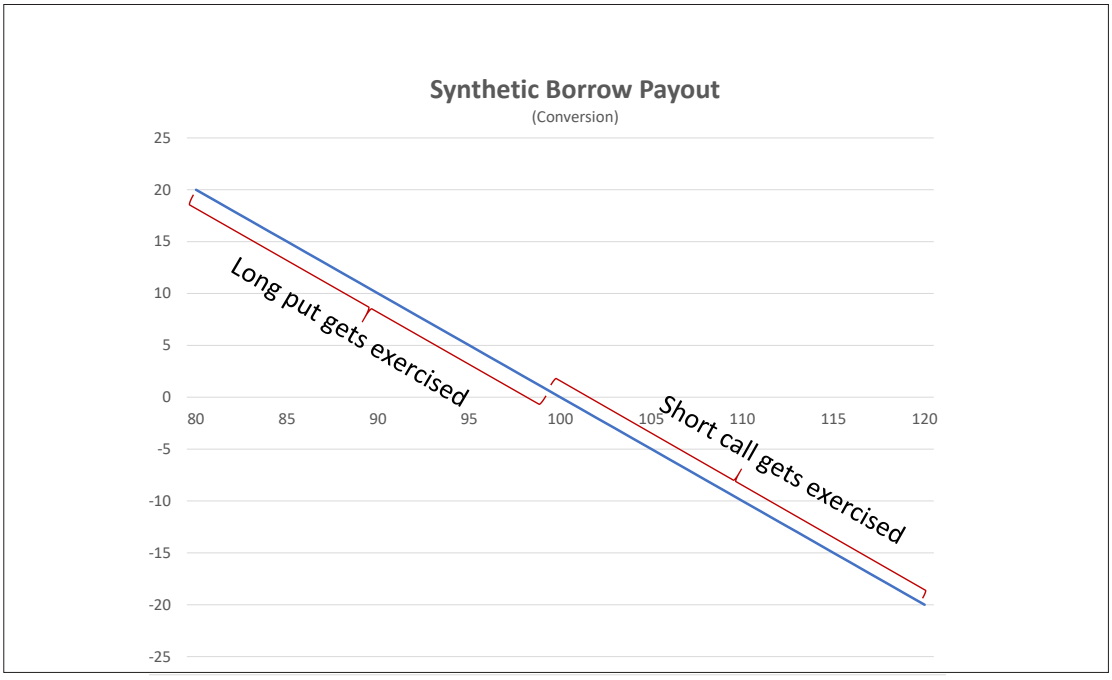


Figure 2



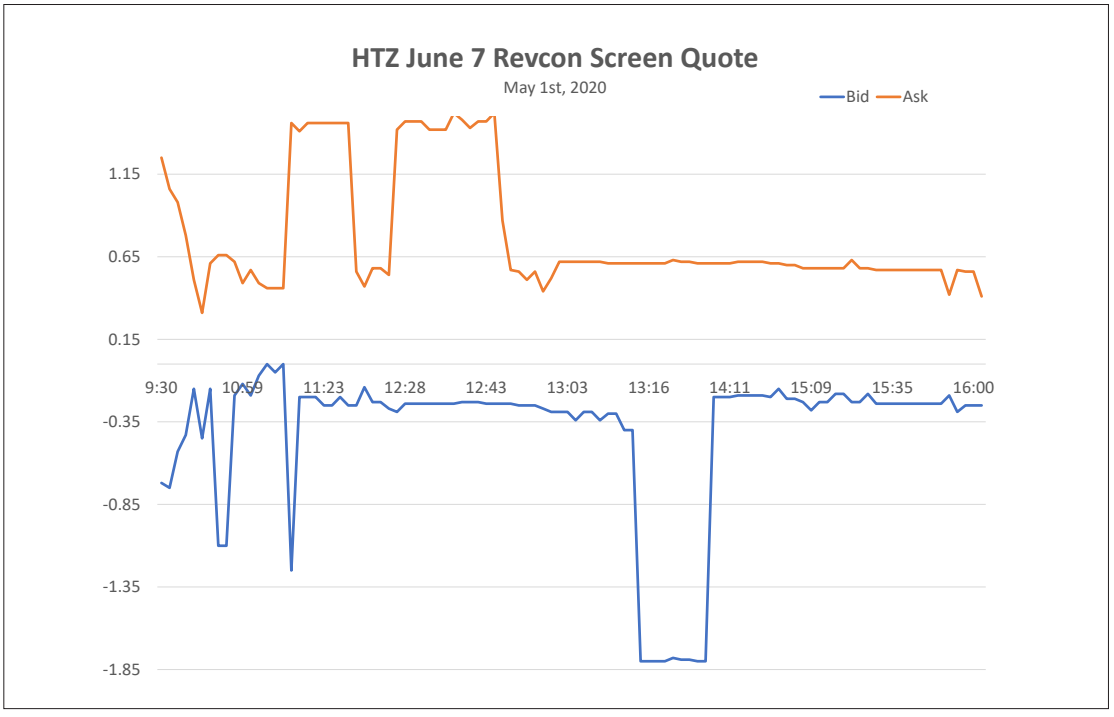
than expected, but it would leave the investor with a residual unpaired option position that would need to be unwound, which is an undesired outcome. Individual stocks have many strike and expiration combinations. Tesla for example has over 6,000. One of the many technical challenges we had to overcome was building an algorithm that processes market data in real time, uses machine learning and AI to dynamically pick strike and expiration combinations that minimise early exercise risk while seeking optimal liquidity. We had to start from scratch to optimise the needs of our customers. Our Goal was to build a system that does this, while being intuitive and user friendly.

Price discovery

A lender or borrower of securities looking to trade a synthetic loan in the options market would first need to understand its market microstructure. A very high level of precision is required to achieve the desired result. The difference between a good trade and a bad trade is usually measured in pennies, often fractions of pennies. Existing options quotation and pricing infrastructure in the US is wholly inadequate for this purpose. Minimum quotation increments for individual options legs are never less than one cent, and in many cases, are five or 10 cents. The synthetic loan package is isolating the economics of a term stock loan, while the individual options by themselves will have a very different risk profile. Their screen quotation will reflect this. We always consider the compiled screen quote before executing an option trade but looking at the compiled quote itself will not give us much insight into synthetic borrow pricing.

Hertz is a name that has became a hard-to-borrow due to the COVID-19 pandemic. Short interest skyrocketed from 15 million shares in mid-February to more than 58 million shares as of 30 April. Demand for borrow was up almost 400 percent which is reflected in overnight rates, term rates, and option pricing. Figure 3 is an intraday screen quote of the HTZ 7 June Revcon over the course of 1 May. On this particular day, synthetic borrows traded twice at 12:55 and then again at 15:48 for a total of 350,000 shares. The borrow fee paid to term the borrow until that June expiration was 30 cents a share in both

Figure 3



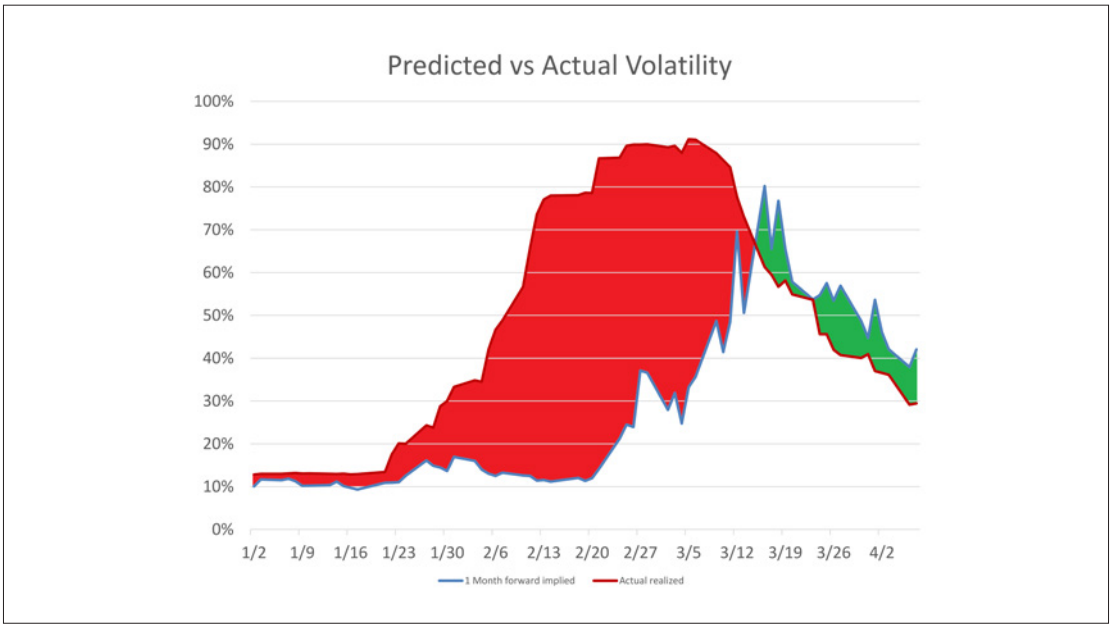
transactions. The market for the common stock was US$3.60 at US$3.61, a one cent spread. An investor pricing a common stock trade would have had very little uncertainty about its value. However, somebody looking to trade a 7 June Revcon would have had no such luxury. The screen quote at this particular moment in time was down 21 cents to 55 cents, meaning the quote was 76 cents wide! Comparing this quote to the 30 cents trade price will not give us much information about the fairness of the transaction for either side. Clearly another price discovery mechanism is required.

American vs European pricing

Calculating implied borrow rates on Revcons that are constructed with American options is a somewhat controversial topic. Closed-form solutions, meaning solutions that can be expressed with a mathematical equation and give an unambiguous answer, simply do not exist. European pricing models do have closed form solution and give a very high degree of precision with respect to predicted profit and loss (P&L) vs actual P&L, but don't model early exercise risk. The predicted P&L and actual P&L can diverge significantly for a synthetic stock borrow trade with meaningful early exercise risk.

Modelling is fragile. American pricing models that are able to model early exercise risk rely on a couple assumptions that are sometimes fatal. They assume that we know the volatility of the stock in the future, and also that we know returns will be normally distributed. If the first quarter of 2020 has taught us anything, it's that both of these assumptions can be wildly wrong. Figure 4 compares one-month interpolated implied volatility to the actual realised volatility that corresponded to the predicted period. The red regions correspond to times that the implied volatility market under predicted actual volatility, and the green regions are times the market over predicted volatility. The fragility of these assumptions was never more apparent than on 12 February, when one-month forward looking implied volatility was 14 percent, a measure of what market was expecting in terms of volatility for the following 30-day period. However, volatility for the 30-day period that actually followed was quite different. The market ended up realising more than 86 percent volatility for those 30 days. When you are expecting 14 percent volatility, and you get 86 percent, it shows that assumptions can be wildly wrong, and any model that relied on them would have been useless.

Figure 4



We have worked with many bankers that put far too much weight in their models. Over reliance on models creates bad outcomes. One can look to recent headlines to find evidence of this fact. Our strike selection AI and our pricing models are constantly evolving but they will never be better than their underlying assumptions. Early exercises are far better to be avoided than modeled for our use case. There is no simple answer to the modelling problem. There is however, a path forward.

FLEX European options

We believe we have developed the combination of technologies that can avoid early exercises in 99.97 percent of all synthetic borrow trades using American options. What about that last 0.03 percent? We think eliminating that last bit of risk is the key to bringing the larger stock loan universe into the synthetic market. FLEX contracts have been around for a very long time. They trade, clear, and face the OCC like regular listed contracts, yet can be created with European style exercises to avoid 100 percent of early exercise risk. Users could trade Revcons without having to create the risk infrastructure to deal with the 0.03 percent tail risk that a stock loan position turns into an outright options trade because of an early exercise. Our long term goal is to start quoting a standard strike and expiration FLEX European contract every month. When we are confident we can maintain a continuous two-way market in the system all month long in a big enough list of names, we will roll out FLEX European pricing to all system users.

The goal for many fintech startups is unfortunately to remove humans from the process entirely. That was never our goal. Delta One was designed to augment humans, not replace them. There is estimated to be $1.7 trillion worth of US equities on loan at any given time, and the US options market has over $3.3 trillion worth of notional open interest, yet the Revcon market rarely exceeds $35 billion worth of trades per month. From where we sit, it seems clear that the surface has just been scratched on this market and growing it will not happen without getting more humans involved, not fewer.

We often get asked what we think our total addressable market is. It would be easy to look at existing volume and say that it's not bigger than $35 billion per month, but we think that would be a very narrow-minded way to look at it.

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