Singapore Court of Appeal Clarifies Application of Unilateral Mistake in Algorithmic Trading

The Singapore Court of Appeal has, by a majority, upheld the finding of the Singapore International Commercial Court ("**SICC**") that a cryptocurrency exchange platform operator was liable for breach of contract when it unilaterally reversed completed trades in Bitcoin ("**BTC**") and Ethereum ("**ETC**").

Importantly, the Court of Appeal, in considering how, under the doctrine of unilateral mistake, the requirement of knowledge of the mistake is to be assessed where the contract is concluded entirely by algorithm, confirmed that the non-mistaken party would be treated as having sufficient knowledge if the algorithm's programmer had actual or constructive knowledge that an offer automatically made by the algorithm would only ever be accepted by a party operating under a mistake, and if the programmer had acted to take advantage of that mistake. The Court of Appeal also held that, in determining whether there was unilateral mistake, the relevant time frame within which the knowledge of the programmer running the algorithm should be assessed was the from the point of programming up to the point that the relevant contract was formed. This deviates somewhat from the SICC's decision which took into account the programmer's state of mind only at the time of writing the software. See: ***Quoine Pte Ltd v B2C2 Ltd*** [2020] SGCA(I) 02).

Our Comments

The Court of Appeal's decision is significant as it marks the end of the litigation around the first reported court case in Singapore involving cryptocurrency trading, while setting down precedents that would likely guide future dispute resolutions concerning automated trading or transactions that function without human intervention (whether involving cryptocurrencies, financial instruments or otherwise).

It is important to note that this particular case involved *deterministic* computer programs, which appears to have had a bearing on the SICC's and Court of Appeal's decision to examine the knowledge or state of mind of the programmer when applying the doctrine of unilateral mistake. It remains to be seen how the Singapore courts would approach disputes involving artificial intelligence or machine learning systems, where decision-making logic could evolve in ways that may not be fully envisaged by the programmer.

Separately, the Court of Appeal also held that it was not necessary in the present case for it to decide whether cryptocurrency, specifically BTC, is a species of property that is capable of being held on trust. This is because, in any case, no express trust arose over the BTCs in the seller's account, as there was no intention to create a trust. This means that the Court of Appeal neither overturned nor affirmed the SICC's holding that cryptocurrencies, although not legal tender, have fundamental characteristics of intangible property and can be treated as property that may be held on trust. Accordingly, this issue is not fully settled under Singapore law, and it remains open for future litigants to argue this issue before the Court of Appeal.

This update takes a look at the Court of Appeal's decision.

Background

This dispute arose out of unilateral reversal of trades in BTC and ETC pursuant to contracts concluded entirely by algorithm.

We briefly re-cap below salient key facts relevant to this update:

- Quoine Pte Ltd ("**Quoine**"), in operating a cryptocurrency exchange platform ("**Platform**"), played the role of market-maker on the Platform by placing buy and sell orders for cryptocurrency generated by its "Quoter Program".
- B2C2 Ltd ("**B2C2**"), another cryptocurrency trading company, traded on the Platform through an algorithmic trading software designed to function with minimal human intervention ("**Trading Software**") designed almost entirely by Mr Maxime Boonen ("**Boonen**"), a director of B2C2. The Trading Software's algorithm was deterministic, in that it would always produce exactly the same output given the same input. The inputs to the Trading Software, which would be used to generate quotes for sale and purchase orders on the Platform, were to be the best 20 orders from the Platform. Programmed into the algorithm was a fail-safe "deep price" of 10 BTC to 1 ETH, which would be triggered if input data from the Platform was unavailable.

On 13 April 2017, Quoine altered log-in information for a number of critical operating systems on the Platform, but inadvertently omitted to make certain necessary changes to the "Quoter Program". This oversight resulted in the Quoter Program's inability to generate new ETH/BTC orders on the Platform and eventually led to the "deep price" of 10 BTC to 1 ETH for sell orders for ETH taking effect on the Trading Software.

On 19 April 2017, B2C2's sell orders were eventually matched with the buy orders of two other traders ("**Counterparties**"), and 13 trades ("**Disputed Trades**") for the sale by B2C2 of ETH at prices of 9.99999 BTC and 10 BTC for 1 ETH were concluded with the Counterparties. Those rates were approximately 250 times the then-prevailing market rate of approximately 0.04 BTC for 1 ETH.

The Disputed Trades were automatically settled by the Platform, with the relevant amount of BTC being debited from the Counterparties' accounts and credited into B2C2's account, and the corresponding amount of ETH debited from B2C2's account and credited into the Counterparties' accounts.

When Quoine learned of the Disputed Trades, it took the decision to unilaterally cancel the Disputed Trades and reverse the debit and credit transactions on 20 April 2017.

B2C2 took Quoine to court on the basis that Quoine's unilateral cancellation of the Disputed Trades and reversal of the settlement transactions were in breach of contract or breach of trust.

Quoine's Case on Unilateral Mistake

Quoine's principal defence was that the contracts underlying the Disputed Trades which were entered into between B2C2 and the Counterparties ("**Trading Contracts**") should be vitiated for unilateral mistake at both common law and in equity, and that they were thus properly cancelled.

As affirmed by the Court of Appeal, for both unilateral mistake at common law and in equity, one party must have transacted while operating under a mistake as to a fundamental term of the contract.

However, depending on whether the doctrine of unilateral mistake is being invoked at common law or in equity, what the non-mistaken party must have known (or ought to have known) about the mistaken party's mistake is different:

(a) For unilateral mistake at common law, the non-mistaken party must have had *actual* knowledge of the mistaken party's mistake. If this is established, the contract will be rendered void.
(b) For unilateral mistake in equity, however, the non-mistaken party must have had *at least constructive* knowledge of the mistaken party's mistake and must have engaged in some *unconscionable conduct* in relation to that mistake. If this is established, the contract will be voidable.

Quoine's case was that the Counterparties had entered into the Trading Contracts under two mistaken beliefs:

(a) Firstly, that it was necessary to close out their positions in response to the margin calls which the Platform made on them ("**First Mistaken Belief**"); and
(b) Secondly, that they were buying ETH for BTC under contracts at prices which accurately represented or did not deviate significantly from the true market value and/or price of ETH relative to BTC on 19 April 2017 ("**Second Mistaken Belief**").

Quoine further submitted that B2C2 had acted unconscionably by intentionally including the "deep prices" in the Trading Software.

The key question arising from the unique facts of this case was how the doctrine of unilateral mistake should apply to contracts concluded entirely by deterministic algorithms. For example, in any analysis concerning the non-mistaken party's knowledge of the mistake or whether the non-mistaken party had acted unconscionably, whose state of mind is relevant given that no humans were involved in contract formation? What is the relevant time frame for assessing that person's knowledge?

The SICC's Decision

Ruling against Quoine on its defence of unilateral mistake, the SICC found that:

- The Counterparties did hold the First and Second Mistaken Beliefs, and that the Second Mistaken Belief was a mistake as to a term of the Trading Contracts.
- That said, where acts of deterministic computer programmes were in issue, the state of mind of the programmer of the algorithm (here, Boonen) at the time the computer programme was written was relevant – and the SICC found that Boonen did not have actual or constructive knowledge of the First and Second Mistaken Beliefs. After considering the evidence, the SICC took the view that Boonen had not programmed the "deep prices" in the Trading Software with malicious intent, and that while such programming might have been opportunistic in the sense that B2C2 would be best placed to profit "*if the unlikely became a reality*", there was no sinister motive and no impropriety on Boonen's part.

The SICC therefore ruled that the Trading Contracts were not vitiated for unilateral mistake, whether at common law or in equity. It also rejected all the other defences raised by Quoine.

Our previous update on the SICC's decision can be accessed here.

Quoine appealed against the entirety of the SICC's decision.

The Court of Appeal's Decision

The Court of Appeal, by a majority, dismissed Quoine's appeal.

On Quoine's defence of unilateral mistake, the Court of Appeal found that:

- There was no operative mistake as to a fundamental term of the Trading Contracts; and
- Even if there were an operative mistake, it was the programmer's (i.e., Boonen's) state of knowledge that was relevant and attributable to the parties, and the Court of Appeal accepted that Boonen did not have actual or constructive knowledge of the mistake, and did not program the Trading Software with the "deep prices" with any sinister intent or to take advantage of or exploit any such mistake.

No operative mistake

On appeal, Quoine pursued only its case in respect of the Second Mistaken Belief, which is that the Counterparties believed they were buying ETH for BTC under contracts at prices which accurately represented or did not deviate significantly from the true market value and/or price of ETH relative to BTC on 19 April 2017.

The Court of Appeal found that the Second Mistaken Belief did not constitute an operative mistake as to a fundamental term of the Trading Contracts. It noted that:

- Because the Trading Contracts had been entered into pursuant to deterministic algorithmic programmes that had acted just as they had been programmed to act, it cannot be said that a mistake affected their formation.
- The mistake, if anything, was in the way the Platform had operated arising from Quoine's failure to make certain necessary changes to several critical operating systems, which led to a series of steps that force-closed the Counterparties' positions and triggered buy orders for ETH being placed on their behalf. This could be seen as a mistake as to the *premise* on which the buy orders were placed. But it cannot in any way be said to be a mistake as to the *terms* on which the Trading Contracts could or would be formed.
- The Second Mistaken Belief was not a mistake as to a term of the Trading Contracts (i.e., a mistake as to the prices at which the Trading Contracts were entered into), as the prices at which the Disputed Trades were concluded were arrived at by operation of the parties' respective algorithms, which had operated exactly as they were intended to.
- The Counterparties' mistaken belief was therefore simply a mistaken *assumption* about how the Platform would operate, or the premise on which the buy orders were placed. They believed that the Platform would not fail; theirs was a mistaken assumption as to the circumstances under which the Trading Contracts would be concluded. Such a mistaken assumption was not an operative mistake in the context of unilateral mistake at common law.

No actual or constructive knowledge of Second Mistaken Belief

On the question of how knowledge of the mistake (even if there was one) should be determined in the context of contracts made by computerised trading systems, the Court of Appeal took the view that:

- Because a deterministic algorithm is bound by the parameters set by the programmer, it is the programmer's state of knowledge that will be relevant and attributable to the parties.
- The question is whether, when programming the algorithm, the programmer did so with actual or constructive knowledge of the fact that the relevant offer would only ever be accepted by a party operating under a mistake and whether he had acted to take advantage of the mistake.
- The relevant time frame within which the knowledge of a programmer or the person running the algorithm should be assessed was from the point of programming up to the point that the contract in question was formed.

Here, even assuming there was an operative mistake, the Court of Appeal saw no reason to overturn the SICC's findings that, when programming the Trading Software with the "deep prices", Boonen had not done so with actual or constructive knowledge that sell orders at the "deep prices" would only ever be accepted by a party operating under a mistake and that he had not acted to take advantage of that mistake, and that, while Boonen's inclusion of the "deep prices" was an opportunistic business decision, there was no sinister motive behind it. The Court of Appeal further observed that the latter finding excluded any notion of the Trading Contracts having been entered into in circumstances where B2C2 had acted unconscionably.

In addition, the Court of Appeal found that Quoine failed to show that B2C2 or Boonen had, up to the point that the Disputed Trades occurred, become aware of the problems with the Quoter Program or the fact that the Platform's order book had gradually thinned out in the period after the Trading Software had been programmed and prior to the Disputed Trades, which was when the Trading Contracts were entered into.

Taking all the evidence together, the Court of Appeal was satisfied that Boonen did not have actual or constructive knowledge of the Second Mistaken Belief. It went so far as to remark that Boonen would have had to "*foresee a perfect storm of events*" – beginning with the problems with the Quoter Program and ending with the conclusion of the Disputed Trades at the "deep price" – to have entertained such knowledge.

We would, for completeness, highlight that Mance IJ, the sole dissenting judge, preferred to approach the issue using a novel approach.

Mance IJ was in favour of recognising a wider scope of equitable mistake in the context of algorithmic trading, which he believed would provide equitable relief in circumstances where "*any reasonable person, knowing of the relevant market circumstances, would have known that there was a fundamental mistake*".

His proposed new test asks the question what any reasonable trader would have thought, given knowledge of the particular circumstances.

On the facts of this case, Mance IJ was of the view that there could be only one answer to that question – which is that a very unusual or unfathomable market development had occurred, and that the only explanation of the transactions was "*major error*". He would therefore, on the basis that the test in law was what he had proposed, allowed Quoine's claim that the transactions were voidable for unilateral mistake in equity to succeed.

As things stand, Mance IJ's proposed test is not the law in Singapore.

On the basis of the conventional doctrine of unilateral mistake, the Court of Appeal held that the Quoine's defences of unilateral mistake at common law and equity failed.

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