



## The Token Ledger

*A New Vehicle with the Power to Redefine Personal and Corporate Finance in the 21st Century.*

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## Abstract

The Token Ledger Whitepaper addresses key factors that led to the Global Financial Crisis of 2008; Transparency, Risks & Liquidity. Cointinuum stable coin sits above a transaction platform and a suite of distributed ledger technologies designed as derivatives and tools to enhance and reinforce hard assets as a buffer in times of financial stress. The Bit Real Estate Exchange platform will provide a distributed ledger interface, tokenized real estate assets, and smart contracts designed as *Credit Default Swap Tokens*. These investments will work in complementary fashion, tied to the physical property, risk mitigation for securitized debt and a bulwark in times of financial strain, as the tokens hold both real and synthetic value, tied to the original asset, but also independently staked across other cryptocurrencies, as with a diversified portfolio.

## Introduction

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The following whitepaper is written for the masses, not just the elites and investors of the world. The work we're doing is important and it affects everyone. Therefore, we've taken care to make this material both approachable and easily digestible for the average person. As such, much of the paper is written in layman's terms. However, there are areas where technical information, concepts and terms are shared in order to advance our case theory. It is our hope that with collective input from industry professionals, the investment community and as well as our society in general, we will not only have the honor of being entrusted with this great task, but we will also have the benefit of incorporating the wisdom of our collective conscience toward the mission. As the name implies, Cointinuum is not a disruptor, and equally so, the *Bit Real Estate Exchange* is not intended to be a disruptor, but a token ledger facilitator.

## Background

The global financial crisis of 2007-2008 was the worst financial event in recorded history, including the Great Depression of the 30's, OPEC in the 70's, and the Asian Crisis of 1997. Over-leveraging on the part of the investment banks like Lehman Brothers, and a lack of transparency inside of financial products and transactions, provided the conditions where a cyclical shift in the housing market and interest rates left the entire financial system vulnerable to collapse. This paper will delve into some of these points in detail as a means of demonstrating the Use Case for the Cointinuum decentralized app (DAPP), *Bitrealex*. Cointinuum is the token currency used to store value of and relating to real properties and contracts associated with borrowers, homeowners, lenders, title and their institutional counterparties and investors.

Cointinuum will provide new financial tools for business and personal use that will offer asset protection in all financial matters related to the purchase, sale, lending and securitization of real property. So that fundamental factors that lead to the financial meltdown can never happen again. The instrument can be thought of as a 3<sup>rd</sup> Ledger in an income statement. It's called the Token Ledger. It's at once a store of value for the

complex and arcane financial vehicles whose problematic descriptions evade comprehension to average consumer. While at the same time it is quite simply a “smart” contract or series of contracts, all with imperative data and metadata as content curated for the purpose of providing transparency, risk management and liquidity to institutional investors. Once deployed, this instrument will offer a whole new strategy for wealth creation and protection, risk management, financial planning, Collateralized Debt Obligations/Mortgage Backed Securities issuances, and other uses yet to be conceived. While it can be all of these things at once, its practical application as a store of value is well proven, and clearly represented in calculating gain vs. loss and debt vs. equity on the balance sheet. Think of an asset as the balance of debts and credits. When you factor in a 3<sup>rd</sup> element, token values; you can slide the pieces around the ledger like a Sudoku puzzle until you reach the desired debt picture for whatever the purpose may be. We’ll explore how Cointinuum works to address these problems in the coming section, but before we get too deep into the financial piece let’s do some housekeeping.

## Bitcoin

As a foray into Cointinuum and for anyone unfamiliar with the history of Bitcoin, the decentralized network was invented by Satoshi Nakamoto in 2008 and famously debuted this new Blockchain technology to the world in 2009 with the publication of a whitepaper “Bitcoin: A Peer-to-Peer Electronic Cash System”. It was hailed as elegant solution to the persistent problem in distributed computing known as the *Byzantine General’s Problem*<sup>1</sup>. Essentially, the problem arises from a state of uncertainty about the accuracy of information and integrity within a system, as the system breaks down, operators can be in the dark as to the nature and scope of the breakdown. This means that although the system may appear to be functioning well, it may in reality be under attack, silently becoming more corrupted until it suddenly fails without any forewarning. The decentralization of information by way of independent nodes across a network makes for a more secure network and thus presents a solution to this problem. Even as individual nodes or even a group of nodes may fall under attack, the system itself cannot come under attack<sup>2</sup>.

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<sup>1</sup>Antonopoulos, Andreas (2017). *Mastering Bitcoin – Programming the Open Blockchain*. O’Reilly Media, Inc.

<sup>2</sup>51% attacks remain a threat, where an individual attacker or group of attackers control 51% of the network, they can still cause harm to the system.

Another innovation of Bitcoin that became a proof of concept was the idea of Proof of Work (PoW). This problem centers around the issue of "double-spending", whereby a digital wallet could potentially conduct multiple simultaneous transactions using the same funds, creating an invalid transaction that would be reversed upon settlement. PoW, as demonstrated through the computation of a SHA-256 algorithm means that double spending cannot occur since each transaction must be validated using the correct key and nonce. Satoshi's Proof of Work model efficiently addressed this issue and together with the decentralize aspect of the node network, Bitcoin is an exceedingly secure system, at present.

I say "at present" to mean that based upon the knowledge available at the time it was created and decisions that were made that set Bitcoin in motion on its current path. Eventually, Bitcoin will run out as miners will mine that last of the "mint-able" coins. And then, gone with it will be the incentive for miners to continue supporting secure transactions with their precious resources; time, energy, & equipment, especially when there's more lucrative coins to be mined elsewhere, as there are sure to be. The result will be a reduction in the level of difficulty of the nonce equations that miners must solve in order to win Bitcoin. This problem is known as *Tragedy in Commons*<sup>3</sup>.

The algorithm is designed to adjust the level of difficulty such that a new coin gets mined every 10 minutes until it reaches 21 million coins in distribution. This means that with all the miners in the world pursuing this equation, one miner or group miners can only win a coin once every 10 minutes. Imagine how difficult a problem it must be to solve in order to achieve this output. Now imagine cutting the level of difficulty in half, and now half again, maybe even again. What level of security remains at this stage? These are the kinds of conditions that can make a system vulnerable to attacks that would be detrimental to its value and thus its viability. Hopefully the bitcoin community can come together and collaborate on a solution to this threat.

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<sup>3</sup>Garrett Hardin, *The Tragedy of the Commons*, 1968 *Science*. The population problem has no technical solution; it requires a fundamental extension in morality.

# The Problem – Transparency, Risk & Liquidity in Collateralized Debt Obligations and Mortgage Backed Securities

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The problem Cointinuum aims to solve is one that contributed to the collapse of the investment bank Lehman Brothers, the mortgage company Countrywide, and the global financial crisis brought about as a result of a trifecta of risky subprime lending, over-leveraging and a market correction with a high interest rate environment that led to a systemic failure of the banking, mortgage and housing sectors worldwide. Institutional investors from around the world each bought their share of US based mortgage backed securities (MBS) with complete faith that these assets would hold their value. I say faith because we know how little transparency existed at the time of the financial meltdown. Mortgages were being packaged in what amounted to a black box. Private label issuers would combine sub-prime loans in with conventional mortgages and sell them off in bundle, never disclosing the truth of what was in them.

In time, questions and concerns over the quality of these mortgages led to opportunistic answers in the form of a specialized niche type of insurance, Credit Default Swaps (CDS). CDS are a useful tool in order to help mitigate any perceived risk in the CDO investment pool. And so, institutional investors continued buying more Collateralized Debt Obligations with CDS attached, while investment banks took on greater and greater amounts of leverage. As a result the ratio of money borrowed by an investment banks versus the bank's own assets reached unprecedented levels. When the defaults finally came rolling in, banks didn't have nearly enough liquidity to address creditors. So, they went bankrupt.

Taking a deeper look into the root cause of the crisis, it is necessary to examine the modalities of debt structuring and how creditors are prioritized in the case of default or bankruptcy. In order to fully appreciate how Cointinuum will provide the intended

solution, we must understand what generated the problem in the first place, as well as the current framework and its relation to the past condition. The following excerpt from the article, "Secret Liens and the Financial Crisis of 2008" by Michael Simkovic<sup>4</sup> illustrates the significance and magnitude of the problem with which we are faced:

"From the creditors' perspective, preferential treatment in bankruptcy compared to secured loans is the primary advantage of asset securitization over secured debt. This preferential treatment drove the rapid growth of asset securitization. From 2000 through the first half of 2007, global asset backed securities issuances grew twenty-seven percent per year (Compound Annual Growth Rate), from \$532 billion in 2000, to over \$2.5 trillion in 2006. Securitization became a leading vehicle of corporate finance, growing from thirty-two percent of US new credit issuance in 1998 to forty-nine percent in 2007."

Unless you're working in the banking and securities industry, you've probably never stopped to wonder where the money comes from that gives your bank the ability to give you a loan. You may probably think that it comes from the deposits we make as banking customers, and you'd be only half right (actually much less than half). That's because the bank also takes out loans of its own, called leveraging, based on its balance sheet and credit worthiness. Often this leverage may be 15 to 1 in ratio, but it can be even higher when there's no transparency or when steps are taken to hide debt on the balance sheet.

Let's highlight a few key terms. The first is Collateralized Debt Obligations (CDO)<sup>5</sup>. Initially created for the corporate debt markets, CDOs evolved into the mortgage-backed security (MBS) markets. Used to pool many loans into private label securities for sophisticated, wealthy and/or institutional investors, the average consumer doesn't realize that in this transaction the bank that is the debtor. "Moral hazard, in the context of CDOs, bears on the issuer's or CDO manager's incentives to select high-quality assets for the CDO, to engage in costly enforcement of covenants and other restrictions on the behavior of obligors. By securitizing and selling a significant portion of the cash flows of the underlying assets, these incentives are diluted."<sup>5</sup> The investment bank issues the

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<sup>4</sup>Simkovic, Michael (2009) "Secret Liens and the Financial Crisis of 2008" *American Bankruptcy Law Journal*, Vol. 83, p. 253, 2009

<sup>5</sup> Duffie, D. & Gârleanu, N. (2003) *Risk and Valuation of Collateralized Debt Obligations*. Graduate School of Business Stanford University



CDO, which is basically and promise to pay investors in prescribed sequence based on collection of mortgage payments from the pool of bonds. It is the investment bank's credit rating upon which the investors stake there investment and expect payment. While the source of funds may originate from the downstream consumer borrower who makes a monthly mortgage payment, if payments are not made, depending on the structure, it will be the investment banks whose profits will suffer from this outcome. Issued as whole, CDO's are then subdivided into slices called "Tranches". These tranches pick up interest payments as cash flow enters the CDO from mortgages payments. Unlike bonds which carry quarterly dividends, CDO's pay through to investors on a monthly basis. If a borrower should miss a payment, depending upon how the investment is structured, cash will flow into a given tranche based up its seniority in the CDO. If a borrower should default completely, again, depending upon how the investment is structured, cash will again flow (or not flow) into a given tranche based up its seniority in the CDO stack.

As Simkovic<sup>6</sup> explains, the securitization of an asset has the same economic result as taking out a secured loan, except it is less transparent and therefore produces higher leverage. Meaning the bank can hide its debts in order to borrow more money. Now here's where things get interesting. One would reasonably assume that this would not be okay with the investor, accept you'd be wrong, for two reasons. The first is due to the nature of the financial ecosystem, with competition for steady flow of capital up and down the supply chain. The second is derived as a practical remedy without limiting deal flow. Professor Kettering explains:

"...sophisticated lenders prefer to structure their loans as asset securitizations because, if the debtor seeks bankruptcy protection, these lenders theoretically receive a stronger claim on the assets than would be possible under a secured loan. Asset securitization-

investors are therefore more likely to be repaid in full and on time than traditional secured lenders.... The distinctive feature of securitization is that the transaction. . . is structured to isolate the asset pool from the Originator [(the debtor)] in such a way that, if the

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<sup>6</sup>Simkovic, Michael (2009) "Secret Liens and the Financial Crisis of 2008" *American Bankruptcy Law Journal*, Vol. 83, p. 253, 2009

Originator later becomes subject to an insolvency proceeding, the proceeding will not interrupt the continued receipt by the financiers [(the creditors)] of the payments due to them, as and when due, through realization on the asset pool . . . . [T]hat goal may sometimes be referred to as 'bankruptcy isolation' of the securitized assets. Secured lenders are in a less attractive position if a debtor seeks chapter 11 protection. The Bankruptcy Code attempts to improve the chances that a debtor seeking to reorganize will be able to do so by limiting the rights of secured creditors."<sup>7</sup>

As we can see, the issue being created here is one that evolved out of a desire to; 1.) Avoid bankruptcy tax 2.) Maintain non-recourse status 3.) Maintain pre-bankruptcy waiver rights and above all 4.) Leverage greater sums of borrowed capital. Transparency suffers not for its own sake, but because institutions require it as a mechanism to achieve these desired results. Below we will convey a set of solutions that alone cannot address all of these issues. Still, by implementing them we can help mitigate future damage inflicted on the economy when another crisis arises, particularly as a result of defaults. Our plan aims to shore up and protect the value of assets using a new financial tool. Just think, the difference between financial calamity and calm is not between 0% and 100%, it's between only 3 or 5%, maybe 10% at most. This means, if by having a token ledger financial tool in place across our economy, the value of these assets being statistically significant at plus 5% range of complementarity, would provide such a protective buffer to prevent future economic collapse.

## Cointinuum Use Case Solutions

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Our mission is to address some of the problems that led to the financial crisis by developing systems and platforms that will increase the adoption of blockchain technology in the financial arena. We believe that the use of blockchain smart contracts and tokenized property ledgers can help protect wealth by hedging and supporting assets at all times and conditions, especially when traditional measures of value fail, such

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<sup>7</sup>Simkovic, Michael (2009) "Secret Liens and the Financial Crisis of 2008" *American Bankruptcy Law Journal*, Vol. 83, p. 253, 2009



as during the crisis when we saw properties values plummet. If BRX had been a “thing” at that time, it’s possible that properties would’ve held value despite the crisis. It’s also possible that we can support and incentivize the stabilization and redevelopment of blighted neighborhoods through the tokenization of undervalued assets. Therefore our vision and efforts will be to see a mass adoption of the token ledger on every property and parcel in the US and beyond.

The token ledger can be many things; a financial tool, an asset, and even a vehicle for accomplishing specific objectives. But for our purposes it is mostly a vehicle for producing derivative assets in a decentralized app used to store value belonging to homeowners, speculators, lenders and investors of real property, mortgages and other financial products in that space. These tokenized assets have varied qualities, some of which are and some that are not legally bound to the property itself, but linked at the direction of the asset owner, with Proof of Stake (POS), whereby the value may be applied in any number of ways as it relates to the buying, selling, leasing and brokering, insuring and guaranteeing various aspects of real property transactions. Indeed, as you will find in the following sections, there are a multitude of tokens that can be deployed in this space, each according to its specific use and purpose. For now let us concentrate on two; *Cointinuum BRX* and *Credit Default Tokens*. They represent the low hanging fruit within the Bit Real Estate Exchange Service eco-system.

Use Case #1 – *Cointinuum BRX™* (*Bit Real-Estate Exchange* tokens, pronounced “bricks”). There are two types of BRX tokens; 1.) ***Hard Asset Tokens (HAT)*** – Tokenized ownership of the physical asset itself. This equates to things we think of such as home-equity, mortgages, and securities. HAT tokens can be created as a means of refinance for mortgage purposes or the tokenization of the equity ownership of a given property. 2.) ***Synthetic Asset Tokens (SAT)*** – Tokenized derivatives that are valued based on their pairing to individual hard assets. Though they are not representing ownership of the asset itself, they are analogized to the real estate market and thus valued by the connection to each distinct piece and parcel of real property for which the Token ID is minted. During the public launch phase, the initial cost of SAT derivatives will be assessed using a factor of .000340909, applied to the subject property value†.

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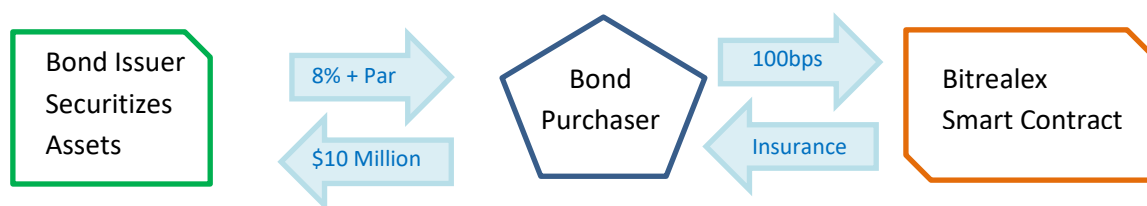
†This equates to approximately \$75USD per \$220,000 of Market Value. Property valuations will be pulled from objective and impartial sources, then aggregated to obtain an average from the sources.

## Use Case #2 - Credit Default Swap Tokens

*"A credit default swap (CDS) is a derivatives instrument that provides insurance against the risk of a default by a particular company. This contract generally includes three parties: first the issuer of the debt security, second the buyer of the debt security, and then the third party, which is usually an insurance company or a large bank."*<sup>8</sup>

Credit Default Tokens (CDT) – Just like Credit Default Swaps have been utilized as a risk management tool for the MBS industry, so too shall BRX tokens be used for the same purpose. Using blockchain "smart contract" technology and leveraging the inherent value of Cointinuum and BRX we can achieve the same degree of risk mitigation for a fraction of the cost. Admittedly there are additional risks involved with a new financial product. But the cost in acquiring a supply of Cointinuum tokens early in the ICO stage reflects this and investors can warehouse these coins for use at a later date, such as underwriting Credit Default Tokens for MBS investors down the road. As shown by the figure below, the process is the same as in traditional currency.

Figure 1. Bit Swap Token Example



<sup>8</sup>Wen, Yuan (2016) *Credit Default Swap –Pricing Theory, Real Data Analysis and Classroom Applications Using Bloomberg Terminal* State University of New York at New Paltz

## BRX CDT Smart Contract Advantages:

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- Transparency – Each smart contract contains critical loan underwriting metadata, for more informed decision making.
- Credit Risk – Investors may model out their required amount of protection and at a reduced overall cost given the smart contract terms.
- Liquidity- CDT's may be sold for immediate cash value and transferred to another party.

In addition to offering equity token conversions (tokenization) for the investor and mortgage communities, as well as supplying derivative investments and credit default swap tokens, we we're developing API solutions that will allow BRX information to propagate across platforms and exchanges, from MLS sites to other cryptocurrency index sites.

The BRX platform is not intended to be a disruptor but a facilitator. We're working toward mass adoption of blockchain technology and the use of the distributed ledgers as an indispensable tool in transactional real estate and beyond, from title chains to title insurance, from home warranty to home policies, there are many applications and uses in the real estate space.

Finally, and perhaps most interestingly, we envision cross transactions between other cryptocurrencies on the exchange platform. It goes without saying that not all users will have or use Cointinuum as their exchange currency. Owners of altcoins will want to trade from and into their chosen currency. However, the type of coin used as the secured token can be any number of coins provided that they meet certain standards. For example, other "stable" coins and "quality" coins will be traded interchangeably for BRX. And as a result, Bit Real Estate Exchange could be positioned as a de facto ratings agency for cryptocurrencies, as only high grade crypto coins will be eligible to bare the suffix BRX™.

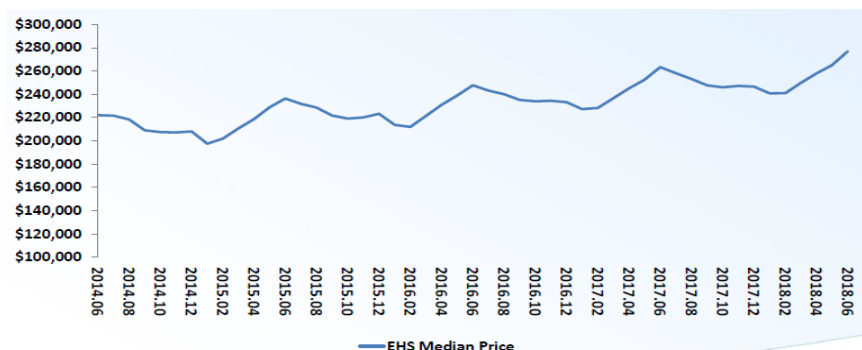
## Governance

Bit Real Estate Exchange will be a decentralized app platform, providing a trustless system for executing transactions. As a trustless system with protocols intended to operate with minimal human input, little is needed in the form of governance. Accept however, unforeseen real world situations, such as technical and regulatory changes may necessitate intervention in order to protect the value that has been created and stored on the blockchain. It is prudent and in the best interest of all stake holders to have a mechanism that addresses such eventualities. A council of stakeholders shall be formed as a means of coping with existential threats, challenges and changes to the BRX system and Cointinuum currency. This governing body will work in partnership with Bitrealex management team to self-regulate the property ledger system in a fair and objective manner. Though it should be clearly understood, we believe leadership is indispensable and not abdicable for the sake of the greater good. Therefore, we shall retain the final decision authority in all matters of policy and technical origin.

### Monetary Policy

Cointinuum aims to be a relative safe haven for coin investors, in that, although fluctuations in the coin value will occur, they will only occur gradually over time and not in a volatile manner. In order to achieve this result the currency will be pegged to US real estate market based upon a composite index of median US *Existing Single-Family Home Sales Prices*. As of the initial drafting of the whitepaper, the median price of an existing home was \$276,900 in the US<sup>9</sup>. The equivalent value in Cointinuum is 30,000 units of coin or \$9.23 per coin. Our monetary policy calls for a restrained distribution amount that will support the goal of maintaining the stability of the coin value relative to these fluctuations in home prices.

Figure 4.  
Median Price  
of Existing  
Homes Sales



<sup>9</sup>National Association of Realtors Summary of June 2018 US Existing Home Sales Statistics

## Conclusion

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We recognize in Bit Real Estate Exchange an opportunity to deploy blockchain technology for the purpose of solving one of the most enigmatic societal problems of our time, the Tragedy of Commons. Banks will continue to over leverage their accounts and investors will continue buying securities. So then, the question is not if we should limit or stop it, but to create a safer atmosphere in which to allow these forces to coexist, and even thrive.

“Bit Ledgers” (Distributed Token Ledgers) will redefine how we think of personal finance and the thought matrix in negotiations. Having a literal bargaining chip with which to negotiate will provide more opportunities than ever before. Distributed Token Ledgers can work as a complementary feature to any transaction whereby 3<sup>rd</sup> parties play a crucial role. Brokers, for example, might prefer to be compensated in digital currency when the exchange value will provide greater returns as compared to the tradition mode. It becomes a win-win if the owner of the token can acquire the initial token at a discount or maintains ownership for a long enough period of appreciation. We envision the economy becoming augmented by these financial tools in ways that have yet to be imagined.

This closing statement reiterates the *Cointinuum BRX* use case along with the four specific features it will provide. Firstly, we will create and propagate Cointinuum BRX tokens, both HAT and SAT, with the aim of delivering a means by which stakeholders may subdivide and distribute the value of any given piece of real estate. As explained earlier, this process tokenizes the hard asset in 2 distinct ways, one that represents ownership of the debt or equity on a particular property and another in which the value is derived through synthetic means, not through direct ownership of any of the underlying assets. Secondly, we will develop a decentralized application designed to provide a platform upon which these tokens and derivatives in real estate may be traded. API's will be developed that allow the bit ledger to flow from platform to platform, such as in the MLS and IDX services. Property detail reports will include this

data amongst the other varied points of data, all to be considered in the proposed negotiations of a transaction. Thirdly, Credit Default Swaps smart contracts will be underwritten providing insurance for the MBS industry supported by Cointinuum currency. Fourthly and finally, our platform will operate as the de facto ratings agency for cryptocurrencies in general as only stable coins and high quality coins will be eligible to trade on the Bit Real Estate Exchange and carry the suffix BRX™, which is synonymous with the tokenization of real estate assets.

**For more information contact us at [team@cointinuum.io](mailto:team@cointinuum.io)**

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*Antonopoulos, Andreas (2017). Mastering Bitcoin. Programming the Blockchain. O'Reilly Media Inc.*

*Hardin, Garrett (1968). Science. Vol. 162, Issue 3859, pp. 1243-1248 Pacific Division of the American Association for the Advancement of Science at Utah State University, Logan.*

*Simkovic, Michael (2009) "Secret Liens and the Financial Crisis of 2008" American Bankruptcy Law Journal, Vol. 83, p. 253, 2009*

*Wen, Yuan (2016) Credit Default Swap –Pricing Theory, Real Data Analysis and Classroom Applications Using Bloomberg Terminal State University of New York at New Paltz*

*Duffie, D. & Gârleanu, N. (2003) Risk and Valuation of Collateralized Debt Obligations. Graduate School of Business Stanford University*

*<https://www.nar.realtor/newsroom/existing-home-sales-subsidize-06-percent-in-june>*