

Blockchain and Public Finance

By Ben Bartlett

The Municipal Bond Market is effectively controlled and administered by large Wall Street firms. These firms represent the large money center banks and are supported by a network of financial and legal advisors. Municipal debt is handled through the Depository Trust Corporation (DTC) in New York/New Jersey and notes are generally denominated in \$5,000 blocks. The secondary market is dominated by large institutions trading in minimum \$250,000 blocks. While there are no specific restrictions on individuals owning or trading municipal debt instruments, in practice, the market has evolved to service the institutional markets first and foremost.

California, like the other 53 states and territories that issue municipal debt, is exempt from registration under the Securities and Exchange Act of 1933. That means, it has wide latitude to issue debt. Exercising that latitude has generally cost more than using the existing underwriting/DTC system in the last 40 years. However, that calculation has changed with the advent of blockchain and related distributed ledger technologies which can replicate all the legacy processes at lower costs, with higher transparency.

Blockchain technology allows California to issue bonds that can be certificated as tokens on public or private blockchain. If the State chooses to use a Transfer Agent to track ownership of each note, and generally manage the project, it could give bond holders the option to choose whether to hold the security 1) directly registered with California; 2) on a blockchain of their choice; or 3) at the DTC (which is required for institutions but may be desired by retail investors). The transfer agent could also act as paying agent for the State and facilitate investor instructions to change their holdings between the three states of certification.

Given the concerns around anti-money laundering, the bonds should be issued as zero-coupon instruments where the difference between the issue price and the face value redemption represents the tax free interest for investors.

Blockchain technology may be able to enable California, her cities and counties to issue better bonds at lower cost to both Municipalities and investors. As a side benefit, a tokenized bond issuance allows the State to:

- achieve greater transparency;
- targeted investment; and
- serve public policy goals of financial inclusion by making bonds affordable.

1. Describe the California Context for the Blockchain Based Public Finance

California, combining both the State and individual municipal issuers, is the largest issuer of municipal debt in the United States ([Muni Facts](#)). Municipal debt is used to finance both long term capital projects and short term cash flows. Long term capital projects are designed to maintain and improve the public assets like the infrastructure of the State. Short term cash flows are used to manage the timing between income (tax, fees, fines), and expenses at the State and local levels.

California retains municipal advisors who are contracted to provide the most appropriate financing solution for any given project or suite of projects that the State plans to finance. From this point of view, there is little to no practical difference between a bond administered through the DTC system or one that is tokenized and administered by a particular blockchain.

2. Review any current literature or pilot projects relevant to the given use case. Describe any existing practices. Identify failures and successes to learn from.

The current municipal bond market has evolved very slowly over the past five decades. The largest real change in that time has been the dematerialization of bond certificates and coupons. The removal of physical certificates has driven the consolidation of municipal debt securities into the Depository Trust Corporation (DTC), and wholly owned Cede & Co who acting as de facto transfer agent owns substantially all of the issued shares in the United States.

DTC is owned and operated as a consortium between the roughly 400 largest financial institutions in the United States (with some foreign representation). As far as their members are concerned, the Municipal Debt market as it stands today is an unexciting but reasonably successful market for its members.

Currently, the vast majority of municipal bonds are available in \$5,000 denominations and a tradable lot is generally considered anything greater than \$250,000 in face value.

While municipalities are specifically identified as exempt issuers in the Securities and Exchange Act of 1933, almost all issues today are initiated through an underwriting process. Due to the participation of Financial Industry Regulatory Authority (FINRA), regulated Broker-Dealers in the underwriting process, the rules promulgated by the Municipal Securities Rulemaking Board (MSRB) come into play. The Municipal Issuer is *not* subject to MSRB or FINRA regulation but the underwriter managing the issue is. That said, [California has promulgated rules and procedures](#) that both the State and the municipalities in the State must follow.

Minibonds. As the asset class with the least innovation since the 1970's, there have been many attempts to "democratize" the municipal bond with minibond offerings (smaller denominations

down to the \$100 level), retail offering periods (which are common in California), geographic limitations and combinations of these. While most of these pilots have demonstrated an impressive amount of interest amongst voter/investors who value access, tax free returns, and local impact, the cost of these issuances have come in well above traditional offerings, limiting adoption.

The City of Berkeley [has issued an RFP](#) to issue Blockchain based Microbonds for the purchase of a firetruck. Berkeley's goal is to leverage its tax exempt status as a municipal issuer, and the outsized local economic impact of its regular budget, with the efficiencies of the blockchain token markets to offer a new kind of cost effective, affordable, and scalable debt instrument.

3. What agencies, companies, or organizations might benefit most from improvements to data collection, storage, workflow? Which are responsible for managing confidential records, providing benefits, etc?

Three types of organizations would directly benefit:

1. Municipal Government Finance Departments;
2. Investors seeking tax free income after changes to State and Local Tax 'SALT' deductibility; and
3. Investors seeking sovereign debt exposure.

Govt. Finance Depts. may benefit from Transparency, Cost Reduction, and Smart Accounting.

On the Government side, Municipalities would benefit from increased clarity into the holding and trading patterns for their debt, and decreased costs due to blockchain enabled automation.

Investors. After the Global Financial Crisis of 2008, many investors have gravitated away from fractional reserve banks for their cash deposits, preferring instead to park excess funds in government bonds. Investors, particularly those in the top tax bracket, will have an appetite for bonds offering a tax free return. Lower income investors will benefit from the reduced purchase price of the bonds. The market in general will benefit from increase secondary market liquidity.

Records would be managed in accordance with the chosen medium.

For bonds directly registered with California, the records would be managed in the current fashion and following existing regulations and procedures to protect against misuse. The result is a high level of data granularity (identity of the transactor and transaction) available to the State.

For bonds certificated onto a blockchain (tokenized), the records of the transactions will be available to all observers of the blockchain but the identity of the transactors will remain as pseudo-anonymous as the blockchain selected permits. Alternatively, this process can be

managed by permissioned ledger. In either case, the result is a high level of data granularity for transactions.

Bonds held at DTC will suffer from the same opacity as current bond issues today. Information is available through [EMMA](#) but it is not as granular as the other two states of certification.

Indirectly, voters win because Municipal governments will be able to leverage the improved transparency to give voters better outcome analyses when asking for fresh bonding authority.

4. What is the scale of stakeholders, constituents or beneficiaries affected? (E.g., number of people, size of market, \$\$ transacted, etc)

The scale of participants expands from today's existing financial institutional buyers of debt instruments to a much broader class of retail (voter/investors) and family office/wealth management investors. As the adoption of tokenized municipal debt certificates grow, the growth is only limited by the ability of holders to adapt to the new wallet and token based system. In 2018, the MSRB indicated that California issued about \$51bn in municipal debt and given an average duration of 6 years, it is safe to assume that between 16% and 20% of that issuance could be addressed (under 15 month maturity) with existing authorization to issue Tax Anticipation Notes.

In California, the State and its Cities and Counties can issue TANs up to 70% of next year's budget for a given Municipality without voter pre-approval. For longer term bonds or bonds that would exceed the 70% of next year's budget amount, the normal voter approval would be required.

In theory, there is no reason why the entire amount of California's annual debt issuance couldn't be made available in tokenized format. Market acceptance is the hurdle that needs to be overcome.

5. How mature is the current IT infrastructure, including staffing, hardware, network speed and access, etc?

The current IT infrastructure is already well developed. On the administrative side, there will be new procedures, but the basic structure of web/app access and digital identity authentication supported by cloud based databases is already well understood.

On the token side, the structure already exists. Adoption of the wallets to facilitate transactions and holding is a non-technical matter of disseminating market information. In terms of network speed and access, current transmission rates from WiFi or cellphone service is sufficient at the end user level while commercial internet connections and cloud offerings are readily available at reasonable cost for administration.

The program itself would largely be an enterprise software implementation with some procedural updates. However, the benefits of increasing the local velocity of money and the ability to retain most of the program fees within the local economy would generate extra employment locally over existing funding methods.

6. What are the parameters for consideration regarding security and privacy? (E.g., HIPAA requirements for medical records, other requirements for confidentiality, etc)

As the administration of the program would fall to the Municipality itself, an SEC regulated Transfer Agency, and/or a FINRA/MSRB Broker Dealer, security and privacy are already well understood and defined in terms of responsibility and procedures. Tokenization will add improved security and privacy models to the existing mix.

7. How might blockchain provide value in this context?

Blockchain token architecture offers an excellent platform for payment systems as well as new types of financial instruments which are currently rolling out of the Distributed Finance (or DeFi) community. The tokens offer the ability to save money and transact electronically in a local currency which is stable and backed by the taxing authority of the municipality that issues them.

8. What trade-offs should be considered before deciding whether to adopt a blockchain-based system? What are the potential risks and benefits?

Risks:

- The retraining and adoption phase will take time and money to execute properly.
- At the most risky end, loss or theft of tokens, the program is no more risky than a stored value card (Clipper, Starbucks).
- On the positive side, transactions of lost or stolen tokens are very easy to trace, destroy and re-issue..

Benefits:

- Lower overall costs for the city
- Residents gain an opportunity to invest locally
- The potential to increase the velocity of money in the local economy.

9. Who else should be consulted before making a recommendation on this use case?

Three levels of consultation:

- Finance department officials at the State, County and City levels
- Municipal advisors already engaged by Municipal debt issuers.
- Municipal bond counsels, although that will probably cost extra.

10. How is this use case affected by trust considerations and intermediation among those using blockchain for transactions?

When bonds are certificated into tokens, they are held in wallets that are controlled by the holder. The holder can choose to continue to hold those certificates to maturity, transfer those certificates to another wallet (eg. Coinbase wallet) or trade those certificates with another wallet holder. In every case, the blockchain will record every movement of value as tokens are “spent” and created. While the ownership will be somewhat obscured by the nature of blockchain addresses, all transactions will be viewable by anyone with an internet connection and appropriate blockchain browser.

11. What is the role of digital identity as it relates to this use case?

Digital identity is critical at all levels of participation in the scheme. The device identity model will be implemented strictly to ensure that users can be authenticated properly at every level.

12. What are potential statutory and regulatory barriers to implementation that should be considered?

As Municipal Issuers are specifically exempted in the Securities and Exchange Act of 1933, the barriers are those imposed by the State of California. For trading of municipal securities in the secondary market, trades will follow the same regulations as regular securities transactions (registration with FINRA, follow MSRB rules, Know Your Client procedures at account opening). For transfers involving only a transfer agent (ie. sale from municipality to investor, conversion to tokenized or DTC status and final redemption) these will follow the SEC rules governing Transfer Agent activities.

Please include any preliminary recommendations.

There are many moving parts so the best way to evaluate the usefulness of combining blockchain technologies and municipal finance in the short run is to monitor the progress of the Berkeley Microbond Financing Program which is currently at the RFP stage.