using cryptographic tokens as a means of small business finance
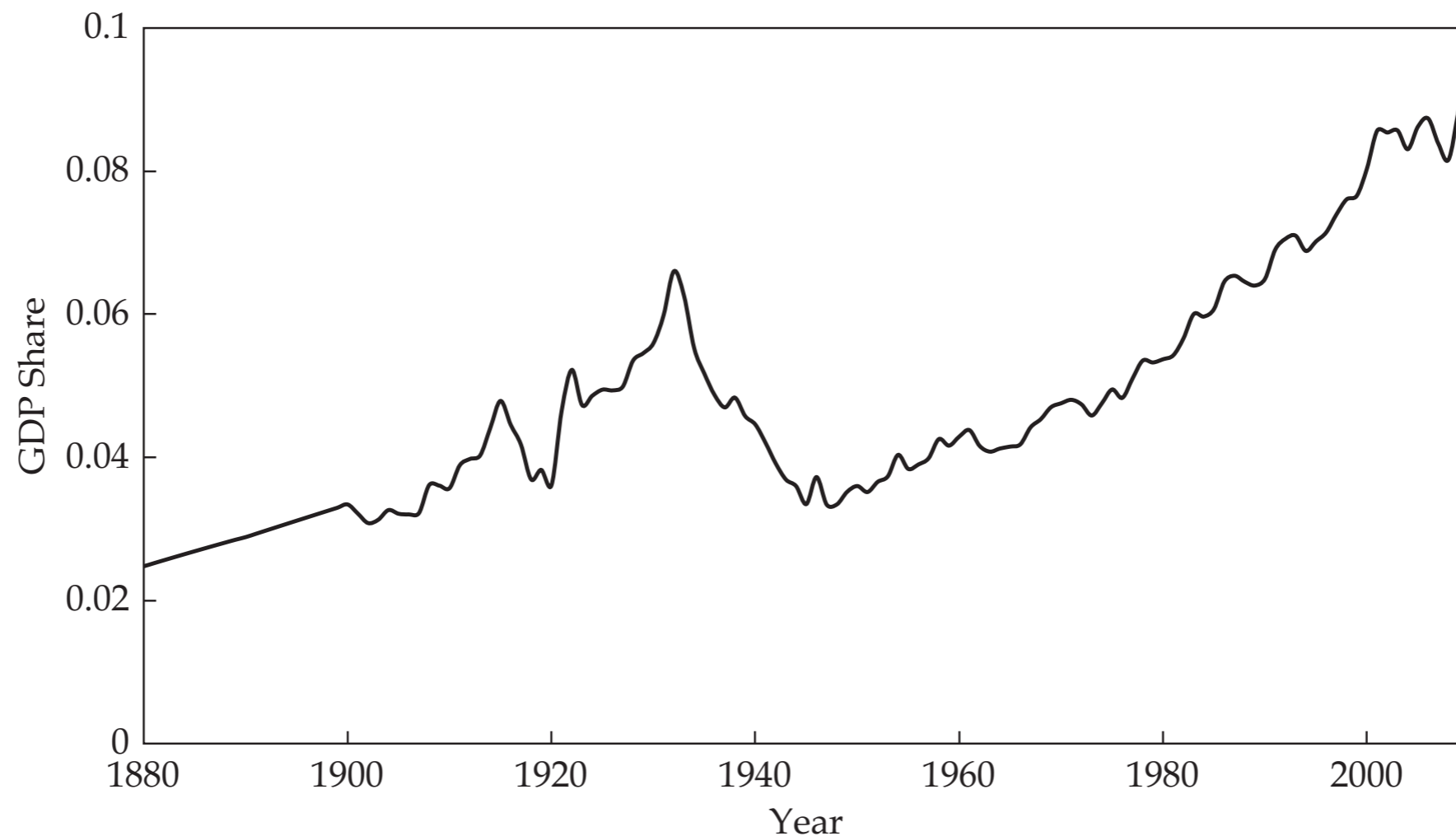
rebuilding finance from the bottom up

a presentation by steve randy waldman — 20 oct 2016 — @interfluidity

- Finance is **big**.

Finance Share of GDP

taken from "Why is finance so expensive?" by Thomas Philippon

Ch 9 of "Rethinking the Financial Crisis" (2012), ed Blinder, Lo, Solow, et al.

- Yet there's very little evidence that the "real economy" to which financial services are provided has benefited from the increasing size and cost of modern finance

- In fact, for smaller firms, it's easy to argue the reverse. Consider:

> "Small and medium-sized enterprises with under $500 million in sales generate roughly 45 percent of the country's business revenues, but they account for less than 5 percent of total capital markets activity"
>
> ~ Amy Cortese, *Locavesting*

the problem

- Traditional sources of external capital for smaller firms include **friends and family**, **bureaucratically subsidized state finance** (e.g. SBA loans or loans tailored to minority-owned businesses), **venture capital**, and especially **commercial banks**

- All of these sources have **severe drawbacks**.

  ⇒ Capital from friends and family is distributed independently of the number and quality of potential entrepreneurs

  ⇒ Access to bureaucratically subsidized finance is limited and rationed, available only when bureaucratic criteria and potential projects match

  ⇒ The VC model is suited only to a particular kind of potentially high growth firm, and in practice, to people with very particular social networks

the problem

- Changes in the structure of both the economy and the banking industry render **commercial banks increasingly poorly suited to small and medium-sized business lending**

  ⇒ The economy is increasingly **service-based**, requiring investment in **human and intangible capital that cannot serve as security to a loan**

  ⇒ **Consolidation** of the banking industry and **increased regulatory conservatism** disfavor lending decisions based on local knowledge or "soft-information"

- Banks, bureaucratic lenders, and VCs all typically require firms to issue **nonmarketable debt** (convertible or not), which has an inappropriate risk profile for most small ventures

- In general, the landscape for external finance looks something like this:
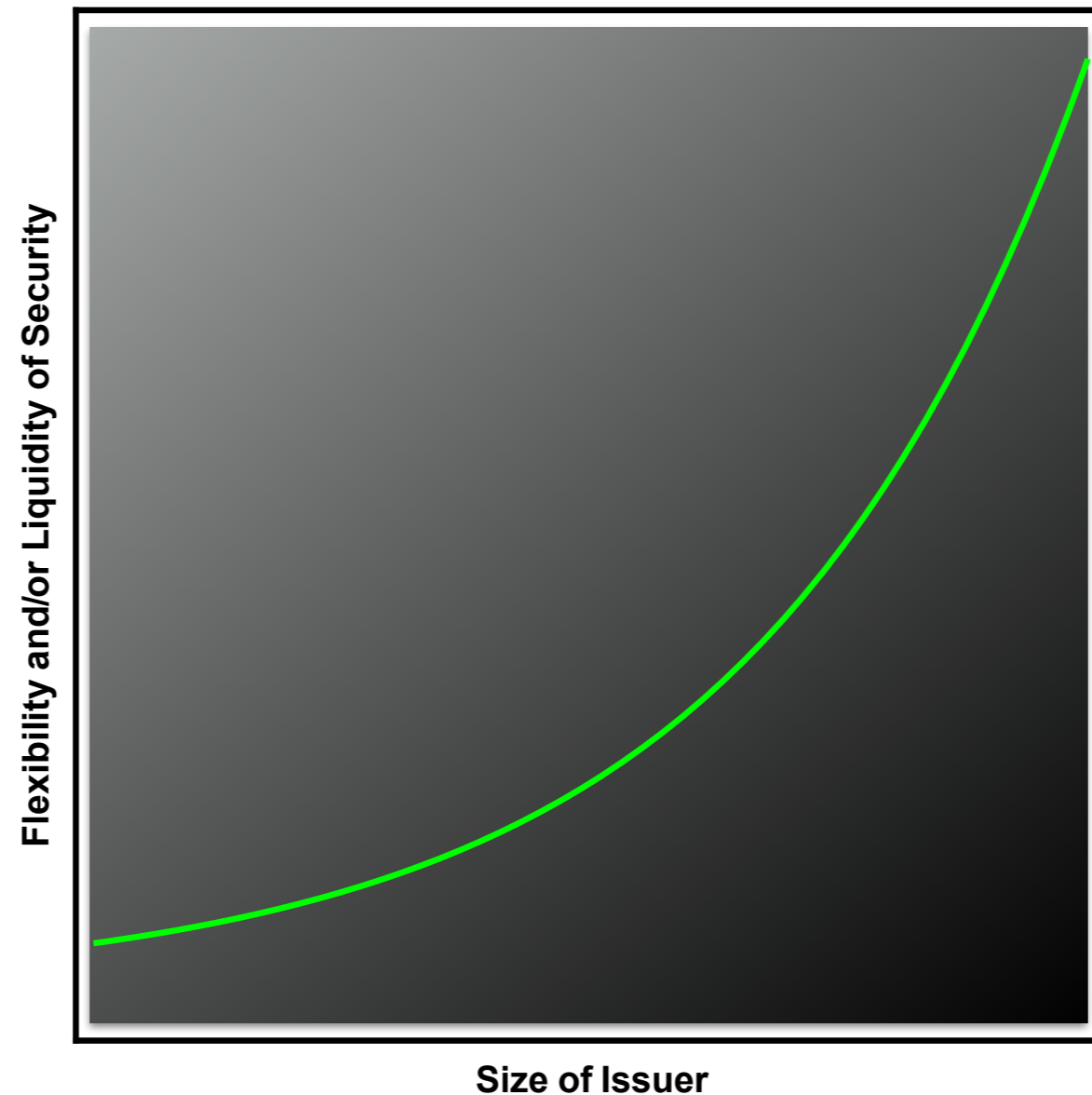
By "flexibility", I mean the ability of the firm to match its obligations to investors with business conditions, and so share rather than magnify financial risk

the problem

- The paucity of options for firms is matched by ***a paucity of options for investors***

- There are almost 6 million of firms in the United States (almost 30 million counting firms with no employees), only ***a very small fraction of which (probably 10,000 to 20,000) are accessible to investors in any way via public capital markets***

- Investing has grown ***stupid***

  ⇒ The broad public ***increasingly doesn't bother,*** convinced (correctly) they they have no informational edge in public markets and should just index or hold safe bonds

  ⇒ Yet ***every individual has a unique information*** set that, in theory, ought to help ***inform aggregate investment***

if only…

- It would be ***beneficial to small and medium sized enterprises*** if they could raise capital by offering liquid securities to the general public, if that could be made practical

- It would be ***beneficial to investors*** if they could invest in firms about which they have direct information, with which they can interact and monitor personally, if the hazards of self-dealing or scams could be moderated

- It would be ***beneficial to communities***, if neighbors and customers were stakeholders in the businesses they interact with

- It would ***improve aggregate investment***, if the immensely important and productive SME sector could be financed by risk-bearing capital markets

why not?

- "Regulation" is the facile answer

  ⇒ The regulatory burden associated with registering and issuing securities to the general public in the United States, plus the burdens associated with getting such securities listed and traded on public exchanges are sufficiently high as to largely discourage such issues by small firms

  ⇒ But that happened for a reason

- Until recently, ***the practical impediments to managing a publicly held, frequently-traded securities issue in a manner that an investor community should reasonably trust would have been large even in the absence of regulatory formalities***

- A small firm that offered such securities, if it were serious, would have to put a large fraction of its resources into arranging and managing the issue, as though it were investing in a line of business rather than covering some accounting formalities

why not?

- Even absent regulations, small firms trying to manage a liquid public issue would likely either scrimp on covering the necessary costs, and so do a poor job of it (in which case investors should not trust them)

- Or they would do the requisite work and pay the costs, in which case they would largely be in the business of selling and managing their stock (which is likely to be a pretty scammish business)

- We have some experience with these kinds of firms. There do exist the so-called "penny stock" / "pink sheet" markets, about some of whose issues you may have received some e-mails.

- A case can be made that, historically, ***the regulatory burden discouraged a class of issues that for the most part could not have been honestly and successfully pursued***

- Hopefully, then, if ***technological improvements*** make it possible for small and medium sized firms to issue and effectively manage liquid, publicly traded issues, ***some path to forbearance and tolerance by regulators can be found.***

  ⇒ So far regulators have been tolerant of technological experiments that could be interpreted to run afoul of securities laws. They have explicitly adopted a cautious "wait and see" attitude.

This Pollyanna-ish thesis can be taken too far, however. For example, the recently added burdens associated with the Sarbanes-Oxley Act seems to have discouraged public issues by firms of a scale that historically thrived as public companies. Also, securities regulations have put a burden on issues not intended to be liquid and traded, securities for which the practical burdens of management might not be large.

what is a cryptographic asset?

- Like any financial asset, a cryptographic asset is nothing more than a chit or token that represents certain rights

- The rights associated with a traditional financial asset are defined in a legal contract and enforced by the legal system

- Accounting, management, and reporting associated with a traditional financial asset are performed by the issuer, at its expense

what is a cryptographic asset?

- The rights associated with a cryptographic asset may be defined by a legal contract, but compliance is enforced to the maximum extent possible automatically by computer code executing in a blockchain system

- Accounting, management, and reporting associated with a cryptographic asset are performed to the maximum extent possible automatically by computer code executing in a blockchain system

what is a cryptographic asset?

- The legal system may serve as a backstop, where automated enforcement yields perverse consequences or disputes arise.

- But recourse to the legal system is expensive.

- The goal is to design cryptographic assets for which pursuit of legal remedies would be extremely rare

what is a blockchain?

- A blockchain is a woowoo magic revolution thing.

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what is a blockchain?

- Ironically, a blockchain is *a technology of authority*

- It's purpose is to manage an authoritative accounting of the current state of the world and its history

- A blockchain differs from an ordinary database (which can also manage an accounting of the state of the world and its history) in the *careful way all proposed changes of state are fingerprinted and verified by a large, dispersed community of putatively independent participants*. Changes of state are rejected if they are invalid or if the proposer lacks the requisite authority to cause the change of state

what is a blockchain?

- Once the broad community has agreed that a change of state has occurred, the event has authoritatively happened. No single party, malicious or otherwise, can cause or undo a change of state except in accordance with preagreed rules typically enforced automatically and without discretion by the community

- Blockchain applications can manage authoritative (think audited) accounts and computations
  - ⇒ as long as the rules governing the behavior of the accounts can be described algorithmically, without need for discretion

- What's exciting about blockchains isn't the new things that they can do. ***Everything a blockchain can do, a "trusted third party" made of and/or supervised by human professionals — bankers, lawyers, accountants, regulators — can do as well, and more flexibly***

what is a blockchain?

- What's exciting about blockchains is that **they do what they do very cheaply and very quickly**, precisely because the continual intercession of expensive human professionals is not required to ensure that they remain trustworthy

- Blockchains are **"disruptive" in the traditional Clay Christensen sense**, in the way that PCs began as inferior, but much cheaper, substitutes for large business computers

- …**or in the Gutenberg sense**. Books were published — much more beautifully as a matter of fact! — prior to the invention of the Gutenberg press. But making publication orders of magnitude faster and cheaper turns out to really matter!

what is a blockchain?

- However, blockchains are limited compared to traditional technologies of trust:

  ⇒ They cannot audit discretionary choices, in the way that an accountant could. They can enable discretionary choices and track them, but verifying the appropriateness of such choices is beyond their capacity

  ⇒ They are far less capable of rendering humans trustworthy by defining arrangements that include disincentives to behave inappropriately.

    — A blockchain can't put a person in jail for fraud

    — A blockchain application can only "fine" people to the extent the application holds value for them in escrow (although this may change if e.g. blockchain-managed reputation becomes socially compelling)

what is a "cryptographic token"?

- Blockchains enable the definition of "tokens" which may have economic value. These are purely arbitrary chits, whose float, issuance, and redemption are verifiably and authoritatively managed by the blockchain.

- Exchanges of such tokens clear and settle immediately and automatically

- If a token designer wishes, tokens can be redeemable, instantaneously and without ceremony, and the float — publicly visible always — will update instantaneously

- Conversely, tokens can be issued, instantaneously and without ceremony, but the circumstance of issue and/or total float can be constrained

what is a "cryptographic token"?

- Tokens can be incrementally issued on scales from micro to huge without requiring changes in infrastructure

- Tokens are bearer instruments, but they manage themselves. Functions like

   $\Rightarrow$ payments of distributions
   $\Rightarrow$ communications with token holders
   $\Rightarrow$ votes and proxy management

can be automated into token designs

designing tokens to finance small biz

- If small businesses were to issue public tokens to raise and manage capital, precisely what should those tokens represent claims against?

- Rather than thinking of tokenholders as (just) abstract arms-length financiers who rationally advance funds or not, we want to encourage the possibility that customers, local stakeholders, people with personal knowledge of the principals, would be stakeholders whose interest and goodwill might be relevant to the success of the firm

designing tokens to finance small biz

- Some principles:

    1. Claims should be **valuable, as in value-able**. Although some speculative interest is welcome, "blue-sky" structures that might entice speculators with unlimited upside should be avoided

    2. As much as possible, claims should be **evaluable without detailed information about the internals of the business**. They should be susceptible to "rule of thumb" valuation by people (especially customers) who interact regularly with the firm and its principals

    3. Claims should help diffuse rather than aggravate the risk that a slowdown in business activity could lead to shuttering of the firm or loss of control by issuers

    4. Claimholders' interests should be aligned with issuers. They should benefit from firm performance that exceeds expectations, and experience reduced return when firm performance suffers

designing tokens to finance small biz

- If small businesses were to issue tokens to raise and manage capital, precisely what should those tokens represent claims against?

- Some possibilities include:

    ⇒ Claims against money on a fixed schedule (traditional debt)
    ⇒ Claims against profits (traditional equity)
    ⇒ Claims against revenue
    ⇒ Claims against product

designing tokens to finance small biz

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  ⇒ ~~Claims against money on a fixed schedule (traditional debt)~~
  ⇒ ~~Claims against profits (traditional equity)~~
  ⇒ Claims against revenue
  ⇒ Claims against product

- I want to argue that neither traditional debt and traditional equity are well suited to small businesses

debt is not ideal

- Small businesses face volatile cash flows, in and out, and have limited refinancing options.

- The fixed-schedule burden of debt imposes severe risks on small businesses, risks which ideally capital structure innovation could help diffuse

- Creditors risk downside with no stake in the upside of a business, potentially creating large divergences of interest between issuers and debt holders

straight equity is not ideal

- Profit, "earnings", are an accounting construct, and can be managed too flexibly by a small business. There is huge scope for self-dealing

  ⇒ Choices about e.g. salary to firm principals amount to straight transfers of wealth from or to shareholders

  ⇒ Accounting choices about e.g. various kinds of loss reserves impact reported profit

  ⇒ Trustworthy claims against earnings require outside review of discretionary business practices and accounting choices, precisely the sort of expensive trust infrastructure that historically renders public small business finance impractical

- Purely discretionary payouts leave minority shareholders at the mercy and subject to the predation of the majority. Again, corporate law has elaborate mechanisms for managing and protecting minority interest, but that infrastructure is costly to access

straight equity is not ideal

- Investors who will be *pari passu* with principals may naturally want control rights of some sort

  ⇒ Cryptographic tokens do offer the tantalizing capacity of automating voting procedures, which might enable small business to be controlled in some fashion by a community of public shareholders

  ⇒ But translating shareholder democracy to tangible firm control is hard, and, arguably, many small businesses should be controlled by basically dictatorial founders. Resolving disputes inter-shareholder might require recourse to the expensive legal system

  ⇒ It is possible — and exciting — to imagine entities managed entirely by diffuse tokenholders, whose business decisions are executed and managed directly by a blockchain system to the maximum extent possible. That is the idea of a DAO ("Distributed Autonomous Organization"), and while exciting, we wish to focus on finance for traditional small business

idea! claims on revenue 💡

- A token can represent a claim on a fixed amount of future revenue, paid out continuously as a fraction of total revenue

- Revenue is relatively concrete. Although complications of revenue recognition can exist, for many firms revenue is quite close to gross inbound operating cash flow

- Depending on how firms receive payments, revenue may be trackable automatically by a blockchain system, allowing for automated payouts by tokens

- Claims on revenue allow firms to (partially) match payouts to cashflows, helping to diffuse financial risk

  ⇒ Only partially because they are insensitive to volatile outgoing cash flows

idea! claims on revenue 💡

- Claims on revenue broadly align the interests of business principals and tokenholders, because the rate of return on the funds invested is a function of the rate of revenue earned by the firm

- Claims on revenue are value-able. Given a required rate of return and an estimate of the rate of revenue the business will generate, it's trivial to value a claim on a future dollar

- Ultimately, the only information investors' require is an estimate of future revenue and a evaluation of the probability of firm bankruptcy. For existing businesses with which a potential tokenholder interacts with directly, information sufficient to form a reasonable view may be communicated relatively easily.

idea! claims on product 💡

- Instead of representing a share of profit or revenue, tokens can represent a claim on the good and services that a firm produces directly

idea! claims on product 💡

- Instead of representing a share of profit or revenue, tokens can represent a claim on the good and services that a firm produces directly

- "At the register", instead of paying for a muffin, you can surrender a token worth a muffin. You can always buy a token on your phone while you stand in line

- Firms issue tokens that, perhaps after period of delay, become redeemable for the firm's goods and services, if available

- On the **assumption** that sales (as a function of both supply and demand) are large relative to demand to redeem tokens, tokens can be **valued much like an ETF pegged to the net asset value** of a muffin (or whatever good the token stands in for)
  - ⇒ (It would likely trade at a small discount to NAV.)

idea! claims on product 💡

- If demand for muffins is low relative to the desire of tokenholders to redeem, the token will decline in value, reducing the effective price to customers of the goods themselves (who could buy a cheap token to pay at the register rather than paying in cash the full price)

- If supply of muffins is low relative to the desire of tokenholders to redeem, the token may or may not decline in value, depending on whether there is demand to reserve supply in the future at full price

- Firms may wish to manage the demand for redemption by setting a purely discretionary "tip rate", a payout in cash or in kind, paid as an incentive to hold

idea! claims on product 💡

- For services or goods that cannot be stored, token values can exceed the "net asset value" of the product for which it can be redeemed, if the price of the product is anticipated to appreciate for some time faster than the rate of return required to hold the token

- Such tokens, or portfolios of such tokens (that diversify idiosyncratic business risk), could be used to enable very fine-grained speculation in the prices of certain markets

  ⇒ Suppose you are bullish about hotel room prices in Constanta, Romania…

- These tokens diffuse risk for issuers, as long as mass redemption does not starve the issuer of cash flow necessary to service other obligations.

idea! claims on product 💡

- When demand is slack, issuers can find relief by repurchasing tokens at a discount

- When demand is slack, redemption itself is relief, as a redeeming tokenholder is a customer who may not have arrived otherwise

- When demand is slack, redemption itself is relief, as the opportunity cost of fulfillment is the cost of goods sold rather than the full price of the good charged to customers

- Tokenholders benefit as the scale of business grows (relative to the scale of redemption of tokens), and from any tip rate the business may pay to discourage redemptions, if and only if sales are strong

idea! claims on a dollar of product 💡

- Suppose that "at the register", a token is worth $1 towards purchasing of goods or services from the firm

- This behaves very similarly to a claim on units of product, except when sales are brisk relative to redemption demand it will be worth very close to $1

- As with claims on units, when demand is slack relative to redemption demand, it will trade at a discount. When supply is constrained, it may or may not trade at a discount

- As with claims on units, issuers may wish to pay a purely discretionary "tip rate" to manage redemption demand, which may be in cash or in kind (i.e. in more tokens)

idea! claims on a dollar of product 💡

- To holders, these tokens look similar to shares in a Money Market Mutual Fund, always worth near $1 and earning "tips" when demand is healthy, with a risk of "breaking the buck" and becoming worse less should demand go slack

- It matters (I think, I claim) a great deal that these are liquid, publicly traded cryptographic tokens, rather than more familiar and traditional sorts of claims (like illiquid loans or even gift cards)

- Let me count the ways…

...benefits to issuers

⇒ *pay reduced liquidity premium*

⇒ *pay reduced premium for idiosyncratic, diversifiable risk*

⇒ *accessible to best informed investors*

⇒ *accessible to investors who experience intangible value from holding tokens for personal and philanthropic reasons*
   — *Businesses can dynamically **rank and thank** their top funders*

⇒ *investors become better customers and provide free marketing*

⇒ *accessible to most optimistic investors (winners' curse, issuers' gain)*

⇒ *dynamically variable float*

⇒ *potential benefit from incorporation into conventional "modern portfolio theory" asset classes*

⇒ *liquidity*

⇒ *easy to hold a diversified portfolio*

⇒ *can invest in businesses holders know, like, and patronize*

⇒ *holder may feel good about investing in personally tangible value-producing firms*

⇒ *holders' community may benefit from increased "investment" (in every sense) and alignment of interest between businesses and other stakeholders*

⇒ *investable opportunistically, at fluctuating prices*

⇒ *exposure at will*

⇒ *small businesses can be sorted and aggregated into low or negative correlation subsets, yielding more efficient portfolios*

...(grandiose) benefits to economy

⇒ *better, more fine-grained allocation of investment capital*

⇒ *easier escape from "secular stagnation", as more savings find demand-generating real investment projects rather than attenuated claims on financial claims*

⇒ *tempering the "shampoo economy" — as investment capital is deployed to a less concentrated, stereotyped menu of assets, funding pressure is less likely to build up asset bubble that pop and then repeat*

⇒ *scale of investment is inversely correlated with labor intensivity of investment. (and not necessarily as an inefficiency, can entail a efficient improvement in quality). could address labor glut, "wealth of humans" problem (see Ryan Avent)*

payments and liquidity

- Liquidity is always something of a mystery.

- An obvious, serious, objection to all of this is that however technologically cheaply and easily a token may be traded, tokens issued by small business will not in fact be liquid in trade

- An easy response is empirical: An inexplicably vast menagerie of largely impossible to understand or value "alt coins" are currently reasonably liquid on multiple exchanges.

- Tokens whose values are straightforwardly pinned should attract competitive liquidity providers who can put bids and asks around relatively narrow valuation bands

- But still…

payments and liquidity

- Nothing prevents small-business-issued cryptographic tokens from being used as means of payment in the way that Bitcoin is

- Of course they would never be units of account: People won't price their goods in *MuffinTokens*

- But it would be possible to devise a payment mechanism that proportionally liquidates a fraction of payers' portfolio to cover the value of a payment, and then proportionately matches the recipients' portfolio, as long as transaction costs are low

- These would create a glut of pure, no information "noise trades", the prevalence of which in traditional theory should draw liquidity providers into offering narrow, deep spreads

- Of course there may be a bootstrap problem, low transaction costs imply liquidity, liquidity must be drawn by low transaction costs

getting started: "investment banks"

- Independent humans and small businesses can and will try small experiments with tokens, working around securities laws, or arguing their issues are not subject to them, or simply behaving honestly and gambling on authorities' forbearance

- But blockchain systems, like every kind of software system, exhibit increasing returns to scale. Once something "works", ideally it should be deployed widely.

- Most small businesses will not have the wherewithal, technically, legally, to invent and try their own experiments for some time.

- There might be a role for organizations that keep track of the experiments that do happen, and that help small firms set up and manage their own token schemes

getting started: "investment banks"

- Ideally, I think such organizations should be bipartite, with a not-for-profit component which charges at-cost only for the actual work of service provision (i.e. designing and setting up the system that manages the offering), affiliated with individuals who endorse the offerings by promising to buy and hold for a solid lock-up period a fraction of the issues they "underwrite".

- This eliminates the capacity of the "investment bank" to use its specialized information and connections with potential investors to charge an uncompetitive fee. Unlike with traditional prestige investment banks, any endorsement would be paired directly with exposure to the economic consequences.

- Fine-grained local investments require community-specific investment bank expertise. Ideally (always ideally), this is an industry that should not consolidate.

recapitulating banks + investment banks

- A system that would let people hold diversified, yield-generating portfolios of tokens that could be used directly for payments sounds a little like an account at a commercial bank, from a depositors' perspective.

- In reality, it would be more like a money market mutual fund, it could lose value, while a bank guarantees return of principal and a promised yield.

- Relatedly, such a system wouldn't be protected by a state-issued deposit guarantee, the existence of which serves as a subsidy to commercial bank investment, since the state ultimately absorbs the banking systems' downside risk.

recapitualting banks + investment banks

- In my view, our economy has traditionally relied on the state subsidy of bank investment to sustain economic vigor

- In my view, that channel for supporting the economy has withered, perhaps irreversibly, due to consolidation and regulation and the stereotyped "hard-information" lending that large regulated institutions favor

- Small business "investment banks" that make their money by accepting balance sheet exposure to high quality issues they underwrite could be an interesting locus for state subsidy of aggregate investment, by matching and "riding along" with such banks or by offering them subsidized loans

- (In this very unlikely alt.future, it's fun to consider how some roles of banks and investment banks would become reversed.)

some acknowledgments

- Mostly I am entirely just making this shit up. Take it with appropriate grains of salt.

- From a very different perspective, the book *Locavesting: The Revolution in Local Investing and How to Profit From It* by Amy Cortese covers some similar ground.

- I am indebted also to conversations with the excellent Martin Koeppelmann of Consensys (whose Gnosis prediction market project plans a not-so-small token offering very shortly)

- Thank you very much for your patience!