Bitcoin and Beyond: The Possibilities and Pitfalls of Virtual Currencies

David Andolfatto*

Vice President
Federal Reserve Bank of St. Louis
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DIALOGUE WITH THE FED

Beyond Today's Financial Headlines

FEDERAL RESERVE BANK OF ST. LOUIS

CENTRAL TO AMERICA'S ECONOMY*

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Noble Spirit

❑ "We have elected to put our money and faith in a mathematical framework that is free of politics and human error."

   - *Tyler Winklevoss* (suffered a loss of Facebook).

❑ "I think the fact that within the Bitcoin universe an algorithm replaces the functions of [the government]...is actually pretty cool."

   - *Al Gore* (inventor of the Internet).

Outline

- ❑ What is Bitcoin and what does it offer?
- ❑ How Bitcoin works: Nuts and bolts.
- ❑ Is Bitcoin a bubble? A good investment? A good money?
- ❑ The "nominal exchange rate indeterminacy" problem.
- ❑ Bitcoin and the underground economy.
- ❑ Can Bitcoin be regulated? Can it be taxed?
- ❑ The evolution of money; competing protocols.
- ❑ Whither central banks?

What Is Bitcoin?

❑ *Bitcoin* is a *set of rules* written down as a computer program designed to:

A. Create and manage a supply of digital currency units called *bitcoins*, and

B. Process payments between anonymous users by debiting/crediting digital accounts with bitcoins.

Who Invented It?

❑ Identity is unknown.

❑ A programmer known only by the pseudonym "Satoshi Nakamoto."

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❑ A problem? Not necessarily. *Caveat utilitor*.

An Evolving Open-Source Code

❑ Volunteer programmers work to patch and improve the code over time (e.g., Linux OS).

❑ Open-Source: Anyone is free to go read it.

❑ Downside: It's big and written in a language that almost nobody understands.

❑ About 17 MB of source code (500 phone books).
   o About the size of a typical bill coming out of D.C. lately?

How Things Work Now

❑ Money supply = Fed paper + digital dollars.

- o Managed by banking system.
- o Fed paper = legal tender status.
- o Bank accounts insured by FDIC.

❑ Payments are processed in one of two ways:

- o Bilaterally (cash, private), or
- o Through an intermediary (digital, recorded).

Common Complaints

❑ We hate banks…

  o Digital networks remain highly disconnected.

  o Charge too much for processing payments.

  o A lack of privacy (they keep records!).

❑ And we especially hate *central* banks…

  o Diminish the purchasing power of money by printing too much of it → they create inflation.

How Bitcoin Is Different

❑ A virtual currency with zero intrinsic value and no legal backing.

❑ Absence of any central authority:

   o   No central bank to manage the money supply.

   o   No select intermediaries to process payments.

❑ Hope is to: [1] achieve long-run price-level stability; and [2] drive transaction costs to zero.

The Wallet

❑ Acquire a "computer wallet" (free).

- o Wallet is an encrypted computer file where bitcoins are stored.

- o Wallet can live in almost any physical device.

- o Your identity is disguised (users employ pseudonyms).

- o The content of every wallet is publicly observable.

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Security Concerns

BrianAJackson/iStock/Thinkstock

❑ Your bitcoins are subject to loss/theft just like cash.

❑ A serious concern for rich wallets.

❑ Solutions entail use of "trusted" intermediaries.

➢ *Coinbase* will secure and manage *your* wallet.

➢ *Elliptic Vault* will store/insure *your* wallet (Lloyd's of London).

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The Blockchain

❑ A *public ledger* containing the historical record of *all* bitcoin transactions.

    o Lives in a global network of computers.
    o A communally shared record of which wallets own which bitcoins.

❑ For the system to work, participants must trust the integrity of the blockchain.

    o The power to alter/fabricate history is the power to steal.

The Miners

❑ Transfer of bitcoins from one wallet to another works just like online banking.

  o Except that there is no single agent or bank to process the payment!

❑ Record-keeping (how wallets are debited and credited) is performed by "volunteers" drawn from the community called *miners*.

Miners Must Reach A Consensus

❑ Pending transactions are cleared and added to the blockchain only after a "majority vote" approves them.

william87/iStock/Thinkstock

The Miners

☐ Note: Communal record-keeping of a public data bank of "virtual credits" is an ancient practice.

☐ The most critical and difficult-to-understand part of the Bitcoin protocol is how it prevents the miners from exploiting the system.

☐ Need a PhD in *computer science, cryptology* and *game theory*!

gheatza/iStock/Thinkstock

Mining: A Misleading Analogy

"He's mining for bitcoins again."

william87/iStock/Thinkstock

Mining: A Misleading Analogy

❑ Gold miners are rewarded for producing gold.

❑ Bitcoin miners are *not* rewarded for producing bitcoins; they are rewarded for their record-keeping services.

❑ They just happen to get paid, in part, with newly-created bitcoins (seigniorage).

   o But they are also paid, in part, with service fees.

❑ Upshot: BTC can function w/o increasing the money supply (mining can be financed entirely with fees).

Summary

❑ A stroke of genius—a monetary system governed by a computer algorithm.

   o Low-cost banking available to anyone in the world.

   o A digital cash supply free of political manipulation.

❑ Drawbacks:

   o Decentralized structure implies "slow" processing.

   o Trust is still needed—*location* of trust is different.

How Big Is It?
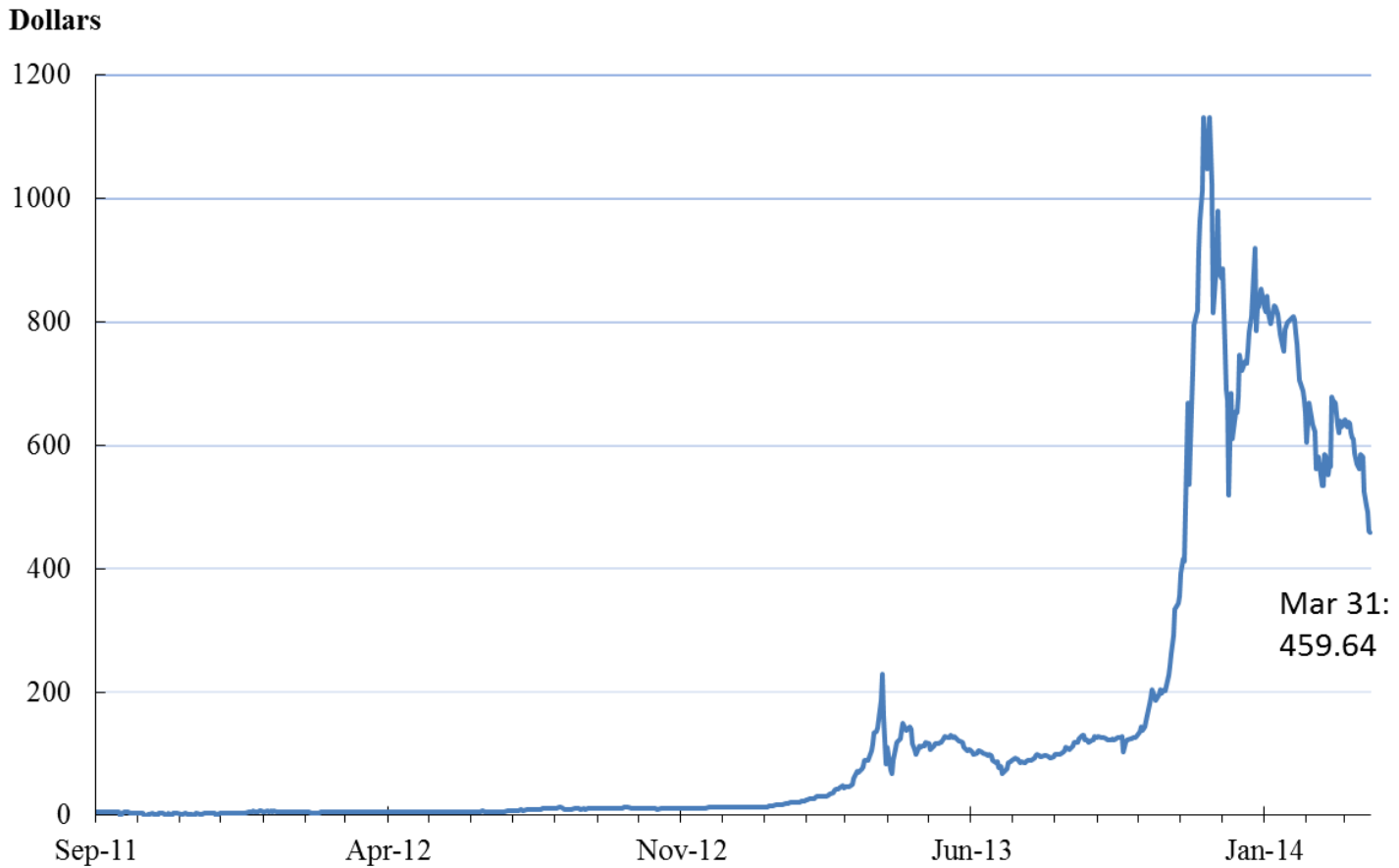
❑ Currently, $7 billion BTC in circulation.
  o $1,200B USD in circulation.

❑ About 40 transactions per minute.
  o About 200,000 Visa transactions per minute.

❑ Average transaction size about $2,000.
  o Average Visa transaction about $80.

Bitcoin Price Skyrockets

Price of Bitcoin in USD

Dollars

Mar 31:
459.64

Source: Bitcoincharts.com

Is Bitcoin a Bubble?

❑ *Yes*…if *bubble* is defined as a *liquidity premium*:

<p style="color:red; text-align:center">Bubble = Market Price - Intrinsic Value</p>

❑ Since intrinsic value of BTC = 0, market price consists purely of a bubble.

❑ But most assets likely have a "bubble" component to their price, e.g., gold, UST.

Is Bitcoin a Good Investment?

❑ Warning: Theory tells us that asset price changes are difficult to forecast.

❑ Outlook depends on a host of factors:

   o How rapidly and extensively will it penetrate the market?

   o How might government regulations evolve over time?

   o How easy is it to replicate the product? What sort of competing products might emerge?

Bitcoin and the Failure of Mt. Gox

❑ A bitcoin foreign exchange center *and* wallet service.

MT GOX

WHERE IS YOUR MONEY

william87/iStock/Thinkstock

❑ The wallets were "stolen" – not Bitcoin's fault.

Is Bitcoin a Good Money?

❑ A good money should maintain a stable purchasing power over *short* periods of time.

❑ Price-level stability depends on both money supply and money demand.

  o Advocates of Bitcoin (and gold) want a rigid supply, but neglect demand volatility.

  o Money demand can fluctuate violently in the short run (Re: BTC price chart).

  o An "elastic" supply of money is needed to stabilize purchasing power.

Purchasing Power of Currencies

CPI Based
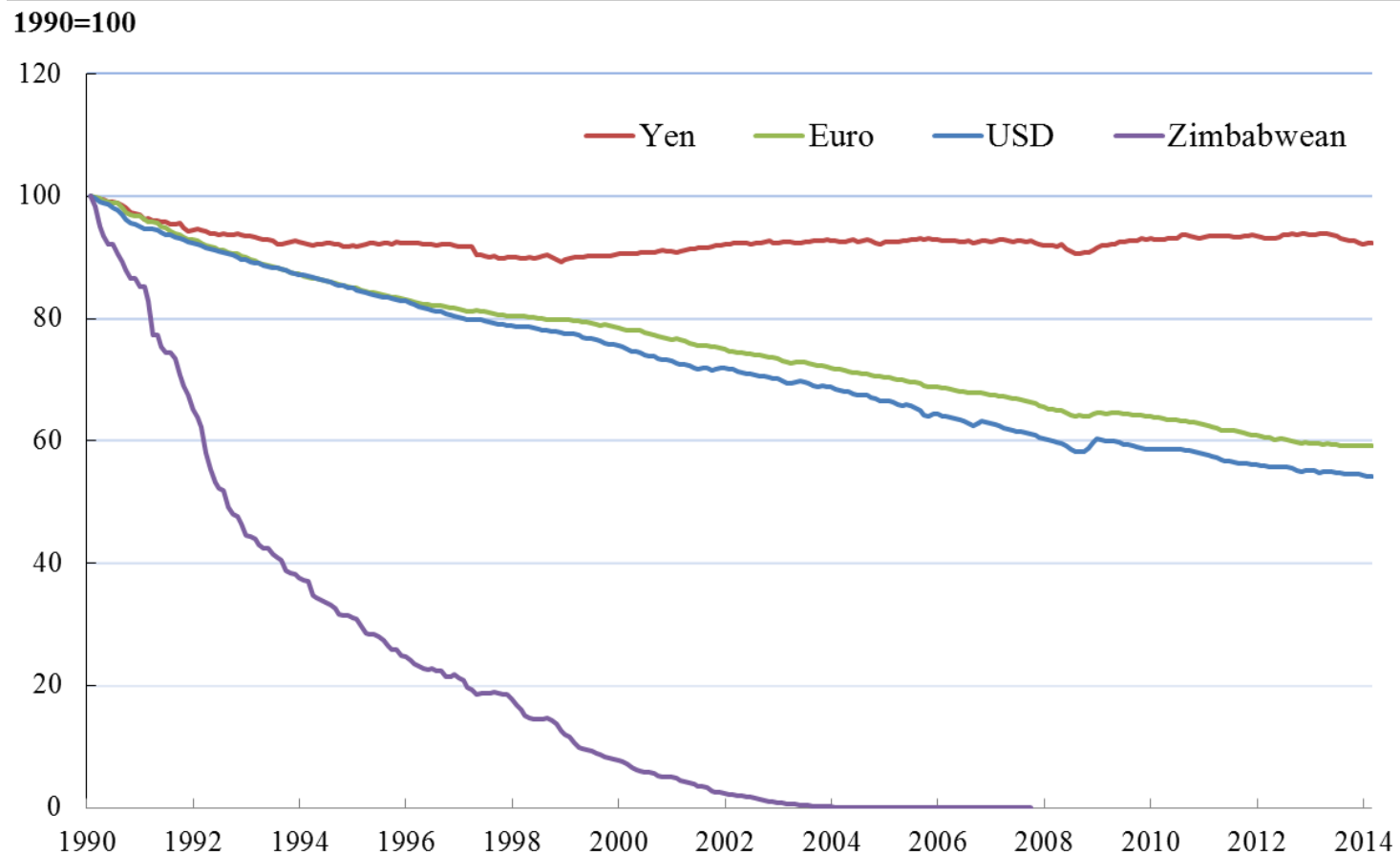
Source: Bureau of Labor Statistics, Euro Stats, IMF and Ministry of Internal Affairs.
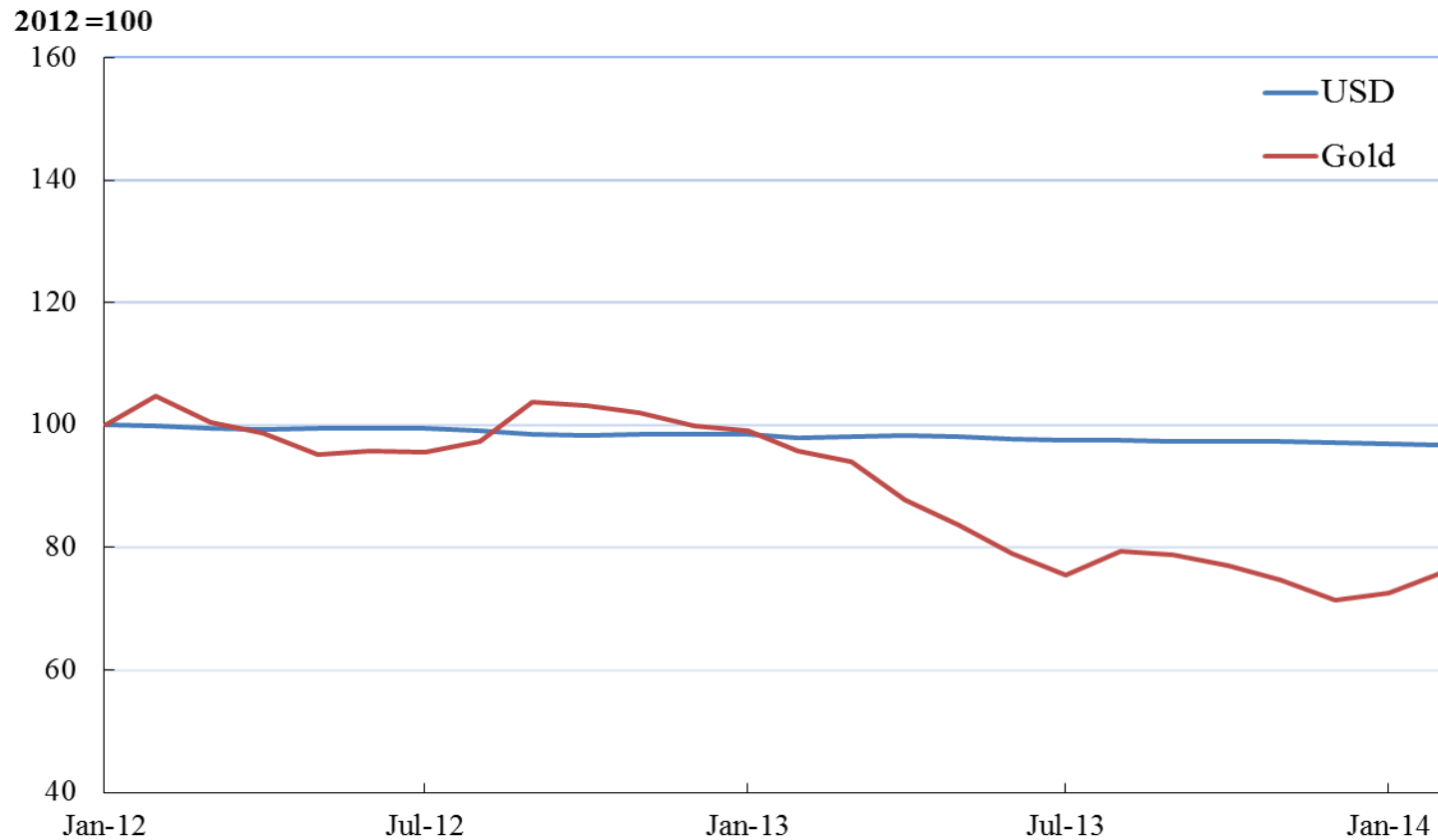
Purchasing Power of Bitcoin and USD

Nov. 2013 – Mar. 2014

Nov 21. 2013=100

Source: Bureau of Labor Statistics, Haver Analytics and Bitcoincharts.com

Purchasing Power of Gold and USD

Jan. 2012 – Feb. 2014

Source: Bureau of Labor Statistics, S&P Goldman Sachs and Haver Analytics

Nominal Exchange Rate Indeterminacy

❑ What determines the market exchange rate between two intrinsically useless objects?

Kasia Biel/Hemera/Thinkstock

Nominal Exchange Rate Indeterminacy

❑ Evidence is that exchange rates are "excessively volatile."

❑ Problem: No "fundamental" economic force pins down the relative price of two intrinsically worthless objects.

❑ This explains why fixed exchange rate regimes (or common currency areas) are so popular.

❑ What would happen in a world of multiple, unregulated, competing digital currencies?

❑ Likely outcome is excess ER volatility and a need to hedge.

Does Bitcoin Facilitate Illegal Trading?

❑ Sure, but so does USD, gold, etc.

❑ Remember, BTC transactions travel wallet-to-wallet, where wallet identities are disguised.

  o In this sense, BTC is like USD cash in facilitating illegal trades.

  o On the other hand, wallet histories are publicly available (unlike USD cash transaction histories).

❑ In any case, BTC also facilitates *legal* trading.

Can Bitcoin Be Regulated?

❑ Some countries have issued an outright ban on the use of bitcoin (and other currencies).

❑ But how does one slay the Hydra?
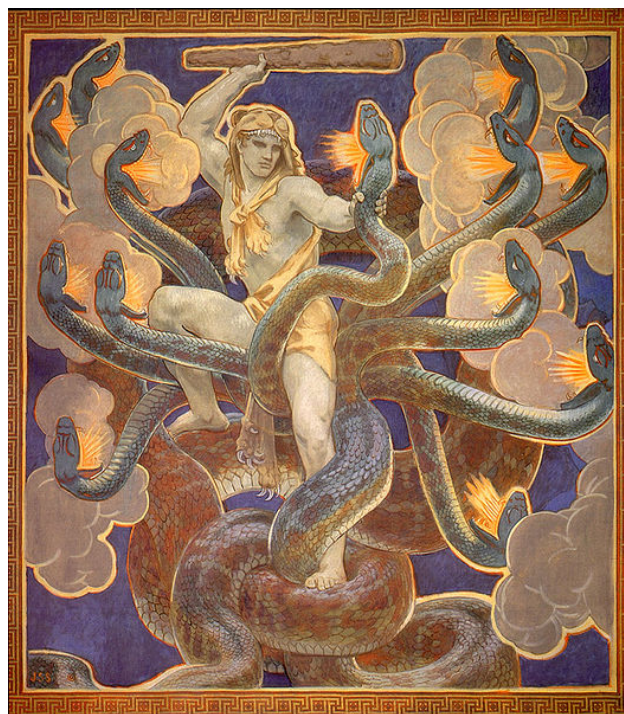
Can Bitcoins Be Taxed?

❑ In the U.S., the IRS has recently ruled that, for tax purposes, bitcoins will be treated as *property* and not a *currency.*

   o I.e., when you buy then sell bitcoins, you must report the resulting capital gain/loss.

   o Compliance means added record-keeping costs.

❑ The effect of this and similar rulings serve to diminish the attractiveness of bitcoins as a currency. (Ripple a winner?)

❑ But enforcing an outright ban is close to impossible.

The Evolution of Money

❑ A long tradition of new currencies competing with old.

    o   Hundreds of local currencies exist in U.S. alone.

    o   New wave is an extension of this idea, combining the science of cryptology with the power of the Internet.

❑ Partial list of Bitcoin competitors: Ripple, Litecoin, Auroracoin, Peercoin, Dogecoin, Nxt, Mastercoin, Namecoin.

❑ Probably the most important aspect of this technology revolution is the threat of entry into the money and payments system.

    o   Will force traditional institutions to adapt or die.

Whither Central Banks?

❑ Well-run central banks should welcome the emerging competition.

❑ There is (in my view) room for beneficial coexistence; for example:

  o A politically independent Fed operating an "elastic" currency supply with congressionally assigned mandates (e.g., price-level stability).

  o Together with *Ripple*, a currency-agnostic P2P payment system to facilitate low-cost payments.

A Match Made in Heaven?

Janet Yellen

Satoshi Nakamoto

SDenson/iStock/Thinkstock

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The End