

The new shape of money

Financial Innovation and the Evolution of Currency

BY / Ken Dewoskin

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The idea of money and its beginnings

The evolution of money, over 2,500 years old in several parts of the world, is an intimate and quintessential element of the history of humanity, society, and governance. In the earliest of Chinese historical texts, Shen Nong, one of the Three Sovereigns and Eight Emperors credited with founding Chinese civilisation, was said to be the progenitor of agriculture and herbal medicine. He was also said to be the first “regulator” of markets. That meant establishing standards for product weights and measures and establishing standards of value to settle transactions and store wealth, in other words, some form of money.

In broad measure, the evolution of money began with tokens of intrinsic value, fashioned from gold, silver, jade, cowry shells, and like materials that had intrinsic trading value within a community. The production of such tokens, coining, was a step toward convenience, because it made visible the amount of valuable content in hand without resorting to weighing or other forms of mechanical measurement. It is believed that the use of money in China dates back to the Neolithic age, when cowry shells were used. Archeologists have recovered bronzed cowry shells, dating from the time of China’s first well-documented Dynasty, the Shang (BC1500 – BC1046). Bronzing a shell was equivalent to printing a value on it, and this would appear to be potentially the earliest example of such a currency with a clearly designated and authorised value.

Although hard to fathom given the pace of change in the latter part of the twentieth century, it was there that began the slippery slope toward virtualisation that is an omnipresent feature in today’s emerging reality. Once a token became established with a certain value in a community, the issuer could easily diminish its intrinsic value, not necessarily by altering the



size and shape, but by reducing the intrinsic value of its content. In other words, the currency issuer could eliminate the cowry shell – and that is exactly what happened. In China, prior to the invention of pure bronze coins in the early Zhou Dynasty, about the 10th century BC, copper of cowry shells, made from cooper, lead, stone, bone, and wood, and without any cowry shell in them, were circulating.

This was akin to removing the silver from US25 cent coin, which, after 170 years of bearing silver, became silver-free in 1965. That diminished the intrinsic value but not the market (or inherent) value of the coin. Such was the exchangeable value inherent in the coin, that there was no sudden collapse in the value of the US quarter dollar coin, despite it having an intrinsic value that was a fraction of its former self.

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The history of currency, from the beginning to the present day, is one of ever increasing virtualisation, a march from the steady reduction of intrinsic value to the point where currency has no physical existence at all. That is the story of this paper, and that is the essence of much of the financial innovation that we are seeing today.

Virtualisation and technology

Thinking about the future evolution of currency in our increasingly connected and internet enabled world, it is useful to review how consensus within a community of trust and social contract around the market have evolved.

The early evolution to derived exchangeable value rather than valuable intrinsic content itself, such as stamped or cast base metals, then printed paper, worked as long as the community agreed on its inherent value relative to non-currency goods that were regularly bought and sold, or more specifically, were readily exchangeable for something of inherent value. Sellers who accepted the currency needed to have confidence in markets and that the currency could be exchanged for other goods and services. Lacking intrinsic value, a currency could only be stable if two conditions were met.

Firstly, there must be a limit on the amount produced, related to the growth of productivity in the economy, so that inflationary processes did not disruptively erode public confidence in the currency. A loss of confidence in the currency would create a preference for storing wealth and transacting in other media, maybe a different currency, or another store of perceived value such as gold, silver or platinum.

Secondly, it was imperative that there be a single authorised issuer that had sufficient technology to prevent corrupt creation of new money by unauthorised minters – thus providing surety over the source of supply.

Among the many strong administrative measures of China's first emperor, Qin Shi Huangdi, was the drive to take and maintain firm control of coinage, eliminating other issuers and regional variations that had proliferated in the previous Warring States Era, thereby asserting the singular authority of his government to issue currency. He understood that a single authorised "sovereign" currency was the cornerstone of orderly markets and an imperative for economic stability and growth.

These two basic conditions, as well as the key government role in regulation, oversight and reinforcement, are useful to keep in mind when we consider the evolution of currency in today's world, especially under the influence of globalisation and the Internet.

It is easy to think of currency virtualisation as a recent phenomenon, but it began the moment currency took leave of intrinsically valuable content. It is almost humorous to reflect that paper (or plastic for that matter) which is the basis behind the majority of global physical currencies are of even less intrinsic value than the bronze of times gone by. However, it is also necessary for the future to bear in mind the fundamentals that enable the community to accept that some instrument of little or no intrinsic value had trading (or exchangeable) value that they could agree on.

Paper money has continued to play a major and enduring role in the path to currency virtualisation. Although many theories abound, it is likely that paper money had its origins in party-to-party promissory notes. Such a bill originally would have had a specific payer and a payee. But what if the issuer were the local feudal lord, or the king, or the emperor?

When the issuing party was known in a community to be reliable, such written notes could circulate among parties that did not include the original issuer. The natural evolution of such bills led to the creation of "legal tender," the issuance of which became a responsibility and monopoly right of governments and which could circulate between any payer or payee. Such tender was not credible because of the payer's signature, seal, or chop, but because of the government's mandated seal of approval. And it was thus that the government ultimately bore the responsibility to meet the two conditions that supported the measure of inherent over intrinsic value, limiting supply and preventing counterfeiting.

It is also worthwhile reflecting on the role of checks and similar bills of payment, that are authenticated by means of a signature, seal, or chop which are known to the payee and the institution (ordinarily a Bank) against which the claim will ultimately be raised. In a quaint and non-functional remnant of its roots in such promissory notes that paper currency today continues this practice. So the RMB100 note bears a vermilion chop from the central bank, and the US Federal Reserve Note bears the signatures of both the Secretary of the Treasurer and the Treasurer of the United States. The vast majority of common checks involved the original issuer, the payee, and the bank in a tri-lateral recognition and authorisation to the inherent value of the transaction they supported.



Although it is technically possible to “sign-over” a check, where the original payee transfers its redemption value to a new payee, this was proved to be an operationally inconvenient process, given the difficulty of authenticating the chain of signatures. So relying on a third party, the emperor, national treasurer, or the like, was a major innovation in enhancing the utility of a bill/note/paper and thus reducing transaction complexity, cost, and risk.

Once currency took leave of intrinsic value, technology had an unprecedented opportunity to evolve the base elements of physical currency in tandem. Trust in the monetary device could be secured only if not readily duplicated and easily traceable to an authorised issuer. As a result, processes were developed to incorporate fine stamping of metals, milling of coin edges, formulation of unique alloys and papers, advances in gravure printing, the invention of optical inks, and the development of means to include metal, plastic, and hidden images within the layers of paper money. All represent examples of technology enabling the development of physical currency by facilitating authentication (thereby supporting surety of supply). The enabling role of technology in currency evolution is another point to keep in mind when considering financial innovation today.

Advancing technologies enable increasing convenience and an increasing gap between the intrinsic value of its material content and its accepted market value.

The demise of paper and metal

Over the past thirty years we have progressively witnessed a continual demise in reliance on the actual paper and metal forms of currency that have served markets for 3,000 years.

Alternate bills of payment, in the forms of various kinds of promissory notes, are traceable to the 9th century, but it was during the twentieth century that such notes in the form of “checks” rose into prominence. Checks are debit instruments, in that they require funds to be on deposit for the account of the issuer and oblige the banks to transfer funds to the payee from the payer’s account. Only through regulation can the receiver of a check have any form of assurance that the funds are in fact in place.

The beginnings of the accelerated demise of the use of paper money and checks began in the 1940s with the proliferation of credit cards, primarily in the US. Originally issued by goods and service providers themselves, credit cards began as special purpose devices, to promise settlement of a transaction related to gasoline, air travel, a particular department store, and the like. We see history repeating itself in the recent developments in third party on-line payment

systems that are being created or expanded by on-line retailers, auctioneers, or game and entertainment providers to settle transactions involving their own goods and services.

Throughout the continued move toward virtualisation during the twentieth century, we have witnessed a proliferation of credit cards, charge cards, and debit cards that eliminated the use of paper and metal money from a wide and growing range of transactions. There are a couple of notable milestones in the evolution of these cards, against evolutionary moments that are being reenacted in the development of Internet-based currencies. First is the recognition and acceptance of a card by merchants or other parties beyond the issuer. This has reached a point in the US where even government agencies, like the US Postal Service and tax authorities, accept bank-issued credit cards for payment, in lieu of actual US Federal Reserve Notes.

The second is the ability to use the card remotely, without presenting it physically. In the early days of credit cards or “plates” as they might have been known, it was not uncommon for the issuing merchant to keep the plate for the customer, who could retrieve it at the store’s credit desk and confirm the amount of the transaction being charged. It was not a major step to make cards useable say, over the telephone, by relying not on physical presentation for authentication but long card numbers, confirmation codes, and corollary personal data, like personal ID numbers, address data, date-of-birth data, and the like.

No matter how diverse the terms and conditions attached to credit cards, charge cards, and debit cards have become, they preserve some common features that have become limiting in this era of globalisation and Internet-based transactions. These features must be balanced against the relatively high transaction costs given the underlying cost of service. They include cards and associated accounts being denominated in a single sovereign currency, which engages exchange rate risks and often exacts fees associated with using the card in currencies other than the original denomination. They include clearance networks of limited geographic scope, and those are often associated with regulatory complexities and costs that constrain clearance across borders.

Currency continues its evolution along trend lines well-established in history. It is remarkably like what we are witnessing today, and what we are anticipating tomorrow in financial service innovation. The basics remain, in terms of development processes, reliance on connection to some issuing authority, and a close, symbiotic relationship to technology development – albeit at an unprecedented rate of change.

Banks and incremental innovation

We are in an era of incremental innovation nurtured by continuous advances in connectivity. At the surface level of financial service innovation are the obvious developments that traditional banks have created and sponsored. Banks, as the authorised and regulated “custodians of the physical currency,” have been at the center of innovation and system

developments that drove credit, charge, and debit card usage on a global basis. Banks now referred to as “too big to fail” have used their focus on both commercial and retail clients to grow into global networks and provide an extremely broad array of transaction settlement, risk management, and wealth storage services.

Concurrent innovations with the emergence of the internet have progressively incorporated on-line banking to manage traditional accounts, saving customers the need to travel to physical branches and await teller services. These include the proliferation of ATMs, providing 24 hour seven day service in a large number of locations, many where physical bank branches would be impractical, like airports and convenience stores. As technology provided the base, they have grown to include the issuance of credit, charge, and debit cards of the sort described above, with every variation of credit facility and settlement option. Financial services of this order follow the trend toward self-service and remote accessibility, one or both of which we see in the parallel growth of e-commerce for almost every financial transaction in our daily lives from airline check-in to the self-scan supermarket check-out.

These innovations continue to provide alternatives to traditional transaction mechanisms, whilst working within the major traditional banking framework. As such, they are innovation of an incremental nature. In the grand scheme of emerging connectivity, it is probably more appropriate to describe these innovations as significant service enhancements, cumulative and not disruptive, to the accepted order of traditional banking arrangements. They replace paper checks with electronic payment systems, personal checks with credit and debit cards, then credit and debit cards with mobile communication devices, biometric authentication, and sundry tokens to identify and authenticate the parties to a transaction. The key technologies here are all related to the creation of two-way wired or wireless networks that link individuals securely to institutions that support these services.

On-line mortgage companies have taken significant market share in some economies, not by providing a product that is fundamentally new, but through adding efficiency to a complex process by using on-line communication, document management, and payment services. There is no fundamental difference in the core structure and legal requirements of a mortgage written in the traditional face-to-face manner or one written on-line, but the customer interface and level of convenience are dramatically different,



removing the need for the banker or the customer to meet physically. Likewise with credit and debit card usage, once almost exclusively a physical “swipe” device, has moved rapidly and significantly into virtual, no contact usage, relying on authentication codes and passwords to maintain security for the providers, the merchants and their customers.

Major capital transactions like mortgage-financed purchases really call attention to how far coins and bills of legal tender have receded into the market background of mature economies. If any physical cash actually changes hands at a real estate transaction in any developed economy, it is so unusual as to suggest some special, if not suspicious, circumstance. Buying a house can initiate a thirty year relationship between a bank and a client during which major sums of money are exchanged on a monthly basis without any physical currency ever brought into the relationship.

Traditional banks, whether local, regional, national, or international, and whether focused on retail or merchant services, all recognise that their emerging competitors are not from the banking sector. The disruptive competitor of tomorrow is the fast growing and well-capitalised companies in digital businesses who are edging into and disrupting their market space.

The challenge the traditional, regulated and incremental innovators face, in the simplest terms, is whether the technology tools available to them can restore competitiveness to their traditional operations in the face of competitors who are selling substitute services coming from a totally different provenance.

The challenge is relatively easy to articulate but difficult in the extreme to offer a solution. That said, there are some interesting perspectives on how the paths to traditional banks and new entrants have diverged. For example, going back not many years, international banks profited from a revenue stream derived by investing a couple of weeks of “float” during which an instrument submitted in one part of the world in one currency was cleared in another part of the world in another currency. That clearance process might have taken 45 days if based on paper. Today, the clearance process has been reduced to one or at the most two days, eliminating the float for merchant banks and along with it their profits from the float.

On-line merchants who provide settlement services with in-house or dedicated outside providers have used essentially the same technology to create a float, which is a source of new profit for them. When a transaction is confirmed and “settled” by the buyer, their payment system can take possession of the funds from wherever they are stored instantaneously, and then their payment system will hold them in escrow until the delivery of the goods or services is confirmed. The elegance of the innovation here is using technology that in one case has eliminated a source of profit in a new way that creates a new source of profit. This innovation is partially made feasible by the evolution of settlement processes that are enabled by credit systems to ones that are enabled by stored value systems, and that evolution seems to be a significant one in the emergence of innovative financial services.

With digitalisation technologies, and the innovations in financial services they enable, we should continue to witness the close relationship between technology and currency. The obvious trend is for physical currency, in the form of coins and bank notes, to recede further into the background of markets, and eventually for any form of physical instrument to disappear. That is already commonplace, of course, with on-line payment systems, stored value cards, and mobile device based payment services. It is useful to consider where these technologies will develop, as digital functions continue to mature, and functions such as near field communication and big data management enhance the precision of content tailoring, the reliability of authentication and security, and the overall convenience and efficiency of settling a value transfer. Big banks are in a position to benefit from the technologies, but at what price do they carry the legacy of their role as authorised and regulated custodians of the physical currency?

Interestingly, while important incremental changes have already occurred in banking that have irreversibly improved the efficiency of service delivery, such as transaction settlement services to buyers and sellers, as yet they have not entailed fundamental business model innovation nor have they necessarily reduced the cost of services. One efficiency from the standpoint of service providers has been the re-distribution of the transaction burden from the banker to the seller and buyer. The extent of the impact from this change has emerged with the deeply disruptive growth of eCommerce and online settlement demand.

New players and new business models: or the demise of plastic

The initial phases of disruptive innovation driven by eCommerce tended to cluster around alternate means of transferring funds, primarily focused on the age old premise of transaction settlement. In the early stages of development, such transfers tended to travel along channels that were essentially extensions or updates of traditional channels, primarily credit cards and debit cards. On-line payment systems and the technologies that enabled them linked the established credit or debit instrument of sellers and buyers, sometimes adding bank card clearance services for small sellers who did not have them. The soaring number of transactions conducted over the internet and the increasing automation of credit and debit card settlement would appear to have proven highly lucrative for card issuers, enjoying the advantages of using their advanced and closed payment systems to support the transaction cycle, at an ostensibly reduced cost compared to traditional physical means.

What might have not been foreseen was the degree to which this trend was concentrating the customer relationship driving card usage in the hands of the ever increasing array of internet merchants. Highly competitive pricing of goods on the Internet, cutting out the cost of physical locations and distribution points, made the appeal of the settlement service margin strong, and it was all but inevitable that the internet merchants themselves would innovate or acquire their way into that part of the transaction cycle. Increasingly transfer mechanisms were being

integrated seamlessly into the main eCommerce interface itself. Third party, wholly Internet-based settlement agents grew, shaving lucrative percentage points off the cost to buyers and sellers of settling and monetising transactions. The eCommerce platforms increasingly assumed settlement functions through acquiring pure internet “banking like“ services. They either deployed funds that were already internal within their systems or tapped directly into the buyers and seller’s bank accounts electronically linked to the eCommerce site. For sites that were primarily C2C, it was both convenient and efficient for customers who were both buyers and sellers to use an integrated online account to receive and disburse funds, either maintaining a deposit balance or using a line of credit. What was the value of going to an outside channel to access the traditional transaction banking platform, such as through a card issuer or banking provider?

The strong relationship internet merchants had with their customers gave them the leverage to transform the settlement structures quickly and, as it would appear, profitably. The innovations evolving in this subsector are most simply described as the primary product and service provider disintermediating settlement networks by reaching directly into banks or even disintermediating banks by substituting their own bank-like settlement and transaction services. In other words, eCommerce merchants ventured into banking functions to reduce the cost of transaction settlement. But they then continued their incursion into banking services that traditionally had nothing to do with transaction settlement, as they experienced the benefit of holding deposits and extending credit. And so we find ourselves in the midst of a powerful global trend wherein numerous popular eCommerce sites and payment channels are rapidly expanding their “banking like” services.

Expect the future to be one of varied and increasingly ambitious means of disintermediation driven by technological innovation focused on cost reduction.

The ultimate form of disintermediation occurs when the on-line transfer channel has funds stored within its own system for immediate completion of the transaction event without recourse to any external agent or account that forms part of the traditional payments and clearing systems of the global economy. Overall, this is a strong emergent trend, driven by two forces. Firstly, there is no need to share transaction fees with either a primary account holder, such as a bank, or an intermediary settlement network, such as a credit card company. But secondly, and perhaps more importantly, it encourages the use of stored value services to replace credit services.

The economics of moving customers from a creditbased system to a debit based system are compelling.

But secondly, and perhaps more importantly, it encourages the use of stored value services to replace credit services. Rather than having a bank or credit card collect a fee, which partially supports a month-long float the bank must fund for the transaction, the settlement agent gets

the cash in advance, and rather than the customer, the settlement agent gains the benefit of the float, enabling much lower fees and providing operating or investment capital for use by the settlement agent. Of course, this does not eliminate the high interest credit option for users who do not settle their balances monthly and carry a balance, but it will significantly relieve the burden of the credit float for banks in the cases of card users who settle their accounts and do not carry a balance. For credit-based buyers, all on-line settlement systems now offer and even incentivise “pay later” options or subscription options based on credit card economics, which is yet another incursion into the traditional banking providers’ market space.

The growth of debit based services as opposed to credit based services is especially appropriate for emerging economies, where both credit information and debt collection processes are certain to be less developed than in mature economies. Debit systems with stored values can grow fast in emerging economies because they offer consumers convenience of non-cash transactions while avoiding outsize credit risk for financial institutions.

In China, for example, stored value systems are ubiquitous, everything from transport cards, telecom and data services, on-line gaming, media, and entertainment, boutique retail and supermarkets, drycleaners, nail salons, restaurants, electricity meters, and gas meters, to give a few examples. In exchange for the customer’s loss of earned interest by prepaying for the card, device, or service, most stored value products offer some form of discount, rebate, or other calculable incentive. The product and service originator derives additional benefits from the loyalty impact of the stored value, which can fund additional customer benefits beyond what the investment stored cash would provide.

China now has a vast number of cards, major card distributors, and on-line marketplaces where cards can be bought, refilled, and used to purchase sundry services, digital goods, or even physical goods, most unrelated to the original issuer of the cards. The most popular cards were created on the huge user bases of on-line gaming, blogging, and chatting providers. While difficult to measure, it is evident from the rapidly growing size of the constellation of related service providers, including now aggregators and factoring shops, as well as the increasingly number of sellers of everything willing to accept payment via these cards, that they are becoming a material part of China’s consumer wallet. There is the potential that some form of leverage will enter into China’s system, actually expanding liquidity and purchasing power even though currently the face value of cards is fully purchased by consumers, or purchased with a small discount.

Ultimately, the specific overall development of the stored value universe in China will be strongly influenced by the future evolution of existing bank-based services, other forms of transaction support, and currency regulation.

Although we use the term “card,” there is strong momentum to the virtualisation of the card itself. The plastic is easily replaced by a set of “card numbers,” ID information, authenticating passwords, and often an authenticating code sent to a registered mobile phone or a small electronic receiver. China’s stored value cards began as physical cards, purchased at newsstands, quick shops, and telecom stores. Now, shopping in the on-line marketplaces for stored value cards, consumers see all manner of cards, color-coded, with flowers, cartoon characters, landscapes, etc., but they are unlikely ever to hold a physical version of the cards they are buying.

Stored value systems in turn lead to another important evolutionary step. Once an on-line merchant deploys technology capable of storing funds and debiting funds for settlement, it is a small step to provide expanded services related to stored funds, including essentially all deposit services provided by traditional banks (of course subject to any potential regulatory hurdles). These include interest bearing deposits, wealth management products, investment products like mutual funds and other securitised assets, and the like. These products conceived and developed in a digital environment are likely to be, and remain, highly competitive, through efficiencies available in all aspects of management and distribution. Licenses are now being granted in China to several successful on-line eCommerce sites for expanded banking services along these lines. Their prospects for profit from banking services may well exceed those from their original eCommerce activity.

Finally, in the case of stored value systems that use dedicated physical devices, such as magnetic cards, RFID cards, numbered cards, or tokens, there is a tendency for such devices to become tradable in and of themselves, essentially serving as surrogates for actual sovereign currencies. These constitute a realm of shadow currencies that can circulate in substantial volumes. If regulations permit anonymous transfer of things like gift cards, (although this is likely to change as the trend to combat nefarious means spreads across the globe - we are even increasing coming under scrutiny in China), then sizeable amounts of money can be moved from one hand to another without cash and without any trail in the banking system. Because such devices are typically subject to discounts, rebates, and are generally not convertible directly to cash at the issuer, they give rise to factoring intermediaries, who make margins by cashing them at various discounts to the bearers.

The anonymity of transactions completed with stored value cards is itself one of the major appeals. A personal check, a debit card charge, or a bank transfer leaves a paper trail that many buyers, for many reasons, seek to avoid. The reasons can range from a legitimate desire to prevent identity theft or fraud, with information that must be disclosed in a non-anonymous transaction, to countless other, less legitimate reasons for anonymity. And understandably many of these reasons are of interest and concern to currency regulators and tax authorities.

This review of the current marketplace for currency and currency surrogates leads us to the future. We have recently seen the emergence of pure digital or virtual currencies, not attached to the legal tender of any country and not regulated by any monetary authority. They are purely market priced in the huge global marketplace for virtual items that the world-wide-web has enabled. And at least as they are conceived and promoted, transactions in such virtual currencies are completely invisible to any regulator.

The cutting edge in currency evolution

An even more profound transformation is emerging now in the form of currencies that are untethered from any government authority and its legal tender. These currencies may have no intrinsic value and in fact no physical form at all. Their value derives entirely from an underlying reserve of assets or, even more abstractly, a transparent limit on supply and the existence of a group of transacting agents who accept them for exchanges of goods and services. It is worthwhile reflecting that the two principles of the earliest forms of currency still exist – control over supply and control over the integrity of that supply. While the commercial future of these currencies remains uncertain, their appearance and growth underscores several key features of financial service innovation in our digital age.

Not the least of these features derives from the nature of globalisation, namely that a rapidly growing volume of transactions and investments are oblivious to the national borders within which monetary regulators and currency issuers operate.

The powerful appeal in a borderless, virtual currency needs to be recognised as a cornerstone in strategic planning by financial service innovators given the appeal it holds for suppliers and consumers in terms of potentially enhanced efficiency for a growing variety of transactions and mitigation of potential risks inherent in today's volatile global currency markets.

Virtual currencies are at the cutting edge of currency evolution and present a number of unprecedented challenges not only to regulators but to the very concept of what a currency is. It is not much of an exaggeration to say this changes the ground rules that were established by the likes of the First Emperor, linking the right to issue currency to the core rights and responsibilities of the government. The distinctive feature of a virtual currency is that it does not carry a fixed value denominated in a sovereign currency and so floats entirely outside the

domain of any government. A stored value card, retail store gift card, on-line gaming card, casino chip or plaque, prepaid telecom or transport card, and eCommerce payment system balance are all denominated in a sovereign currency. Their actual reference cash value may vary, dependent on their liquidity or ultimate transaction value, but their value within their native market place is not subject to a daily exchange market dynamic and not highly volatile.

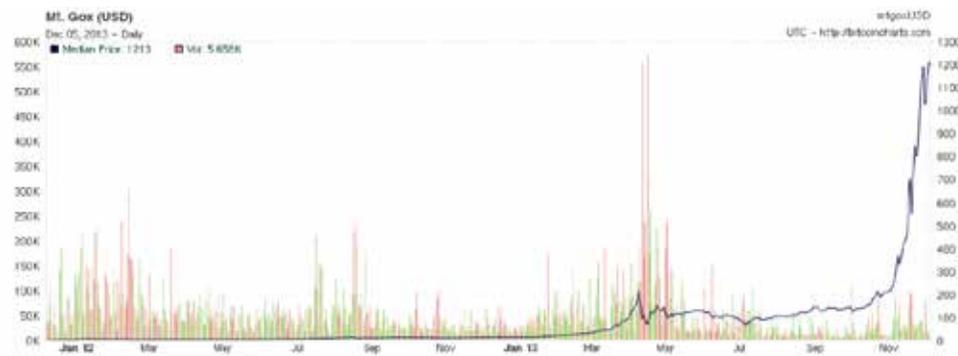
Virtual currencies in a sense reach back to the roots of all currencies, serving P2P in kind trades as a device of convenience to standardise values and expand markets. Ven is something of a transitional form of a virtual currency, because it was created by Hub Culture, an adventure-traveler social networking site, originally pegged to the US dollar and then to a basket of currencies, carbon credits, and commodities. It began as a Facebook application in mid 2007, enabling users to “pay” each other for virtual services, such as travel information, to maintain a market balance among a growing community of participants who would otherwise be doing each other favors. A provider of useful information would earn Ven and thus be enabled to buy other information from their Ven account. Ven became tradeable one year later.

The key information site for Ven is venmoney.net, where the developers provide this description: The value of Ven is determined by the financial markets in a weighted basket of currencies, commodities and carbon futures trading against other major currencies at floating exchange rates. Ven is the first digital currency to float, and the first to include carbon in its pricing, making it the only environmentally linked currency in existence...

Ven is 100 percent backed by reserve assets equivalent to the total Ven in circulation... Ven is in some respects akin to what former Chinese central bank governor Zhou Xiaochuan suggested in the wake of the global financial crisis, viz, that the IMF expand the settlement use of Special Drawing Rights (SDRs) that were backed by a basket of global currencies, untied to any single sovereign currency, and available globally for transaction settlement and reserve holding. Some 20 million units of Ven are reported to be in circulation, and Ven has been used for actual commodity purchases and on carbon trading exchanges. As of 2012 derivative products based on Ven's reserves have been bundled into Ven Funds.

A major step beyond Ven and more widely recognised in the media and market are Bitcoins. Whereas Ven promotes stability based on underlying reserves, Bitcoins value proposition is based on an absolute ceiling in terms of total target circulation and a complex, virtual “mining” process that demands significant computer resources to expand Bitcoins in circulation. That ceiling is 21 million Bitcoins. As of this writing in the second week of November, nearly 12 million Bitcoins were in circulation, and with a very recent spike in value, that circulation valued in US dollars is approximately \$3.7 billion. As of this writing, in the last 24 hours, some 1.1 million Bitcoins were traded, an astonishing 10 percent of all Bitcoins in circulation. Bitcoin value is based purely on supply-demand balance, and the currency's levels of volatility have exceeded almost any known precedents.

In 2011, Bitcoin prices jumped from about \$0.3 to \$32, and then settled at a low market value of about US\$2. Then a long period of appreciation ensued, with some retreats, until recently. Bitcoins increased over 2000 percent in the last year, and experienced a 300 percent rise just since 3 October to reach a record value on 7 November 2013 of US\$309. The next day, values ranged as high as US\$358. In early December, on China's exchange Bitcoins spiked to an all-time high of over US\$1,200, and then plunged 30 percent after China's central bank declared that Bitcoins were not really a currency and Chinese banks could not trade in them. The chart below shows the two year appreciation of Bitcoins, according to the US dollar traffic on trading site, Mt. Gox.



Source: <http://bitcoincharts.com>

The top four Bitcoin exchanges, the only ones trading more than 10,000 coins a day, are shown in the following chart, dated 5 December 2013.

Symbol	Latest Price	30 days	Average	Volume	Low	High	Bid	Ask	24h Avg.	Volume
BTC China	4976.63	▲	4394.82	1,374,171.65	1378.01	7988.88	4976.63	4976.63	4976.63	89,674.42
Mt. Gox	1218.008	▲	543.72	1,229,066.17	228	1242	1218.008	1254.998	1266.89	18,206.06
BESTamp	1129.8	▲	583.32	1,020,328.55	226	1182	1129.8	1129.8	1117.24	14,842.87
BMC-e	1992	▲	598.06	695,647.87	216	1992.2	1992.8	1992.8	1948.41	20,618.78

Source: <http://bitcoincharts.com>

It is interesting to note that by volume, the largest Bitcoin exchange is the Bitcoin-CNY exchange, BTC-China, given that the CNY is not freely convertible into any other currency by regulation. The aggregate of the next three, all US Dollar exchanges, is about 2.5 times higher than the CNY activity. In the long list of dozens of active Bitcoin exchanges, some quite small, all of the world's major currencies are provisioned.

Bitcoin promotes among its features the confidentiality or untraceability of Bitcoin transactions. It is untied to any sovereign currency, is stored in encrypted Internet vaults, and does not travel through established banking or on-line transaction channels. And it is these features that make this stage in the evolution of currency particularly deserving of reflection and analysis. To date, it is the ultimate anonymous settlement instrument.

With very few and very minor exceptions, the issuance of currency is a monopoly right of sovereign authorities. Minting itself may be delegated to one or more banks or other agents, as historically has been the case with Hong Kong, but the sovereign authority maintains monopoly right to delegate, retract, and regulate the minting of currency in its name. This is essential to the crafting and implementation of monetary policy that provides critical leverage for regulating a national economy.

It is not surprising that the emergence of globally circulated and seemingly viable virtual currencies is an issue of interest to the world's major currency regulators. The scope and materiality of the currencies share is not the issue. Bitcoins are inconsequential in that respect. The US\$400 million or so of Bitcoins exchanged globally in a typical 24 hours represents 0.0075 percent of all global currency trading, in contrast to the US dollar representing about 87 percent of all trading on average in 2013, according to daily currency trade volumes from the Bank of International Settlement survey in April 2013. And that is at Bitcoins recent sharp peak in value. Going back to 3 October 2013, the Bitcoin share of daily global trading would represent about 0.0025 percent.

It is the lack of regulation and transparency in the movement of Bitcoins that concerns regulators. Exchanges have failed, leaving investors with total losses. But the entire concept of Bitcoins challenges not only the sovereign and monopoly rights of nations to issue currency but confounds the intensification of controls over global currency flows that have evolved since the heightened scrutiny post-9/11 to hunt and eliminate the financing of large scale terrorism operations. While some argue that the ubiquitous presence of the US dollar makes US dollar movements even more difficult to track, the reality is Bitcoins would by reputation and rumour appear to have become the main settlement currency for illicit activity, like that represented by the notorious eCommerce site Silk Road.

Silk Road, which was shut down by the US Federal Bureau of Investigation (FBI) in a raid September 2013, trafficked in drugs, weapons, and according to some reports, assassins. In the wake of the September raid, the trading value of Bitcoins slumped some 15 percent. The website founder reportedly accumulated US\$80 million in Bitcoins, a fraction of the US\$1.2 billion the FBI says has flowed through illegal websites, and the agency has pledged publicly to continue to hunt down Bitcoins used for illegal transactions. Taking the FBI number, and using the 3 October value of Bitcoins, that would mean over 80 percent of Bitcoins in circulation were somehow engaged in such website flows.

Through confiscatory raids, the FBI itself is now one of the world's major holders of Bitcoins. At the same time, China's central bank has warned investors that investments in Bitcoins are speculative and could lead to heavy losses.



Looking ahead

How viable purely virtual currencies unlinked to any nation will be, especially those not backed by reserves of measurable (and therefore inherent) value, remains to be seen, but that is not the main point in examining them.

Virtual currencies represent the innovative intensity of companies entering the world of financial services from non-traditional backgrounds, and they help us chart potential financial service developments in the not-too-distant future.

The International Monetary Fund (IMF) special drawing rights suggested by China never took on the role, or the reserve composition, China wanted. Yet, it is not far from feasible that the market will create new and stable, non-sovereign currencies that can be regulated to the satisfaction of both governments and consumers.

The single largest question is who pays when someone doesn't in the virtual world of commerce, currency and exchange?

This is the one point that remains unresolved and that will be addressed in our next paper because in the end someone has to pay. Adding to the relatively easy to define credit risk, in the fastmoving world of new technologies, who pays when security failures, fraud, or illegal transactions create losses, and what will be the regulatory environment (if any) to contain such and limit consumer risk. We cannot deny the continued and omni-present existence of credit risk. Whilst efficiency, convenience and innovation have their place the challenge for policymakers, lawmakers, regulators and the world at large is that in the end someone has to balance the value taken from the value created. Credit in the virtual world could easily be the next 'bubble.'

It is certain that the numerous versions of virtual currencies and transaction settlement devices less radical than Bitcoins are already a major and growing convenience for consumers around the world. Most of us reach less and less frequently for our wallets to take out the

little pieces of paper that we used to call "money", and there are fewer and fewer small coins accumulating in those big jars at home. This means among other things that some aspects of banking that we still think of as innovations, like automatic teller machine (ATM) machines, are already facing obsolescence, after a bare 30 years of popular use.

That is a useful measure of the speed of the cycles of innovation and obsolescence that now powers and transforms financial services. Banks understandably see less and less competitive threat from their well-established banking competitors, and more and more from new entrants, almost exclusively from the ranks of popular Internet newcomers. And yet established banks are by no means dinosaurs in today's financial service world. They are suiting up for the intensifying competition, and in the innovation, turbulence, and transformation we will witness in the years ahead, markets and consumers are certain to be great beneficiaries.

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