Net Currency

A Peer-to-Peer Electronic Sovereign Currency Portfolio System

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Abstract: Net Currency is a digital currency portfolio monetary system with the goal of enabling financial assets denominated in any sovereign currency to be registered, kept, and transacted electronically, securely, and globally among its members and communities, with full traceability and accountability. Based on block chain technology framework, Net Currency combines the legitimacy, stability, and liquidity of the world sovereign currency, with the speed, connectivity, and innovations of the evolving Internet. In a simple yet powerful way, Net Currency bridges the realms of financial and digital worlds for future international finance.

What is Net Currency?

Net Currency is a geo-political neutral digital currency portfolio monetary system. Net Currency is not issued by any central bank of any country, nor it is generated by computer algorithms. Rather it is issued and funded by a community of users and consists of a portfolio of underlying world sovereign currencies, with percentages of each currency agreed upon by its members.

Unlike Bitcoin and other computer generated virtual currencies (crypto-currency)[1], Net Currency is tied into the real-world sovereign currencies. It is designed to be transparent and discourages currency speculations.

The concept of currency portfolios has been put into practice, such as Euro's predecessor European Currency Unit, and World Bank's Special Drawing Rights (SDR). As of September 2017, there are 1.14 trillion Euros in circulation[2]. As of May 2016, there are 204 billion SDR (USD 285 billion) created and allocated among the member countries[3]. One of the advantages of a currency portfolio is to minimize the risk of currency fluctuation.

However, the design and usage of traditional currency portfolios are confined to the central banks or banking institutions. Net Currency, on the other hand, can be constructed and utilized by any individual or organization.

Why Net Currency?

In a globalized economy, financial assets denominated in any single sovereign currency are becoming globalized as well. One example is foreign exchange (Forex) market, where individuals, companies, and banks buy and sell domestic and foreign currencies for the purposes of sending money, travel, investment, business operations, trading, hedging, or simply account balancing. The daily global Forex trading volume is around USD 5 trillion[4], while the national GDP of United States in 2016 is USD 18 trillion[5]. In other words, every four days the global forex market trades more than the annual U.S. national GDP.
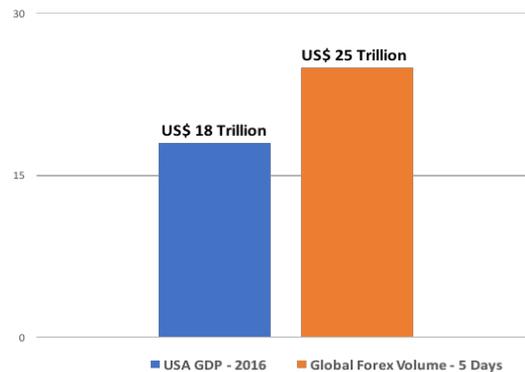

Figure 1. Global Forex Volume vs. United States GDP

However, the frictions and inefficiencies of traditional banking systems are becoming magnified in the globalized economy. Some of those inefficiencies are caused by bureaucratic processes that cannot change quickly, some are caused by legacy technology infrastructures that cannot adapt easily, and some are caused by centralized institutional behaviors that cannot learn and service client requirements locally and timely.

New technologies have been rising to address those challenges. Paypal, for example, solves the online payment problem by enabling merchants to take credit card payments online more easily and securely. In 2016, Paypal processed USD 354 billion in online and mobile payments[6]. More recently, crypto-currency such as Bitcoin attempts to invent a computer-generated currency which can be registered and traded irrevocably among peers using a distributed leger framework known as block chain. In 2017, the total value of bitcoin in circulation is estimated to be USD 16 billion[7].

The crypto nature of the Bitcoin requires deep understanding of math theory and computer technology, which proves to be a huge hurdle for its world-wide adoptability. Some predicts that Bitcoin will never reach the same level of trustworthiness of a real currency. Bitcoin did become popular with certain technology communities, but it soon falls prey to currency speculators and illicit trades, which exacerbate its reputation as 'illegal' currency[8].

The new era of globalized economy calls for a currency that can bridge the digital world and the financial world, with the prerequisite that anyone can understand, trust, and use it.

Net Currency is invented to address this challenge.

How to Construct a Net Currency?

The basic unit of Net Currency is NTC (Neco for short), which can be constructed using a portfolio of underlying sovereign currencies, with the percentage of each underlying currency agreed upon by its members.

This design allows Net Currency to be geo-political neutral and market driven, while customizable for the specific requirements of its members.

$$NTC = SUM \text{ (weighted percentage * underlying currency);}$$

To construct an NTC with three underlying currencies (USD, RMB, and EURO, with weighed percentages of 40%, 30%, 30%, respectively), we can use:

$$1 \text{ Neco} = 0.40 \text{ USD} + 0.30 \text{ RMB} + 0.30 \text{ EURO}$$

How to Calculate the Value of Net Currency (NTC, or Neco)?

The value of NTC is determined by two factors: 1) the composite (type and weighted percentage) of the underlying currencies; 2) the relative exchange rate among the underlying currencies.

The first factor is customizable and subject to the desire of its members. The second factor is market driven. The value of a NTC can be calculated as the exchange rate of NTC against its underlying currency.

Assuming the exchange rates among USD, RMB, and EURO as the following:

	USD	RMB	EURO
USD	1	0.153	1.198
RMB	6.530	1	7.820
EURO	0.835	0.128	1

The value (exchange rate) of NTC can be calculated as:

NTC	USD	RMB	EURO
%	0.40	0.30	0.30
Exchange Rate	0.805	5.258	0.672

Net Currency Immutability and Exchangeability

Once a Net Currency is in circulation, the composite of its underlying currency (type and weighted percentage) cannot be changed. If a Net Currency is no longer required, it should follow the de-commission procedure and refund the currency holders in market value with underlying sovereign currencies.

The holder of one kind of Net Currency should be able to exchange to another kind of Net Currency. The exchange rate should be fully market driven.

Net Currency Stability

As NTC's underlying sovereign currencies change value because of market's changing conditions, NTC's value will change as well. However, because NTC composes of a portfolio of currencies, its fluctuation band will be much narrower than any of its underlying currencies.

In the example of NTC.1, assume EURO does not change in value, a theoretical 30% change of USD/RMB exchange rate results in only 12.5% change of NTC/USD exchange rate.

	Scenario 1	Scenario 2	Change
USD/RMB	6.53	8.53	31%
NTC/USD	0.805	0.710	12.5%

Because of this anti-fluctuation feature, Net Currency can be used for currency hedging purposes to absorb the shock of extreme currency moves and manage the risk of currency devaluation.

The First Net Currency

The first Net Currency, NTC.1, has three underlying currencies, USD, EURO, and RMB, with weighted percentages of 0.40, 0.30, 0.30 respectively.

The rational is simple: those three currencies represents the top three economies of the world. In 2016, United States GDP is USD 18 trillion, European Union GDP is USD 16 trillion, and China GDP of 11 trillion.

Based on the national GDP, the weighted average of USD, EURO, and RMB in NTC.1 should be 0.40, 0.35, 0.25. The slight over-weigh (0.30 vs. 0.25) of RMB is to reflect that China's economy has been growing faster than both US and EU, and is expected to continue to keep the growth momentum.

Net Currency Naming Convention and Mapping

Each Net Currency has a corresponding Net Currency Designation Code (NDC), which is digits only. The Net Currency Naming Registry (NNR) keeps track of all the Net Currency Designation Code and provide the mapping and look up service.

For example, a Net Currency naming record in the NNR could be something like this:

Designation Code	NTC.1
Name	First Net Currency
NIO	netcurrency.com
Country	China
Currencies	USD, RMB, EURO
Weighted Average	0.40, 0.30, 0.30
Initial Pool Size	NTC 1 million
Circulation Date	1/1/2018
Total Circulation Volume	NTC 1 million
Daily Trading Volume	NTC 5 million
Status	Circulation

Who Can Issue Net Currency?

In theory, anyone can issue a net currency. In practice, Net Currency is issued by a qualified Net Currency Issuing Organization (NIO) which represents a community of members that have specific requirements for such a Net Currency.

For example, expat communities need to send money back to their family members in the home countries, trading partners from different countries need to agree on a common currency, multi-national companies have business operations across national boundaries and need a common currency to settle accounts in each country.

Net Currency Issuing Process

Sovereign currencies are printed and managed by the central banks of each country. Crypto-Currencies are generated by computer algorithms that require the computers, usually server farms, to solve a difficult mathematical problem. Net currency, on the other hand, are neither printed by banks or generated by the computers.

Net Currency are funded by the underlying sovereign currencies. For example, for 1 million NTC.1 to be in circulation, it requires USD 268,402, RMB 1,752,664, and EURO 224,126 to fund the issuance.

NTC.1	Lot 1	Lot 2	Lot 3
1,000,000	333,333	333,333	333,333
Underlying Currency	$268,402	¥1,752,667	€224,126

After a Net Currency receives the approval from a Net Currency Naming Registry, it can start the funding process to get enough funds for its Initial Pool Size. The purpose of The Initial Pool Size is to make sure there are enough liquidity for this Net Currency to circulate.

The Initial Pool Size can be broken down into smaller lots, with each lot being funded consequently or in parallel to facilitate the funding process. When the Initial Pool Size of the Net Currency is funded, by members buying the Net Currency with corresponding underlying sovereign currency, then and only then the Net Currency is ready to circulate.

What is Net Currency Naming Registry (NNR)?

As there are infinite combinations with different currencies and different weights, in theory there could be an infinite variety of Net Currencies constructed and in circulation for different purposes among different user communities.

A Net Currency Naming Registry (NNR) needs be established to provide registration services to the Net Currency communities. The services NNR provide include: keeping track of, looking up, application review and approval for each Net Currency.

Each Net Currency should be issued by a Net Currency Issuing Organization (NIO). NIO could be an individual, a company, an organization, or a government agency. An NIO can apply for one or more Net Currency.

When issuing a Net Currency, the following basic qualifying information should always be present:

1. Name of the Net Currency;
2. Name of the Issuing Organization;
3. Country of the Issuing Organization;
4. Type and total number of the underlying currencies, and their weighted percentage;
5. Initial pool size;
6. Circulation date;
7. Total circulation volume;
8. Daily trading volume;

NIO applies for a Net Currency Designation Code (NDC) by submitting qualifying information to the NNR, which upon successful review issues a NDC to the NIO for this Net Currency.

NNR can use a combination of hierarchical and peer-to-peer architecture to provide a mechanism to ensure timely registry and synchronization among different registry nodes.

Net Currency Status

A Net Currency has six basic status: Specification, Application, Funding, Circulation, De-Circulation, and Obsolete.

- Specification: The proposed Net Currency is in design stage by a NIO;
- Application: Net Currency application received by the NNR, pending approval;
- Funding: Net Currency application approved. Members are starting to fund the initial pool size; Note that the initial pool size can be broken into several smaller lots;
- Circulation: Net Currency has reached or exceeded its initial funding size, ready for circulation;
- De-Circulation: The Net Currency is scheduled to be de-commissioned. New transactions and purchases are not allowed, and members have started the withdraw and refund process;
- Obsolete: The Net Currency is no longer in circulation;

New status code can be added to support new case scenarios.

Net Currency Dynamic Equilibrium, Market Maker, and New Issuance

Any Net Currency in circulation should always starts with a position of equilibrium, which means that its underlying currencies are fully funded based on the weighted percentage of its composite.

In the example of NTC.1, for 1 million NTC to be in circulation, it is desirable to divide the initial pool size into three equal lots, with each lot funded by one underlying sovereign currency, in this case USD 268,402, RMB 1,752,664, and EURO 224,126 respectively. This ensures that the NTC has enough liquidity. More importantly, the liquidity corresponds to the weighted percentage of each underlying currency. In other words, it starts with the right mixture of liquidity.

It is worth noting that it is not necessary to have the initial pool size divided into equal lots among Net Currency's underlying currencies. For a variety of reasons, an NIO may decide that one underlying currency should have a bigger lot size than the others. In other words, starting equilibrium position does not necessarily mean starting with equal lot size of each underlying sovereign currency.

As members start to buy, sell, or hold the Net Currency, the liquidity of its underlying sovereign currencies will inevitably fluctuate. Algorithms can be developed to adjust transaction parameters to achieve dynamic equilibrium. NIOs should monitor the trading patterns in real-time and ensure adequate liquidities to fund all transactions. NIOs should

also have the capability to step in as a Market Maker or issue new NTC to provide the liquidity so the Net Currency maintains a proxy to dynamic equilibrium.

Can Net Currency be Traded with a Sovereign Currency other than its Underlying sovereign currency?

Yes, provided that the currency is sovereign and fully market driven. In fact, due to its portfolio nature, Net Currency should be indistinguishable in characteristics with any other sovereign currencies in the global financial market.

Can Net Currency Cause Inflation?

No, Net Currency cannot cause inflation.

Every NTC is backed by its underlying sovereign currencies in the initial stage, and is funded on par value based on its weighted percentage by its members. In circulation and new issuance stage, buying and selling NTC effectively exchanges NTC from and to the underlying sovereign currencies based on market exchange rates. In de-circulation stage, NTC should refund the underlying sovereign currencies at market value back to its holders.

Because NTC does not introduce any inflationary factor into its life cycle, it cannot cause inflation.

Can a Crypto Currency be an Underlying Currency of a Net Currency?

No. The making of crypto-currencies is not transparent and difficult to understand, the regulation of are in grey area, the value tends to fluctuates violently, and the application invites speculators and illicit trades.

Those characteristics of crypto-currencies run in contrary to Net Currency's founding principles: legitimate, safe, and stable.

What are Net Currency Trading and Transaction Protocol (NTTP), Net Currency Trading Exchange (NTX), and Net Currency Transaction Registry (NTR)?

The trading management of Net Currency involve three components: Net Currency Trading and Transaction Protocol (NTTP), Net Currency Trading Exchange (NTX), and Net Currency Transaction Registry (NTR).

NTTP is a set of message specifications for the buying, selling, and other trading instructions for a Net Currency. Its exact format and protocol specs are to be formalized via a request for comments (RFC) process. Guidelines can be found in Hyper Text Transfer Protocol (HTTP, RFC 2616)[9] and Financial Information Exchange Protocol (FIX)[10]. HTTP is a standard for Internet communications, FIX is a standard for trading equities and other financial instruments in world's financial markets.

NTX is an online destination where Net Currency trades can be executed. Similar to the Forex markets, NTX provides liquidity, trading facility, and counter-party management for Net Currency transactions. NTX also acts as Market Maker when there is a temporary shortage of liquidity.

NTR is the book or leger keeper of the Net Currency transactions. The goal of an NTR is to maintain the authenticity, integrity, and irrevocability of any Net Currency transactions. NTR can utilize block-chain technology framework to implement its services, but this does not exclude other technologies as add-ons or integral part of its infrastructure. NTR is essential for Net Currency to satisfy banking and financial regulations, such as KYC (Know Your Client) rule.

Can Net Currency Cause Money Laundering?

No more likely than the current banking system.

In digital world, Net Currency relies on the technology infrastructure of NIO, NTX, and NTR to ensure the authenticity and integrity of each trade. In financial world, Net Currency is backed by sovereign currencies and every Net Currency user is associated with a real-world bank account. This ensures the legitimacy and manageability of Net Currency.

Can Net Currency Cause Capital Flight?

No. Capital flight refers to one-sided movement of currency, usually from the domestic currency to a foreign currency. Capital control regulations are put into place by central banks to control the risk of capital flight and mitigate its negative impact on national foreign reserve.

Net Currency will not cause capital flight for three reasons:

1) Net Currency provides additional access to vast untapped global forex liquidity. For example, China's entire foreign reserve is USD 3 trillion[11], while the global forex trading volume is USD 5 trillion per day.

2) Net Currency offers new peer-to-peer forex liquidity that does not impact the national reserve. Net Currency enable its user communities to auto-balance its trading, and do not have to burden the central banks and national foreign reserves for currency exchange;

3) Net Currency offers local optimization of forex liquidity. Each Net Currency starts with equilibrium position. In subsequent trading, NIOs and NTXs are requires to provide additional liquidity to maintain dynamic equilibrium in the event of large scale one-sided trading.

In short, Net currency will not cause capital flight. In fact, it will only help a country's foreign reserve by offering vast new forex liquidity access with dynamic optimization.

What is Net Currency Application Provider (NAP)?

Net Currency application provider (NAP) is an application developer that develop applications for Net Currency user communities.

Typical NAP application can be: online fund transfer among specific user communities, such as migrant workers sending money home; online payment gateway to accept Net Currency as a payment methods for merchants; online trading and asset management platform to trade equities, bonds, and other financial assets with Net Currency, monetary dominator for Artificial Intelligence (AI) and robotic applications and communities;

Conclusion

Net Currency bridges the digital world with the financial world in a legal, stable, and secure way. It empowers user communities to design a digital currency for their specific financial applications.

Net Currency can be understood, trusted, and used by any individual or organization.

More importantly, Net Currency provides a foundation upon which an entirely new electronic infrastructure can be built for future international finance. Legacy and emerging applications, such as payment, ecommerce, wealth and asset management, trading, hedging, securitization, and investment banking, can be implemented for individuals, groups, organizations, communities, trading partners, corporate or institutional clients, and special economic trading zones and regions.

1. Nakamoto, Satoshi, "Bitcoin: A Peer-to-Peer Electronic Cash System", 24 May 2009. https://bitcoin.org/bitcoin.pdf
2. European Central Bank, "Banknotes and Coins Circulation", September 01, 2017. http://www.ecb.europa.eu/stats/policy_and_exchange_rates/banknotes+coins/circulation/html/index.en.html#
3. International Monetary Fund, "Special Drawing Rights SDR", April 21, 2017. http://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/14/51/Special-Drawing-Right-SDR
4. Daily Forex, "Forex Market Size, A Trader's Advantage", January 2014. https://www.dailyfx.com/forex/education/trading_tips/daily_trading_lesson/2014/01/24/FX_Market_Size.html
5. World Bank Group, "GDP Ranking", July 01, 2017. https://data.worldbank.org/data-catalog/GDP-ranking-table
6. Statista, "PayPal's Annual Payment Volume", February 2017. https://www.statista.com/statistics/419783/paypals-annual-payment-volume/
7. Blockchain.info, "Bitcoins in Circulation", October 2017. https://blockchain.info/charts/total-bitcoins
8. Cryptocoin News, "Top 10 Countries in Which Bitcoin is Banned", May 27, 2015. https://www.cryptocoinsnews.com/top-10-countries-bitcoin-banned/
9. The Internet Engineering Task Force, "Hyper Text Transfer Protocol – HTTP/1.1", June 1999. https://tools.ietf.org/html/rfc2616
10. New York Stock Exchange (NYSE Euronext), "Specs and Connectivity Options". https://www.nyse.com/connectivity/specs
11. Global Finance, "International Reserves of Countries Worldwide", March 2013. https://www.gfmag.com/global-data/economic-data/international-reserves-by-country