

# Yuro

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**Abstract**—In 2008 Satoshi Nakamoto started the journey of the de-centralized crypto concept, ever since then the total market capitalization increased by 3,363% in 2017 alone. Coupled with this increase, the majority of cryptocurrencies are extremely volatile, where some crypto reached 10 times that of the dollar denominated gold price. The high volatility as evidenced by the sharp price correction which was experienced on the cryptocurrency market in mid-December 2017 with some falling by more than 40% in a month. Some coins e.g bitcoin, moves on average, 5% each day. While this is good for investors looking for extremely high investment returns, it is hardly a characteristic of a currency, let alone a store of value, potentially limiting the majority of these currencies use, especially as a transaction token. This is why we have created Yuro.

Yuro is a cryptocurrency designed to protect the value of your crypto assets. It is based on a smart contract that is fully transparent. The contract calculates the current value of Yuro by comparing how much a basket of foreign fiat currencies can be purchased by one Euro. However, unlike other cryptocurrencies, the price of Yuro is stable. Its value is calculated based on the deviations of the five major currency pairs with respect to the fiat Euro. Over 5 Trillion dollars worth of Forex is traded every day. This high liquidity leads to less fluctuation. Nevertheless unlike other stable currencies the value of Yuro is not fixed. Yuro almost acts as your own personnel crypto savings account which is both transparent and convenient.

**Index Terms**—Yuro, Cryptocurrency, Euro, Economy, Forex, Stable.

## I. INTRODUCTION

This project was started primarily to provide a mechanism against extreme volatility in the cryptocurrency space by proposing an asset-backed token with a stable price which is expected to grow in value.

### A. Yuro (YRX) Vs Euro (EUR)

The European Union has undergone substantial and unexpected growth throughout 2016-17 showing a strengthening Eurozone economy with employment rising across the bloc barring the United Kingdom and Estonia, this coinciding with a 10 year high in economic growth, reduced perceptions of European political risk, weakness of currency rivals (the euro has appreciated to its strongest level against USD in 2 and a half years becoming the top performing G10 currency of 2017) and the prospect of tapering quantitative easing initiatives has economists projecting this growth to continue throughout 2018 (Blitz, 2018; European Commission, 2017; The Economist, 2017; Maurice, 2017). While possible that the Eurozone can maintain this trajectory, many extraneous factors currently exist that elevate uncertainties around the future stability of the single market currency with economists speculating that the rise in the euro will be reversed expressing concerns over

lagging inflation, a lack of major growth catalysts to spur on sustainable growth periods along with perceptions of looming trade war fears with the US to cause sharp movements in the euro which can result in unstable investment opportunities (Blitz, 2018; Boston, 2018; Fisher, 2018; Samson, 2018; The Economist, 2017; Kottasova, 2017). Investing in Forex markets presents a steep learning curve for new investors demanding considerable time, knowledge, and dedication. The Yuro platform originated as a means to mediate this volatility for new investors via the Yuro cryptocurrency token that leverages price fluctuations in the forex markets via adaptive mathematical modelling.

### B. Birth of decentralized systems

Before we dive into the development of Yuro, its important to understand the history of cryptocurrency. In 2008, Satoshi said he established A Peer-to-Peer Electronic Cash System”. The single most important part of Satoshis invention was that he found a way to build a decentralized digital cash system. In the nineties, there had been many attempts to create digital money, but they all failed until 2008, when Satoshi invented bitcoin. Here at Yuro we believe in Satoshi’s concept, we believe transparency and in a system where you could invest in the economy basket easily, that’s why we have created Yuro: One of the first cryptocurrencies which exposes you to the market and is hedged against the price of the Euro

Yuro is based on the Ethereum blockchain, it is a decentralized platform that runs smart contracts, this means that applications run exactly as programmed without any possibility of downtime, censorship, fraud or third-party interference. This technology allows the nodes to store the most recent state of each smart contract, in addition to all of the ether transactions. For each Ethereum application, the network needs to keep track of the ‘state’, or the current information of all of these applications, including each user’s balance, all the smart contract code and where it’s all stored. This makes the network secure and reliable.

### C. The significance of stable coins

The cryptocurrency market is extremely volatile, this makes it difficult for any cryptocurrency to properly function as a “currency”. The volatility of the market can be attributed such things as;

- A lack of intrinsic value - Sparse regulation in the space - Long term investors (i.e. financial advisers, retail brokers) left out - Hard mentality - Offline HODLing (crypto assets stored in an off-line wallet and not on an exchange) etc.

A stable coin is a cryptocurrency that is pegged to another stable asset, like gold or the U.S. dollar. Its a currency that is global, but is not tied to a central bank and has low volatility.

This allows for practical use cases for cryptocurrencies such as paying for things every single day.

For cryptocurrencies to go mainstream a less volatile environment needs to be created and stable coins like Yuro aim to do just that. An optimal stable coin needs to incorporate long and short term price stability, scalability, privacy and decentralization, all of which Yuro provides, along with ease of use and easy integration for partners and 3rd parties.

#### D. Foreign exchange market - FOREX

The forex market is the largest capital market in the world, with an average of 3 trillion dollars currency transactions made each trading day. Foreign exchange market is basically an over the counter market as there is no physical place where the participants meet to execute their deals. It is more an informal arrangement among the banks and brokers operating in a financing centre purchasing and selling currencies, connected to each other by telecommunications technologies. The value of one currency is determined by its comparison to another currency via the exchange rate. The major currencies traded most often in the foreign exchange market are the euro (EUR), United States dollar (USD), Japanese yen (JPY), British pound (GBP) and the Swiss franc (CHF). With the forex market There is no final winning trade; no huge gains; no trade of the century. Advanced strategies like margin trading, options and futures require a great deal of analysis. Traders make money in the forex market by analyzing trends and making smart decisions. The gain on each trade is a small step in the direction of his or her long-term goals. Making profit from such a market is a very complex and slow process, it requires a great deal of experience and knowledge. Furthermore Many forex traders, in addition to paying attention to major economic releases, analyze the forex market using technical analysis, which in turn is based on historical exchange rate data and other market observable. for example the open interest rates and the volume to determine the future direction of a currency pair. This very complex investing system makes it almost impossible to invest and profit from such a market, without having all the skills required and the knowledge. This has led to the birth of Yuro.

## II. MATHEMATICAL MODELLING

The most significant part of any cryptocurrency is its foundation. Yuro is based on a solid foundation, the mathematical modelling is written by experienced engineers, scientists and economists.

The graph below shows fiat currency rates from 16th of July 2018 and their associating weights. To capture relative movements rather than subjecting the index to movements based on nominal values each currency is weighted according to the average GDP over the last 10 years.

These figures form the bases of the example calculations. Note that Yuro will be updated according to the market and the value of the tokens will depend on the "basket value".

EUR:USD	→	1:1.17	[48%]
EUR:GBP	→	1:0.89	[7%]
EUR:CHF	→	1:1.17	[2%]
EUR:JPY	→	1:131	[14%]
EUR:CNY	→	1:7.84	[29%]

Fig. 1. Exchange Rate 2017

Furthermore, to reduce the sensitivity of the basket to external shocks (e.g. earthquakes) across these currency zones, the affected currency pair can be replaced by other major currencies like the Australian dollar (AUD) making Yuro more stable. The same logic can be applied by re-assigning the weights among the currency pairs.

Yuro unit price is inversely proportional to the price of euro:

$$P_t = \int_{\infty}^{\frac{C}{P_w}} \frac{C}{P_w^2} dP_w$$

Where:

$P_t = Yuro$ ,  $C$  is constant and  $P_w = Price\ of\ basket$

Taking the derivative of this function one can see an increase in the relationship between  $P_t$  and  $P_w$ .

$$P_t^1 = -\frac{C}{P_w^2}$$

In the above equation we can see that negative slope changes as  $P_t$  changes with  $P_w$ . From the second derivative, we see that the price at a token asymptotically tends towards infinity as the price of the euro tends to zero (see graph below).

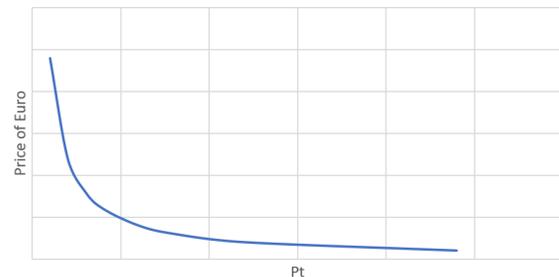


Fig. 2. Relationship between Yuro and price of Euro

#### A. Stability Mechanism

A Stable currency is a currency which successfully performs its functions as a means of exchange, unit of account and a store of value because its purchasing power is stable. The commonest way of measuring changes in the value of a currency, or its purchasing power, is the Consumer Price Index (CPI). This reflects the changes in the total price of a basket of goods and services which are deemed to be consumed by an average household. A currency is stable when the general level of prices, measured by the Consumer Price Index, does not vary too much. Consequently to measure the stability of Yuro (YRX), the average **exchange rates** for the last 10 years of the 5 currencies (Basket), USD, JPY, CHF, CNY and GBP were taken:

USD	JPY	CHF	CNY	GBP	Year
1.39	130.37	1.51	9.60	0.89	2009
1.33	116.52	1.38	8.99	0.86	2010
1.39	111.33	1.23	9.01	0.87	2011
1.29	102.70	1.21	8.11	0.81	2012
1.33	129.71	1.23	8.17	0.85	2013
1.33	140.42	1.21	8.19	0.81	2014
1.11	132.32	1.07	6.97	0.73	2015
1.11	120.32	1.09	7.35	0.82	2016
1.13	126.71	1.11	7.63	0.88	2017
1.21	131.47	1.17	7.72	0.88	2018

Fig. 3. Average Exchange rate when compared to EURO

The value of **YRX** is then calculated based on the above figures and the average GDP weights, as described in section 2 of this paper. Therefore the value of YRX for the last 10 years is as follows:

YRX	Year
1.242537	2009
1.16448	2010
1.174142	2011
1.064573	2012
1.090885	2013
1.096286	2014
0.937268	2015
0.969873	2016
1.005246	2017
1.029196	2018

Fig. 4. Value of Yuro for the last 10 years

The graph below shows the stability of **YRX** for the last 10 years. The average value of YRX is calculated to be **1.07**. Where the average deviation from the base value of 1.0 is 6%.



Fig. 5. Stability of YURO - 10 Years

### III. THE YURO TOKEN

#### A. Yuro's Smart Contract

The Yuro token (YRX) is deployed as part of a smart contract on the Ethereum blockchain. Ethereum is a decentralized platform that runs smart contracts. Ethereum is currently the second largest cryptocurrency by market value and more tokens in the top 100 (by market cap) are based on Ethereum as compared to other platforms such as Waves or Neo. The smart

contract acts as an exchange with only one pair YRX/ETH. Upon receiving ETH the smart contract returns the equivalent amount in Yuro tokens and vice versa. The base price of Yuro is calculated with respect to a basket of currencies as discussed earlier. To ensure the integrity of the price of each currency, the API uses more than 10 different sources to calculate a weighted average price of each currency pair. A similar process is used to calculate the price of Ethereum. The smart contract itself is written in Solidity which is a contract-oriented language for writing smart contracts. To minimize security risks a peer-reviewed framework known as Open Zeppelin was used to start the development of the token. The token was implemented using the ERC 20 interface to ensure that it is compatible with most Ethereum wallets. The initial smart contract has already been tested on the Ropsten test network with a special focus on security and performance. Some of the proceeds from the crowd sale will be used to acquire the services of multiple consulting firms which specialize in auditing smart contracts.

Cryptocurrency started primarily to answer the lingering frustrations of those of us whose money and assets are held by one centralized unit (and often intervened by the government itself) and whose transfers are limited and frozen at a timely basis. As mentioned in the previous section most cryptocurrencies suffer from high levels of price volatility due to many complex factors, such as government influences, social media influence, constantly in-stable public insight and highly speculative and unregulated markets. Therefore in order to tackle the stability problem, we have created a smart contract token. This contract is based on an approach where a cryptocurrency is used as collateral in a contract for difference (CFD). With this method, two parties take opposite sides of a trade, where one party is guaranteed price stability, and the other party is granted leverage.

This works as long as sufficient collateral exists, and the contract can be settled by an honest 3rd party with a price feed. Yuro is a cryptocurrency that has the properties and advantages of Ethereum, but is also capable of maintaining price uniformity with a globally adopted currency (e.g. E.U. Euro), this makes Yuro a very high utility for convenient and censorship-resistant trades.

Lets take a real world scenario. On Wednesday 18th of July 2018 Alex sends 10 ETH to the Yuro Smart Contract. A transaction fee of 7% is charged so he is issued 3891 YRX tokens  $((10 - 0.7) * (431/1.03))$ . On 21st of July he has noticed that ETH has dropped by 13% so he decides to redeem his tokens. When he redeems he gets 10.5 ETH  $(3891/(380/1.03))$ . So in a bear market within 3 days he has made a profit of 0.5 ETH but as the price of ETH has dropped his investment in fiat currency has remained stable.

#### B. Insufficient Collateral (Black Swan) Events

So what happens when there isn't enough collateral? A black swan event is triggered in the smart contract. A new base value of Yuro is calculated by dividing the Ether in the pool equally into the number of Yuro tokens issued.

Lets take another real world scenario where this would have occurred. On Wednesday 18th of July 2018 Alex sends

10 ETH to the Yuro Smart Contract. A transaction fee of 7% is charged so he is issued 3891 YRX tokens  $((10 \cdot 0.7) \cdot (431/1.03))$ . On Thursday 19th of July 2018 Bob sends 10 Eth to the Yuro Smart Contract. A transaction fee of 7% is charged so he is issued 3720 YRX tokens  $((10 \cdot 0.7) \cdot (412/1.03))$ . On the 21st of July 2018 they both decide to withdraw when the ETH Price is 369 YRX (380/1.03). So in an ideal world Alex should get 10.5 ETH and Bob should get 10.1 ETH. However, imagine that the pool only has 15 ETH left, though its liabilities now stand at 21.6 ETH. Now a black swan event has occurred where the liabilities are greater than the actual value in the pool. So the smart contract calculates a new value for ETH:YRX =  $((3720+3891)/15) = 507.4$ . So Alex gets  $3891/507.4 = 7.67$  ETH and Bob gets 7.33 ETH. So even in the case of a black swan event the liquidation mechanism is fair and transparent.

#### IV. CROWD SALE OF DIVIDEND TOKEN

The primary purpose of the crowd sale is to generate substantial Ether to fund the pool to minimize the likelihood of a black swan event. The remaining funds will be used for conducting security audits, future development etc. During the crowd sale standard Yuro tokens will not be issued. Instead special dividend tokens known as YDTs (Yuro Dividend Tokens) will be issued. Each token will be sold at a cost of roughly 20 cents with a minimum spend of 0.1 ETH required. A hard cap of 15 million tokens will be used. Once the crowd sale is complete and the standard Yuro tokens have been issued, at least 50 % of the transaction fees generated when issuing Yuro tokens will be distributed to the holders of YDT. No more YDTs will be issued after the crowd sale to keep the supply fixed.

#### V. CHALLENGES

Being the first cryptocurrency of its kind Yuro undoubtedly faced familiar as well as unique hurdles during its early stages of development. That being said, very few products in today's world; physical and virtual, are released without having to overcome obstacles along the way. The Yuro Foundation team realized early on that due to the perplexing nature of the Yuro transparency was of utmost importance. We needed to ensure the quality of our data sources as well as the accuracy of our mathematical model, in order to accomplish this the Yuro Foundations finance department continuously track the exchange rates of the economy basket via the most reputable online and offline sources such as the Central Bank, CNN money, Bloomberg markets, XE etc. Their results are posted on the foundations' blog every Friday to give investors a real-time, unadulterated view into the value of their Yuro tokens.

The volatility of the crypto market was also a challenge for the team early in the design phase. Price fluctuations (such as the recent BTC price drop) may drastically affect the price of Yuro hence identifying a way to ensure investor security was crucial. This was achieved using our mathematical model, by ensuring the Yuros value never drops below the price of the fiat Euro, investors are safer knowing that the Yuro, unlike

most cryptocurrencies, isn't completely hinged on the price of Bitcoin.

As always investing is risky business, whether it be on cryptocurrencies, the stock-market or real estate, nothing is guaranteed. The same goes with Yuro, although the Yuro Foundation team has built arguably the most effective, trustworthy and useful cryptocurrency on the market, it to some degree, is dependent on both the physical and crypto markets. However with better automation and constantly improving predictive analysis Yuro could soon replace your debit and credit cards.

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