



Valuing ChainLink with Metcalfe's Law

Executive Summary

- **We have applied a superior data source to value the LINK token.** Daily Unique Function Callers gives a fairly accurate picture of ChainLink network growth because it is free from the noise of price-user feedback loops.
- **Changes in Monthly ChainLink users accounts for over 70% of changes in monthly LINK prices.** The corollary is that, on average, a 10% increase in users should result in about a 6% increase in LINK price.
- **LINK's dramatic 250% price increase over the past 12 months is grounded in fundamentals,** not speculative mania or price manipulation. ChainLink's user growth, as measured by unique function callers, has averaged over 40% per month during that time.
- **LINK's Price to Value has fluctuated dramatically in the past,** but it has generally been value that has caught up to price, rather than price crashing to value.

ChainLink and Function Calls

In a prior research note, we summarized the features and advantages of ChainLink. At the top of the list is the ability of a decentralized oracle network to bridge real world enterprise data to blockchain architecture through smart contracts.

ChainLink permits a user to capture real world data by executing software code. A request to execute this code is termed a function call. For example, if fictional ABC Pharma Corp wished to monitor and record shipments of prescription painkillers, an oracle could record the quantity, price, date, and time of that activity. ABC may want to do this to ensure its drugs are not stolen or misdelivered. Governments may mandate such tracking for the same reason. A

ChainLink smart contract would place this information into a blockchain to establish a tamper-proof record of all shipments, quantities, and payments.

ABC Pharma Corp pays for this service using a LINK token:

The ChainLink network utilizes the LINK token to pay ChainLink Node operators for the retrieval of data from off-chain data feeds, formatting of data into blockchain readable formats, off-chain computation, and uptime guarantees they provide as operators. In order for a smart contract on networks like Ethereum to use a ChainLink node, they will need to pay their chosen ChainLink Node Operator using LINK tokens, with prices being set by the node operator based on demand for the off-chain resource their ChainLink provides, and the supply of other similar resources.

—ChainLink Whitepaper

LINK, like every other cryptocurrency (including bitcoin), is a demand-driven network asset. As such, its value is dependent upon the number of "users" of the network. It is therefore possible to value the ChainLink network with Metcalfe's Law, so long as a reasonable user count can be established.

Unique Function Callers as an Accurate User Count

Our prior research on ChainLink used active addresses and Ethereum price. Active Addresses as a proxy for users may be very useful but has two drawbacks.

1. It is an estimate of user growth, and tends to only capture those individuals that transact in the cryptocurrency.
2. Cryptocurrency is an immature market prone to feedback loops between price and user activity. This means active addresses can be reflective of short-term

user growth but not long-term user growth.

ChainLink’s unique function callers look more like Facebook monthly active users. When a Facebook user logs into their page, the impact on Facebook’s stock price is presumptively positive because that user will view or purchase advertising or other revenue generating media. The converse is not necessarily true; a rising Facebook share price does not prompt people to use Facebook.

Function calls to ChainLink increase LINK’s value because it represents a direct financial interest in the oracle service ChainLink provides. The converse it not true; an increase in LINK’s price does not trigger people to make function calls to the ChainLink network. In fact, most LINK holders don’t even have that capability so they couldn’t perform that action even if they wanted to. This one-way relationship, calls → value, allows for an accurate picture of the relationship between network size and LINK price.

Value

There is an extensive and growing library of material supporting Metcalfe’s Law as the basis for network valuation, including financial networks and cryptocurrency networks. We can cite dozens of published papers but refer you to the references section of Peterson’s quartet of works.

We obtained the daily count of unique callers from bloxy.info and applied Metcalfe’s Law to value LINK as a network.

For this research, we use the formula

$$V = AM$$

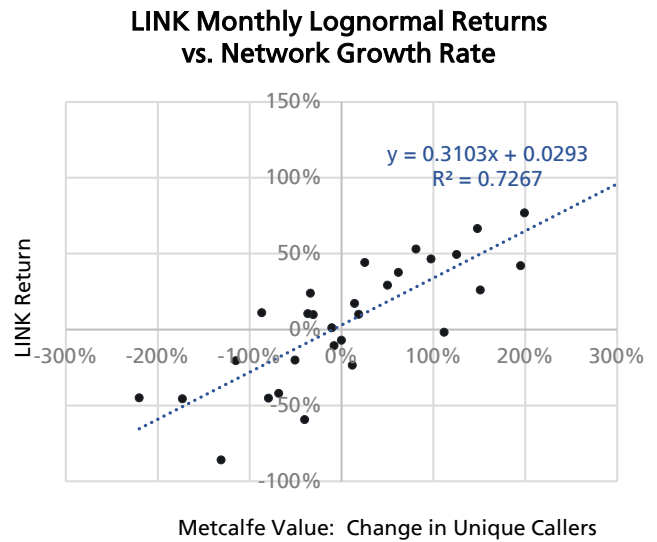
where

$$M = 0.5n(n - 1)$$

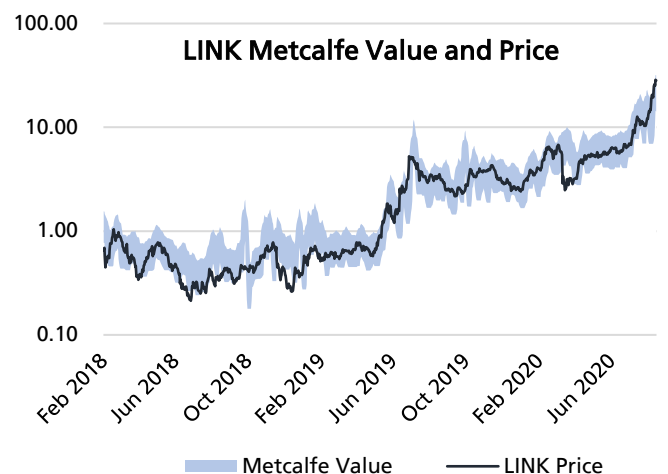
n is unique caller count per day and A is an exponential decay factor proportional to users and adjusted for price elasticity of demand.

	<i>Coef.</i>	<i>S.E.</i>	<i>t</i>	<i>p</i>
Intercept	0.03	0.04	0.66	0.51
%Δ M.V.	0.31	0.04	8.63	0.00

A plot of monthly changes (these are stationary lognormal first differences) in Metcalfe Value vs. LINK Price returns shows the obvious relationship.

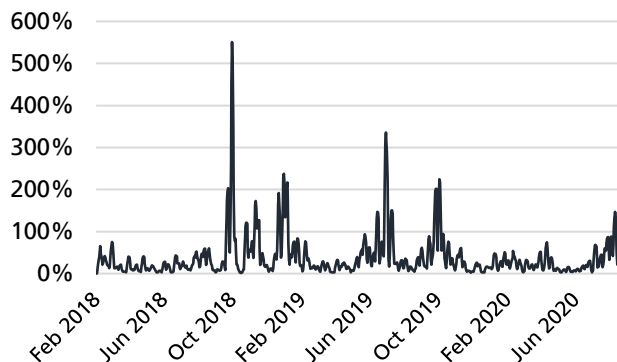


ChainLink’s daily function caller activity can vary greatly from day to day. However, we can look at long- and short-term trends and estimate a high and low boundary around LINK’s daily Metcalfe Value. LINK’s price has mostly stayed above the lower bound of this range. Two notable exceptions are December 2018 (the nadir of “crypto winter”) and the market crash of March 2020.



Using the lower bound of Metcalfe Value as a baseline, we can look at the relationship of Price to Value to evaluate whether LINK is or has been priced near equilibrium and what the downside risk might be.

LINK Price to Metcalfe Value



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