



Striking Gold in Software Repositories ?

An *Econometric* Study of Cryptocurrencies on GitHub

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Why do we think there is “gold”?



Dabbish et al. 2012, Trockman et al. 2018

1.) Visible Signals on GitHub Influence Perceptions of Software Quality



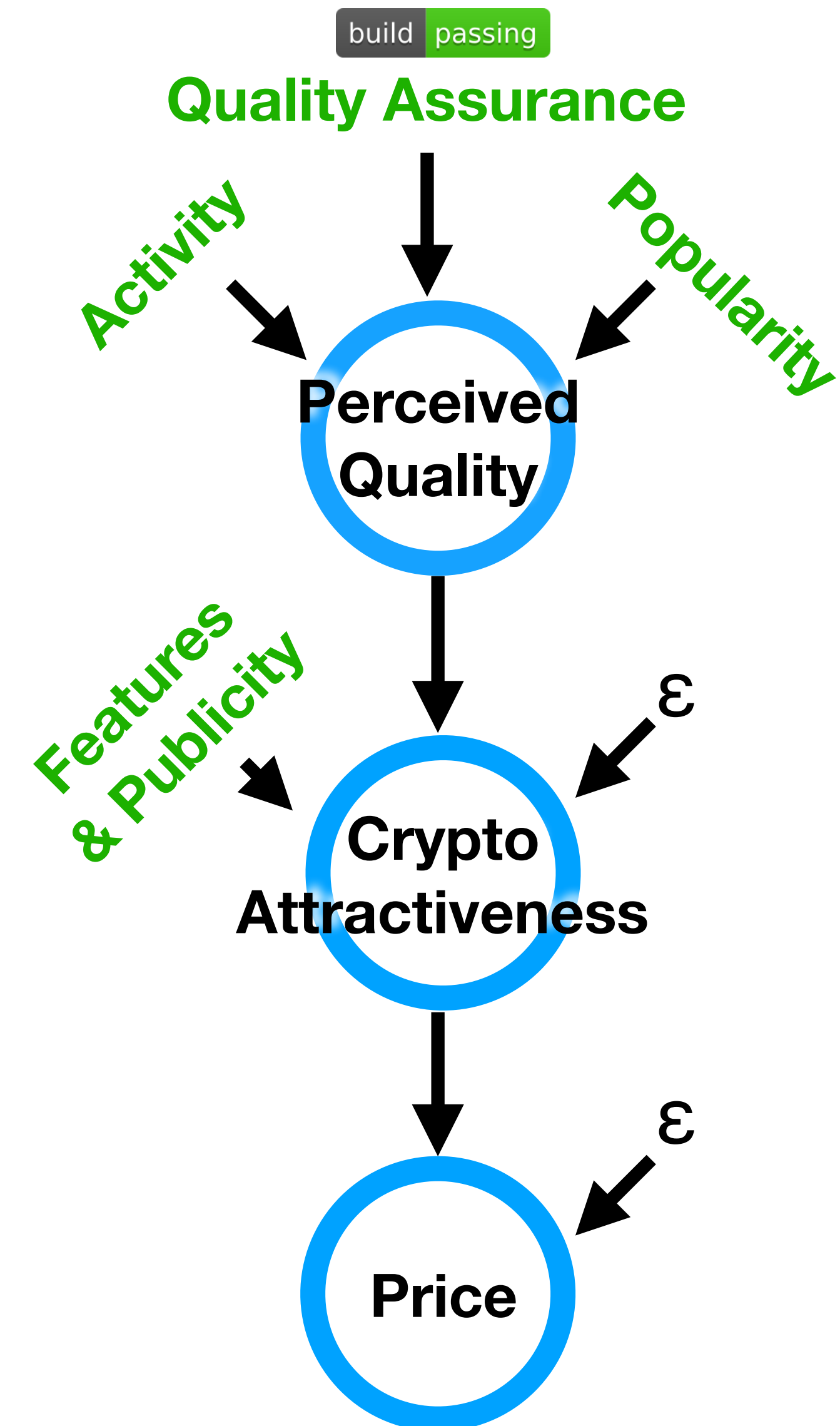
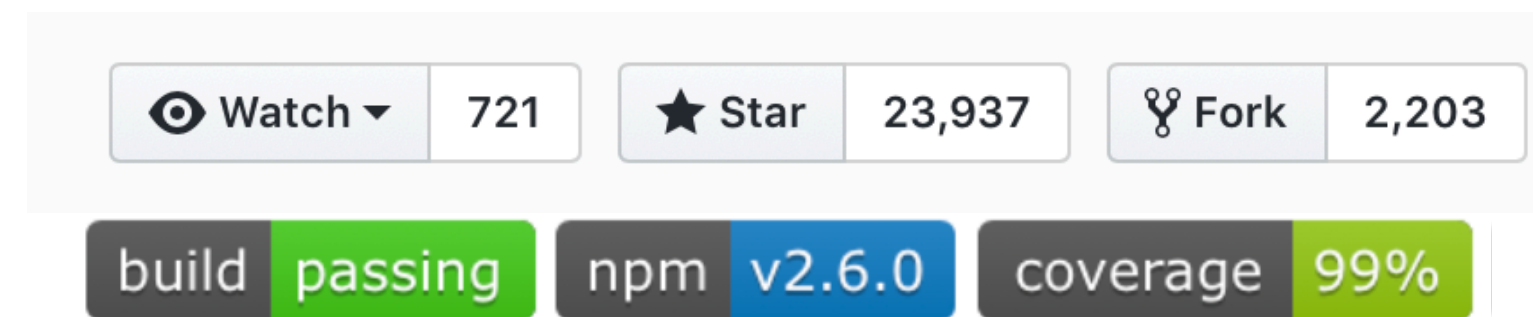
Kristoufek 2013, 2015;

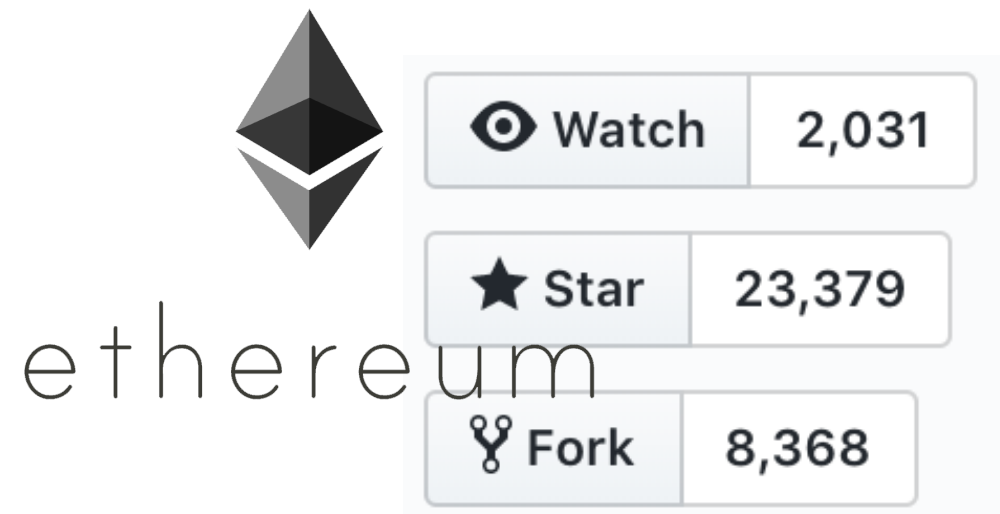
2.) “Attractiveness” Influences Crypto Speculators



Garcia et al. 2014

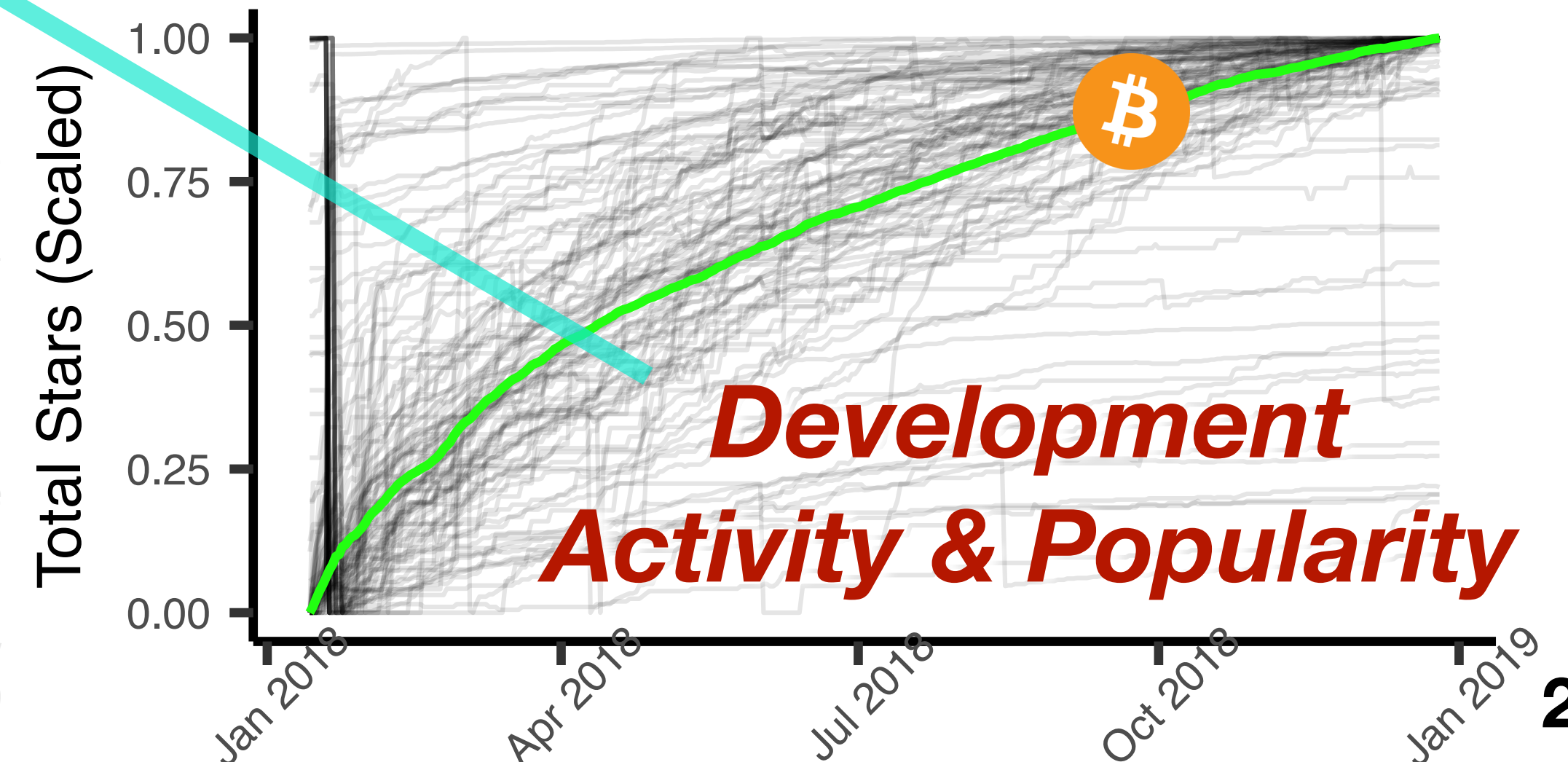
3.) Informed? Speculators Drive Price



The GitHub logo, featuring the Octocat character on the left and the word "GitHub" in a large, bold, black sans-serif font on the right. The Octocat is a black cat-like creature with a light brown face, large brown eyes, and a small smile. It has eight tentacles, with the top two holding a small blue and white object. It is standing on a light blue circular base.

(different availability for different parts of the study)

...and more!



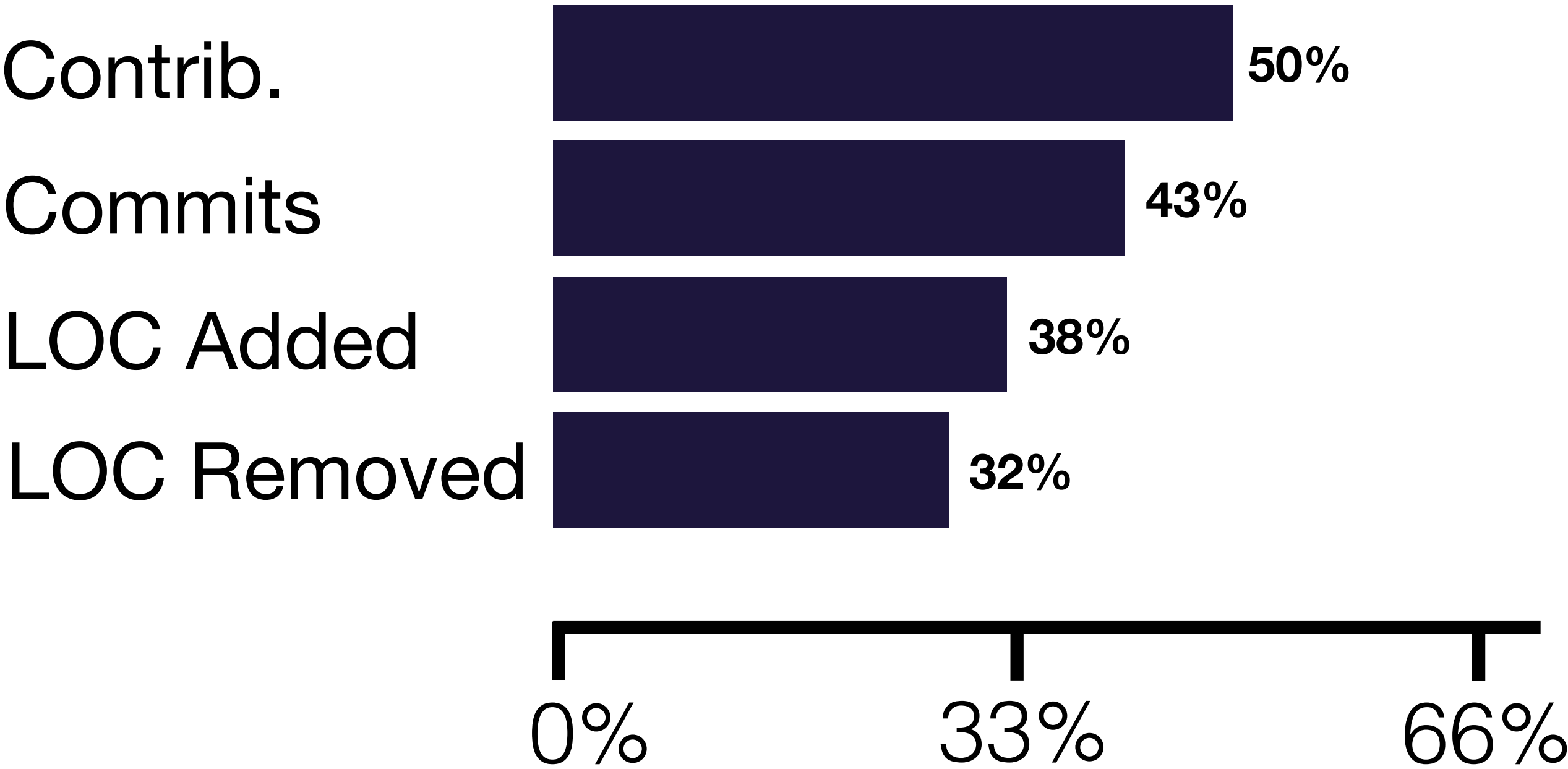
Correlation with Avg. Market Cap = (price × coins)



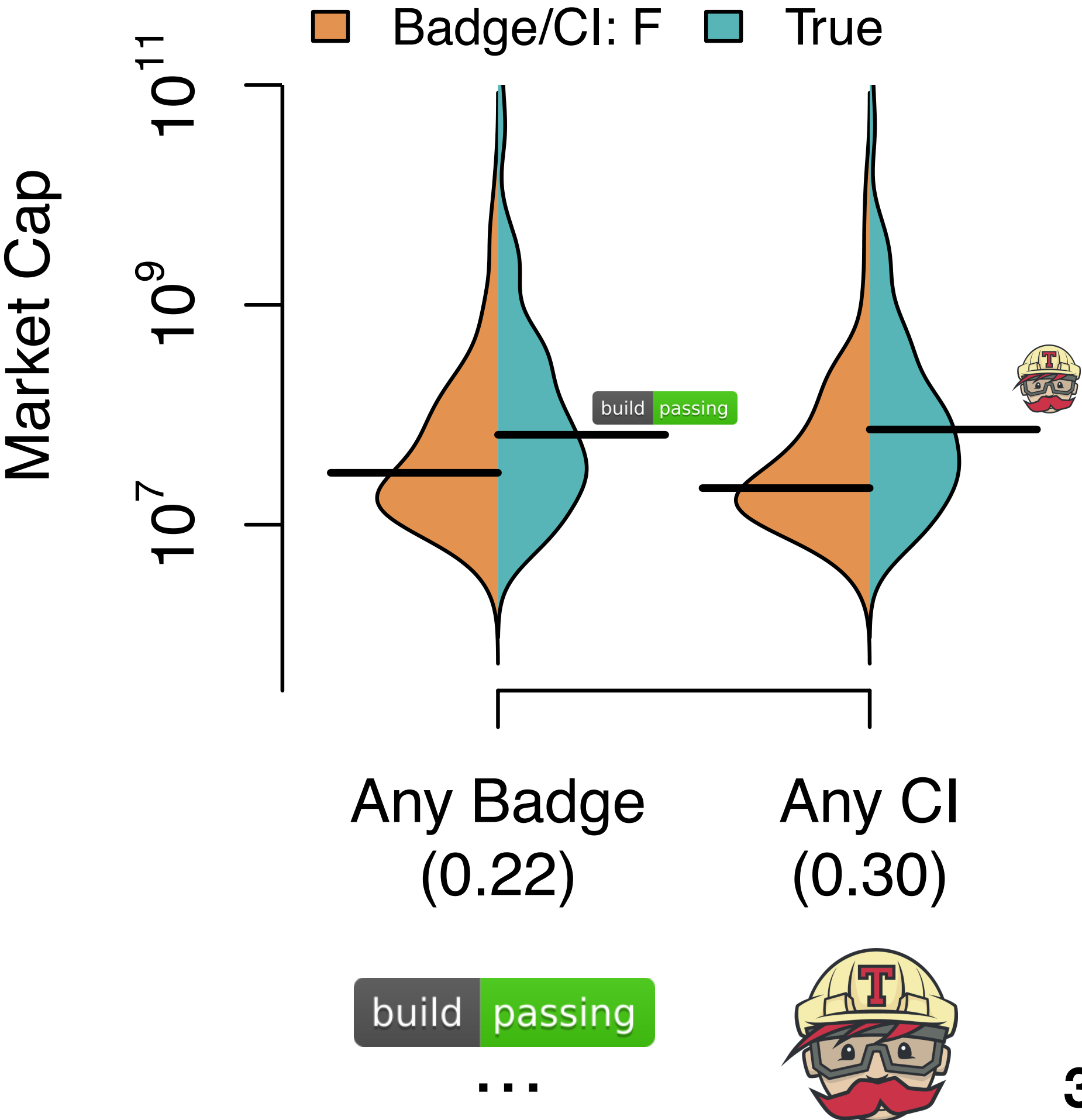
Popularity Metrics



Activity Metrics



Quality Assurance Indicators



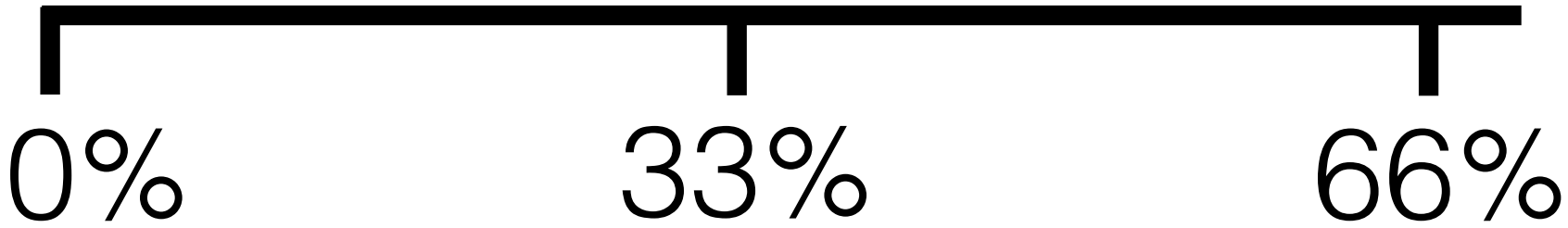
Linear Models of Avg. Market Cap = (price × coins)



Popularity Metrics



Only popularity metrics are significantly and positively associated with avg. market cap.



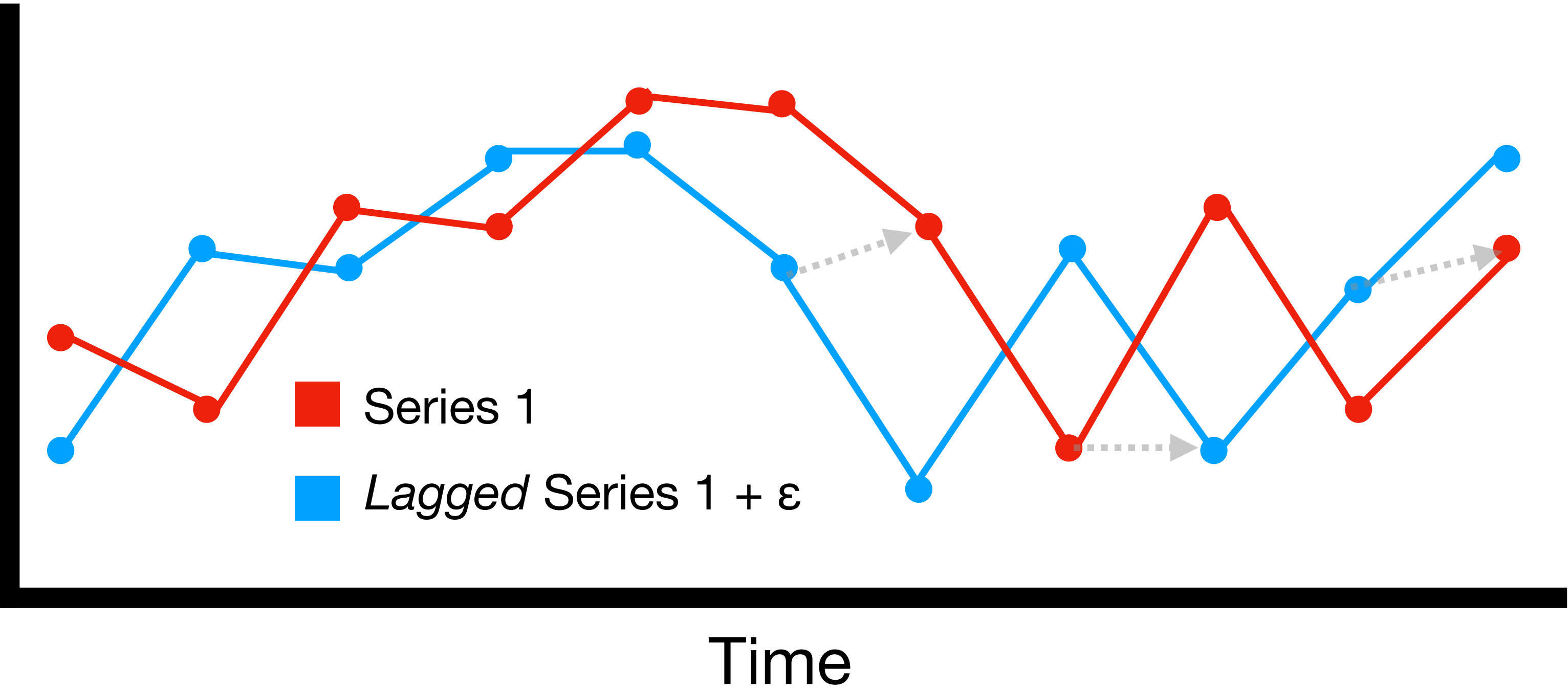
$\mu \log \text{Market Cap (1y)}$

Full Model With forks

$\mu \log \text{Stars}$	0.29 (0.18)	Joint ***
$\mu \log \text{Watchers}$	0.03 (0.20)	
$\mu \log \text{Forks}$	0.47 (0.17)	
$\mu \log \text{Commits}$	0.35 (0.30)	
$\mu \log + \text{LOC}$	0.08 (0.08)	
$\mu \log - \text{LOC}$	0.08 (0.08)	
$\mu \log \text{Contrib.}$	0.31 (0.31)	
HasBadge	0.21 (0.21)	
HasCI	0.23 (0.23)	
(Intercept)	14.0 (0.48)***	
Observations	149	
Adj. R^2	55.6%	

Granger “Causality”

Metrics \longleftrightarrow ? Market Cap



$$y_t = \delta_0 + \sum_{j=1}^p \alpha_j y_{t-j} + \sum_{j=1}^p \gamma_j x_{t-j} + \epsilon_t$$

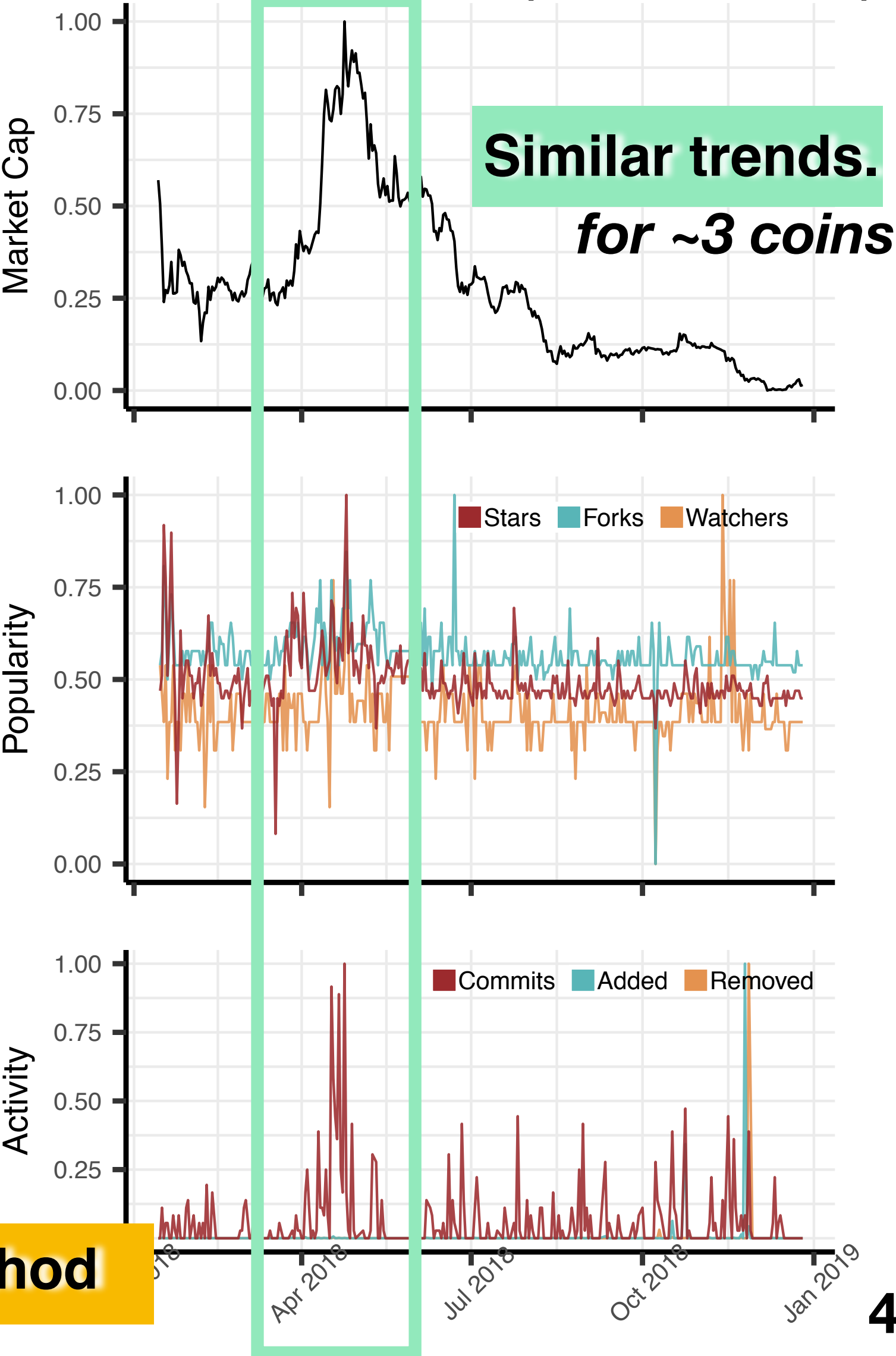
Dependent Variable

Past Levels of Dependent Variable

Past Levels of Independent Variable

Note:
Toda-Yamamoto method

Coin: Bytom (1 of ~150)



Metrics $\overset{?}{\longleftrightarrow}$ Market Cap **Not compelling.**



We see evidence of Granger causality in only a few projects.

Correcting for multiple hypotheses, this is insignificant.

Stars *Granger-cause?* Market Cap **9/142 coins**

Binance, Cryptonex, Diamond, Electroneum, Emercoin, INS Ecosystem, Pandacoin, Vericoin, ZenCash

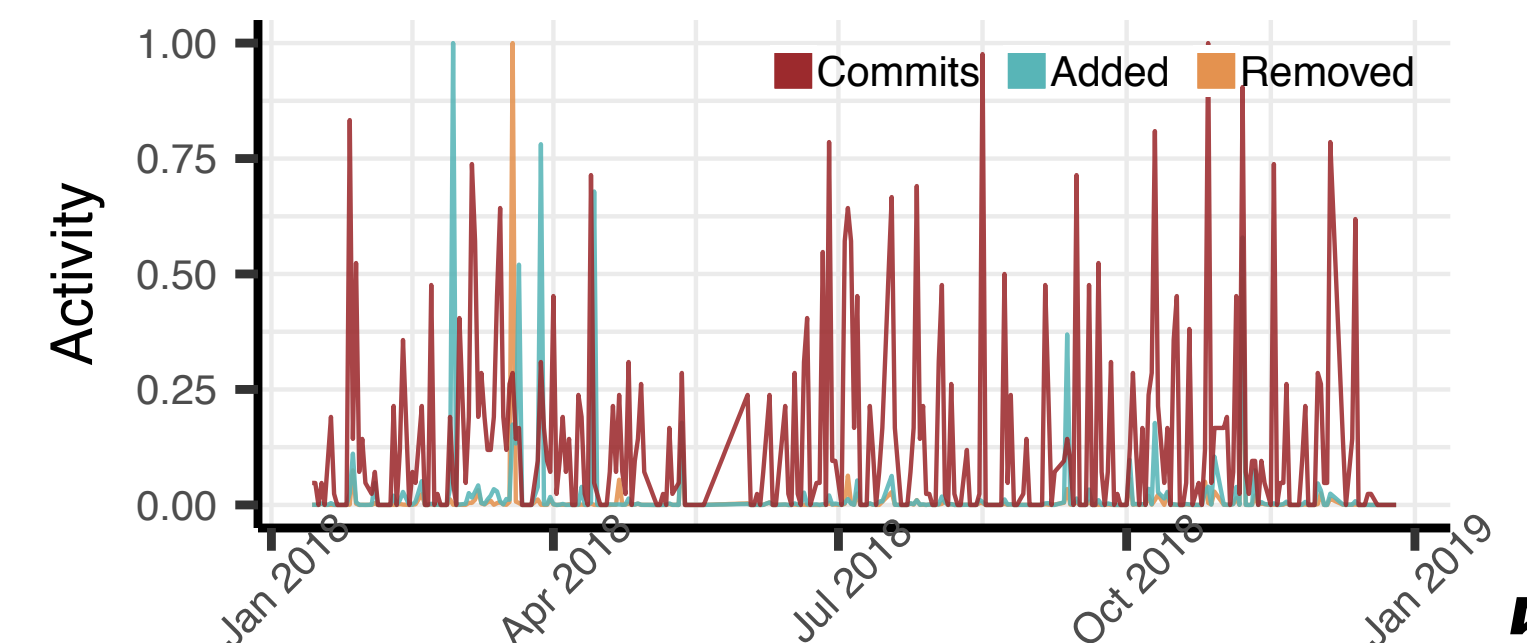
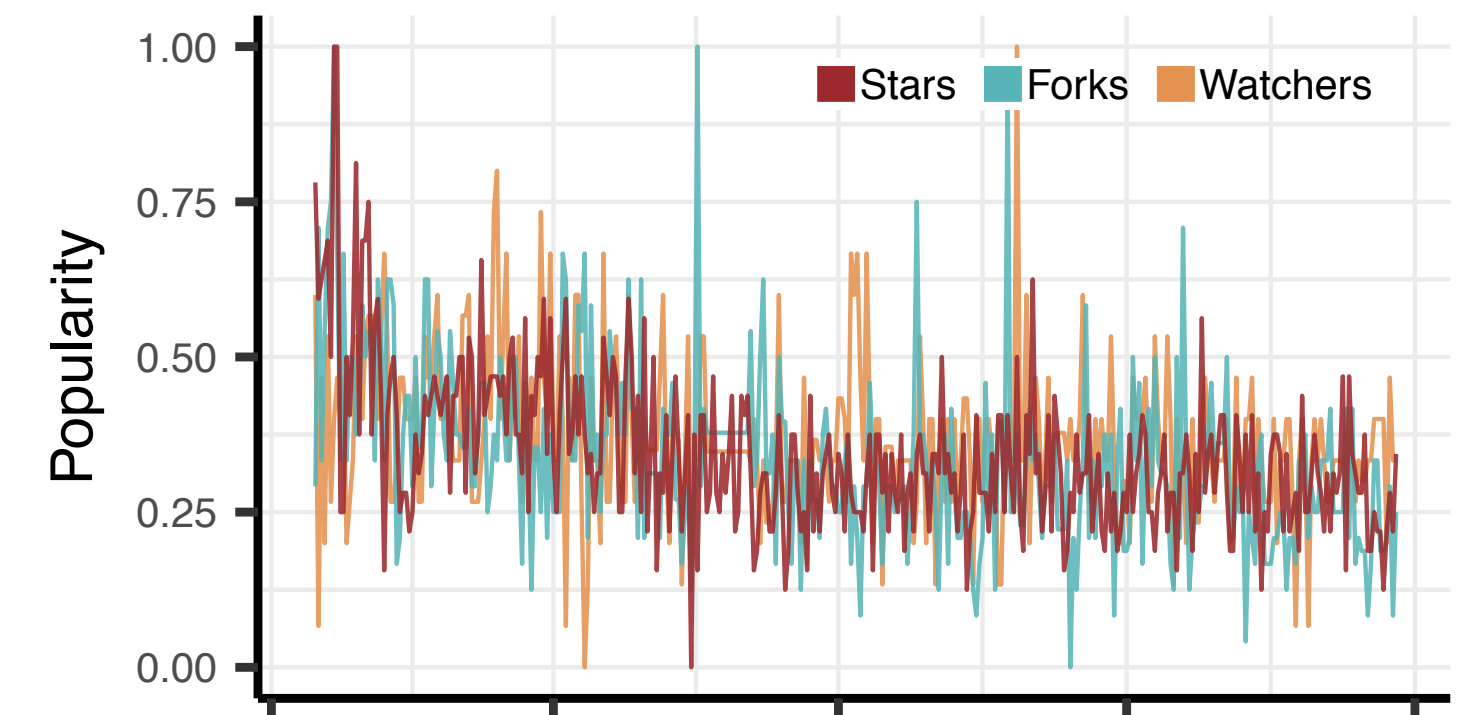
Watchers *Granger-cause?* Market Cap **4/146 coins**

Ark, Mintcoin, NEM, PIVX

*(But we are likely to get similar from random noise.)



Representative example



Metrics $\overset{?}{\longleftrightarrow}$ Market Cap **Not compelling.**



Other models reveal a **very weak connection** between popularity and market cap, which is not robust.

Stars *Granger-cause?* Market Cap **9/142 coins**

Binance, Cryptonex, Diamond, Electroneum, Emercoin, INS Ecosystem, Pandacoin, Vericoin, ZenCash

Watchers *Granger-cause?* Market Cap **4/146 coins**

Ark, Mintcoin, NEM, PIVX

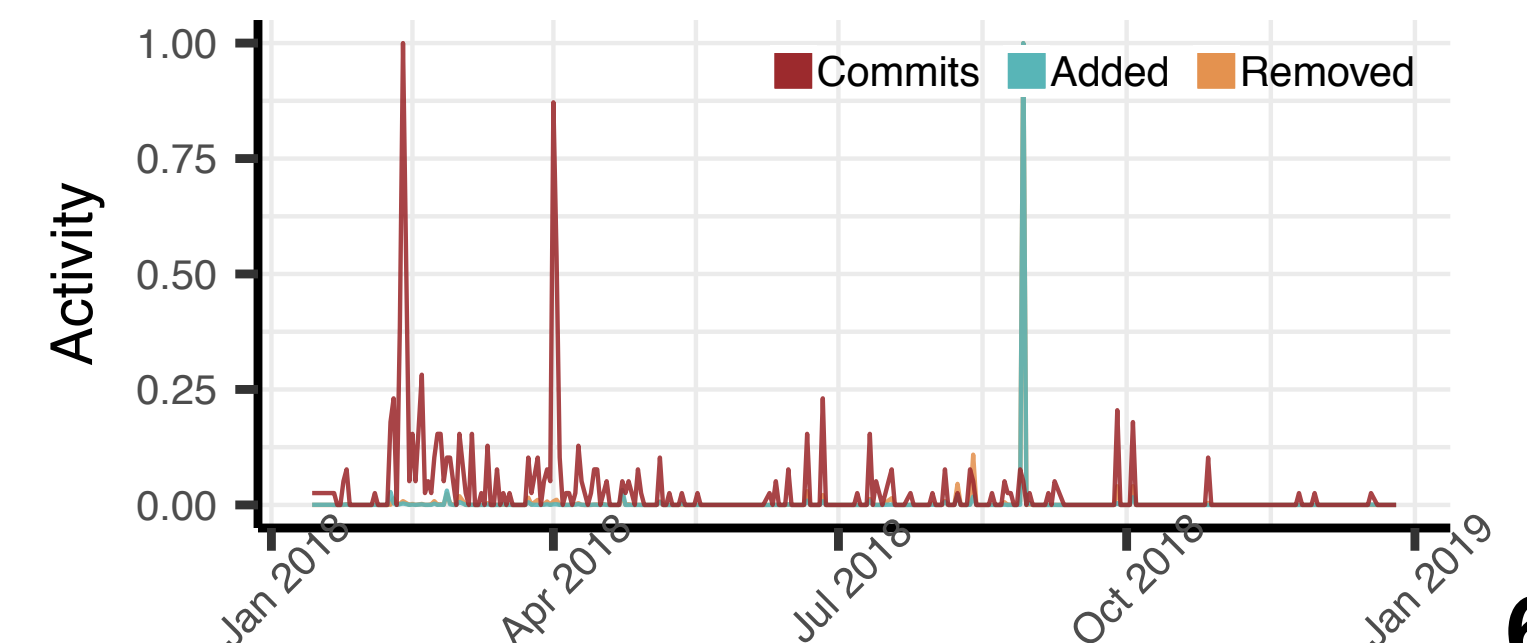
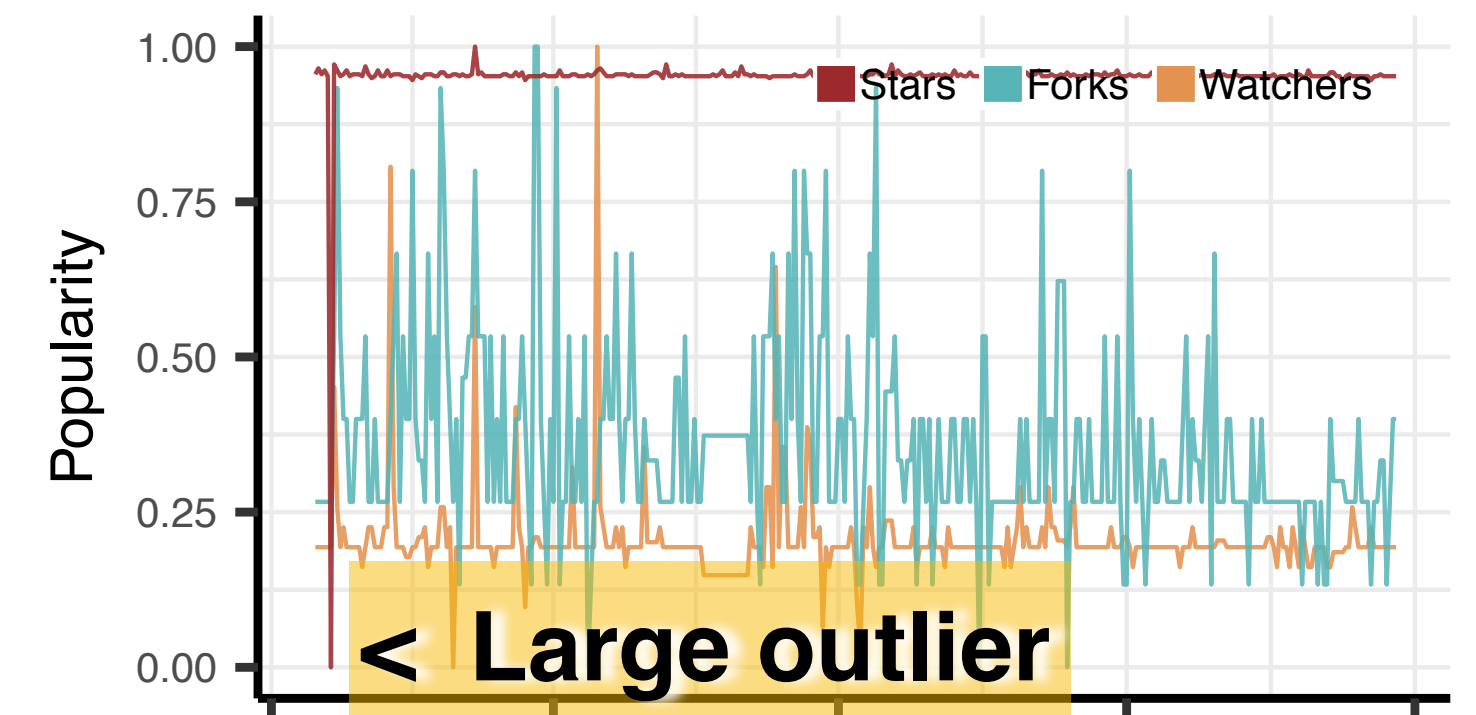
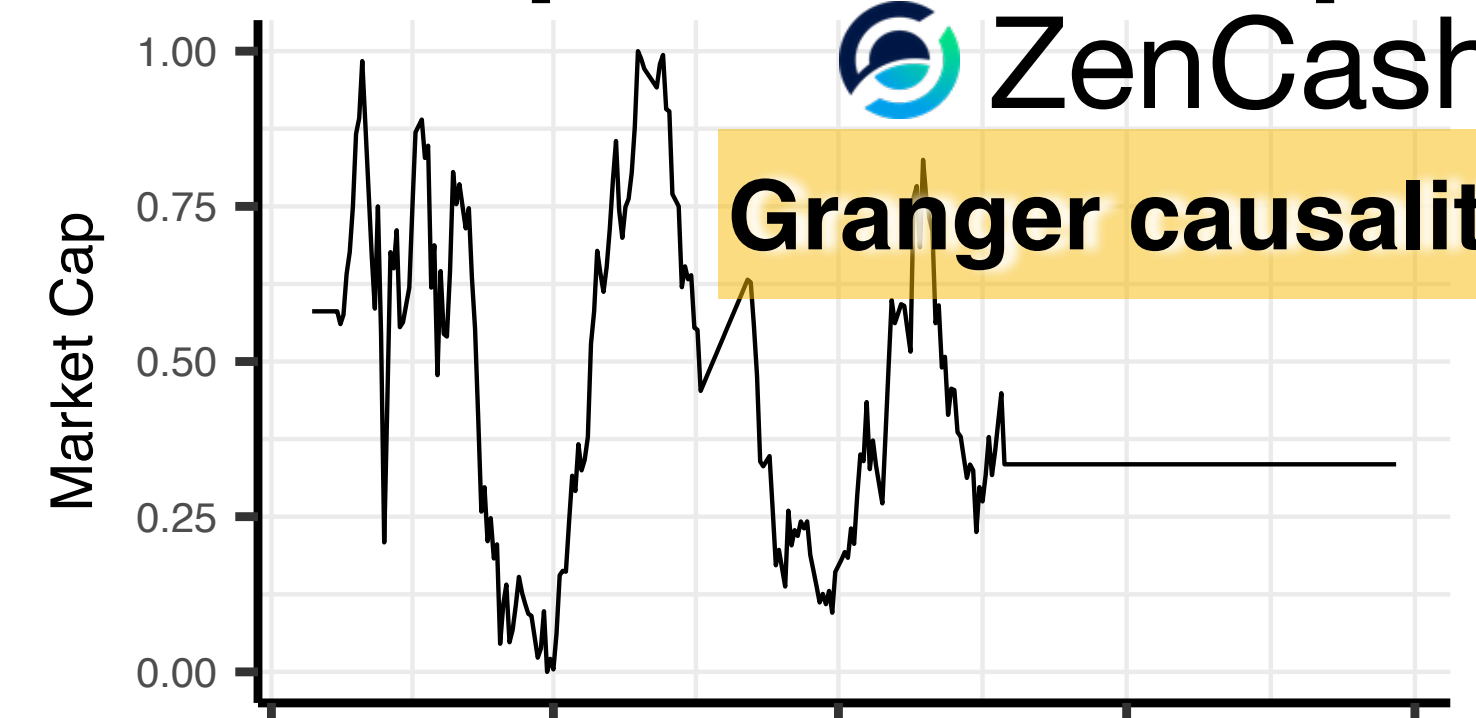
*(But we are likely to get similar from random noise.)

Exclusive!

Exceptional example

 ZenCash

Granger causality?



Looks like **we haven't struck gold.** BUT:



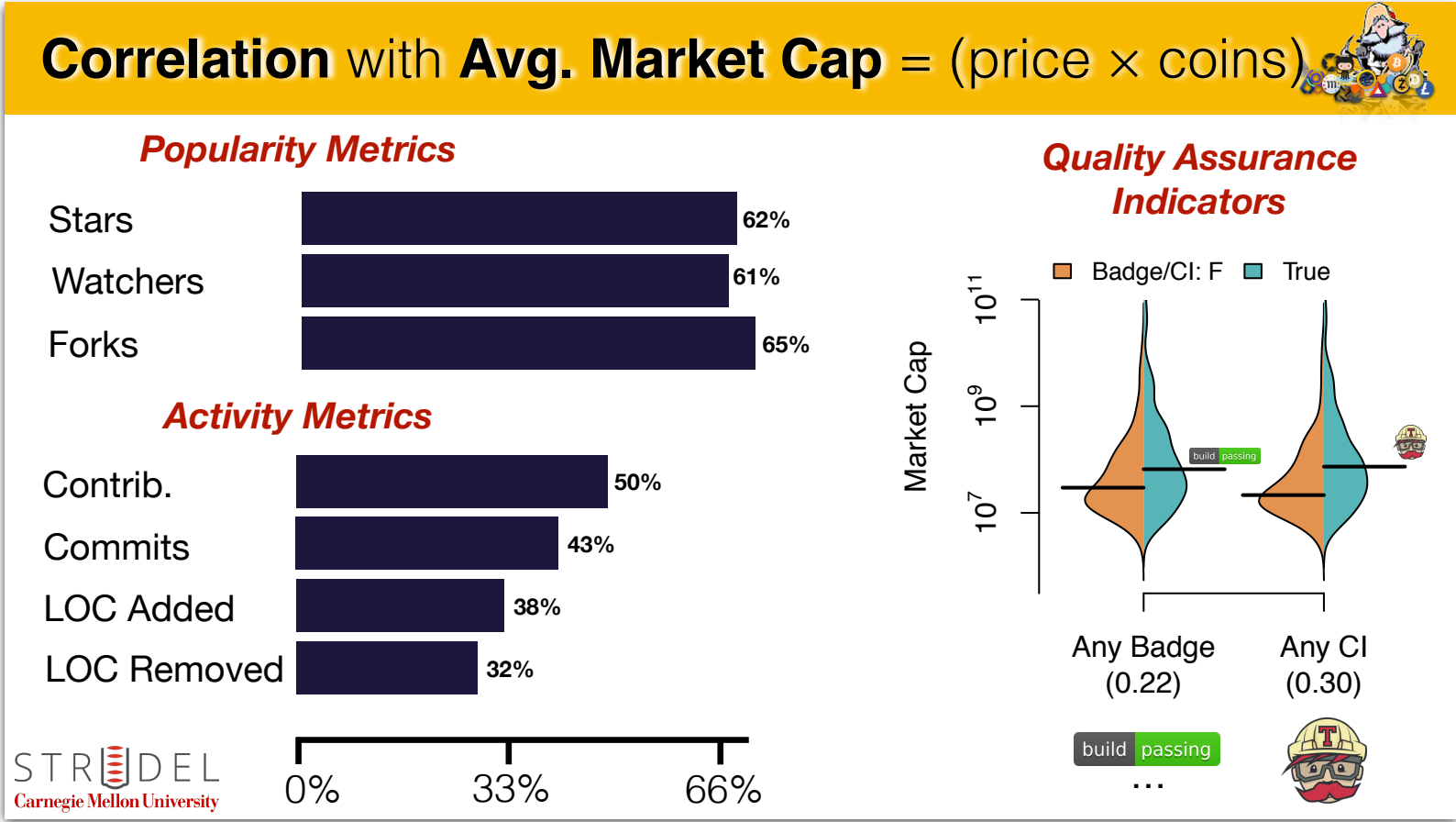
Future work

- Multi-year trends
- Sophisticated models
- Volatility or volume

Check out
econometric
techniques
for future studies!

Contact
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Long-term: Signals of Pop. & QA



Short-term: Very limited evidence

