

Analysis of Ethereum

Background

The price-to-earnings or P/E ratio is an important index for valuing traditional financial sectors such as corporations and equities. P/E ratios are utilized by a variety of investors to analyze the value of a company's shares. This metric can also be highly useful for comparison against historical performance, can help to account for volatility over time, and has become commonly studied by value investors. The blockchain economy lacks an organized set of tools that can be used to inspect asset values. This proposal highlights the idea of employing a form of price-to-revenue analysis on the Ethereum blockchain in order to generate a value assessment for the token Ether (ETH).

Methodology

The Ethereum blockchain operates using a transaction fee system and has utilized two consensus mechanisms throughout its history (Proof of Work and Proof of Stake). In order to conduct a transaction on the Ethereum blockchain users must purchase ETH to pay fees. These transactions are what gives Ethereum a use case and thus what gives ETH inherent economic value. The amount of fee required to complete a transaction is known as gas. Multiplying the daily total amount of gas used in transactions by the average daily gas price gives a daily total fee revenue for the Ethereum blockchain in terms of ETH. If this value is then multiplied by the daily average price of ETH in US dollars (USD), this will produce a daily total fee revenue for the Ethereum blockchain in terms of USD. The daily average ETH revenue in USD can be annualized by multiplying by 365. These values will be used as the revenue portion of the ratio. In order to calculate the price component of the ratio, the daily ETH market cap value can be generated. This value can be found by multiplying the daily average ETH price by the daily total ETH supply on that day. In order to calculate the daily PR ratio for ETH, one can simply divide the daily market cap of the ETH token by daily annualized revenue values from ETH transaction fees. This process was conducted using a self-produced MATLAB program (shown below).

MATLAB Code

```
%%% Created by: Maxwell Tardif, Date: 11/22/2022
```

```
%%% This section of code reads the ETH daily average gas price file, saves it into a matrix, saves the  
daily average gas prices into a separate matrix,
```

```
%%% then divides by one billion to change units from wei to gwei, and again for gwei to eth
```

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```
agpdata = readtable('export-AvgGasPrice.csv');  
dvalwei = agpdata.Value_Wei_(1:end);  
dvalgwei = (1/1000000000) * dvalwei;  
dgvaleth = (1/1000000000) * dvalgwei;
```

%%% This section of code reads the daily gas used file, saves it into a matrix, and then saves the daily gas used into a separate matrix

```
dgudata = readtable('export-GasUsed.csv');  
gasused = dgudata.Value(1:end);
```

%%% This section of code reads the daily average ETH price file, and saves the daily ETH price into a separate matrix

```
depdata = readtable('export-EtherPrice.csv');  
ethprice = depdata.Value(1:end);
```

%%%Calculates daily market cap in terms of USD

```
dethmsupp = readtable('export-Ethersupply');  
supply = dethmsupp.Value(1:end);  
dmcap = ethprice .* supply;
```

%%%Calculates daily revenue in terms of ETH and USD as well as annualized revenue based off of each daily marketcap

```
dethrev = dgvaleth .* gasused;  
usdethrev = (dgvaleth .* gasused) .* ethprice;  
annualusdrev = 365 * (usdethrev);
```

%%%Calculates daily PR ratio

```
ethpr = dmcap ./ annualusdrev;
```

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%%Plots daily revenue in terms of ETH and USD as well as daily Profit-Revenue ratio over the entire history of the Ethereum blockchain/over specific time frames

```
figure(1); clf
x = length(dethrev);
y = linspace(1,x, 2672);
plot(y, dethrev)
xlabel("Days since genesis of network (through 11/22/2022)")
ylabel("Daily revenue (ETH)")
title("Daily Ethereum revenue in ETH over time (-MRT)")
```

```
figure(2); clf
plot(y, usdethrev,"g")
xlabel("Days since genesis of Ethereum network (through 11/22/2022)")
ylabel("Daily blockchain revenue (USD)")
title("Daily Ethereum revenue in USD over time (-MRT)")
```

```
figure(3); clf
plot(y, ethpr, "r")
xlabel("Days since genesis of network (through 11/22/2022)")
ylabel("Daily blockchain PR ratio")
title("Daily ETH PR Ratio over time (-MRT)")
```

```
figure(4); clf
plot(y(1000:end),ethpr(1000:end), "cy")
xlabel("Days (From 1000 days after genesis through 11/22/2022)")
ylabel("Daily blockchain PR ratio")
title("Daily ETH PR Ratio (1000 days after genesis through November, 2022 -MRT)")
```

```
figure(5); clf
subplot(5,1,1)
plot(y, dethrev)
```

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```
xlabel("Days since genesis of network (through 11/22/2022)")
ylabel("Daily blockchain revenue (ETH)")
title("Daily Ethereum revenue in ETH over time (-MRT)")
subplot(5,1,2)
plot(y, usdethrev, "g")
xlabel("Days since genesis of network (through 11/22/2022)")
ylabel("Daily blockchain revenue (USD)")
title("Daily Ethereum revenue in USD over time (-MRT)")
subplot(5,1,3)
plot(y, ethpr, "r")
xlabel("Days since genesis of network (through 11/22/2022)")
ylabel("Daily blockchain PR ratio")
title("Daily ETH PR Ratio over time (-MRT)")
subplot(5,1,4)
plot(y(1000:end),ethpr(1000:end), "cy")
xlabel("Days (From 1000 days after genesis through 11/22/2022)")
ylabel("Daily blockchain PR ratio")
title("Daily ETH PR Ratio (1000 days after genesis through November, 2022 -MRT)")
```

```
figure(6); clf
subplot(6,1,1)
plot(y, dethrev)
xlabel("Days since genesis of network (through 11/22/2022)")
ylabel("Daily blockchain revenue (ETH)")
title("Daily Ethereum revenue in ETH over time (-MRT)")
subplot(6,1,2)
plot(y, usdethrev, "g")
xlabel("Days since genesis of network (through 11/22/2022)")
ylabel("Daily blockchain revenue (USD)")
title("Daily Ethereum revenue in USD over time (-MRT)")
```

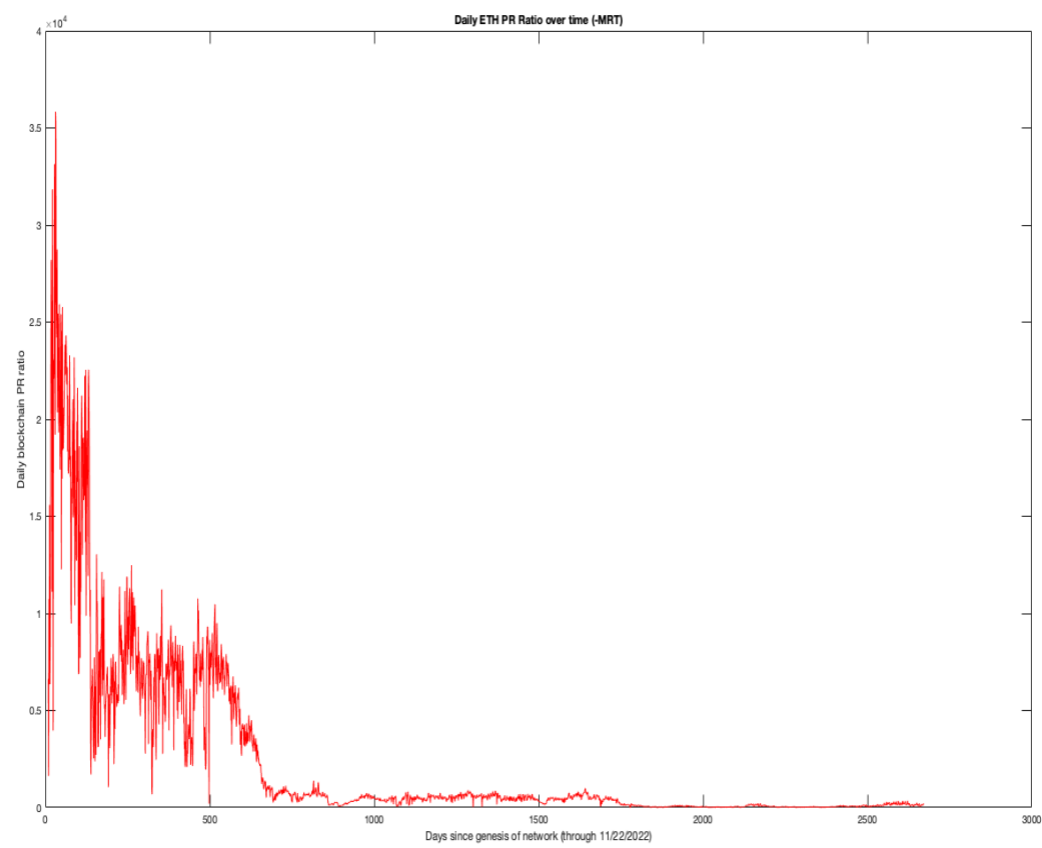
```
figure(7); clf
subplot(7,1,1)
```

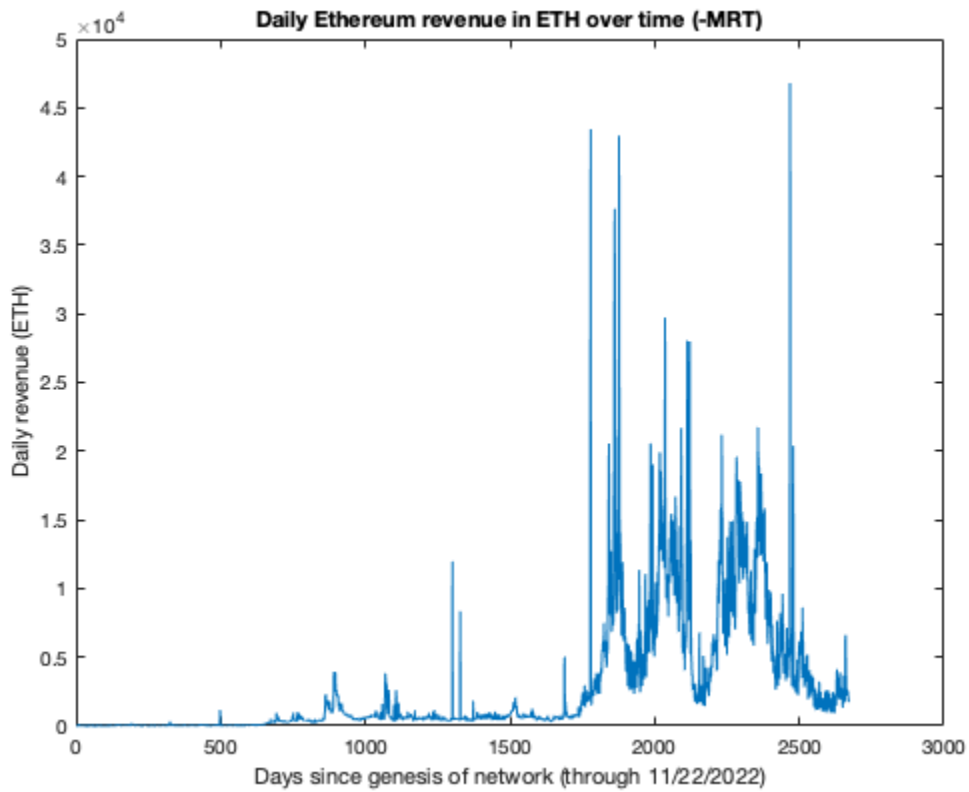
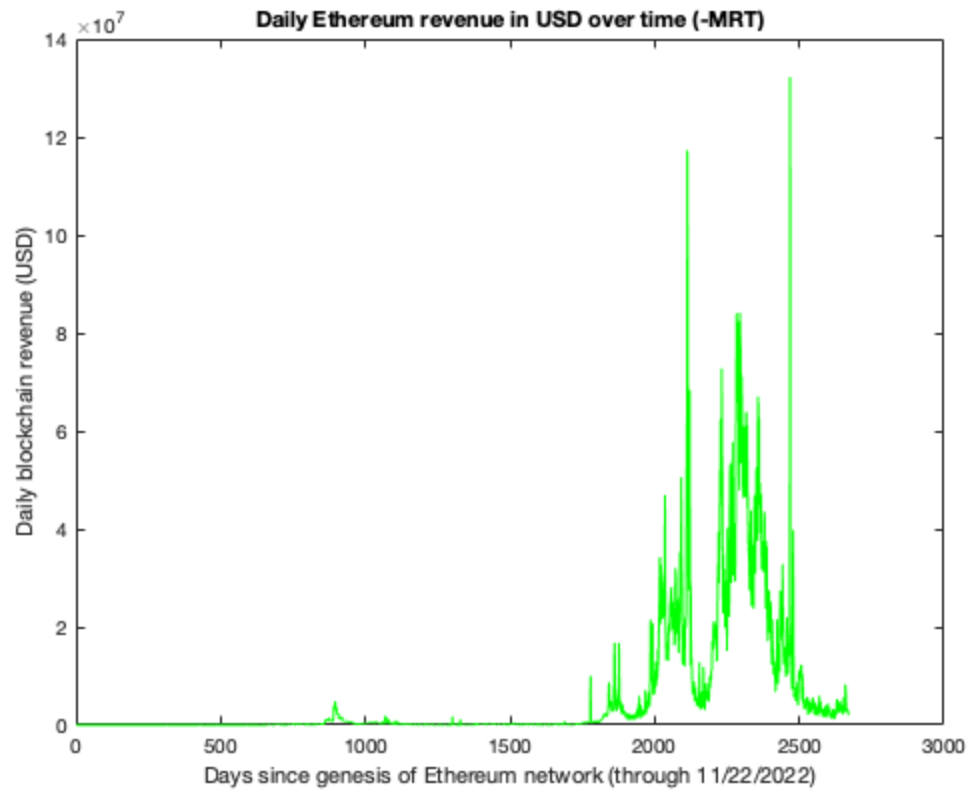
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```
plot(y, ethpr, "r")
xlabel("Days since genesis of network (through 11/22/2022)")
ylabel("Daily blockchain PR ratio")
title("Daily ETH PR Ratio over time (-MRT)")

subplot(7,1,2)
plot(y(1000:end),ethpr(1000:end), "cy")
xlabel("Days (From 1000 days after genesis through 11/22/2022)")
ylabel("Daily blockchain PR ratio")
title("Daily ETH PR Ratio (1000 days after genesis through November, 2022 -MRT)")
```

Data and Figures





Conclusion

The data displayed in Daily ETH PR Ratio graph over the entire history of the Ethereum blockchain displays many important trends about ETH as a financial asset. For the early history of the system, the price to revenue ratio was extremely high, with values in the tens of thousands. This makes logical sense as ETH prices were widely based on extreme speculation, with little to no value being generated in fee revenue on a daily basis. As the Ethereum blockchain matured to conduct more transactions on a daily basis, the PR ratio decreased significantly as the revenue generated from fees increased greatly in proportion to the increases in ETH prices. In this period starting roughly three years after the creation of Ethereum, the ETH price-to-revenue ratio decreased significantly to a value of several hundred. This value is similar to a PE ratio for a "growth" stock. The PR metric for ETH helps to reinforce the notion of ETH as a mature financial asset and can also be useful for predicting ETH price depending on the amount of fee revenue generated.