Case analysis of EIP-1559 implementation on Polygon PoS and its potential impact on MATIC total supply

Introduction

EIP-1559 is said to be one of the biggest changes in the history of Ethereum. Previous to the London fork (EIP-1559 was deployed on August 5), the design of the new transaction fee mechanism was widely discussed for a few years by the core community, and meticulously modeled and simulated in the context of several academic-like initiatives.

Nearly three months have passed now since the deployment of these new features and we think that it's time to start seeing analytics initiatives using 1559-specific on-chain data, regarding the potential effects of the new mechanism on MATIC total supply over time, changes on validators incentives, UX improvements for transaction creators, increasing incentives for exploiting MEV opportunities, among others.

[Here](#) you can find our first report. It aims to introduce the goals, scope, assumptions, methodology approach, and results for EIP-1559 on Polygon PoS research project. Next, we offer a short summary of that report.

Goals

We present a best, base, and worst-case analysis of the potential impact of EIP-1559 on MATIC total supply. After proving the stationarity of our time series, we take static histograms and compute quantiles related to worst, base, and best case analysis. Our results offer annual estimates for the impact of MATIC burning on the total supply.

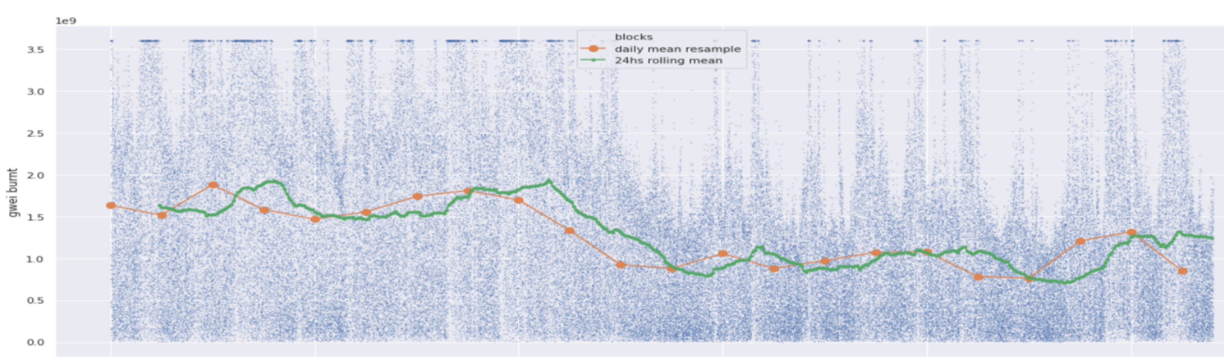
We use ETH burnt / tx_fee ratio observed distribution as a proxy for the estimated distribution of expected ratios on Polygon PoS. From real data ETH ratio distribution, we take quantiles .05, .25, .5, .75, and .95 for best-best, best, median, worst, and worst-worst case analysis. In this context, the less MATIC we burn the better (in terms of total MATIC supply impact).

Then, we summarize and compute descriptive statistics over the distribution of daily tx fees from the Polygon dataset limited to the September time window. We use the following stats as the potential parameters for worst and best analysis, and intermediate cases: min, max, mean, median, .25, and .75 quantiles.

Finally, we get a matrix of the spectrum from best to worst cases combining burn/tx_fee ratio cases from Ethereum data and the stats set from Polygon PoS data.

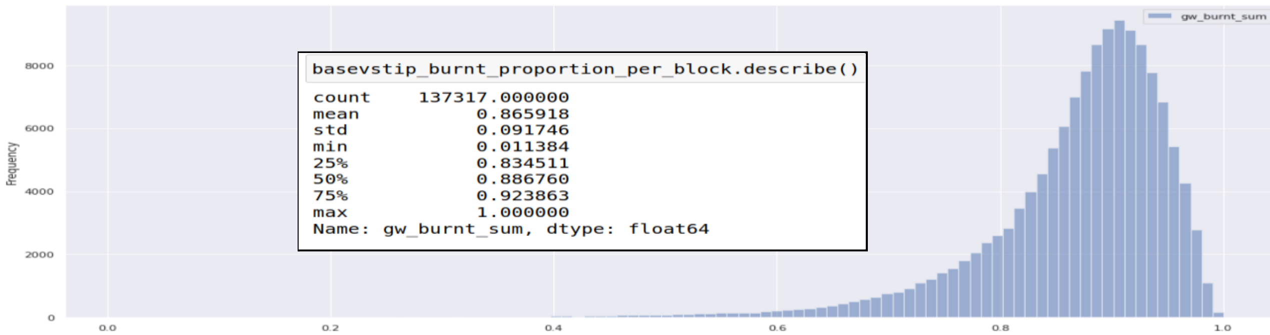
Exploratory Data Analysis and Stationarity Test

Although there seems to be a moderated downtrend of burnt Gwei signal in September, this does not affect the stationarity of the series as it is proved next.

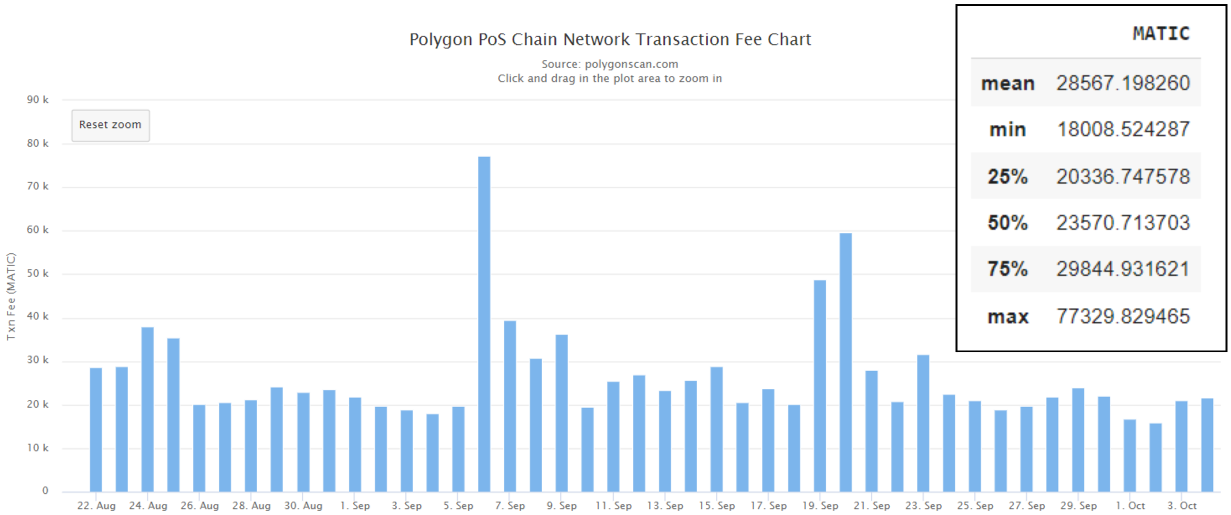


We use the Augmented Dickey-Fuller (ADF) method, to test for a unit root in a univariate process in the presence of serial correlation. We take the static histogram of the observed distribution of burnt/tx_fee ratios on Ethereum.

The observed distribution of ETH burnt / tx_fee ratio and MATIC tx_fee



We also include MATIC tx_fee time series, so we can use the computed statistics:



	MATIC
mean	28567.198260
min	18008.524287
25%	20336.747578
50%	23570.713703
75%	29844.931621
max	77329.829465

Results:

Here we show the most important results. Keep in mind that these estimates are our first attempt to quantify the actual behavior of the Polygon PoS networks after deploying EIP-1559, and they should be interpreted as rough predictions since there is still very limited availability of specific EIP-1559 real data.

First, we offer an estimated set of case results for annualized MATIC burning to throw some light over our main question. **What is the impact of EIP-1559 on MATIC total supply per year?**

Case analysis of annualized MATIC burnt

MATIC_tx_fee_stats	annual_tx_fees	annual_burn_bestbest_case	annual_burn_best_case	annual_burn_mean_case	annual_burn_median_case	annual_burn_worst_case	annual_worstworst_case
mean	1.042703e+07	7.311922e+06	8.701469e+06	9.028951e+06	9.246271e+06	9.633145e+06	1.004645e+07
min	6.573111e+06	4.609375e+06	5.485334e+06	5.691775e+06	5.828772e+06	6.072654e+06	6.333199e+06
25%	7.422913e+06	5.205295e+06	6.194502e+06	6.427634e+06	6.582342e+06	6.857755e+06	7.151984e+06
50%	8.603311e+06	6.033046e+06	7.179557e+06	7.449761e+06	7.629072e+06	7.948280e+06	8.289298e+06
75%	1.089340e+07	7.638964e+06	9.090662e+06	9.432791e+06	9.659831e+06	1.006401e+07	1.049580e+07
max	2.822539e+07	1.979297e+07	2.355440e+07	2.444087e+07	2.502914e+07	2.607639e+07	2.719519e+07

Case analysis of the annualized impact on MATIC Total Supply, in percentages

MATIC_tx_fee_stats	annual_tx_fees	annual_burn_bestbest_case	annual_burn_best_case	annual_burn_mean_case	annual_burn_median_case	annual_burn_worst_case	annual_worstworst_case
mean	0.104270	0.073119	0.087015	0.090290	0.092463	0.096331	0.100465
min	0.065731	0.046094	0.054853	0.056918	0.058288	0.060727	0.063332
25%	0.074229	0.052053	0.061945	0.064276	0.065823	0.068578	0.071520
50%	0.086033	0.060330	0.071796	0.074498	0.076291	0.079483	0.082893
75%	0.108934	0.076390	0.090907	0.094328	0.096598	0.100640	0.104958
max	0.282254	0.197930	0.235544	0.244409	0.250291	0.260764	0.271952

Case analysis of daily MATIC burnt

MATIC_tx_fee_stats	daily_tx_fees	daily_burn_bestbest_case	daily_burn_best_case	daily_burn_mean_case	daily_burn_median_case	daily_burn_worst_case	daily_burn_worstworst_case
mean	28567.198260	20032.662079	23839.641188	24736.851183	25332.248729	26392.177486	27524.524091
min	18008.524287	12628.423631	15028.311611	15593.905334	15969.238997	16637.409273	17351.231159
25%	20336.747578	14261.083229	16971.239558	17609.955789	18033.814282	18788.368627	19594.476628
50%	23570.713703	16528.892272	19670.019863	20410.305269	20901.566084	21776.110274	22710.406224
75%	29844.931621	20928.668765	24905.923732	25843.263500	26465.291565	27572.628063	28755.621462
max	77329.829465	54227.310923	64532.593317	66961.291271	68572.999577	71442.168239	74507.368020

Conclusions

Under the assumption that ETH burn ratio is a valid proxy for MATIC burn ratio - both metrics computed as a function of tx_fee - and taking into consideration the constrained time window of the sampled data, our analysis implies that in the worst case of all scenarios evaluated, the annualized burnt MATIC represents a 0.27% of the total supply.