



An analysis of LAND in The Sandbox: Q4 2022

BRL Research Note #2

November 22th, 2022

Background, data and methods

Background

Digital real estate in the form of digital parcels of LAND in virtual worlds such as The Sandbox is **emerging as a new asset class** and may represent a significant aspect of future digital social interaction, identity on the internet, the metaverse and financial markets. Virtual LAND owners can build on it, use it, sell it or rent it out, making it a basis for their virtual presence.

LAND in The Sandbox is transparently represented on public blockchains by means of so-called Non-fungible Tokens (NFTs), which ensures that each parcel cannot be copied and can be clearly assigned where they are located in the metaverse. As a blockchain token, **LAND is also comparatively easy to acquire and manage in a personal wallet**. Acquisition can take the form of primary sales direct from The Sandbox or secondary trading on decentralized exchanges.

As LAND is a new asset class, there is understandably (still) a **strong need to better understand the phenomenon**, and fact-based evidence can help. The objective of this research note is to analyze LAND sales in the leading virtual world of The Sandbox based on statistical methods and to uncover empirical evidence that will assist in **better understanding the asset class** and **better assessing potentials and challenges**.

Data and methodology

We extract a **historical snapshot of all LAND sales** until November 9th, 2022 using the NFTPort and Flipside Crypto APIs. Data includes, among other things, timestamp, involved blockchain addresses, transaction hash, token IDs and prices paid in USD and ETH. Processing this snapshot, we are able to calculate daily LAND statistics, including metrics such as pricing, returns, volume and more.

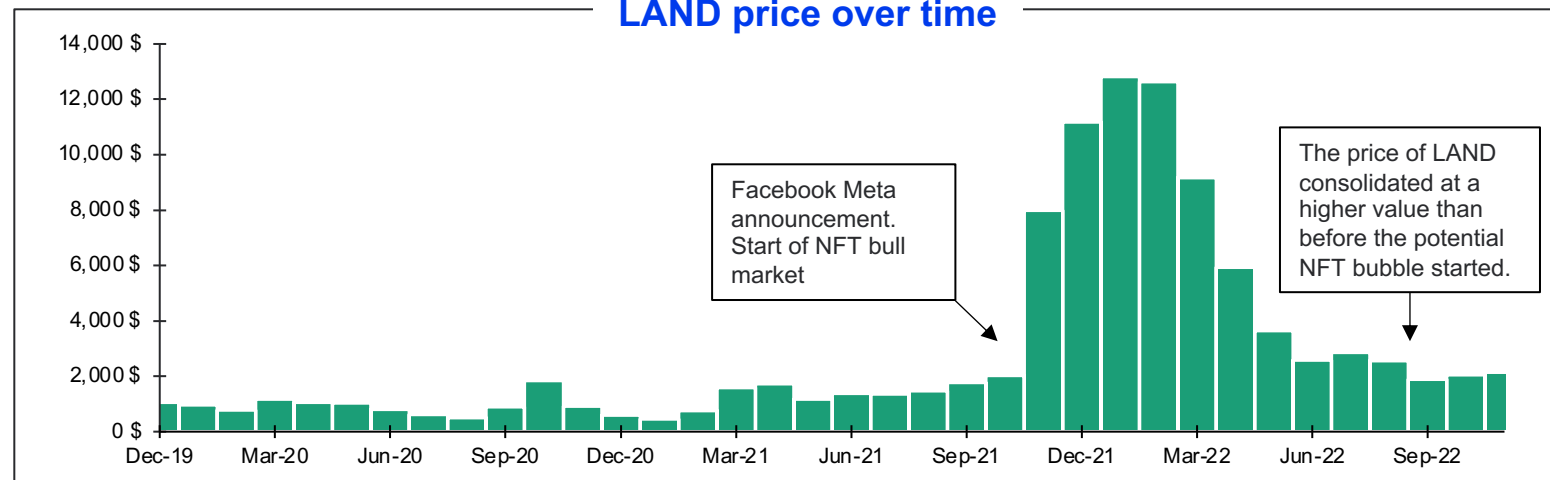
The Sandbox virtual world consists of a square map with a maximum of 166,464 LAND parcels (408 x 408). To assess how the internal characteristic of location in the virtual world affects LAND prices, we identify the **coordinates of high-profile LAND owners** on the map to analyze how geographic proximity to such LANDs affects the pricing of (nearby) other LANDs that are sold. For example, the *Bored Apes Yacht Club* (BAYC) NFT project has an estate that includes the coordinates -78, 168. Using the outer edges of each high profile ESTATE (i.e. multiple LANDs) as a basis, we calculate the Manhattan Distance as the sum of absolute differences to the LAND sold as $D(x,y)=\sum_{i=1}|x_i-y_i|$. Thus, the Manhattan Distance represents the distance between “city blocks” in the virtual world of The Sandbox. This allows us to **assess geographic proximity as a factor for LAND pricing**.

The price of LAND has consolidated

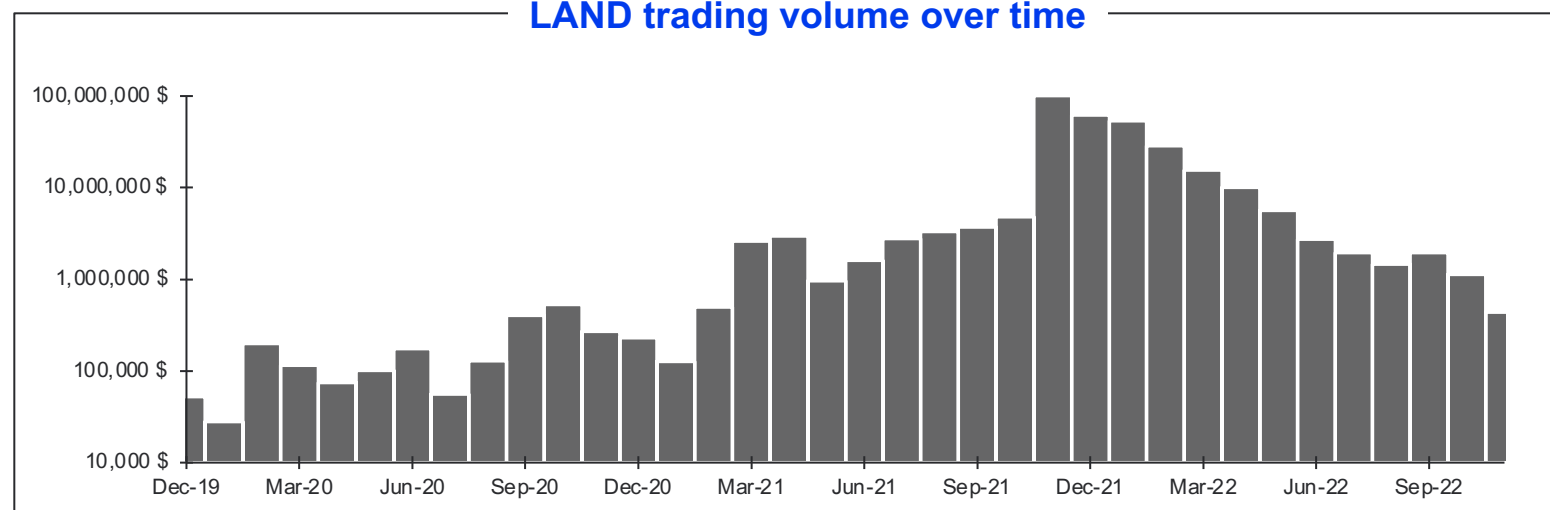
The **price of LAND has consolidated at a higher level than it was at the start of the market rally** potentially triggered by Facebook's rebranding to Meta in October 2021, with prices averaging between \$2,000 and \$2,200 per LAND after a cooling of the market for NFTs. This can be interpreted as a sign that LAND has been understood as an asset class and the market has registered the benefit of LAND as integral part of the virtual work of The Sandbox.

While LAND traded volumes are extremely far from the late 2021 high, LAND markets on decentralized marketplaces such as OpenSea continue to enjoy brisk trading. On average, **millions of dollars in LAND volumes continue to be traded each month**. Accordingly, LAND continues to be a liquid asset in the sandbox and owners are able to sell it comparatively easily or interested parties can find sufficient liquidity and offers on the secondary market to cover their needs.

LAND price over time



LAND trading volume over time

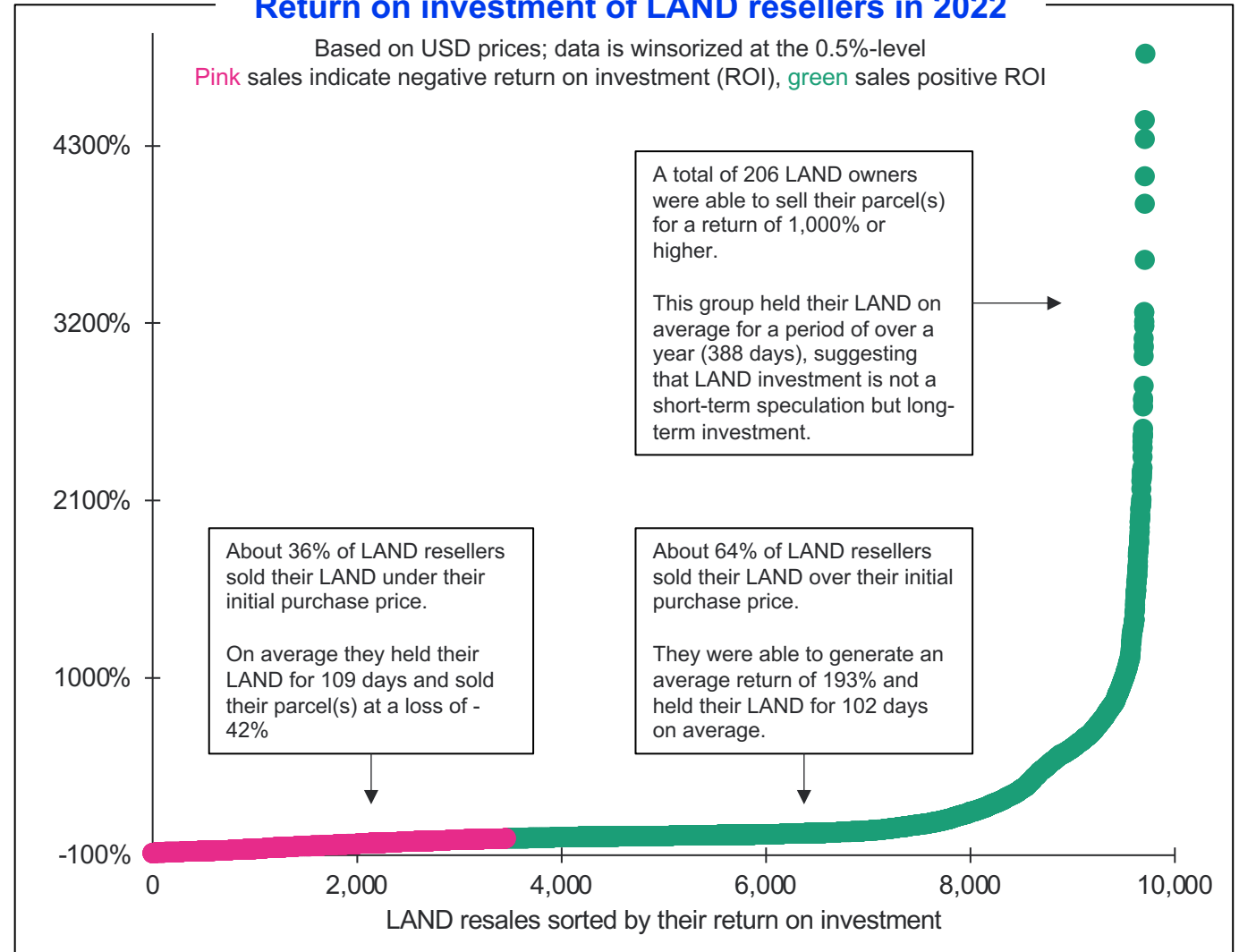


LAND resellers made an average return of 109%

In 2022, close to 10,000 digital parcels of LAND were resold in the Sandbox, which allows us to identify a previous and new market price for each parcel. This enables us to **determine the extent to which individual LAND investors were able to achieve positive or negative returns** and to calculate averages.

The figure on the right visualizes the returns achieved by all LAND resales in 2022. It shows that **less than half of resales generated a loss** and **the majority achieved positive returns**. **The average returns across all resales is 109%, the median is 15%**. As can be seen directly, some individual investors were able to achieve very high returns, as over 2,000 LAND sales generated returns of 100% or more. For the purpose of intuitive readability, the results are winsorized here, i.e. the 0.5% lowest and highest returns are excluded from the analysis. This is also the case since individual LAND sales achieved returns between 10,000% and 100,000%. These are outliers, which can be attributed to either extremely early LAND buyers or manual errors of users. Accordingly, they are not very significant for the overall economic classification of LAND resales.

Return on investment of LAND resellers in 2022



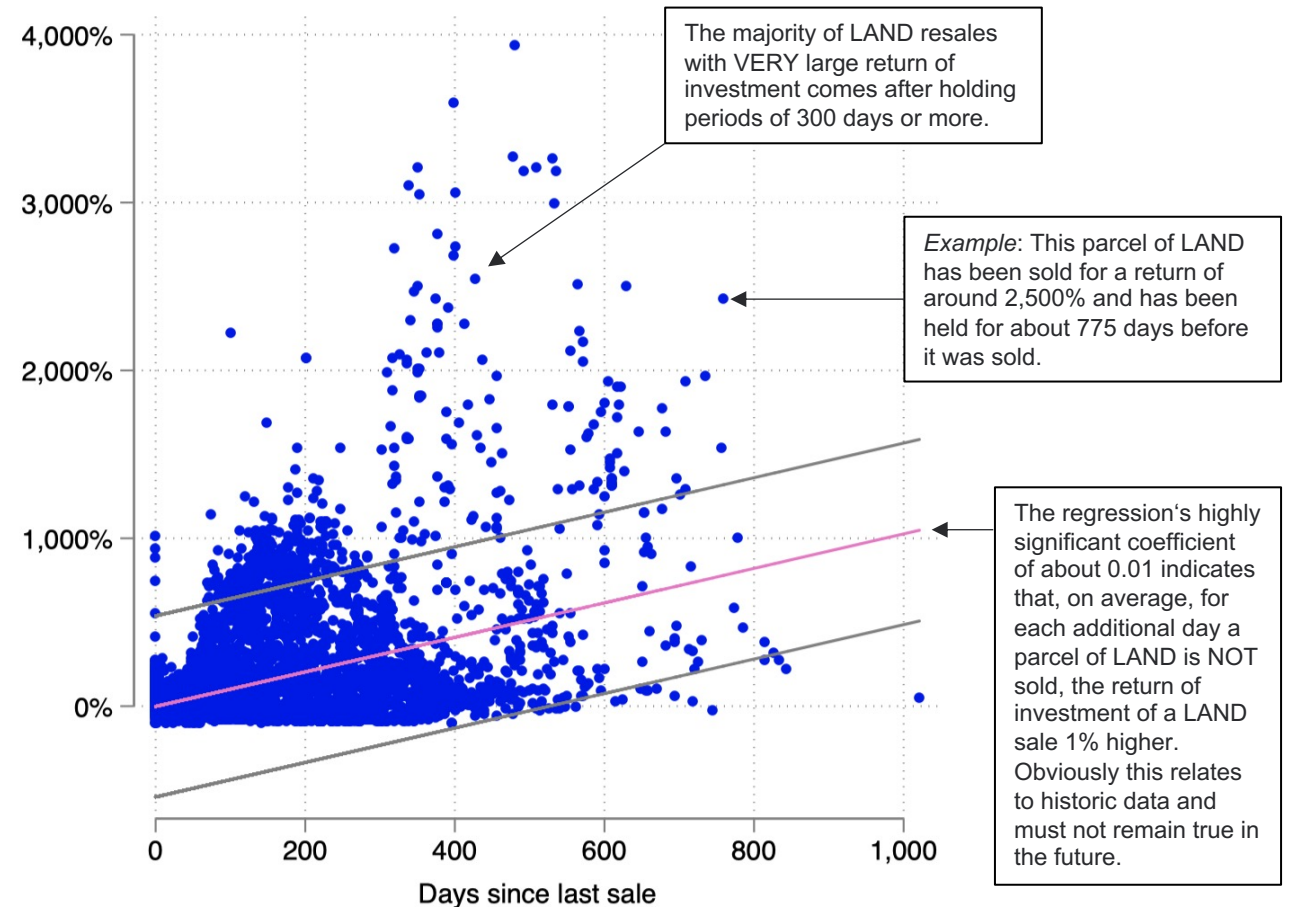
LAND long-term holding has historically paid off

This graphic shows **the relationship between returns from LAND resales in the year 2022 and the number of days the LAND has been held before its sale**. Each blue dot represents an individual sale of LAND, whereas the Y-axis indicates the return on investment of the sale and the x-axis indicates the number of days the LAND has been held by before it was sold. Using regression analysis, we are able to **estimate how a particular increase in the number of days held relates to the return on investment of a LAND resale**.

We identify a highly significant statistical correlation, indicating that, **historically, it paid off the hold LAND for longer periods**. For each additional day a LAND was held, the average return increased by about 1% (standard error 0.2%). This result indicates that **digital real estate may not be a short-term speculation but rather a type of investment that owners (should) hold on for longer periods**. Of course, the identified results may be influenced by various other factors. However, if one makes the connection to traditional real estate, the result seems logical. In most cases, it simply does not make sense to sell a piece of land or real estate within a very short time. Rather, these are long-term assets.

LAND resales versus days held in 2022

Based on USD prices; data is winsorized at the 0.5%-level

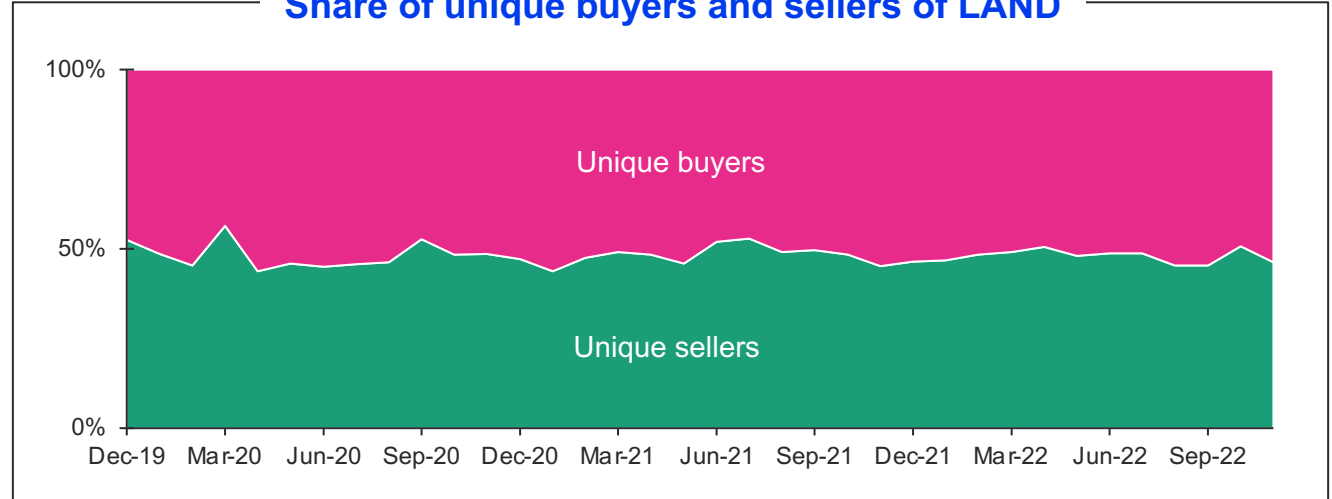


Active wallets show positive trend

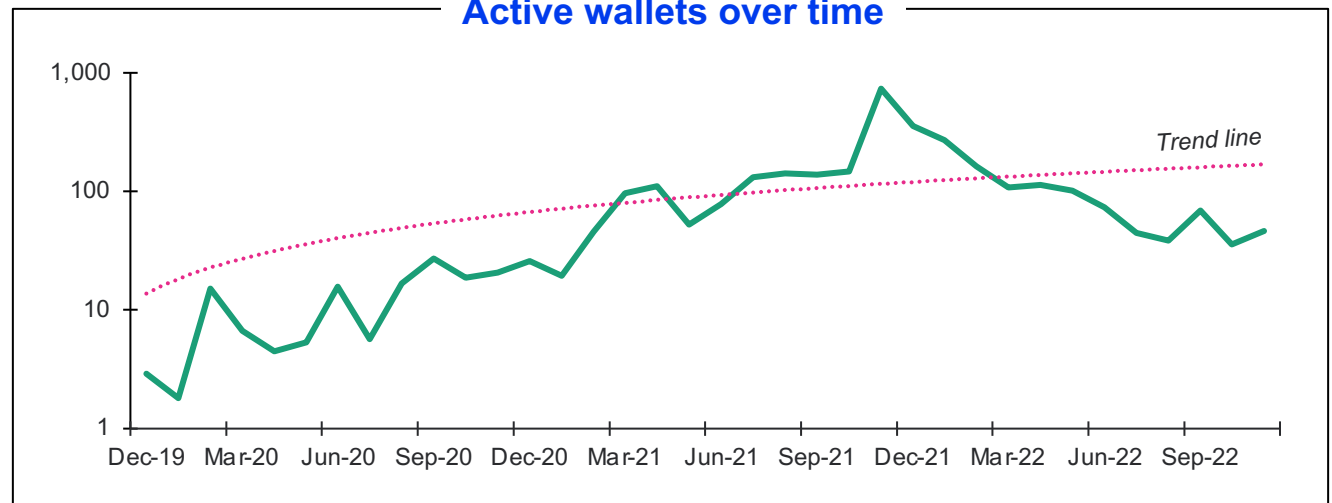
64% of LAND owners possess “only” one parcel of LAND, whereas about 2% of owners hold on to over 51 LANDs. With just over 30% (36,801) of all existing LAND, a blockchain address belonging to the company The Sandbox has the relatively largest share of LAND ownership. However, it can be assumed that this is LAND that will be sold on the primary market via auctions in the future. The next largest addresses own “only” 2.97% and 1.41% of all LAND – quite a low number for crypto assets. The high percentage of individuals with only one LAND parcel can be seen as an **indication of a healthy distribution**. Basically, the market is not characterized by a few extremely large LAND owners.

As visualized in the figure above, the ratio of buyers and sellers of LAND is roughly balanced over time, suggesting that no individual (large) market participants are accumulating or selling LAND on a large scale. Accordingly, supply is not centralizing, which can be interpreted as healthy for the still young market. Although the number of active wallets interacting with LAND is far from the high in December 2021, **a long-term increasing trend for the number of active wallets can be identified**.

Share of unique buyers and sellers of LAND



Active wallets over time

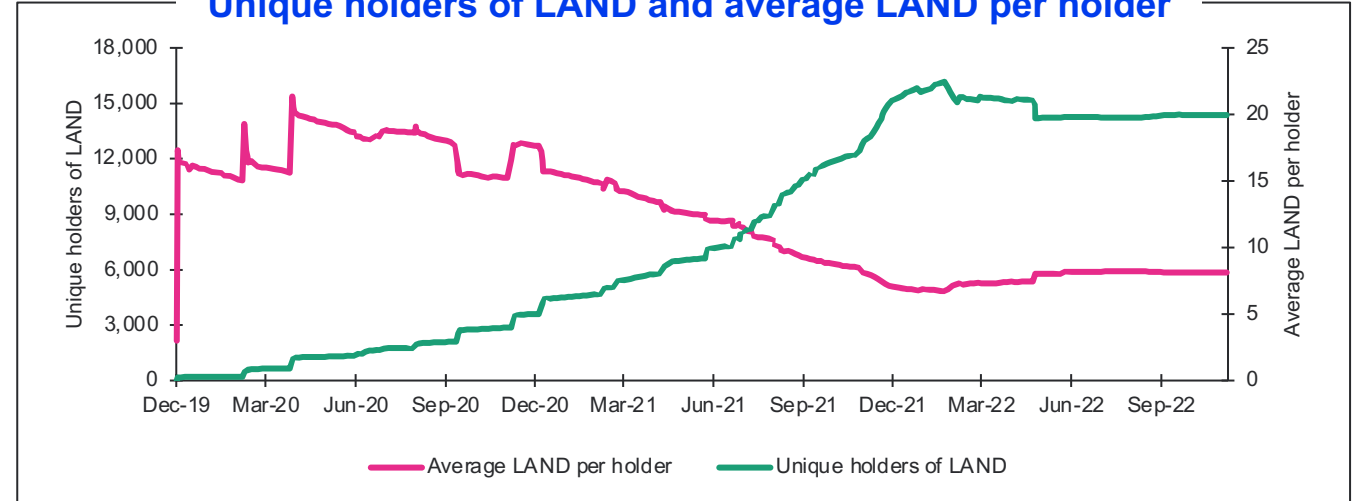


The average holder owns 8 parcels of LAND

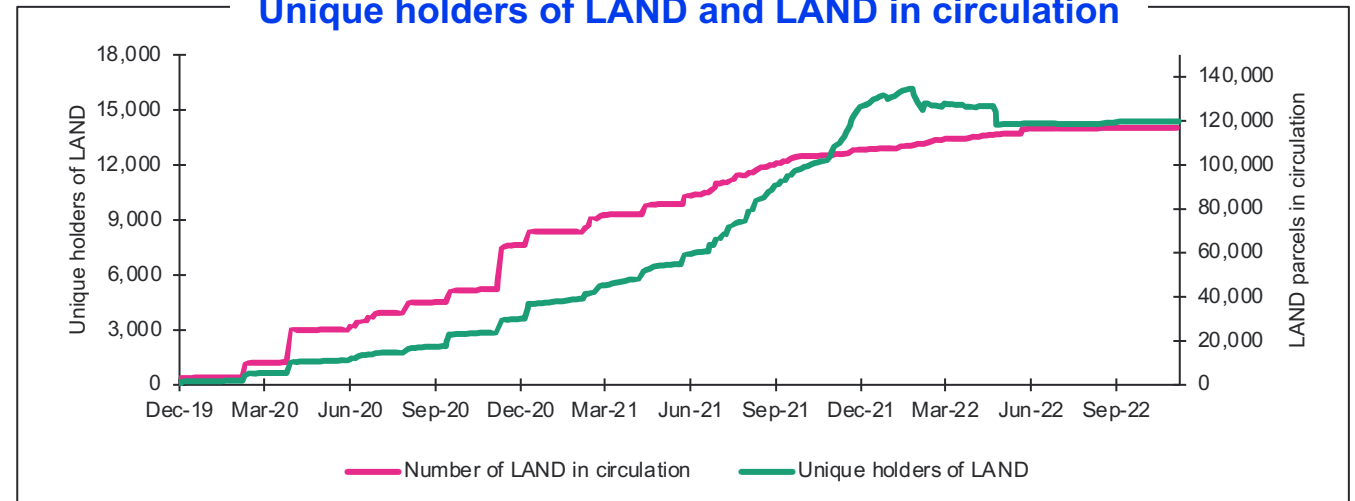
The first graph shows the average number of LAND parcels per owner and the total number of unique owners of LAND between December 2019 and November 2022. It can be seen that **the average number of LAND per owner is decreasing over time**. For example, the number was still 18 in mid-2020, dropped to 12 by mid-2021, and is only about 8 in November 2022. Accordingly, it can be concluded that **the degree of centralization of the still young asset class is decreasing over time**, which can be interpreted as positive for a long-term development.

The second graph visualizes the number of unique holders of LAND and shows the number of LAND in circulation. By November 2022, the approximately 116,850 LAND in circulation correspond to a share of about 70% of all LAND ever existing. Accordingly, it can be concluded that even if a large part of all LAND has already been auctioned, a large proportion remains unsold and **further auctions on the primary market can likely be expected in the future**. However, it is also apparent that the graph increases less steeply with time, suggesting that the sale of "new" LAND tends slow—which is logical, as The Sandbox likely wants to ensure a long-term supply on the primary market.

Unique holders of LAND and average LAND per holder



Unique holders of LAND and LAND in circulation

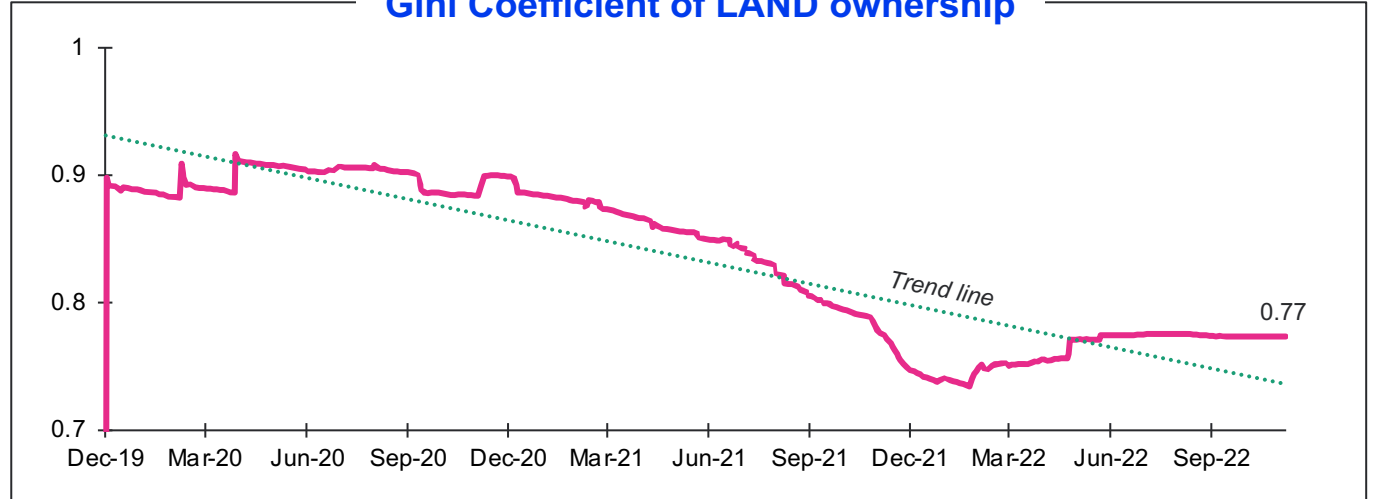


LAND distribution has become more equal over time

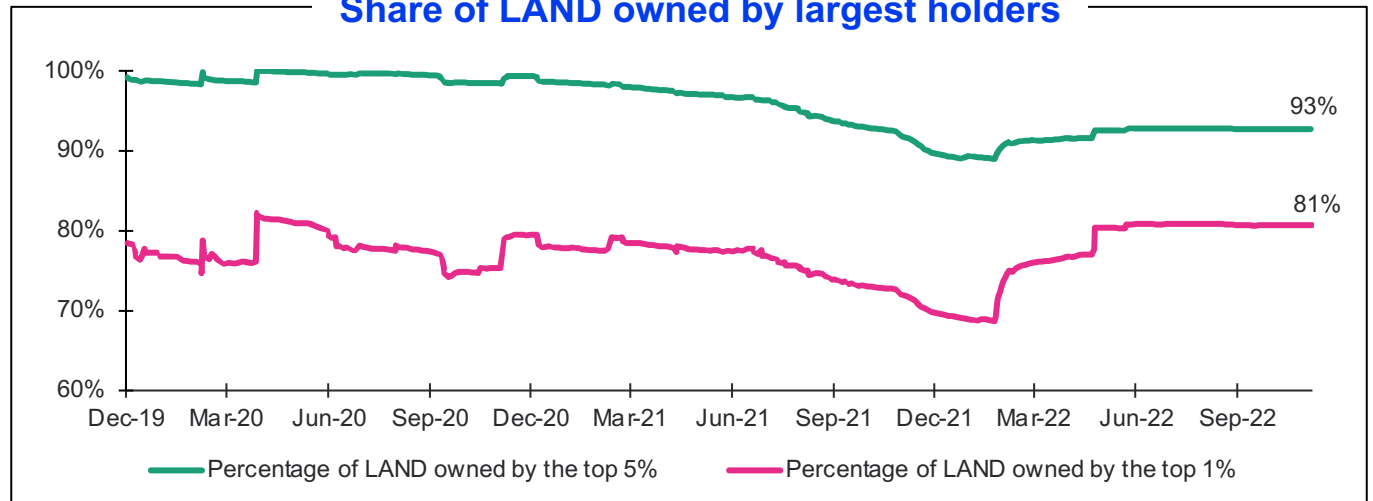
The upper graph visualizes the Gini Coefficient of LAND ownership over time. The **Gini Coefficient is a statistical measure that represents inequality** within a particular group (i.e. LAND owners). A level of 0 stands for perfect equality and a value of 1 for maximal inequality. The value in November 2022 is 0.77, which suggests that there is some degree of inequality, but this is a) standard for crypto assets and b) much higher for a wide range of crypto assets. For comparison, the average Gini Coefficient of the distribution of assets in the world is about 0.8. The most important finding is that the Gini Coefficient is decreasing over time, which means that **the distribution of LAND is reaching a higher level of evenly distribution over time**. This is basically a good sign, considering claims of crypto assets such as decentralization.

The second graph visualizes the percentage of all circulating LAND that is held by the 1% and 5% largest addresses. The figure intuitively illustrates that a lot of LAND is held by comparatively few holders, which is not an abnormality. The top 1% of owners hold 81% of the LAND, but for Ethereum, for example, this number is 95% (Bitcoin 90%; Dogecoin 98.5%).

Gini Coefficient of LAND ownership



Share of LAND owned by largest holders



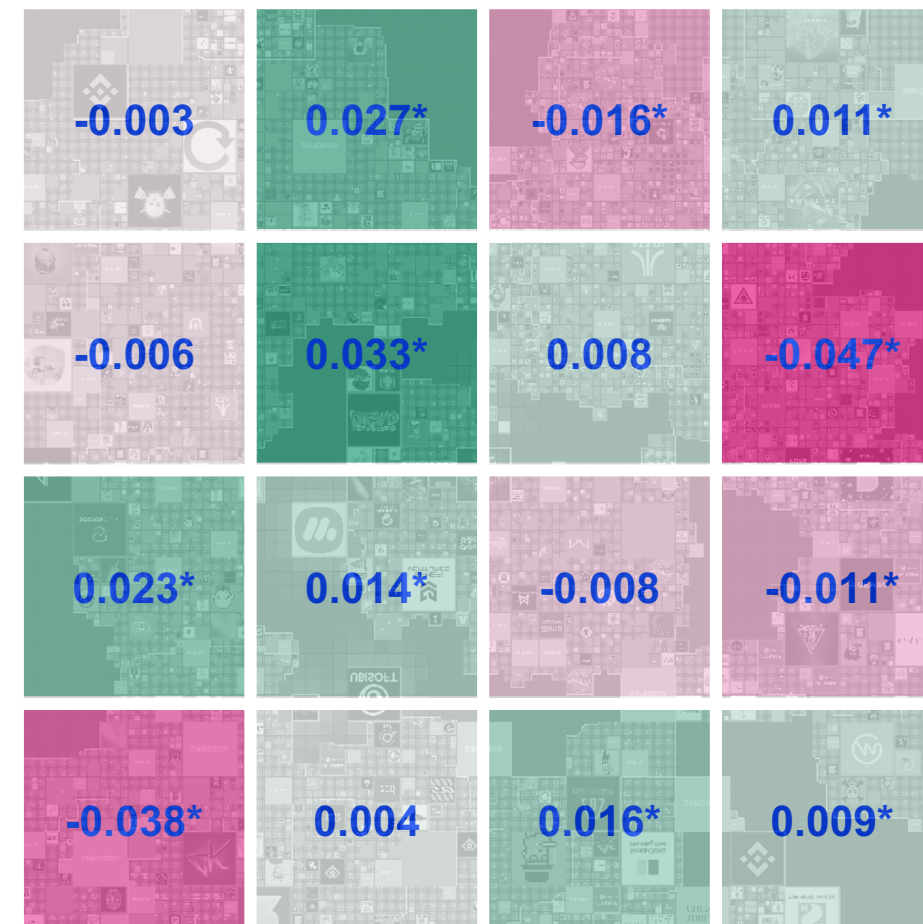
Location matters in the metaverse

Even though **there is no travel distance in the metaverse**, studies like the Blockchain Research Lab's recently published "LAND Ho" report show that the **location of LAND in virtual worlds does have an impact on the price** of the respective parcels. The adjacent table shows correlation coefficients between the price of LAND (log-transformed for statistical purposes) and the extent to which a given LAND is located in one of the sixteen quadrants. The numbers indicate the extent to which there is a statistical relationship between the two metrics. A positive (significant) value indicates that prices tend to be higher if the LAND is located in the respective quadrant, a negative value that prices tend to be lower. Accordingly, the results show that **it is by no means irrelevant where a respective LAND is located**. Similar to traditional real estate, location matters.

Of course, there are **plenty of possible reasons why a LAND at position x might fetch a higher price than at position y**. Just as with traditional real estate, the extent to which specific other parcels are located in the immediate vicinity, whether several parcels are directly connected and can form an ESTATE, or whether the currency in which LAND is purchased or paid for is currently worth "more" or "less" plays a role. Thus, volatility in the prices of Ether or SAND may cause LAND buyers to pay higher or lower USD values as they use these (volatile) currencies as a basis for calculation.

Correlations between LAND price and quadrant in The Sandbox

Log-transformed LAND prices in USD; an asterisk indicates statistical significance at the 5% level.

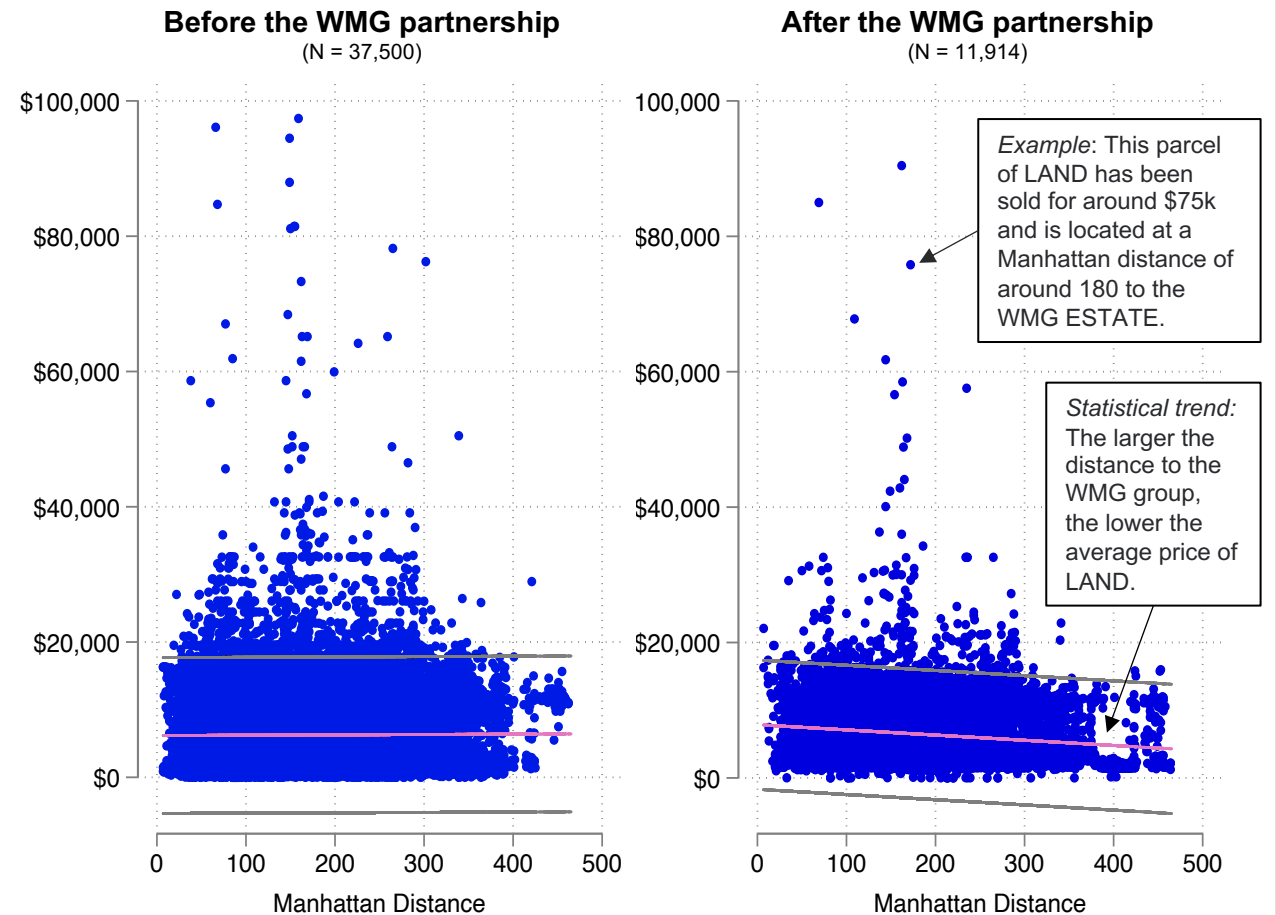


The arrival of Warner Music Group resulted in a price effect

The Sandbox has partnered with a plethora of brands, artists and companies that have or are creating themed worlds and experiences in the virtual world of The Sandbox. One of these is Warner Music Group (WGM), which announced its partnership in January 2021. WGM stated its plans to create a musical theme park and concert venue in The Sandbox, where concerts and musical experiences can be held.

The figure visualizes all LAND sales before (left) and after (right) the announcement of the partnership and the creation of the WGM ESTATE in the sandbox. Each blue dot represents a sale of LAND, with the y-axis representing the respective sales price in USD and the x-axis representing the Manhattan Distance to WGM's ESTATE. The pink line represents the coefficient of a linear regression, the gray lines visualize 95% confidence intervals. We find that before the partnership, geographic proximity to the location of the (future) ESTATE was insignificant, i.e. not really relevant. After the announcement, we identify a highly significant statistical relationship implying that **for every single point of distance further away from the WGM ESTATE, the price of LAND falls by an average of \$7.68** (95% confidence interval between -\$8.63 and -\$6.73).

LAND prices in relation to the distance the WGM ESTATE



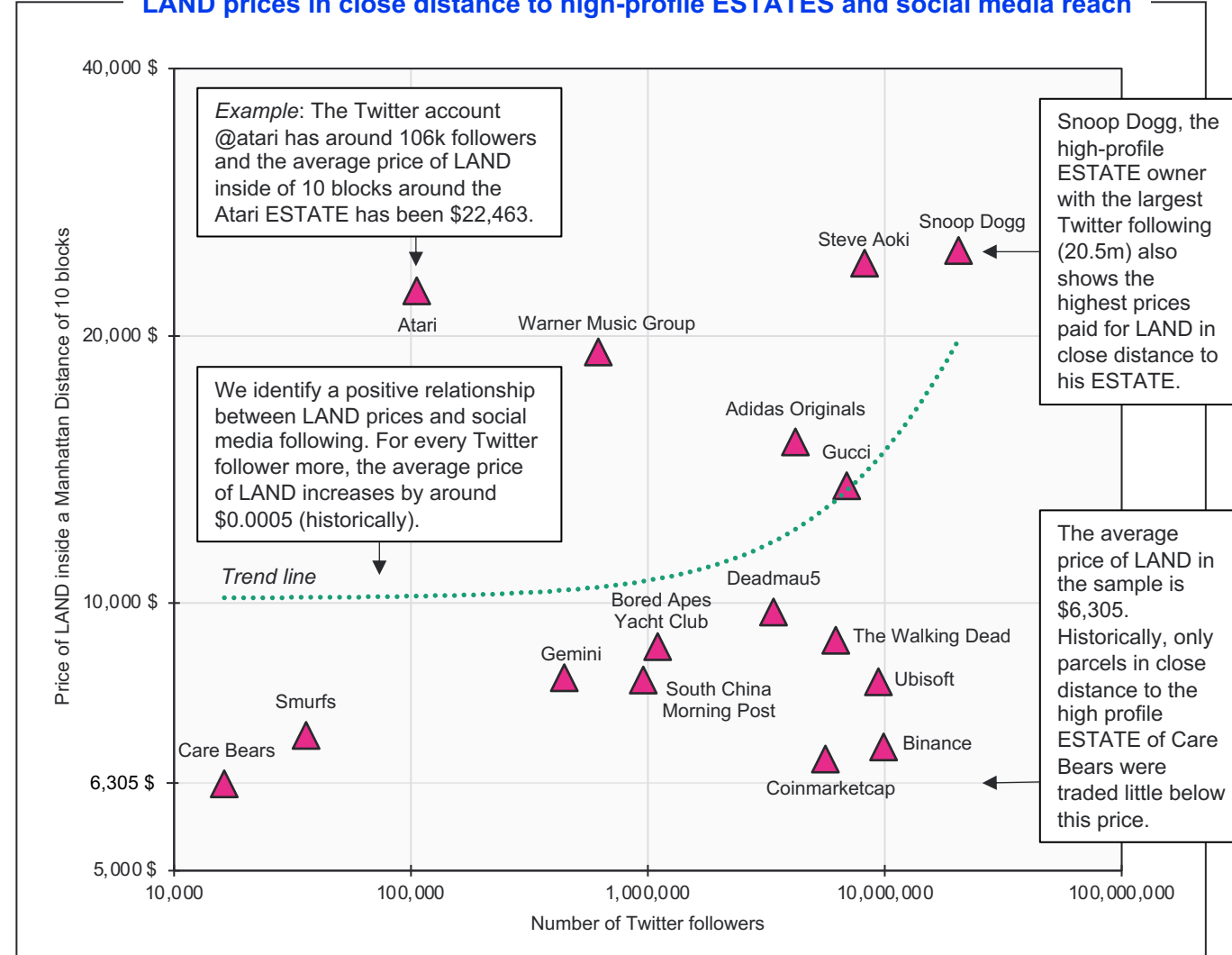
It paid to own LAND next to major brands and artists

The figure visualizes average LAND prices paid within a distance of 10 blocks around the ESTATES of the respective brands, companies or personalities as well as the number of Twitter followers of the respective high-profile entity. It can be seen that higher than average prices were paid for LAND around 15 out of 16 of the ESTATES, revealing that neighborhood effects or signaling effects are present. **Buyers see the proximity to well-known brands as a signal of quality** and are therefore **willing to pay higher prices**.

While we identify a generally **positive correlation between social media network size and LAND prices**, there are also many outliers. For example, effects of crypto-related companies seem comparatively lower (e.g. Binance, Coinmarketcap) than media personalities and companies. This may indicate that the **signaling effect is particularly high when the entity comes from a “foreign” sector**, i.e. represents a “surprise”.

Furthermore, the price effect is very high for Atari (“only” 106k followers). In addition to the effect just described, this may be due to the fact that Atari, as one of the first major brands in the sandbox, has an early mover advantage or has a high profile / reputation without a large social media presence.

LAND prices in close distance to high-profile ESTATES and social media reach



Discussion and outlook

Digital worlds with crypto economies like The Sandbox represent pioneers of the rapidly growing metaverse. Compared to centralized virtual worlds like Roblox or Second Life, the virtual world of The Sandbox helps to implement **the next step of empowerment of users and other stakeholders**. Users of the digital world of The Sandbox own their digital LAND, avatars or experiences and can trade, rent, transfer to other virtual worlds or use it in any other way. The combination of empowerment in the context of the creator economy, the financialization through crypto assets and the assurance of trust through the underlying blockchain technology represents a promising interplay of innovative approaches.

We have found that **the average LAND reseller has achieved a return on investment of over 100%**. Furthermore, our results suggest that digital real estate is not a short-term speculative opportunity, but rather **LAND should be viewed as a long-term investment** – similar to traditional real estate. **LAND's distribution is becoming more equitable over time**, which is a positive sign for the asset. In addition, we find that **brands and high-profile personalities in the virtual world are seen as a signal of quality**, leading to neighborhood effects around LAND prices.

Digital real estate in the form of **LAND represents an essential building block of innovative virtual worlds like The Sandbox**. Due to the underlying blockchain technology, it can be ensured that the maximum number of LAND is fixed, which represents a potential **scarcity or finite resource** similar to traditional real estate markets, gold or Bitcoin. As a non-inflationary asset, **LAND may consequently become a promising long-term investment and asset class**. If the metaverse and The Sandbox continue to grow, as the recently concluded Sandbox Alpha Season 3 with over 39k daily users and over 4.1 million wallets suggests, **demand for LAND may increase in the long term**. This may especially be the case considering that comparatively older non-blockchain-enabled virtual worlds the Roblox have over 50 million daily users. This can be seen as an indication that The Sandbox and **demand for LAND still has large growth potential**.

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We would like to thank The Sandbox for funding this study. Apart from the specification that the report should evaluate virtual land as a new asset class, based on data from The Sandbox, the sponsor did not influence the design or content of the study.



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