

Lecture 17

NFTs and Games

This Talk Will Answer Three Questions

- Are NFTs useful for game dev?
- Should you put NFTs in your game?
- Did I sell my *Black Lotus* too early?

This Talk Will Answer Three Questions

- Are NFTs useful for game dev?

Maybe yes

- Should you put NFTs in your game?

Absolutely not

- Did I sell my *Black Lotus* too early?

I needed the money

This Talk Will Not Answer

- Are cryptocurrencies a **scam**?
 - They certainly make scamming easy (see the video)
 - But different from saying everything is a scam
- Are cryptocurrencies **bad for the environment**?
 - **Proof of work** vs. **proof of stake** is relevant here
 - Must be addressed for crypto to be viable long-term
- What is the **best cryptocurrency platform**?
 - Most current game-related examples are on **Ethereum**
 - Note that Avalanche is from a former CS professor

This Talk Will Not Answer

- Are cryptocurrencies a **scam**?
 - They certainly make scamming easy (see the video)
 - But different from saying everything is a scam
- Are cryptocurrencies a **speculation**?
 - **Proof of** “In it for the tech”
 - Must be a **short-term** investment?
 - **Proof of** **work** **where**
 - **Proof of** **stake** **long-term**
- What is the **best cryptocurrency platform**?
 - Most current game-related examples are on **Ethereum**
 - Note that Avalanche is from a former CS professor

Quick Survey of Crypto

- A cryptocurrency is a **distributed system** that
 - Has no central authority; **consensus is distributed**
 - Has an associated set of tokens (**cryptocurrency**)
 - Defines how **new currency tokens** can be created
 - Tracks **individual ownership** of these tokens
 - Allows individuals to **transfer** token ownership
- Often include two other **optional features**
 - Currency tokens are **limited** and **deflationary**
 - Transactions are **append-only**, preserving history

How Is This Money?

- Money is anything that can **pay for goods/services**
 - Unlike barter, has **universal value** (not situational)
 - If we can **get people to accept it**, it is money
- There is a long history of **community currencies!**
 - German communities during the Weimar period
 - Company scrip in mining and logging camps
 - Even Ithaca in recent decades (Ithaca Hours, Ithacash)
- Only need a few things to be accepted
 - A community that agrees on the **value of the currency**
 - Transparent controls on how **new currency enters system**

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1
Ithacash)

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But Crypto Does Have Major Issues

- **Not universally accepted** for goods and services
 - Limited support for some "in-network" goods
 - NFTs are, in fact, an excuse to spend crypto
- Most people **buy in/cash out** in another currency
 - Makes crypto more of an **asset class**
 - Prevalent in the buy-and-hold mentality
- All crypto transactions **have (not so hidden) fees!**
 - Transfers incur a transaction cost (e.g. Gas fees)
 - Not unlike credit card fees, ATM withdrawals
 - But no way (e.g. **paper money**) to avoid the fees

But Crypto Does Have Major Issues

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- But no way (e.g. **paper money**) to avoid the fees

What Is Up With the Fees?

- Crypto is a **distributed consensus protocol**
 - If you transfer ownership, consensus must verify
 - This is done with voting (like most consensus protocols)
 - Voters must solve **hard crypto problems**
 - Need to incentivize the voters for **time, electricity**
- Crypto is a world where **everything is financialized**
 - To some degree the world works this way too
 - But companies try hard to **hide this from consumer**
 - Crypto is very in your face about it

These Fees Are a Major Problem

- Many cryptocurrencies are **intentionally deflationary**
 - There is a limit on the number of tokens available
 - As reach limit, mining is harder, **more expensive**
- Cost of currency gets more **expensive with demand**
 - But this currency is what the fees are paid in
 - Means the **cost of all transactions go up**
- **Example:** Ethereum Gas Fees
 - Pay for every financial transaction
 - Depend on **time of day** and **transaction speed**
 - Average price currently around \$50 per transaction

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Imagine that
on an ATM

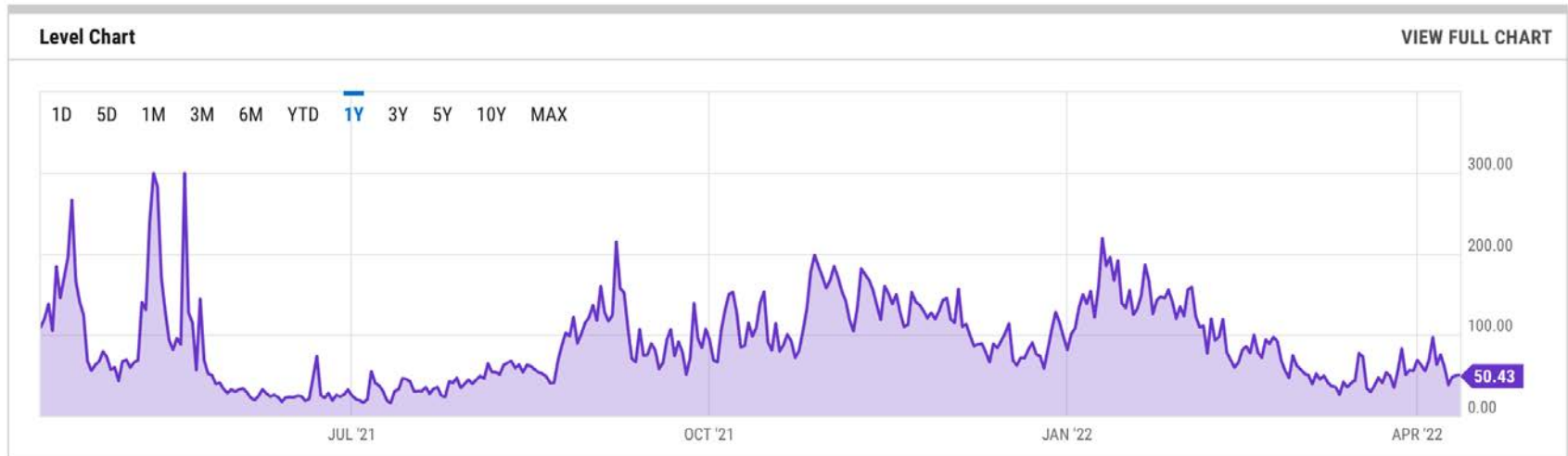
Ethereum Gas Fees

Ethereum Average Gas Price

50.43 Gwei for Apr 12 2022

Overview

Interactive Chart



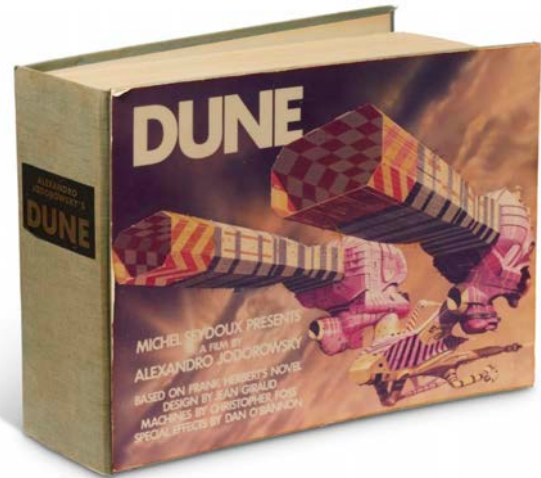
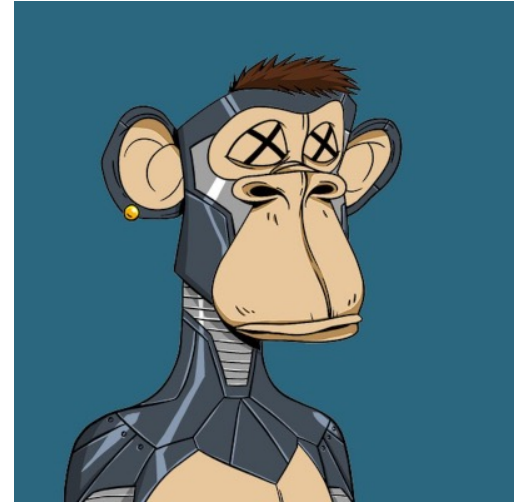
And it could be worse!

Smart Contracts and NFTs

- **Ethereum** generalized the notion of currency
 - No longer just a numeric token
 - Now actually a (small) **block of data**
 - This data can store **small programs**
- This led to the concept of a **smart contract**
 - Crypto framework guarantees you own something
 - But the code indicates what that ownership means
 - Money is a **certificate of ownership** (of something)

Nature of NFTs

- Digital ownership is about **rights**
 - Say you buy something (JPEG)
 - The NFT is not that something
 - It is your rights (copy, use, sell)
 - What rights depends on purchase
- NFTs are **not magical**
 - Rights exist in the “real world”
 - Done with traditional contracts
 - NFTs do not give new rights
 - Just a means to buy and sell

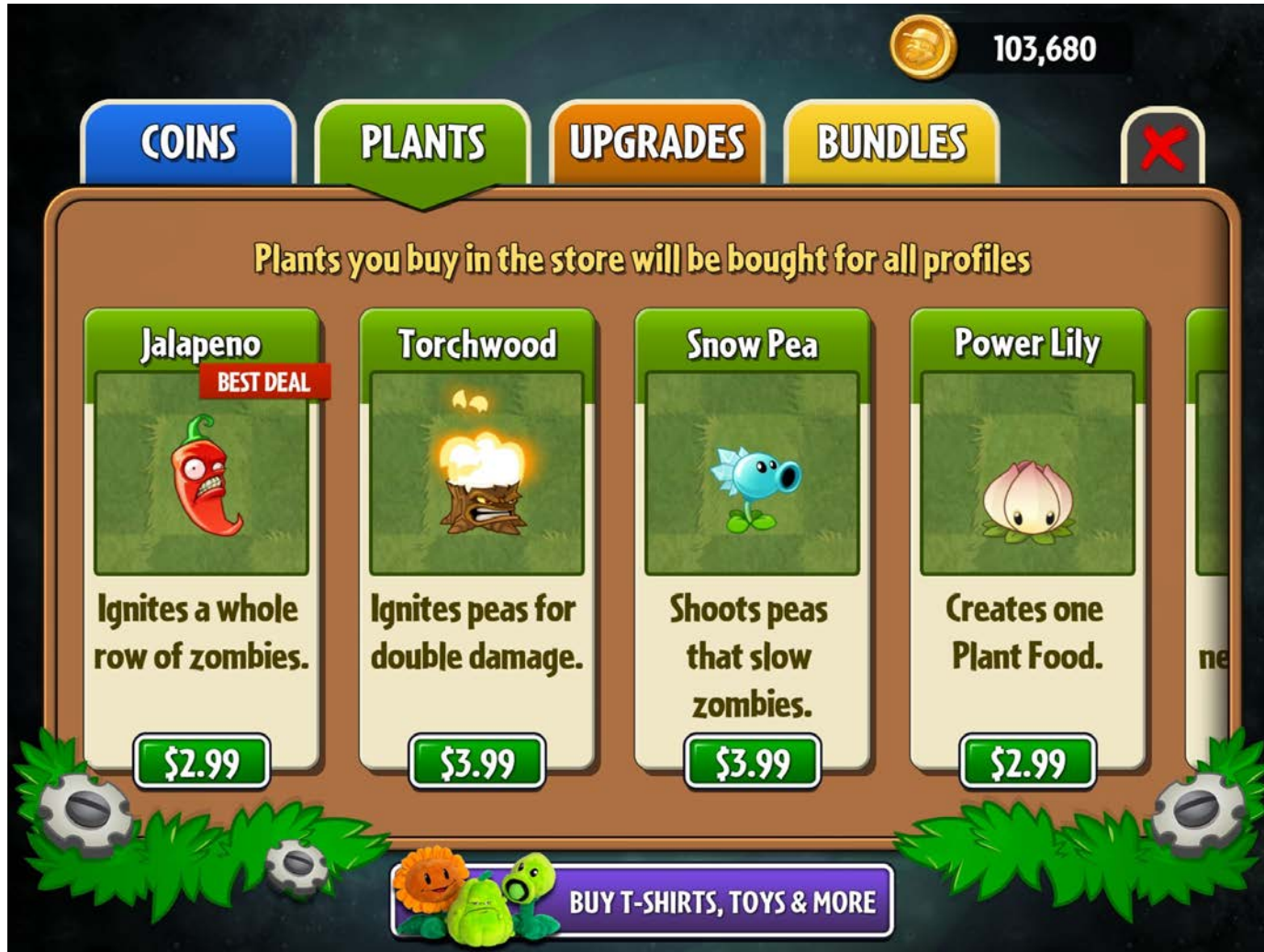


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Games Already Have Digital Items!



So Why Would We Want Crypto?

- Ownership is **transferable**
 - Can buy items from other players
 - Can sell items to other players
- Ownership is **portable**
 - Items are not lost when server is shutdown
 - Items could be moved to a new game/server
 - (Though value of this is matter of debate)
- Everything is **decentralized**

So Why Would We Want Crypto?

- Ownership is **transferable**
 - Can buy items
 - Can sell items

Cannot be prevented by game developer
- Ownership is **portable**
 - Items are not lost
 - Items could be lost
 - (Though value of this is matter of debate)

Only if supported by game developer

shutdown
game/server
- Everything is **decentralized**

This Can Be Taken Too Far

- **Wolf Game:** Entire game on block chain
 - Primary mechanic is farming digital items
 - Sheep NFTs produce crypto tokens
 - Wolf NFTs can steal other NFTs
- No server, so can never go down
 - Well, except if Ethereum goes down
- Unfortunately, it had bugs!
 - Ethereum and NFTs are **append-only**
 - **Could not be patched**, only reissued
 - Reissuing bugs resulted in **lost value!**



Real Focus: Play-to-Earn

- P2E: game designed so players can **extract money**
 - Acquire digital assets in the core loop
 - Use transferability of digital assets to cash out
- Most digital games **discourage** or **forbid** this
 - Reason why *World of Warcraft* made “bind on X” items
 - Selling game items typically requires selling account
- Wolf Game is also an example of P2E
 - Can sell everything (\$WOOL, characters) on OpenSea
 - But **can also lose money**: wolves can steal sheep NFTs

This Is Not a New Idea



Is P2E Gambling?

- Gambling (in the US) is a complicated topic
 - Legality varies state to state (due to Constitution)
 - Not everything involving money is gambling (e.g Bingo)
- NYS explicitly has carve-outs for **games of skill**
 - Outcome doesn't depend on a **material degree** of chance
 - Poker ruled game of skill (legal) in 2012
 - Online fantasy sports ruled (legal) in 2022!
- This makes legislation extremely difficult
 - Legality is determined on state-by-state basis
 - But **online games** are accessible everywhere

Short History of the Poker Boom

- The 2000s saw a massive boom in poker worldwide
 - **Texas hold 'em** was sensationalized on TV
 - **Online poker websites** were created everywhere
 - Cornell CS students went to work at some of them
- Online poker created **many problems**
 - Much easier to lose all your money than in person
 - Bots were everywhere, taking people's money
 - Universities struggled with students betting tuition money
- US Congress wanted to get involved
 - But remember, gambling is a **state** issue

And Then Came Black Friday

- Congress used its classic trick: **interstate commerce**
 - They cannot outlaw something that is a matter of state law
 - But they can regulate how money flows between states
- Unlawful Internet Gambling Enforcement Act (**UIGEA**)
 - Outlaws “knowingly accepting payments ... [used] in a bet”
 - Does not outlaw gambling; goes after **money, not game**
- This effectively **killed online poker** in 2011
 - Three largest poker websites had their domains seized
 - Smaller sites exist today, but nowhere near the boom

Why Do We Care About This?

- Exactly the problem crypto was supposed to solve!
 - Decentralize finance and give power to communities
 - Prevent someone from shutting down money transfers
- So why didn't crypto help with poker?
 - Because crypto is **not a currency**; need to cash out
 - The places to cash out can be **targeted by the law**
 - Plus, remember those **high transaction costs**?
- What is the **ultimate goal** here?
 - Need some way for players to make money
 - But must do it without **betting** or **staking**

UIGEA Definition of Betting is Broad

- Risking **anything of value** in a game **subject to chance**
 - Designed to catch poker, even though skill a major factor
 - But this includes almost all video games as well
- Video games have this exception

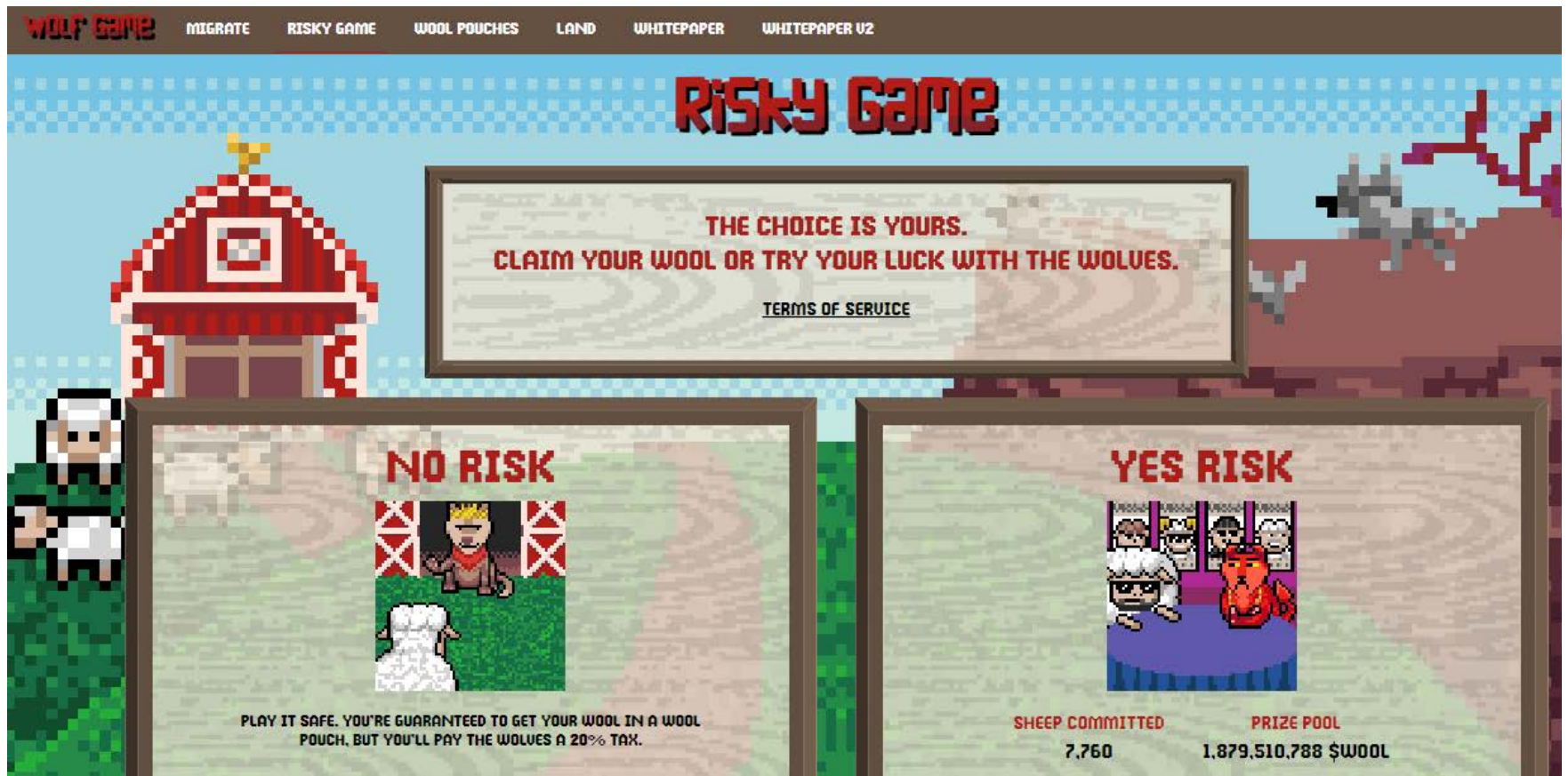
participation in any game or contest in which participants do not stake or risk anything of value other than points or credits ... provide[d] to participants free of charge and that can be used or redeemed only for participation in games or contests offered by the sponsor
- This means that games must have a **closed economy**
 - In *Magic Arena*, cannot trade cards or “cash out”
 - Ability to official cash out assets makes UIGEA a threat

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NOT material degree

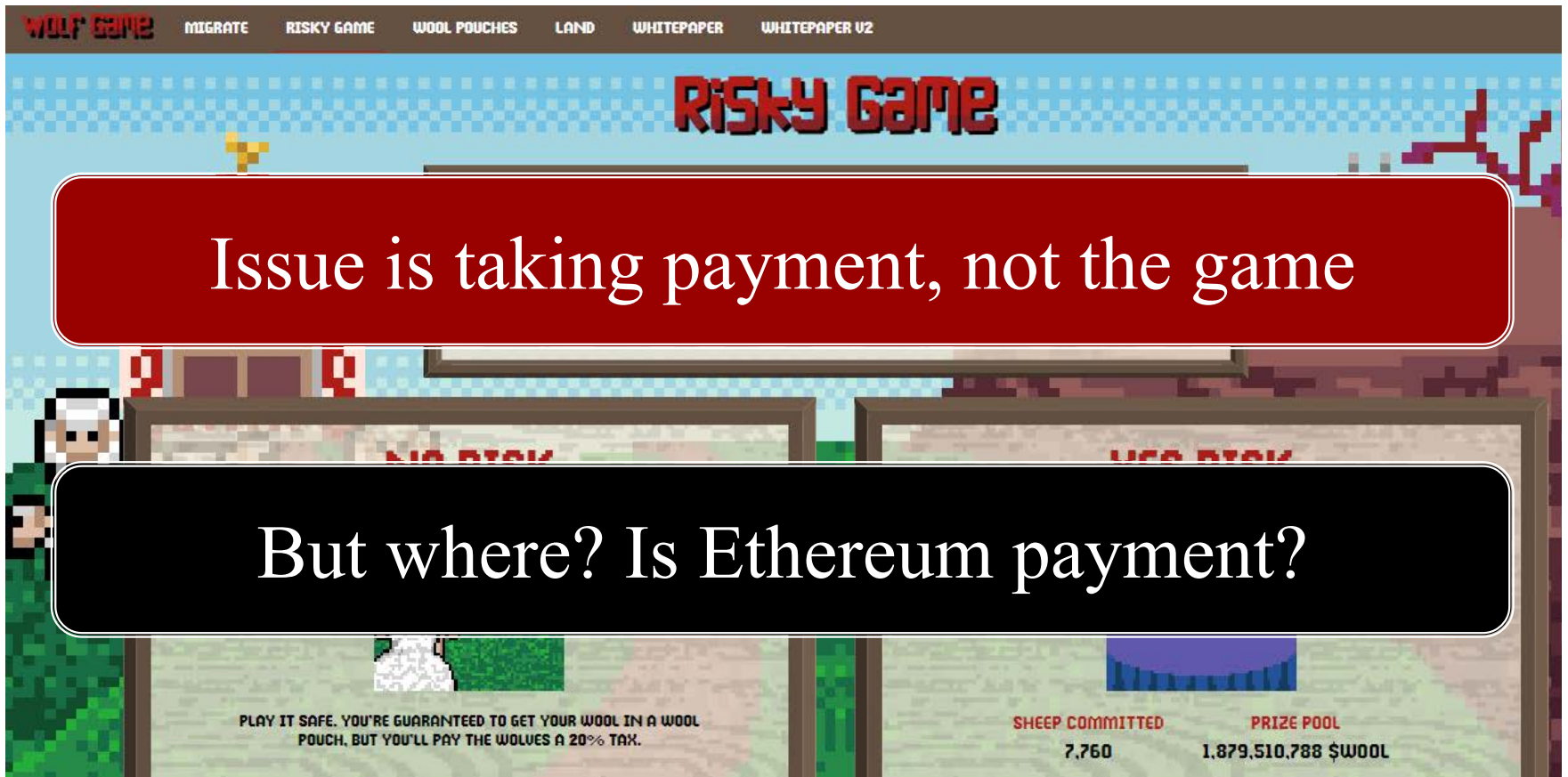
Almost Certainly Illegal Betting



Almost Certainly Illegal Betting

The screenshot shows the 'Risky Game' interface. At the top, there is a navigation bar with links: WOLF GAME, MIGRATE, RISKY GAME, WOOL POUCHES, LAND, WHITEPAPER, and WHITEPAPER V2. The main title 'Risky Game' is displayed in a large, pixelated font. A large red banner with white text reads: 'Issue is taking payment, not the game'. Below the banner, there are two framed panels. The left panel is titled 'NO RISK' and shows a sheep and a wolf. The text below it says: 'PLAY IT SAFE. YOU'RE GUARANTEED TO GET YOUR WOOL IN A WOOL POUCH, BUT YOU'LL PAY THE WOLVES A 20% TAX.' The right panel is titled 'YES RISK' and shows a group of sheep and a wolf. Below it, there are two columns of text: 'SHEEP COMMITTED 7,760' and 'PRIZE POOL 1,879,510,788 \$WOOL'.

Almost Certainly Illegal Betting



What Are Okay Ways to Make Money?

- **Collector model**

- Certain resources are rare and unique
- Players sell after they have gone up in value

- **Farmer model**

- Certain resources only achieved by player effort
- Players charge their labor cost for “creation”

- **eSports model**

- Players can win money by playing tournaments
- Money is put up by **sponsors**, not by the players

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Fundamentally the NFT business model

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The Collector Model



✓ Authenticity Guarantee

Black Lotus Unlimited (HP/DAMAGED) Reserved List Power 9 Magic) 292182 ABUGames

Condition: Used

Ended: Mar 30, 2022, 7:50PM

Winning bid **US \$9,749.99**

Sobs in 2001

Shipping: \$0.50 Secure delivery with signature confirmation | [See details](#)

Located in: Boise, Idaho, United States


Delivery: Estimated within 8-11 business days
Includes shipping to and from the authenticator

Returns: 30 days returns | Buyer pays for return shipping | [See details](#)

Payments:      

PayPal CREDIT

*No Interest if paid in full in 6 months on \$99+. | [See terms and apply now](#)

 Earn up to 5x points when you use your eBay Mastercard®. [Learn more](#)

The Collector Model



- But **never** a good time to sell
 - Item earns nothing while hold
 - Few items outpace investments
 - Best time is **if need money**
- A best a **one-time windfall**
 - Cannot just buy another one
 - Not a reliable revenue source
- Only good for early adopters

Magic is What P2E Aspires To Be

- Players **can earn money** from
 - **Playing tournaments** (prize money)
 - **Selling** off your card collection
 - **Renting** your cards to other players
- Can use cards to play a **wide variety of games**
 - Official formats like **Standard**, **Modern**, or **Legacy**
 - Fan-made games like **Commander** or **Tiny Bones**
- No coincidence early P2E have a CCG feel
 - *Axie Infinity* is *Pokemon/Slay-the-Spire* inspired
 - Card mechanics are easier to turn into NFTs

Magic is What P2E Aspires To Be

- Players **can earn money** from
 - **Playing tournaments** (prize money)
 - **Selling** off your card collection
 - **Renting** your cards to other players
- **Understanding Magic: The Gathering can help us understand games and NFTs**
 - Games like **Commander** or **Tiny Bones**
- No coincidence early P2E have a CCG feel
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Magic Has Similarities to eSports

- Tournaments were designed **from the beginning**
 - Organized play was a major part of the business model
 - Prizes became an expected feature early on
- Tournaments exist at **many different levels**
 - Friday Night Magic at game store
 - Star City Games Conventions
 - Magic Pro Tour
- Prize money ultimately comes from players but....
 - Player **expenditure is capped** (attendance fee)
 - Events are **branded as a convention** (e.g. ComicCon)

Magic Has Similarities to eSports

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 - Organized play was a major part of the business model
 - Prizes became an expected feature early on
- Tournaments exist at **many different levels**
 - Friday Night Funkin' (2018)
 - StarCraft II (2010)
 - Magic Pro Tour
- Prize money ultimately comes from players but....
 - Player-owned
 - Evenly distributed (Con)

More egalitarian than leagues

Avoids charges of betting

Interesting Aside: Card Alters

- Players like alternate art
 - Draw/paint on the card
 - There is a market for this
 - Read the MTG Reddit
- Can **play in a tournament** if
 - Name is not covered
 - Mana (resource) not covered
 - Doesn't alter weight/stiffness
 - Judges approve beforehand
- Generally okay in casual play



More Controversial: Proxies

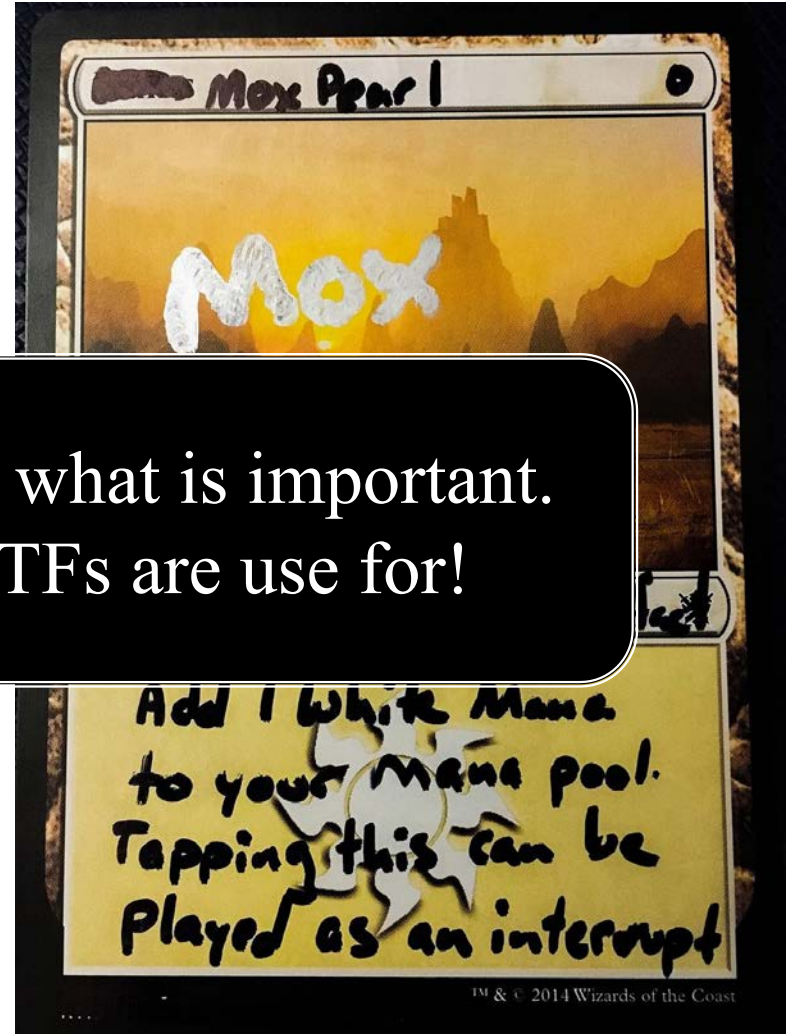
- Proxy: stand-in for a card
 - Typically on a common card
 - Used to represent a rare
 - No attempt at actual art
- Can **play in a tournament** if
 - Replace card damaged at that tournament
 - Replace a rare foil with no non-foil version
- Or if your play group allows



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- Can be used to represent a rare card
 - Replace a rare foil with a non-foil version
- Or if your play group allows

Proof of ownership is what is important.
And this is what NFTs are use for!



Why Are *Magic* Cards Worth Money?

- **Very old cards** are collectible due to rarity
 - Ultimately not very useful in the game
 - Banned from all but **Vintage** (w/ few players)
- **More recent cards** can have value because
 - Help players win games/tournaments
 - Have an art style a player particularly likes
 - Allow a player to make a themed deck
- Even newer cards are counterfeited!

But the Line Does Not Go Up

Oko, Thief of Crowns

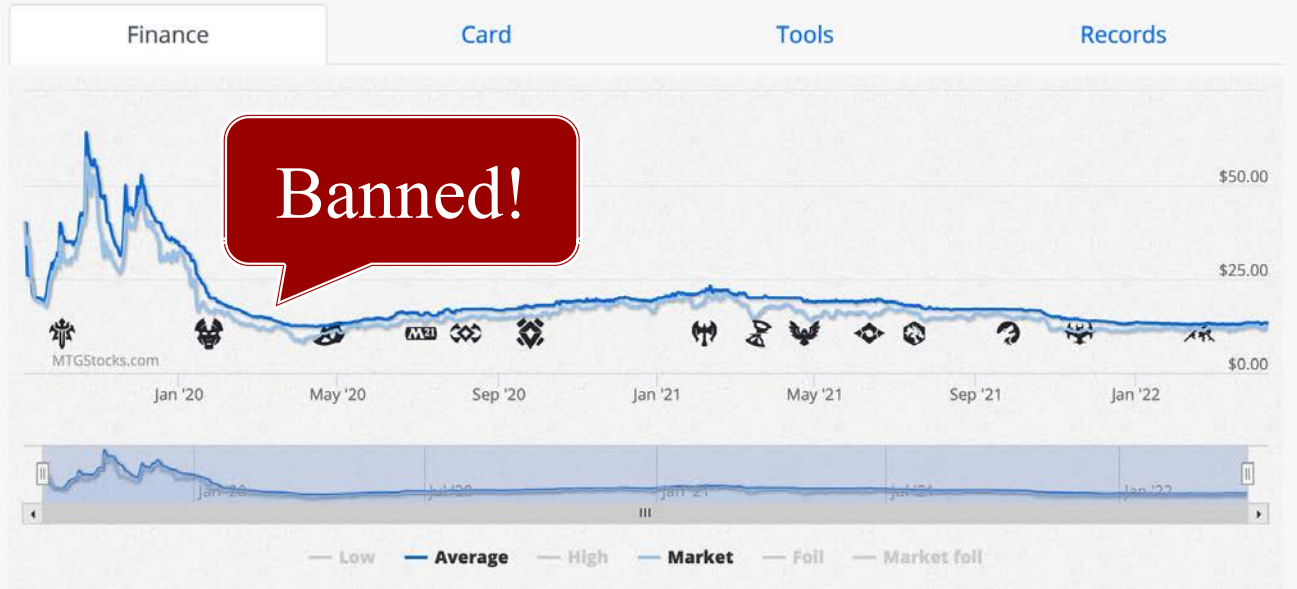
AVERAGE
\$13.31

MARKET
\$12.07

FOIL
\$20.91

EUROPE AVG
€12.92

Throne of Eldraine



But the Line Does Not Go Up

Misty Rainforest

AVERAGE
\$33.50

MARKET
\$29.51

FOIL
\$121.98

EUROPE AVG
€25.01

Zendikar



What Is Going On Here?

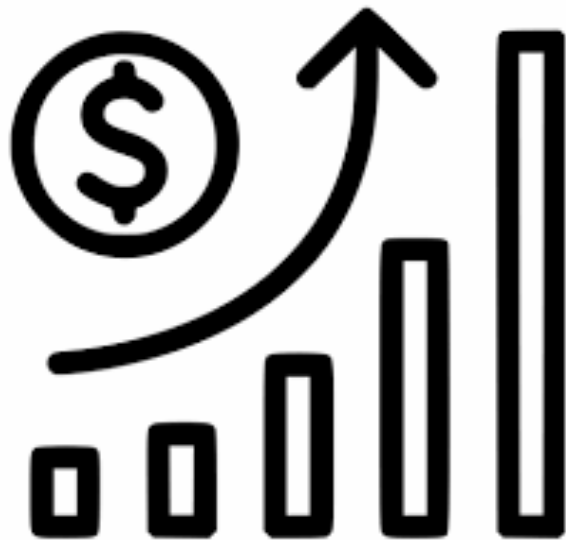
- Value is a product of **rarity** and **demand**
 - Either or these can change at any time
 - Wizards can **reprint** more cards (rarity)
 - Wizards can **ban** a card from a format (demand)
- Wizards distances itself from secondary market
 - Because otherwise card packs are gambling
 - They only make money from the first sale
 - Though Secret Lairs operate as a loop hole
- Wizards cares about *Magic* as a game (**yes, really**)

This Is a Big Difference With P2E

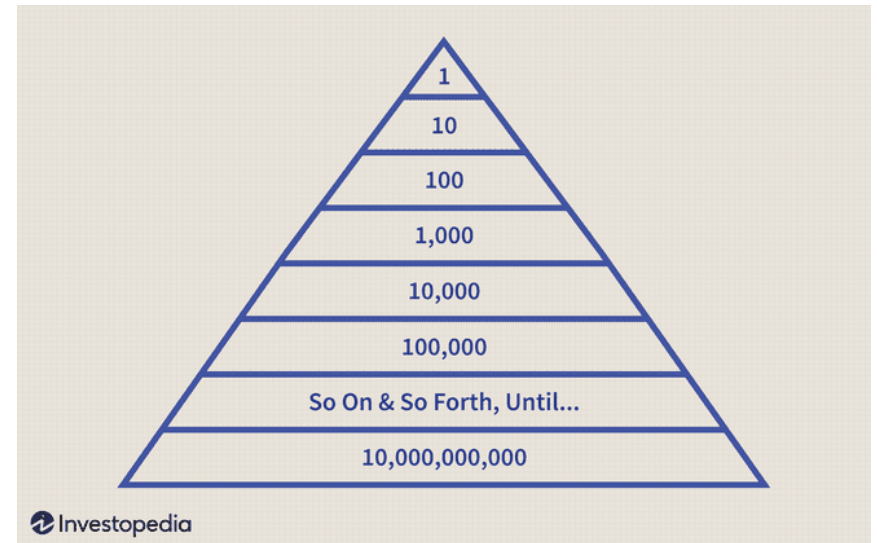
- Most *Magic* players play **to enjoy a game**
 - Money spent is balanced against other entertainment costs
 - The market is at best a way to defray some of this cost
- P2E gamers play **to earn money**
 - View the income potential as the primary selling point
 - Design choices that favor fun over reward are unpopular
- But the business model is **not sustainable**
 - Players buy resources to make money, not have fun
 - Means they should make more than what they paid
 - But can only sell to other (potential) players

One Of Two Things Must Happen

Inflation



Pyramid Collapse

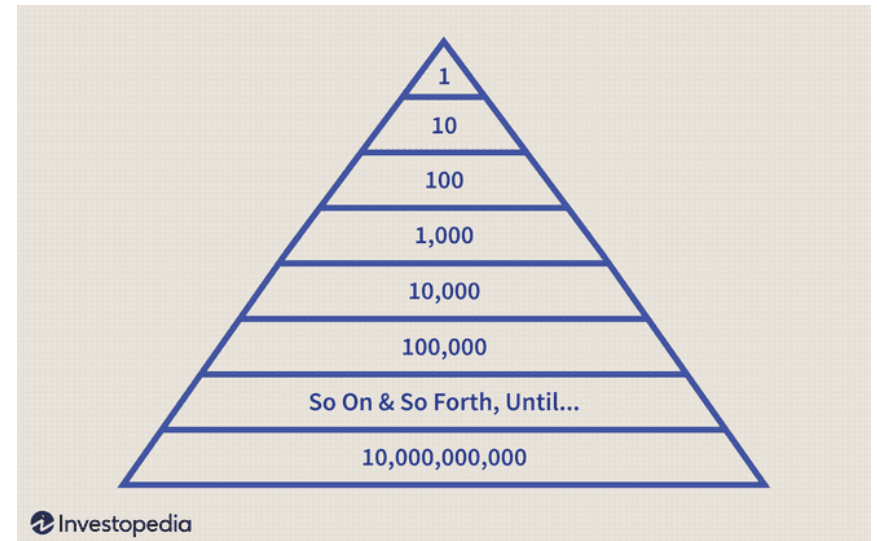


One Of Two Things Must Happen

Inflation

In terms of
game assets,
not money

Pyramid Collapse



Crypto Just Has Bigger Problems

- All NFTs are built on top of crypto coins
 - Right now, Ethereum is the major platform
 - Sometimes a side coin to reduce transaction costs
- Ethereum is a **deflationary currency**
 - There are a fixed number of tokens available
 - As more people come in, tokens more expensive
- Deflation sucks; it is much worse than inflation
 - Seems weird, since value of money goes up
 - But unspent money is worthless
 - Once you spend money, too hard to get more

Are NFTs Useless for Gaming?

- Making money the focus is problematic
 - If earnings from **player money**, problems with **law**
 - If earnings from **internal economy**, often **collapses**
 - If earnings from **tournaments**, need **sponsors**
- To make them work, **must focus on tech**
 - Flexible transferability (trading, selling)
 - Persistence and validation w/o central server
 - But **transaction costs** cannot be ignored

What is the Strength of *Magic*?

- *Magic* has a unique **bipartite design**
 - **Meta rules** that define goals and play sequence
 - **Card rules** that define interactions
 - Continually evolving game with new interactions
- This is what made the variants possible
 - Change the meta rules, keep the card interactions
 - Balance in one format often carries over to others
 - In unique cases banning in new format is required

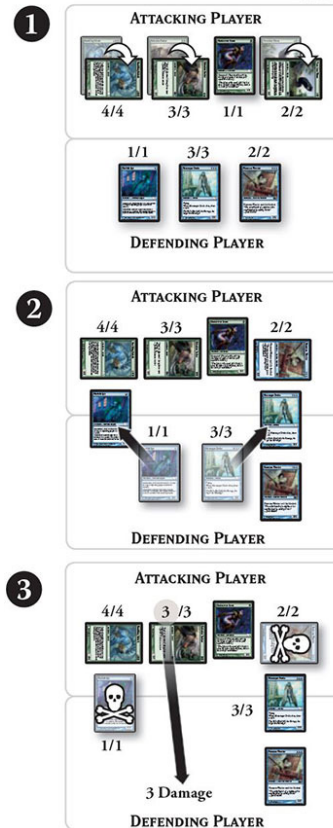
Bipartite Design of *Magic*

Card Rules



Meta Rules

EXAMPLE OF COMBAT



DECLARE ATTACKERS

The attacking player attacks with his three biggest creatures and taps them. He doesn't attack with the smallest because it's too easy to destroy, and it might be useful for blocking on the opponent's next turn.

ASSIGN BLOCKERS

The defending player assigns blockers to two of the attackers and lets the third attacker through. Blocking choices are up to the defender.

COMBAT DAMAGE

The unblocked attacker deals 3 damage to the defending player. The blocked attackers and the blockers deal damage to each other. The smaller creatures die and the bigger creatures live.

Apply This to Open-Source Gaming

- Have a basic **open-source** online **game client**
 - Allow users to make own servers
 - Allow users to modify the game code
 - Allow users to ban/accept certain items
- But **game items** are **commercialized**
 - Items purchased/minted through a third-party
 - Game client validates and leverages game items
 - Individual clients can ban certain items for balance
- Currently easiest to do with online CCG

How Do You Make Money?

- You could be the **item developer**
 - Need guarantees that you don't break the balance
 - Reputational trust is a major factor here
 - Why Wizards focuses on the game, not the market
- You could **run tournaments**
 - Again, need to make sure not run afoul of the laws
 - Fixed cost w/ prize pools announced ahead of time
 - In-person cons mix in other events and content

How Do You Make Money?

- You could be the **item developer**

- Need good balance
- Reputation
- Why? The market

Income stream requires constant design work

- You could **run tournaments**

- Against the laws
- Fixed amount of time
- In-person content

Income stream requires constant marketing/hosting

Wouldn't This Be Centralized?

- Item creation would see some **consolidation**
 - Game R&D benefits from **economy of scale**
 - Branding helps convince customers of **balance**
 - Easier for clients to **blacklist/whitelist** companies
- But decentralizing items still has value
 - Permits (small) competing groups of item designers
 - Items are still usable if original designer folds
 - Designers are not liable for issues with selling

But This Will Never Happen

- Item designers/sellers have **no market** w/o client
 - Someone must make the client first
 - Usually the group that plans to sell the items
- Initial creation of the game takes **time** and **money**
 - If anything more than a CCG, probably a lot of money
 - Developer (item seller) needs to recoup that cost some how
- Immediate competition makes **recouping difficult**
 - Other companies benefit from all their work
 - Their product has same value, without start-up cost

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 - Someone must make the client first
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- Initial cost **money**
 - If anyt **money**
 - Develop **some how**

A lot of work for less
revenue than a normal game

- Immediate competition makes **recouping difficult**
 - Other companies benefit from all their work
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Summary(?)

- P2E and NFTs are about players **extracting money**
 - Charging labor costs to generate a resource (gold farming)
 - Appreciation of a rare resource over time (old *Magic* cards)
- But the tech is no protection from **the law**
 - Anything that is zero-sum runs afoul of UIGEA
 - Most else is either inflationary or a pyramid scheme
- In order to be useful must **focus on the tech**
 - Need a compelling reason for **decentralized items**
 - Need a compelling reason for **cross-game support**