Management Science and Technology Management (MSTeM)

MMS 562F: Tech Driven Transformation

Introduction

Campbell R. Harvey

Duke University and NBER

January 2022


Asymmetric-key-cryptography
Scaling-risk
AMM
Proof-of-stake
Yield-farming
Vertical-scaling
DEX
Nonce
Sharding
Slashing
KYC
Address
Vampirism
Mint
Invariant
Schelling-point-oracle
Direct-incentive
DAO
Halting-problem
Testnet
ERC
Optimistic-rollup
EOA
Airdrop
Fork
Keeper
Smart-contract
Oracle
Double-spend
Gas
Hexadecimal
Burn
Miner
PoS
Mainnet
Defi-Legos
Consensus-protocol
Layer
Utility-token
Flash-swap
Horizontal-scaling
Miner-extractable-value
Flash-loan
dApp
PoW
IDO
Contract-account
Node
Vault
Stablecoin
Router-contracts
Symmetric-key-cryptography
Digest
Impermanent-loss
Bonding-curve
Governance-token
Hash
Proof-of-work
DeFi
Staking

Norms

- Attendance is mandatory.
- Class length is variable. Classes may go longer or shorter (generally longer – especially the last class).
- Mobile phones are required and must be on silent (no buzzing).
- When lap tops are in use, only applications we use in the class should be open, e.g., Outlook should be closed.
- If you are very late for the class, do not ask questions that might have been covered in the first part of the class. Sit near the back (until the break).

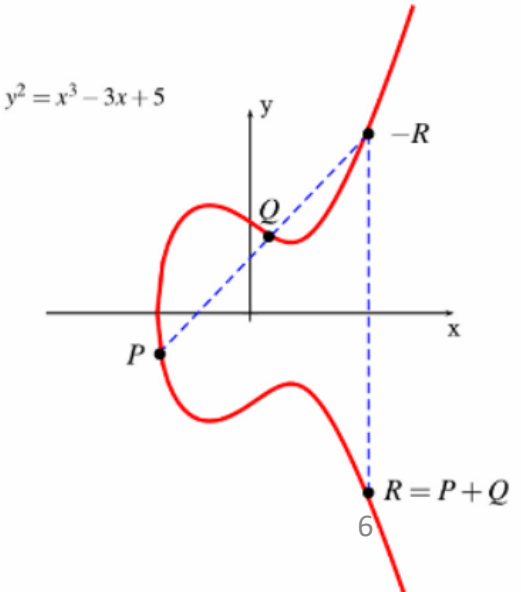
Norms

- If we have a guest speaker: 1) no laptops open; 2) no mobile devices visible; 3) sit near front of the class for the video* (not applicable 2021)
- Group participation is peer evaluated. I realize that there will be some “divide and conquer” for the big project due to backgrounds of the group members. However, each group member must have a firm grasp of the start-up idea.
- Honor code is maintained.

Expectations

Setting expectations

- Much like an advanced graduate class, I will be leaning on the students in the class to participate. Some of you have knowledge that could be productively shared with the rest of the class. I will ask certain students to step up.
- Syllabus/Course Topics is a moving target.
- Some material in this course will be among the most technically challenging that you will encounter at grad school.
- That said, the most important ingredient for success in this space is creativity – not pure technical ability.



My Goals

My playbook is a long-term strategy. Some of you will be frustrated and confused. That's OK. It is part of the learning process.

- You need to know what you don't know.
- You need to know if someone thinks they know something and they really don't know.
- I want to take you to the 0.1% of business technology knowledge
- I want to enable you to be the disruptor – not the disruptee!

Key areas of course

The course is heavy tilted to blockchain technology and decentralized finance. However, more generally:

- Blockchain and DeFi
- Quantum computing
- Systematic investing
- Brain machine interface
- Other*

*Students have the option of choosing a firm in another emerging technology for the final project

Why me?

New Course for Spring 2015

INNOVATION & CRYPTOVENTURES

I&E 550

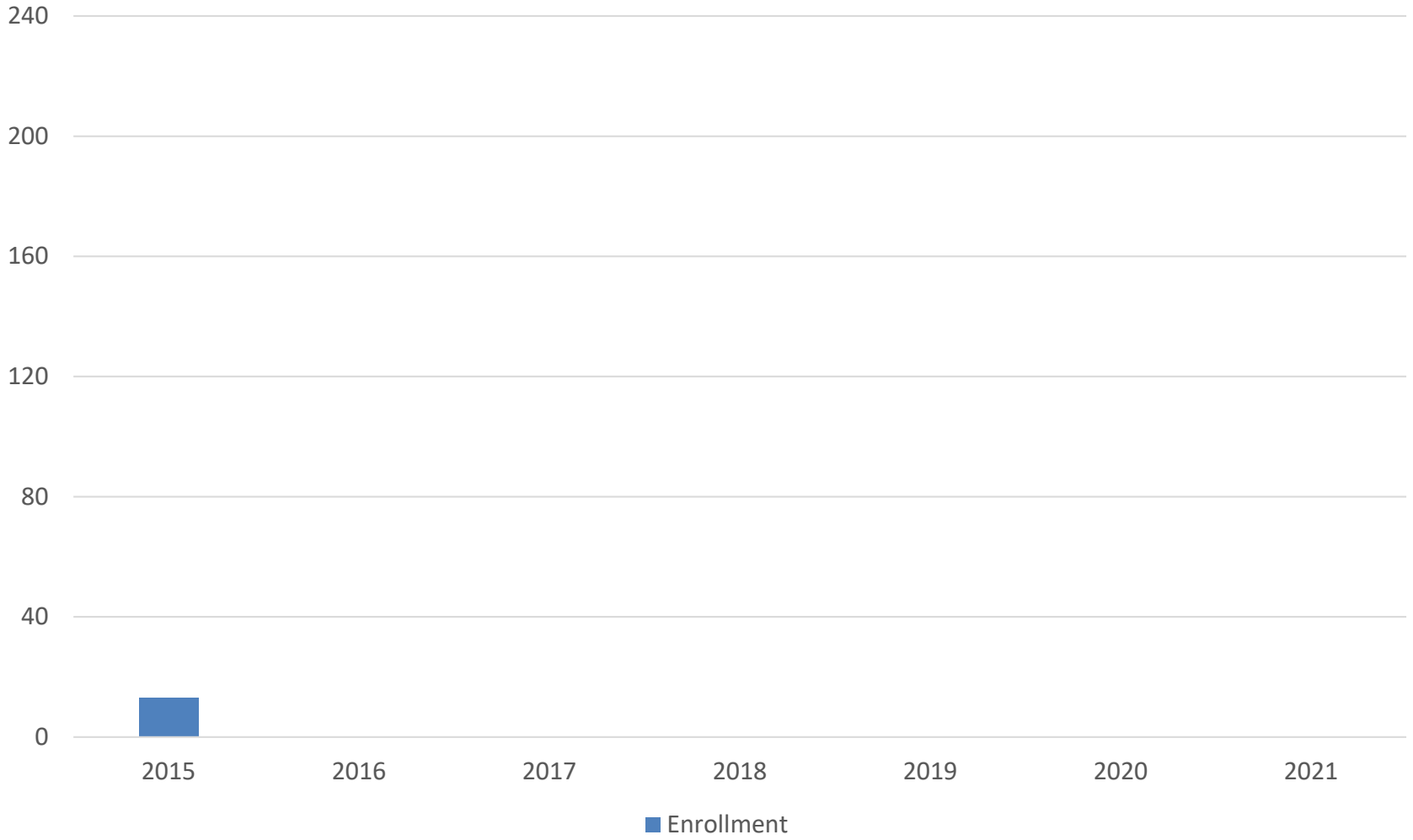
Bitcoin. Risks of new technology. Disruption forecasting. **Implications of blockchain.** Venture capital. **Bitcoin 2.0.** Legal and regulatory environment. Cryptoventures.

Campbell R. Harvey, (2014)

Cryptofinance

http://ssrn.com/abstract=2438299

Duke Masters Level: Blockchain Enrollment



Financial Times

February 16, 2015

Business Education

FEATURE OF THE WEEK February 15, 2015 10:31 pm

Professors stake out territory for bitcoin

Stephen Foley

'B' keeper

The last thing Campbell Harvey wants is to find himself playing the role of Lawrence Summers in The Social Network, who had to adjudicate arguments between Mark Zuckerberg and the Winklevoss twins when he was president at Harvard University.

The follower

NEWS • TECHNOLOGY

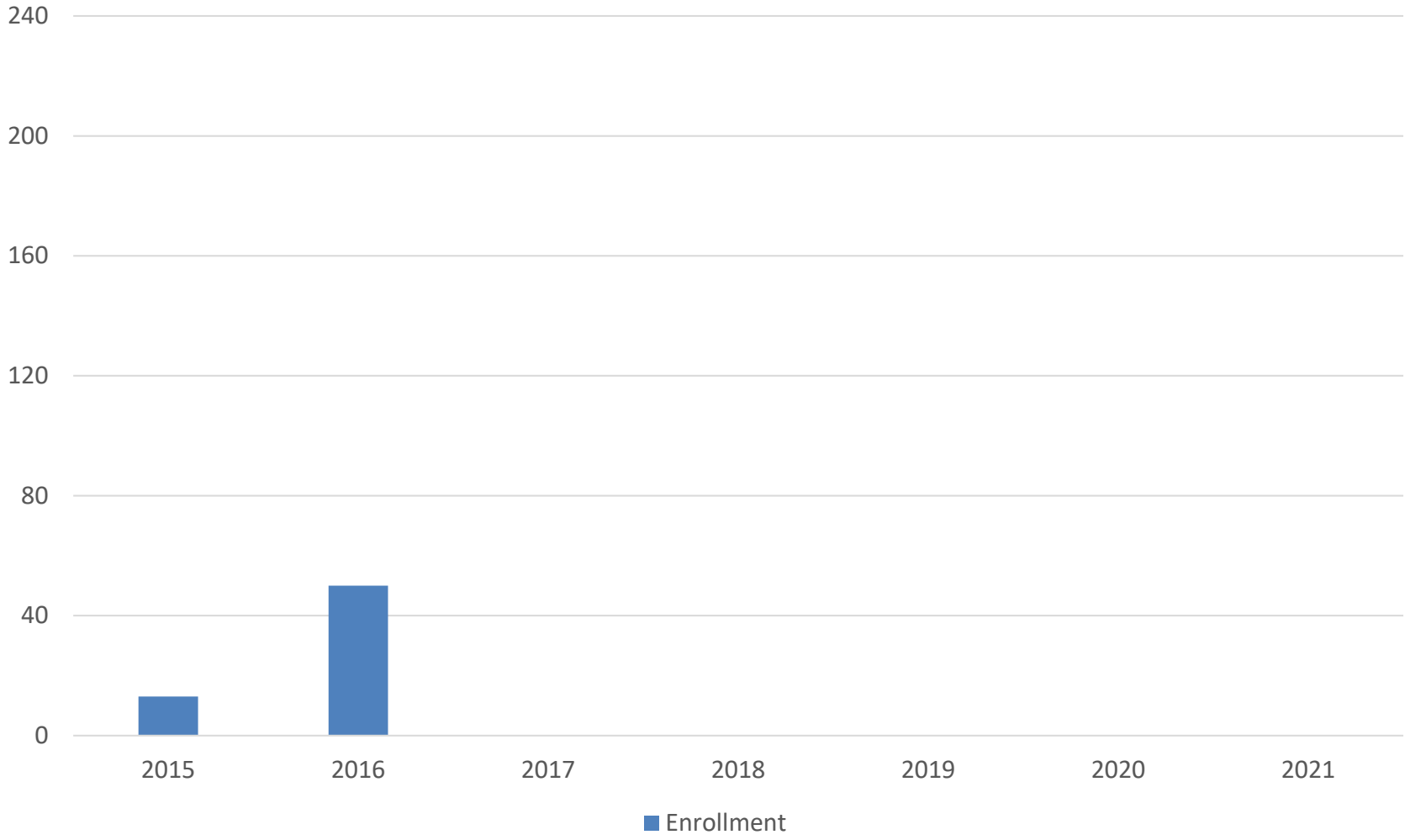
Stanford Joins NYU and Duke in Offering Bitcoin Course

Grace Caffyn (@GCaffyn) | Published on August 24, 2015 at 12:17 BST

NEWS IN BRIEF

Stanford is joining NYU and Duke University in offering a course on bitcoin – kicking off with a free security webinar tomorrow.

Duke Masters Level: Blockchain Enrollment



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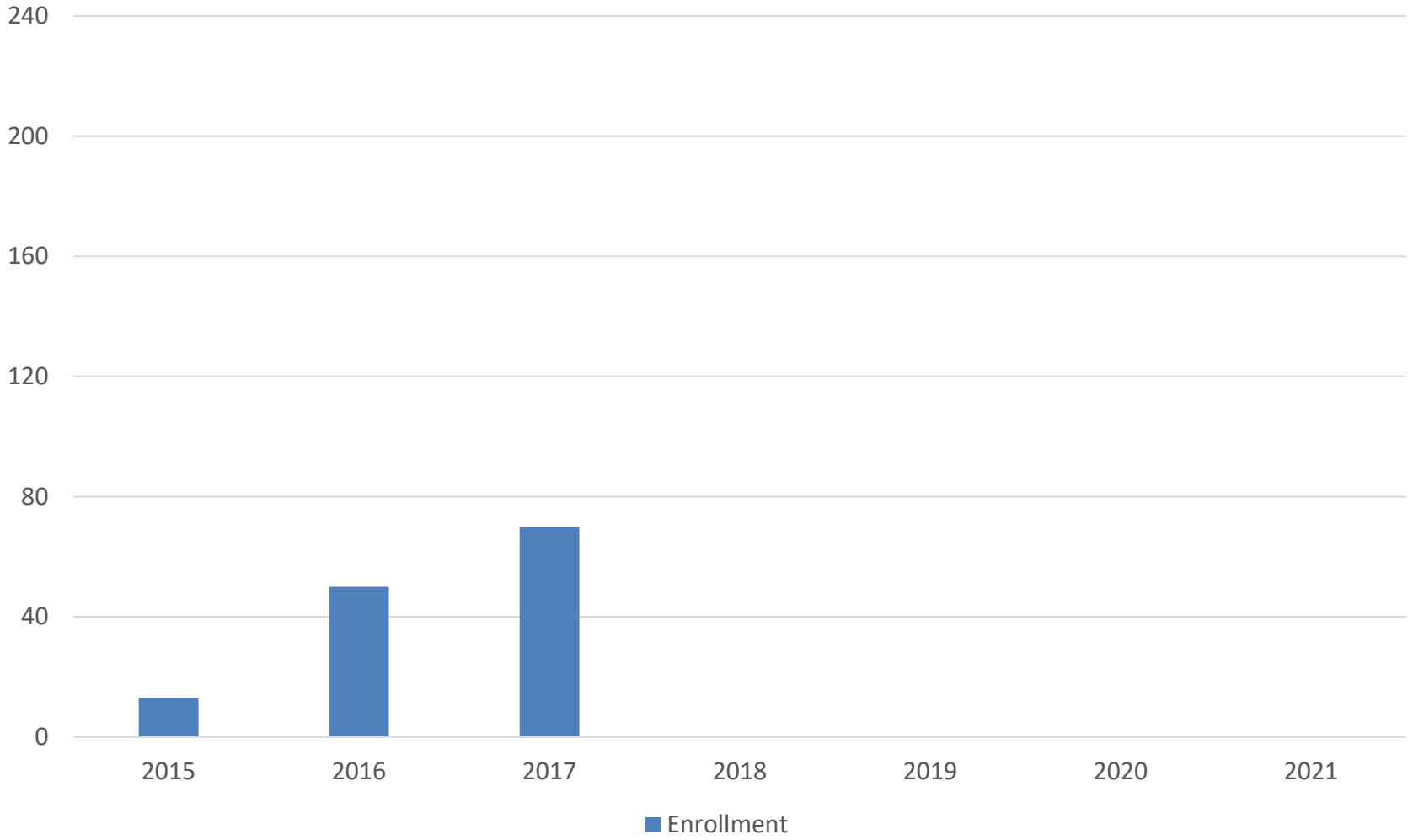

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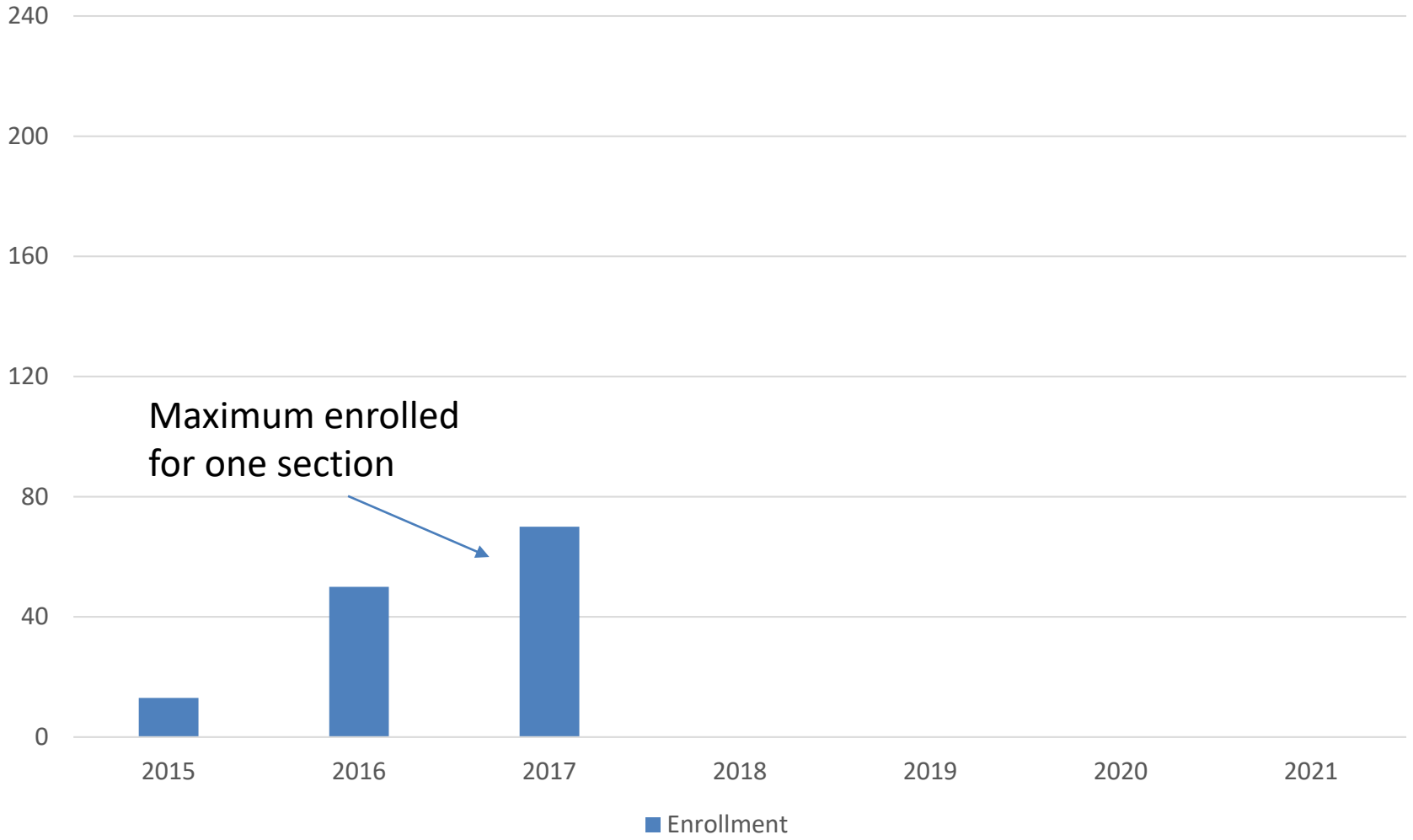

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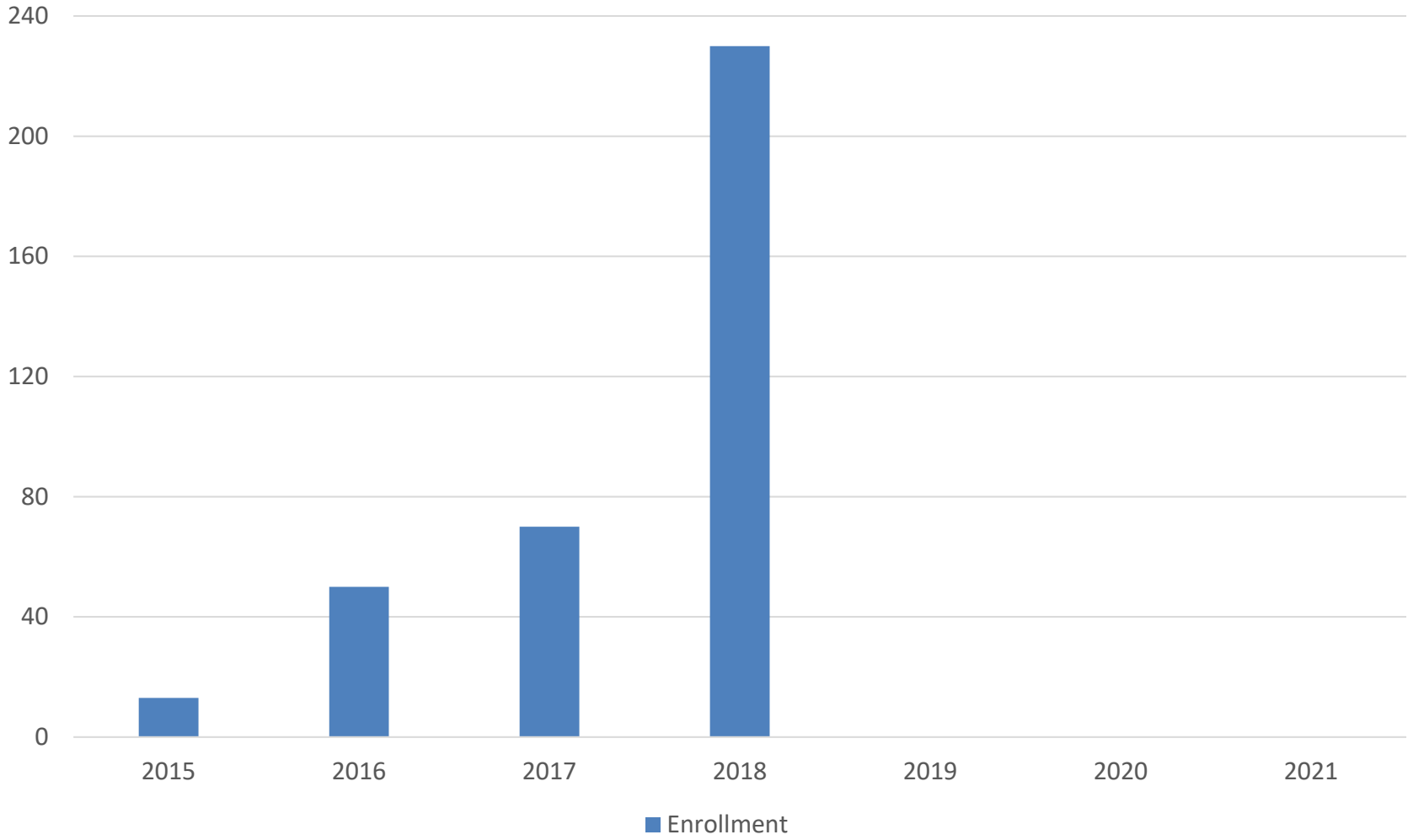

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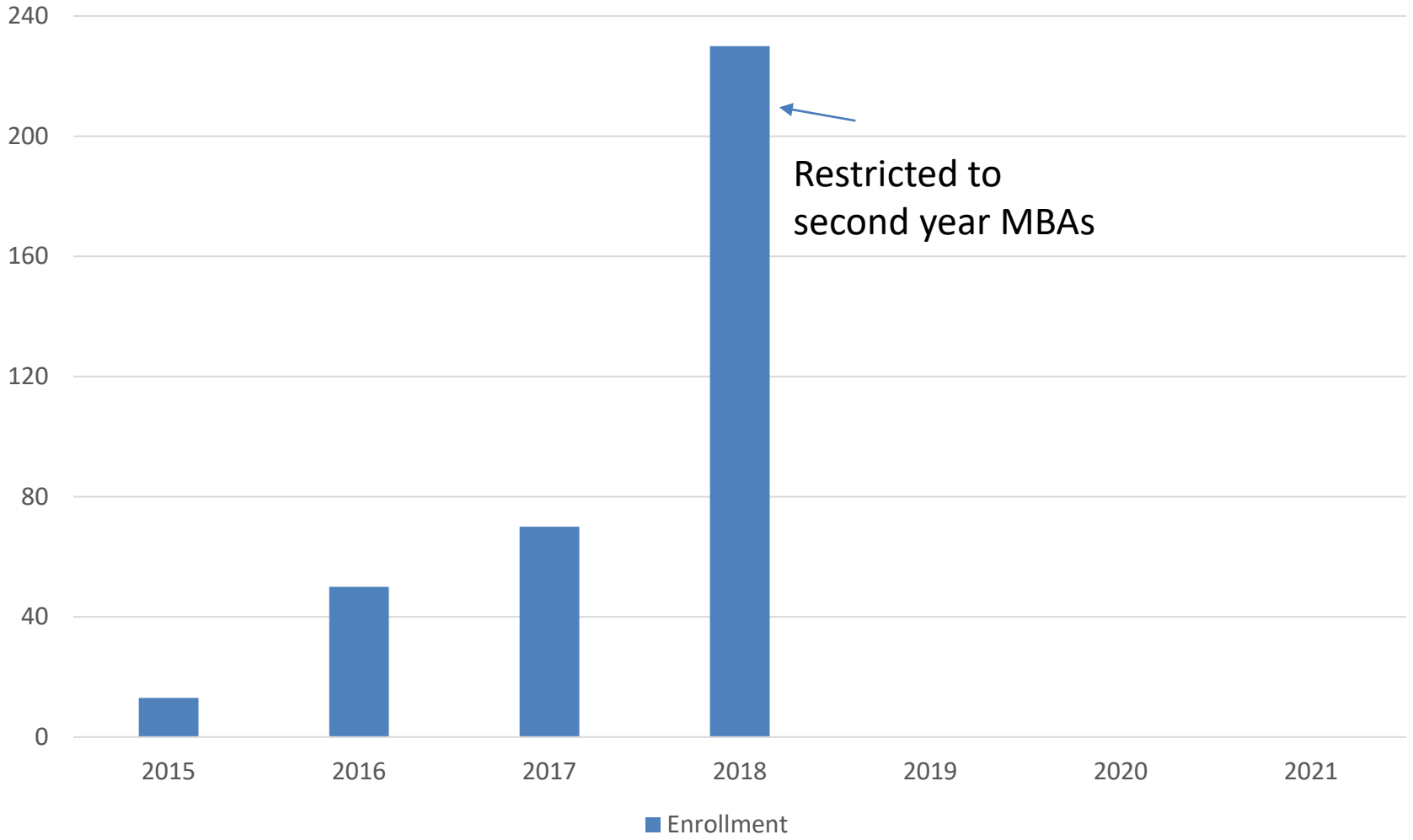

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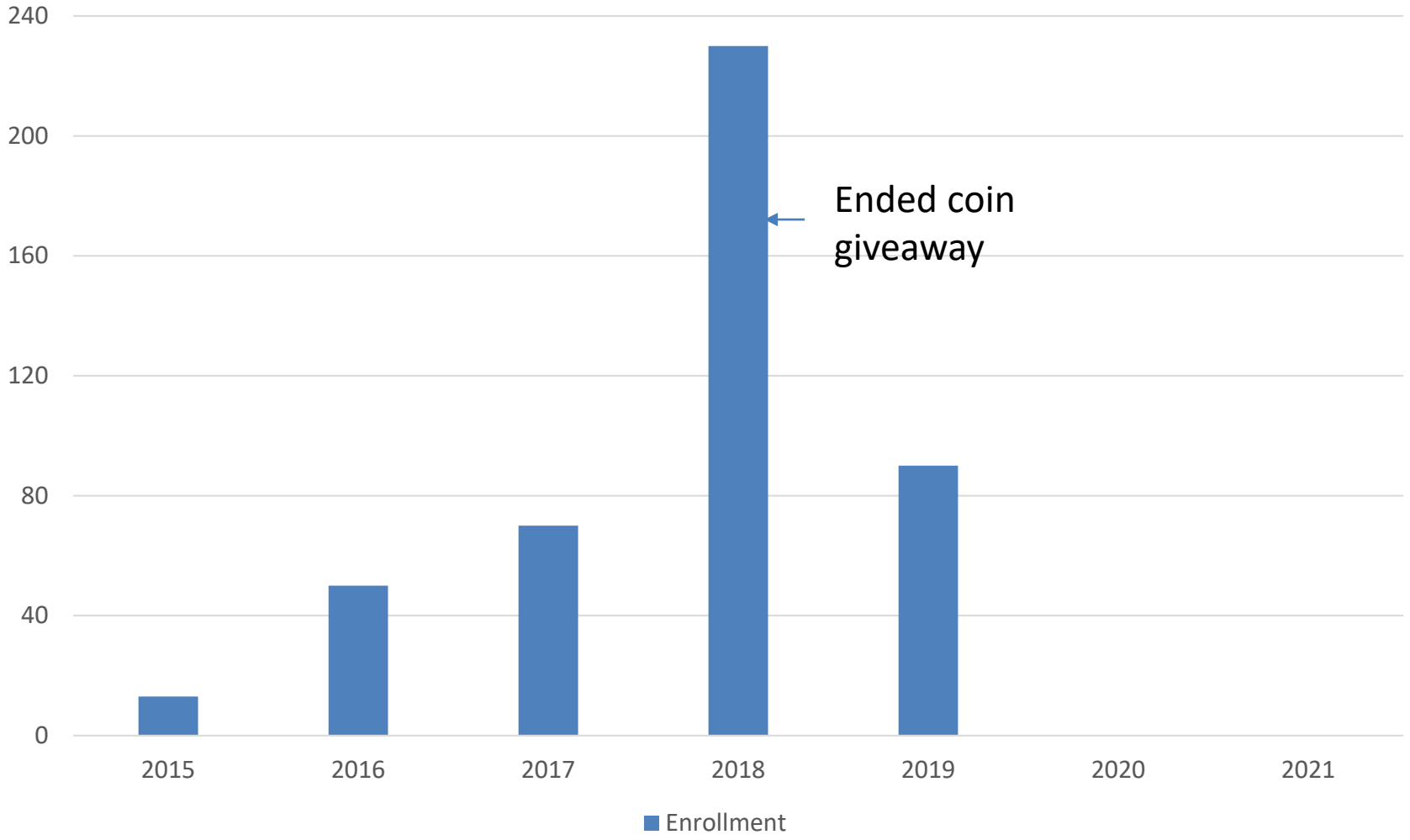

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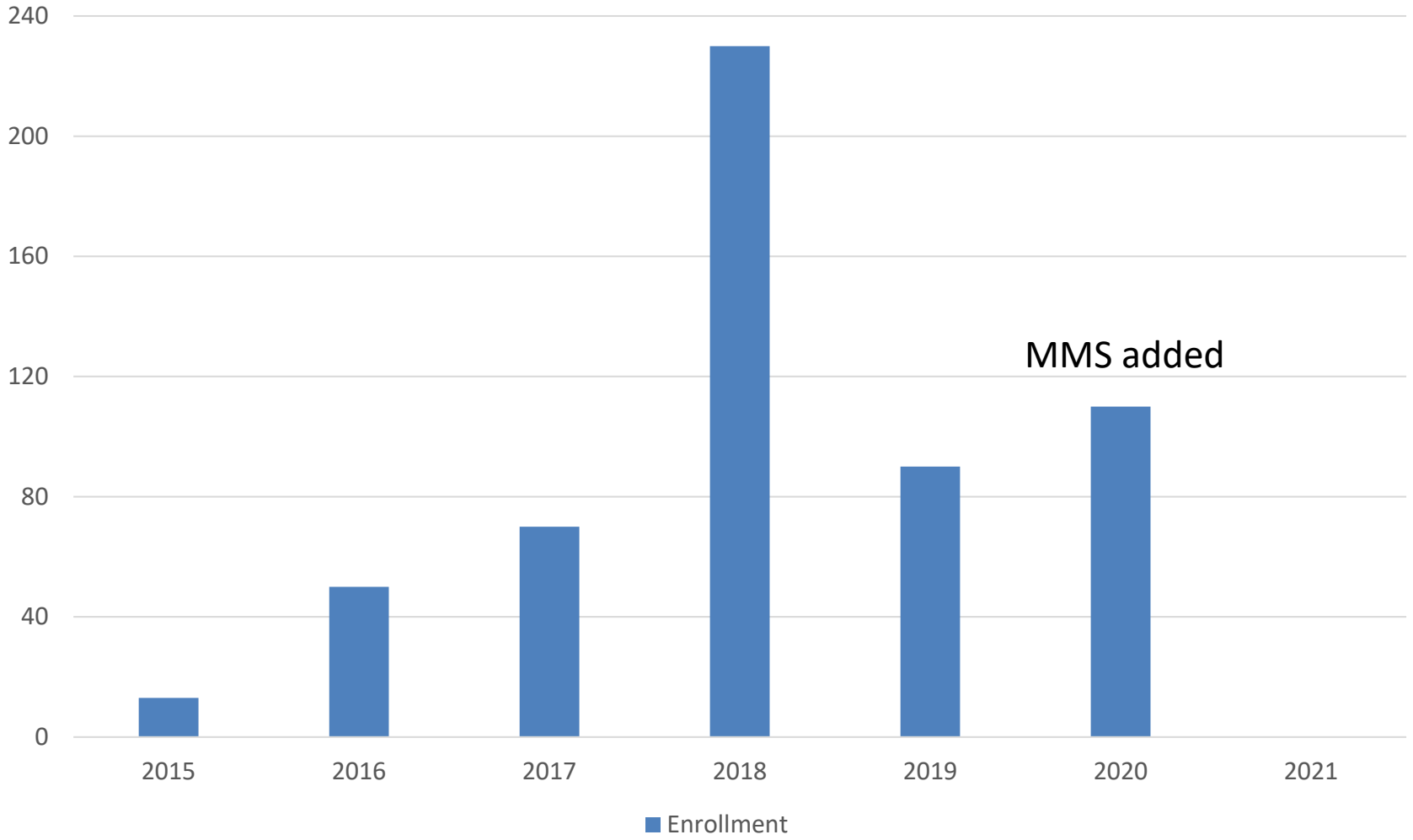

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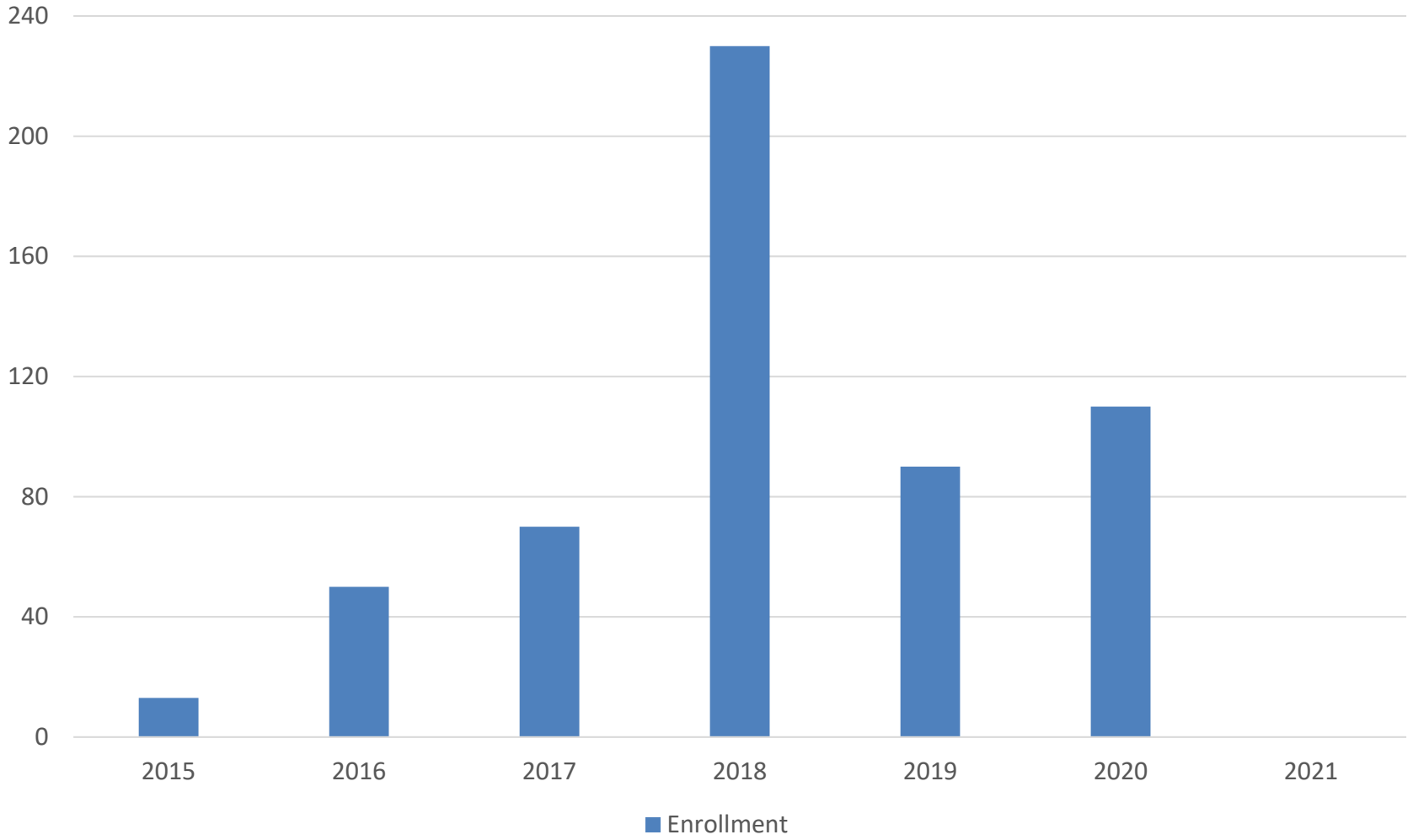

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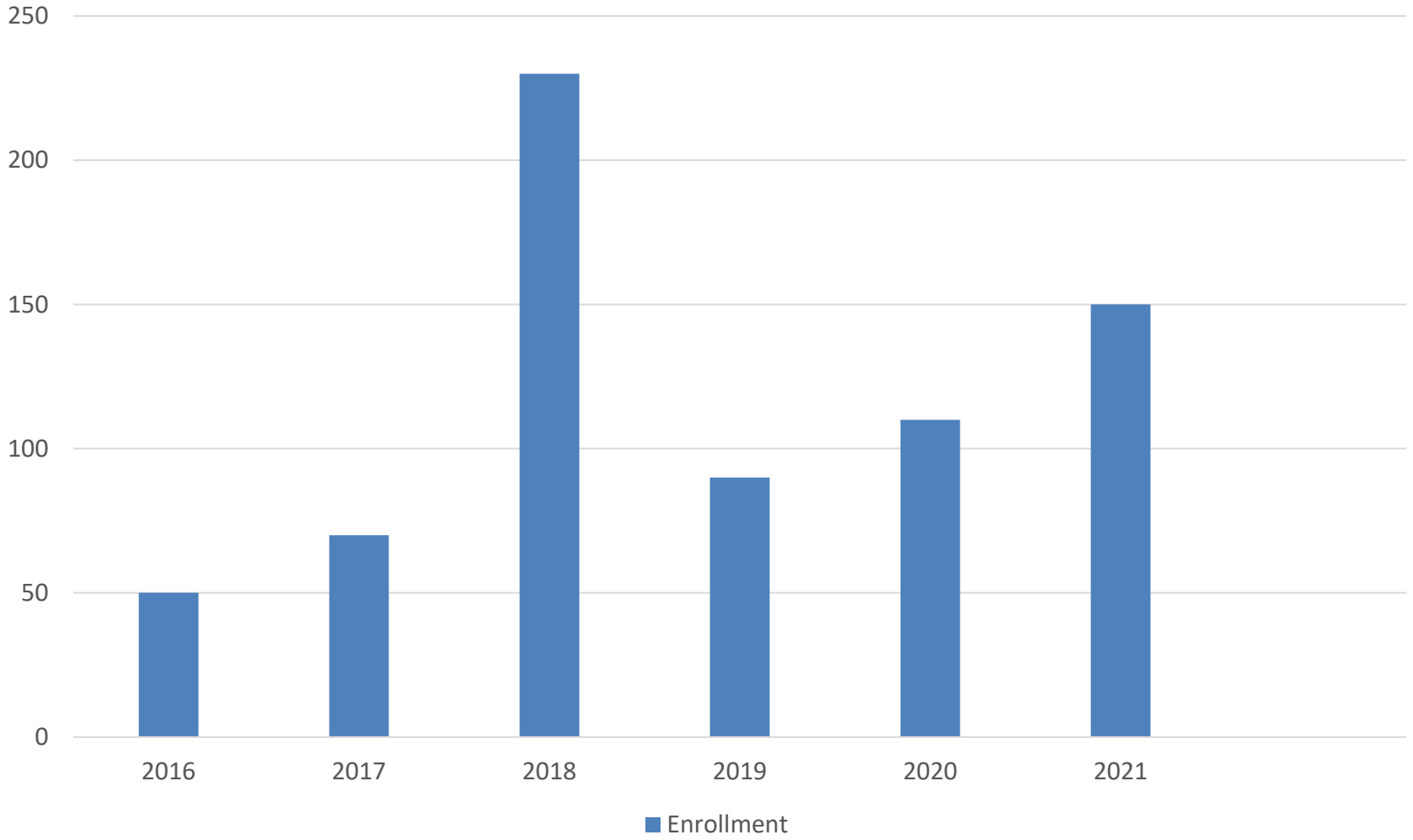

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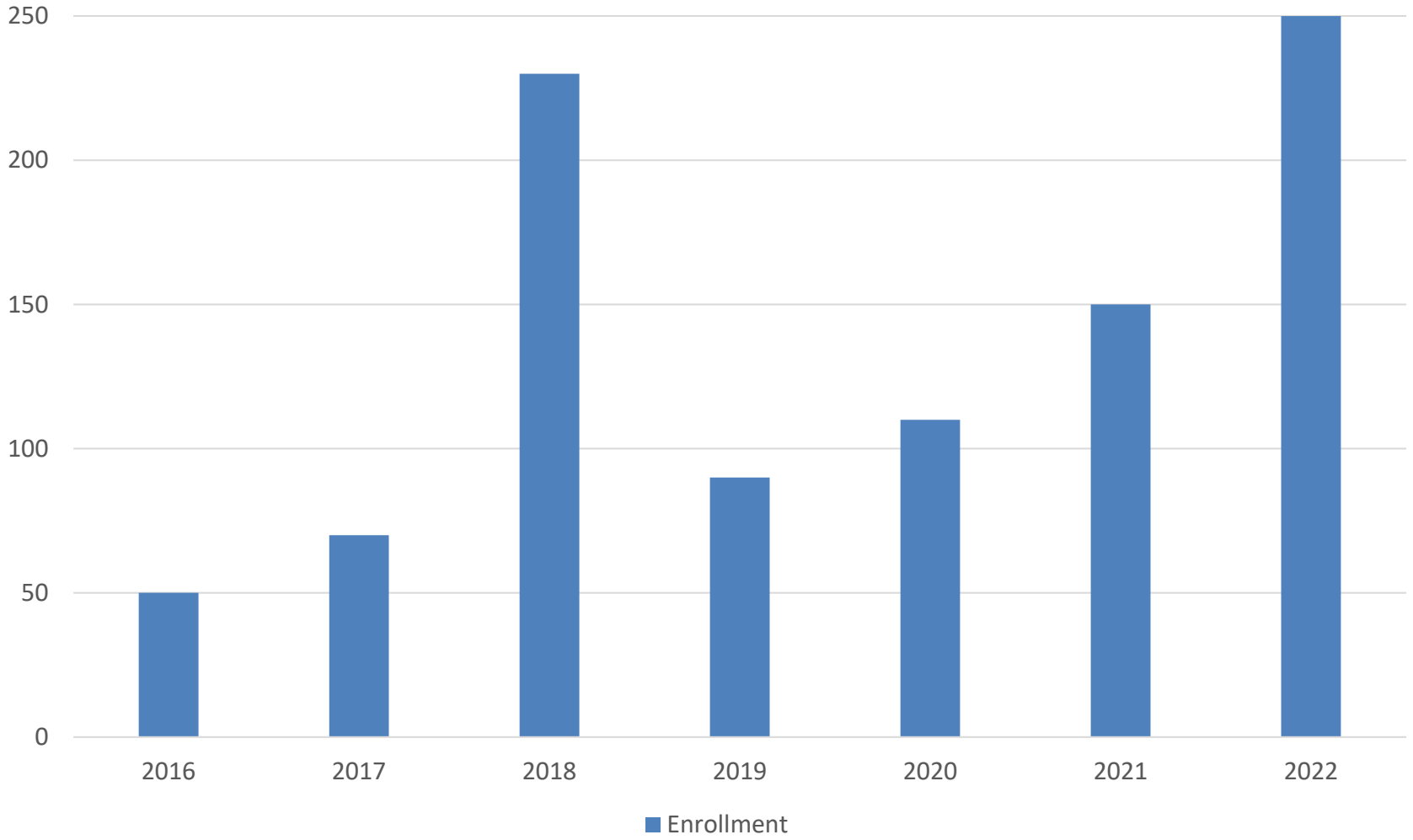

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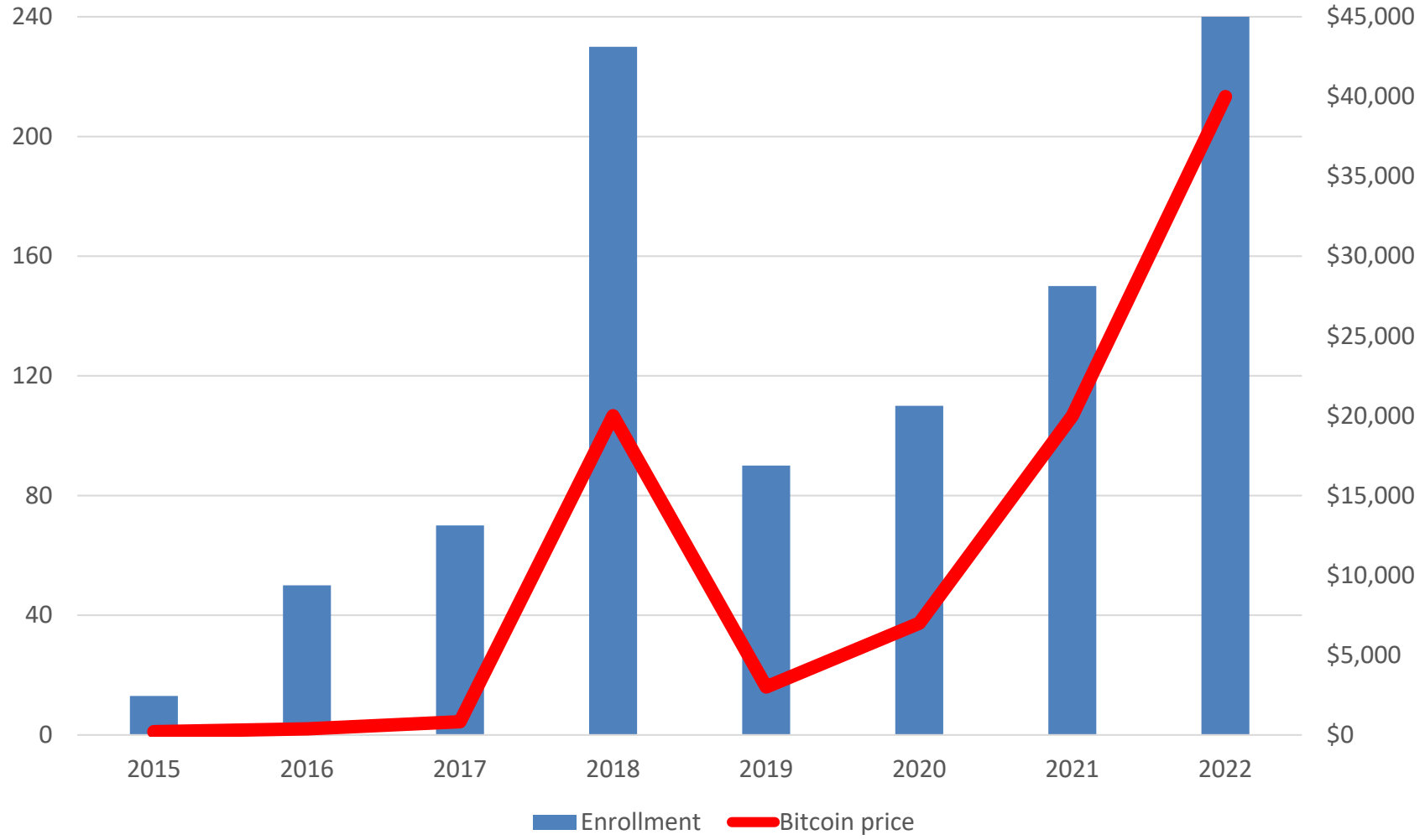


Bitcoin price at enrollment

Main Deliverable (group project: 50%)

- Majority of the grade is determined by the quality of a maximum 15 slide deck either analyzing an existing firm or technology
- Student presentations on last session of the course. All students need to attend. The class will be extended (more than two hours).
- You must schedule a meeting with me to discuss possible ideas/companies. See my Google calendar sheet.
- Maximum group size is 4.

Other Deliverables

- Preassignment (individual – complete/incomplete)
- Participation+5-question quizzes following class (50%: individual)
- Innovation project (group: 50%)

Plan

- One crucial component of Web3 and the Metaverse is DeFi
- 90% of the course is DeFi and blockchain mechanics
  - 1. DeFi Infrastructure
  - 2. DeFi Primitives
  - 3. DeFi Deep Dive
  - 4. DeFi Risks and Opportunities

Plan

- Much of the content of this course is already on line
- The value added will be from the questions you ask and your individual contributions to the class
- There are many topics I would like to talk about (and learn more about from you). I need students to step up.

Plan

- Example. A student approaches me (or a group of students) saying “we want to learn more about NFTs”. The students prepare 10 slides and we carve out 30 or 60 minutes in class to talk about NFTs.
- Other examples could be mechanics of DAOs, Web3 topics like DeSo, blockchain bridges, regulatory issues, CBDC, ETF/CTFs, etc.
- It is a full time job to keep up with this space and I need your help

Plan

- Stuff will happen during the course and I will derail the class to talk about current events
- The Slack is a very important community for us
- Personally, I would like amass enough material so that I can begin:
  - 2nd edition of my book, DeFi and the Future of Finance
  - On-line learning experiences that focus on Web3/DeFi 2.0/Metaverse

Plan

- If the course does not seem “organized”, that is a result of this space evolving so rapidly.
- One thing that you will learn is that this course is just the tip of the iceberg. It gets to that point where you can understand 75% of the Messari report.
- Second half I will give a keynote speech that I have delivered all over the world

A lot of hype

THE WALL STREET JOURNAL.

MARKETS

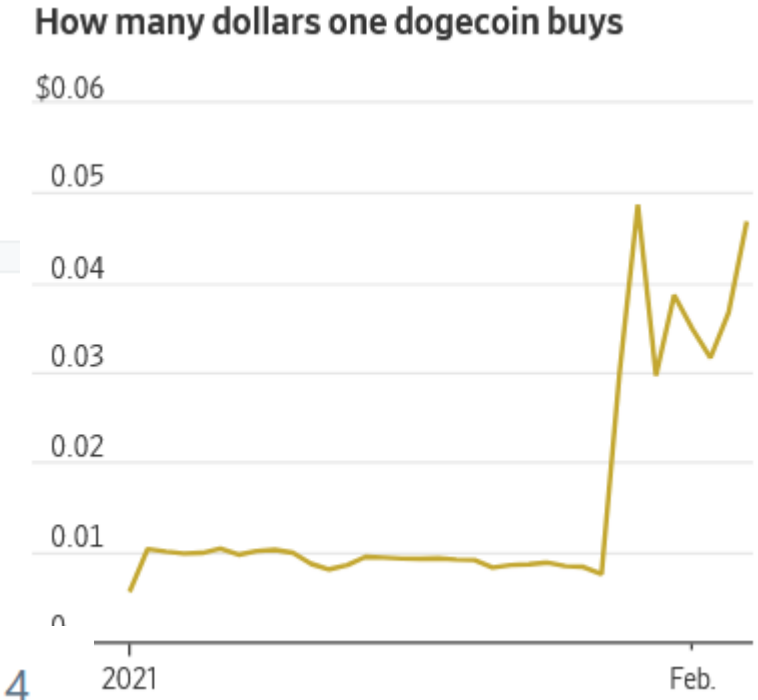
Elon Musk's Dogecoin Tweeting Has Believers Barking for More

Cryptocurrency that started in 2013 as a joke is suddenly worth a total of more than $6 billion

Elon Musk @elonmusk · Feb 4

No highs, no lows, only Doge

22.6K 126.6K 756.4K



Ali kemal özer @ali_kemal_ozer · Feb 4

Replying to @elonmusk

Thanks man, %40 profit in 10 minutes😁

A lot of hype

Not just blockchain

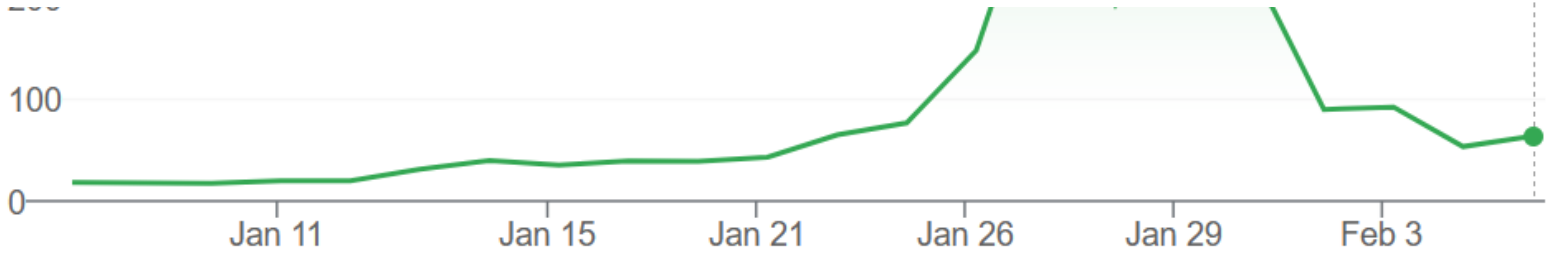
A lot of hype

Not just blockchain

Market Summary > GameStop Corp.
NYSE: GME

63.77 USD +10.27 (19.20%)
Closed: Feb 5, 7:59 PM EST · Disclaimer

Gamestop on the ASX? Why GME Resources (ASX:GME) share price rocketed 28% today



Roubini Op-Ed

- Let's examine his arguments: February 10, 2021

FINANCIAL TIMES

Opinion **Bitcoin**

Nouriel Roubini: bitcoin is not a hedge against tail risk

Elon Musk may be buying it, but that doesn't mean everyone else should follow suit

NOURIEL ROUBINI + Add to myFT

Roubini Op-Ed

- Yes. Agree is a bubble and experienced many bubbles

> Claims that bitcoin is the new "digital gold" are feeding a new bubble in it and other cryptocurrencies. The last one in 2017-18 saw bitcoin go from $1,000 to $20,000 and then fall back to $3,000 by the end of 2018.

Roubini Op-Ed

- Yes. The fundamental value of any fiat is zero.
- No. Proof-of-work is both a strength and weakness (proof of stake does not consume as much energy)

Since the fundamental value of bitcoin is zero and would be negative if a proper carbon tax was applied to its massive polluting energy-hogging production, I predict that the current bubble will eventually end in another bust.

Roubini Op-Ed

- Yes. Scaling is a major risk and it is true bitcoin will never be a transactional currency
- No. Other blockchains are not as vulnerable

> Referring to bitcoin or other crypto as "currencies" is a misnomer. They are not a unit of account: virtually nothing is priced in them. They are not a scalable means of payment: with bitcoin you can do five transactions per second while the Visa network does 24,000. Bitcoins are barely used by legitimate companies as payment for goods and services, although Tesla said it planned to start accepting them.

Roubini Op-Ed

- No. It is a store of value but a volatile one – like investing in a stock
- No. He misses the barter point which is key in DeFi

> Crypto is not a stable store of value: even some crypto conferences refuse to accept them as payment for attendance fees. The volatile price moves can wipe out any profit margin of a merchant within a matter of hours. They aren't even denominated in a consistent way that allows users to compare relative prices o goods. This reliance on different tokens is effectively a return to barter. The Flintstones had a more sophisticated monetary system based on a benchmark: the cartoon cavemen used shells.

Roubini Op-Ed

- Yes. Bitcoin is speculative asset. It is true it has no fundamental value.
- No. Gold, like bitcoin, is an unreliable hedge.

Even referring to crypto as assets is a misnomer. Most assets have a stream of income (stocks, bonds, commercial real estate) or a use (housing) or some other utility (fiat currency provides liquidity and can be used for payments). Gold has no income but it has industrial uses. It also has utility as a store of value and a hedge against inflation, currency debasement and tail risks.

Roubini Op-Ed

- Yes. Bitcoin is not anonymous.
- Yes, it is a speculative asset.
- Yes, it is the wild west
- No, some of the alternative coins have utility.

Crypto has no income, no utility, no payment or other services. It isn't even anonymous because the underlying blockchain technology makes it easy to trace payments. It is only a play on a speculative asset bubble, worse than tulip-mania as flowers had and still have utility. Its store of value against tail risks is unproven. And worse: some cryptos, dubbed "shitcoins", are financial scams in the first place or debased daily by their sponsor. Bitcoin's price is highly volatile, and claims of misbehaviour, including pump and dump, spoofing, wash trading and front-running by exchanges, are widespread.

Roubini Op-Ed

- No, not all stablecoins are like Tether (we will talk about USDC, DAI and FEI.

> Stablecoins claim to be superior. But New York authorities are already investigating whether one, tether, is being used to manipulate the price of bitcoin.

Roubini Op-Ed

- No, the reason the fees are so high for credit cards is to cover the lack of security.
- No, there are emerging solutions to losing your private key.

Vitalik Buterin, a co-founder of the cryptocurrency ethereum, argues that no crypto can be at the same time scalable, safe and decentralised. Traditional financial systems are scalable and safe: if your credit card or bank account is hacked or stolen, you are made whole. But they are centralised because participants and assets are verified by trusted institutions. Right now, crypto is neither scalable nor safe. If your private key is stolen or lost, the assets are gone for good.

Roubini Op-Ed

- Yes, the mining is centralized by all miners incented to do the right thing.
- Yes, exchanges centralized but growing importance of DEX

It isn't even decentralised. Oligopolistic miners control most bitcoin mining. Many are out of reach of western law enforcement in places such as China, Russia and Belarus, creating a national security nightmare. About 99 per cent of bitcoin trading occurs on centralised exchanges, which may be hackable. Furthermore, the original programmers retain outsized control over their creations. In some cases they act as police, prosecutors and judges, and reverse transactions that are supposed to be immutable. Nor is crypto equitable: a small number of "whales" control much of bitcoin's value.

Roubini Op-Ed

- No, these are mainly false statements (he is now talking blockchain not bitcoin).
- No, criminal prefer cash.

This undermines claims that crypto will decentralise finance, provide banking services to the unbanked, or make the poor rich. Blockchain claims to enable cheap money transfers to refugees, but crypto is much more likely to provide cover for scam artists, conmen, tax evaders, criminals, terrorists and human traffickers.

Roubini Op-Ed

- No, gold is an unreliable inflation hedge.
- Yes, TIPS are a reliable hedge

Our world is beset by financial crises, geopolitical risks and very loose monetary policy. There is growing demand for safe haven assets that are a hedge against inflation, currency depreciation and debasement and tail risks. Gold, inflation-indexed bonds, commodities, real estate and even equities are all reasonable candidates.

Roubini Op-Ed

- No, serious investors want a diversified portfolio and you can make the case for crypto.
- Yes, bitcoin has no place in a Corporate Treasury.

Risky, volatile bitcoin doesn't belong in the portfolios of serious institutional investors. Many of its retail backers are suckers being manipulated by an army of self-serving insiders and snake oil salesmen. Tesla's Elon Musk and MicroStrategy's Michael Saylor may be betting the house on bitcoin. That doesn't mean you should.

Roubini Op-Ed

- No= 13
- Yes= 11
- 11/24 = 46%

Roubini Op-Ed

- No= 13
- Yes= 11
- 11/24 = 46% = (curved!) B^-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