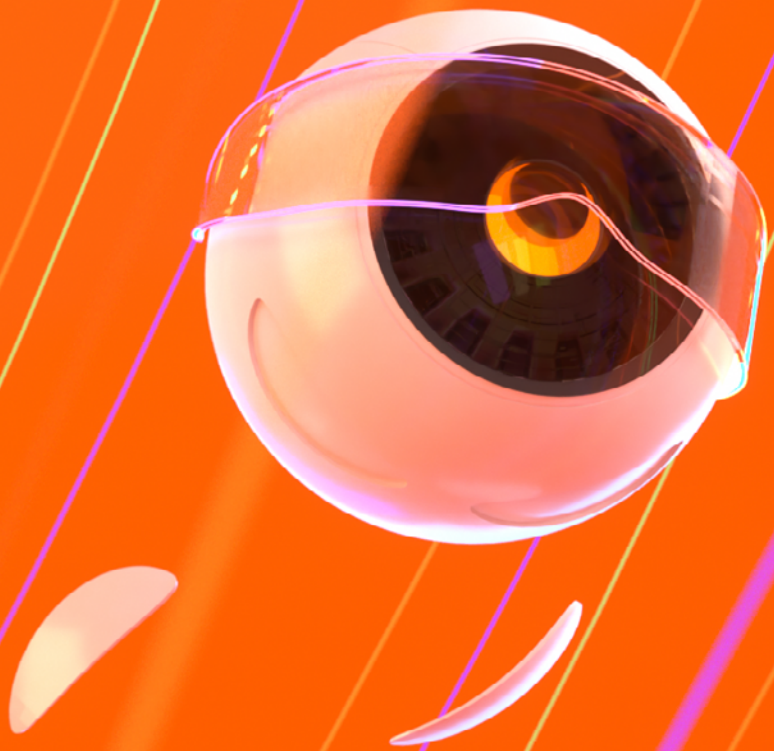
Investment Recipes

by AtonRā Partners



7 APRIL 2021

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AtonRâ Partners

AtonRâ Partners SA
www.atonra.ch

research@atonra.ch
+41 22 906 16 16

7, rue de la Croix d'Or
1204 Geneva | Switzerland

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ARTIFICIAL PANCREAS SUGARCOATS DIABETES

Igniting The Diabetes Tech Market

Innovation needed

Diabetes, the incapacity to metabolize sugar due to pancreas dysfunction, is a vast and growing market that needs a new wave of innovation.

- Automated insulin pumps are emerging to disrupt the diabetes market and are gaining shares over multiple daily injections (MDIs) of insulin, currently the most common diabetes treatment.
- The increased prevalence of diabetes worldwide and the low market penetration, especially in Type 2 diabetes, are bringing tremendous investment opportunities.

The artificial pancreas market is ready for adoption

The development of artificial pancreas technologies, including continuous glucose monitoring (CGM) systems and smart insulin pumps, promise a leap forward in adoption, backed by an increased device accessibility.

- Automation and ease-of-use via our smartphone are empowering patients and represent major technological drivers for adoption.
- Increased reimbursement and easy access through the pharmacy channel are consolidating the market's growth, mainly among Type 2 patients.

A race for the smartest artificial pancreas

MedTech giants and pure players spend a lot on R&D to develop the best-in-class product to gain market share in this underpenetrated growing market.

- Insulet and Tandem Diabetes showed strong FY20 results and plan to release their latest automated insulin delivery (AID) system by the end of 2021.
- MedTech giants, like Abbott and Medtronic, are increasing their resources and R&D spending in the diabetes industry to maintain their leading position and keep up with the emerging competition.

A Sugar-Related Disease

Insulin – the hormone responsible for sugar metabolism

The pancreas is the human body's factory for insulin production, which regulates blood glucose metabolism.

- A dysfunction in insulin production leads to a reduction in sugar uptake when needed, inducing various chronic disorders such as diabetes.
- High blood sugar levels can lead to severe complications, including retinopathy, kidney problems, stroke, and much more.

Diabetes – Two categories of patients

There are two types of diabetes patients. The first category, called Type 1, regroups people that do not produce insulin at all, while Type 2 patients are characterized by insufficient production or detection of insulin by human cells.

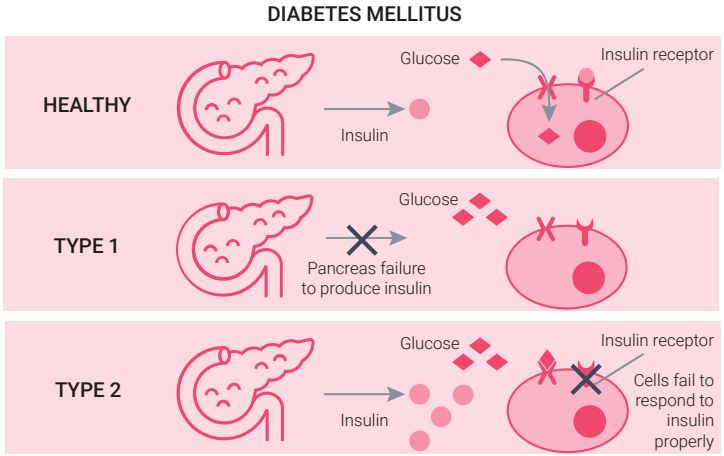
- Today, ~25mn diagnosed people are suffering from Type 1 diabetes, the strongest form of the disease, representing <10% of all diagnosed diabetes cases.
- The second category of diabetes, highly related to lifestyle, account for >200mn diagnosed people worldwide but estimated prevalence is much higher (~400mn).

Artificial pancreas – A new way to treat diabetes

The most common solution to treat diabetes is to inject artificial insulin into patients. A new form of automated and smart system to deliver insulin is the artificial pancreas.

- A sensor, known as continuous glucose monitoring (CGM) system, is used to monitor blood sugar levels in real-time.
- At the same time, an insulin pump delivers insulin in response to the sensor's data, mimicking a normal pancreas' functions.

Diabetes	Type 1	Type 2	P300 Latency (MS)
Cause	Autoimmune	Lifestyle Related	-16
Onset	Sudden	Progressive	-15
Prevention	None	Diet and Exercise	-22
U.S. Prevalence (diagnosed)	1.6mn	25.6mn	14
Worldwide Prevalence (diagnosed)	24.2mn	206.8mn	-73



SOURCE:
CDC Diabetes,
IDF DIABETES ATLAS Ninth edition 2019

Diabetes – A Public Health Priority

Prevalence is constantly increasing

Diabetes's total prevalence is rising tremendously, becoming an unprecedented public health concern that must be solved quickly.

- The increase of unhealthy lifestyle habits and the global aging population are the leading causes of the rapid increase of Type 2 diabetes' new cases.
- People suffering from diabetes (Type 1 and 2) has more than tripled worldwide since the beginning of the '00s and is expected to reach 700mn by 2045.

Treatments are not convenient

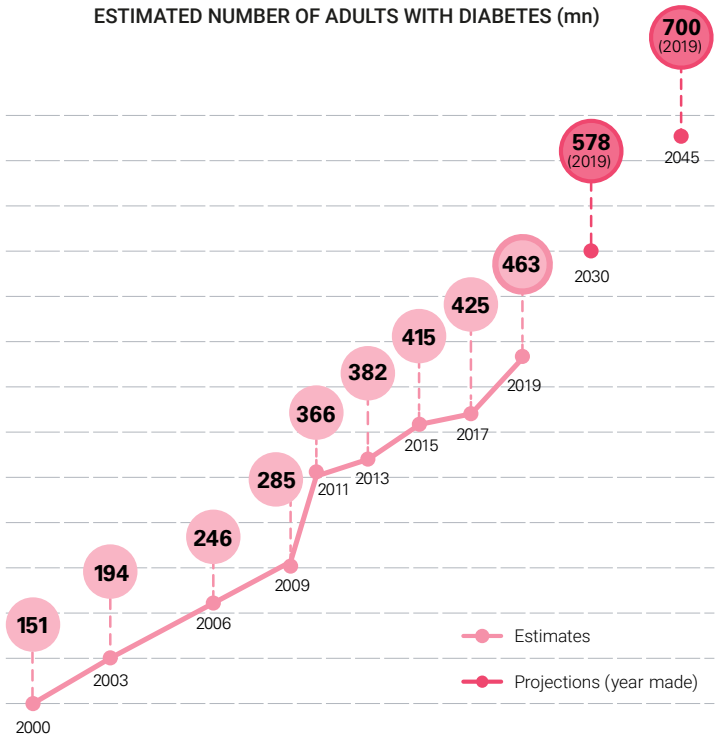
Actual treatments are not convenient for patients and are lacking automation. The most common way to treat diabetes is by manually injecting insulin doses every day.

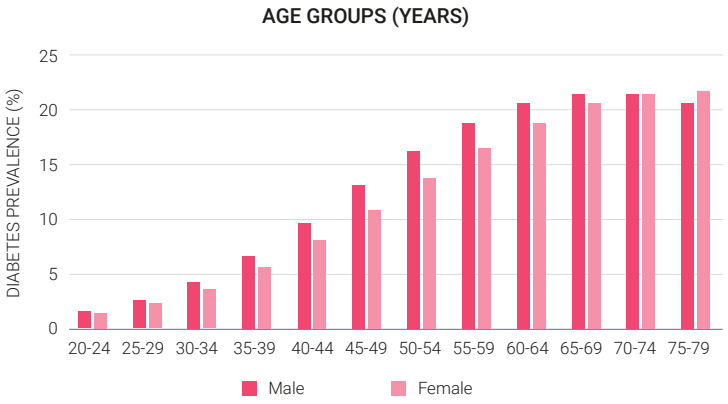
- Multiple daily injections (MDIs) are an everyday hassle for patients who must never forget to inject themselves.
- It is estimated that more than 90% of Type 1 and intensive Type 2 diabetic patients rely on MDIs, while 5% are using conventional insulin pumps.

Substantial market opportunities for artificial pancreas

The growing prevalence of the diabetic population and the lack of convenient treatment bring tremendous market opportunities for the artificial pancreas.

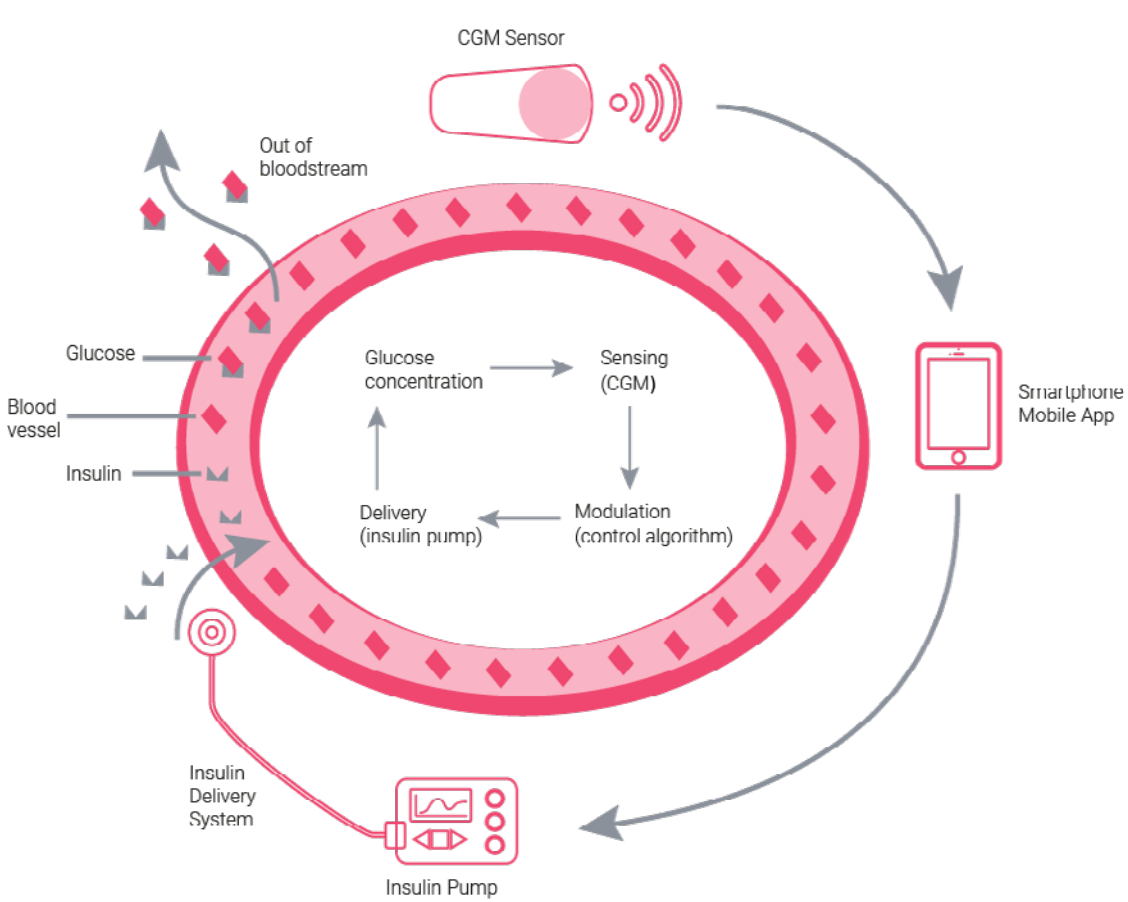
- The insulin pump market is expected to grow at a 10% CAGR to $8.5bn by 2027.
- The artificial pancreas market shows a penetration rate of 30% among the Type 1 and only 1% among the Type 2 population in the U.S.

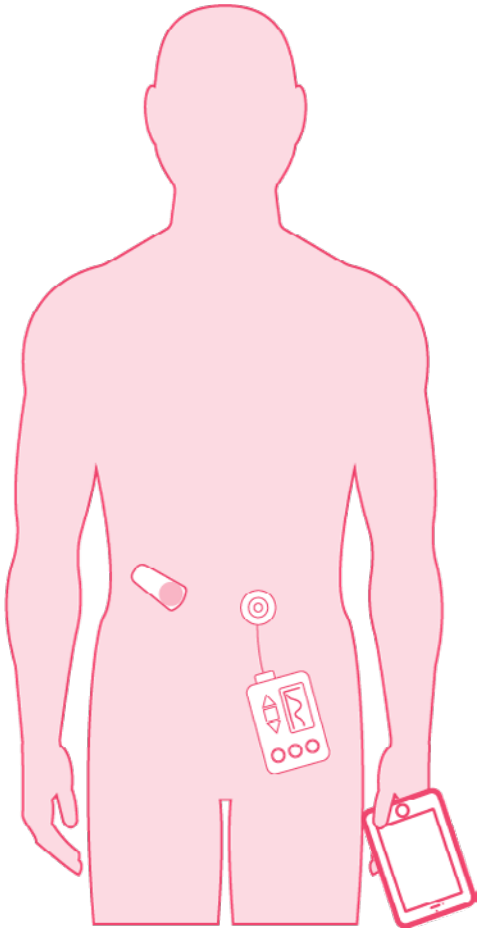




SOURCE:
Insulin Pumps Market to Reach USD 8.50 Billion by 2027; Rising Prevalence of Diabetes to Augment Growth: Fortune Business Insights™

Closed-Loop Artificial Pancreas





SOURCE:
Advances in artificial pancreas systems

Artificial Pancreas Are Ready For Adoption

Devices smarter than ever

Several new product launches are expected this year, enabling a leap forward for the diabetes tech market. New automated and smart artificial pancreas coupled with mobile apps bring a new wave of innovation to the market.

- Technological advances in CGMs and insulin pumps, offering a better experience to patients, are expected to increase adoption by 21% in 2021.
- >90% of customers are currently from the Type 1 diabetes population. Both CGM and insulin pump makers target the large and underpenetrated market of Type 2 diabetes to drive future growth and adoption.

Geographic expansion is fueling growth

Insulin pumps and CGM makers focused their business almost only in the U.S., thus global geographic expansion remains a significant growth opportunity.

- Insulin pump penetration among the Type 1 population out of U.S. (OUS) is set to a small 10–15%.
- Dexcom's geographic expansion strategy aims to triple their patient total addressable market (TAM) by H2 2023.

Easy access through the pharmacy channel

Good reimbursement policies and easy access to insulin pumps and CGMs through the pharmacy channels are boosting adoption.

- Dexcom and Insulet are now moving to the pharmacy channel to give easier access to their product, which is expected to increase Type 2 diabetes adoption.
- Insurance coverage for artificial pancreas devices is already well established for Type 1 diabetes and is expected to increase for the Type 2 population.

SOURCE:
Insulin pump adoption seen climbing 21% in 2021 on wearables boom: survey
CGM patients seen rising 38% in 2021 fueled by Type 2 diabetes: poll

CGMs Are Indispensable

CGMs are gaining traction

Continuous glucose monitoring (CGM) systems, allowing users to follow their blood glucose levels in real time, are disrupting the diabetes tech market.

- The Covid-19 pandemic has accelerated CGMs adoption as it boosted remote patient monitoring, telehealth and wearables momentum.
- CGMs market, led by Dexcom and Abbott, is expected to see adoption rising by 38% in 2021, mostly fueled by traction in the Type 2 population.

Dexcom – A pure player on the rise

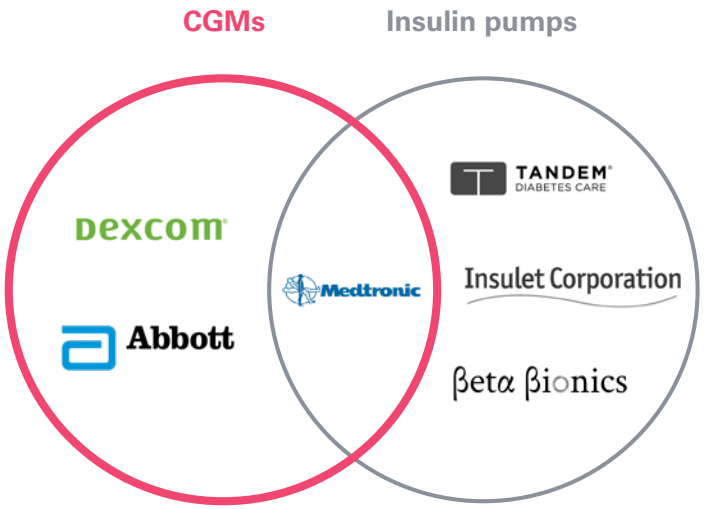
Dexcom is the worldwide leader in continuous glucose monitoring devices allowing to close the loop for automation in concert with insulin pumps.

- Insulet and Tandem integrate Dexcom's sensor in their system to continuously adapt insulin delivery in response to blood sugar levels.
- Dexcom plans to release the next-generation CGM device G7 by the end of 2021, which is expecting to deliver much better patient experience.

Abbott – A giant keeping up with innovation

Abbott is directly competing with Dexcom and Medtronic and is using the power of its size to gain market share over opponents.

- Abbott received the CE mark last September for its FreeStyle Libre 3 system and is currently developing the 4th version of the CGM system.
- Abbott's Libre Sense, based on FreeStyle Libre, is the first CGM device designed for use in athletes without diabetes to track their glucose levels during sport.



SOURCE:
Tandem Diabetes Care, Company Overview FEBRUARY 24, 2021,
Insulet CorporationJ.P. Morgan Healthcare Conference,
DEXCOM Investor Presentation

A Race For Automation

Insulet Corporation – The most promising insulin pump maker

Insulet, part of our Top picks 2021, is a pure player in the insulin pump industry and develops a wearable patch pump expected to knock down barriers for pump therapy adoption.

- Omnipod 5, their new tubeless closed-loop system, is expected to be launched in H1 2021 and will be a significant driver for Insulet's growth as it is expected to be the state-of-the-art insulin pump in the market while reducing costs.
- Its pay-as-you-go (PAYG) model in pharmacies and the 30 days free trials aim to increase adoption within both diabetes population.

Tandem Diabetes – The first closed-loop system

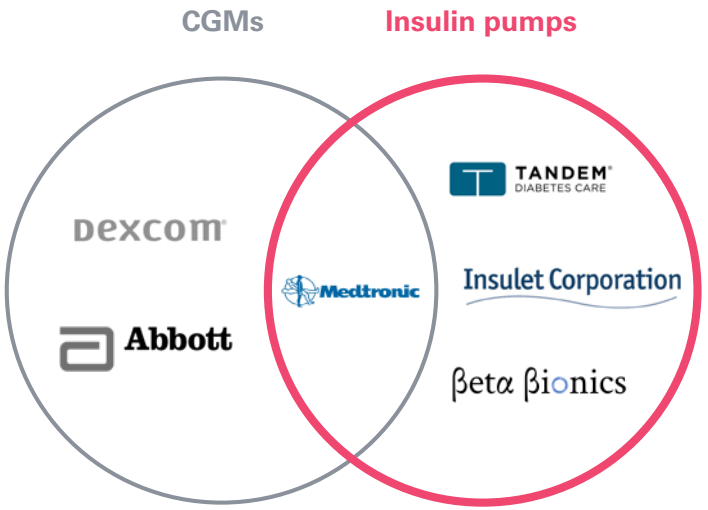
Tandem Diabetes is Insulet's main competitor in the race for the best and smartest insulin pump. It currently has the most advanced insulin pump in the market, with its FDA-approved Control-IQ algorithm for automated insulin dosing system.

- Its main shortcoming, though, is its reliance on an external device.
- Tandem Diabetes expects to release the t-sport pump this year, a small insulin pump directly connected to a mobile app targeting diabetes Type 2 patients.

Medtronic – The MedTech giant is losing share

The MedTech mastodon, leading the diabetes market, has recently doubled efforts and resources to stay in line with competitors.

- Insulet and Tandem, pure players in insulin pumps, are seriously taking on Medtronic, which is expected to lose 8% of its ~60% market share by 2022.
- To keep up with the competition, Medtronic plans to launch the MiniMed 780G, their latest automated insulin delivery (AID) system, in the coming months..



SOURCE:
Tandem Diabetes Care, Company Overview FEBRUARY 24, 2021,
Insulet CorporationJ.P. Morgan Healthcare Conference,
Medtronic Gains Momentum in Diabetes

Catalysts

- **Access through the pharmacy channel**. An easy and increased access to CGM systems and insulin pumps across the pharmacy channel will expand the diabetes tech market by increasing diabetes Type 2 adoption.
- **Ease of use.** Devices' automation and directly using smartphones for glucose monitoring and insulin bolus are critical features for people's adoption.
- **Geographic expansion.** Insulin pump and CGM makers are entering new markets which are highly underpenetrated and represent a substantial growth opportunity.

Risks

- **Delays due to Covid-19.** The pandemic could induce further delays in the new products expected to be released this year.
- **Incertitude in medical device reimbursements.** The medical device industry is hit by revised reimbursement policies in the U.S., which would negatively impact the insulin pumps market's growth.
- **Cybersecurity.** The hyperconnectivity of automated and smart artificial organs presents the risk of a cyberattack if they are not well protected, potentially leading to disastrous consequences.

Bottom Line

- We expect the diabetes tech market to grow significantly following the release of new automated insulin delivery (AID) systems, easy pharmacy access, and a remote device control which will be critical drivers for insulin pumps and CGMs adoption.
- Technology and innovation will continue to drive the diabetes tech market's positive momentum by reducing the burden and improving patients' outcomes (simplicity, automation, and empowerment). We are exposed in our portfolios to this underpenetrated market to capture its growth and associated returns.

Companies mentioned in this article:

Abbott (ABT US), Dexcom (DXCM US), Insulet Corporation (PODD US), Medtronic (MDT US), Tandem Diabetes Care (TNDM US)

DIGITAL MINE, REAL MONEY

How To Benefit From The Crypto Rally?

The Bitcoin rebirth

Among the unexpected consequences of the Covid-19 crisis is the regain in interest for Bitcoin (BTC) and other digital assets. The economic environment is auspicious for this asset class, and institutional investors are jumping in.

- The price of BTC has been multiplied by a factor of ~10x in 1 year.
- Bitcoin "market cap" hit the $1tn mark in March 2021.

Miners in the sweet spot

Among various solutions to get exposed to Bitcoin, we believe miners are well-positioned to capture its price increase. Like conventional miners, their price behaves like a levered exposition to the underlying asset, here BTC.

- It is estimated that >1mn miners exist. A fraction of them holds most of the computing power that validates the transactions on the network.
- Bitcoin miners broke their revenue record in February 2021.

Chips manufacturers are the kingmakers

The mining industry has its own set of risks and opportunities. Investors must be aware of the complex value chain behind crypto miners and keep in mind that the hardware performance drives the return on investment.

- The current shortage of specialized mining chips impacts the entire sector, which must wait for deliveries before upgrading its mining facilities.

Introduction To Crypto Mining

The role of crypto miners

Miners have the key role of monitoring, verifying, and validating transactions. They ensure the blockchain's legitimacy without relying on a central authority like a central bank or a traditional banking institution.

- We introduced miners' role in Decentralized Finance, system revolution or craze?

Overview of blockchain consensus

The consensus is the process for achieving agreement on the next state of a data value within a distributed network. It describes how miners compete and are rewarded. We distinguish two leading families of consensus mechanisms:

- Proof-of-work (e.g., Bitcoin, Ethereum): Miners compete using computing power to solve numeric problems.
- Proof-of-stake (e.g., Ethereum 2.0, Dash, Polkadot): Validators lock up collateral in exchange of interests for the right to verify transactions.

Acting in the interest of everyone

Miners must also ensure the security of the network. They prevent malicious attacks and make sure transactions are not reversed or coins double-spent. The larger the number of miners, the smaller the chance of success of a hack.

- For a proof-of-work blockchain, a malicious attack would require, in theory, 51% of the mining power.
- For a proof-of-stake blockchain, a malicious attack would require, in theory, 51% of the assets staked.

SOURCE:
Bitcoinmining.com, Investopedia, Block Geeks, AtonRâ Partners

Bitcoin, Where Everything Started

Focus on Bitcoin

In this article, we focus on Bitcoin mining. Although Bitcoin could hardly be used in everyday life in its current state, the digital asset has leveraged its first comer position and gained the status of proxy for the entire crypto world.

- The first Bitcoin block was mined on 3 January 2009.
- At the end of March 2021, the market cap of BTC exceeded $1tn.

BTC miners get rewarded

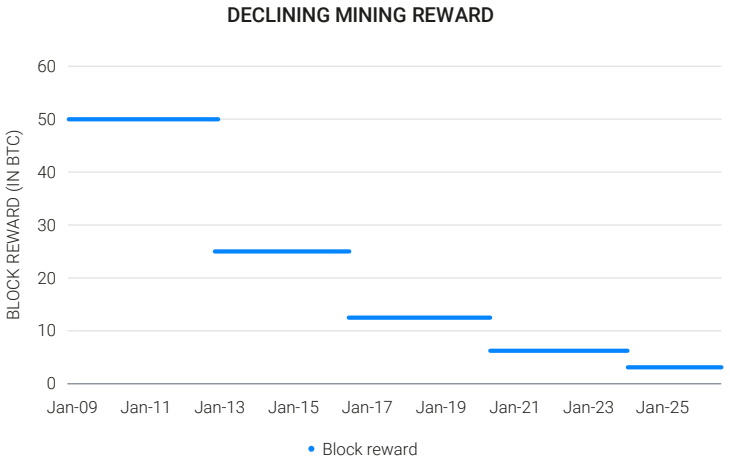
Optimized mining hardware differs among the various digital assets. For Bitcoin, miners use their computing power to find the output of a cryptographic hash function. For each new block, they receive a predetermined reward in Bitcoin and the fees paid by the transaction's initiators.

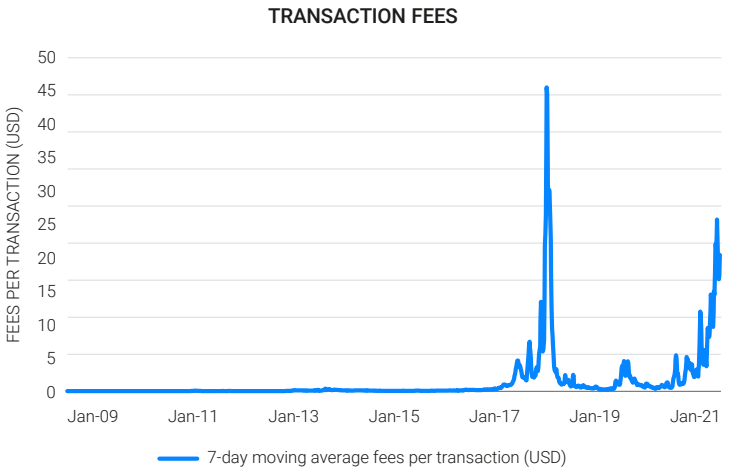
- Bitcoin uses a proof-of-work consensus.
- The block reward diminishes every 210'000 blocks (~4 years) and is currently at 6.25 BTC. 21mn BTC can be mined in total.
- The transaction fees depend on the congestion of the network.

An evolving mining difficulty

The Bitcoin network automatically adapts the mining difficulty according to the total computational power being used to mine. If the average mining time decreases, the mining difficulty increases – and vice versa.

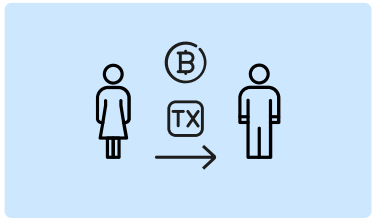
- The difficulty level is adapted every 2'016 blocks (~14 days).
- Bitcoin's predetermined supply schedule is one block every ~10 minutes.



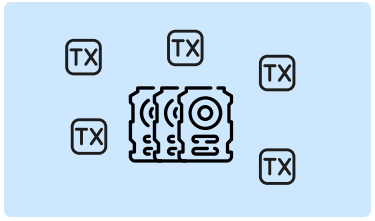


SOURCE:
Coin Market Cap, Seba Bank, Blockchain.com, AtonRâ Partners

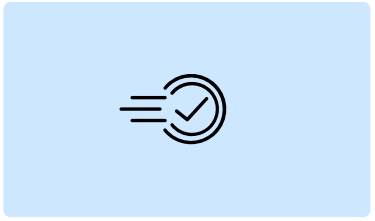
Bitcoin Mining Overview



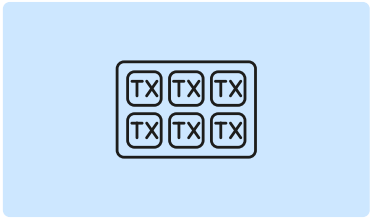
Alice sends Bob some BTC.



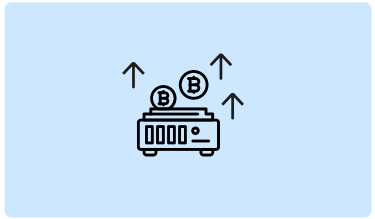
Miners around the world are alerted of the impending transaction.



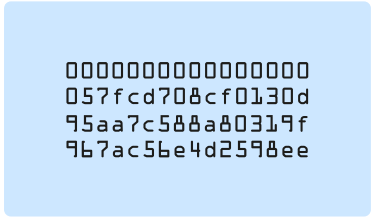
Miners verify that Alice has enough BTC in her wallet for the transaction.



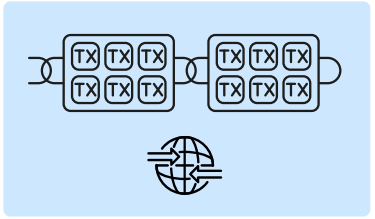
Pending transactions are bundled into a block of 1MB (~2000-2200 transactions).



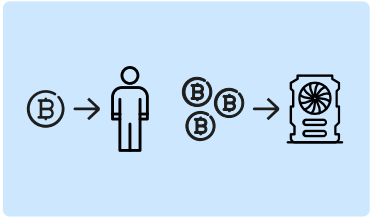
Miners race to verify the transaction and to solve the proof-of-work problem.



Finding the right output of the hash function can be compared to a competitive lottery, where miners must guess a 64-digit hexadecimal number (see above) with a certain but arbitrary number of zeroes as the beginning and whose complexity evolves.



Once a miner finds a valid answer, the new block is added to the public ledger. The updated blockchain is distributed to the entire network.



Bob receives Alice's BTC. The winning miner gets the transaction fees and the block reward.

SOURCE:
Harvard Business School, AtonRâ Partners

Miners' Profits Depend On Bitcoin Price

Record revenues for miners

The recent appreciation of Bitcoin has generated record revenues for the mining industry. The precedent record was during the peak of late 2017 when the block reward was twice as high.

- This year, miners cashed in $1.1bn in January and $1.36bn in February.
- >85% of these revenues come from the block rewards, the rest from transaction fees.

The income statement of a miner

All Bitcoin mined are accounted as revenues. The gross profit can be obtained by deducting the costs linked to mining, mostly amortization and the electricity costs to run computations and cool down the facility.

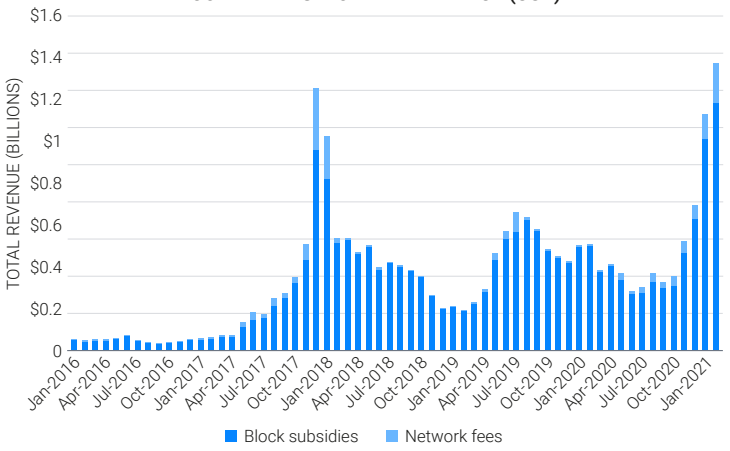
- Above a specific price, any BTC price increase goes directly to the bottom-line, in essence making Bitcoin miners a leveraged play on Bitcoin price.

Bitcoin could keep its current trend

It would require another article to review the recent evolution of BTC. Future will tell if the recent appreciation will last. Still, several factors (safe-haven, fear of inflation, interest from institutional investors, BTC as treasury management, etc.) have helped Bitcoin become a hot topic and reach a new status.

- We outlined in several notes that digital assets would benefit from the market environment, e.g., Outlook 2021: is money still worth something?

BITCOIN MINING MONTHLY REVENUE (USD)



SELECTED COMPANIES HAVING BITCOIN FOR TREASURY PURPOSE

Company	Approx. USD value
MicroStrategy	$5.4bn
Tesla	$2.8bn
Galaxy Digital	$1.0bn
Square	$0.5mn

Data as of 18 March 2021. At least 26 public companies have disclosed investments in Bitcoin.

SOURCE:
Coindesk, Coin Metrics, Bitcoin Treasuries

A Complex Value Chain

Miners double down their efforts to get block rewards

The recent surge in price in BTC has increased the appetite of many players. Competition to mine blocks is increasing. As a result, the computing power, measured in hash rate, to mine and process transactions reached new records.

- Miners compute ~160 quintillions (10^18) hashes per second.
- Mining alone, a standard PC would need decades and tons of luck to get reward blocks in this environment – winning the lottery is more plausible.

A variety of business models

Industrial-scale miners have raised billions to build complex infrastructure. They aim to compete with mining pools, groups of cooperating miners who share block rewards. Alternatively, cloud miners do not take the risk of not getting block rewards: they rent their computing power to individuals.

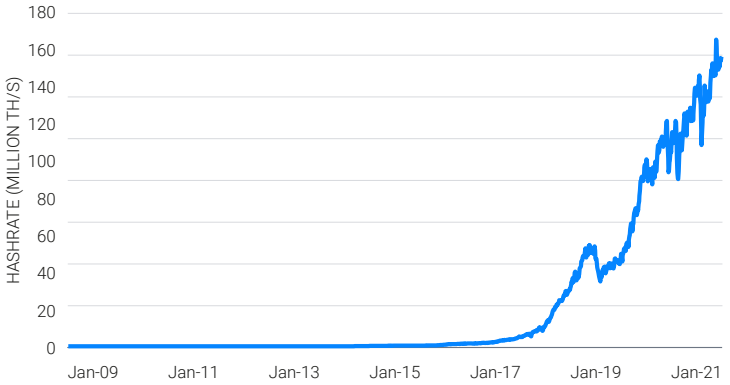
- Cipher Mining will raise $595mn to buy mining chips. The firm is merging with the SPAC Good Works Acquisition for an enterprise value of $2bn.
- BitDeer rents Bitcoin mining hardware starting from $937.50 for 150 days, marketing a break-even after 102 days.

How investors can get exposure to the mining industry

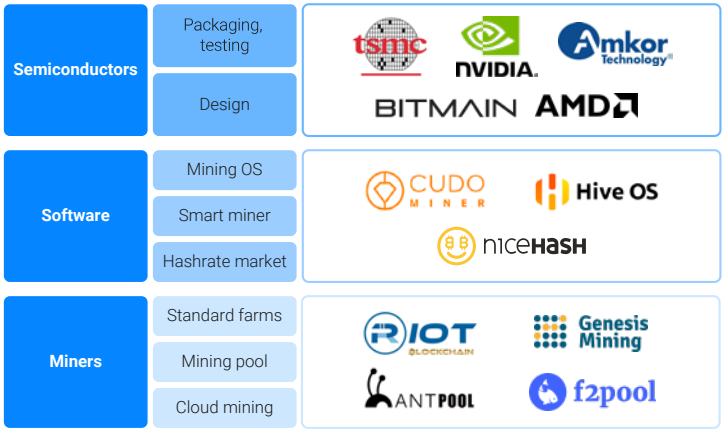
Miners are an obvious option. The semiconductor industry supplies powerful hardware. And the software industry will become more important as the complexity of mining increases.

- Each category offers investors a different set of expectations and risks.

TOTAL HASHRATE



MINING INDUSTRY OVERVIEW (NON-EXHAUSTIVE)



SOURCE:
Blockchain.com, CoinDesk, Global Coin Research

Microchips Drive Return-On-Investment

GPUs do arithmetic computations best

Crypto mining is a mathematical puzzle solved by brute force. Consequently, the more Arithmetic Logic Units (ALUs) you pack in, the faster you can compute.

- Microprocessors (CPUs) are multi-purpose computing chips, embedding only a few ALUs per core and a lot of control logic and cache memory.
- Graphics Processing Units (GPUs) process parallel computations through 1'000s of ALUs and wide memory buses, enabling much faster mining.

FPGAs accelerate dedicated algorithms

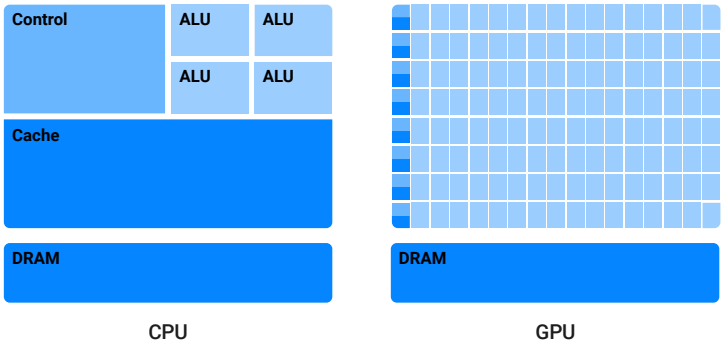
Cryptocurrency mining performance results from secure hashing algorithms (e.g., SHA), which can be optimized using Field Programmable Gate Arrays (FPGAs).

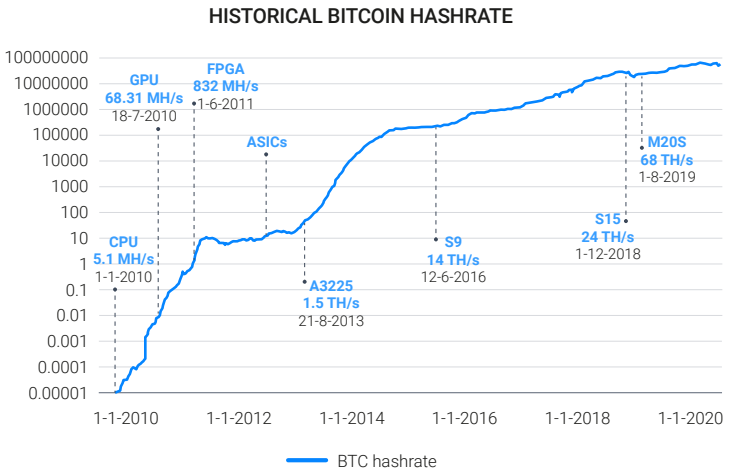
- Bitcoin mining relies on repetitive SHA-2 algorithm computations, which require about 1'000 configurable logic blocks (or roughly 10'000 gates).
- FPGAs offer a significant improvement in performance vs. GPUs and can be fine-tuned for various crypto-currencies algorithms.

ASIC is the optimal recipe, hard-wired in a silicon chip

For leading crypto-currencies such as Bitcoin, the most profitable option is to design a dedicated circuit, which will ensure an arms-race edge to its users.

- Application Specific Integrated Circuits (ASICs) provide the best energy efficiency and performance, offering ~10x the dollar return per day of GPUs.
- Leading ASIC providers such as Bitmain or Canaan use the latest 5nm technology from TSMC – one or two generations ahead of CPUs/GPUs.





SOURCE:
NiceHash, BitcoinWiki, "ON THE HARDWARE IMPLEMENTATIONS OF THE SHA-2 (256, 384, 512) HASH FUNCTIONS" ISCAS'03

Can’t Get Enough Mining Processors?

An opportunity too good to pass up

The Bitcoin mining market has been plagued with volatility and is just exiting the 2019 crypto winter. Yet, market adoption looks very different today. Additional chip manufacturers are joining the crypto party.

- Samsung confirmed its manufacturing of crypto-mining ASICs.
- The global cryptocurrency mining hardware is expected to grow by $2.8bn by 2024, with a CAGR accelerating towards +10%.

China’s Bitcoin mining rig manufacturers are sold out

The recent Bitcoin appreciations ignited an unprecedented demand for mining ASICs. Manufacturers, starting with TSMC, the largest semiconductor foundry, are constrained to limit the offered volume to crypto mining companies.

- TSMC’s narrow volume has been secured by Bitmain.
- Canaan reported $200mn advanced payment (2 years of revenues) for North America, as chip shortage rebalance the global crypto mining map.

GPU players are back in the game

Gaming cards have been in shortage as a collateral effect, as miners desperately tried to get their hands on computing capabilities. Mining Ethereum and other alternative coins remain profitable using GPUs.

- Nvidia has seen between $100mn and $300mn revenues from crypto mining in Q4 2020, pushing it to release dedicated products (called CMP).
- AMD is expected to repurpose its Apple-only product line towards crypto-mining – as hinted by the company’s latest Linux drivers.

SOURCE:
China Money AI, Encrypted Money Research, Technavio

Who's Mining?

Mining pools rule the game

Even the largest miners must join their forces within mining pools to get a chance to validate a block and receive BTC rewards. Pools increase the probability of mining a block and reduce the income volatility for the miners. Mining pools deduce from the rewards a small fee for their software and the maintenance.

- Riot Blockchain estimates these pool fees to reach ~2% of revenues.
- The top-5 pools earn ~2/3 of blocks mined.

What about listed companies?

Listed miners are building up their computing power. They mostly wait for ASICS deliveries from Bitmain. Like any other players, they use mining pools. Compared to the hundreds of thousands of smaller miners, they have the financial resources and the contacts with ASICs providers to upgrade their machines continuously.

- Listed miners account for <10% of total computing power. We expect the market share of the largest miners to increase going forward.

China, the preferred place of mining pools

China's central government embraces its own central bank digital currency but is highly skeptical towards Bitcoin and other cryptocurrencies. Yet, the country has the highest concentration of mining pools.

- In April 2020, China accounted for ~65% of mining pools' hash rates, followed by the United States with ~7%.
- Miners go to China for its electricity prices, fees, and their loyalty to mining pools – not necessarily to the country.

HASHRATE OF MINING POOLS AND LISTED COMPANIES

	Estimated hashrate	Future hashrate (expected full deployment)
Selection of listed companies		
Argo Blockchain	1.1 EH/s	~5.0 EH/s (2022)
Cipher	-	39.8 EH/s (2025)
Hive Blockchain	0.4 EH/s	2.5 EH/s (Q4 2021)
Hut 8	1.1 EH/s	1.3 EH/s (Q2 2021)
Marathon Patent	1.4 EH/s	10.4 EH/s (Q1 2022)
Riot Blockchain	1.3 EH/s	4.0 EH/s (Q4 2021)
Top Mining pools		
Poolin	27.8 EH/s	
F2Pool	25.7 EH/s	
AntPool	19.0 EH/s	
Binance Pool	18.3 EH/s	
BTC.com	15.8 EH/s	

Data as of March 2021. Total hashrate of ~160 EH/s. Data only for the computing power dedicated to Bitcoin mining. Companies may mine other coins (e.g., Hive mines mostly Ethereum) and be engaged in other activities (like cloud mining or VC investments).

SOURCE:
Cambridge for Alternative Finance, BTC.com, Companies' reports

Challenges To Overcome

Green, greener, greenest

The electricity consumption to run the Bitcoin blockchain is significant – but so is gold or other store-of-value assets. Chips' efficiency has improved, and miners take responsibility by switching their operations to renewable energy.

- The network would use more energy than Argentina or the Netherlands.
- Texas is attracting many mines thanks to its wind energy boom.
- 76% of miners already use renewable energy in their operations.

An arms race of computing power

As more miners join the party and chips become more capable, existing players must continuously renew their material to maintain market share. This could end if the consensus is modified from proof-of-work to proof-of-stake.

- The Bitcoin network will triple its computing power by 2025, as per Cipher. Likely to be a conservative estimate.
- Ethereum is transitioning to proof-of-stake, where validation is not done by who has more computing power but has more wealth.

The emergence of cryptojacking

The use of malware to force victims' computers to mine cryptocurrencies is rising. BTC's higher hash rate makes the network resilient to attacks yet not immune.

- Hackers usually prefer to mine Monero or Zcash, which are less traceable.
- In 2018, the Smominru crypto mining botnet infected >500K computers.

SOURCE:
Cambridge for Alternative Finance, Cipher, CSO

Catalysts

- **A per se asset class.** Bitcoin will consolidate its status as a new asset class with time. New financial products dedicated to crypto miners will arrive – like for natural resources miners.
- **BTC at $100'000.** Bitcoin price is beating records. Reaching a 6-figure price for 1 BTC is not anymore impossible. If it happens, miners' profits will grow exponentially.
- **More miners going public.** The listed industry will expand with the arrival of miners like Cipher and Northern Data. Miners are getting more professional, and institutional investors will have to be exposed to the industry.

Risks

- **Mining ban.** India and China's Inner Mongolia are among the places imposing or considering mining bans. The roll-out of central bank digital currencies could accelerate bans to defend national interests.
- **Behave like a levered Bitcoin.** Bitcoin miners can be seen as levered investments in Bitcoin. Bitcoin is highly volatile. For sure, the road ahead will not be a quiet river.
- **New BTC products.** Several Bitcoin ETFs are waiting for approval by regulators in the U.S. These products will offer an easy solution for investors to get exposed to BTC. The valuation premiums of existing proxies like Bitcoin miners could be under pressure.

Bottom Line

- Bitcoin is breaking records, and the dynamics are very different from late 2017. Among other reasons to explain the rally, institutional investors have switched from the question "Why should I have Bitcoin?" to "Why should I not have Bitcoin?". Bitcoin miners benefit from the recent surge, as any incremental price increase goes directly to the bottom-line.
- Our fintech portfolio is exposed to the blockchain and cryptocurrencies industry, including mining companies.

Companies mentioned in this article:

AMD (AMD US), BitDeer (not listed), Bitmain (not listed), Cannan (CAN US), Cipher Mining Technologies (GWAC US), Northern Data (not listed), Nvidia (NVDA US), Samsung (005930 KS), TSMC (2330 TT)

Digital assets mentioned in this article:

Bitcoin (BTC), Dash (DASH), Ethereum (ETH), Monero (XMR), Polkadot (DOT), Zcash (ZEC)

E-YUAN: CHINA STEPPING INTO THE FUTURE

Leading The Central Bank Digital Currency Race

E-yuan soon in your e-wallet

As we wrote, the issuance of central bank digital currency has the potential to reshape the whole financial system. China is making this a reality by steamrolling ahead with its plans about bringing a digital yuan to the retail masses.

- While most countries are still focused on defeating the pandemic, China has been rolling out the first Digital Currency Electronic Payment (DCEP) tests.

Near-Field Communication (NFC) a key enabler

Thanks to NFC, DCEP can be used more widely than other payment means like Ali-Wechat pay, as it provides an actionable solution for special cases.

- Using either DCEP or Ali-Wechat pay makes no difference in an online scenario, but offline, DCEP works even without an internet or mobile connection.
- NFC becomes a convenient solution where a connection is weak or unreliable (think subways or underground parking lots, or remote areas).

The main winner is the central bank

The impact of DCEP on the various economic players is varied and hard to quantify, but China's Central Bank (PBOC) is the biggest winner.

- Policymakers are wary of the growing power of the Tencent and Alibaba mobile payment empires and are looking to bring them back under control.
- A swarm of new fintech companies is looking forward to breaking through the barriers to entry built by Tencent and Alibaba.
- Bitcoin is also at risk as China tightens its cryptocurrency market.

DIGITAL YUAN WALLET ON BANK APP

The Background History Of The Digital Yuan

It is all about monitoring.

For decades, the China has developed ways to oversee its economy. DCEP is the latest one, as the digital yuan intends to replace cash and thus would allow monitoring any monetary transaction.

- Since 2020, GOC has tracked any banking transaction above CNY 100k.

A blessed environment to give birth to the digital Yuan

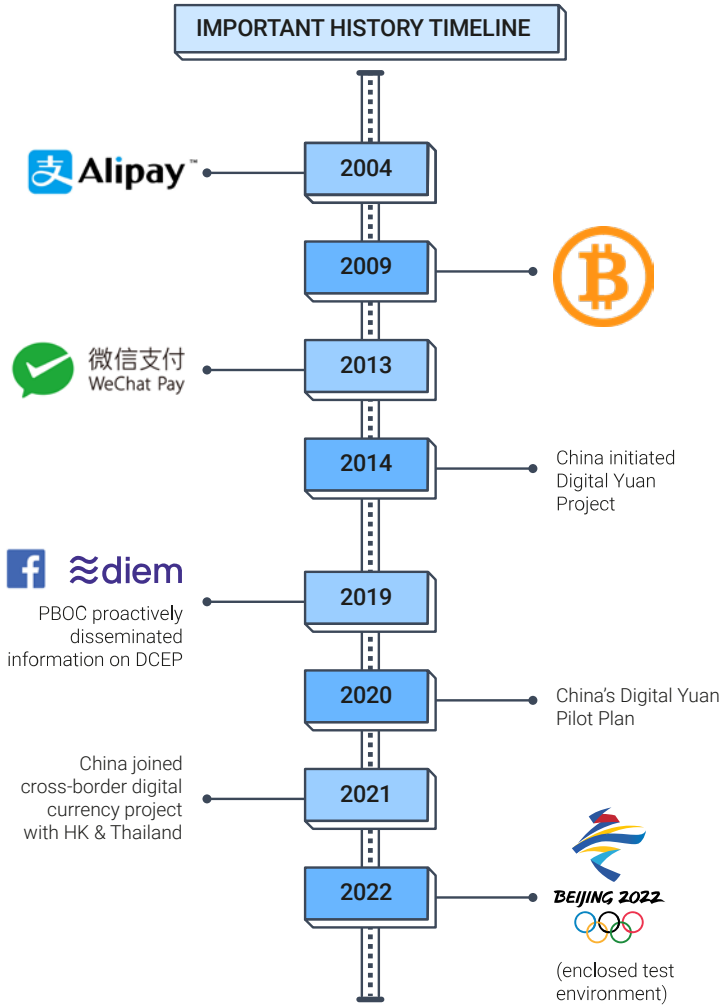
Perfect background settings led China to spearhead the governmental digitalization race. Its cashless-friendly environment in almost every purchasing setting allows the PBOC to avoid building its own network of links to each store.

- With a smartphone penetration rate above 63% (as of 2020), China has the biggest savvy-tech user base globally, more than 911mn people.
- >81% (as of 2019) of Chinese smartphone users have adopted mobile payment, well above the 29% of the U.S..

"Must win" both on sports and politics

In 2020 China already rolled out its trials in four cities, as it looks to cover the venues of the coming 2022 Beijing Olympics (enclosed test environment).

- With less than 12 months to get ready, China will attempt a new world record, witnessed by participants from all over the world.



SOURCE:
Statista: Penetration rate of smartphones in selected countries 2020,
Statista: Proximity mobile payment usage penetration in selected countries in 2019

A Life-Sized Pilot Plan

Digital luck to get started

In the initial tests, catering to Chinese nature, the distribution of digital yuan has been done through a lucky draw (lottery) system. Winners claim the money on their banking apps and spend it with participating merchants within the validity period.

- In Shenzhen, a total of 20mn digital yuan were distributed through lots of 200 yuan each, resulting in a winning rate of ~2.6% (or about 1 in 40 citizens).

A comfortable user experience

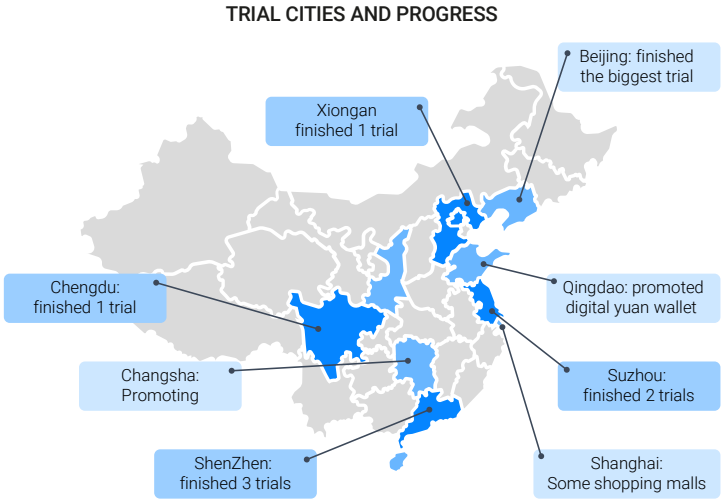
For end-users, the journey of paying was just as easy as using Ali-WeChat pay, and no paying habit needed to change, except using a different app.

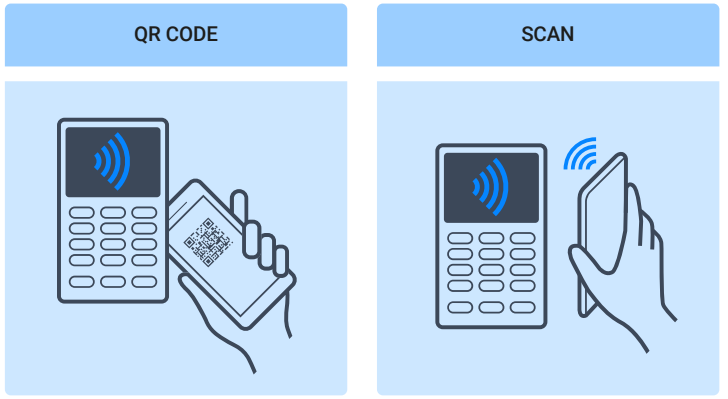
- In the trial cities, tens of thousands of local merchants accept already DCEP, covering food & beverage, grocery shopping, and entertainment services.
- Three payment options are available: QR code, scan and NFC (new feature).

Accruing multiple benefits

From the central bank's perspective, the success of the pilot plan brings only benefits and no harm.

- Breaking the duopoly of Alibaba and Tencent (with respectively 55% and 38% of market share) and bringing in new fintech players reboots a healthy competitive environment in cashless services.
- Real-time data empower the government to monitor the economy closely. Its controllable anonymity is conducive to detect fraud and illegal transactions.
- The popularity of cryptocurrencies, such as Bitcoin, can be challenged by the national currency's functionality.





A Game-Changer Keeping The System Unchanged

No need to disrupt the banking system

China de facto choose to avoid bank disintermediation. The central bank issues a token passed on to commercial banks, which place it into users' hands (or actually e-wallet) through existing bank apps.

- This dismissed the concerns about possible competition for the banks if the public was given the option to have deposits directly with the central bank.

Keeping the monetary system intact

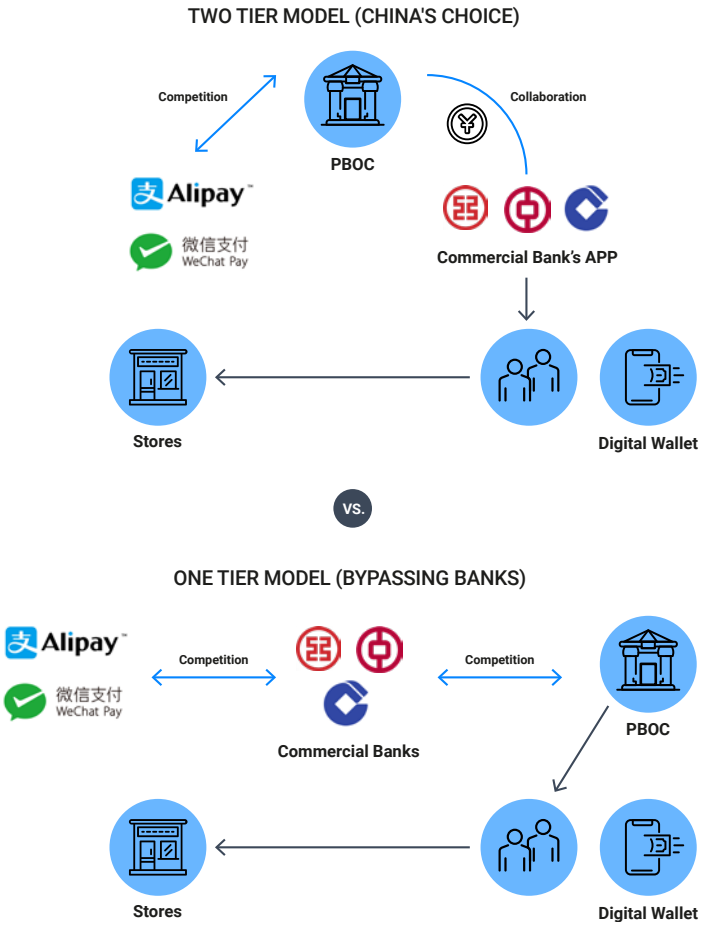
Digital Yuan is being introduced to merely replace physical notes and coins in circulation, so the money supply is not expected to change or spur inflation. As such, it maintains current creditor-debtor relationships between PBOC and banks.

- When cash is issued, commercial banks need to deposit reserves with the central bank. For the digital yuan, the reserves and the system are the same.

DCEP preserves the "offline" nature of cash

PBOC adopts the Unspent Transaction Output (UTXO) system enabling the digital yuan to have various offline circulation steps before being registered online again (e.g., when internet connection may not be available).

- When processing a deal offline, the buyer will issue a payment token X which carries with it data about eventual other offline transactions, which are all reconciled as soon as the users are back on-line.



Ensuring No Space Is Left Blank

Weak networking connection no longer holds online payment back

Near-field communication (NFC) is a wireless data transfer method that enables electronic devices to communicate without an internet connection. It is the solution to a poor network signal in rural areas, inside buildings or underground, as well as in case of unexpected network connection loss.

- NFC already powers contactless payments for mobile wallets like Apple Pay, Android Pay, and contactless cards.
- It is designed to exchange data through a simple “touch gesture” (with devices being less than 4cm from each other).

A small spark for wearable devices

The need for using DCEP without smartphones began to form during the Beijing trial to solve the problem of running out of phone battery. And some banks released their own hardware wallet in a portable device using NFC.

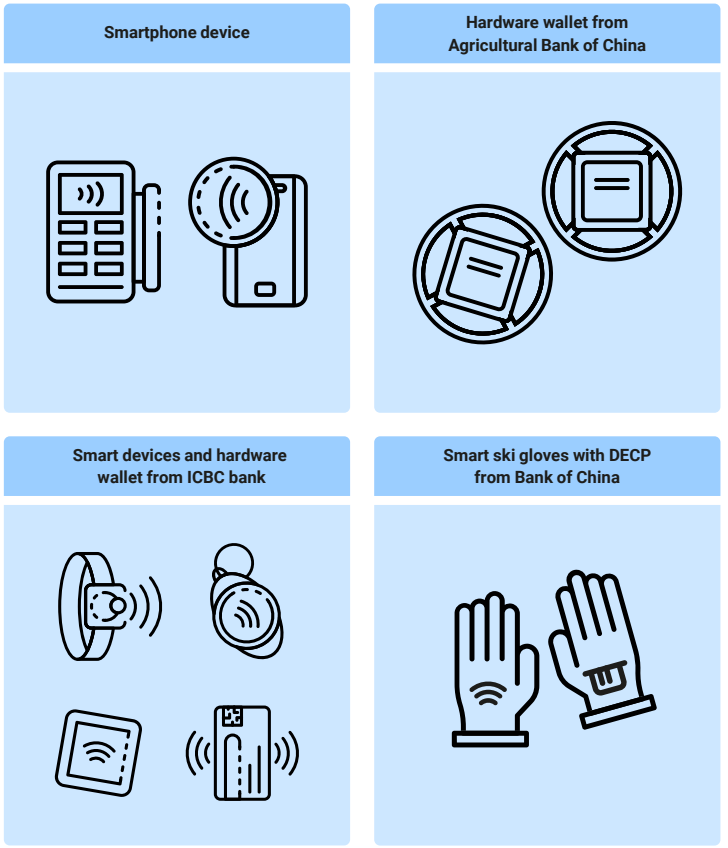
- It's a novel use for a well-established technology, yet not a game-changer.

Data security and account safety are still missing on the map

Shortcomings of NFC in terms of security are well known. There is a clear need for software solutions providers to raise security levels to comply with banking IT systems to prevent fraud and missing transactions.

- Even with DCEP, two devices completing a money transfer by simply touching each other risks opening the door to scams and criminal issues.

NFC APPLICATIONS



SOURCE:
IMPLICATIONS OF CHINA'S DIGITAL YUAN INITIATIVE (2020)

The Faster, The Stronger

End-users need more incentives to switch

High convenience and long-held habits make it difficult to switch away from Ali-WeChat Pay. DCEP needs to lure end-user with improved features.

- Digital yuan's offline payment capability could attract users when a communication network is unavailable.
- Private mobile payment platforms face bankruptcy risks that users may want to avoid.

Shop keepers get paid faster and more

DCEP enables shoppers to shorten their collection time because payments are completed immediately. And if the transaction is free of charge, it will encourage stores to urge customers to use DCEP.

- The fees are borne by the stores when consumers pay with digital payment, but it's so far yet unclear if commercial banks will charge fees for DCEP.

Commercial banks may win traffic back

Working as a payment agent offers the chance to increase customer stickiness. And DCEP short-cutting alternative payment platforms like Ali-WeChat Pay would bring much-needed traffic to banks.

- However, eliminating transaction fees may be the price to pay for the banks.

Photo by VCG/VCG via Getty Images

The Harder, The Better

Ali-WeChat Pay facing headwinds

The impact on Alipay and WeChat Pay may be significant, depending on whether DCEP will be available for their services, and if transaction fees will be charged.

- Even if DCEP payment is made available to all platforms, the current duopoly is likely to continue, albeit in a weaker position.

An opportunity for upcoming payment services

DCEP may offer an opportunity to payment service platforms that are dwarfed by the incumbent duopoly. Opening-up the market is one of the desired side effects behind the DCEP project.

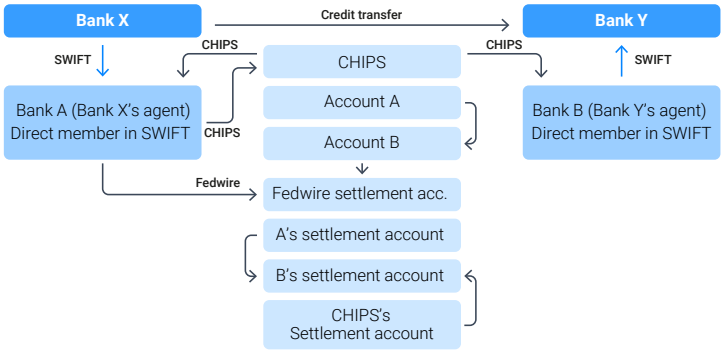
- Leveraging business data concerns new platforms can make inroads into a closely guarded market.

Coming out of U.S.' shadow

DCEP is the first step to realizing China's grand ambition of internationalizing the yuan while reducing reliance on the SWIFT system and the U.S. dollar. The growing Sino-US trade tension is pushing China to prepare for extreme scenarios.

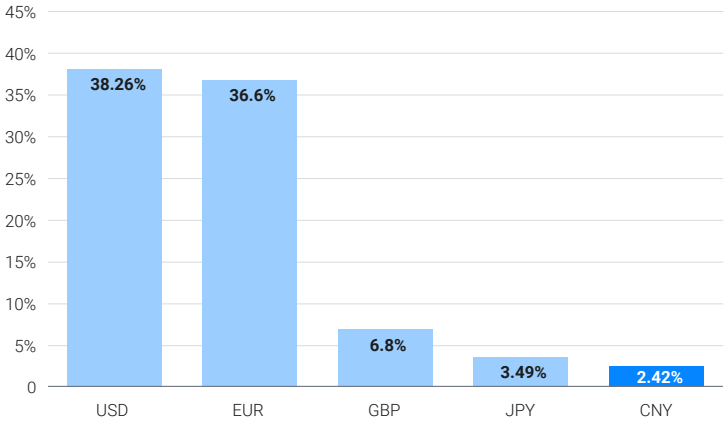
- Following U.S. sanctions upon individuals from China and Hong Kong in 2020, with threats of excluding institutions from the U.S. dollar payment system, Chinese officials have vigorously promoted that internationalizing the digital yuan will help establish a transnational currency system that can compete with the U.S. dollar hegemony.

CROSS-BORDER CURRENCY TRANSACTION DIAGRAM



* **SWIFT**: Society for Worldwide Interbank Financial Telecommunication
* **CHIPS**: clearing house interbank payment system

CNY'S SHARE AS A GLOBAL PAYMENT CURRENCY – JANUARY 2021



Digital Yuan Standing Up To Bitcoin

China introduces its anti-Bitcoin

Being virtual is the only commonality DCEP and cryptocurrencies share.

- Digital Yuan is not a decentralized blockchain currency issued by any private developer, like Bitcoin or Ethereum.
- Bitcoin, or cryptocurrencies in general, challenge the banking system by causing disintermediation while the digital Yuan is built to complement it.
- Digital yuan is highly regulated on the number of agencies (banks), while there is no regulation (yet) for the crypto market.

China shuts the door to miners

Cryptocurrency mining consumes huge amounts of energy. China is leveraging its pledge to achieve carbon neutrality by 2060 to ban all cryptocurrency mining activities in Mongolia.

- China accounts for ~65% of bitcoin mining, compared to the ~7% for the U.S.
- Mongolia is a coal-producing area famous for its low-cost energy, but also one of 30 areas that failed to meet the energy targets in 2019.

China tightens the noose on Bitcoin's largest market

Since 2019, China has initiated a series of measures to restrict the market while giving its central bank digital currency legal status.

- Financial authorities banned exchanges of cryptocurrency.
- A draft law was published to prohibit individuals and entities from making and selling tokens.

Type	Digital Yuan	Diem (Libra)	Bitcoin	Third party payment
Issued by	PBOC	100+ institutions	Developer	NA
Value	Pegged 1:1 to the yuan	Backed by the USD	Market value	Credit card like
Legal effectiveness	Legal tender	Waiting for approval from the U.S.	Unrecognised globally	Not accepted by all stores
Offline payment	Yes (Bilateral)	No	Thunder Network platform	Some (Unilateral)
Settlement	Central bank	Diem association	Hash rate	Commercial banks
Risk Recognition	Big data	KYC	No	Big data
Anonymity/ Privacy	Some	Some	Yes	Some

SOURCE:
Bitcoin Mining's Days Are Numbered in One China Province

Catalysts

- **China's supportive attitude.** In China's state-driven economic system, government's strong support will accelerate the whole process. Nationwide adoption could happen earlier than we expect.
- **Broader applications.** Applications in special scenarios will continue to emerge, and the increased demand for customized payment terminals and AI computing will bring more industry opportunities.
- **Data security and account safety technology.** Security encryption- related technology is likely to upgrade, which will bring a new wave of investment to push industrial development.

Risks

- **Overloaded central bank system.** Currency digitization increases the risk of system instability as hundreds of millions of daily data flood into the central bank's system, causing system paralysis.
- **Shadow banking.** China has historically been dependent on the informal financial system, i.e., underground lending activities outside of traditional banking systems. The adoption of digital currency may become an exogenous factor to trigger the collapse.
- **Service charge.** Payment fee is a determining factor to affect banks and shoppers' attitude toward promoting digital yuan, and duopoly's business incomes.

Bottom Line

- China is running the first real-life experiment of a digital currency, and the whole world is paying attention. The implications are multiple and varied, from breaking up the current digital payment duopoly of Ali-WeChat Pay and fending off the rise of Bitcoin to extend better control and monitoring of the economy and all its transactions.
- The promotion of a digital Yuan will accelerate the digital transformation of traditional financial companies and bring unprecedented opportunities for the whole supply chain from payment systems to terminals to security software, contributing to expand the investible universe of our Fintech portfolio.

Companies mentioned in this article:

Alibaba(BABA US),Tencent (TCEHY US)

A SERVING OF ALTERNATIVE PROTEINS

Feeding The World: The Protein Challenge

A costly confusion: proteins ≠ meat

We all know proteins are one of the three major food constituents, along with sugars and lipids. Unfortunately, we most commonly associate high protein content food with meat and animal-based products (ABP), driving their consumption through the roof.

- Consumption per person doubled in the last 40 years in western societies and more worryingly increased 8-fold in Asia.
- Ironically, numerous foods easily compete with meat and ABP for high protein content.

Welcome to the environmental slaughter

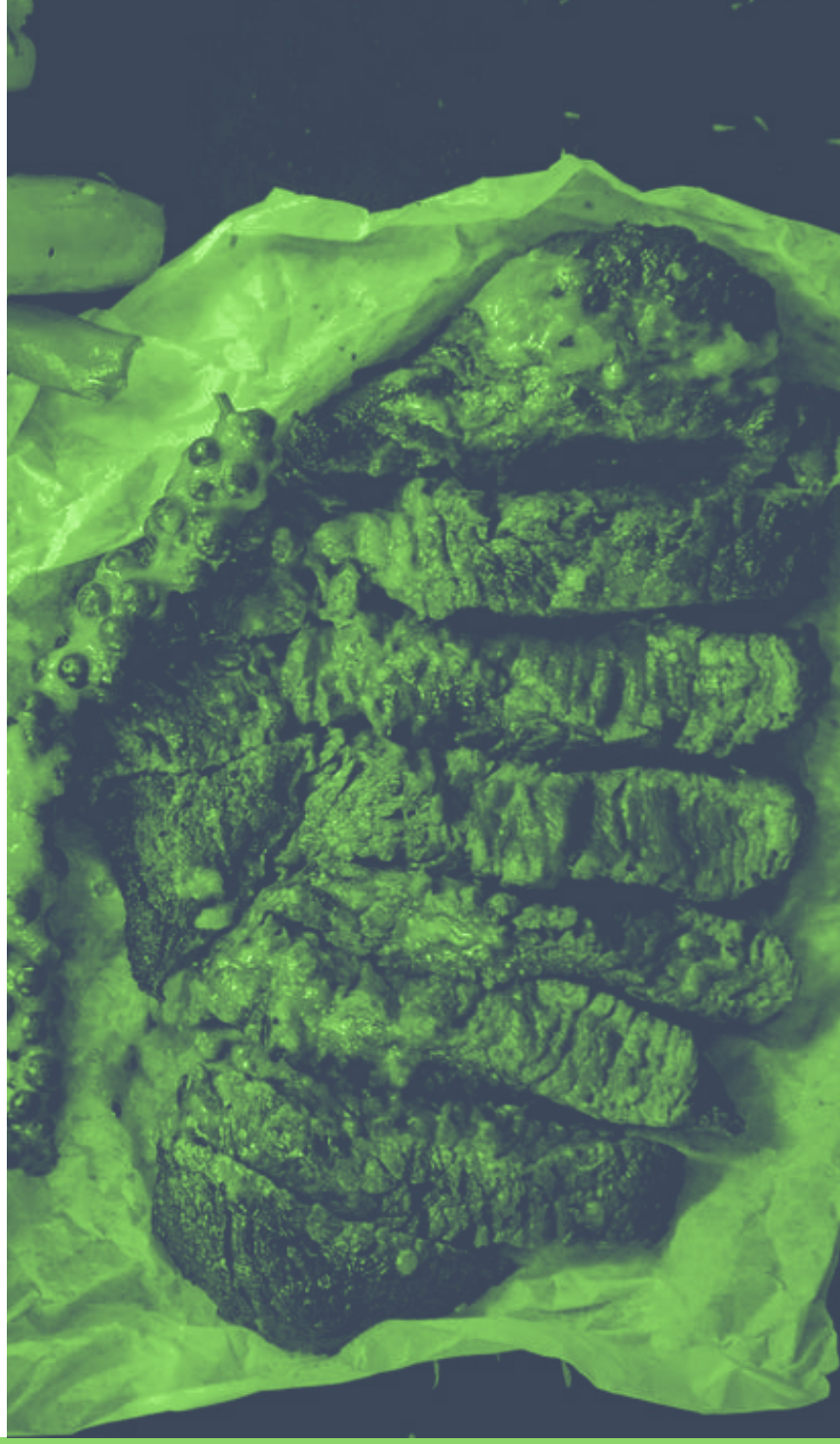
Raising an animal for its meat is an environmental catastrophe. Greenhouse gases (GHGs) emissions, land use, and water footprint propelled the livestock industry to snatch second place for the most polluting industry behind the transport industry.

- The meat industry is a $1.2tn mastodon, still growing at a 2–3% CAGR despite the top 5 meat and dairy corporation emitting more GHGs than Exxon, Shell, or BP.
- The livestock industry uses more land than any other economic activity.

Alternative meat is a largely untapped opportunity

Foodtech and Biotech joined hands to improve alternative protein production. Mimicking current ABP, they trailblaze a potential food revolution.

- 2 approaches are currently being industrialized: plant-based and cell-culture-based, both supported by the fermentation industry.
- Beef, fish, chicken, and eggs are the first product mimicked, with more to come.



SOURCE:
Good Food Institute, Bloomberg

Sourcing Proteins = Sourcing Amino Acids

Proteins are bags of amino acids

As we previously published, proteins are essential for all biological activities and are composed of amino acids. Proteins are the only source of amino acids on Earth for humans. Protein intake is necessary to sustain life.

- About 20% of the human body is made up of protein. Because our body does not store protein, it is vital to get enough from our diet.
- Protein–energy malnutrition accounts for 6 million deaths annually worldwide.
- This global protein deficit is expected to worsen due to the COVID-19 pandemics.

Busting the myth animal protein > plant protein

All living organisms on Earth produce proteins. Animal proteins used to be considered superior for being "complete" (containing all the amino acid types). Yet, all recent studies show that a high plant protein intake over animal protein is the best diet.

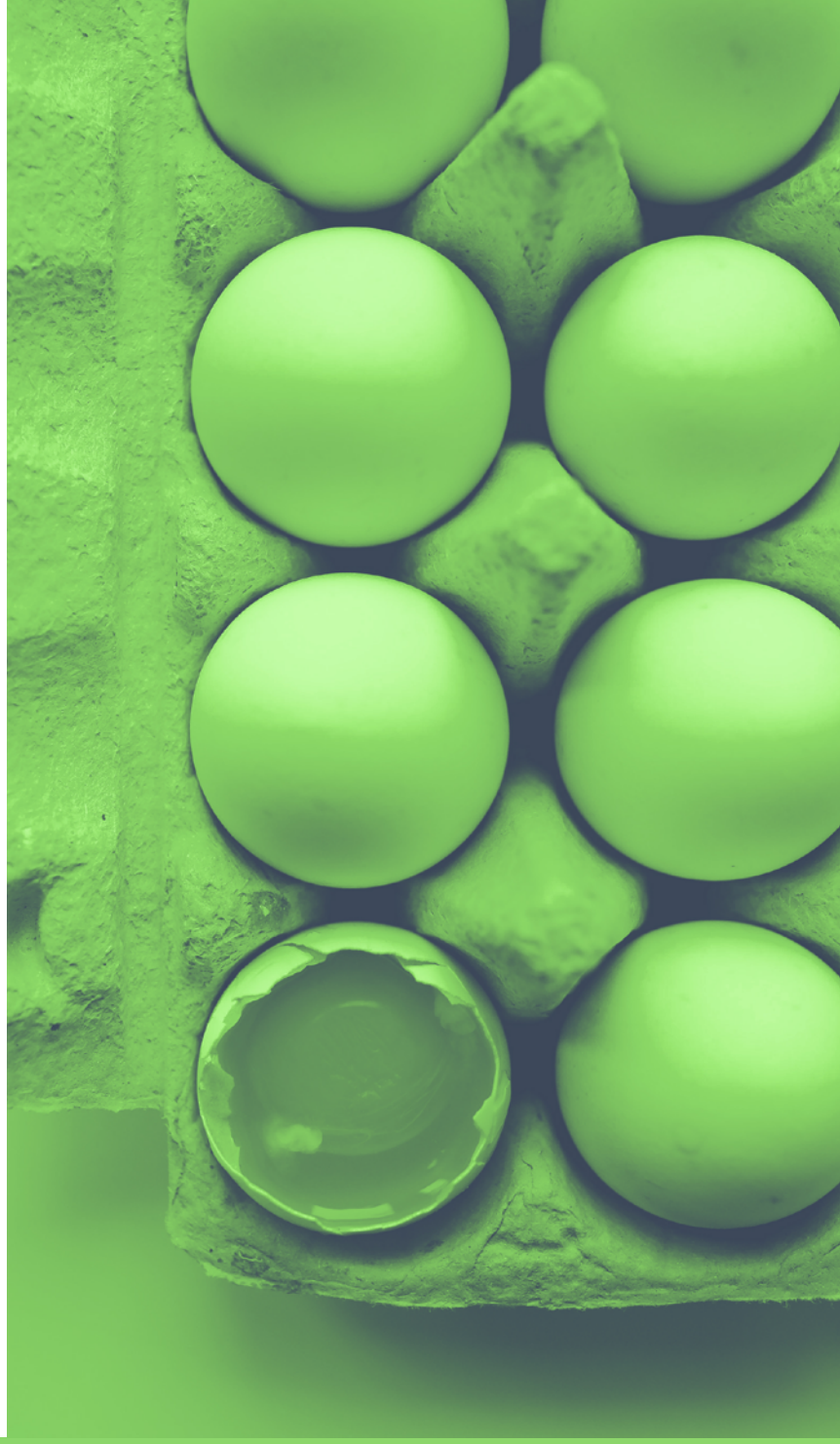
- A vegetarian diet based on the American Heart Association guidelines of five servings of whole grains and five or more vegetables and fruit servings would supply all the amino acids necessary for health.
- A plant protein diet leads to a lower risk of heart disease, diabetes, and obesity.

ABP gets a C grade for a nutrient to mass

ABP may be rich in animal protein yet is packed with associated deleterious nutrients: saturated fats, cholesterol, carcinogenic N-nitroso compounds, and heterocyclic amines. Plants do not contain any in significant concentration.

- Pound-for-pound, plants pack more nutrients into fewer calories – the only exception being vitamin B12, easily supplemented or supplied in a "flexitarian" regime.
- The content is different, though – animal proteins do not come with fibers.

SOURCE:
American Heart Association, WHO



Healthy Diet, Healthy Planet

The Western diet cannot be globalized

The "globalization" of western diets is causing a shift to unhealthy eating but, as we have written, the real deal is the environmental impact: in a nutshell, the world cannot support it.

- There are two heads of cattle, three sheep or goats, one pig, and thirty chickens for each human being.
- We would need the bioproduction of 4.5 planets if the world adopted a western diet.

Government muttering: "Eat your greens"

The U.S., E.U., and Israel are among the first governments to subside alternative protein production. The gap between renewable energy subsidies and sustainable food production with alternative protein must shrink to meet the Paris agreement.

- Support to renewable energy was $166bn worldwide while the whole energy sector is responsible for as much GHC emissions as the livestock industry.
- The U.S., E.U., and Israel funded >900 companies for around $1bn, 166 times less than for green energy. This leaves a huge opportunity for public investments.

Greta and the New Gens have different consumptions habits

Environmental concerns and ethical questions about the meat industry fuel the change for sustainable energy and sustainable agriculture in the younger generation.

- Young people have been talking about climate change for decades. But the latest generation of protestors is louder and more coordinated than its predecessors.
- Meat consumption in the U.S. and western Europe is still high, yet growth halted over the last ten years after four decades of 5–10% growth per decade.

SOURCE:
UN

The “Beefy” Meat Industry Pollutes A Ton

GHG emission: your plate is faultier than your car

Animals are bioreactors producing more GHGs than they capture while growing.

- In 2019, total emissions from global livestock reached ~9.5 Gigatons of CO2-equivalent per year, representing ~18% of all anthropogenic GHG emissions.
- Raising cattle, for both beef and milk, is responsible for ~65% of the livestock sector’s emissions.

Water consumption: A hole in the glass

Drinkable water is the most precious resources we have on Earth, and all life forms rely on it. Despite this fact, the amount of water supplies diverted to the livestock industry is massive, and cattle get the lion’s share.

- Only 0.5% of the Earth's water is available as freshwater.
- The production of 1kg of beef requires 15’414 liters of water on average. 8’763 liters for sheep and goats, 5’988 liters for pork and 4’325 liters for chicken, whereas production of 1kg of vegetables requires only 322 liters of water.

Earth: a giant parking spot for cattle

Livestock uses massive land resources, and cattle sit on the throne again.

- Pasture and arable land for producing meat is ~80% of the total agricultural land and ~30% of the world surface.
- Although beef accounts for less than 2% of the calories consumed globally, its production uses 60% of the land. Not just a giant parking lot, an expensive one too.

SOURCE:
UN, Science

Food For A Sustainable Future

Tackling five problems at once is on the menu

Alternative "meat", either from plant-based, cell-Culture based or hybrid approaches, tackles all the livestock industry issues at once.

- Alternative "meat" is estimated to reduce land use by more than 95%, GHG emissions by 74%–87%, and water usage by 80–90%.
- Nullify risk of contamination by harmful pathogens, e.g., salmonella and E. coli.
- Does not require antibiotics, thereby reducing the public health threat posed by antibiotic resistance.

A slice of the meat market is big enough

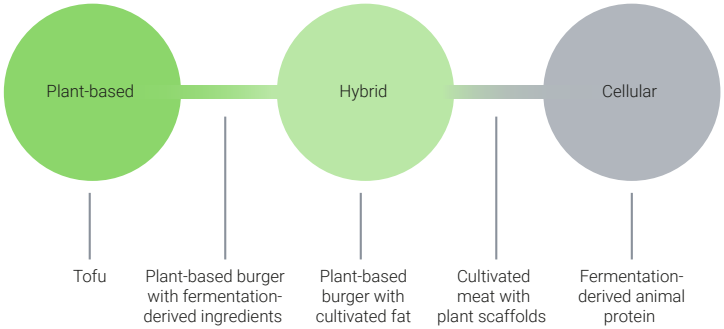
If alternatives captured even only a fraction of the global meat market, both would still be juicy opportunities.

- 1% of the global meat market would be between $10bn and $20bn.
- Collectively, such companies have raised $3.1bn as of year-end 2020 (or ~0,2% of the addressable market), leaving ample room for further investments.

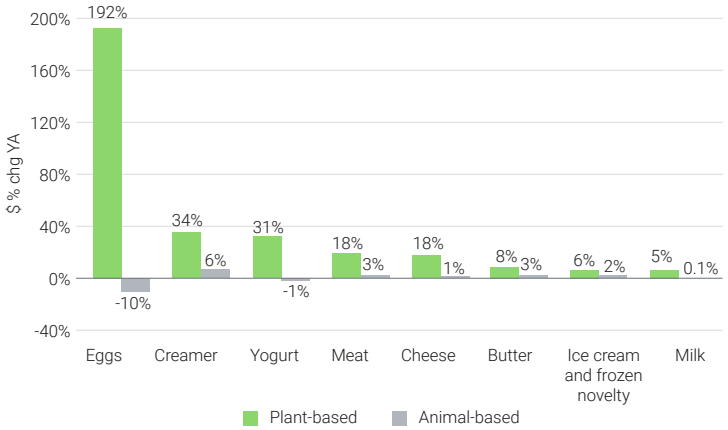
Food industry leaders have alternative meat on the radar

Plant-based meat meteoric rise has not gone unnoticed. Industry leaders all want a piece of the cake to support and protect their current business.

- 9 of the ten largest meat producers in the U.S. either bought existing plant-based food brands, launched their own, or collaborated with plant-based companies
- 10 of the largest U.S. foodservice companies have launched a plant-based menu. The "Impossible Whopper" alone in the U.S. led to a 3.5% increase in Burger King's overall sales.



ANIMAL-BASED AND PLANT-BASED PRODUCT COMPARISON: DOLLAR SALES GROWTH 2019



SOURCE:
Good Food Institute

Synthetic Meat, Real Growth

Greenlight for plant-based alternatives

Pushed by the rise of flexitarian, vegetarian and vegan movements, PBM consumption is rising fast. Poster child companies have attracted massive investments, with Beyond Meat being the first to IPO in 2019.

- The plant-based meat market reached $5bn in 2020 and is projected to reach $8.3bn by 2025, recording a CAGR of 14.0%.
- The premium of PBM vs. traditional meats is now inferior to 20%, as the economies of scale are materializing.

Grow little cells, grow!

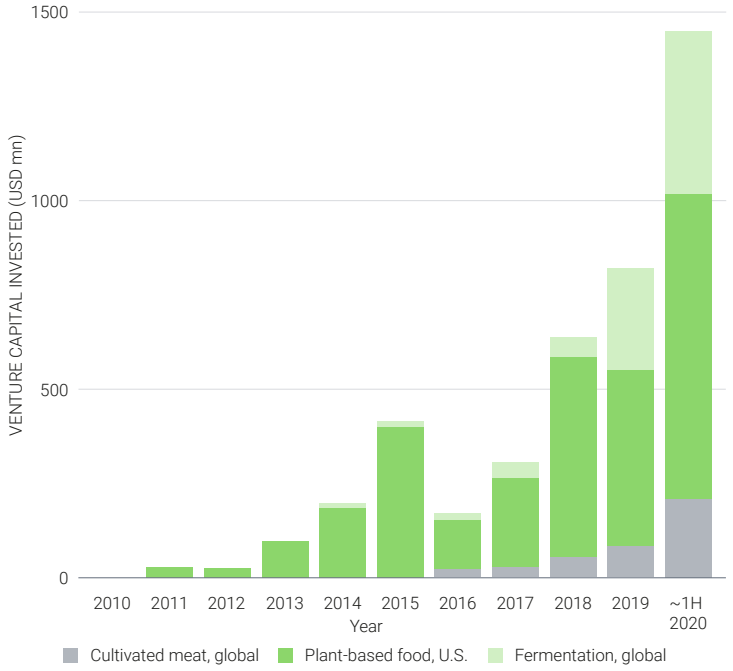
Cell-Culture Meat (CCM) is based on advances in stem cell biology and tissue engineering originally purposed for medical applications. CCM delivers the best quality alternatives yet will not compete on price and address real-meat eaters.

- $189mn was raised by cultivated meat companies in the first quarter of 2020 – more than the amount invested in the CCM industry's entire prior history.
- Number of companies in the space have double over the last year, yet none is close to going public..

Fermentation is good for both

Fermentation complements PBM by synthesizing molecules such as flavor and proteins to mimic meat's taste and texture. It also enables CCM by providing the collagen or fibronectin needed for 3D meat printing and cell growth acceleration.

- $435mn were invested in fermentation companies in the first seven months of 2020 alone – half the amount ever raised for fermentation companies.
- VC market is hot due to the combined power of fermentation with PBM and CM.



SOURCE:
Good food Institute, Bloomberg

Plant-Based Alternatives

Three steps to a more nutritional “meat”

The production of PBM is nothing new - tofu, tempeh, and seitan have been developed thousands of years ago-, but the new-generation of PBM is the transition needed to compete with meat. They are usually produced in a 3-step process.

- Protein isolation where target plant proteins are extracted from plants.
- Formulation, in which the plant proteins are mixed with ingredients to develop meat texture such as food adhesives, plant-based fat, and flour. Nutrients are added to match or exceed the nutrient profile of the meat.
- Processing, in which the mixture undergoes protein reshaping processes (e.g., stretching, kneading, trimming, pressing, folding, extrusion, etc.).

Meat most serious price competitor

The current price of meat is barely compressible compared to the PBM. Massive economies of scale will disrupt the livestock industry giant.

- Currently, the heavily subsidized meat industry selling price is at $2.80/pound. PBM went from $9.87/pounds to $4.5 in less than two years.
- As an example, within only a single year, Impossible Food was able to cut prices to distributors by 15% on average through quadrupling production capacity.

The “seeds” are sprouting

2020 was a historical year for PBM companies. The start-up ecosystem is flourishing with future investment opportunities.

- Impossible Food has made inroads in innovative fermented-based meat flavoring.
- JUST is turning mung bean into an egg, one of the most consumed protein sources.
- Redefine Meat spearheads 3D printed plant-based meat.

SOURCE:
Vox, Good Food Institute, Nature

Cell-Culture Based Alternatives

Literally growing an animal part

Cell-Culture Meat (CCM) is based on advances in stem cell biology and tissue engineering originally purposed for medical applications. The transposition of this knowledge to the food industry relies on four central components.

- Muscle and fat cell isolation and culture is the critical step to cultured meat.
- Animal-free culture medium formulation is currently a major bottleneck of the culture media, which relies on expensive purified animal extracted fluid.
- Scaffold development means switching from 2D to 3D in cell culture, a very challenging development.
- Bioreactor design that relies on 30 years of biotech knowledge for production.

The top of the crop for meat eaters

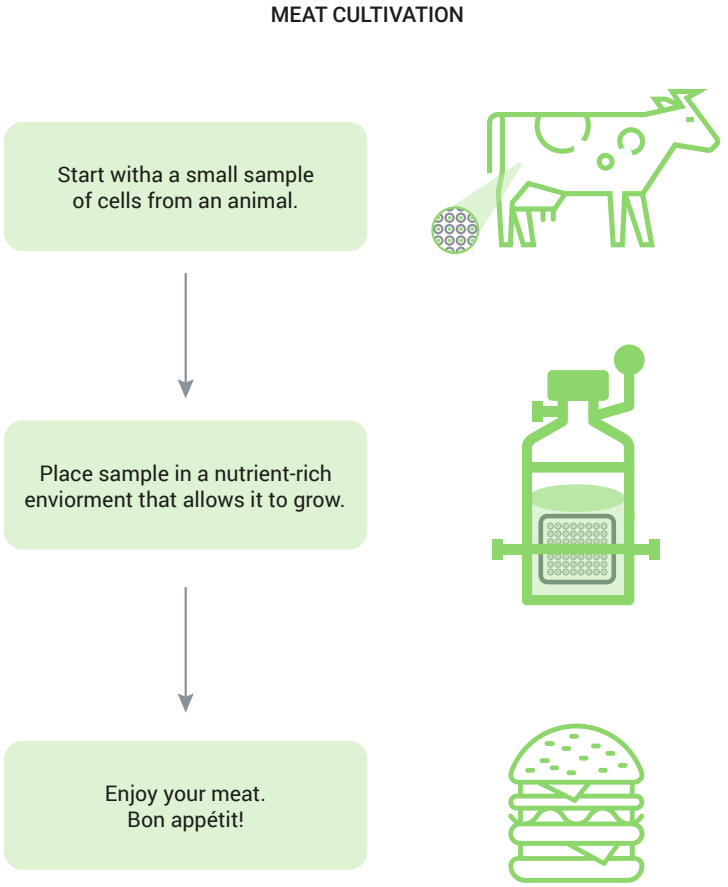
CCM is bound to be the "high-end" market for alternative proteins.

- Price per kg will remain above the current ABP product.
- It targets "real meat" eaters while combining new gens ethics and environmental concerns, a premium ready to be paid up to 34% as shown in various polls.

A "growing" competition

More than 1/3 of CCM companies were founded or left stealth mode in 2019, and >50% have raised external funding. We are monitoring some of the hottest start-ups in the frying pan.

- Aleph Farms meat has leading 3D bioprinting capacity.
- Shiok meat has first in class expertise on alternative seafood proteins.



SOURCE:
GrandViewResearch, Good food Institute

The Fermentation Supplements

Fermentation brings up the flavor for PBM

PBM cannot mimic the taste of meat alone as well as the texture. Fermentation is a fast and efficient way to synthetize molecules, including flavour and proteins.

- Impossible Food produces the soy leghemoglobin in an engineered yeast strain to give the “bloody” flavor in its burgers.
- Perfect Day’s ice cream base contains the whey recombinant protein, a well-known protein in the bodybuilding universe, to improve the texture.

Fermentation brings the scaffold and the growth factor for CM

Challenges slowing down CM production can be lifted with fermentation.

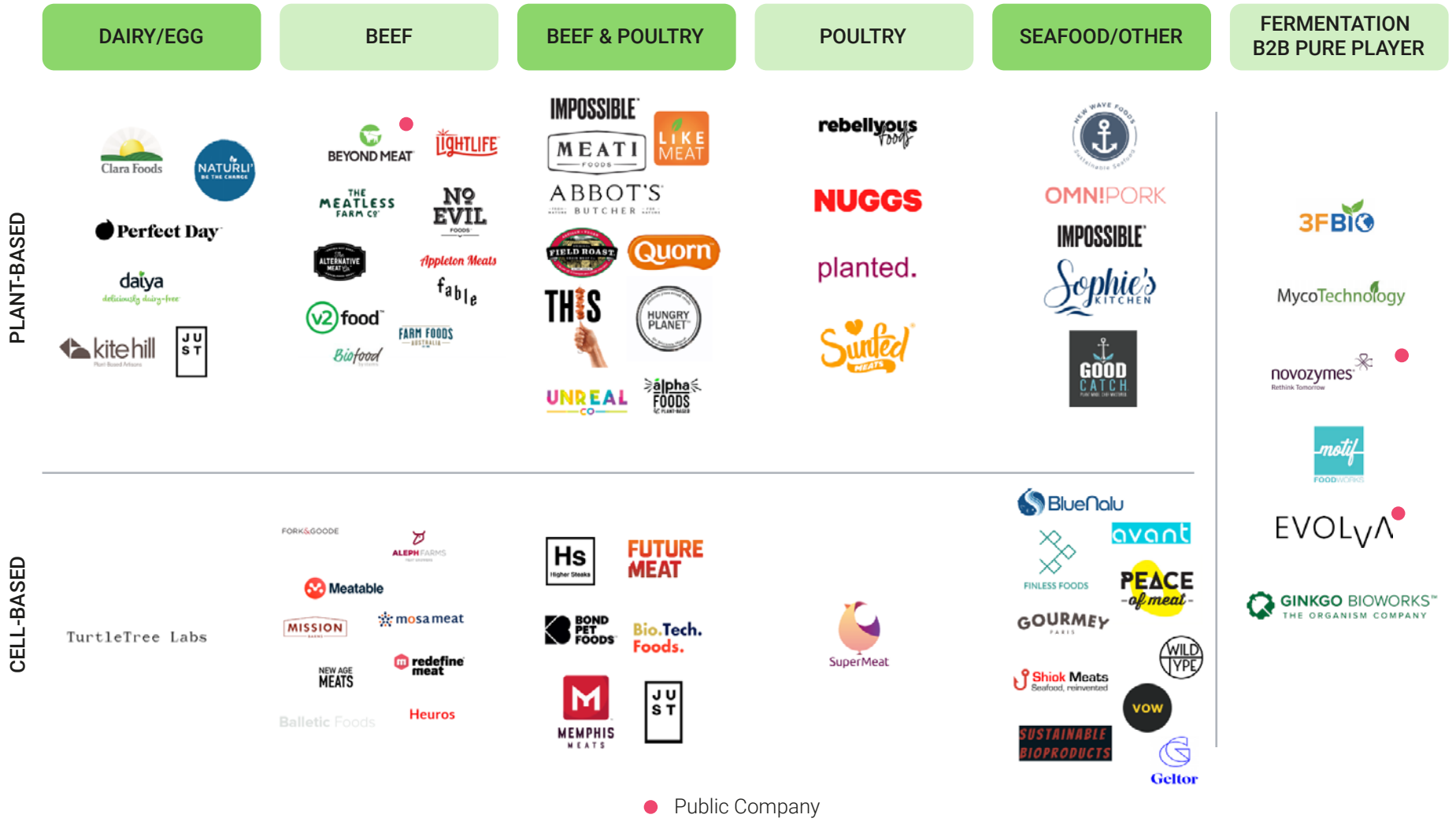
- Scaffolding: proteins such as collagen or fibronectin produced through fermentation can serve as a scaffold for complex 3D cultured meat.
- Growth factor: fermentation is the primary mean of producing animal-origin-free growth factors to replace those of animal origin.

A special class of B2B players

While no listed companies are delivering fermented-based meat, the market sees the rise of companies providing support for the fermentation companies.

- Novozyme provides custom enzymes to process some feedstock
- Ginkobioworks provides the engineered microorganisms for fermentation, a.k.a. the biofoundries.
- Mycotechnology is capable of recycling food waste via mushroom-based fermentation.

SOURCE:
Good Food Institute, Companies Websites



SOURCE:
AtonRâ Partners

Catalysts

- **Highly successful products drive fast acceptance.** The "Impossible Whopper" is just starting to roll worldwide and is a hit in the U.S. Nine out of ten world's favorite meals will have a competitive alternative by 2030.
- **Price parity with animal-based products is within reach.** As prices go down, consumer's rationality will favor alternatives to animal-based products. By 2023, price parity will be achieved for most products.
- **Public and investor ESG concerns direct money to alternative proteins.** Sustainable habits are becoming part of day-to-day life, and a vast majority of investors include ESG in their logic. Government budgets are expected to follow and support the funding in alternative protein sources.

Risks

- **Difficulty scaling-up the production.** Alternative proteins require specifically-designed industrial factories for scaling. Construction and expansion of such plants could take longer than expected.
- **Texture and flavor parity are not reached.** If the effort toward mimicking taste and texture from the current animal-based product is slow, then customer transition may take longer or not transition at all.
- **Post-Covid slower economic growth.** The opportunity requires massive investments and depends on consumers' purchasing capacity as the alternative to meat is no meat, not plant-based or CCM meat.

Bottom Line

- A serving of Alternative Proteins a day keeps global warming away. The livestock industry is a major polluter, energy, land-use, and water-wise. Production of alternative protein is exploding and is reaching price parity with traditional meat, driving an end market of over $8bn for plant-based alone and attracting massive venture investments.
- Our portfolio is already well-positioned to participate in the alternative meat tsunami. We keep monitoring the space as pure-players go public and across the value chain. Today nascent, the market will be several hundreds of billions in the next ten years, and we are ready to capture this opportunity with early investing.

Companies mentioned in this article:

Aleph Farms (Private), Beyond Meat (BYND-US), BP (BP-US), Burger King (QSR), Evolva (EVE), Exxon (XOM – US), Gingko bioworkds (Private), Impossible Food (Private), JUST (Private), Mac Donalds (MCD-US), Mycotechnology (Private), Novozyme (NZYM-B), Redefine Meat(Private), Shell (RDSA), Shiok Meat (Private)

CHARTS FOR THOUGHTS

An Inflection Point In Home Prices?

Home prices and earnings

The charts show the Purchase Only House Price index (a broad measure of the movement of single-family house prices) along with the Average Hourly Earnings index (a classical measure of income from labor).

- The indices have been rebased to 100 starting in 1991.
- The second graph, the ratio between the two indices, allows for a better visualization of the indices' relative performance beyond the trend.

Causes of divergence

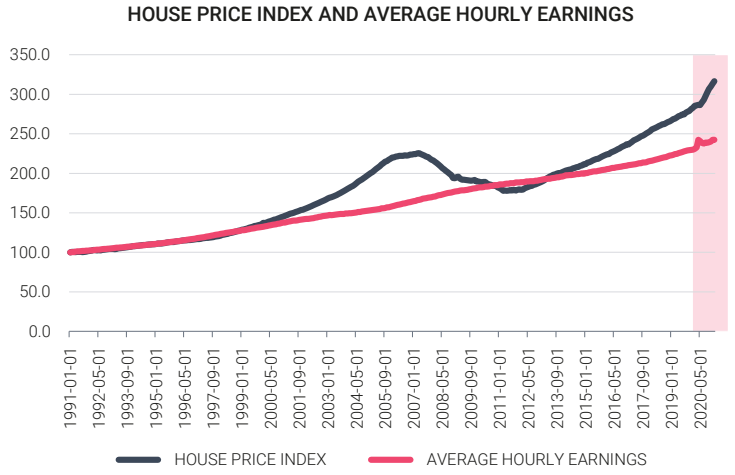
During the '90s, home prices rose in line with the average earnings growth. In the early '00s, the indices diverged significantly only to mean-reverse during the great financial crisis. Since 2014 they diverged again albeit at a lower pace.

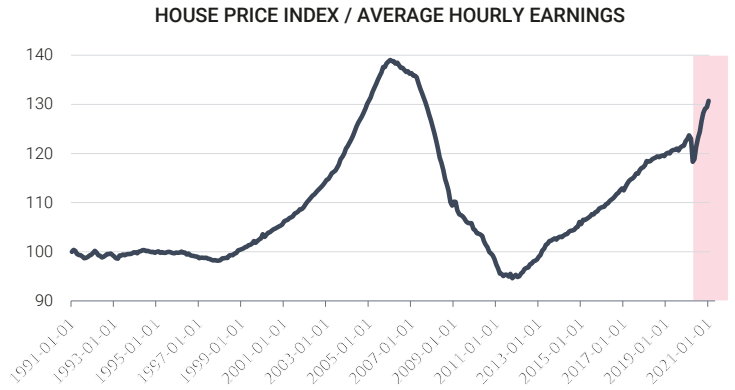
- Monetary policies such as lowering rates or quantitative easing combined with fiscal policies such as easier access to credit for subprime borrowers might explain the divergences.

Is this time different?

Following the Covid-19 outbreak, hourly earnings spiked in April and then stabilized, while house prices plateaued until June, before re-accelerating exponentially.

- Is it a new structural phenomenon consecutive of deurbanization due to newly adopted home-office solutions?
- Could this divergence force the central bank to raise rates causing another crisis?





SOURCE:
Data Never Sleeps 8.0

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AtonRâ Partners is a conviction-driven asset manager combining industrial and scientific research with financial analysis. AtonRâ Partners focuses on long-term trends powerful enough to be turned into thematic equity portfolios.

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