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WisdomTree Market Outlook

WisdomTree.eu
+44 (0) 207 448 4330

Authors

Christopher Gannatti
Global Head of Research

Mirva Anttila
Director Digital Assets Research

Ayush Babel
Global Associate Director, Quantitative Research

Luca Berlanda
Associate Director, Quantitative Research

Piergiacomo Braganti
Director, Macroeconomic Research

Pierre Debru
Head of Quantitative Research & Multi Asset Solutions

Aneeka Gupta
Director, Macroeconomic Research

Blake Heimann
Senior Associate, Quantitative Research

Elvira Kuramshina
Associate Director, Quantitative Research

Nitesh Shah
Head of Commodities & Macroeconomic Research

Mobeen Tahir
Director, Macroeconomic Research & Tactical Solutions

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Commodity Outlook: Shift in the economic cycle and greenflation to support commodities

In this section

We are cautiously optimistic that commodities will end 2023 sturdier and enter 2024 with strength as the economic cycle turns for the better. Commodities, as a late-cycle performer, will catch up with equities in due course. However, reliance on China—the largest commodity consumer—could be fraught with some difficulties. Looking further, the green arms race—the fight for market share in the supply chain for the energy transition—will lead to a rise in many commodity prices.

Commodity outlook amid unsettled economy

The International Monetary Fund (IMF)[1] and World Bank (WB)[2] have in recent months upgraded their economic outlooks for 2023 (to 3.0% and 2.1%, respectively, upgrades of 0.2% and 0.4%). While the IMF maintained its outlook for 3% growth in 2024, the WB cut its growth forecast to 2.4%. Like many other forecasters, they have been surprised by the resilience of the global economy but worry about the latent effects of the unprecedented rise in interest rates in developed countries.

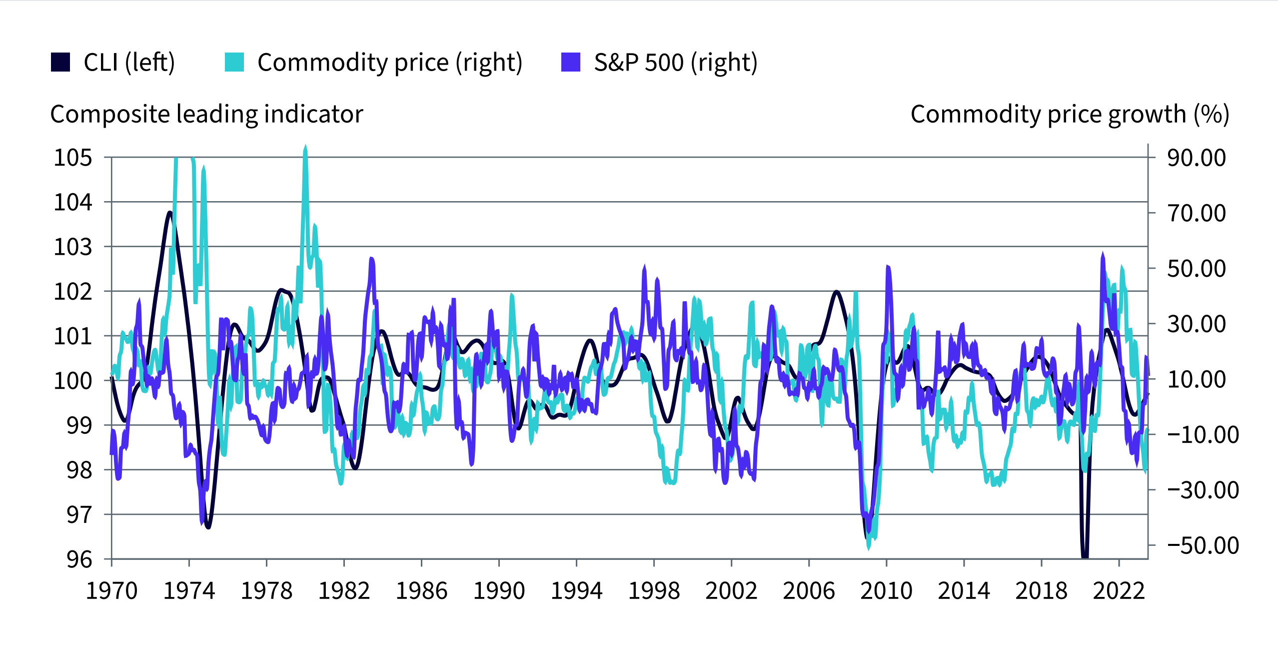
Commodities are sensitive to economic growth. As figure 1 below illustrates, when composite leading indicators (CLIs, a proxy for output gaps—that is, when the economy is performing above or below potential) have risen historically, so have commodity prices. CLIs seem to have bottomed out and have been rising since the beginning of this year. Equity markets—also a cyclical asset class—have been rising with greater vigour than commodity markets, but as figure 2 shows, commodities tend to be late-cycle performers, and hence, we expect them to follow equities higher in due course.

> Commodities tend to be a late-cycle performer and hence we expect them to follow equities higher in due course.

1 World Economic Outlook, 'Near-Term Resilience, Persistent Challenges', International Monetary Fund, July 23.

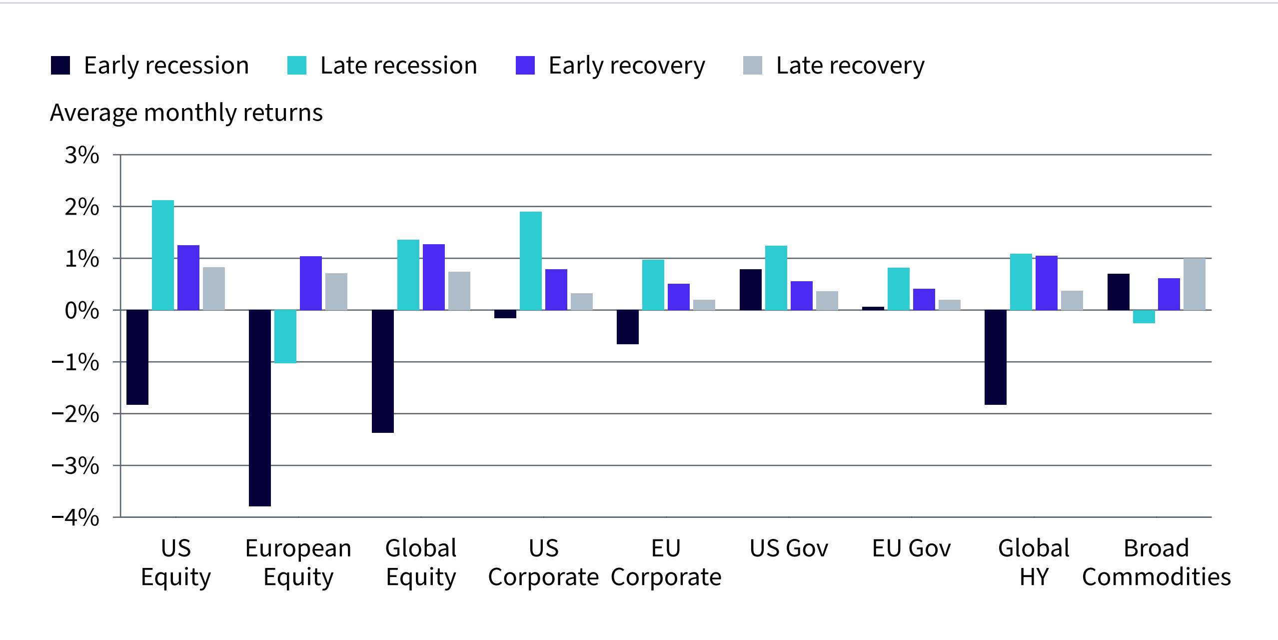
2 'Global Economic Prospects', World Bank, June 2023.

Figure 1: Composite leading indicators and commodities



Source: Bloomberg, The Organisation for Economic Co-operation and Development, WisdomTree. January 1970 to July 2023. CLIs for G20 nations. Commodity prices measured using Bloomberg Commodity Index. **Historical performance is not an indication of future performance and any investments may go down in value.**

Figure 2: Asset performance in different phases of the economic cycle



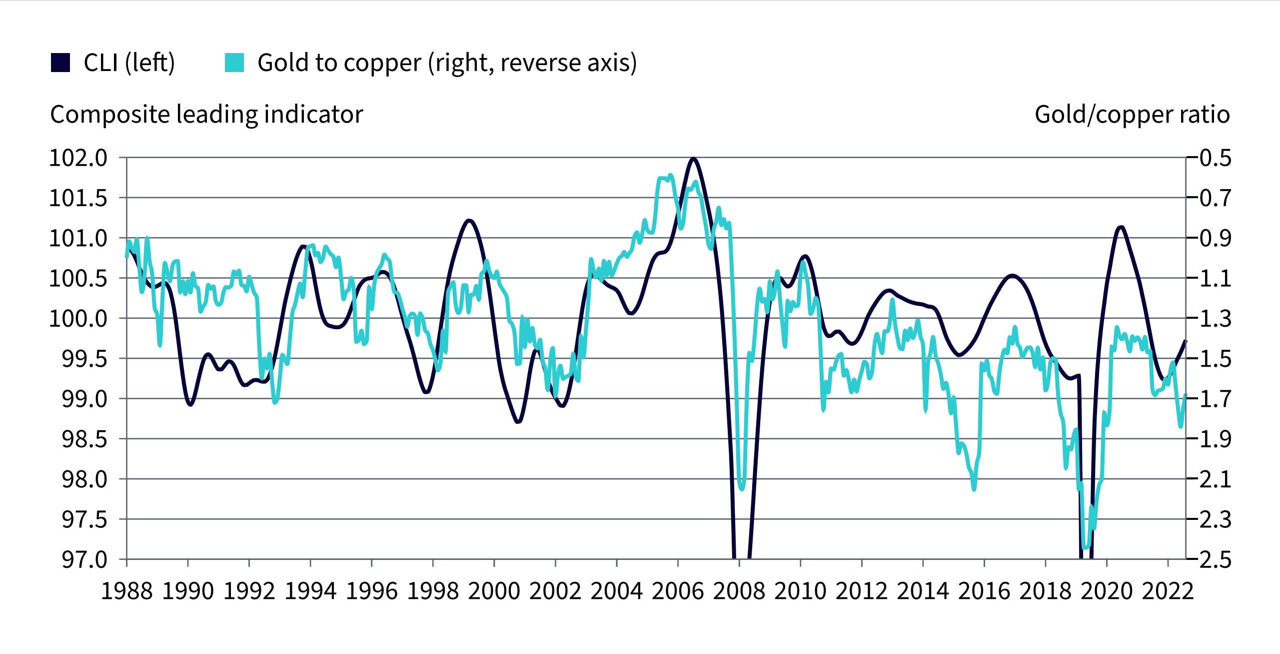
Source: WisdomTree, Bloomberg, National Bureau of Economic Research, January 1960 to June 2023. 'Early' is defined as the first half of an economic phase. 'Late' is defined as the second half of an economic phase. To account for different lengths of recessions and recoveries, monthly returns have been time-weighted. Asset descriptions at the end. **Historical performance is not an indication of future performance and any investments may go down in value.**

Rotation to cyclicals from defensives

Out of the largest commodity products, gold has been the best performer in the year-to-end July 2023. Gold, as a defensive asset, has performed well in times of economic and financial uncertainty. Recession fears and a mini-banking crisis in the US and Europe drove interest in gold bullion and futures. However, as the cycle turns, we expect more price increases in cyclical commodities like copper. As figure 3 illustrates, when CLIs rise, copper tends to perform better relative to gold.

As the cycle turns, we expect more price increases in cyclical commodities like copper.

Figure 3: Cyclicals are expected to gain favour over defensives as market turns



Source: Bloomberg, The Organisation for Economic Co-operation and Development, WisdomTree. December 1988 to July 2023. CLIs for G20 nations. Gold-to-copper ratio indexed to 1 at December 1988. **Historical performance is not an indication of future performance and any investments may go down in value.**

Both the IMF and WB stress that uncertainty is extraordinarily high. One source of the risks lies with global inflation remaining high. El Niño, extreme weather, tight labour markets and pass through from earlier currency depreciation drive this risk. Commodities are expected to remain a great hedge against such risks. If central banks prolong hawkishness and threaten economic growth further, then gold will likely be in favour.

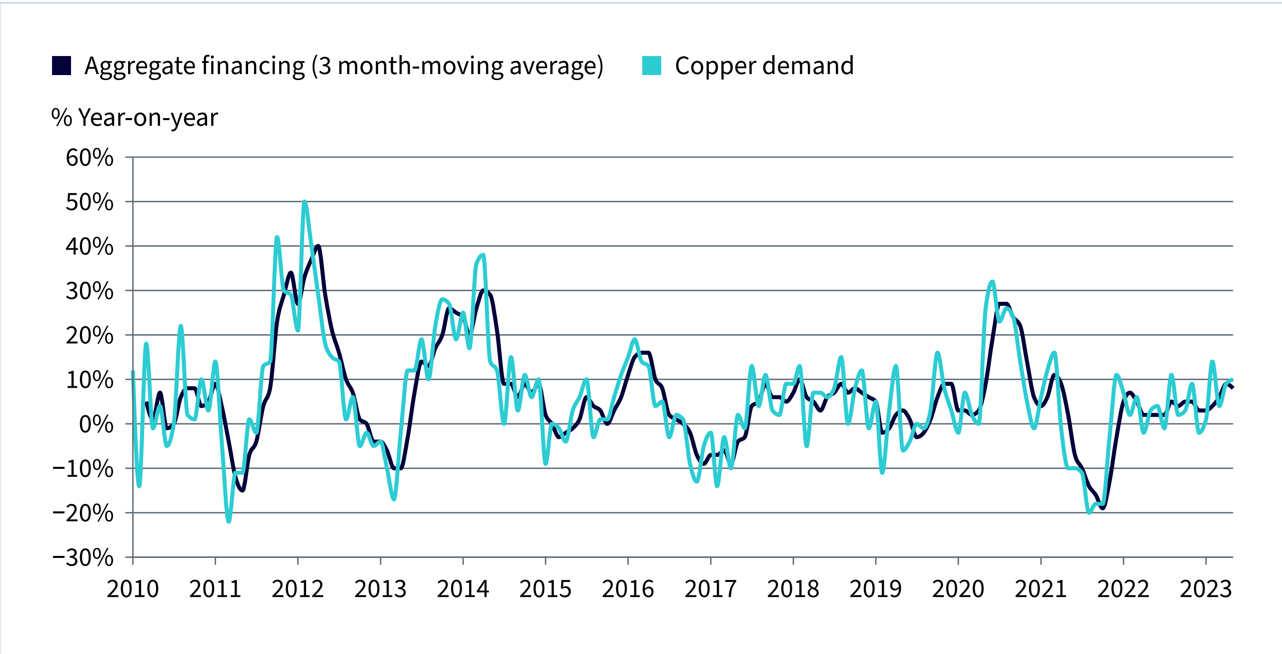
Another key risk identified is if geoeconomic fragmentation deepens. The ongoing risk is that the world economy will separate into blocs amid the war in Ukraine and other geopolitical tensions could intensify, with more restrictions on trade. Commodity prices once again are likely to rise as a result (without commensurate economic growth). Once again, commodities futures investments appear to be a great hedge against this risk.

Historically metal demand in China has been strongly linked to financing conditions.

China's disappointment casts a dark cloud on commodities

China's post-COVID-19 reopening recovery has fallen short of expectations. Data releases from China in July and August 2023 were disappointing and indicate that its recovery has already run out of steam. For example, aggregate financing to the real economy in July 2023 was at the lowest level since 2017 (based on the modern measure) and missed expectations by half. Historically, metal demand in China has been strongly linked to financing conditions (figure 4). On the face of it, it does not bode well for the hope that China will help support metal prices.

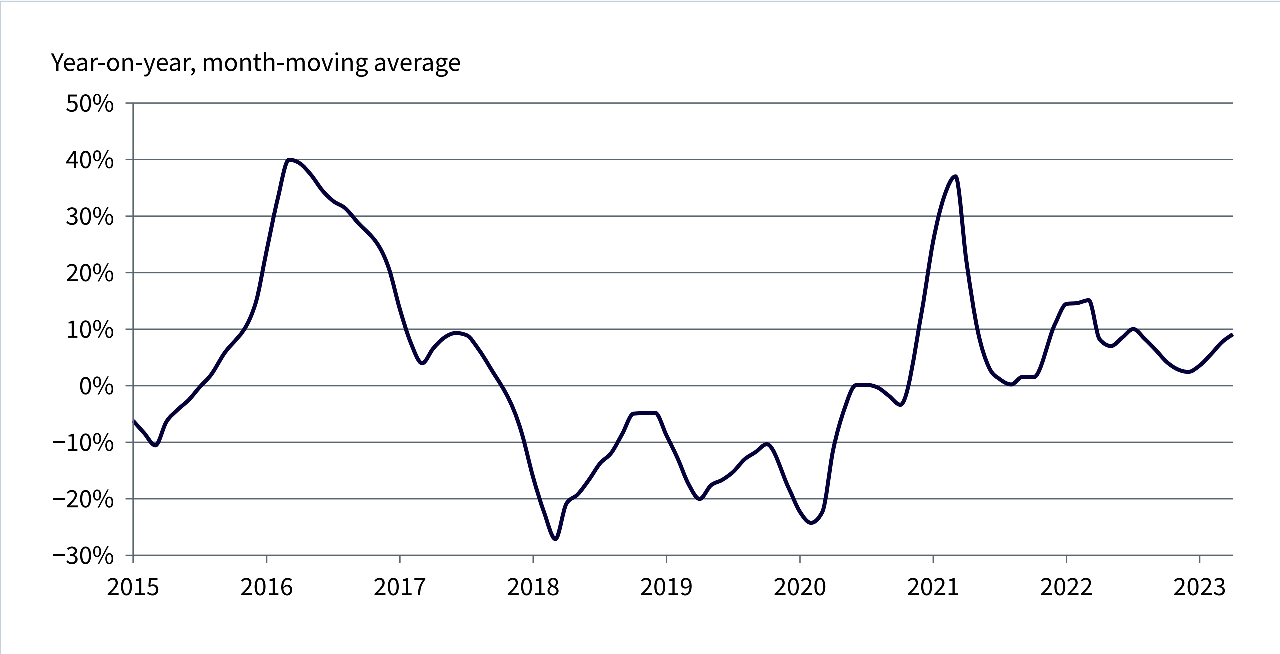
Figure 4: China's aggregate financing and copper demand



Source: Bloomberg, WisdomTree, January 2010 to July 2023. Combines old and new total social financing measures to get a longer aggregate financing time series, but readers should be aware of definitional changes in 2018. **Historical performance is not an indication of future performance and any investments may go down in value.**

Chinese authorities appear to be using the current weakness in manufacturing (and its impact on local metal prices) opportunistically by accelerating electric grid spending (figure 5). Electric grid building is very copper-intensive. China has made net-zero commitments by the year 2060 and is seriously behind in delivering on these promises. Cheap copper prices today (relative to where they could go in the coming decade) indicate that China is being smart in accelerating grid spending today. The future of clean energy consumption is likely to be more electric (as opposed to fossil fuel combusted at point of use).

Figure 5: China's electric grid spending



Source: Bloomberg, WisdomTree, March 2015 to June 2023, four-month moving average. **Historical performance is not an indication of future performance and any investments may go down in value.**

Oil demand at record highs rests on China's support

According to the International Energy Agency, world oil demand hit a record 103 mb/d in June, and August could see yet another peak, boosted by strong summer air travel, increased oil use in power generation and surging Chinese petrochemical activity. Global oil demand is set to expand by 2.2 mb/d to 102.2 mb/d in 2023, with China accounting for more than 70% of growth. If China slips up, renewed optimism in the oil market is likely to stall. While OPEC+ production—which is already at a two-year low—could fall further to counter potential weakness in Chinese demand, we suspect that sentiment could be dented.

No bazooka but a long list of piecemeal stimulus

Chinese authorities have failed to produce a 'bazooka' of policy support for the economy since reopening. However, in recent months, the pace of piecemeal policy announcements has intensified (figure 6). We were hoping that until data improves, the authorities would continue to step up the policy support, but on 21 August 2023, the central bank failed to deliver a much-anticipated easing of interest rates relevant to the mortgage market. We are yet to see if this is a change of strategy.

The pace of piecemeal policy announcements has intensified.

Figure 6: China's recent stimulus measures

Date	Measure
2 June 2023	The State Council confirmed more support for electric vehicles, with details to follow later by the Ministry of Commerce (MOFCOM) and the Ministry of Finance (MOF)
13 June 2023	10-bp open market operations (OMO) seven-day reverse repo rate cut
15 June 2023	15-bp medium-term lending facility (MLF) cut
20 June 2023	10-bp loan prime rate (LPR) cut for both 1-yr and 5-yr
29 June 2023	The State Council pledged to promote home decoration and home appliance consumption
30 June 2023	The People's Bank of China (PBoC) added a RMB200 billion relending quota to support agriculture, small to medium-sized businesses and the private sector
7 July 2023	The National Development and Reform Commission (NDRC) set up a project-loan connection mechanism with seven banks, including policy banks, to support investment
10 July 2023	PBoC and The National Administration of Financial Regulation (NAFR) extended 16 measures to support the property sector until the end of 2024
12 July 2023	Premier Li Qiang held a conference with major platform companies after PBoC and NAFR signalled an end to the regulatory revamp earlier on 7 July
12 July 2023	MOFCOM issued a document supporting the consumption of home appliances and decorations
14 July 2023	PBoC confirmed a soft but real cut on outstanding mortgage rates
19 July 2023	The Chinese Communist Party and State Council issued a joint document to support the private economy

Date	Measure
21 July 2023	Ministries led by the NDRC issued a document to support the consumption of electronics and autos
21 July 2023	The State Council mentioned support of old village redevelopment in mega/extra-big cities
24 July 2023	NDRC published a document to support private investment
27 July 2023	The Ministry of Housing and Urban-Rural Development (MOHURD) hinted at more property easing, including lowering down-payment ratio and mortgage rate, tax and fee cuts for upgrade transactions
28 July 2023	The Ministry of Industry and Information Technology (MIIT) issued an action plan to stabilise light industries
31 July 2023	NDRC issued a document containing 20 measures to restore and expand consumption
1 August 2023	NDRC unveiled detailed measures to bolster private economy
13 August 2023	The State Council issued guidance to attract foreign direct investment
15 August 2023	The first asymmetric policy rate cuts from the PBoC with a 10-bp OMO rate cut and 15-bp MLF rate cut
21 August 2023	10-bp cut 1-year LPR and no change on 5-year LPR (disappointment relative to expectations)
25 August 2023	MOHURD and PBoC announced via Xinhua News that down payment ratios and mortgage rates will be lowered

Source: Government announcements, various media.

Supplies of raw materials are greatly concentrated in a small number of countries.

Critical raw material production challenges

Climate and energy security are closely intertwined. The global energy crisis in 2022 brought about an urgency to find energy solutions that are sustainable from both an energy security perspective and an environmental perspective. Europe's REPowerEU and the US's Inflation Reduction Act are products of regulators/lawmakers responding to that urgency.

The energy transition—the process of moving away from greenhouse gas-intense energy consumption towards more renewable energy sources—presents a significant positive demand shock for the metals needed to build out grid infrastructure, distribution and transmission cabling, vehicle charging infrastructure, battery components, solar panels and wind turbines. However, many nations that are trying to deliver on their promises to meet 'net-zero' pledges have come to the realisation that much of the supply chain to produce the metals and the green energy components is currently far out of their jurisdiction and sphere of influence. The COVID-19 supply chain disruptions clearly highlighted vulnerabilities in the status quo. That crisis had already started the process of 'reshoring' or 'onshoring', that is, moving more of a product supply chain closer to the consumer market. The energy transition is accelerating this trend.

Figure 7 highlights the challenge of moving away from hydrocarbons. Supplies of raw materials are greatly concentrated in a small number of countries. While Russia may have been sanctioned for oil, gas and platinum bullion exports, nickel and platinum sponge can trade freely. These metals are essential for battery cathodes and hydrogen electrolysing. There is a risk that Russia could 'weaponise' the materials by restricting their exports and thus hurt the energy transition. Russia is the third-largest nickel exporter and second-largest platinum exporter.

Chile, the largest copper producer and second-largest lithium producer (with the largest lithium reserves), has become less friendly towards mining in recent years, challenging this source of supply. There has been talk of nationalising the lithium industry in Chile by the leftist president, Gabriel Boric. Also, a push to move to direct lithium extraction (DLE)—a method of removing the metal from brine with less water evaporation (water being a scarce resource in the desert)—could slow the volume of lithium from the country. DLE technology is commercially unproven and may take many years to get to scale.

In July 2023, Chile passed an increase in mining royalties to a range of 8% to 26% of operating margin from the current range of 5% to 14%, starting in 2024. There will also be a 1% ad valorem tax based on sales for miners that post a profit. Chile's Mining Council, which comprises large private firms, estimates this will ultimately boost the average tax rate to 44.7%, exceeding the top of the range of 38%–44% in competing countries such as Peru and Australia.

Figure 7b highlights that the most acute issue in critical raw material is in processing concentration. For almost every key energy transition metal, processing capabilities are dominated by China.

For almost every key energy transition metal, processing capabilities are dominated by China.

Figure 7a: Top 3 extraction countries, market share

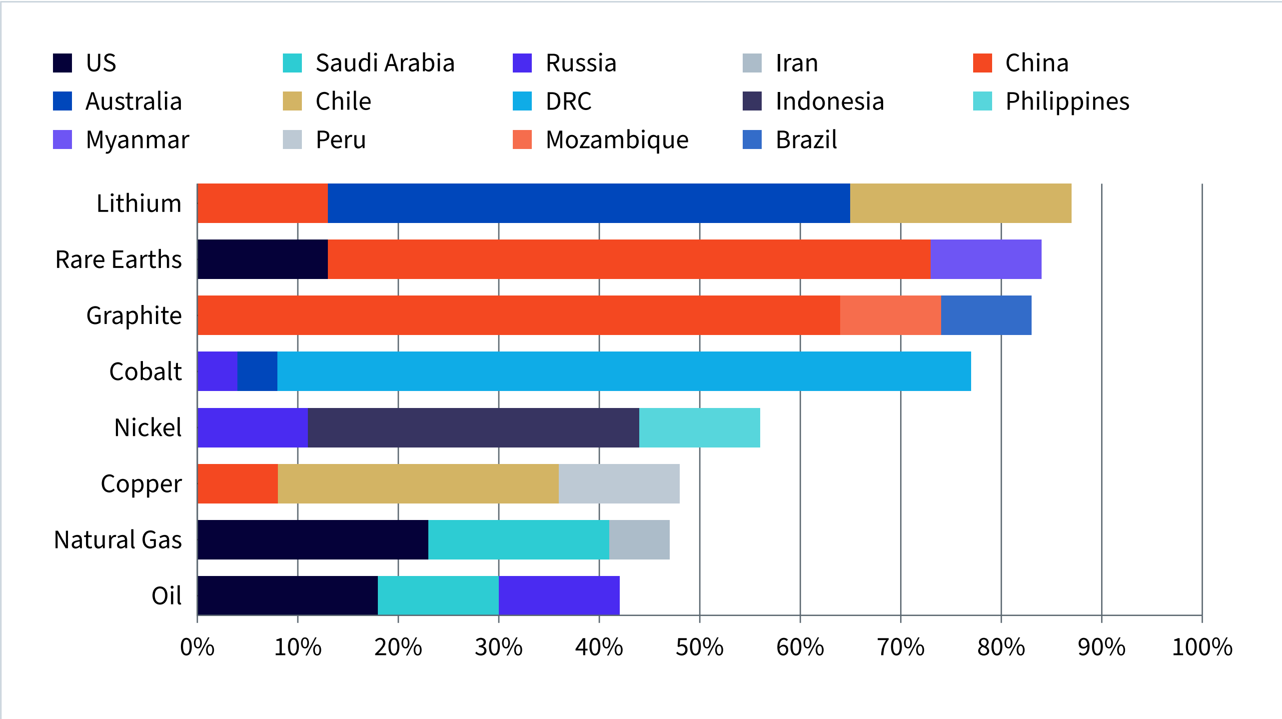
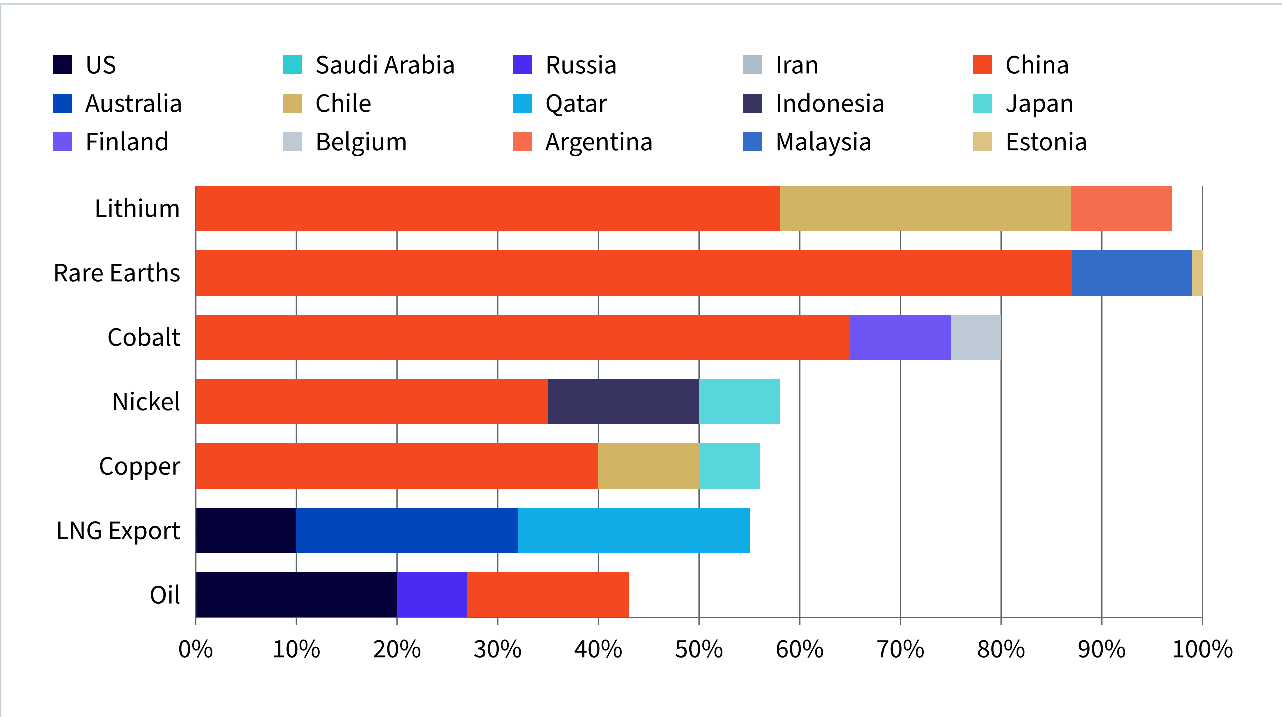


Figure 7b: Top 3 processing countries, market share



Source: International Energy Agency, WisdomTree, 2021. LNG = liquefied natural gas; US = United States; DRC = Democratic Republic of Congo. **Historical performance is not an indication of future performance and any investments may go down in value.**

Inflation Reduction Act catalyses a global green arms race

The 2022 Inflation Reduction Act (IRA) in the US aims to spur investment in domestic green technology. The majority of the US$394 billion in energy and climate funding in the IRA is in the form of tax credits with strings attached to local sourcing and processing.

While other nations and regions have had some form of domestic sourcing incentives in place, the sheer size and scale of the US approach has inspired others to double down on their strategies.

The European Union's CRM

The European Union has maintained a list of critical raw materials (CRMs) since 2011. The list of CRMs combines raw materials of high importance to the EU economy and of high risk associated with their supply. The list sharpens the focus on supply security. In 2011, the list contained 14 materials, and by 2017, in its fourth iteration, the list was 30 strong.

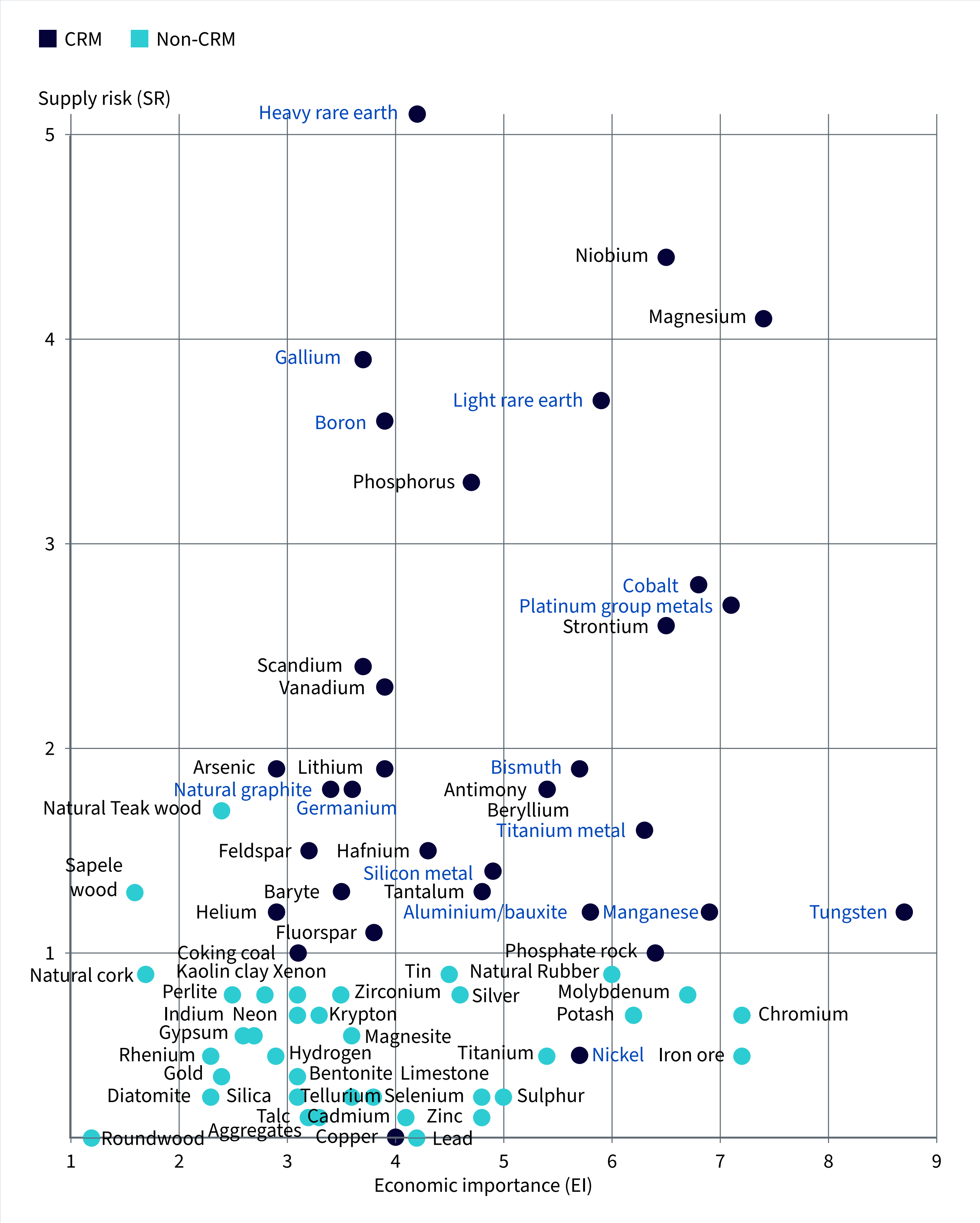
In March 2023, the European Commission proposed adding six more raw materials to the list (and removing two). The additions include copper, nickel, manganese, helium, feldspar and arsenic. (Figure 8 shows all CRMs.) Aluminium has also been added to the list.[3] In the previous iterations, bauxite—a key ingredient for aluminium production—was included, but now the finished product of aluminium is on the list (with bauxite and alumina in one group). Copper and nickel do not meet the 'numerical test' to be included in the CRM list but are included because they are so hard to replace with other materials and very important for the energy transition.

In addition to critical raw materials, the Commission has defined strategic raw materials (SRMs),[4] which are denoted in blue text labels in figure 8.

3 https://single-market-economy.ec.europa.eu/sectors/raw-materials/areas-specific-interest/critical-raw-materials_en.

4 Seventeen of the 34 materials are labelled as SRMs, including copper, nickel, aluminium, lithium, cobalt and platinum group metals.

Figure 8: Critical raw material assessment by the European Commission



Source: European Commission, WisdomTree. To be classified as a CRM, economic importance has to be scored higher or equal to 2.9 and supply risk scored higher or equal to 1, with the exception of copper and nickel. **Historical performance is not an indication of future performance and any investments may go down in value.**

The European Commission's Critical Raw Materials Act proposal sets hard targets for domestic capacities in SRMs by 2030. The European Council's counterproposal sets even higher targets (Council's proposals in parenthesis):

+ at least 10% of the EU's annual consumption for extraction
+ at least 40% (50%) of the EU's annual consumption for processing
+ at least 15% (20%) of the EU's annual consumption for recycling
+ no more than 65% of the EU's annual consumption from a single third country

The European Parliament has not yet adopted its position, and the full negotiation process will likely take time. However, based on the Council's position, negotiations are likely to focus on higher rather than lower local sourcing.

The European Union launched REPowerEU, an ambitious plan to reduce EU dependence on fossil-fuel imports and accelerate the green transition. In October 2022, the European Investment Bank (EIB) announced it is substantially increasing its commitment to supporting the goals of the REPowerEU plan by providing €30 billion in additional financing over the next five years to businesses and public authorities for clean energy. In July 2023, the EIB further increased the financing targets of the original EIB Group commitment by 50% to €45 billion until 2027. This additional financing is expected to mobilise over €150 billion in new green investments, helping Europe cut its carbon emissions to net zero by 2050.

China flirts with new resource restrictions

China said, on 3 July 2023, it would restrict exports of two metals—gallium and germanium—used in semiconductors and electric vehicles, escalating a technology war with the United States and the European Union. However, rather than banning the export of the materials, the proposal is to put in place regulations for companies to obtain export licences for foreign shipments of the metal. The curbs follow the US's blacklisting of Chinese companies in recent years, aimed at cutting them off from access to US technologies, including the most advanced chips.

Greenflation

Resource nationalisation, 'reshoring', the tit-for-tat policy moves to restrict commodity availability and weaponise materials critical for renewable energy and its enablers are all likely to slow the energy transition and moreover, make it more expensive to deliver. The green arms race that will lead to trade frictions is likely to raise the cost of critical raw materials: greenflation.

So long as policy makers do not give up their climate change goals, we believe that commodity prices will likely continue to rise. Some producers will be winners and others losers in this fight for market share. Picking the companies or countries that will be the winners will be difficult. But to hedge against the trend of rising prices, investing in commodity futures appears to be the sensible move.

Conclusion

+ An economic recovery implied by improving CLIs should bode well for commodities. However, as the asset class tends to be a late-cycle performer, we may have to wait for a decisive turnaround.
+ Cyclical commodities should start to outperform defensive ones.
+ China continues to disappoint, with the government failing to provide a stimulus ‘bazooka’. Its piecemeal stimulus strategy, while intensifying in July and the first half of August, is falling significantly short of expectations.
+ The green arms race—the efforts to develop a supply chain to meet the needs of an energy transition in developed countries—could drive up the cost of critical raw materials: greenflation. The prospect of tit-for-tat trade restrictions could simultaneously slow the transitions and make it more costly. The best way to hedge against this is to invest in raw material futures.

2.

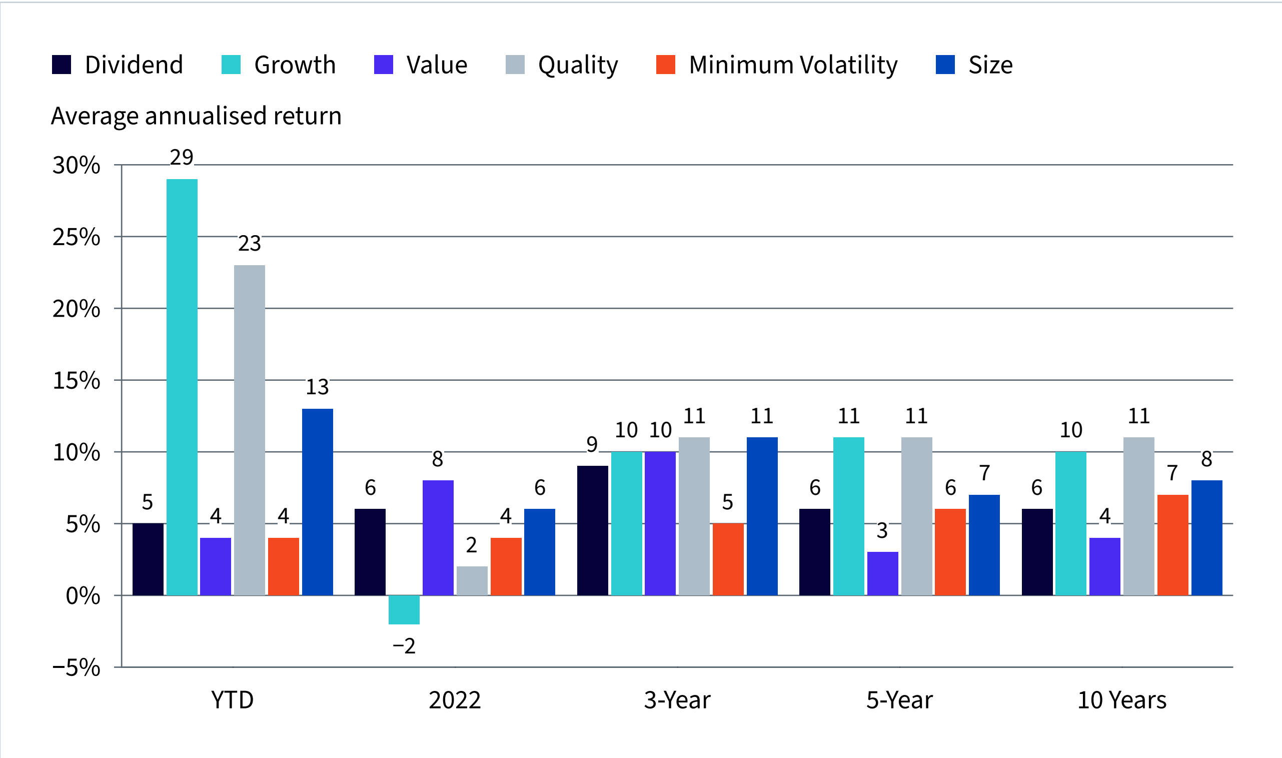
Equity Outlook: Soft landing calls for tough choices

In this section

Market expectations of a Federal Reserve (Fed) pivot and a robust Chinese reopening alongside Europe's prudent management of the energy crisis paved the way for a strong rally in Q1 2023. Soon after, market sentiment soured amidst the collapse of several regional US banks and then spilled over to Europe, resulting in the emergency takeover of Credit Suisse by UBS. This caused a return flight to safety, with the well-known all-weather factor—Quality—rising the most, up 29% YTD. The gap between styles has been vast over the first half of the year. The Growth factor, riskier in nature, posted the second highest performance up 23% YTD. The excitement around artificial intelligence reached a fever pitch in H1 2023, supporting growth-oriented technology stocks ticking higher.

> The gap between styles has been vast over the first half of the year.

Figure 9: Historical comparison of factor performance



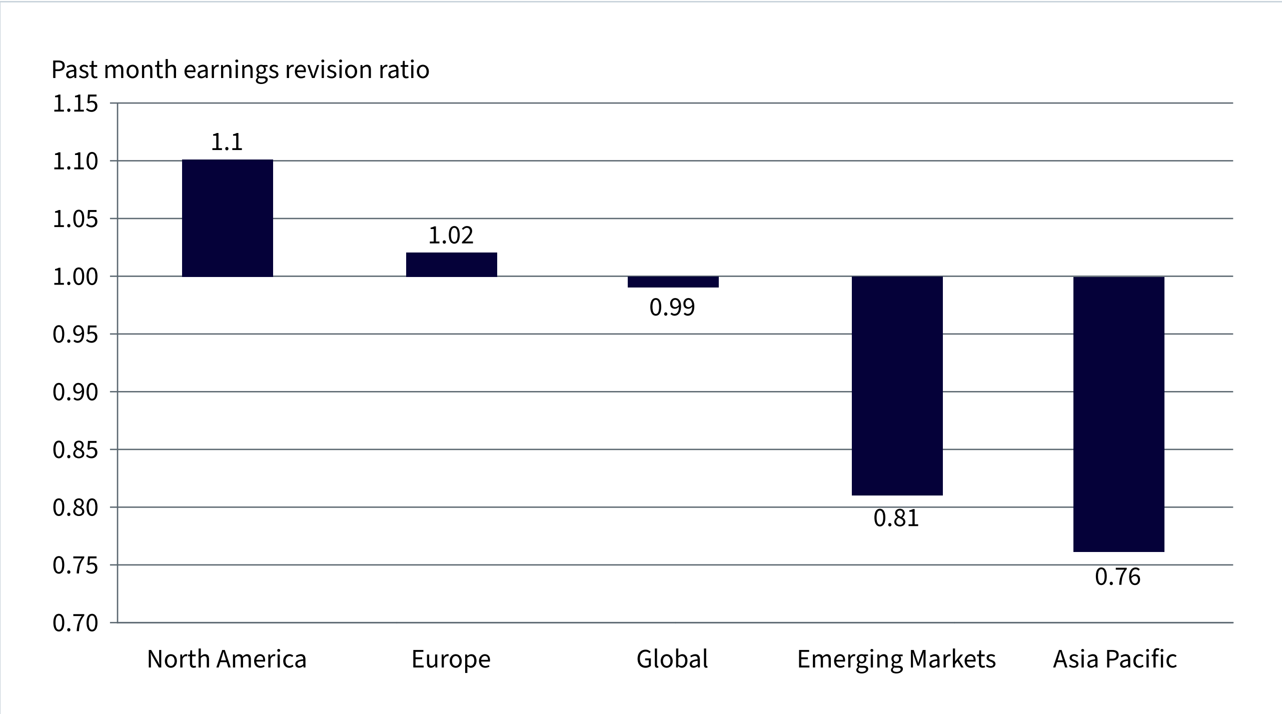
Sources: Bloomberg, WisdomTree, as of 31 July 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

As we enter H2 2023, we remain constructive on select areas of global equity markets. There is a strong likelihood of a tug between macroeconomic factors and earnings. Even if the earnings outlook weakens in China, proactive policy support via rate cuts could support its stock multiples.

The US economy continues to show extraordinary resilience despite monetary constraints and credit tightening. While inflation has shown encouraging signs of decline in the US, strong economic momentum alongside a rebound in commodities raises the risk of a re-acceleration in inflation. In turn, rates could remain higher for longer, resulting in Fed rate cuts being delayed until Q1 2024. In such an environment, an enhanced equity income approach could fit well.

In Europe, where we are likely to witness a mild recession, we believe adopting a more cautious and defensive approach is warranted. Earnings revision ratios remain the strongest in North America while they are the weakest in Asia Pacific.

Figure 10: Comparison of global earnings revision ratios

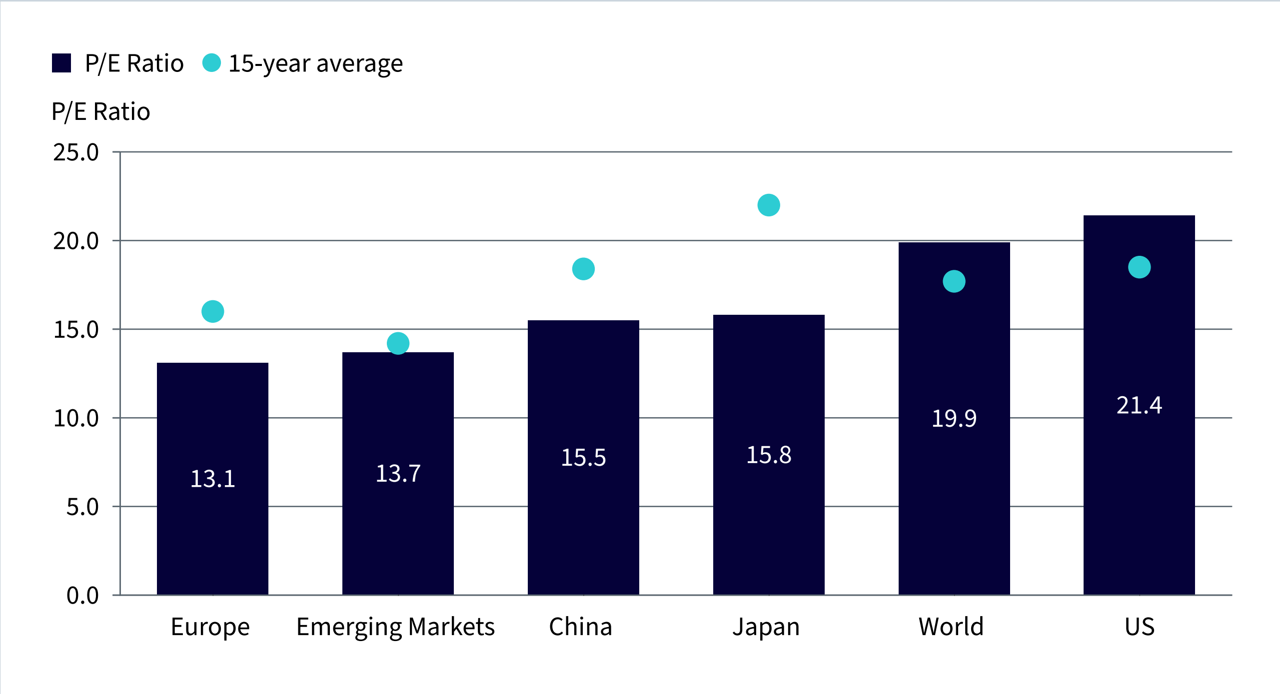


Source: BofA, iQDatabase, WisdomTree, as of 10 August 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

International equities offer compelling valuations

From a valuation standpoint, looking at the price-to-earnings ratio (P/E) across the globe, valuations are compelling across developed international markets (Europe and Japan) and select emerging markets, including China. Sentiment also remains very bearish towards markets such as China and Europe, which could represent an opportunity from a contrarian perspective.

Figure 11: Global equity market valuations



Source: Bloomberg, WisdomTree, as of 22 August 2023. Please note: P/E Ratio is defined as the price-to-earnings ratio. Europe – EuroStoxx 600 Index; Emerging Markets – MSCI Emerging Markets Index; China – MSCI China A Shares Index; Japan – TOPIX Index; World – MSCI World Index; US – S&P 500 Index. **Historical performance is not an indication of future performance and any investments may go down in value.**

US equities are the belle of the ball

The resilience of the US economy has defied all odds. The strength of the US consumer (accounting for 70% of GDP), alongside the fiscal impulse, has been the cornerstone of the US' extraordinary resilience. A larger-than-expected take-up of subsidies for factory building under the Biden administration's stimulus packages (the CHIPs Act, Inflation Reduction Act and Infrastructure Act) has helped to push up government expenditures to 25.5% of GDP.[5] Easy fiscal policy supported both consumers and the broader economy, helping offset the harsh consequences of tighter monetary policy.

The strength of the US consumer has been the cornerstone of the US' extraordinary resilience.

5 Haver, as of 31 July 2023.

In lockstep, US equities enjoyed a strong run-up in H1 2023, rising 19.5%,[6] with growth stocks leading the performance.

It was the narrowest market in history, with just 25% of stocks outperforming the S&P 500, though participation is beginning to broaden out as economic data continues to surprise on the upside. Expectations of cooling inflation aiding the Federal Reserve (Fed) to end its current tightening cycle supported the performance of higher-duration growth stocks. The excitement around artificial intelligence reached a fever pitch in 2023 since the widespread launch of ChatGPT, serving as an important catalyst for technology stocks.

Figure 12: Historical performance and valuations of US equity sectors

Factors	Tickers	Sectors	P/E	H1 2023	H1 2022
Value	S5FINL Index	Financials	15	3%	-14%
	S5INDU Index	Industrials	21	12%	-10%
	S5ENRS Index	Energy	9	0%	42%
	S5CONS Index	Consumer Staples	22	2%	-4%
	S5UTIL Index	Utilities	19	-5%	3%
Blend	S5HLTH Index	Health Care	22	-1%	-6%
Growth	S5TELS Index	Communication Services	20	45%	-28%
	S5INFT Index	Information Technology	33	46%	-17%
	S5RLST Index	Real Estate	37	3%	-15%
	S5MATR Index	Materials	17	10%	-14%
	S5COND Index	Consumer Discretionary	20	36%	-20%

Source: Bloomberg, WisdomTree, as of 31 July 2023. Please note: P/E is the price-to-earnings ratio. **Historical performance is not an indication of future performance and any investments may go down in value.**

6 Performance of the S&P 500 Index from 30 December 2022 to 31 July 2023.

Market breadth to expand beyond technology stocks

For investors calling for a soft landing, rates are likely to remain at current levels or higher for a longer duration of time. A tight US labour market, with unemployment at historic lows and rising wages, is likely to slow the downward pricing momentum in the service sector.

As the market regime transitions, it should provide a ripe opportunity for market breadth[7] to improve. Markets may begin to favour value and dividend-paying stocks. History has shown us that breadth tends to improve as the economy recovers from a downturn.

Peak pessimism towards China

China's reopening rebound has faded, evident from the lacklustre equity market performance of -3.7% year to date. There is a loss of confidence amongst the consumer, apparent from the exodus of flows from Chinese equity markets in sharp contrast to 2022 when individuals accounted for 60% of the CSI 300 Index's volume. China is grappling with a weak economy, a property sell-off and growing geopolitical tensions with the US. The ascension of the US dollar versus the Chinese yuan is opening a wider gap in the economic race, as China's GDP has fallen to 67% of the level of the US's, down from a peak of 77% in early 2022.[8]

The Chinese government is realising its reforms have backfired by inhibiting the nation's entrepreneurial drive.

The Chinese government is realising its 'anti-monopoly' push, 'prevention of disorderly capital expansion' advocacy and 'common prosperity' reforms have backfired by inhibiting the nation's entrepreneurial drive. There are more signs of a reversal of its regulatory crackdown. The 31-point action plan[9] to improve the business environment for private enterprises by allowing outstanding private sector members in the government's lawmaking and advisory bodies was a step in the right direction. Another indication was the absence of President Xi's phrase, 'Housing is for living, not speculation,' from the communique at the 23 July Politburo meeting, marking a stark change from its usage at every April and July Politburo meeting since 2019. This was followed by the Housing Ministry and People's Bank of China guiding banks to reduce mortgage rates and down payments in an effort to shore up China's ailing property sector.

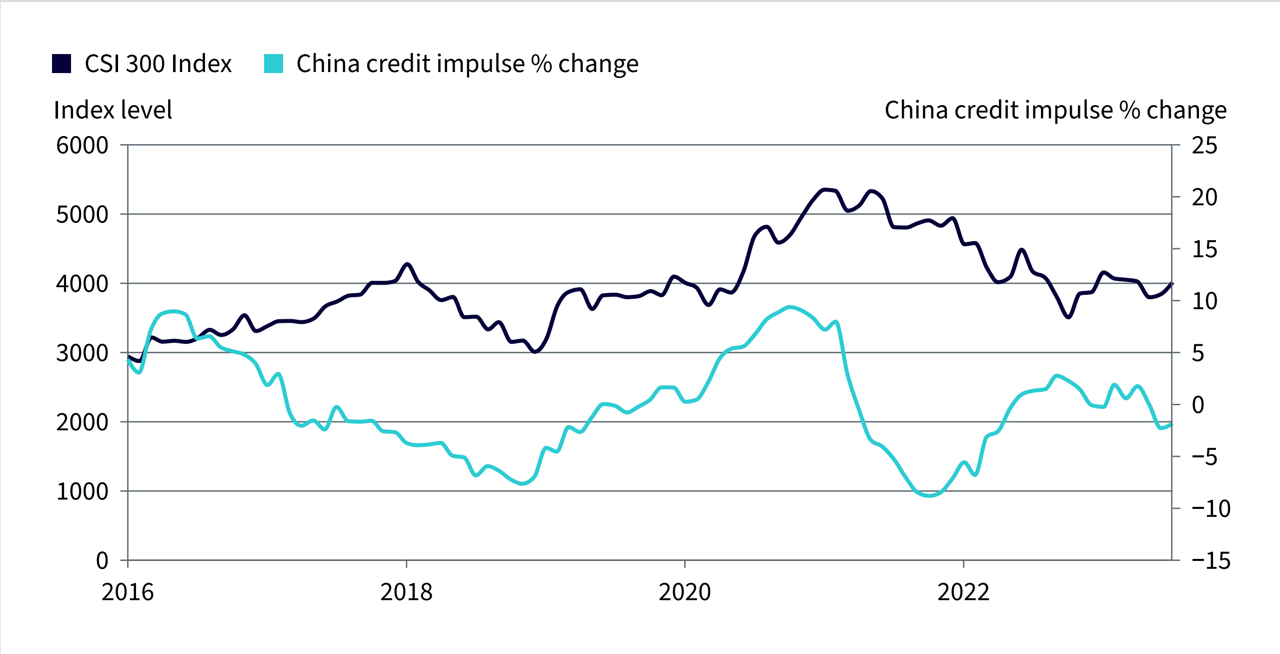
7 Breadth is measured by comparing the equal weighted performance versus the market cap-weighted performance of the US stocks listed on the S&P 500 Index.

8 Bloomberg, as of 31 July 2023.

9 China's cabinet (Communist Party's top official and State Council) issued a joint document on 19 July 2023.

Policy efforts so far have fallen short of expectations. The People's Bank of China (PBOC) is likely to continue with piecemeal monetary easing alongside the government extending more targeted support. A more modest recovery is likely to encourage greater policy support, which historically has driven equities higher.

Figure 13: Chinese stocks tend to benefit after the build-up of credit



Source: Bloomberg, WisdomTree, as of 31 July 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

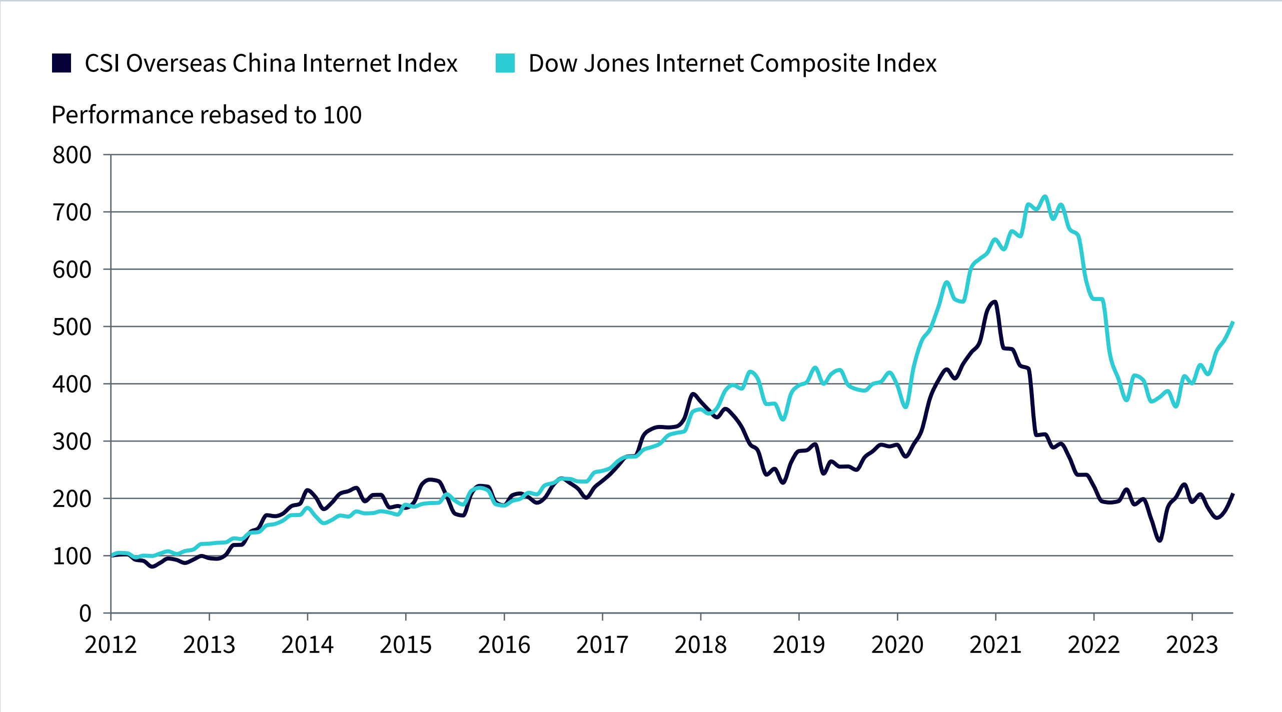
Pockets of opportunity in non-state-owned enterprises

Non-state-owned enterprises, particularly within the Technology, Communication Services and Health Care sectors, faced the brunt of China's regulatory crackdown. These regulatory interventions stifled growth in key sectors such as e-commerce, mobile payment, ride-hailing and online education. It also resulted in the suspension of initial public offerings (IPO) and delisting of Chinese internet companies. As China's regulatory interventions draw to a close, we expect China's Technology sector to benefit from a more business-friendly climate.

> We expect China's technology sector to benefit from a more business-friendly climate.

Growing political frictions in supply chains are also incentivising China to regain independence in the semiconductor and hardware space. Chinese technology companies are trading at a significant discount compared to US peers, offering plenty of room to catch up.

Figure 14: Historical comparison of technology stocks in China vs. the US



Source: Bloomberg, WisdomTree, as of 31 July 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

Chinese healthcare stocks fell sharply in the aftermath of COVID-19-related lockdowns alongside policy headwinds, notably the volume-based procurement policy that led to price reductions for medicines. While lowering medicine prices reduced the costs borne by consumers, it disincentivised long-term research and development efforts. The modest reduction in the pricing of the National Reimbursement Drug List last December provided another signal that the government is trying to strike a better balance between promoting innovation and regulating prices.

China's transition to a less debt-fuelled, less property-reliant and more consumer-driven economy is an important adjustment. We expect government stimulus policies to be aimed at enhancing the efficiency of the private sector. Further iterations of policy rate cuts by the PBOC are likely to follow; however, outright quantitative easing won't be in the cards, as it is likely to further weaken the yuan, which the PBOC would like to avoid. With a low correlation to US equities (at 20x P/E) coupled with a high valuation discount, pockets of China continue to provide good investment prospects.

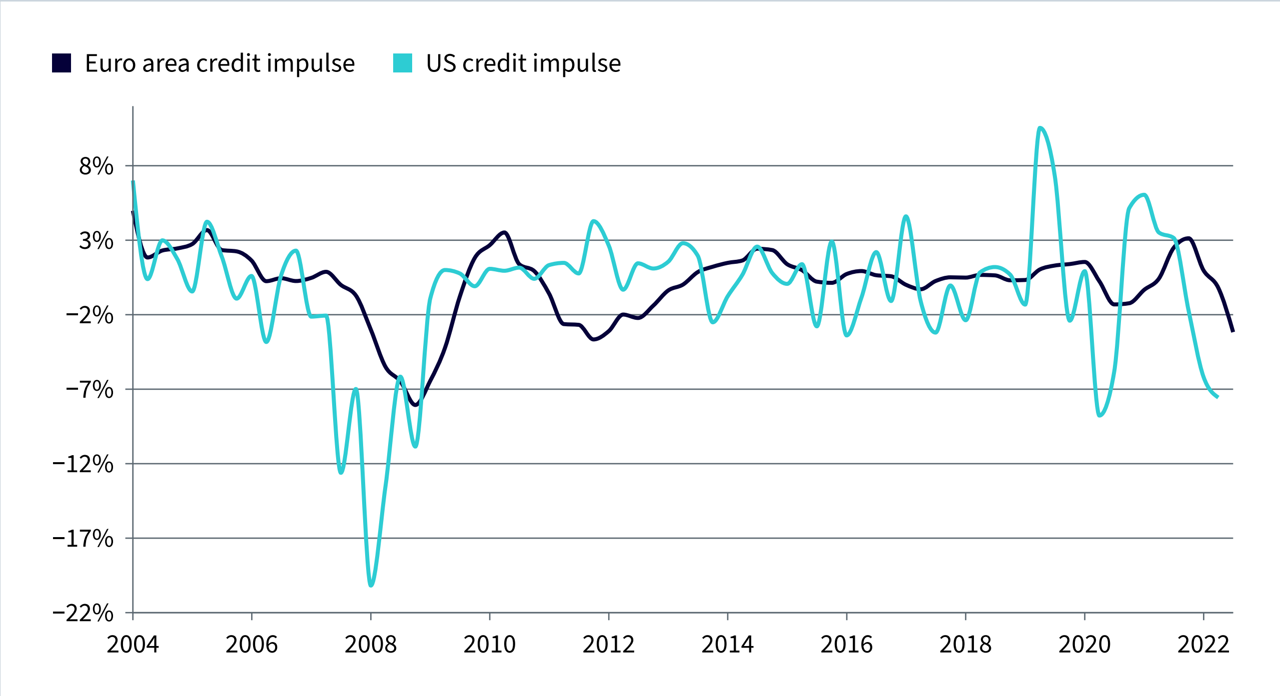
Prefer defensives over cyclicals as Europe runs out of steam

Nearly six months back, investors marvelled at how the euro-area economy had emerged from the energy crisis. Eurozone equities rebounded sharply, up 10.9%[10] following the government's prudent management of the energy crisis, resilient private consumption, and the reopening of the Chinese economy. That momentum appears to be fading as China's recovery slows down, consumer confidence declines and the impact of tighter monetary policy gains a stronghold on the economy. Higher inflation over the past year is holding back demand from households, which is hurting growth. The monetary tightening over the past year not only triggered an increase in real rates, it also impacted borrowers' credit metrics. Owing to this, Eurozone banks have tightened their lending standards.[11] Banks still remain the primary source of corporate funding in Europe. The credit impulse—that is, the annual change in the growth of credit relative to GDP—in the euro area reached its lowest point since 2010.

10 Bloomberg – performance of EuroStoxx 600 Index from 30 December 2022 to 31 July 2023.

11 Euro area Bank Lending Survey (BLS), April 2023.

Figure 15: Credit impulse turns negative in US and euro area



Source: Bloomberg, WisdomTree, as of 30 June 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

Germany touted as 'the sick man' of Europe

Despite the slightly better-than-expected outcome for GDP in H1 2023, the eurozone appears to be headed for a moderate period of economic sluggishness as the gains from the rebound post-lockdowns continue to fade. Divergences among member countries are evident in H1 2023. While Spain is showing improved momentum on the back of services and public investment, Germany surprised to the downside. Germany faces many challenges, ranging from labour shortages to outdated bureaucratic procedures and weak energy policies. However, the most important headwind remains the weakness in manufacturing. Germany is more exposed to the ups and downs of the global manufacturing cycle compared to other major advanced economies. Germany's large export-oriented manufacturing sector is likely to fall further over the course of H2 2023.

Germany's greatest headwind remains the weakness in manufacturing.

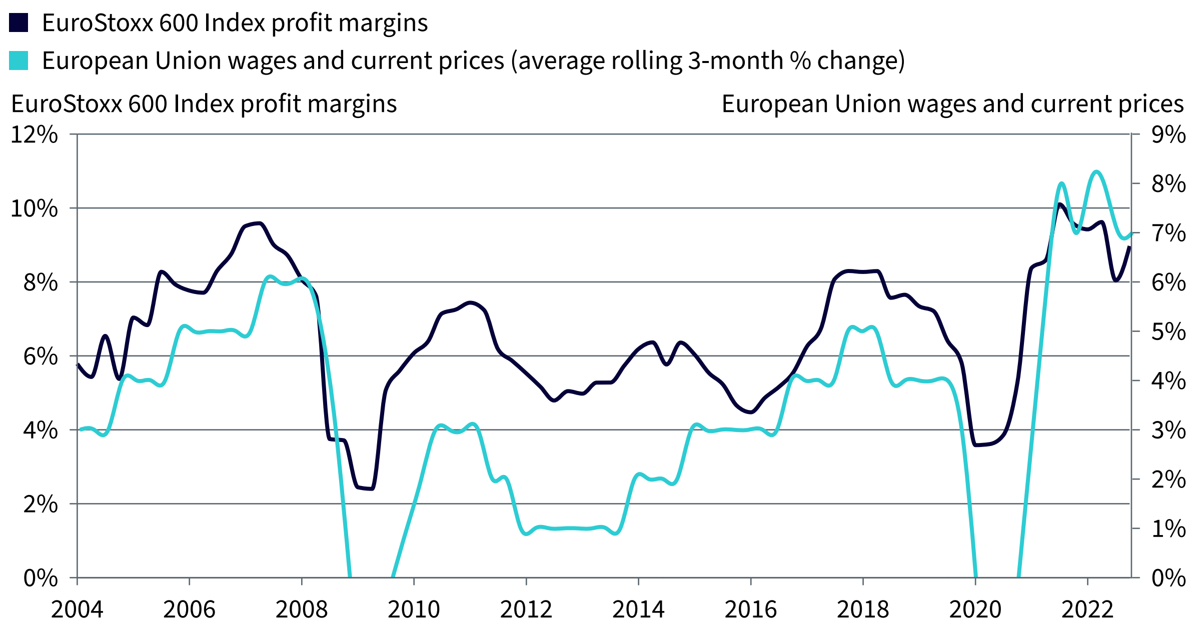
However, by Q1 2024, as the global reduction of inventories would have run its course and global growth returns to a more normal balance between goods and services, the worst of the downturn in German GDP should be over.

Inflation downtrend in eurozone set to continue

Eurozone inflation remains in a downward track. Headline inflation is down by half from its 10.6% peak in October 2022 to 5.3% year-on-year in July 2023. Core inflation is turning more slowly, but it is also likely to decelerate amidst a weaker growth outlook for the eurozone. In response, we expect the European Central Bank to be closer to the end of its current tightening cycle.

During the peak of the COVID-19 pandemic, the unemployment rate for the euro area rose sharply. Since then, unemployment has steadily declined. A GDP-weighted measure for the four largest economies of the monetary union stood at 6.5% in Q2 2023 (the lowest since 1981), compared to 8.6% during the peak of the pandemic. The tightening of labour markets alongside higher inflation is improving the negotiating power of workers, leading to larger pay gains. This, in turn, has hurt the profitability of euro area companies. This has become apparent in the ongoing Q2 2023 earnings season with lacklustre performance showing that eurozone equities are facing profitability pressures as recession concerns mount and activity slows. Wage inflation is likely to peak by early 2024 and decline thereafter.

Figure 16: Rising wages impact corporate margins



Source: Bloomberg, WisdomTree, as of 30 June 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

TINA is alive in Japan

There is no alternative (TINA) to equities is still alive in Japan. This is evident from higher equity risk premiums of 2.48% for Japan compared to 0.58% in the US.[12] While the rest of the world has been busy trying to quell the inflation fires, Japan has emerged from the COVID-19 lockdowns with a faster pace of growth and higher inflation. Japanese equities have taken investors by surprise with their strong performance, up 27.1% in H1 2023.[13] A combination of higher equity risk premiums, a weaker yen supportive of the Japanese export market, corporate reforms and attractive valuations have been important catalysts for equities. Japan's nominal growth trend is expected to remain above 2% over the medium term, following the near 5% surge in 2023.

The Tokyo Stock Exchange (TSE) announced about half of its listed companies had a price-to-book ratio below 1x.[14] According to the TSE, these companies are to disclose their policies and specific initiatives for improvement. All Japanese exchange-listed companies are required to meet the inclusion requirements of the market segments for which they are listed by 2025 or risk being labelled as securities under supervision or even delisting. As a result, historically cash-heavy Japanese companies face increasing pressure to improve their numbers, possibly by funnelling historically high excess cash reserves into increased buybacks or dividends.

The pressure on low-valuation companies to improve their practices and increase shareholder returns is reminiscent of previous initiatives during the Abenomics era, namely the launch of the JPX-Nikkei 400 Index in 2014.

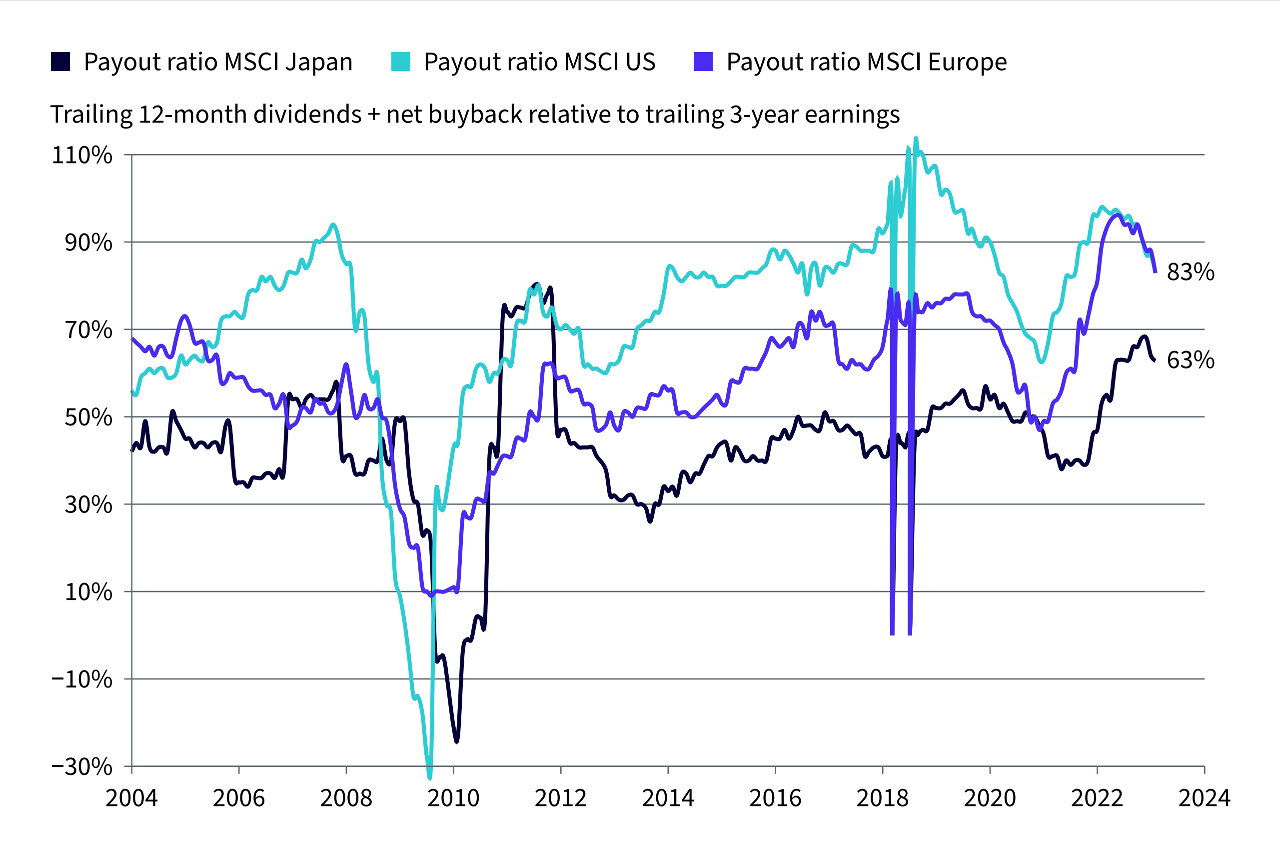
There is no alternative (TINA) to equities is still alive in Japan.

12 Bloomberg, WisdomTree, as of 31 July 2023. Equity risk premium is the difference between the earnings yield and the respective 10-Year Government Bond Yield.

13 Bloomberg, performance of Nikkei 225 Index from 30 December 2022 to 31 July 2023.

14 Please note – details of Tokyo Stock Exchange policy source are Eri Sugiura and Leo Lewis, 'Overhauled Tokyo Stock Exchange Makes Debut,' The Financial Times, 4 April 2022.

Figure 17: Payout ratios in Japan begin to catch up

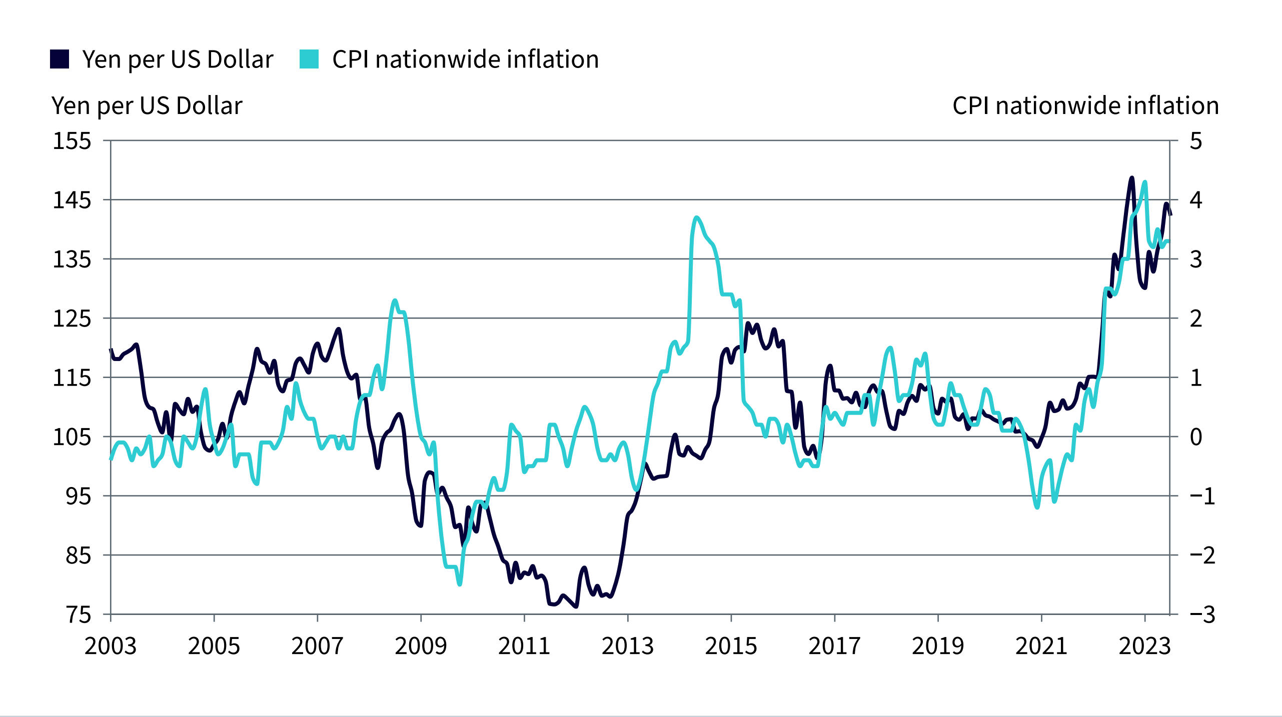


Source: FactSet, WisdomTree, as of 31 July 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

Policy shift still remains loose

The newly appointed Bank of Japan (BOJ) governor, Kazuo Ueda, marked a significant step towards normalisation in July by announcing a further adjustment to its yield curve control (YCC) regime. While the YCC band remains unchanged at ±0.50%, the BOJ confirmed it would allow yields to reach 1%. YCC has been a key element of monetary policy in Japan. The BOJ formally changing its course constitutes an acknowledgement that inflation is returning to the Japanese economy. Yet the BoJ lowered its (median) forecast for FY 2024 to +1.9% and left its FY 2025 projection unchanged at +1.6%, in effect justifying ongoing easing by the Bank of Japan. With Japan's nominal growth rising over the coming years, the revised policy by the BOJ still remains loose, supporting the case for Japanese equities.

Figure 18: Yen trading in lockstep with inflation



Source: Bloomberg, WisdomTree, as of 31 July 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

Historically, a weaker yen has benefitted the performance of Japanese exporters as it enhances their competitive advantage. Adopting a tilt towards dividend-paying Japanese equities is likely to reap the benefits of not only a weaker yen but also corporate governance reforms.

Conclusion

Positive economic surprises across the developed world in the first half of 2023 have underpinned a rebound in risk sentiment. As we progress into year-end, the outlook remains more nuanced. Easy fiscal policy in the US supported both consumers and the broader economy, helping offset the harsh consequences of tighter monetary policy. This should help offset a deeper contraction in US output through late 2023. As the US economy recovers from the downturn, we expect the breadth of the market to improve, favouring value and dividend stocks. Meanwhile China's long-standing problems in the housing and banking sectors are likely to remain a drag on domestic demand. However, we do see pockets of opportunity in undervalued sectors of the market, namely technology and healthcare. Given the strong manufacturing headwinds facing Europe, we expect weak growth in the eurozone for the remainder of 2023, favouring a tilt towards defensive stocks.

3.

Thematic Outlook: Entering the Age of AI — how artificial intelligence can fuel growth across megatrends

In this section

Perhaps we should all stop for a moment and focus not only on making our AI better and more successful but also on the benefit of humanity.’

–Stephen Hawking, 2017

Nobody can fully predict the transformative impact of artificial intelligence (AI) on the world. But progress won’t wait for us to first figure out all the unknowns. Rather, the more we learn and apply AI across multiple fronts, the more we will understand its potential.

At WisdomTree, we believe AI is entering a new and exciting phase. The first phase of the recent AI revolution started when ChatGPT took the world by storm, bringing AI into the consciousness of the masses. The next phase saw an explosion of new applications being introduced over the subsequent months. And now we are about to enter a phase where the technology’s benefits will start becoming apparent: for individuals, it could mean higher productivity; for businesses, higher earnings; and for economies, more growth.

Ultimately, AI will not just be a theme on its own but a foundational innovation that will fuel growth across megatrends. In this outlook, we highlight three frontiers where AI is already beginning to make its presence felt: software, healthcare and the energy transition.

Artificial intelligence is expected to transform the future of software

Our world is becoming ever more digital, as the global pandemic supercharged that trend with no option to turn back. Digitalisation, in turn, provides a thriving ground for the adoption of software that continues to proliferate industries and sectors.

Despite having grown at a rapid clip, supercharged by the digital transformation, software providers are now going through a period of slowing growth. Macroeconomic uncertainty is making companies across the globe slash their software budgets and postpone their digital transformation journeys into the future. At the same time, valuations of software companies have been hit by rising interest rates, limiting the amount of funding available for them from capital markets.

In this environment, software vendors can continue driving their sales either by enhancing the cost/benefit ratio of their current offering or by making their products indispensable for their customers. In 2023, the rise of artificial intelligence presents an obvious opportunity on both fronts, as we will illustrate in this section. AI is rapidly turning into the holy grail for software companies looking for the next big thing to fuel years of growth alongside the ongoing transition to the cloud.

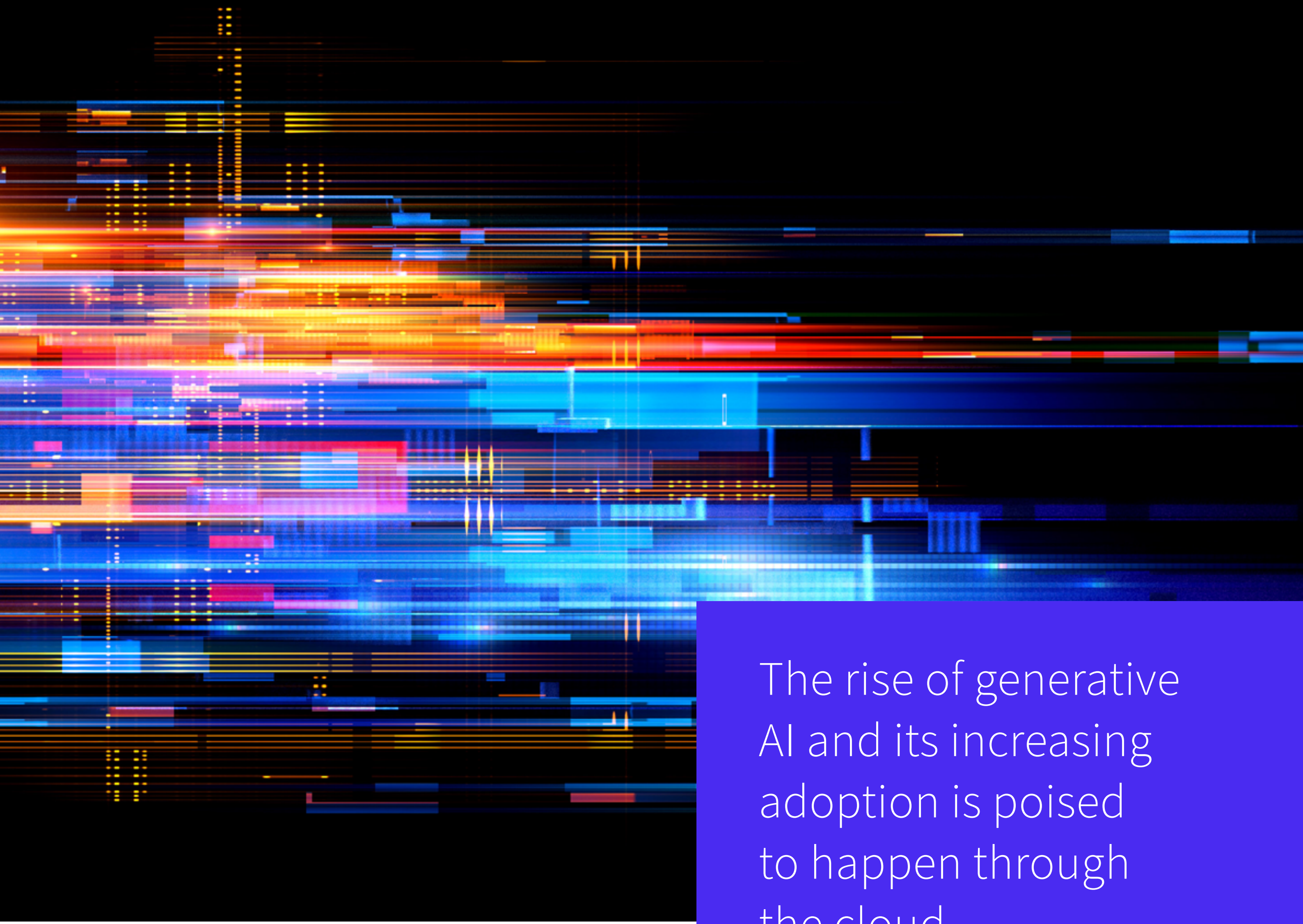
Cloud computing is democratising the access to AI

The release of ChatGPT and the rise of generative AI have brought the power of AI to the masses. Sparking huge excitement around AI across the globe, these events also brought several important developments in the cloud space into the spotlight:

AI is rapidly turning into the holy grail for software companies.

+ Training and running large language models (LLMs) and powering generative AI applications requires huge computing capabilities and happens predominantly in the cloud.
+ Training LLMs relies on huge amounts of data, making digitisation of data key for unlocking new generative AI use cases.
+ Companies without their own enormous computing power resources can use cloud infrastructure vendors like Amazon Web Services, Microsoft Azure or Google Cloud at scale.
+ Companies without their own AI capabilities can leverage the power of generative AI through various software solutions and services.

These trends further demonstrate that the rise of generative AI and its increasing adoption is poised to happen through the cloud, as this is where the technology can be deployed and monetised at scale. At the same time, the growing deployment of AI applications in the cloud allows AI to be efficiently integrated into various cloud software, kickstarting further innovations in the space. Combined with the burgeoning interest in generative AI solutions across industries, cloud computing is well-positioned to democratise access to AI technology and fuel further migration to cloud-based solutions and services.



The rise of generative AI and its increasing adoption is poised to happen through the cloud

More and more companies are becoming enthusiastic about the role of generative AI in their organisations, with 86% of 4,000 IT leaders across industries surveyed by Salesforce expecting it to be prominent.[15] This enthusiasm around generative AI is changing the playing field for software companies, with some of the technology use cases already being observed in a range of business functions and industries. Software development, marketing and sales, customer services, e-commerce and banking are all seeing a flurry of new product releases with generative AI capabilities. This reflects the flexibility of cloud companies to quickly adapt to the evolving needs of their customers due to the nature of the cloud business model.

15 Salesforce, 'As IT Demands Rise, New Data Reveals Importance of Automation and Generative AI', 20 July 2023.

Figure 19: People across business functions and industries believe that the use of generative AI applications can help in their work

86%

of IT leaders believe generative AI to play a prominent role in their company in the near future

92%

of US-based developers are already using AI-powered tools

71%

of marketers expect AI to help them eliminate busy work and focus on strategic opportunities

61%

of salespeople believe that AI tools will help them sell better

Sources: Surveys by Salesforce and Github, 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

In software development, faster task completion through AI-powered code suggestions, better code reviews, AI-powered testing for code changes and efficient analysis of vulnerabilities are only some of the AI-enabled features transforming developer experience (DevEx). A GitHub survey of 500 US-based developers revealed that 92% of them are already using AI-powered tools.[16]

In marketing, generative AI can boost content creation and creative thinking, enhance product discovery by customers and help leverage data more efficiently. In sales, generative AI can help with closing deals through better information about customer preferences, discovering new leads and improving client engagement. According to a recent Salesforce survey, 71% of 1,000 marketers expect AI to help them eliminate busy work and focus on strategic opportunities, while 61% of 1,000 salespeople believe that AI tools will help them sell better.[17]

16 GitHub, 'Survey reveals AI's impact on the developer experience', 13 June 2023.

17 'Sales, Service, and Generative AI: New Research on What's Holding Teams Back', Salesforce, 28 June 2023; 'New Research: 60% of Marketers Say Generative AI will Transform Their Role, But Worry About Accuracy', 5 June 2023.

Generative AI represents an important growth potential for cloud software vendors in other areas where current AI adoption is low. AI in the legal profession represents one such example. Alongside obvious improvements in the time-consuming process of legal discovery, AI can deliver predictive analytics to help lawyers with efficient case selection and development of their litigation strategy. Thomson Reuters reports that 82% of respondents in their recent survey were positive that generative AI could be applied to legal work, although only 5% were either using or actively planning to use the technology.[18]

Bottom line, generative AI allows software companies to develop new products with features that make them much more attractive to their existing and potential customer base. In turn, tapping into industries with low AI adoption can provide software companies with a first-mover advantage.

The golden trio – AI and the cloud cannot thrive without cybersecurity

The future of AI is becoming inexorably linked with the future of the cloud and software. However, the future of both megatrends cannot be secured without the continuous development of adequate cybersecurity solutions. The ongoing digitalisation and rapidly developing generative AI capabilities are providing fertile ground for the ever-evolving cyber-threat landscape with more sophisticated cyberattacks. In 2022, CrowdStrike reported increasing cloud exploitation—a 288% increase in cloud-conscious threat actors—as well as an increasing speed and sophistication of attacks—71% of attacks were malware-free.

> The future of AI and cloud cannot be secured without continuous development of cybersecurity solutions.

18 ‘ChatGPT and Generative AI within Law Firms’, Thomson Reuters Institute, April 2023.

Figure 20. Cybersecurity solutions are becoming ever important with the evolving cyber-threat landscape

288%

Increase in cloud-conscious threat actors in 2022

71%

of attacks were malware-free in 2022

US$4.91 million

Average cost of a data breach due to phishing in 2022

> 90%

of security professionals expect their organisation to be affected by AI-enabled threats in 2023

Sources: CrowdStrike, 2023 Global Threat Report; IBM, Cost of a Data Breach Report 2022; CyberArk, 2023 Identity Security Threat Landscape Report. **Historical performance is not an indication of future performance and any investments may go down in value.**

With the rise of generative AI, threat actors are becoming more efficient and prolific with the use of AI-powered malware, more convincing phishing techniques and deepfakes to achieve their goals. Cybercriminals are also leveraging data and generative AI to identify their victims. CyberArk reports that more than 9 out of 10 security professionals expect their organisation to be affected by AI-enabled threats in 2023. In turn, IBM estimated that phishing was the costliest attack for organisations in 2022, costing them US$4.91 million on average, while stolen or compromised credentials was the most frequent type of attack, accounting for around 20% of cases and US$4.5 million in costs. These figures underscore the importance of identity protection in the digital age and rising cybersecurity risks stemming from generative AI.

Organisations are also recognising the importance of addressing cybersecurity risks—59% of respondents in the McKinsey 2022 survey believe cybersecurity risk to be the most relevant risk stemming from AI adoption in an organisation. To meet the demands of the time, the cybersecurity industry is continuously innovating. The emergence and growth in cloud-based and AI-powered cybersecurity companies are a testament to these innovations. Increasing migration to the cloud and proliferation of AI in the future will only further cement cybersecurity solutions as an imperative to have for any business, creating huge tailwinds for the industry.

Opportunity for AI innovation within healthcare

Artificial intelligence (AI) and machine learning (ML) are rapidly transforming healthcare. This technology is being used to diagnose patient ailments more accurately, offer personalised treatment, identify new drugs and optimise healthcare administration. With increased data availability, advanced algorithms for identifying relevant patterns and advanced computational hardware available to train these models, AI is primed to disrupt the healthcare sector on many fronts. Below are just a few examples of how AI is being used in healthcare today:

+ assist in reading mammograms to improve cancer detection[19]
+ personalise treatment for Alzheimer's patients based on their individual genetics, medical history and other factors[20]
+ learn molecular relationships for identifying new drugs with specific properties[21]
+ automatically document virtual patient encounters on telehealth platforms[22]

As AI technology continues to develop, we can expect to see even more innovative uses of AI in healthcare and continued investment flows into the space. In 2021, a record US$8.6 billion was invested in AI healthcare companies, marking a 20% surge from the previous year. Although investment tapered off in 2022 due to rising capital costs, the Health Care sector continues to be a leading area of focus for AI disruption. Notably, AI investment in this sector consistently accounts for more than 10% of the total funds allocated across all AI application domains.[23]

19 Jamie DePolo, 'AI-Supported Mammogram Reading Detects 20% More Cancers', BreastCancer.org, August 2023.

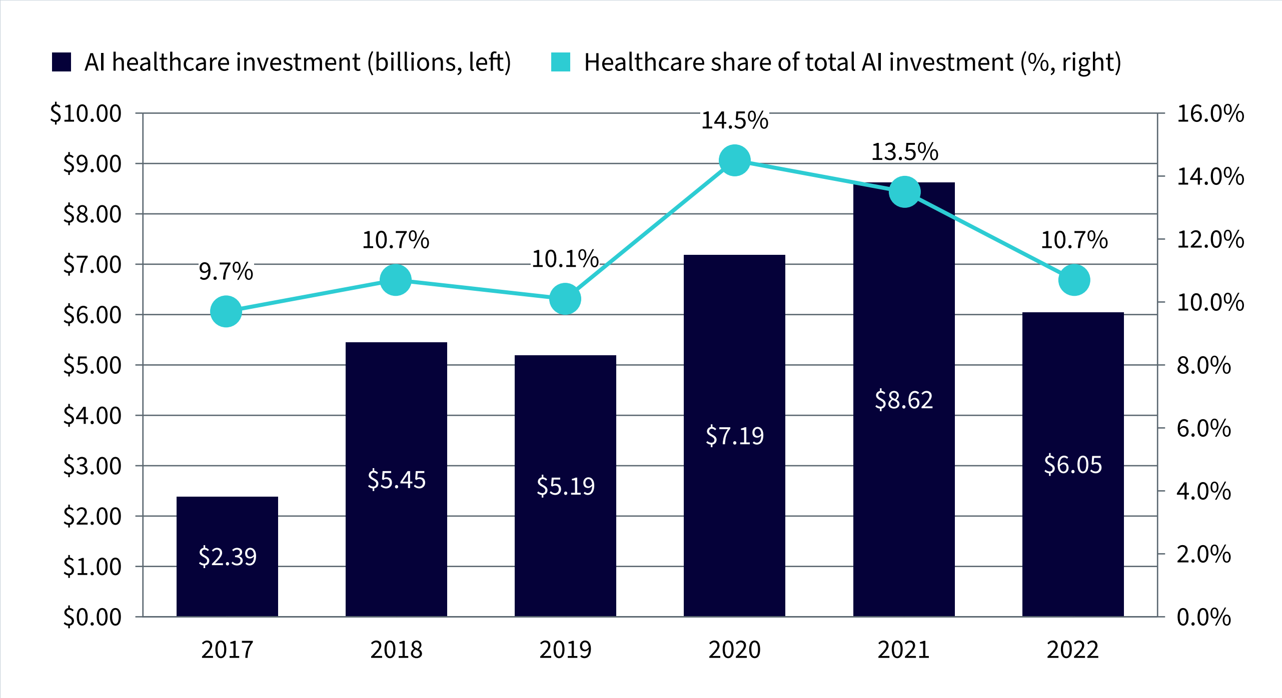
20 'Quest Diagnostics Extends Alzheimer's Disease Portfolio with New AI-Powered Test Service from uMETHOD Health', May 2023.

21 Will Douglas Heaven, 'AI is dreaming up drugs that no one has ever seen. Now we've got to see if they work.', MIT Technology Review, February 2023.

22 'Teladoc expands Microsoft tie-up to document patient visits with AI', Reuters, July 2023.

23 Stanford AI Index Report, 2023.

Figure 21: Private investment in healthcare AI



Source: Stanford AI Index Report, 2023; NetBase Quid, 2022. **Historical performance is not an indication of future performance and any investments may go down in value.**

Demands for better medicine are being met with specialised datasets and tools

The industry's growth is being propelled by the rising demand for personalised medicine, cost reduction imperatives and increased data availability. Personalised medicine uses AI to analyse patient data, helping doctors customise treatments. Additionally, AI automates tasks, freeing healthcare workers to focus on patient care and identifying areas for cost savings, such as preventing unneeded procedures and streamlining documentation. The growing availability of data is also a key driver of the growth of AI within the healthcare industry. AI algorithms require large amounts of data to train and improve their accuracy. Using electronic health records (EHRs), this data can be used to train AI algorithms to improve diagnosis and treatment.

In the realm of drug discovery, the integration of AI and ML is bolstered by extensive molecular and genetic datasets and tools. The Cancer Cell Line Encyclopedia,[24] Connectivity Map,[25] Library of Integrated Network-Based Cellular Signatures[26] and Genotype-Tissue Expression Portal[27] collectively provide insights into gene mutations, gene expressions and molecular interactions

24 Broad Institute, Cancer Cell Line Encyclopedia (CCLE).

25 Broad Institute, Connectivity Map (CMAP).

26 National Institute of Health, Library of Integrated Network-Based Cellular Signatures (LINCS).

27 Broad Institute, Genotype-Tissue Expression Portal (GTEx).

that serve as foundational tools in drug discovery and targeting. Combined with CRISPR,[28] a cutting-edge gene-editing mechanism, these datasets and tools set the stage for targeted drug screening and novel drug development. Partnered with the power of AI for computational drug design, this unlocks new efficiencies for reaching a successful outcome in the drug development process.

AI will improve return on investment (ROI) in the pursuit of new treatments

It is estimated that it takes more than eight years and US$2 billion to develop a drug, and the likelihood of failure is quite high, with only one of ten candidates expected to gain regulatory approval.[29] Generative AI is among the technologies that have the potential to create safer, more efficacious drugs by narrowing the universe of possibilities of drugs to only those with the highest probability of success.

Academic resources suggest that a drug's chance of approval stands at approximately 20% from phase 1 and a scant 2% from pre-clinical stages.[30] Should generative AI elevate the precision of selecting drug candidates during the preclinical phase, we might witness an increase from the current 31.8% success rate transitioning to phase 1. Consequently, the overall 2% approval rate could see a favourable adjustment upward. **By leveraging AI to increase efficiency in the initial, preclinical phases of drug development, a profound impact on overall rates of approval within the drug discovery pipeline could result.** With the prospect of higher approval rates, there's a potential for reduced timeframes and costs in drug development and improved ROI for biotech firms involved in such an endeavour.

AI could have a profound impact on rates of approval in the drug discovery pipeline.

28 CRISPR Therapeutics, Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR).

29 'Why 90% of clinical drug development fails and how to improve it?', Acta Pharmaceutica Sinica B, Feb 2022.

30 'The Current Status of Drug Discovery and Development as Originated in United States Academia: The Influence of Industrial and Academic Collaboration on Drug Discovery and Development', Clinical and Translational Science, July 2018.

Figure 22: Drug development phase success rates

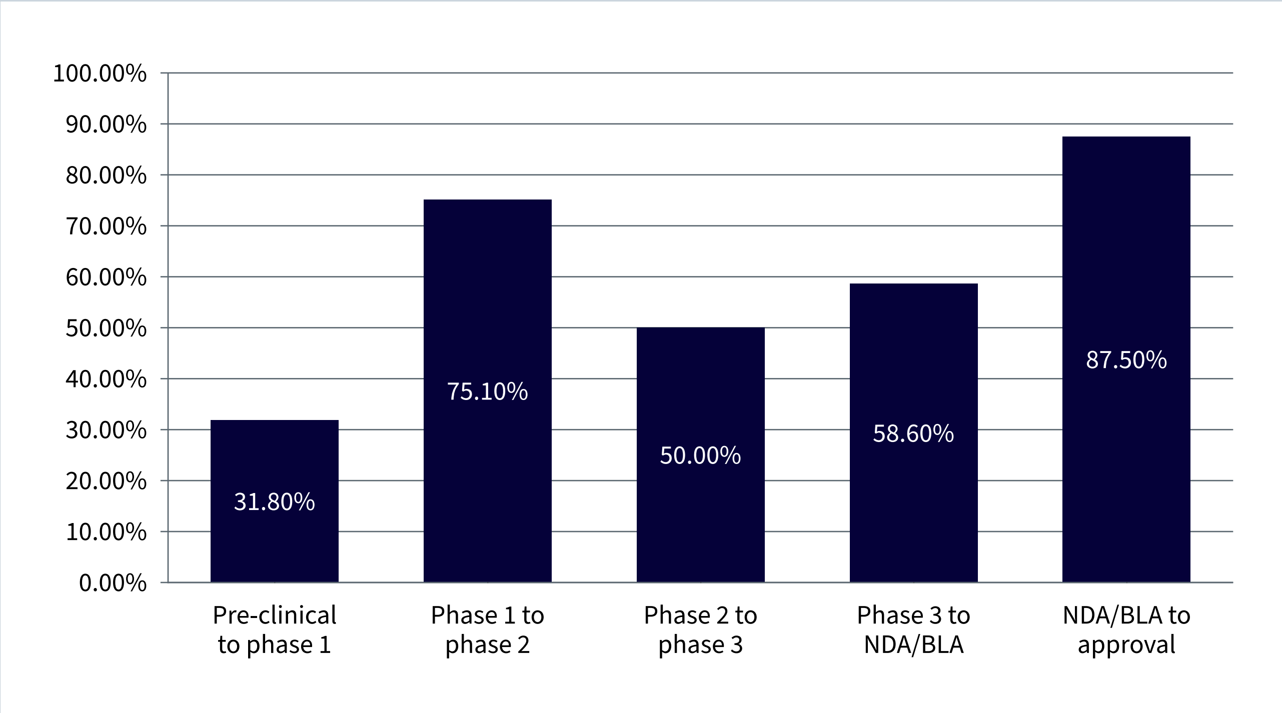
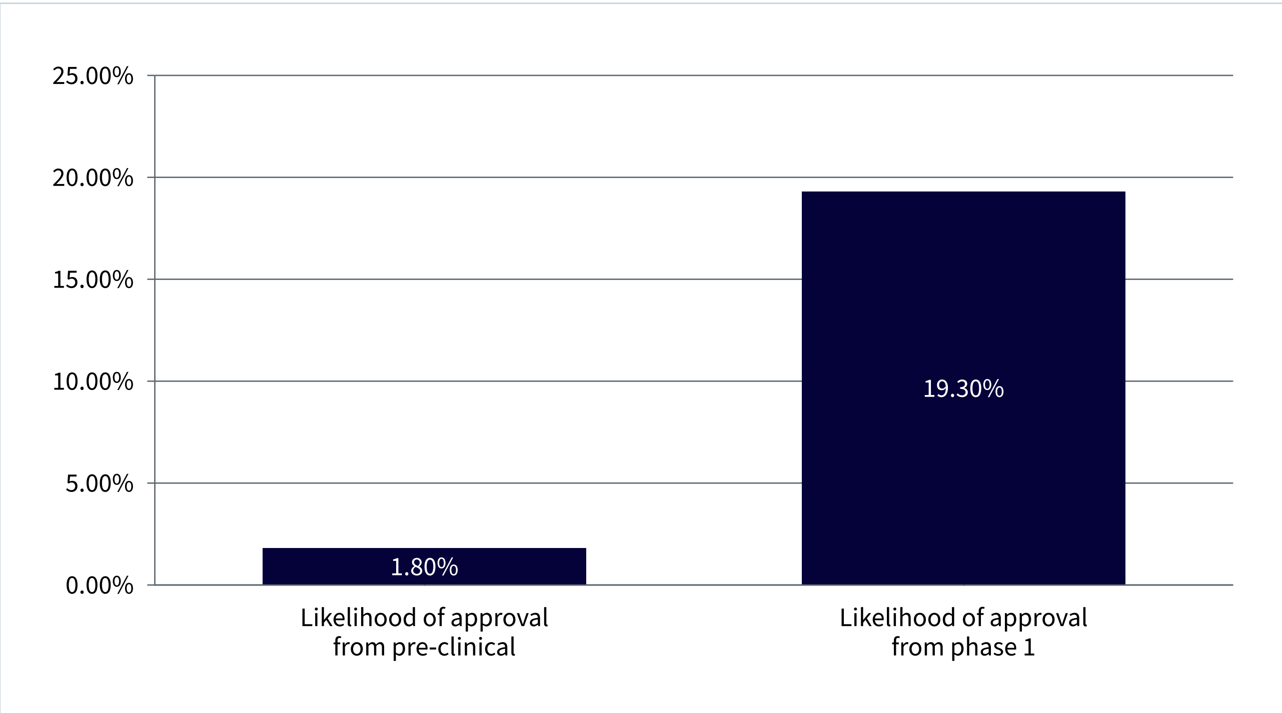


Figure 23: Drug development likelihood of approval



Source: Clinical and Translational Science, 2018. Phase success and likelihood of approvals (LOA) rates of academic drug discovery and development that was begun between 1991 and 2010. **Historical performance is not an indication of future performance and any investments may go down in value.**

By considering the tangible ROI through these technological advancements, our brief exploration of the drug discovery process is illustrative. As AI solutions continue to be implemented within the sector, efficiencies should become more apparent and ROI more quantifiable. Through streamlined operations, heightened precision and individualised patient care, AI stands poised to transform healthcare delivery with enhanced patient results, lowered expenses and broader accessibility. It is an area of great opportunity for innovation, and it will be exciting to see how AI continues to shape the future of healthcare.

AI will turbocharge the energy transition

The energy transition involves switching away from traditional (mainly hydrocarbon) sources of energy to a new mix of clean technologies. This not only requires smart ways of understanding the new energy supply but also better predictions of changing consumption patterns as consumers adopt emerging technologies. AI will be a powerful ally in this process.

A report by PwC and Microsoft estimates that using AI for environmental applications could contribute US$5.2 trillion to the global economy by 2030, a 4.4% increase relative to business as usual, and cut greenhouse gas emissions by 4% by then, equivalent to the projected 2030 emissions of Australia, Canada and Japan combined. And interestingly, this report was published almost three years before AI took the world by storm in 2023.[31]

In this section, we outline three of the many areas where AI-driven innovations have already started transforming the energy transition.

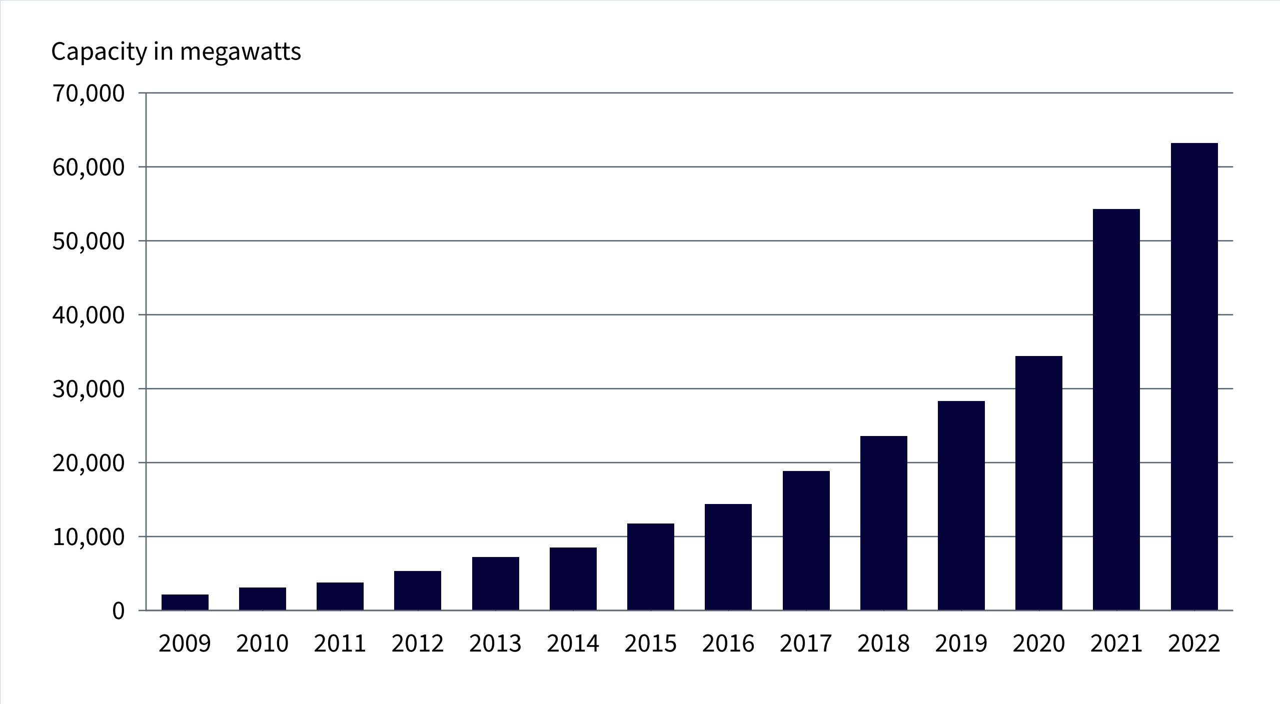
AI will make renewable energy more reliable

Take offshore wind, a highly fruitful and rapidly growing form of renewable energy (see figure 24 below), as an example. Until now, wind farm layouts have been designed based on trial and error, with engineers manually adjusting the orientation of wind turbines to maximise energy production.[32] But now, machine learning algorithms can analyse reams of data on wind patterns, turbine performance and environmental factors to optimise the layout of the farm. So, as the world adds more wind energy capacity, AI will help ensure we extract the most from the investment.

31 'How AI can enable a sustainable future', PwC.

32 'The Future of Offshore Wind Energy: AI-driven innovations', Evwind.es, June 2023.

Figure 24: Offshore wind energy capacity worldwide from 2009–2022



Source: Statista, 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

And as electricity grids become more dependent on intermittent sources of energy like wind, the need for faster and more reliable weather forecasting will be felt. AI tools like DeepMind's DGMR, developed with the UK's Met Office, can make accurate short-term predictions on rain, which will help utility companies better match energy supply with demand.

AI's role will also be critical in maintaining offshore wind projects. According to Bloomberg New Energy Finance, automating offshore wind blade inspections and maintenance can result in a 27% potential reduction in operational costs.[33]

Thus, with the world rapidly scaling up renewable energy sources like offshore wind, the deployment of AI should help optimise the development of projects, aid their maintenance and help manage the energy grid more effectively.

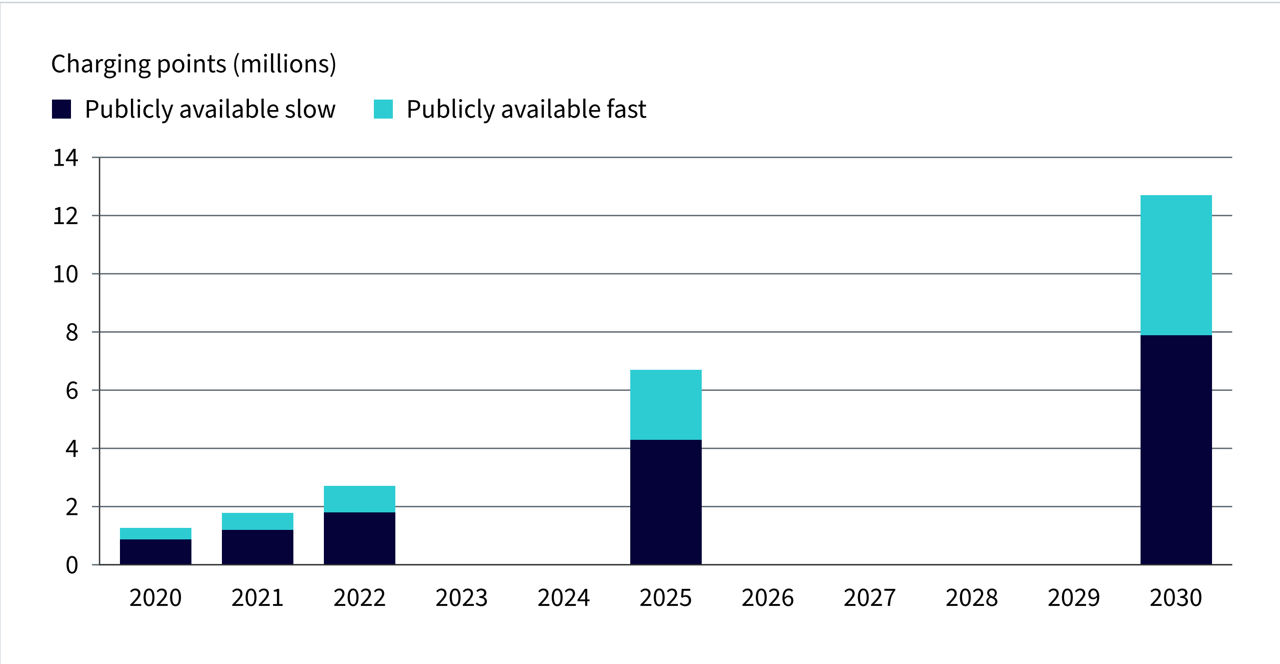
AI should help manage the energy grid more effectively.

33 'Digitalizing Offshore Wind: Cheaper, Faster, More Productive', BloombergNEF, March 2022.

AI is expected to take electric vehicles into overdrive

The world is clearly adopting electric vehicles (EVs) at a rapid pace. EV sales exceeded 10 million in 2022, up from 6.5 million in 2021 and 2.9 million in 2020.[34] But one concern that still holds people back from switching to an EV is whether they will be able to charge them on the go, especially when making long journeys. Fortunately, the buildout of public charging infrastructure is also happening at a noteworthy pace (see figure 25).

Figure 25: Public charging infrastructure is expected to grow in line with vehicle sales



Source: International Energy Agency, April 2023. Data is for the world in the 'Stated Policies Scenario (STEPS)'. **Forecasts are not an indicator of future performance and any investments are subject to risks and uncertainties.**

AI is helping planners determine where to deploy charging infrastructure based on patterns of traffic, consumption and urban sprawl. For example, in the UK, the Oxfordshire City Council has been working with Mind Foundry to use geospatial modelling (a way of using computers to create detailed virtual maps) to identify the optimal locations for installing charging stations.[35]

AI is helping planners determine where to deploy charging infrastructure.

34 International Energy Agency's Global EV Outlook, April 2023. Numbers include battery EVs and plug-in hybrid EVs.

35 'AI Plays Key Role in EV Charger Deployment and More', Blink Charging.

AI's role will go beyond identifying the most suitable locations for building charging stations. It will help consumers better plan their journeys based on the available infrastructure, reducing range anxiety on the go. And it will also help consumers manage charging costs where dynamic pricing models are available based on demand and supply.

AI is expected to help improve recycling

The world produces more than 2.1 billion tonnes of waste each year. By 2050, this could rise to 3.4 billion tonnes.[36] This is clearly a big problem that requires urgent attention. One of the reasons why a lot of recyclable waste ends up in landfills is the challenge of sorting waste. This is where AI can play a crucial role. Sorting technology equipped with cameras and sensors and trained using AI algorithms can achieve efficient and accurate waste sorting.

A recent report[37] estimates that the global waste-sorting robots market is estimated to reach US$7.26 billion by 2026, growing at a compound annual growth rate of 20.16% from 2022. Two-arm robots equipped with sensors and trained using AI can sort 4,000 picks every hour and work around the clock. This compares to around 200 picks per hour for a human who can work a limited number of hours. The robot will also save the human from being exposed to harmful elements in the waste.

While the use of AI across the energy transition had already started before 2023, the sense of urgency in accelerating the transition combined with a widespread acknowledgement of the benefits of AI have made the present moment an exciting inflection point for the industry.

Conclusion

Software, healthcare and the energy transition are three of the many frontiers already being transformed by AI. Like the internet changed all industries by making the world more connected, AI will do the same by making the world smarter. At WisdomTree, we are excited to watch this revolution unfold and believe that it is only just getting started.

36 Source: Statista Global Waste Generation – statistics and facts.

37 Market Data Forecast, 'Waste Sorting Robots Market Size, Growth, Trends, & Forecast', March 2023.

4.

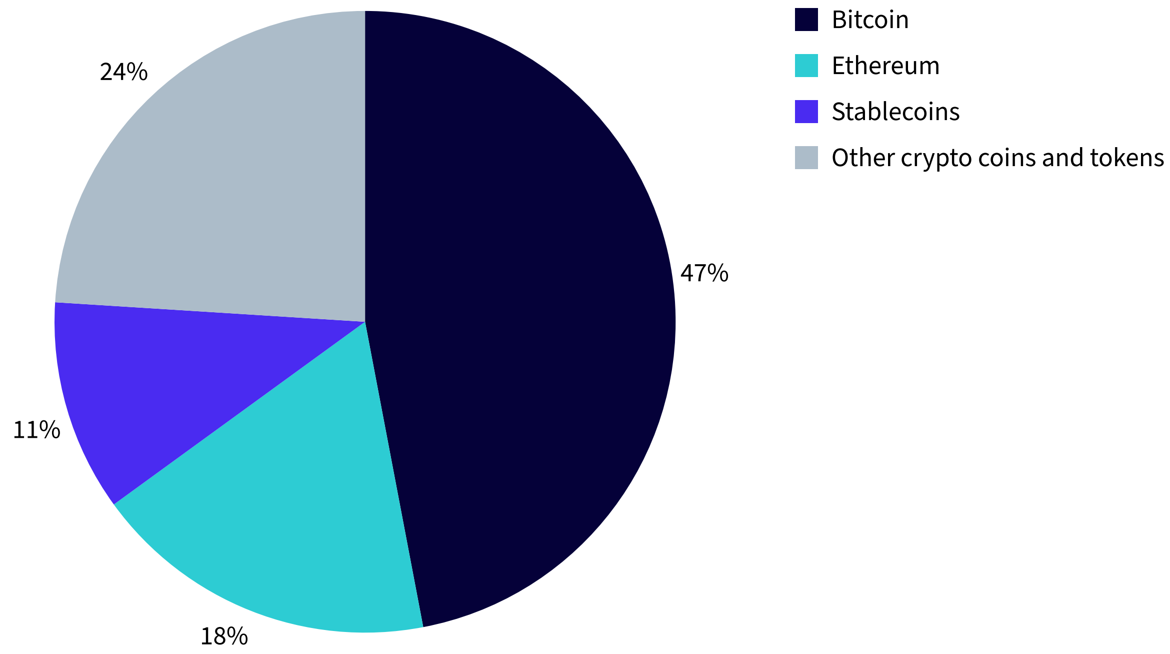
Crypto Outlook: New crypto flows needed to mark the end of the crypto winter

In this section

Crypto sentiment turned positive this summer

The large-cap crypto season is still on, and two of the largest crypto assets, Bitcoin and Ethereum, have both performed well this year. These two assets still dominate the crypto market capitalisation with 65% market share, and if we exclude the stablecoins, this leaves just 24% market share[38] to the 23,000 other crypto coins and tokens.

Figure 26: Large-cap crypto dominance

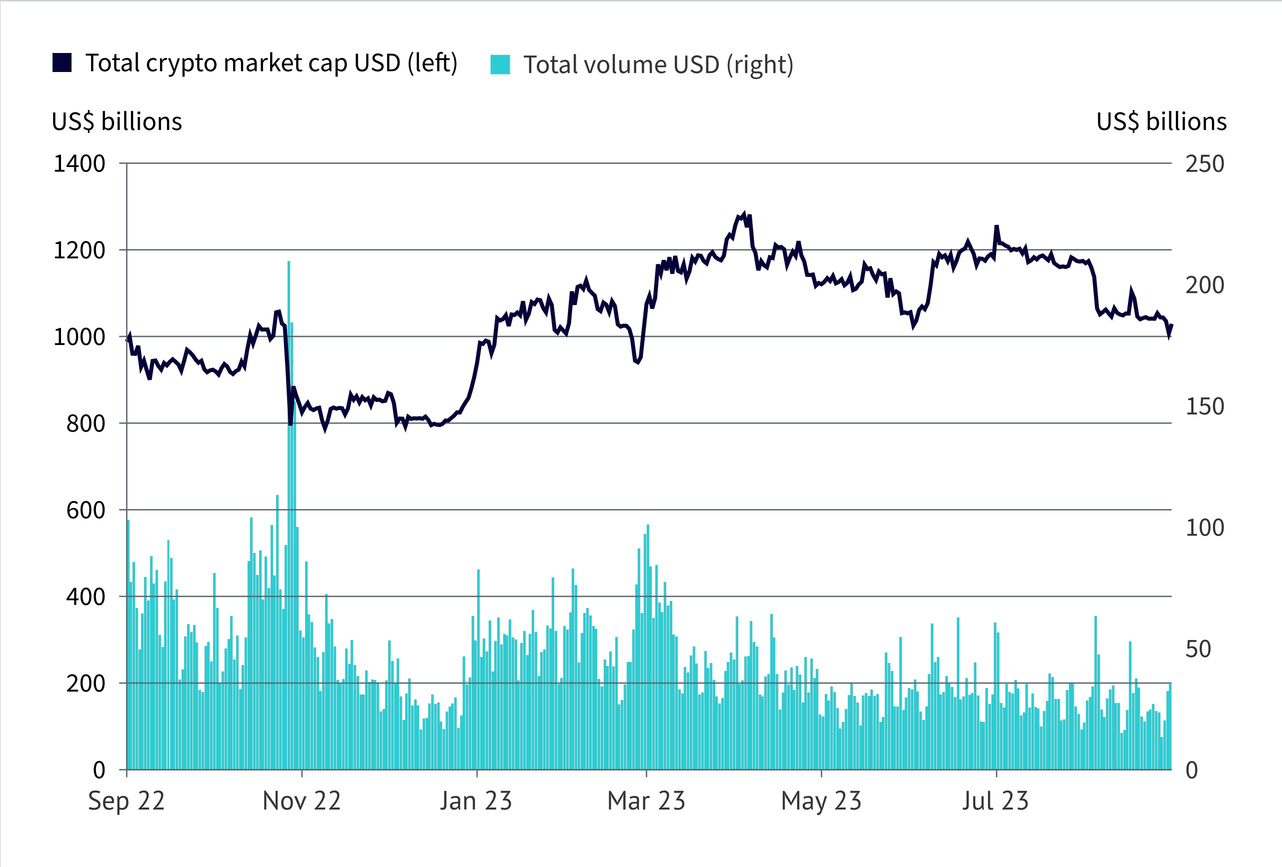


Source: WisdomTree, CoinGecko, as of 24 August 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

Although the H1 2023 news flow was dominated by the closure of several crypto on and off-ramps in the US, the closure of crypto banks Silvergate and Signature and the SEC's lawsuits against Coinbase and Binance, the prices of these two assets and the crypto sector as a whole, nevertheless, went up.

38 CoinGecko, as of 24 August 2023.

Figure 27: Total crypto market cap in USD

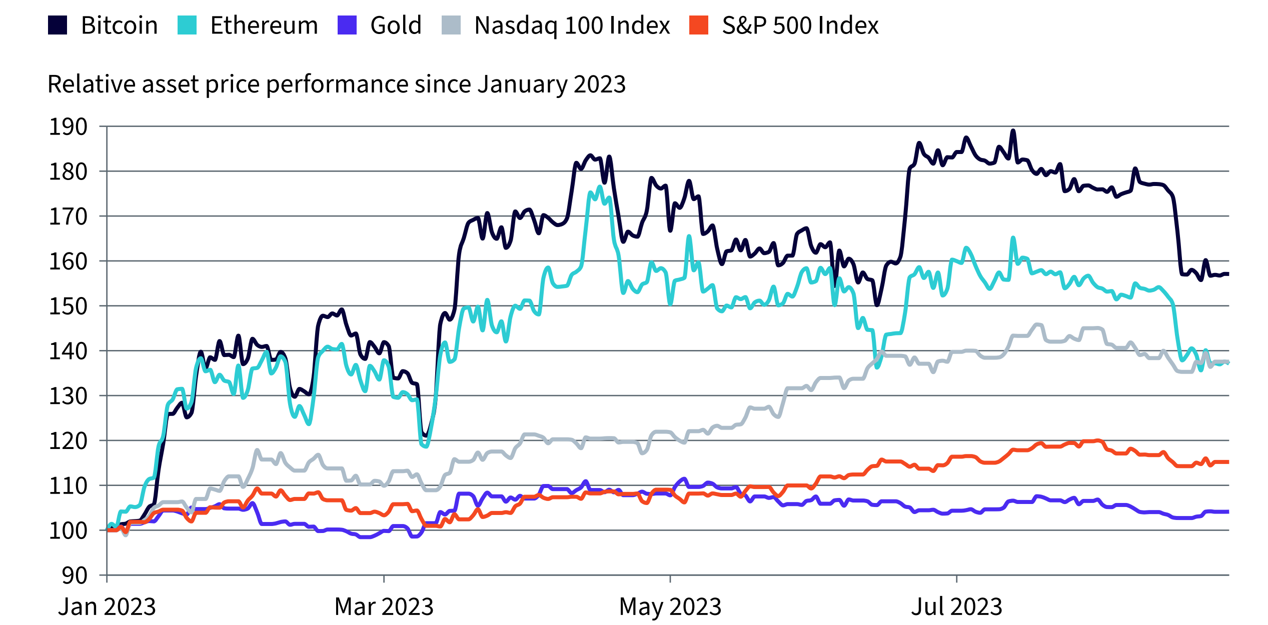


Source: WisdomTree, TradingView, as of 24 August 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

Bitcoin and Ethereum have outperformed major stock indices and gold this year despite facing higher interest rates and regulatory uncertainty in the US.

Bitcoin and Ethereum have outperformed major stock indices and gold this year.

Figure 28: Bitcoin's price has outperformed the other asset classes so far in 2023



Source: WisdomTree, Bloomberg, as of 24 August 2023. XBT = bitcoin, SPX = S&P 500 Index, NDX = Nasdaq 100 Index, XAU = gold, XET = Ethereum. **Historical performance is not an indication of future performance and any investments may go down in value.**

So far this year, bitcoin's price has experienced three major upticks, and it could be that the small supply of bitcoin in the market has magnified these moves. The first upward move in January was due to institutional demand, in our view, plus a short squeeze in trading. The uptick in March had to do with the liquidity crisis of the regional banks in the US; most likely, bitcoin at that time was bought as a hedge or a safe-haven asset, which is independent from the fiat-currency system. The third uptick in price in June took place after BlackRock filed for a spot bitcoin ETF in the US.

Although the prices of Bitcoin and Ethereum had been going up in H1 2023, the crypto sentiment had been quite negative. The sentiment changed markedly after the BlackRock announcement as it was now considered more likely that a spot bitcoin ETF would be approved in the US. An additional positive was provided by the partial win awarded to Ripple Labs when a federal judge ruled that its XRP token is not a security when sold to retail investors via exchanges, against the SEC's claims. This gave hope for the industry that other altcoins could be treated in the same way. The SEC has since appealed the ruling.

Future crypto prices likely to be driven by global liquidity

The future direction of crypto prices is likely to be dependent on the macro landscape.

The future direction of crypto prices is likely to be dependent on the macro landscape. The annual change in US M2 money supply is still negative (Q2 2023, -3.9%)[39] and the US Consumer Price Index (CPI) is decelerating, but both headline and core CPI are still above the Fed's 2% target[40] and the unemployment rate is still below 4%.[41] Given this macro backdrop, it does not seem likely that the Fed will turn stimulative any time soon.

If the Fed continues its 'higher for longer' interest rate policy and global liquidity stays constrained, it is likely that crypto prices will struggle to move significantly higher. In fact, if the economy enters a recession, prices could even fall short-term, although a recession is not our base case scenario for the US. On the other hand, if the Fed starts stimulating the economy, this could have a positive impact on crypto prices. Typical to the 'crypto winter' period, most companies are focused on building product and might even be waiting for a more exuberant mood to emerge before making major product announcements. In our view, new flows to the crypto space are needed to mark the end of the crypto winter.

Approval of a spot bitcoin ETF in the US could lead to a major rally in bitcoin price

We believe the approval of a spot bitcoin ETF could be a major game-changer for the flows in the industry.

In the wake of BlackRock's spot bitcoin ETF filing, several other issuers refiled their applications. This time around, all issuers have filed applications with surveillance-sharing agreements helping to address the SEC's concerns over fraud and price manipulation. For the industry, it would be most advantageous if all applications were approved at the same time, creating a level playing field for everyone. It matters a lot who gets the license first. We saw

39 St. Louis Fed, Fred.

40 Bloomberg, August 2023.

41 Bloomberg, August 2023.

that with the first bitcoin futures product, ProShares Bitcoin futures-linked ETF (BITO), which still dominates the crypto futures market with over 97% market share.[42] The SEC has approved bitcoin futures and leveraged bitcoin futures products but no bitcoin spot ETF as of August 2023.

We believe the approval of a spot bitcoin ETF could be a major game-changer for the flows in the industry. A bitcoin spot ETF would be ideal for the large US$30 trillion investment advisory market in the US because it offers a familiar structure and an easy way to trade. Most investment firms are not allowed to hold physical crypto assets on their balance sheet yet. If just 0.5% of assets managed by advisors were to be allocated to bitcoin, this would mean US$150 billion of investment flows to bitcoin in the long term.

Regulatory clarity needed for institutional crypto adoption

In Europe, the MiCA (Markets in Crypto Assets) bill passed in April 2023, setting a uniform legal framework for crypto assets across the European Union. The bill will be implemented into law in 2024–2025. Regulations are also moving ahead in the Middle East, Hong Kong and the UK. The US is the laggard at this point, and this is hampering institutional investors’ willingness to enter the space. In recent months, there has been some movement on the legislative front in the US, and some crypto bills have passed in the House of Representatives, but it is still a long way to get them approved in the Senate.

This autumn, we are expecting a resolution in the Grayscale versus the SEC legal case. Grayscale has tried to convert its US$16 billion closed-end bitcoin trust (GBTC) to a spot bitcoin ETF, but this has been denied by the SEC. In August 2023, Grayscale won the legal case against the SEC. Our base case scenario is that all the spot bitcoin ETF applicants have a good chance of getting their applications approved at some point, but the timing remains uncertain.

Another legal case that is likely to have a meaningful impact on the crypto space is the SEC versus Coinbase case. In June of this year, the SEC filed a lawsuit against Coinbase alleging that Coinbase violated federal securities laws by offering unregistered securities and acting as an unregistered exchange, broker and clearing agency. Coinbase took the SEC to court, and this court case is ongoing.

Integration of traditional fiat payment methods and crypto has started

In August 2023, payment processor PayPal announced it is introducing a PayPal USD token (PYUSD), a tokenized USD or a stablecoin on Ethereum. This is significant because PayPal has more than 431 million active accounts[43] versus approximately 1 million users on Ethereum and

42 Cointelegraph.

43 Statista.

layer 2s, and over 30 million merchants[44] around the world are accepting PayPal as a payment method. It will be possible to make payments or peer-to-peer transfers with PYUSD, and we expect it to be used with decentralised finance (DeFi) and non-fungible tokens (NFTs) in the future. Although the stablecoin legislation is not yet formalised in the US, PayPal received a BitLicense from the state of New York last year, and the PYUSD token will be issued by Paxos, a company regulated by the New York State Department of Financial Services. PayPal users will also be able to transfer with Venmo users in the US.

Visa is another company at the forefront of this trend. The company is testing a way to offer a solution where on-chain blockchain transactions or 'gas' fees could be paid with a credit card. Successful implementation of this solution could be a major development in the industry as it would no longer require those wanting to interact with the Ethereum blockchain to hold Ether in their wallets.

Another potential game-changer under development is the recently revived 'account abstraction', a proposal based on the Ethereum Improvement Proposal EIP-4337, which could free users from remembering private keys and managing external crypto wallets altogether. One of our main theses has been that the next bull market in crypto requires an easier user interface, and fading the complexity of interacting with crypto wallets to the background would be a major development in this direction.

One of our main theses has been that the next bull market in crypto requires an easier user interface.

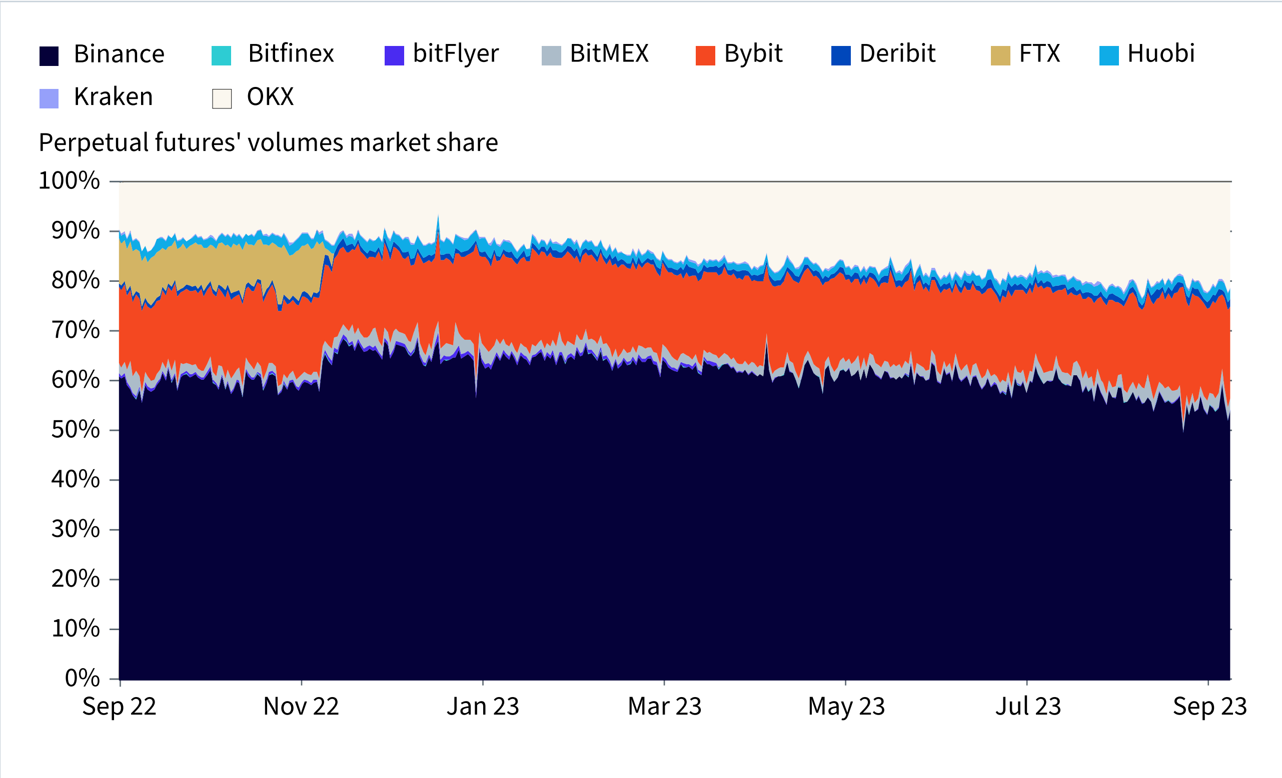
Potential negative surprises: Binance lawsuit and Tether unravelling

While the approval of a bitcoin spot ETF and regulatory clarity would be major positives for the sector, there could be some potentially negative surprises as well. One of them is the fate of Binance, the world's largest cryptocurrency exchange with over 140 million users worldwide. In its June 2023 lawsuit against Binance and its founder, Changpeng Zhao (CZ), the SEC claims the company mislead investors, artificially inflated trading volumes, promoted unregistered securities on its platform for US customers and operated a 'web of deception'. Moreover, Binance and CZ were accused of potentially comingling customer assets by directing part of crypto assets to a market maker controlled by CZ. These are serious claims, and Binance could also face US Department of Justice fraud charges.

44 PayPal.

What happens to Binance matters a lot because it is a critical liquidity provider in crypto. Due to the SEC investigation, its market share of centralised exchanges' crypto spot trading volume has declined somewhat but is still over 50%.[45] Binance also dominates the much larger crypto futures trading volume with a 58% market share.[46] What is also interesting to note is that Binance's largest individual country market by far is China,[47] where crypto is officially banned.

Figure 29: Bitcoin's perpetual futures' volume market shares by exchange



Source: WisdomTree, Kaiko, as of 24 August 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

The other big question mark hovering around crypto is the situation with Tether, the issuer of the world's most widely used stablecoin, USDT. It is known that the stablecoin has had close links with Chinese banks, which might be suffering from liquidity issues. Tether has a somewhat chequered history in terms of assets that back its stablecoin. In its latest Reserves Report,[48] Tether reported having 85% of its reserves (of a total $86.5 billion) in cash, cash equivalents or US Treasuries.

45 CoinGecko, Q2 2023 Crypto Industry Report.

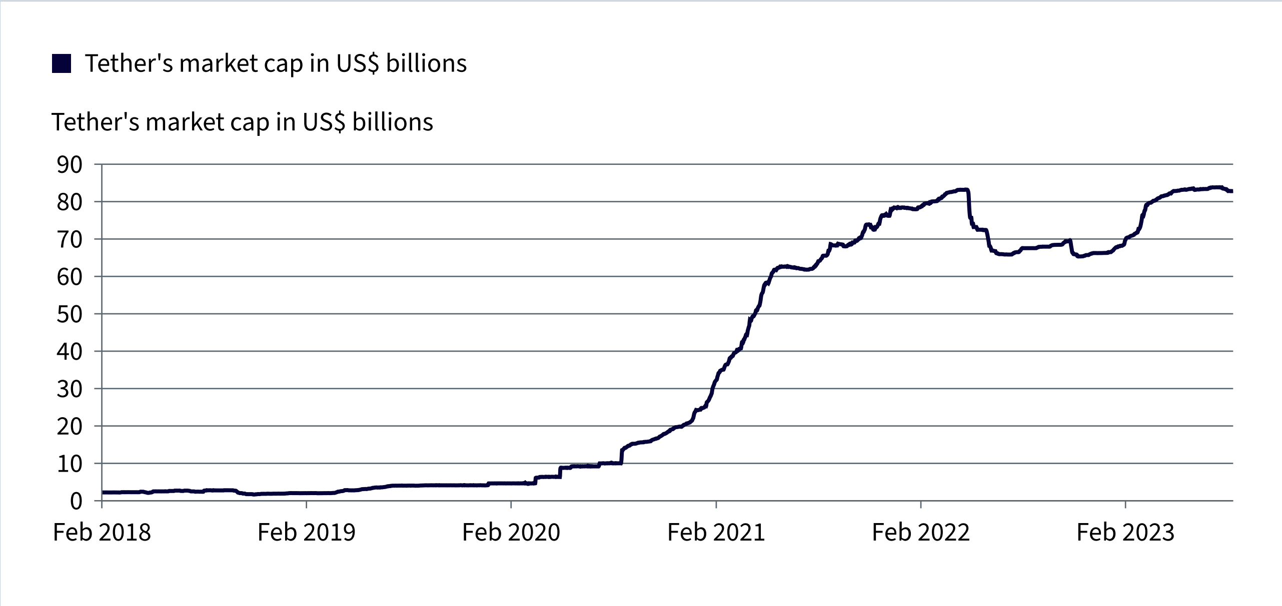
46 Kaiko Research.

47 Wall Street Journal, 2 August 2023.

48 Tether.to, Independent Auditors' Report on the Consolidated Reserves Report, June 2023.

This leaves US$13 billion for other types of assets, of which US$1.4 billion was allocated to bitcoin. An undisclosed sum is backed by commercial paper issued by Chinese commercial banks.

Figure 30: Tether's USDT market cap



Source: WisdomTree, Glassnode, as of 24 August 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

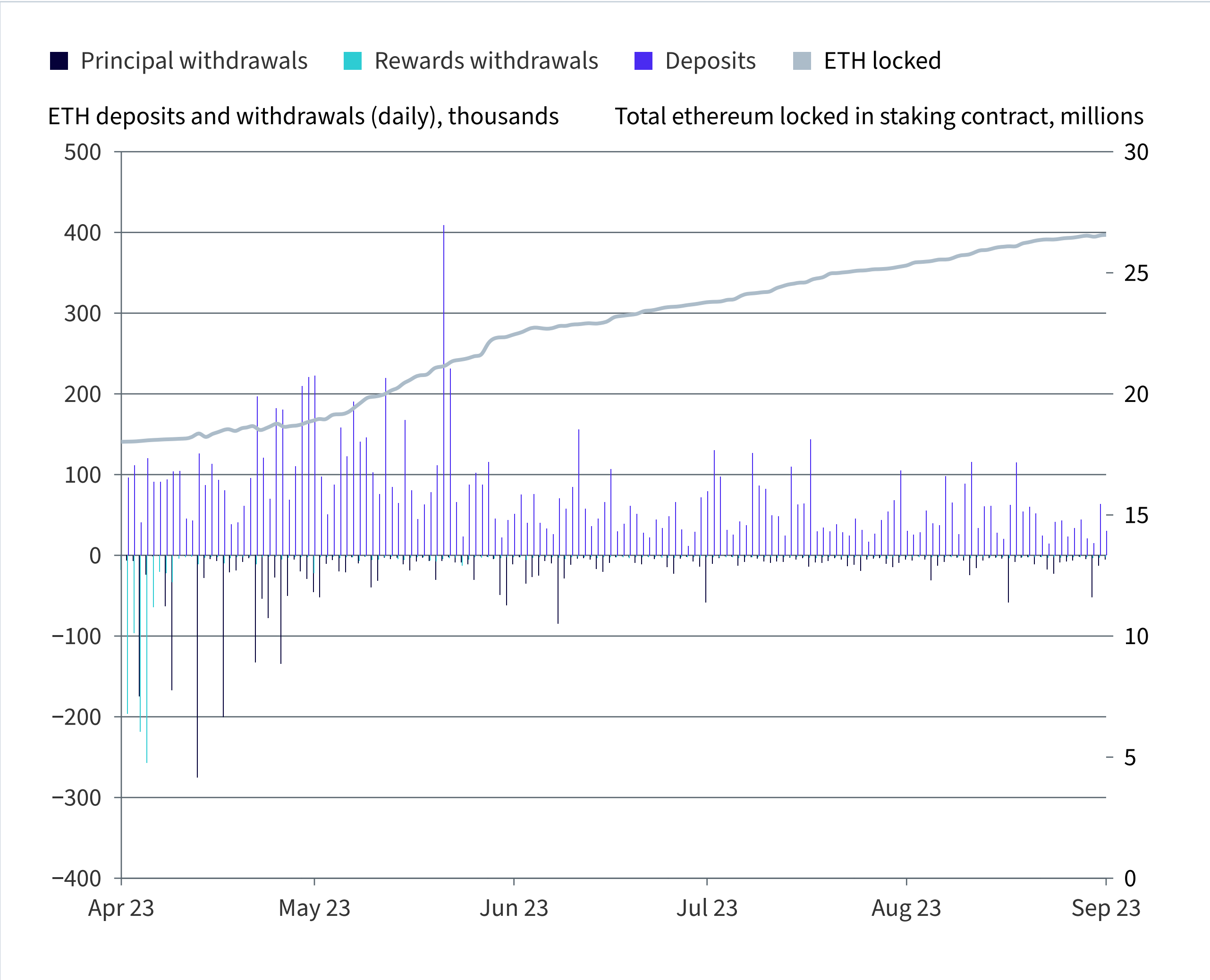
Ether holders can 'stake' and earn passive income

The price of Ether has also gone up this year, although its price performance has been somewhat more muted than Bitcoin's. The use cases for the Bitcoin and Ethereum networks are quite different. In Ether's case, the upside price movement has most likely been driven by the ability to collect a staking yield, which was enabled in April 2023 (Shapella upgrade), and the expectation that a faster network will be enabled later this year. ETH holders can earn passive income by participating in the verification and validation process of the Ethereum network's transactions. This is done by locking away one's ETH in a smart contract, which is also called 'staking'.

ETH holders can earn passive income by participating in the verification and validation process of transactions.

In return, the network awards ETH holders with new ETH. In August 2023, the average annual percentage yield (APY) on staking ETH was 4.1%,[49] but the actual staking yield depends on the number of validators participating in the verification process, the number of transactions on the Ethereum network, the type of staking (solo staking, pooled staking, staking as a service or via centralised exchanges) and whether MEV (maximum extractable value) technology is being used.

Figure 31: Ethereum staking: total value locked, ETH deposits, rewards withdrawals and principle withdrawals

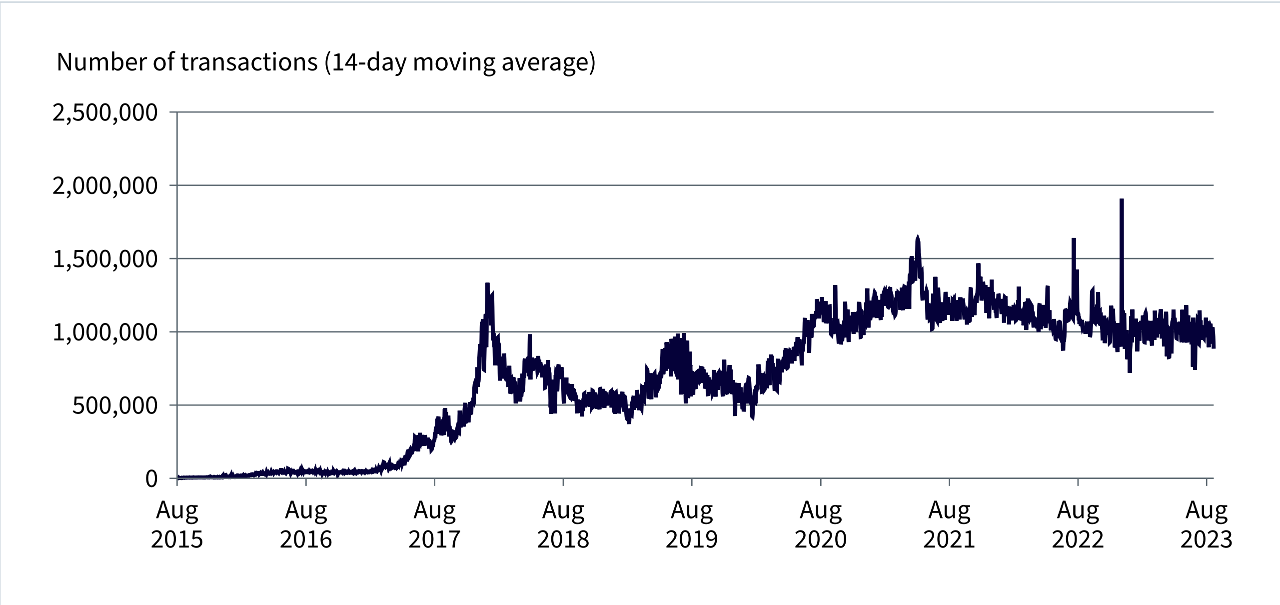


Source: WisdomTree, Nansen.ai, as of 24 August 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

49 Ethereum.org.

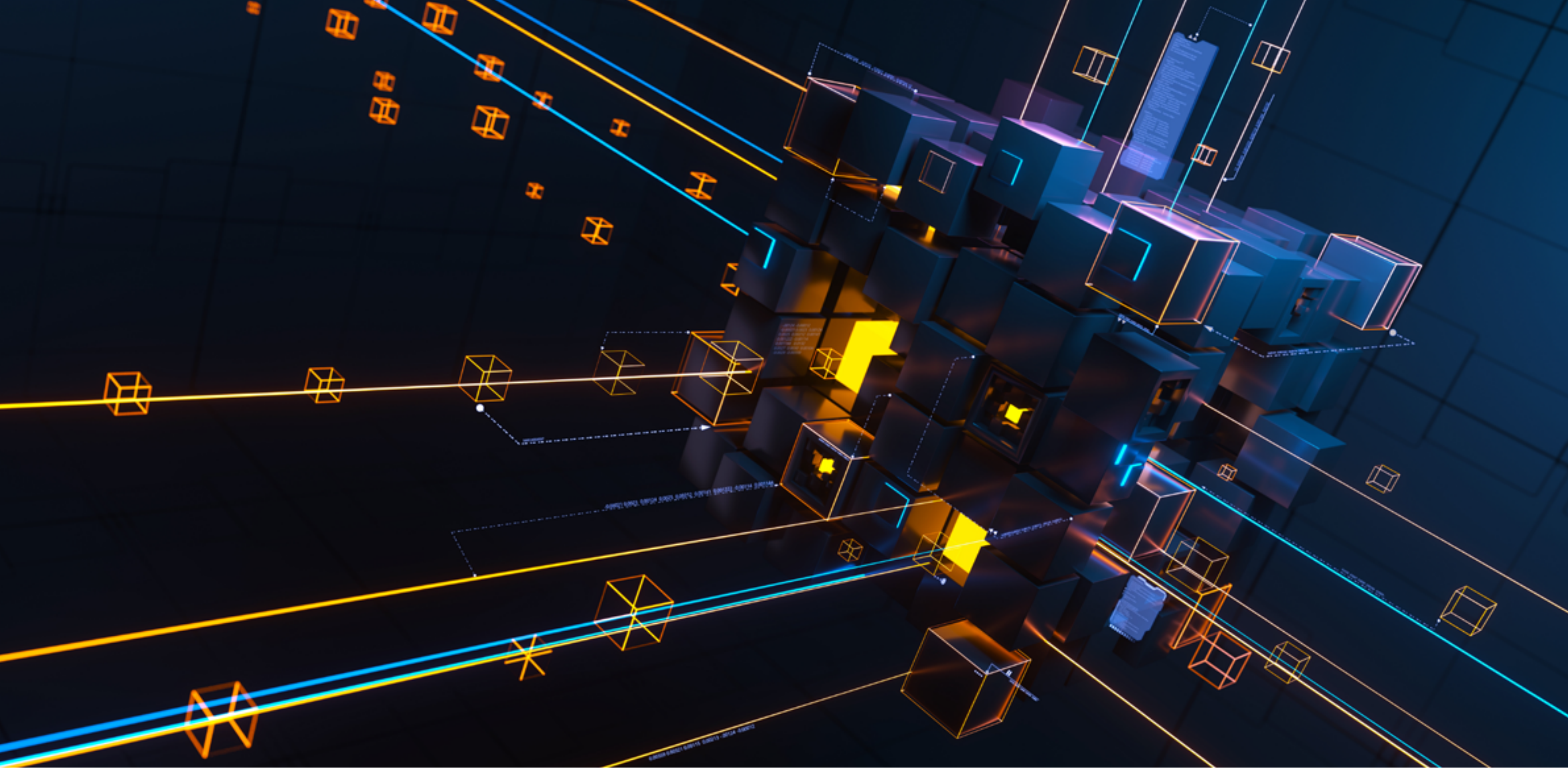
The number of ETH validators has been going up, meaning that earning yield is an attractive proposition for ETH holders. All other things being equal, the more validators there are in the network, the lower the yield per validator. The number of transactions can offset this, but in the past two years, we have actually seen a diminishing number of transactions on the Ethereum network. The peak in the number of transactions was reached in May 2021, when DeFi and NFTs were popular. The problem at the time was the popularity of these applications, which congested the Ethereum network. The large inflow of transactions led to slow transaction speeds and high 'gas' costs, which rose to prohibitive levels in some cases. This deficiency will finally be addressed this autumn when Proto-Danksharding is expected to be implemented on Ethereum (see below).

Figure 32: Ethereum: number of transactions



Source: WisdomTree, Glassnode, as of 24 August 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

The relative weakness in Ether's price compared to Bitcoin could have something to do with the movement of transactions to layer 2 networks and the uncertainty provided by the SEC's claim that 'staking' is a security.



Ethereum planning to provide cheap transactions by using layer 2 networks

Instead of moving to sharding[50] as a way of increasing Ethereum's scalability, the Ethereum developers have decided to transition to Proto-Danksharding, which is a different way of increasing the scalability of the blockchain. The goal of Proto-Danksharding or EIP 4844 (Ethereum Improvement Proposal) is to enable faster transactions, higher throughput (more transactions per second), faster settlement times and cheaper transactions. The increase in transaction speeds will enable new types of applications to be built on Ethereum, such as games or applications that require a large number of very cheap transactions. Proto-Danksharding is expected to be implemented in H2 2023.

The current Ethereum blockchain can handle approximately 15–30 transactions per second (tps), but the goal is to achieve 100,000 tps over time. As a comparison, Visa is currently processing an average of 1,700 tps, and it believes it is capable of processing 24,000 tps. Proto-Danksharding aims to achieve higher scalability by utilising layer 2 solutions which compile several transactions together, move them off-chain and then submit them back to the layer 1 blockchain as a single transaction. Some early estimates[51] have indicated that tested transactions on layer 2 rollups saved 99% of application users' and developers' gas fees.

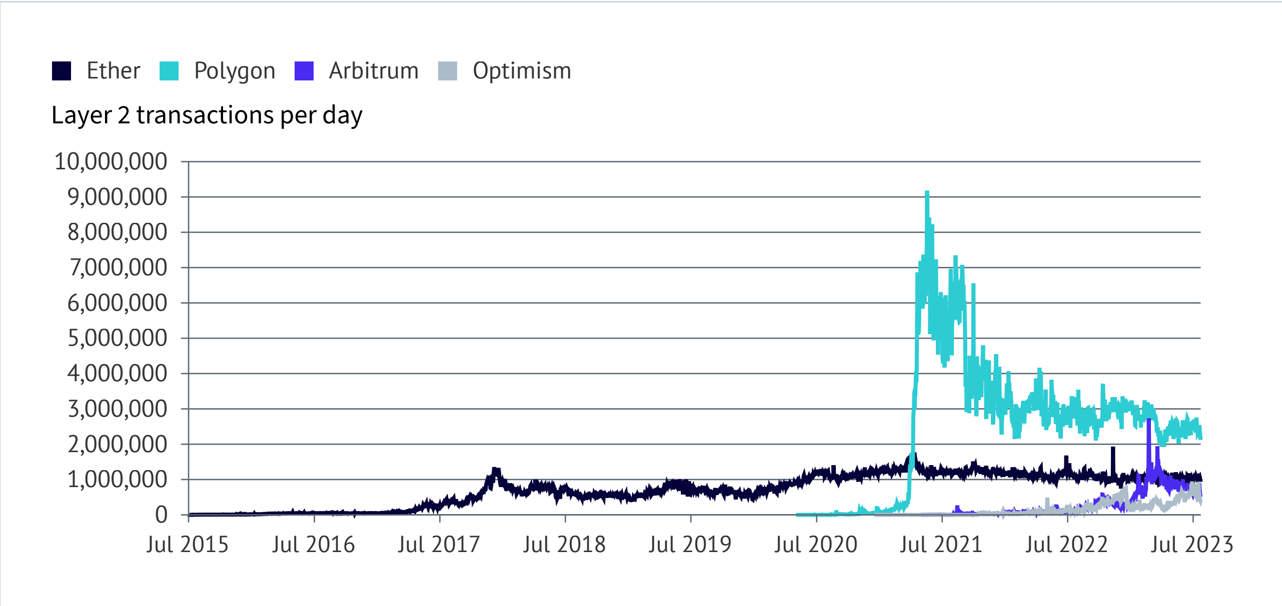
Coinbase's Base emerging as a key Ethereum layer 2 challenger

Layer 2s have seen a steady increase in data traffic. Two interesting questions for the future are: where will the value accrue on blockchains, and will layer 2s take business away from layer 1s?

50 Sharding is an act of splitting the network's data into smaller portions to enhance capacity and improve scalability of the blockchain.

51 Dune Analytics.

Figure 33: Layer 2 network transactions per day



Source: WisdomTree, Etherscan, Arbiscan, Optimistic.etherscan, Polygonscan, as of 24 August 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

In August 2023, a new player entered the scene when the world's second-largest crypto exchange, Coinbase, launched its own layer 2 network, 'Base'. Base is based on Optimism, which uses optimistic roll-up technology to improve the scalability of the blockchain. We believe Base has a good chance of becoming a leading layer 2 solution provider as it is integrated with the Coinbase wallet and Coinbase's ecosystem. For the time being, Base does not offer a crypto token, but this could change at a later date, and early users could be airdropped a token.

> We believe Base has a good chance of becoming a leading layer 2 solution provider.

Base's early success can be seen in numbers. During the first week of its launch, Base managed to capture US$239 million of total value locked (TVL) on its network.[52] If we multiply this by 50, Base could reach close to US$12 billion annual TVL, which would be higher than the current TVL for Ethereum (US$9.9 billion).[53] Less than a month after being introduced, Base's average daily transaction count passed the volume of the dominant layer 2 optimistic rollups, Optimism and

52 https://base.blockscout.com.

53 https://etherscan.io.

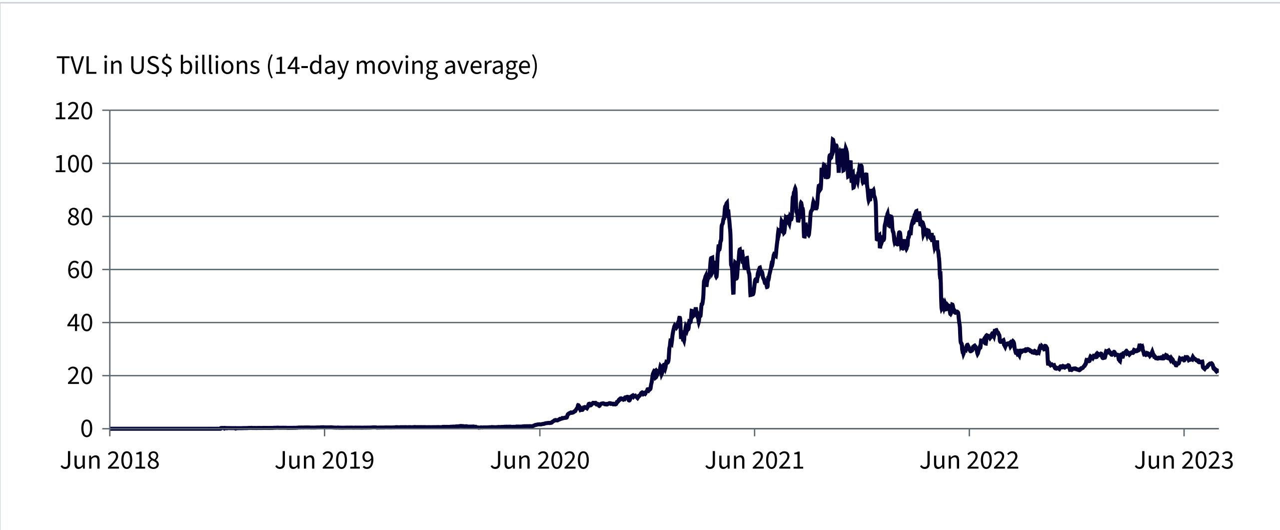
Arbitrum.[54] For the time being, Base's weakness is that it is highly centralized and relies on a single sequencer[55] node operated by Coinbase, but the goal is to make Base more decentralised over time.

Decentralised finance (DeFi) facing headwinds

Despite some hopes earlier this year that most of the leverage had been squeezed out of DeFi and the sector could be ready for a rebound, the opposite has happened. In addition to facing some serious competition from short-term risk-free Treasury yields, and regulatory and tax rules uncertainty, the sector has been plagued by hacks and price manipulation. DeFi has a number of decentralised blockchains with long-term staying power potential, but the space is also vulnerable to hacks. This is partly due to code-pushes. To address this vulnerability in the blockchains, it would be necessary to increase the transparency of the code changes and make sure the code is audited after every code change by an experienced and professional auditing firm. Another area that needs further scrutiny and transparency is the token unlock and vesting schedules.

This is information that is not always readily available but is necessary to be able to judge the up-and-coming selling pressure on the token.

Figure 34: Ethereum: total value locked in DeFi (TVL) in USD



Source: WisdomTree, Glassnode, as of 24 August 2023. **Historical performance is not an indication of future performance and any investments may go down in value.**

54 https://optimistic.etherscan.io, https://arbiscan.io.

55 Sequencer sorts transactions and records the transactions on the blockchain.

Conclusion

This year has been a season for large-cap cryptos, and the two largest crypto assets, Bitcoin and Ethereum, have performed well. The market sentiment seems to have turned positive during the summer with the filing of a spot bitcoin ETF by BlackRock and the early signs that traditional payment processors are starting to integrate with crypto. Two areas we previously identified as necessary for the next bull run, blockchain scalability and better user interfaces, are progressing well. The Ethereum network is scheduled to implement Proto-Danksharding in H2 2023 and achieve cheap transactions and higher throughput by using layer 2 solutions. Coinbase's new layer 2 network, Base, is rapidly gaining momentum and attracting users partly because it is integrated with the Coinbase wallet and ecosystem. Visa is testing a feature of using a credit card to pay for Ethereum transaction fees, which could lead to a major development where the crypto backend is being handled in the background without the user having to interact with crypto wallets. ETH holders continue to find staking attractive, and we expect the number of validators to continue to go up. The direction of crypto prices, however, will likely depend on macro factors: the direction of interest rates and the availability of global liquidity.

IMPORTANT INFORMATION

WisdomTree.eu
+44 (0) 207 448 4330