Statistics and analyses

Emerging trends in sustainable investments and cryptoasset markets

CONSOB
COMMISSIONE NAZIONALE
PER LE SOCIETÀ E LA BORSA

2023

Principali tendenze in tema di investimenti sostenibili e criptoattività

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Il Rapporto analizza le principali dinamiche in atto nell'ambito degli investimenti sostenibili e dei mercati delle criptoattività, anche con riguardo a profili che possono rilevare per il raggiungimento degli obiettivi istituzionali della CONSOB

The Report analyses the emerging trends in sustainable investments and in the markets of cryptoassets, also with regard to the developments that can affect the achievement of CONSOB remit

Gli investimenti sostenibili

Gli indici azionari ESG globali (Stoxx Global ESG leaders e MSCI world ESG) presentano un elevato grado di allineamento nella *performance*. Tale livello di coerenza fra gli indici non è, tuttavia, stabile nel tempo e si riduce se si utilizza come parametro la volatilità invece che il rendimento. Analoga tendenza si riscontra se si misura il grado di coerenza di indici azionari riferiti all'area euro (Euro Stoxx ESG *leaders*, Ftse 4Good Europe 50, MSCI EMU ESG *screened index*). Sempre nell'area euro si rileva, inoltre, un elevato grado di sovrapposizione fra la lista di società costituenti gli indici azionari ESG rispetto agli indici convenzionali (52% fra Stoxx Euro ESG Leaders e Euro Stoxx 50, 82% fra Mib ESG e Ftse Mib).
Infine, l'andamento dell'indicatore di "greenium", ossia del premio al rischio connesso con la eco-sostenibilità (cosiddetta *greenness*) di una impresa e basato sui rendimenti delle società quotate, mostra una significativa volatilità soprattutto in corrispondenza di periodi di *stress* sui mercati finanziari e un *trend* crescente a partire da maggio 2020 fino all'ultima rilevazione disponibile.
Il Sustainalytics ESG *risk score*, che rappresenta una misurazione sintetica dell'esposizione delle società a fattori di rischio ESG (ad esempio, cambiamenti climatici, rischio di transizione, condizioni lavorative inique, mancanza di inclusione sociale, trasparenza nella *governance*, politiche di remunerazione del *management*) registra un andamento positivo nell'area euro con un *trend* decrescente da dicembre 2019 a dicembre 2022, senza subire ulteriori variazioni nel 2023, ossia confermando un tendenziale aumento della capacità delle imprese nel gestire i *sustainability-related risks*. Inoltre, disaggregando settorialmente l'indicatore si rileva che in media l'esposizione ai fattori di rischio delle *utilities* e delle società che producono energia è più elevata rispetto a quella delle imprese appartenenti al settore manifatturiero oppure al comparto finanziario. In Italia, gli ESG *risk scores* si attestano su valori in linea con quelli dell'area euro; a livello settoriale, tuttavia, l'esposizione ai fattori di rischio del comparto finanziario appare in media più elevata rispetto al settore *corporate*. La sezione investimenti sostenibili del Rapporto include, poi, un *focus* sulle società quotate in Italia finalizzato a verificare se l'ESG *risk score* e l'ESG Refinitiv *rating* siano correlati con alcune delle principali caratteristiche delle imprese (*performance*, volatilità, liquidità, *leverage* finanziario, *value at risk*, *price on earnings*, *price to book value*, capitalizzazione e ROA). In dettaglio, utilizzando tecniche di *cluster analysis*, per distinguere le società sulla base dell'ESG *rating*, si evidenzia come il gruppo di imprese con *score* di sostenibilità più elevato si differenzia dall'altro gruppo solo per la dimensione e la liquidità. In particolare, il *cluster* di società con ESG *rating* più alto è rappresentato dalle imprese con maggiore liquidità e capitalizzazione mentre non si registrano differenze significative tra i due gruppi in termini di *performance*, volatilità e valutazioni di mercato.
L'analisi delle obbligazioni ESG inclusa nel Rapporto si fonda sull'identificazione dei titoli sulla base degli *International Capital Market Association* (ICMA) *principles* e si focalizza sui titoli quotati in Italia. Il 12% circa delle obbligazioni ESG così definite non è incluso nella lista dei "Green e Social bonds" di Borsa Italiana, ponendo in evidenza l'esistenza di alcuni disallineamenti nelle classificazioni del profilo di sostenibilità dei titoli. Le obbligazioni ESG sono prevalentemente *green bonds* (53%) appartenenti al settore sovranazionale (54%) con un *time to maturity* compreso fra i 7 e i 10 anni (43%). Inoltre, il 54% dei titoli ESG quotati su Borsa Italiana presenta un lotto minimo minore uguale a 1.000 euro, quindi accessibile agli investitori *retail*, mentre il 69% è negoziato sul segmento di mercato Mot.
Infine, la classificazione dei fondi aperti sostenibili disponibili per la vendita in Italia è stata effettuata adottando i criteri per l'identificazione dei fondi ESG di Morningstar. La maggiore parte dei fondi presenta un Morningstar *sustainability rating* superiore alla media (59%), si classifica art. 8 del Regolamento SFDR (74%) e ricade nella categoria fondi azionari (51%); solo l'8% è domiciliato in Italia, mentre per il 60% sono passati meno di 6 anni dalla data di istituzione (*inception date*). Inoltre, focalizzando l'attenzione esclusivamente sulla componente azionaria del portafoglio, si rileva che in media il 70% del *net asset value* è investito in *large cap* prevalentemente di paesi avanzati.

Sustainable investments

ESG stock indexes at the global level (Stoxx Global ESG leaders and MSCI world ESG) and in the euro area (Euro Stoxx ESG leaders, Ftse 4Good EU 50, MSCI EMU ESG screened index) show a high level of alignment in performance. The degree of coherence, however, tends to be not stable through time and decreases if we focus on volatility. In the euro area, moreover, there is a high overlapping degree between ESG stock index constituents and conventional ones (i.e., 52% between Stoxx Euro ESG Leaders and Eurostoxx 50, 82% between MIB ESG and Ftse Mib). Lastly the "greenium", that is the risk premium due to the eco-sustainability of a firm (so-called *greenness*), which is based on listed firm returns, tends to be more volatile during financial market stress periods of time and shows a growing trend starting from May 2020 to the latest available estimate.

The Sustainalytics company-level ESG risk score measures firms' exposure to ESG risks (i.e., climate changes, carbon footprint, transition risks, safety in the workplace, governance transparency, management remuneration policies). In the euro area it registers a decreasing trend from December 2019 to December 2022, and it remains approximately stable in 2023, showing that firms are increasingly improving their abilities in managing sustainability-related risks. Moreover, utility and energy sectors exposure to ESG risks tends to be higher compared to the exposure of industrial and financial sectors. In Italy, ESG risk scores are on average in line with euro area; the exposure to risk factors in the financial sector, however, tends to be higher compared to what is registered in the corporate sector. Lastly, the Report includes a focus on firms listed in Italy which aims at verifying if both Sustaynalitics ESG risk score and Refinitiv ESG rating are correlated with main firms' characteristics (i.e., performance, volatility, liquidity, financial leverage, value at risk, price on earnings, price to book value, size and ROA). In more detail, by applying cluster analysis techniques in which ESG score is treated as a discriminant factor, two groups of firms are obtained which significantly differs only with respect of size and liquidity. In particular, companies with high ESG rating tend to be more liquid and have a bigger size, while there are no significant differences between the two groups in terms of performance, volatility and market evaluation.

The analysis of ESG bonds listed in Italy relies on International Capital Market Association (ICMA) principles to identify green, social, sustainable and sustainable linked bonds. Given that around 12% of the ESG bonds listed on Italian financial markets is not included in Borsa Italiana "Green and Social bonds List", there is evidence regarding some misalignments among ESG securities' classifications. ESG bonds are mainly supranational green bonds with a time to maturity between 7 and 10 years. Moreover, 54% of ESG bonds listed on Borsa Italiana has a minimum trade size lower than or equal to 1.000 euro, thus within the reach of retail investors, while 69% is listed on Mot bond market segment.

Finally, the Report includes analysis on open-ended sustainable funds available for sale in Italy identified on the basis of Morningstar definitions. Most of sustainable funds has an average or above average Morningstar ESG rating (59%), belongs to art. 8 SFDR classification (74%) and refers to equity category (51%); only 8% is domiciled in Italy, while for around 60%, the age (difference between current date and inception date) is lower than 6 years. Moreover, focusing only on the equity portfolio component, on average, 70% of the equity portfolio is invested in large cap.

Le criptoattività

I mercati delle criptoattività hanno subito pesanti ripercussioni a seguito degli eventi negativi che hanno caratterizzato il 2022. A settembre 2023 il valore di mercato delle principali criptovalute risultava infatti inferiore di oltre il 50% rispetto a quello registrato a fine 2021, in conseguenza di un ribasso del 65% nel 2022 e di un parziale recupero nell'anno in corso. Nel confronto con la capitalizzazione dei mercati azionari il valore di mercato delle criptovalute resta contenuto (2,1% del valore aggregato dei mercati americani, 3,4% dei mercati asiatici e 4,4% dei mercati europei e mediorientali). Oltre il 60% del valore di mercato delle criptovalute è riferibile a bitcoin ed ether. Anche l'ammontare di fondi depositati nelle applicazioni di finanza decentralizzata (Decentralised Finance o DeFi), ha esibito un netto calo (-70% a settembre 2023 rispetto alla fine del 2021 e -63% solo nel 2022). Il settore DeFi si caratterizza per una estrema eterogeneità nelle tipologie di protocolli in essere e, conseguentemente, nei rendimenti dei relativi pool di liquidità pur essendo molto concentrato sotto il profilo della sottostante tecnologia, con circa il 60% dei protocolli basati sulla blockchain Ethereum. Le criptovalute continuano a connotarsi per prezzi estremamente volatili. A settembre 2023 il rendimento annualizzato del bitcoin risultava infatti solo lievemente superiore a quello riferibile ad altre categorie di asset non digitali pur mostrando una volatilità di gran lunga superiore. I volumi di transazioni di bitcoin ed ether si sono drasticamente ridotti dalla fine del precedente anno e la dinamica del rapporto tra valori di mercato e volume delle transazioni (il cosiddetto *network value to transactions ratio* o NVT) suggerisce il sussistere di prospettive ribassiste sui mercati delle due maggiori criptovalute, sebbene l'andamento dei prezzi dei futures si sia stabilizzato nel corso dell'anno dopo il brusco calo del 2022. Segni di strutturale instabilità dei prezzi emergono anche dalla quota di criptovalute inattive, ossia che non sono state oggetto di transazioni nell'ultimo anno, che si colloca su valori prossimi al 60% e 70% rispettivamente per bitcoin ed ether. La correlazione tra dinamiche del prezzo del bitcoin e quelle dei principali indici azionari risulta positiva nel 2023. Il legame appare meno marcato per gli indici europei rispetto a quelli statunitensi e in calo nell'anno in corso rispetto al 2022.

La sicurezza cibernetica delle applicazioni sottostanti alle criptoattività resta un profilo critico: alcune statistiche relative a 188 piattaforme di scambio di criptovalute evidenziano che solo 14 possono ritenersi molto sicure e che, rispetto al 2022, è aumentata la quota di quelle che invece presentano scarse valutazioni di sicurezza cibernetica. Secondo altre fonti, nel 2022 l'ammontare complessivo di fondi sottratti in attacchi hacker su criptoattività si è collocato a 3,8 miliardi di dollari, in lieve crescita dai 3,3 miliardi del precedente anno. Rispetto al 2022 l'interesse verso le criptoattività si è nettamente ridotto come attesta il calo sia del numero di ricerche effettuate in rete di termini a esse associati sia del numero di indirizzi attivi delle maggiori criptovalute. Anche gli investimenti nel settore sono fortemente calati. Stime sui detentori di criptoattività indicano che, a livello globale, quasi il 60% è riferibile ai paesi asiatici e solo il 4% ai paesi dell'Europa occidentale. Tra le maggiori economie europee la quota di popolazione che detiene criptoattività oscilla tra poco meno del 6% in Francia e Regno Unito e poco più del 2% in Italia.

Cryptoassets

Cryptoasset markets have been severely affected by the negative events of 2022. Indeed, the market value of major cryptocurrencies dropped by more than 50% in September 2023 compared to the end of 2021, following a 65% drop in 2022 and a partial recovery in the current year. The market value of cryptocurrencies remains low compared to equity markets capitalisation (2.1% of the aggregate value of American markets, 3.4% of Asian markets and 4.4% of European and Middle Eastern markets). More than 60% of the market value of cryptocurrencies refers to bitcoin and ether. The total value locked in decentralised finance protocols (Decentralised Finance or DeFi) also exhibited a sharp decline (-70% in September 2023 compared to the end of 2021 and -63% in 2022). The DeFi sector is characterised by a high heterogeneity both in the types of existing protocols and, consequently, in the liquidity pools returns despite being highly concentrated in terms of the underlying technology, with around 60% of protocols based on the Ethereum blockchain. Cryptocurrencies continue to be characterised by highly volatile prices. As of September 2023, bitcoin's annualised return was only slightly higher than returns of other non-digital assets while showing far greater volatility. Transaction volumes of bitcoin and ether have fallen significantly since the end of the previous year, and the dynamics of the ratio between market values and transaction volumes (the so-called network value to transactions ratio or NVT) suggest a bearish outlook for the markets of the two largest cryptocurrencies, although the trend in futures prices has stabilised during this year after the sharp drop in 2022. Signs of structural price instability also emerge from the share of inactive cryptocurrencies, i.e. those that have not been traded in the past year, which is close to 60% and 70% for bitcoin and ether respectively. The correlation between bitcoin price dynamics and those of the major stock indexes is positive in 2023. The correlation appears to be less pronounced for European indexes than for US indexes and declining during the current year compared to 2022.

The cybersecurity of applications underlying cryptocurrencies remains a critical issue: statistics on 188 cryptocurrencies exchanges show that only 14 can be considered very secure and that the share of those with poor cybersecurity ratings has increased compared to 2022. According to other sources, the total amount of funds stolen by hackers in crypto attacks stood at 3.8 billions of dollar in 2022, up slightly from 3.3 billions in the previous year.

Compared to 2022, interest in cryptoassets has declined sharply, as evidenced by the drop in both the number of searches made on the internet for terms associated with them and the number of active addresses of the main cryptocurrencies. Investments in the sector have also dropped. Estimates of cryptoasset owners indicate that, globally, almost 60% refer to Asian countries and only 4% to Western European countries. Among the largest European economies, the share of the population owning cryptoassets ranges from slightly less than 6% in France and the UK to a little more than 2% in Italy.

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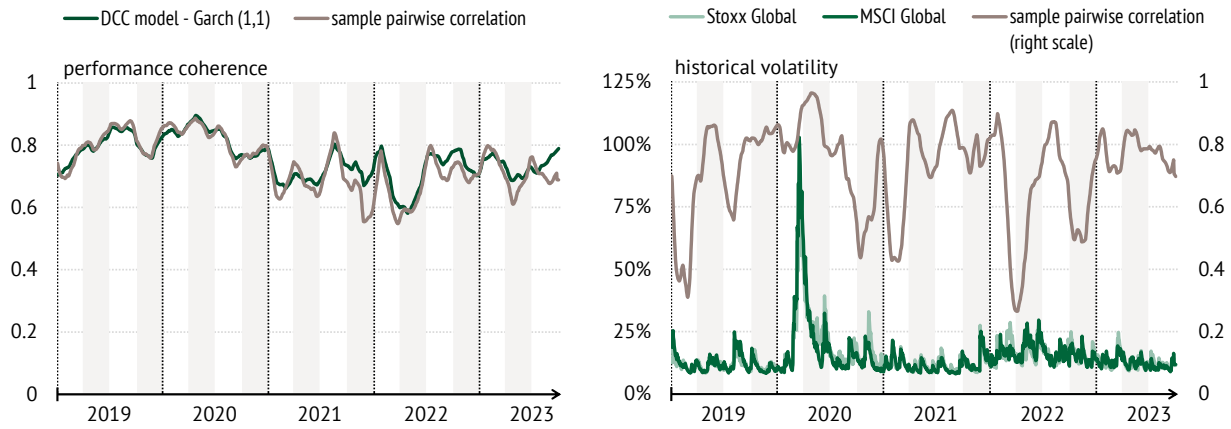
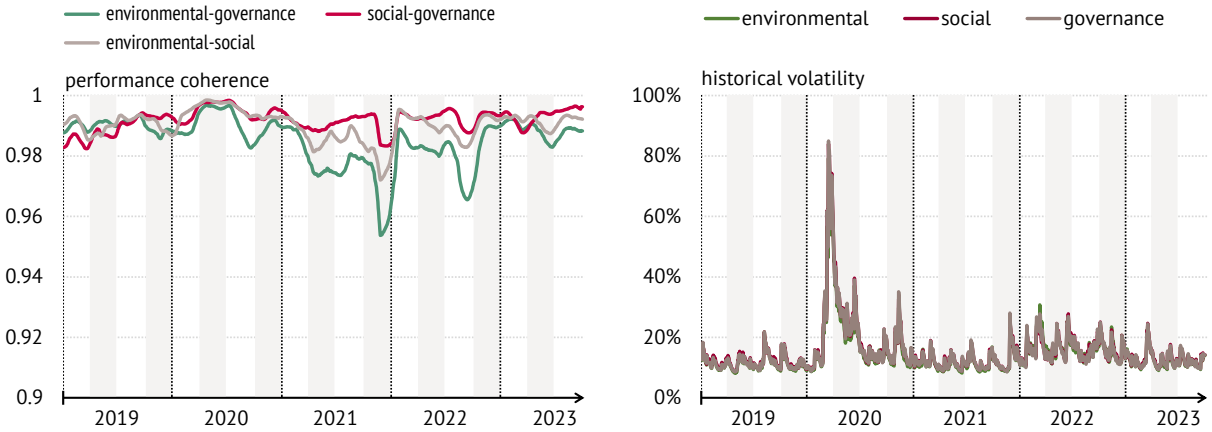
MARKETS TRENDS

Fig. 1.1 – Degree of alignment among ESG stock indexes at global level
(daily data up to 30 September 2023)



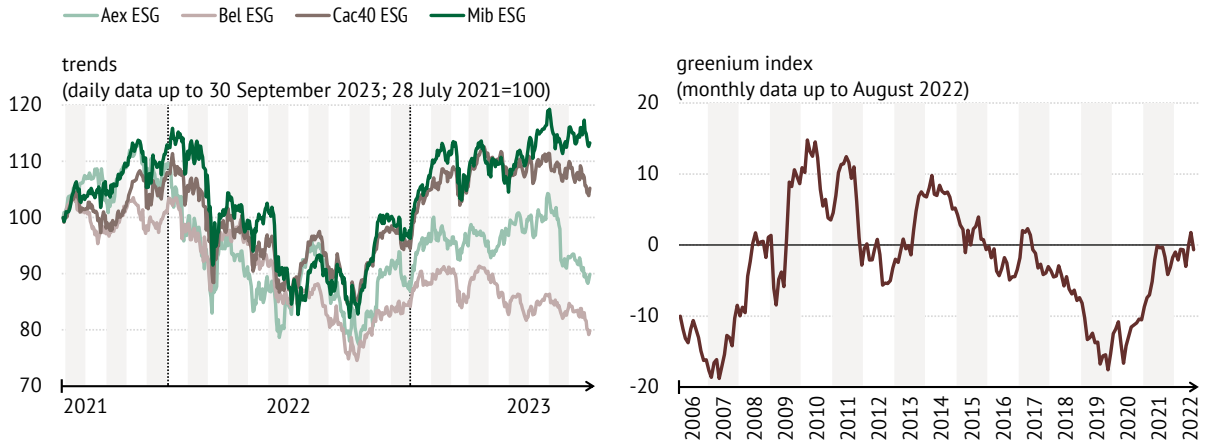
Source: calculations on LSEG Refinitiv Datastream. In the left graph we report 2-month moving average monthly pairwise correlation (values range from 0=minimum to 1=maximum) between Stoxx Global ESG leaders and MSCI world ESG index estimated by Dynamic Conditional Correlation model (DCC), in which volatility is estimated as a Garch (1,1) process. On the right graph historical volatility is estimated as a Garch (1,1) process, it is annualised and expressed in percentage values. On both graphs, the reported sample pairwise correlation is computed as 1-month rolling indicator (2-mth moving average).

Fig. 1.2 – Degree of alignment among global ESG stock indexes by pillars
(daily data up to 30 September 2023)



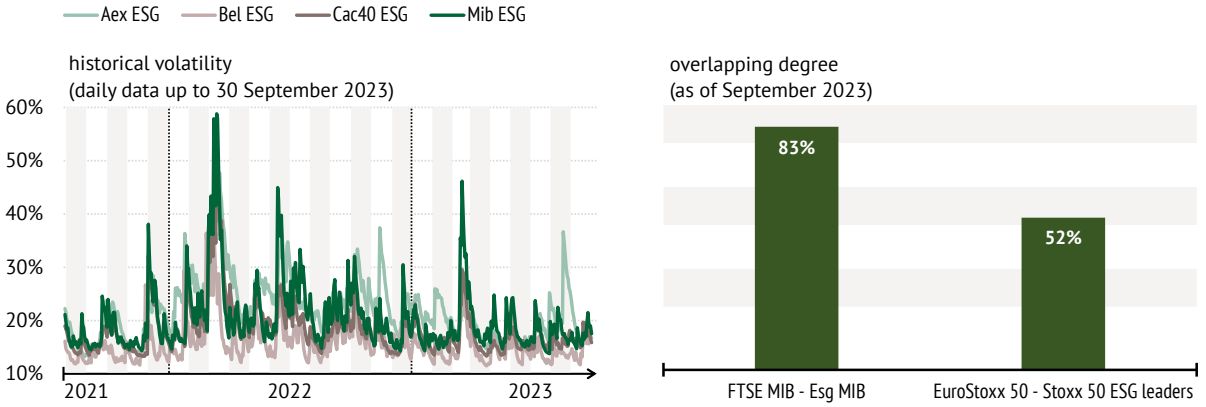
Source: calculations on LSEG Refinitiv Datastream. The sample includes Stoxx Global ESG Environmental/Social/ Governance Leaders indexes. On the left graph we report sample pairwise correlations (values range from 0=minimum to 1=maximum). Historical volatility is estimated as a Garch (1,1) process; it is annualised and expressed in percentage values.

Fig. 1.3 – Euro area ESG stock market



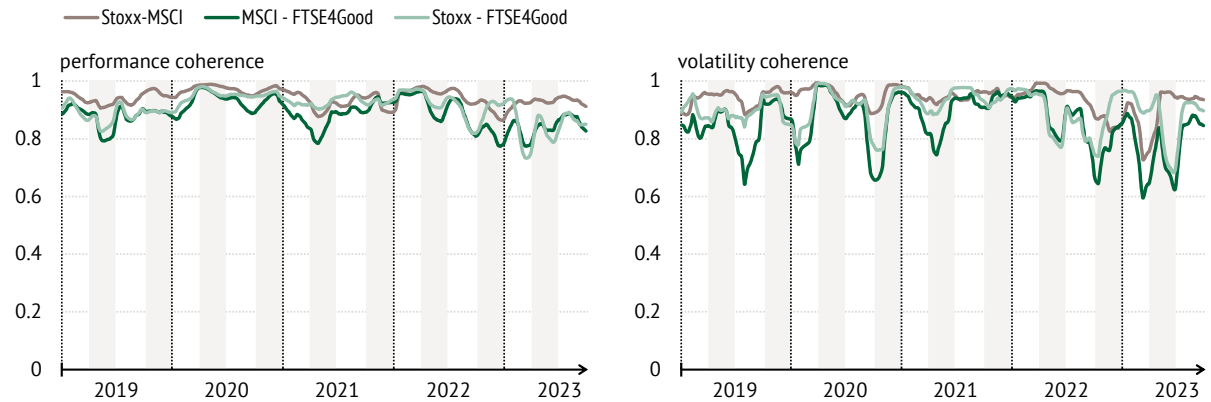
Source: calculations on Euronext data. On the right graph the greenium index is from Alessi, L., Ossola, E., Panzica, R. (2023), When do investors go green? Evidence from a time-varying asset-pricing model, International Review of Financial Analysis n. 90, 102898, https://doi.org/10.1016/j.irfa.2023.102898).

Fig. 1.4 – Euro area ESG stock market historical volatility and overlapping degree between ESG stock indexes and conventional ones



Source: calculations on Euronext and LSEG Refinitiv Datastream data.

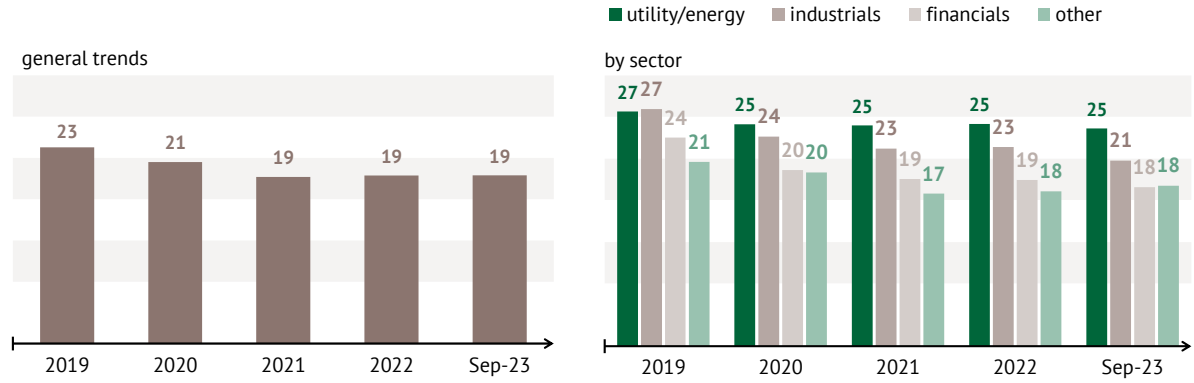
Fig. 1.5 – Degree of alignment among ESG stock indexes in the euro area
(daily data up to 30 September 2023)



Source: calculations on LSEG Refinitiv Datastream. Sample pairwise correlations are reported on the graph (values range from 0=minimum to 1=maximum). Euro Stoxx ESG leaders, Ftse 4Good EU 50, MSCI EMU ESG screened indexes are included in the analysis.

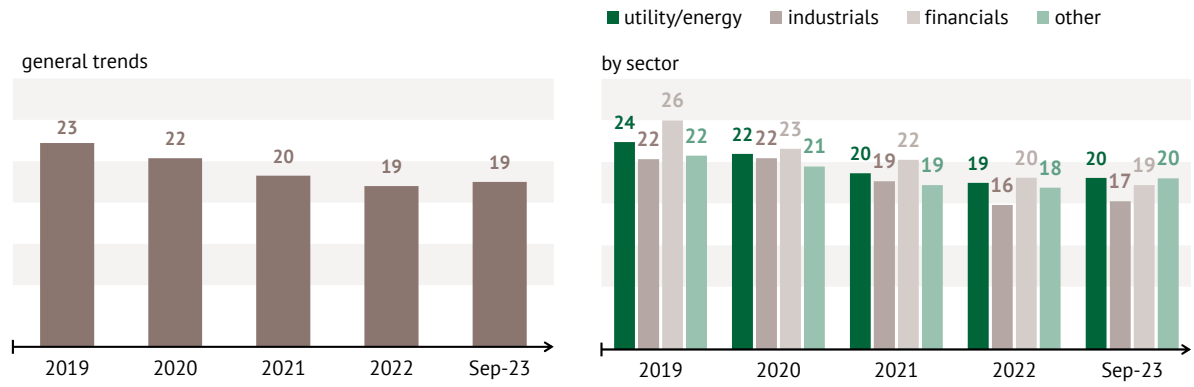
ESG RISK SCORES

Fig. 1.6 – Sustainalytics ESG risk scores in the euro area
(average values)



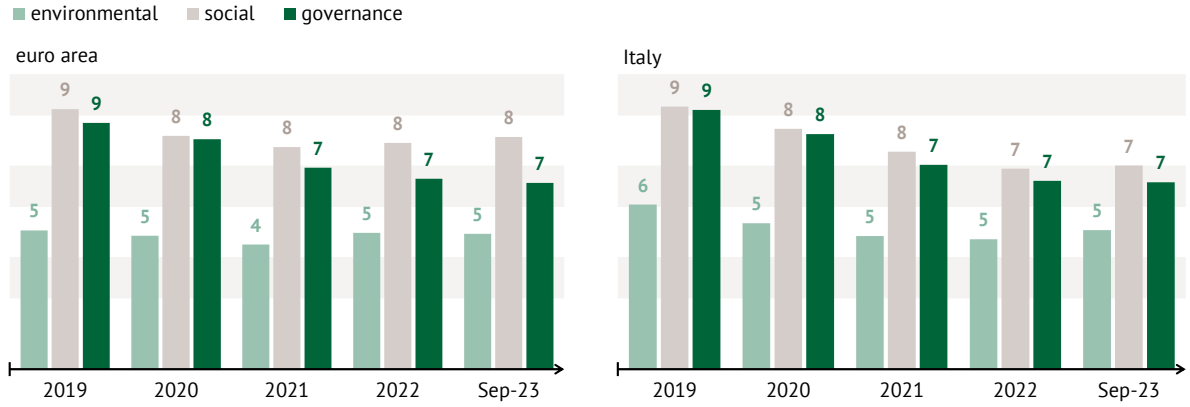
Source: calculations on Morningstar Direct data. The Sustainalytics company-level ESG Risk Score measures the degree to which a company's economic value may be at risk driven by materially relevant ESG factors. ESG risk score scale is from 0-100, with 100 being the most severe. Analysis refers to Morningstar Eurozone 50 Index which is designed to provide exposure to the largest and most liquid companies in the Eurozone, while maintaining sector weights similar to the broad Eurozone benchmark. On the right graph we refer to Morningstar Sector classification. Possible changes, from December 2019 to September 2023, of the Morningstar Eurozone 50 Index constituent list are included in the analysis. ESG risk scores are rounded off to the nearest unit.

Fig. 1.7 – Sustainalytics ESG risk scores in Italy
(average values)



Source: calculations on Morningstar Direct data. The Sustainalytics company-level ESG Risk Score measures the degree to which a company's economic value may be at risk driven by materially relevant ESG factors. ESG risk score scale is from 0-100, with 100 being the most severe. Analysis refers to Morningstar Italy Total Market Exposure (TME) index which targets large- and mid-cap stocks listed in Italy, representing the largest 85% of the market by float-adjusted market capitalisation. In the right graph we refer to Morningstar Sector classification. Possible changes, from December 2019 to September 2023, of the TME Index constituent list are included in the analysis. ESG risk scores are rounded off to the nearest unit.

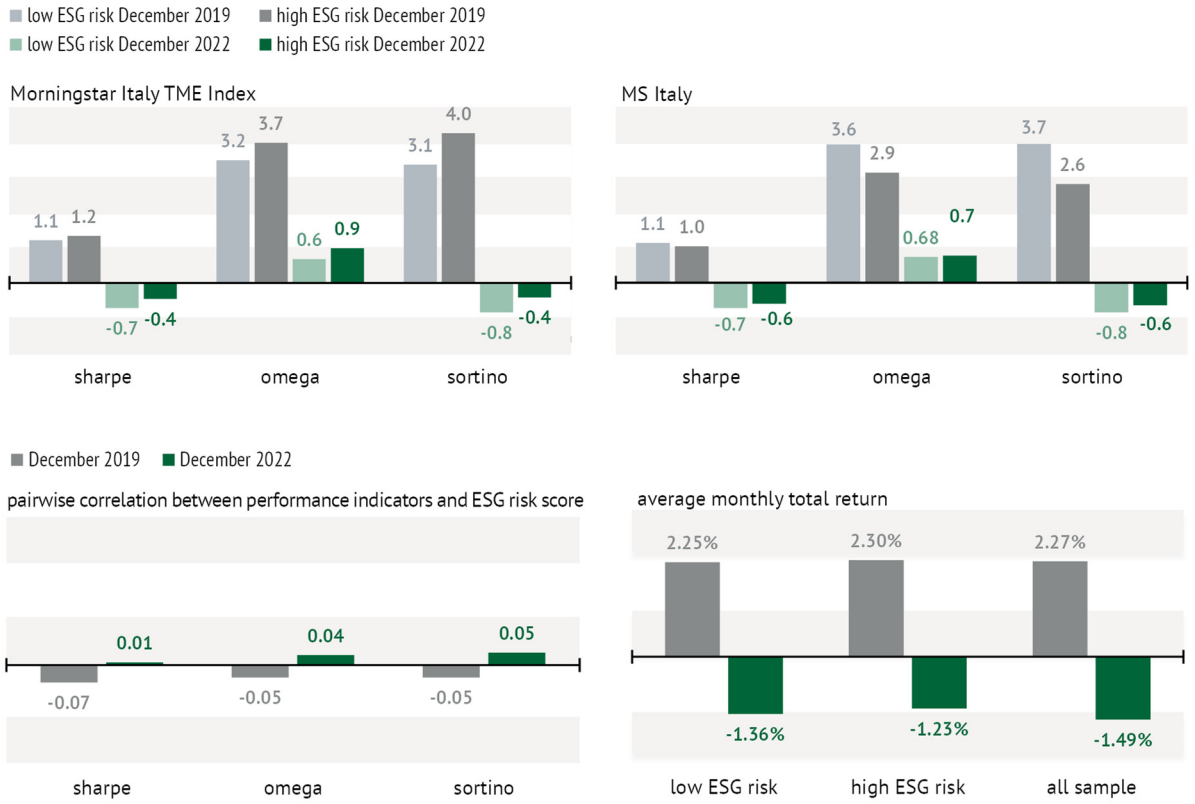
Fig. 1.8 – Sustainalytics ESG risk scores by pillar
(average values)



Source: calculations on Morningstar Direct data. The Sustainalytics company-level ESG Risk Score measures the degree to which a company's economic value may be at risk driven by materially relevant ESG factors ESG risk score scale is from 0-100, with 100 being the most severe. Analysis refers to Morningstar Eurozone 50 Index and Morningstar Italy Total Market Exposure (TME) index. Possible changes, from December 2019 to September 2023, of the Morningstar Eurozone 50 Index and TME constituent lists are included in the analysis. ESG risk scores are rounded off to the nearest unit.

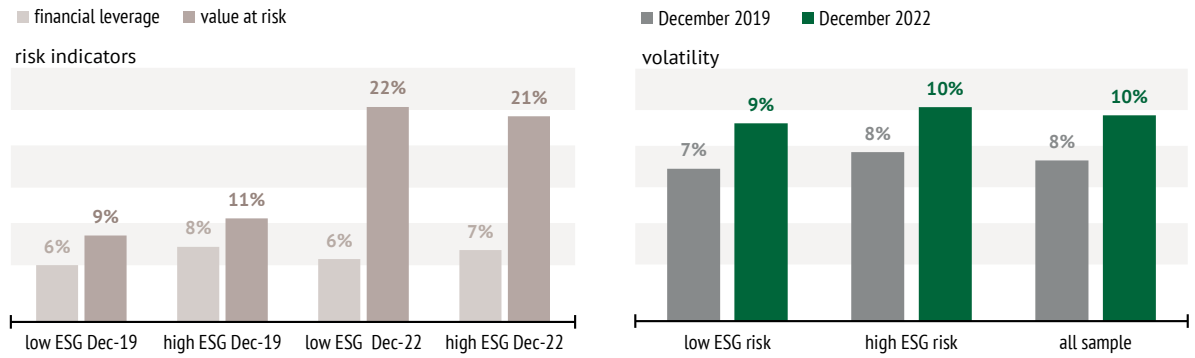
ESG RATINGS: FOCUS ON FIRMS LISTED IN ITALY

Fig. 1.9 – Sustainalytics ESG risk score and performance



Source: calculations on Morningstar Direct data. Morningstar Italy Total Market Exposure (TME) index targets large- and mid-cap stocks listed in Italy, representing the largest 85% of the market by float-adjusted market capitalisation. MS Italy measures the performance of Italy's equity markets targeting the top 97% of stocks by market capitalisation. Sharpe, Omega and Sortino measures are risk adjusted performance indicators. "Low (high) ESG risk" identifies the group of firms whose ESG risk score is under (above) sample median; for each group we compute average values of risk adjusted performance indicators; we performed t-test without finding significant differences between the two groups in terms of performance. Reported pairwise correlations are not significant at 95% confidence level as well.

Fig. 1.10 – Sustainalytics ESG risk score and financial risks

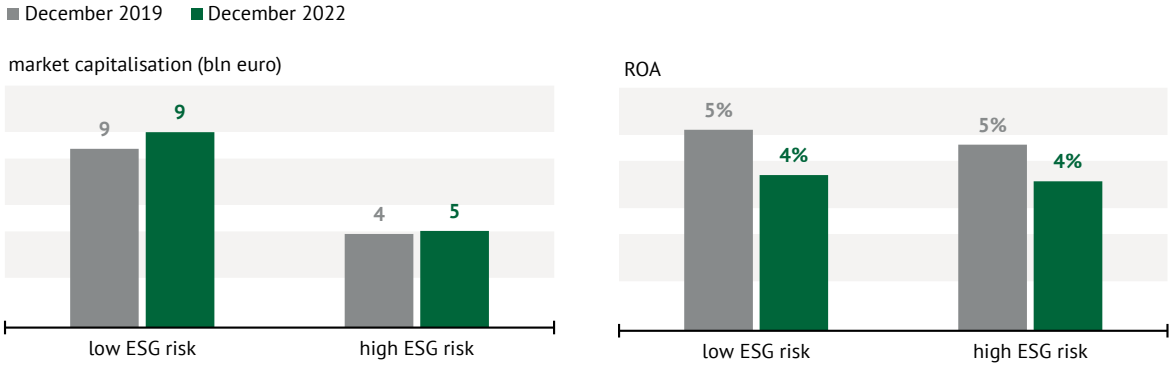


Source: calculations on Morningstar Direct data. Analysis refers to MS Italy which measures the performance of Italy's equity markets targeting the top 97% of stocks by market capitalisation. On the left graph financial leverage is total assets divided by total shareholders' equity and it is expressed in percentage values; value at risk is the potential loss in value of a traded portfolio over a defined period for a given confidence level and it is expressed in percentage values. On the right graph volatility is the standard deviation of total returns and it is expressed in percentage values. "Low (high) ESG risk" identifies the group of firms whose ESG risk score is under (above) sample median; for each group we compute average values of risk indicators and volatility; we performed t-test without finding significant differences between the two groups in terms of risk indicators and volatility.

Fig. 1.11 – Sustainalytics ESG risk score and market evaluation

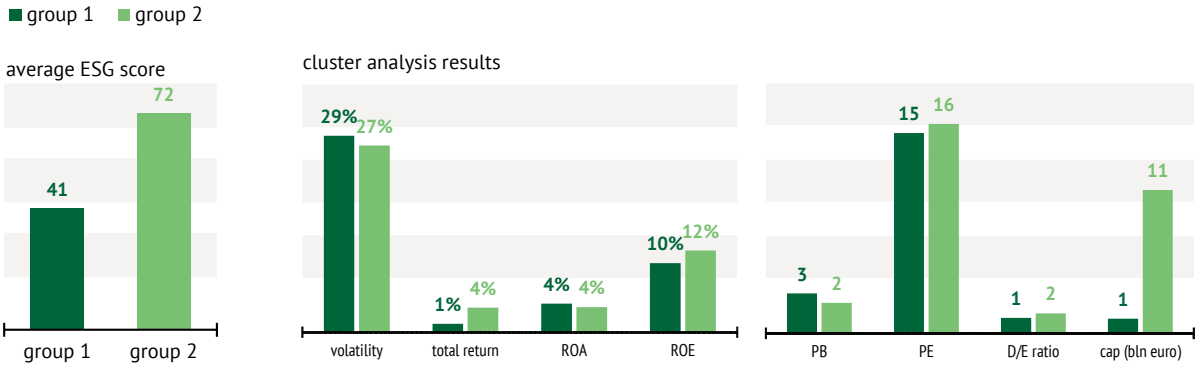
Source: calculations on Morningstar Direct data. Analysis refers to MS Italy which measures the performance of Italy's equity markets targeting the top 97% of stocks by market capitalisation. "Low (high) ESG risk" identifies the group of firms whose ESG risk score is under (above) sample median; for each group we compute yearly average values of market evaluation indicators.

Fig. 1.12 – Sustainalytics ESG risk score, firm size and ROA



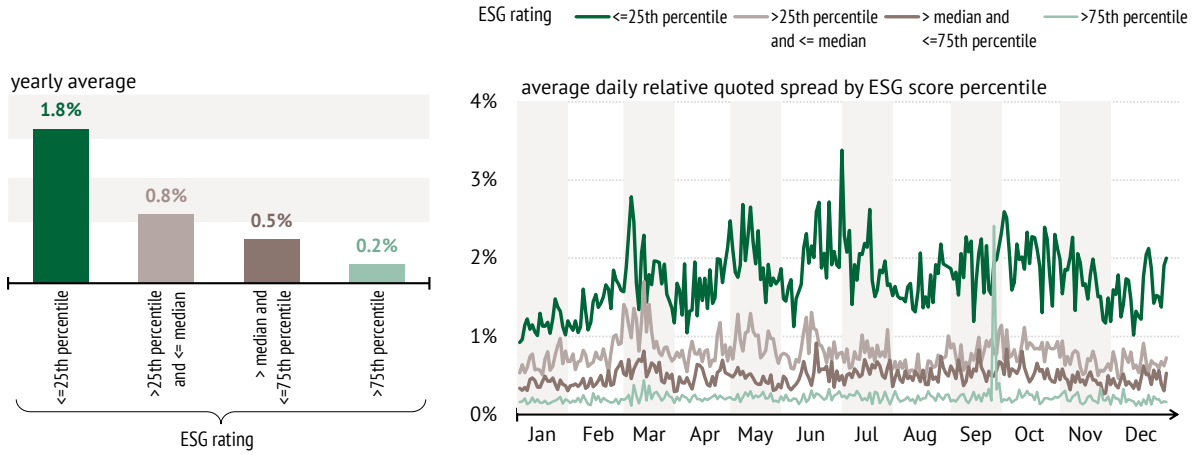
Source: calculations on Morningstar Direct data. Analysis refers to MS Italy which measures the performance of Italy's equity markets targeting the top 97% of stocks by market capitalisation. "Low (high) ESG risk" identifies the group of firms whose ESG risk score is under (above) sample median; for each group we compute yearly average values of market evaluation indicators. Referring only to market capitalisation, for each year (2019 and 2022) mean differences between the two groups (low / high risk) are significant at 95% confidence level on the basis of t-test.

Fig. 1.13 – A characterisation of firms listed in Italy based on Refinitiv ESG rating
(data as of December 2022)



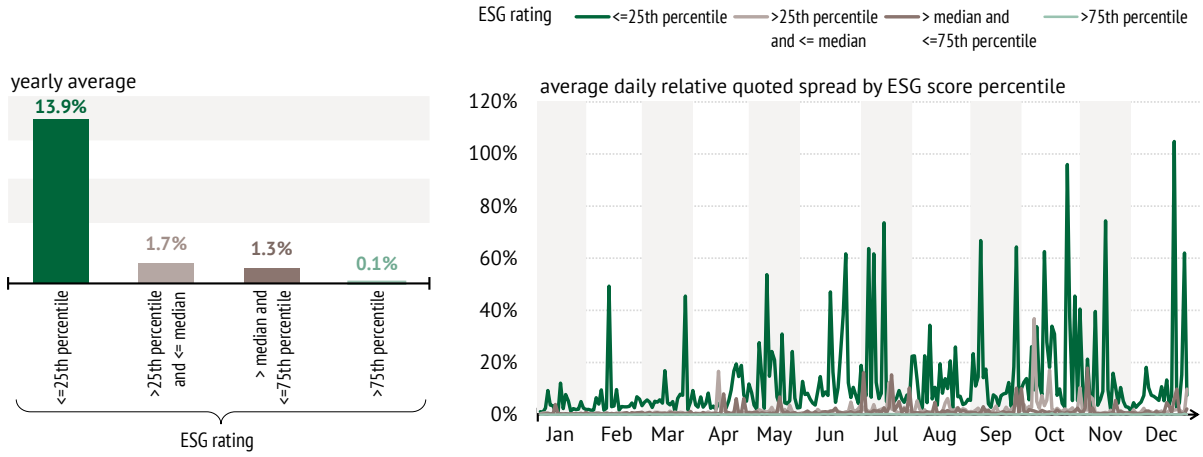
Source: calculations on LSEG Refinitiv Datastream data. ESG Refinitiv score measures a company's relative ESG performance, commitment and effectiveness based on publicly available and auditable data. The sample includes all the firms with an ESG Refinitiv rating and listed on Borsa Italiana (2022 fiscal year). We apply cluster analysis (*K means algorithm*) and we identify two groups by using ESG Refinitiv rating as a discriminant factor. Analysed characteristics of firms are: performance (6-month total returns), risk indicators (volatility and debt to equity ratio - D/E), market evaluation (price on earnings/PE and price to book value/PB), size (market capitalisation), profitability (ROA, ROE). Differences are not significantly different from zero on the basis of t-test. The only exception is market capitalisation.

Fig. 1.14 – Liquidity analysis: relative quoted spread by Refinitiv ESG rating
(2022)



Source: calculations on LSEG Refinitiv Datastream data. Percentiles refer to Refinitiv ESG score sample distribution. In the graphs we report the relative quoted spread ($RQS_{i,t} = \frac{(bid_{i,t} - ask_{i,t})}{(bid_{i,t} + ask_{i,t})/2} * 100$). On the left graph we represent yearly average RQS by Refinitiv ESG rating selected percentiles. On the right graph we represent RQS daily time series by Refinitiv ESG rating percentiles (average values for all the firms belonging to each ESG rating percentile).

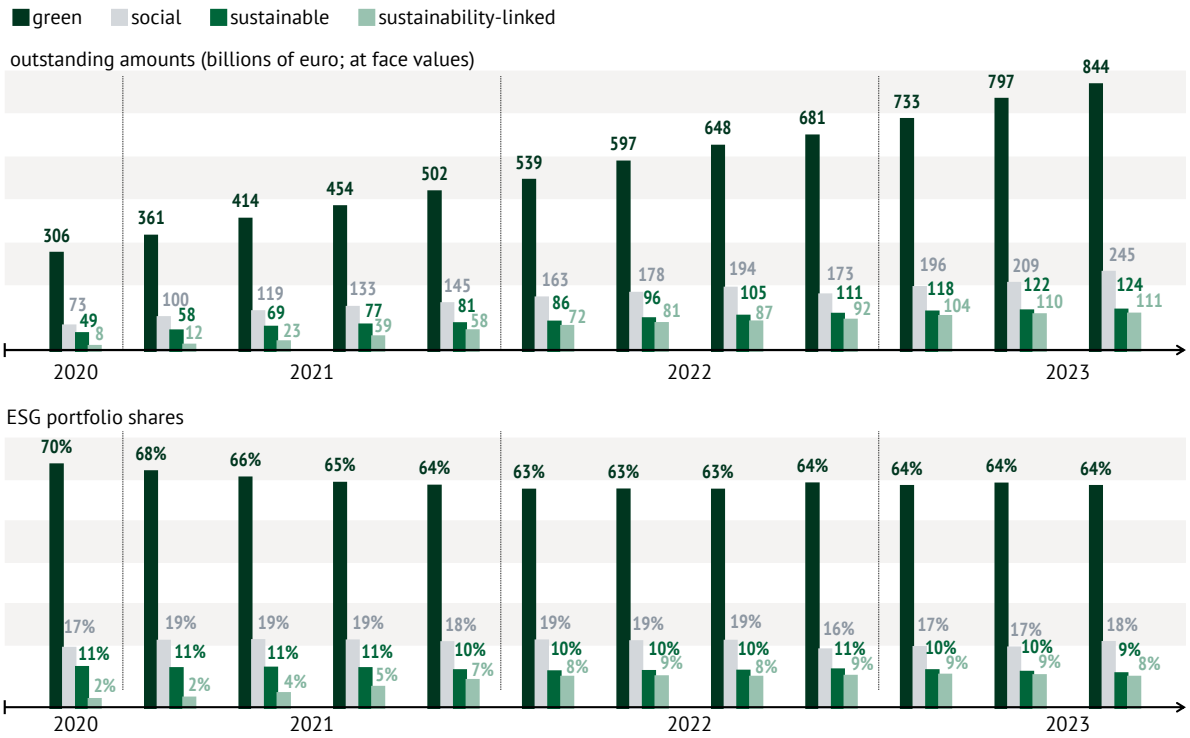
Fig. 1.15 – Liquidity analysis: price impact by Refinitiv ESG rating
(2022)



Source: calculations on LSEG Refinitiv Datastream data. Percentiles refer to Refinitiv ESG score sample distribution. In the graphs we report the price impact indicator ($PI_{i,t} = \frac{|r_{i,t}|}{V_{i,t}} * 100$). On the left graph we represent yearly average PI by Refinitiv ESG rating selected percentiles. On the right graph we represent PI daily time series by Refinitiv ESG rating percentiles (average values for all the firms belonging to each ESG rating selected percentile).

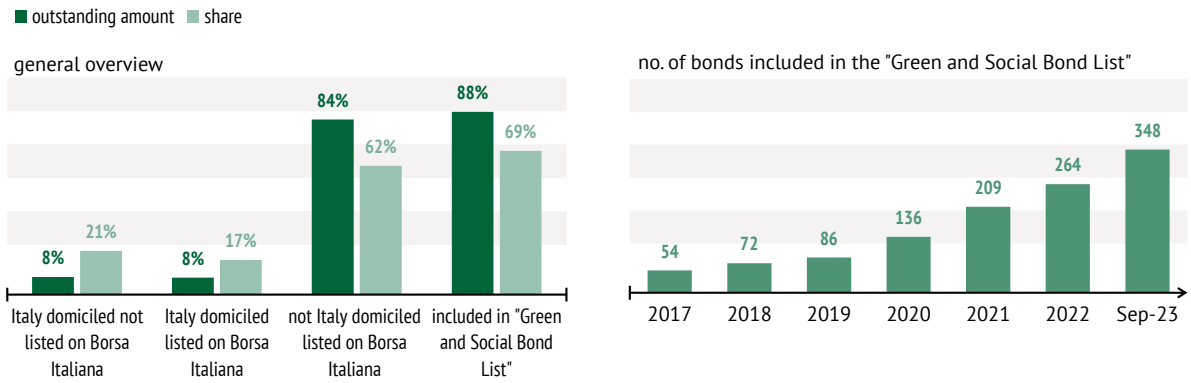
ESG BONDS LISTED IN ITALY

Fig. 1.16 – Euro area issuances of ESG debt securities
(quarterly data up to Q3 2023)



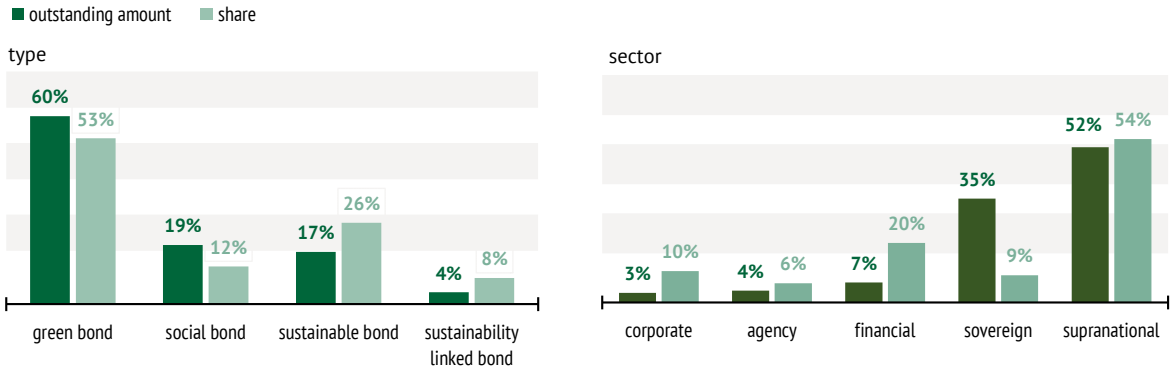
Source: Centralised Securities Database (CSDB), ECB. Note: debt securities are classified as "green" when the proceeds are used to finance projects with clear environmental benefits, "social" when the proceeds are used to finance projects that address social issues and seek to achieve positive social outcomes, "sustainable" when the proceeds are used to finance a combination of both green and social projects, "sustainability-linked" when the issuers are committed to future improvements in sustainability outcomes, with no restrictions on how the proceeds can be used.

Fig. 1.17 – ESG bonds domiciled or listed in Italy
(data as of 30 September 2023)



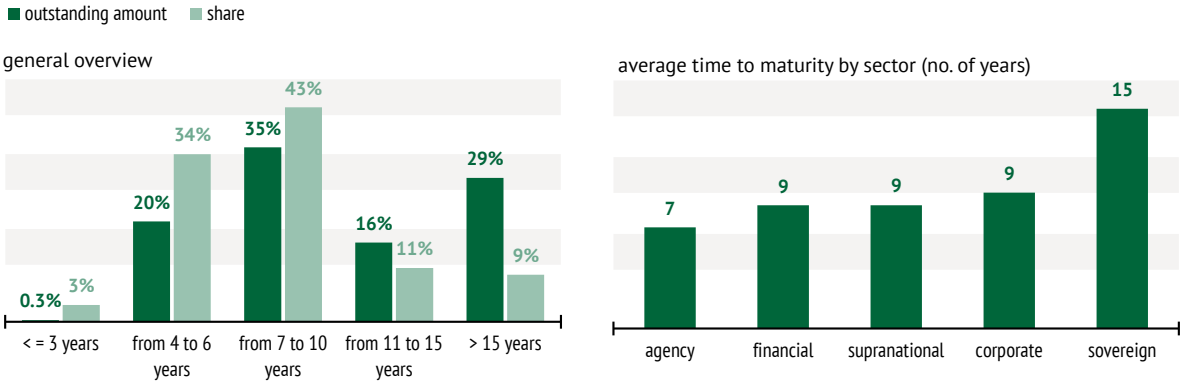
Source: calculations on LSEG Refinitiv Datastream and Borsa Italiana. On the left graph ESG bond classification relies on ICMA standards. On the right graph, only the bonds included in Borsa Italiana "Green and Social Bond List" are represented. Quotes are computed on the total outstanding amount (number) of ESG bonds domiciled in Italy or listed in Italy.

Fig. 1.18 – ESG bonds listed in Italy by type and sector
(data as of 30 September 2023)



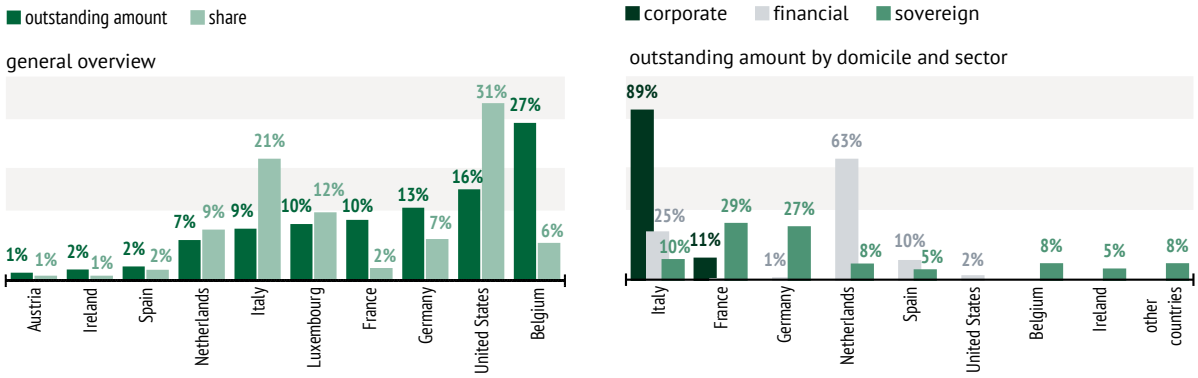
Source: calculations on LSEG Refinitiv Datastream. The sample includes ESG bonds listed on Borsa Italiana. ESG bond classification relies on ICMA standards. For sector definitions, refer to The Refinitiv Business Classification (TRBC). Quotes are computed on the total outstanding amount (number) of ESG bonds listed on Borsa Italiana. Percentages may not add up to 100% due to rounding.

Fig. 1.19 – ESG bonds listed in Italy by time to maturity
(data as of 30 September 2023)



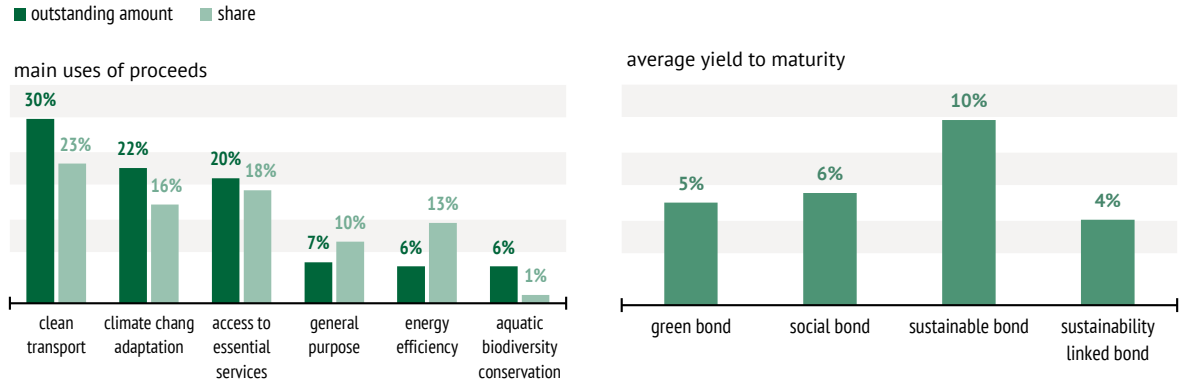
Source: calculations on LSEG Refinitiv Datastream. The sample includes ESG bonds listed on Borsa Italiana. ESG bond classification relies on ICMA standards. For sector definitions, refer to The Refinitiv Business Classification (TRBC). Time to maturity is the difference between maturity data and issue date. On the left graph, quotes are computed on the total outstanding amount (number) of ESG bonds listed on Borsa Italiana. On the left graph, percentages may not add up to 100% due to rounding.

Fig. 1.20 – ESG bonds listed in Italy by domicile
(data as of 30 September 2023)



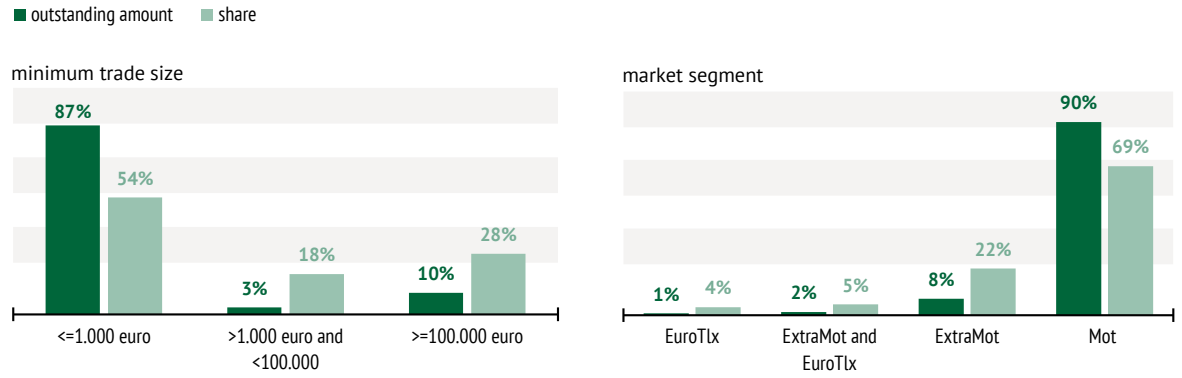
Source: calculations on LSEG Refinitiv Datastream. The sample includes ESG bonds listed on Borsa Italiana. ESG bond classification relies on ICMA standards. Quotes are computed on the total outstanding amount (number) of ESG bonds listed on Borsa Italiana.

Fig. 1.21 – ESG bonds listed in Italy by use of proceeds and yield to maturity
(data as of 30 September 2023)



Source: calculations on LSEG Refinitiv Datastream. The sample includes ESG bonds listed on Borsa Italiana. ESG bond classification relies on ICMA standards. On the left graph "access to essential services" use of proceed refers to health, education and vocational training, healthcare, financing and financial services; "general purposes" use of proceed refers to the selection of Key Performance Indicators (KPIs) and to the Calibration of Sustainability Performance Targets (SPTs). Quotes are computed on the total outstanding amount (number) of ESG bonds listed on Borsa Italiana.

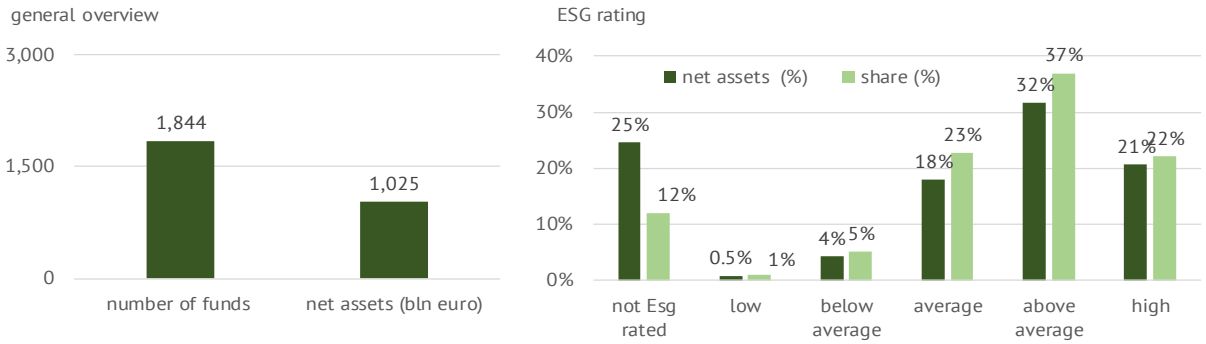
Fig. 1.22 – ESG bonds listed in Italy by minimum trade size and market segment
(data as of 30 September 2023)



Source: calculations on LSEG Refinitiv Datastream and Borsa Italiana data. The sample includes all the ESG bonds listed on Borsa Italiana. Minimum trade size means, for each series of securities, the amount of securities which can be exercised, in accordance with the regulations issued by Borsa Italiana Spa. Quotes are computed on the total outstanding amount (number) of ESG bonds listed on Borsa Italiana. Percentages may not add up to 100% due to rounding.

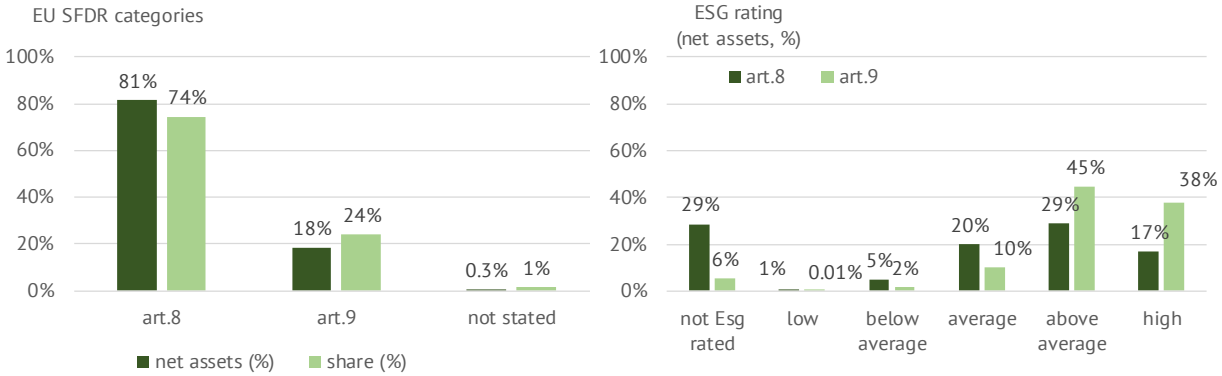
SUSTAINABLE FUNDS IN ITALY

Fig. 1.23 –Open-ended sustainable funds available for sale in Italy
(data as of 10 October 2023)



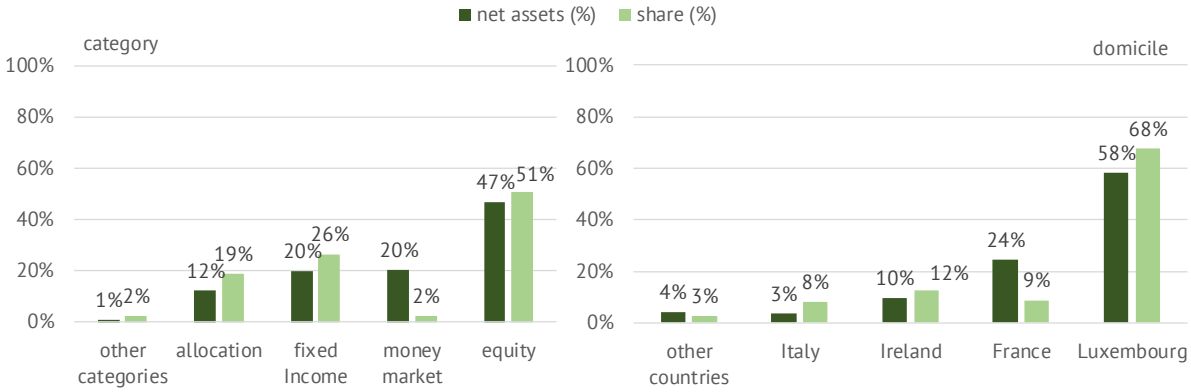
Source: calculations on Morningstar Direct data. Note: Morningstar defines funds as a sustainable investment "if the use of one or more approaches to sustainable investments is central to the investment products overall investment process based on its prospectus or other regulatory filings" (see Morningstar (2022), 'Morningstar Sustainable Attributes, Framework and definitions for the Sustainable Investment and Employs Exclusions attributes'). Funds do not include ETF. Morningstar assigns Sustainability Ratings by combining a portfolio's Corporate Sustainability Rating and Sovereign Sustainability Rating proportional to the relative weight of the (long only) corporate and sovereign positions. Sovereign Historical Sustainability Scores and Corporate Historical Sustainability Scores are ranked and rated separately, to represent the ESG risk of the portfolio relative to its peers for its respective corporate and sovereign positions, and then combined by their relative weights for the Portfolio Sustainability Rating. Higher ratings indicate that a fund is, on average, invested in fewer companies or sovereign debt with a high ESG risk under Sustainalytics' ESG Risk and Country Risk methodologies, and therefore exposed to less risk driven by E, S or G factors. ESG risk is: a) "high" if the score is in the top 10% of the distribution, b) "above average" if it is in the next 22.5%, c) "average" if it is in the next 35%, d) "below average" if it is in the next 22.5%, e) "low" if it is in the bottom 10%. Net asset amount reported in the graphs and used in the computations is the fund size which Morningstar defines as the total amount of money managed as a standalone portfolio across share classes/subaccounts. Fund size can be greater than or equal to the share class/subaccount net assets (it will be equal if only one share class is offered or the fund only appears in one policy). On the right graph, percentages may not add up to 100% due to rounding.

Fig. 1.24 – Open-ended sustainable funds available for sale in Italy by EU SFDR categories
(data as of 10 October 2023)



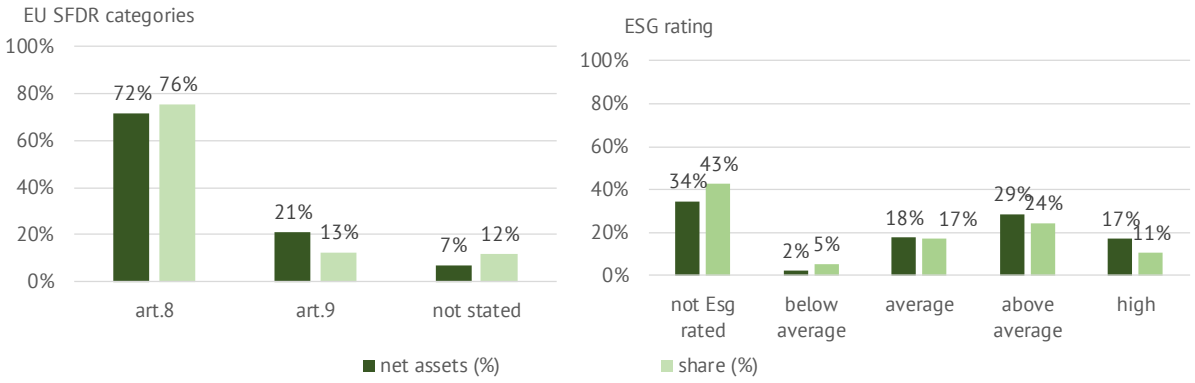
Source: calculations on Morningstar Direct data. Note: Morningstar defines funds as a sustainable investment "if the use of one or more approaches to sustainable investments is central to the investment products overall investment process based on its prospectus or other regulatory filings" (see Morningstar (2022), 'Morningstar Sustainable Attributes, Framework and definitions for the Sustainable Investment and Employs Exclusions attributes'). Funds do not include ETF. According to the EU Sustainable Finance Disclosure Regulation (SFDR), if a financial product promotes Environmental or Social Characteristics, it refers to Article 8; if it has a Sustainable Investment Objectives it refers to Article 9; if it does not fit into either category, it can be classified as "not stated". Morningstar assigns Sustainability Ratings by combining a portfolio's Corporate Sustainability Rating and Sovereign Sustainability Rating proportional to the relative weight of the (long only) corporate and sovereign positions. Sovereign Historical Sustainability Scores and Corporate Historical Sustainability Scores are ranked and rated separately, to represent the ESG risk of the portfolio relative to its peers for its respective corporate and sovereign positions, and then combined by their relative weights for the Portfolio Sustainability Rating. Higher ratings indicate that a fund is, on average, invested in fewer companies or sovereign debt with a high ESG risk under Sustainalytics' ESG Risk and Country Risk methodologies, and therefore exposed to less risk driven by E, S or G factors. ESG risk is: a) "high" if the score is in the top 10% of the distribution, b) "above average" if it is in the next 22.5%, c) "average" if it is in the next 35%, d) "below average" if it is in the next 22.5%, e) "low" if it is in the bottom 10%. Net asset amount reported in the graphs and used in the computations is the fund size which Morningstar defines as the total amount of money managed as a standalone portfolio across share classes/subaccounts. Fund size can be greater than or equal to the share class/subaccount net assets (it will be equal if only one share class is offered or the fund only appears in one policy). Percentages may not add up to 100% due to rounding.

Fig. 1.25 – Open-ended sustainable funds available for sale in Italy by asset category and domicile
(data as of 10 October 2023)



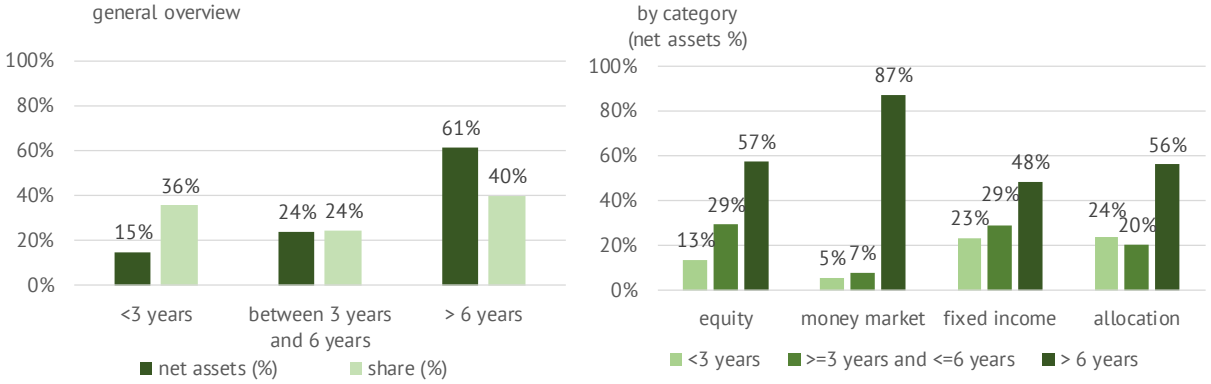
Source: calculations on Morningstar Direct data. Note: Morningstar defines funds as a sustainable investment "if the use of one or more approaches to sustainable investments is central to the investment products overall investment process based on its prospectus or other regulatory filings" (see Morningstar (2022), 'Morningstar Sustainable Attributes, Framework and definitions for the Sustainable Investment and Employs Exclusions attributes'). Funds do not include ETF. On the left graph we represent Morningstar Global Broad Category Groups. "Allocation" funds invest in three major areas, that are stocks, bonds, and cash; "fixed income" funds invest primarily in bonds or other debt securities; "money market" funds invest in money market instruments; "equity" funds invest most of their assets in stocks; "other categories" include: "alternative", "commodities", "convertibles", "real estate". Net asset amount reported in the graphs and used in the computations is the fund size which Morningstar defines as the total amount of money managed as a standalone portfolio across share classes/subaccounts. Fund size can be greater than or equal to the share class/subaccount net assets (it will be equal if only one share class is offered or the fund only appears in one policy). Percentages may not add up to 100% due to rounding.

Fig. 1.26 – Open-ended sustainable funds domiciled in Italy by EU SFDR categories
(data as of 10 October 2023)



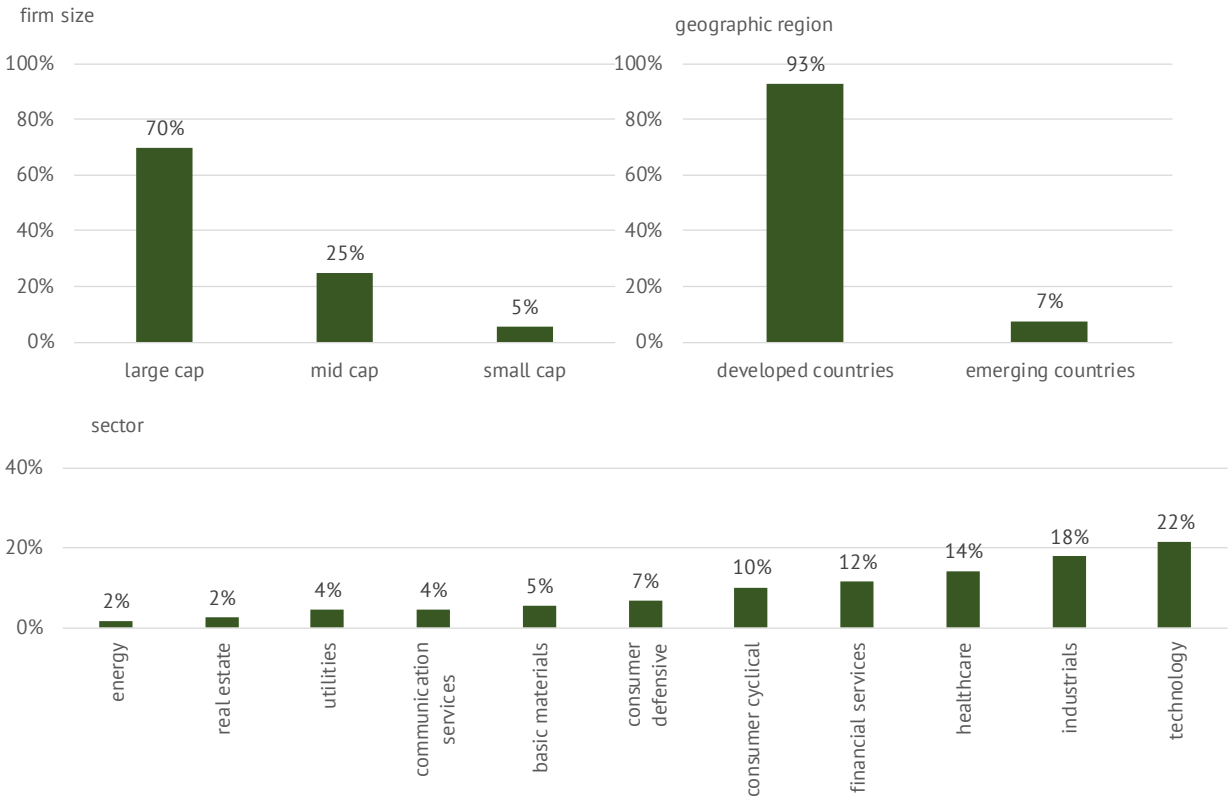
Source: calculations on Morningstar Direct data. Note: Morningstar defines funds as a sustainable investment "if the use of one or more approaches to sustainable investments is central to the investment products overall investment process based on its prospectus or other regulatory filings" (see Morningstar (2022), 'Morningstar Sustainable Attributes, Framework and definitions for the Sustainable Investment and Employs Exclusions attributes'). Funds do not include ETF. According to the EU Sustainable Finance Disclosure Regulation (SFDR), if a financial product promotes Environmental or Social Characteristics, it refers to Article 8; if it has a Sustainable Investment Objectives it refers to Article 9; if it does not fit into either category, it can be classified as "not stated". Morningstar assigns Sustainability Ratings by combining a portfolio's Corporate Sustainability Rating and Sovereign Sustainability Rating proportional to the relative weight of the (long only) corporate and sovereign positions. Sovereign Historical Sustainability Scores and Corporate Historical Sustainability Scores are ranked and rated separately, to represent the ESG risk of the portfolio relative to its peers for its respective corporate and sovereign positions, and then combined by their relative weights for the Portfolio Sustainability Rating. Higher ratings indicate that a fund is, on average, invested in fewer companies or sovereign debt with a high ESG risk under Sustainalytics' ESG Risk and Country Risk methodologies, and therefore exposed to less risk driven by E, S or G factors. ESG risk is: a) "high" if the score is in the top 10% of the distribution, b) "above average" if it is in the next 22.5%, c) "average" if it is in the next 35%, d) "below average" if it is in the next 22.5%, e) "low" if it is in the bottom 10%. Net asset amount reported in the graphs and used in the computations is the fund size which Morningstar defines as the total amount of money managed as a standalone portfolio across share classes/subaccounts. Fund size can be greater than or equal to the share class/subaccount net assets (it will be equal if only one share class is offered or the fund only appears in one policy). Percentages may not add up to 100% due to rounding.

Fig. 1.27 – Open-ended sustainable funds available for sale in Italy by age
(data as of 10 October 2023)



Source: calculations on Morningstar Direct data. Note: Morningstar defines funds as a sustainable investment "if the use of one or more approaches to sustainable investments is central to the investment products overall investment process based on its prospectus or other regulatory filings" (see Morningstar (2022), 'Morningstar Sustainable Attributes, Framework and definitions for the Sustainable Investment and Employs Exclusions attributes'). Funds do not include ETF. Age is computed as the difference between current date (09-10-2023) and the inception date. Percentages may not add up to 100% due to rounding.

Fig. 1.28 – Open-ended sustainable funds available for sale in Italy by equity asset style
(data as of 10 October 2023)



Source: calculations on Morningstar Direct data. Note: Morningstar defines funds as a sustainable investment "if the use of one or more approaches to sustainable investments is central to the investment products overall investment process based on its prospectus or other regulatory filings" (see Morningstar (2022), 'Morningstar Sustainable Attributes, Framework and definitions for the Sustainable Investment and Employs Exclusions attributes'). Funds do not include ETF. In the graphs, net asset weighted percentages of portfolios equity assets invested in stocks displaying the relevant size, geographic area and sector criteria are represented.

Criptoattività

Cryptoassets

Dimensione dei mercati

Principali dinamiche dei mercati

Interconnessioni con mercati tradizionali

Profili di cybersecurity

Interesse nelle criptoattività

Size of the markets

Main markets trends

Linkages with traditional markets

Cybersecurity issues

Interest in cryptoassets

Dimensione dei mercati

Principali dinamiche dei mercati

Size of the markets

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Interesse nelle criptoattività

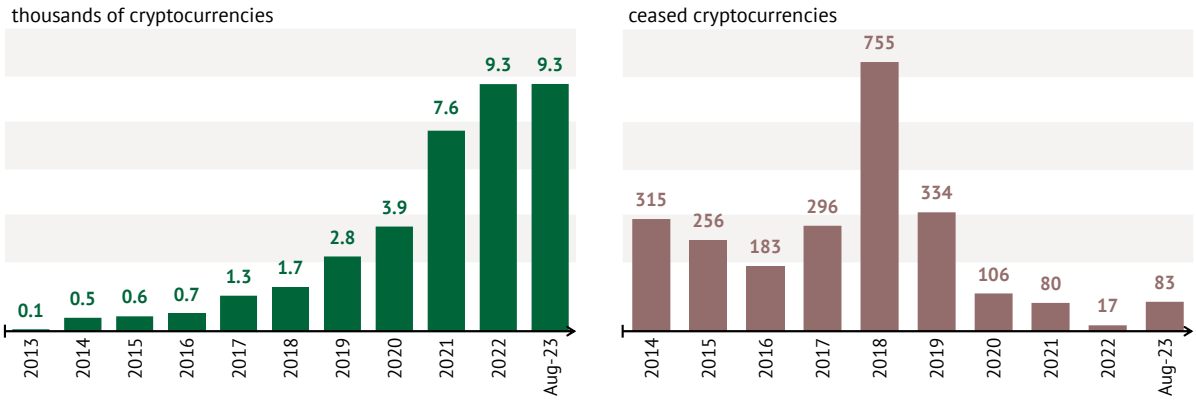
Linkages with traditional markets

Cybersecurity issues

Interest in cryptoassets

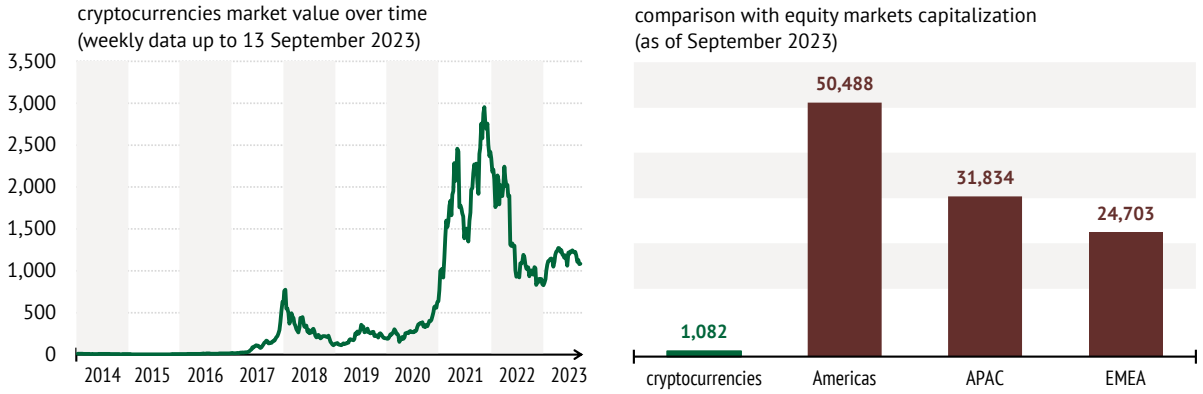
SIZE OF THE MARKETS

Fig. 2.1 – Number of cryptocurrencies over time



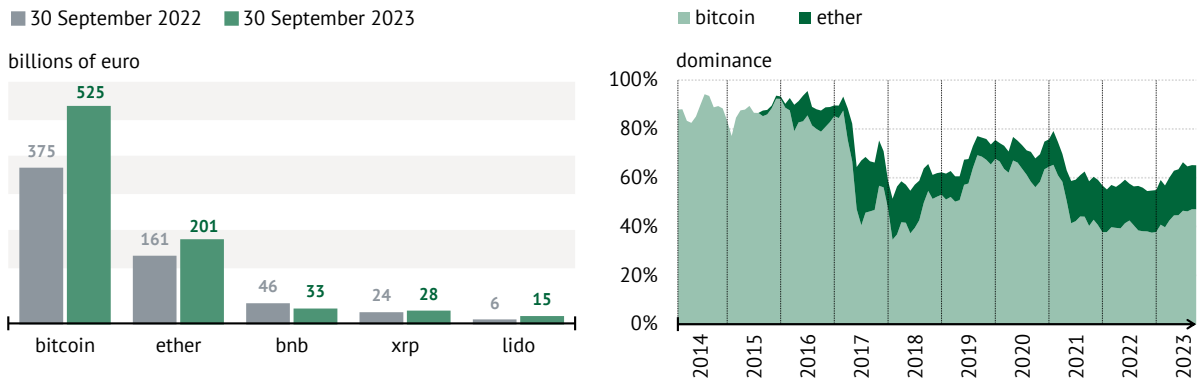
Source: calculations on Statista data and Coinopsy data https://www.coinopsy.com/dead-coins/. Figure on the right refers to cryptocurrencies that: have been abandoned, used as scam, whose website is down, have no nodes, have wallet issues, don't have social updates, have low volume or whose developers have walked away from the project.

Fig. 2.2 – Market value of main cryptocurrencies and equity markets capitalisation
(billions of USD)



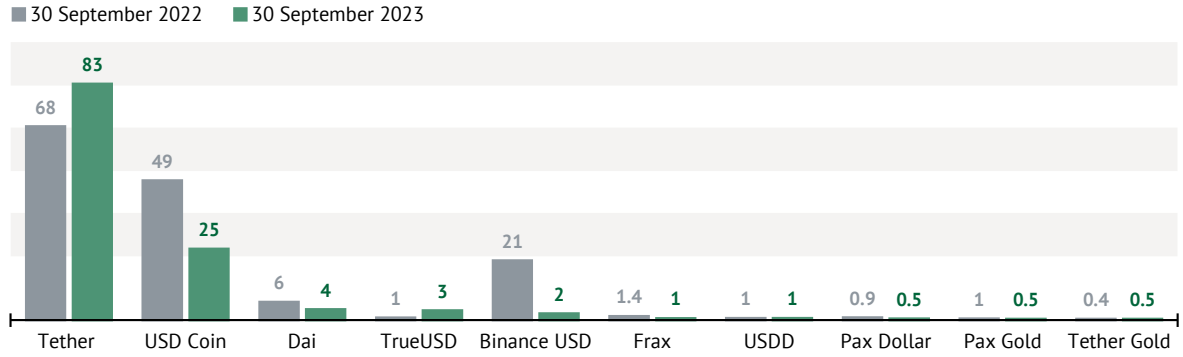
Source: calculations on Coingecko, Statista and World Federation of Exchanges data.

Fig. 2.3 – Main cryptocurrencies by market value and dominance of bitcoin and ether



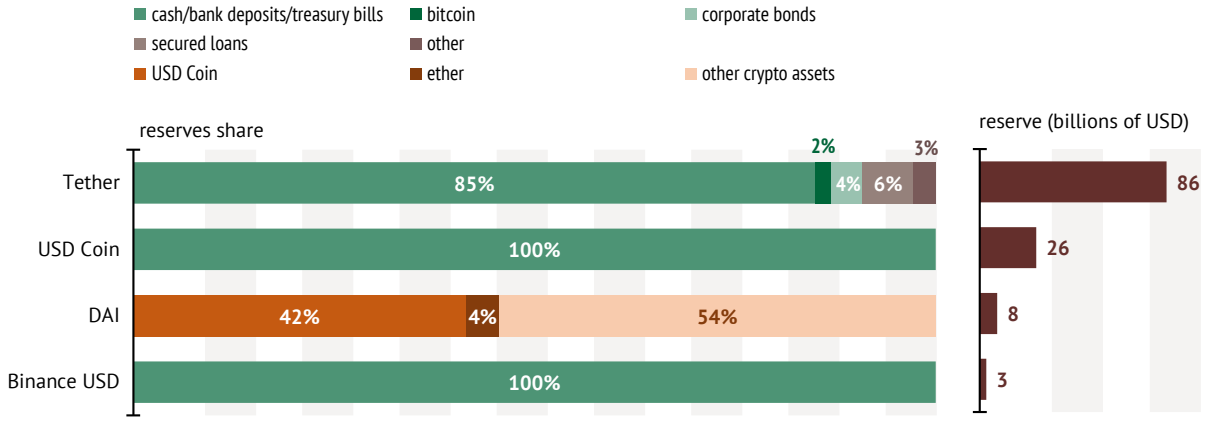
Source: calculations on Coingecko, and Statista data. Figure on the left includes cryptocurrencies with the highest market value as of 30 September 2023.

Fig. 2.4 – Main stablecoins by market value
(billions of USD)



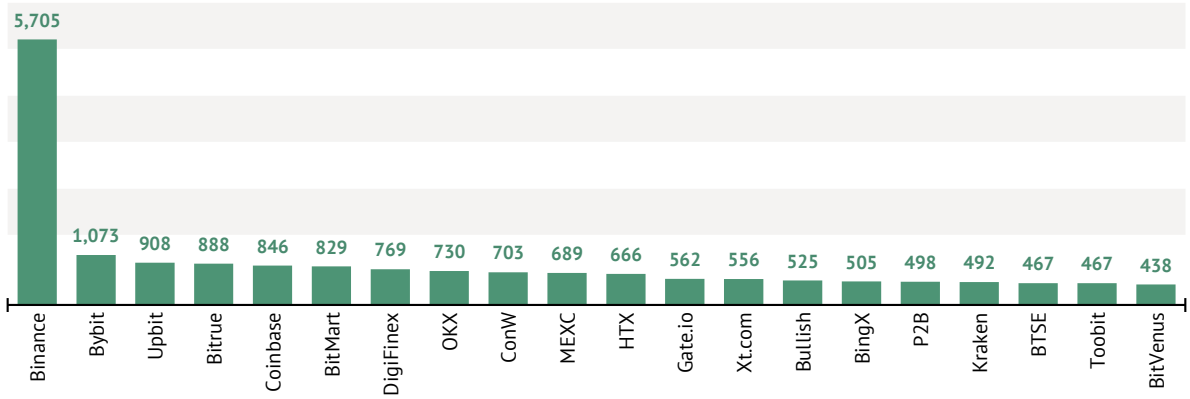
Source: calculations on Coingecko data. Figure includes stablecoins with the highest market value as of 30 September 2023.

Fig. 2.5 – Reserves of the main stablecoins



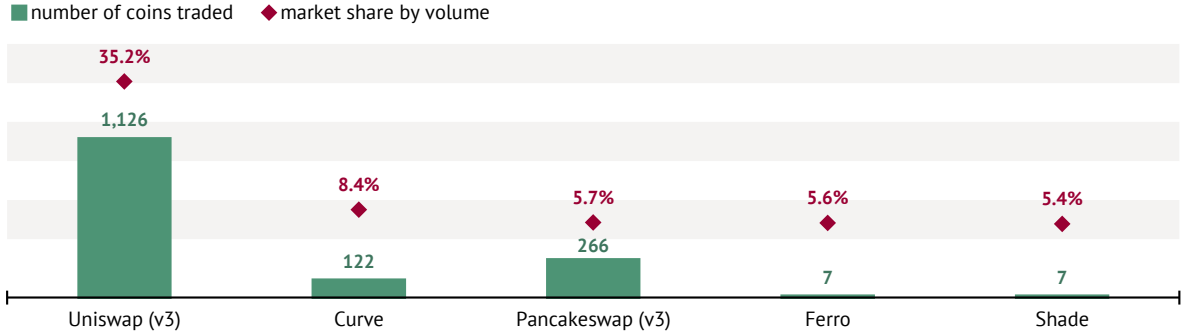
Source: Company websites. Reserves are as of June 2023 for Tether, August 2023 for USD Coin, October 2023 for DAI and August 2023 for Binance USD. At the time DAI collateralisation is more than 140% while the other stablecoins have assets valued at least equal to their outstanding issuance.

Fig. 2.6 – Main cryptocurrency centralised exchanges
(data as of 11 October 2023; 24h volumes; millions of USD)



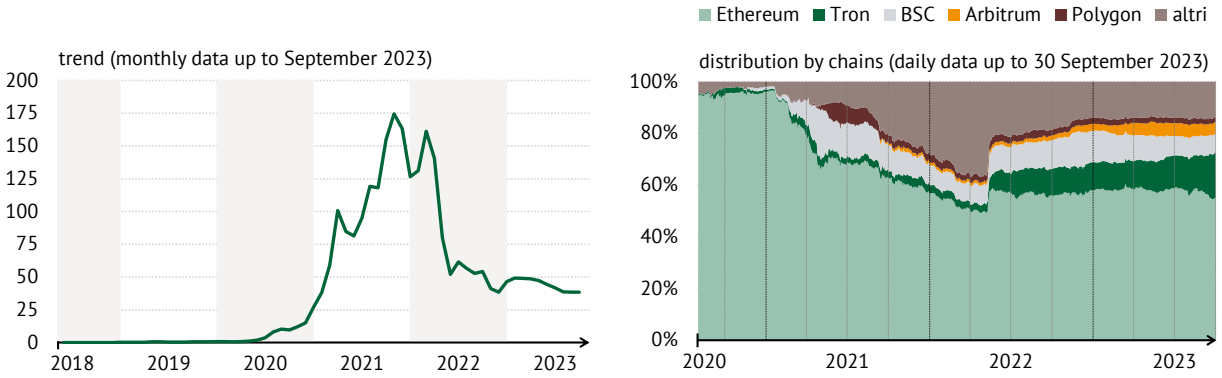
Source: Coingecko. https://www.coingecko.com/it/cambi.

Fig. 2.7 – Main cryptocurrency decentralised exchanges
(data as of 11 October 2023)



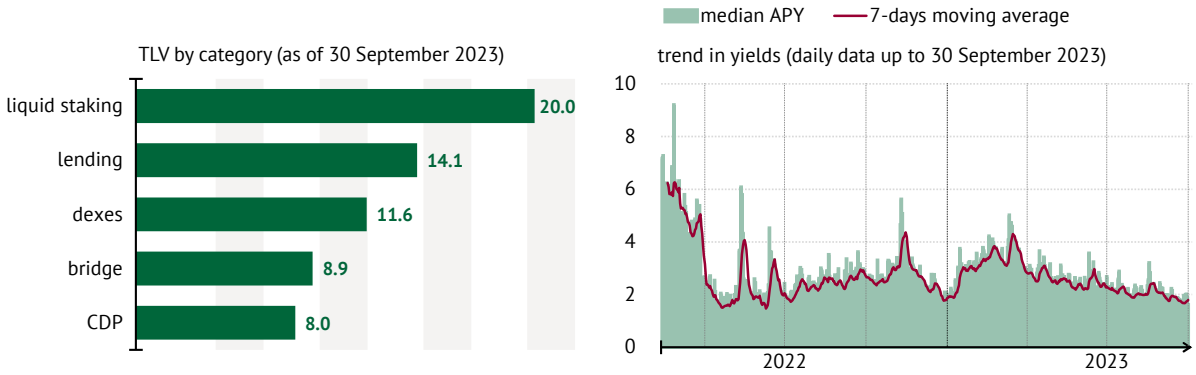
Source: CoinGecko, https://www.coingecko.com/it/cambi/decentralized. Market share by volume is the percentage of total volume traded on all the decentralised exchanges as it is reported by CoinGecko. The Uniswap figure refers to two decentralised platforms, namely Uniswap V3 (Ethereum) and Uniswap V3 (Arbitrum One), with a market share of 27% and 8.2% respectively.

Fig. 2.8 –Total value locked in DeFi protocols and distribution by blockchain
(billions of USD)



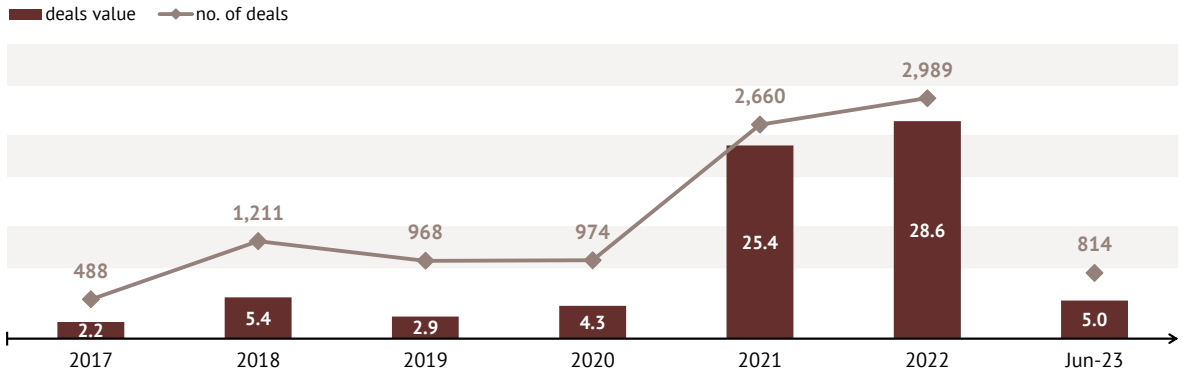
Source: calculation on DefiLlama and Statista data. Total value locked is the total value of cryptoassets locked in DeFi applications and is calculated as total number of tokens held by a protocol multiplied by token price expressed in USD.

Fig. 2.9 – Main categories of DeFi and median yields



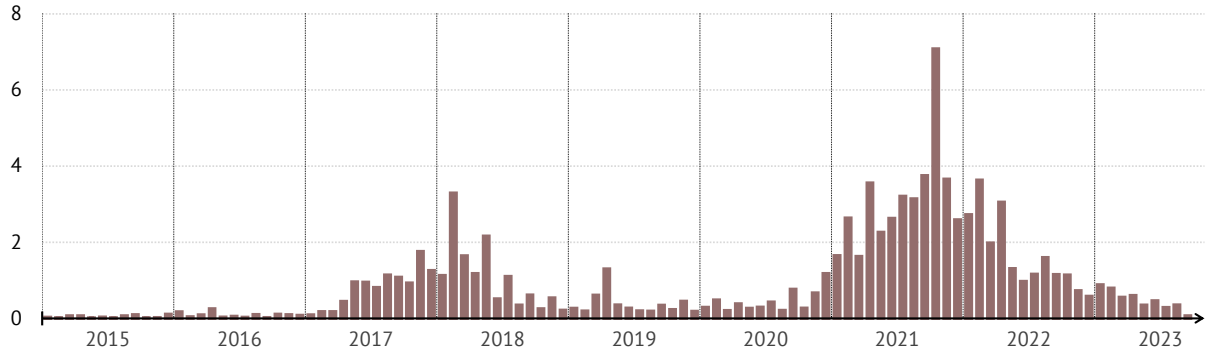
Source: calculations on DefiLlama data. In the figure on the left 'TLV' stands for total value locked, while 'liquid staking' includes protocols that enable users to stake the native assets of a blockchain in exchange for both staking rewards and a tradeable tokenized representation of the staked position, 'lending' includes protocols that allow users to borrow and lend assets, 'dexes' includes protocols where users can swap/trade cryptocurrency, 'bridge' includes protocols that bridge tokens from one network to another and 'CDP' includes protocols that mint its own stablecoin using collateralised lending. Figure on the right refers to data relative to 8,625 liquidity pools; 'APY' stands for average percentage yield.

Fig. 2.10 – Global venture capital investments in crypto companies
(billions of USD)



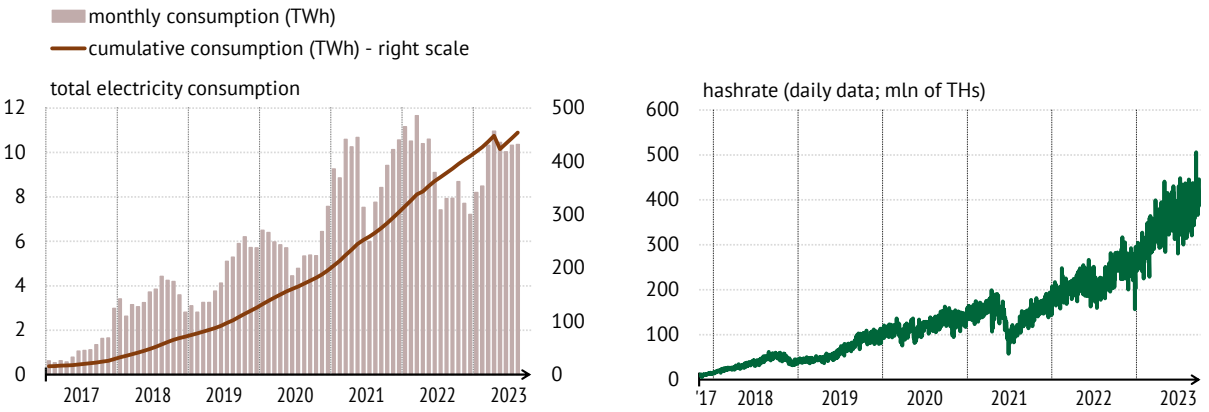
Source: PitchBook, Q2 2023 Crypto Report; https://pitchbook.com/news/reports/q2-2023-crypto-report.

Fig. 2.11 – Funding amount raised by DeFi projects
(monthly data up to September 2023; billions of USD)



Source: DefiLlama; https://defillama.com/raises.

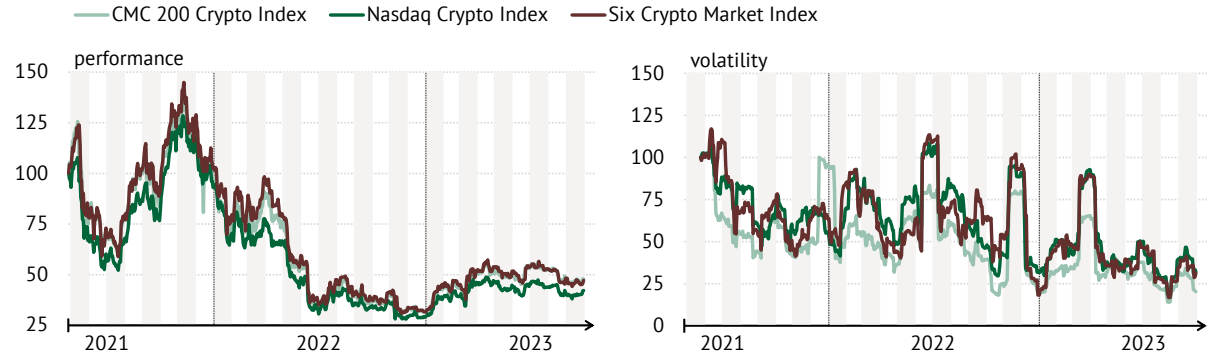
Fig. 2.12 – Total Bitcoin energy consumption and hashrate
(data up to September 2023)



Source: Cambridge Energy Consumption Index and Coinmetrics. In the figure on the left monthly electricity consumption is computed as the sum of daily consumption data calculated by assuming constant power usage over 24 hours at the daily best-guess estimate of Bitcoin's network power demand. The cumulative consumption is the sum of monthly totals. In the figure on the right, hash rate measures the total computing power in Bitcoin proof-of-work network.

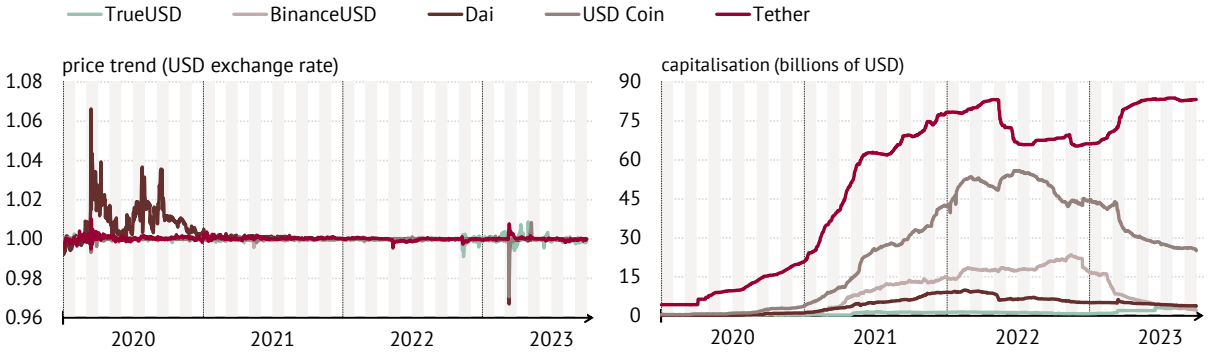
MAIN MARKETS TRENDS

Fig. 2.13 – Trends in cryptocurrency markets
(daily data up to 30 September 2023; 26 April 2021=100)



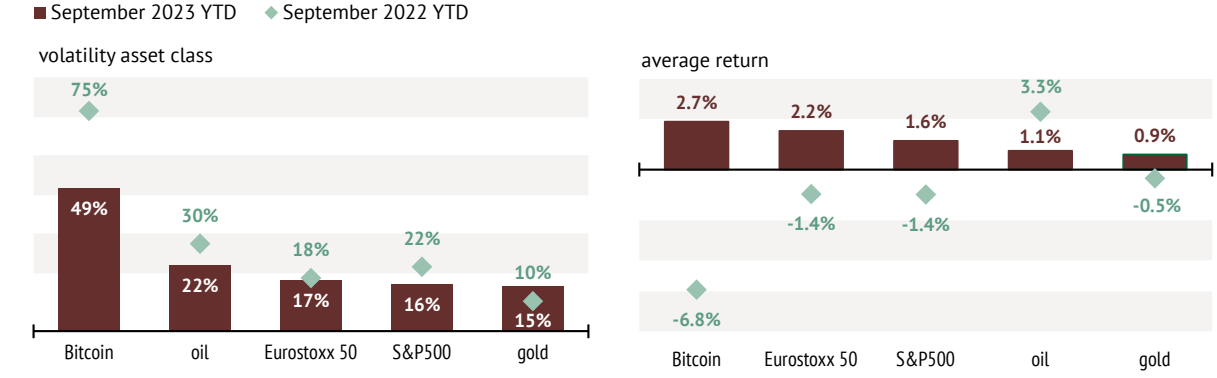
Source: calculations on LSEG Refinitiv Datastream data. Nasdaq crypto index tracks the performance of digital assets traded in USD; its composition as of 30 September 2023 is: bitcoin (weight equal to 67%), ether (31%), litecoin (0.74%), chainlink (0.57%), polkadot (0.35%), stellar lumens (0.34%), uniswap (0.26%), ethereum classic (0.17%). CMC 200 Index includes first 200 cryptocurrencies by market value. Six Swiss 10 crypto index includes the first 10 cryptocurrencies by market value traded on Swiss Stock Exchange. Figure on the right refers to 20-days annualised historical volatility.

Fig. 2.14 –Trends in stablecoin markets
(daily data up to 30 September 2023)



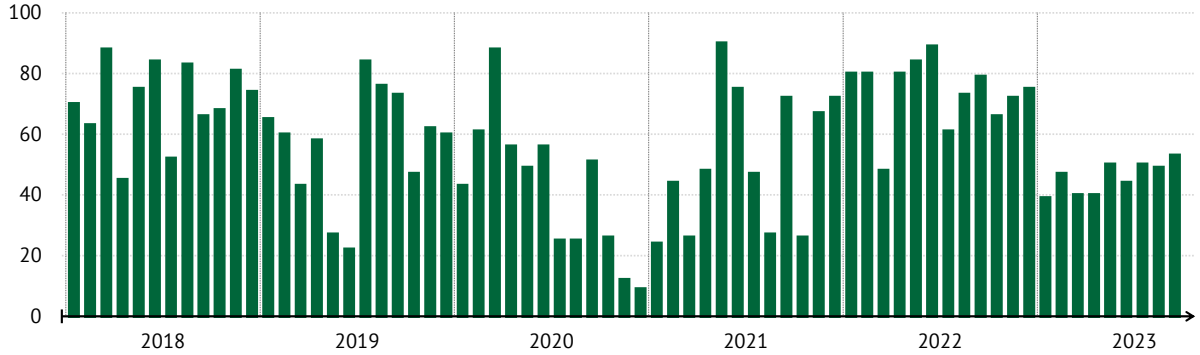
Source: CoinMetrics.

Fig. 2.15 – Bitcoin returns and volatility compared to non-digital assets
(average values between September 2022 and September 2023)



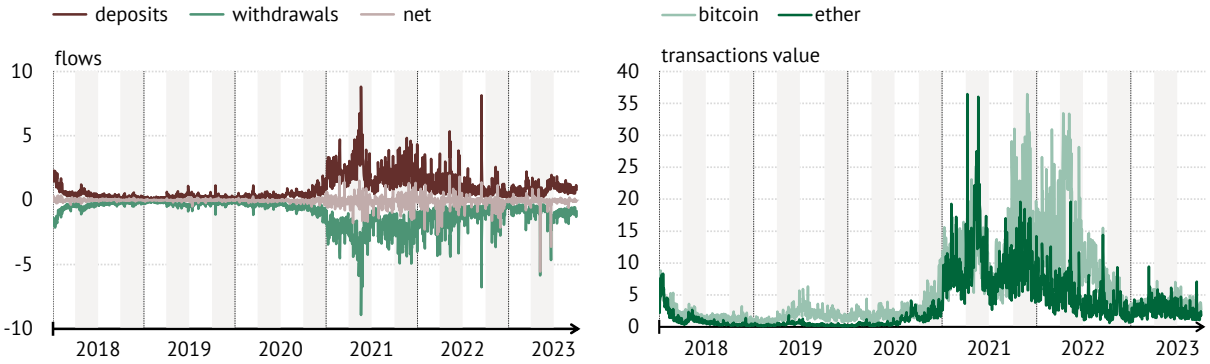
Source: calculations on LSEG Refinitiv Datastream data. Figure on the left reports volatility as the annualised standard deviation computed on monthly returns from 30 September 2022 to 30 September 2023. Figure on the right reports monthly average returns.

Fig. 2.16 – Sentiment towards cryptocurrencies
(monthly data up to September 2023)



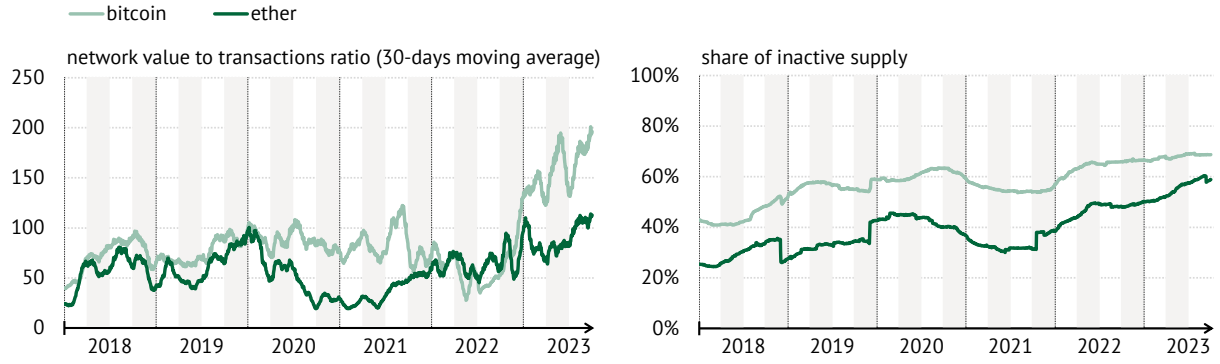
Source: calculations on Alternative.me data, https://alternative.me/crypto/fear-and-greed-index/. The sentiment index is calculated as the complement to 100 of Crypto Fear & Greed Index developed by Alternate.me which uses social signals and market trends to determine the overall sentiment of the crypto market, based on bitcoin and other large cryptocurrencies. It is based on five key metrics: volatility, market volume, social media interaction rate about main cryptocurrencies, dominance of Bitcoin, interest in Bitcoin based on the number of searches on the web. A value of 100 means 'extreme fear'.

Fig. 2.17 – Net flows and transactions value in cryptocurrencies exchanges
(daily data up to 30 September 2023, billions of USD)



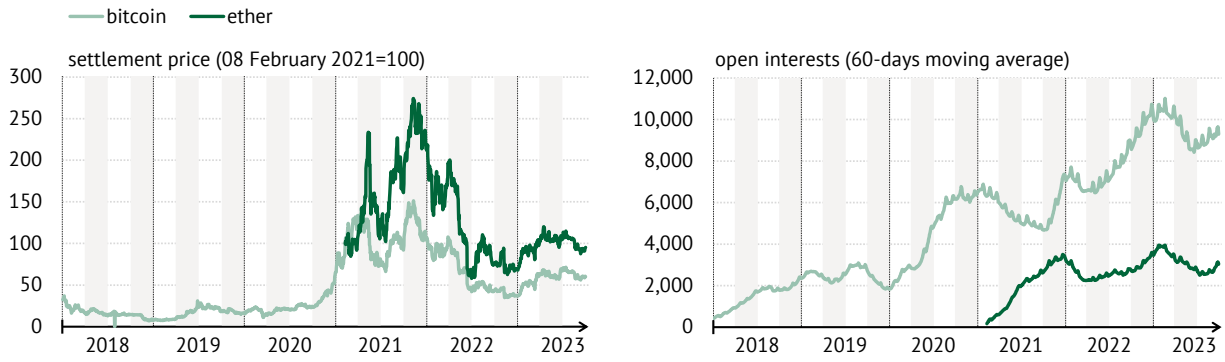
Source: calculations on Coinmetrics data. Data on flows refer to bitcoin and ether.

Fig. 2.18 – Network value to transactions ratio and share of inactive supply in cryptocurrencies exchanges
(daily data up to 30 September 2023)



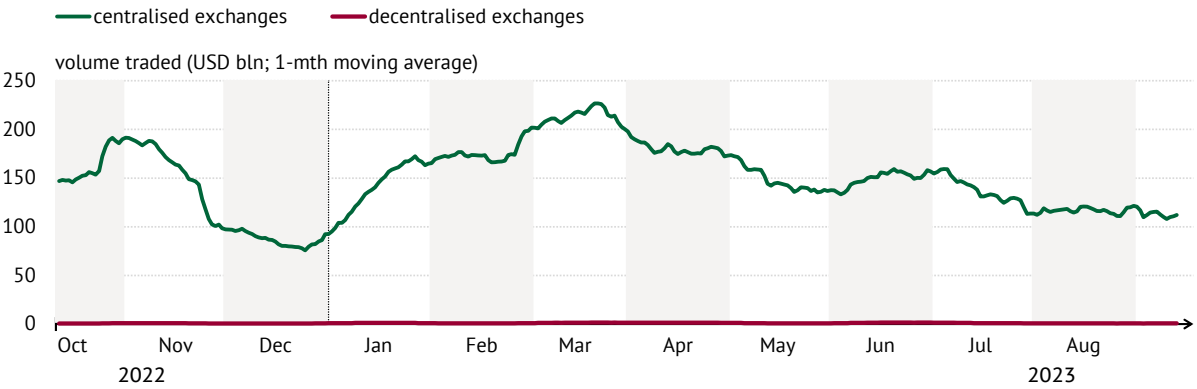
Source: calculations on Coinmetrics data. The share of inactive supply is calculated as the complement to 100% of the ratio between the active supply and the total market value. The active supply represents the cumulative market value related to addresses that have carried out at least one transaction in the last year.

Fig. 2.19 – Trends in futures of main cryptocurrencies
(daily data up to 30 September 2023)



Source: calculations on LSEG Refinitiv Datastream data. Figures refer to indexes of bitcoin and ether futures on Chicago Mercantile Exchange.

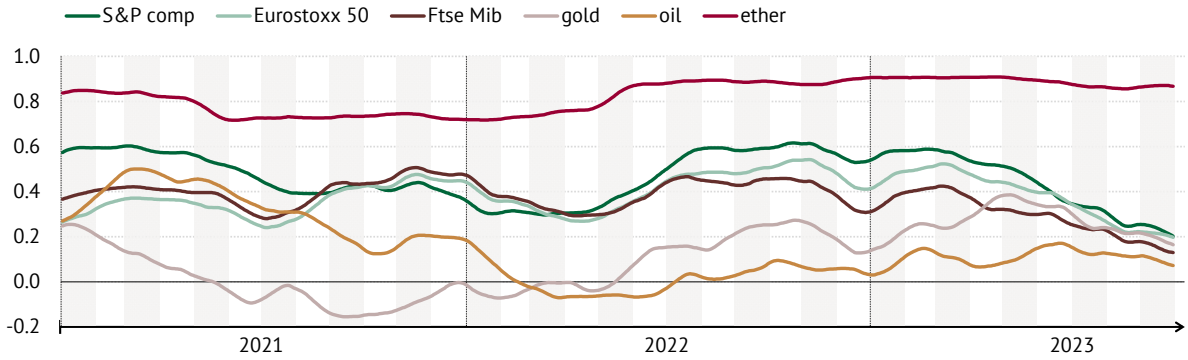
Fig. 2.20 – Turnover of crypto derivatives exchanges
(daily data up to 30 September 2023)



Source: calculations on Coingecko data. Data are related to the main crypto derivatives markets, 49 centralised exchanges and 10 decentralised exchanges. The volume traded is represented as an amount.

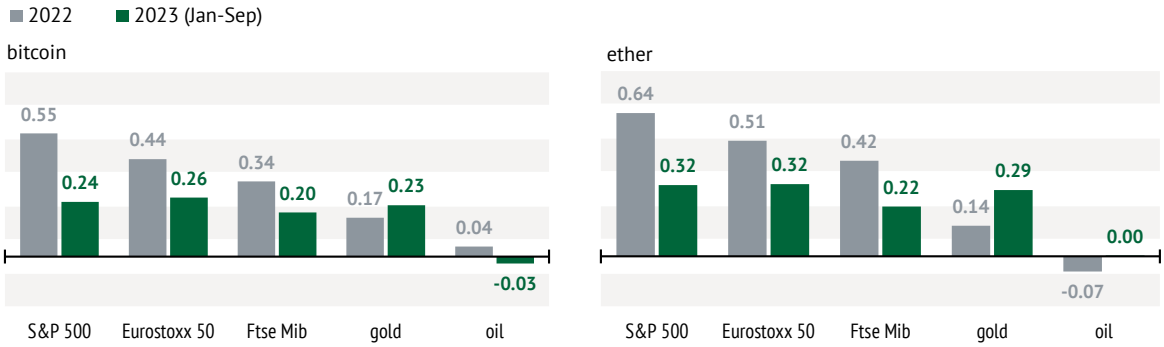
LINKAGES WITH TRADITIONAL MARKETS

Fig. 2.21 – Trends in the interconnection among bitcoin and selected assets
(daily data up to 30 September 2023)



Source: calculations on LSEG Refinitiv Datastream data. Figure reports the 260-days moving averages of 30-days pairwise correlations between bitcoin and S&P500, Eurostoxx 50, Ftse Mib, ether, gold and oil price. Gold correlations are computed on DJ Commodity Index Gold and oil correlation are computed on Goldman Sachs Commodity Index Crude Oil Spot.

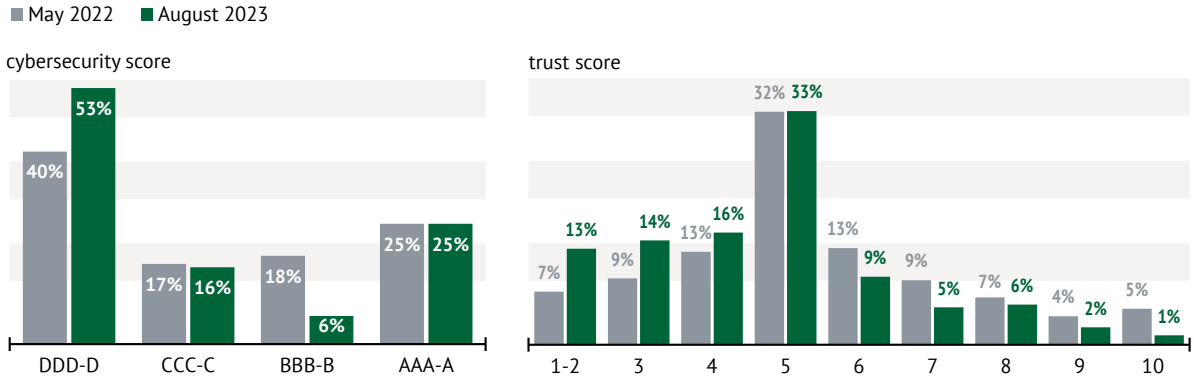
Fig. 2.22 – Average interconnection among main cryptocurrencies and selected assets over selected periods



Source: calculations on LSEG Refinitiv Datastream data. Figure reports the average 30-days pairwise correlations over the selected periods. Gold correlations are computed on DJ Commodity Index Gold and oil correlation are computed on Goldman Sachs Commodity Index Crude Oil Spot.

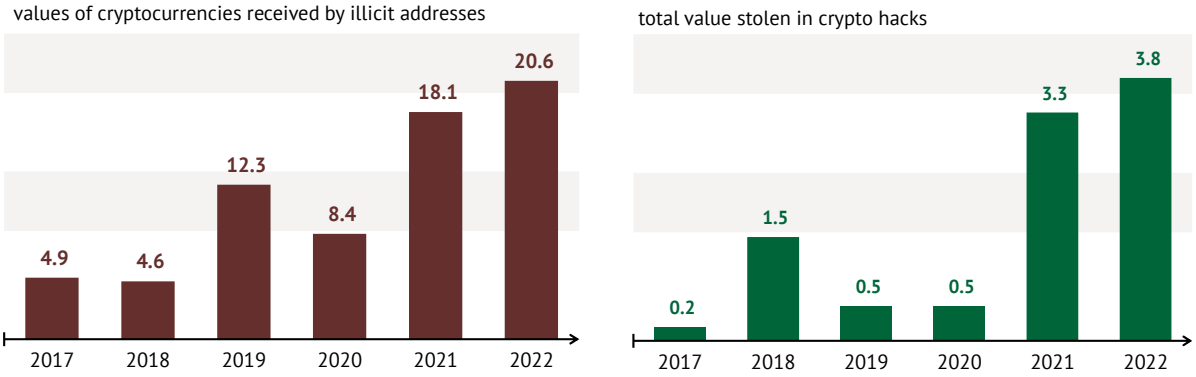
CYBERSECURITY ISSUES

Fig. 2.23 – Centralised cryptocurrencies exchanges by cybersecurity and trust scores
(distribution by score)



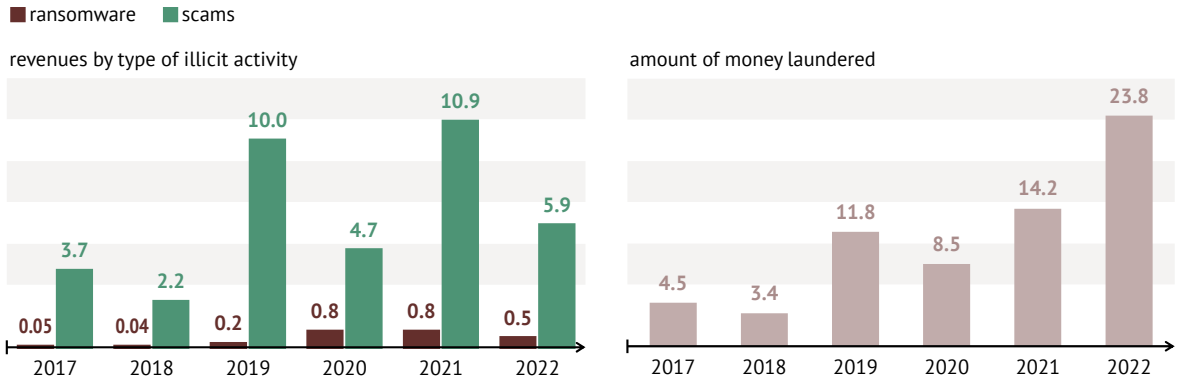
Source: Coingecko. Figure on the left reports data referring to 188 exchange platforms that are currently assigned a cyber score. The cyberscore evaluates how well prepared an exchange is against external facing threats towards its platform (servers, web services, front-end), users (account safety features) etc. Figure on the right reports data referring to 538 platforms that are currently assigned a trust score. The trust score is an indicator of the availability and the reliability of statistics (such as volume traded, historical trading data, bid-ask spreads, tickers data, order book data) provided by the platform; the higher the values of the trust score the higher is rated the information made available by the platform. For methodological details on trust and cyber score see https://blog.coingecko.com/trust-score-explained/.

Fig. 2.24 – Cryptocurrencies received by illicit addresses and stolen funds in crypto hacks globally
(billions of USD)



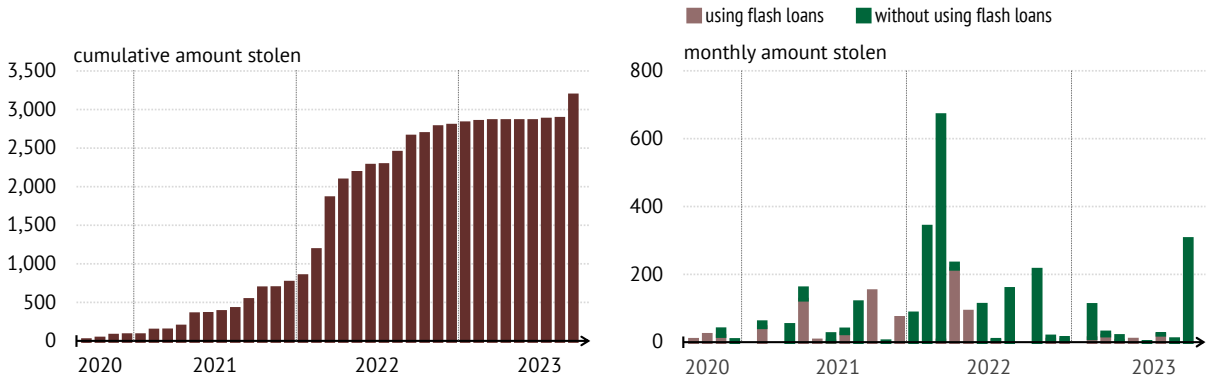
Source: Chainalysis. The 2023 Crypto Crime Report.

Fig. 2.25 – Revenues by type of illicit activity and money laundering in cryptocurrencies
(billions of USD)



Source: Chainalysis "The 2023 Crypto Crime Report". Ransomware is a type of malware that prevents or limits users from accessing their system, either by locking the system's screen or by locking the users' files. Crypto scams include various fraudulent activities such as fake websites, phishing, pump and dump schemes, fake apps, etc.

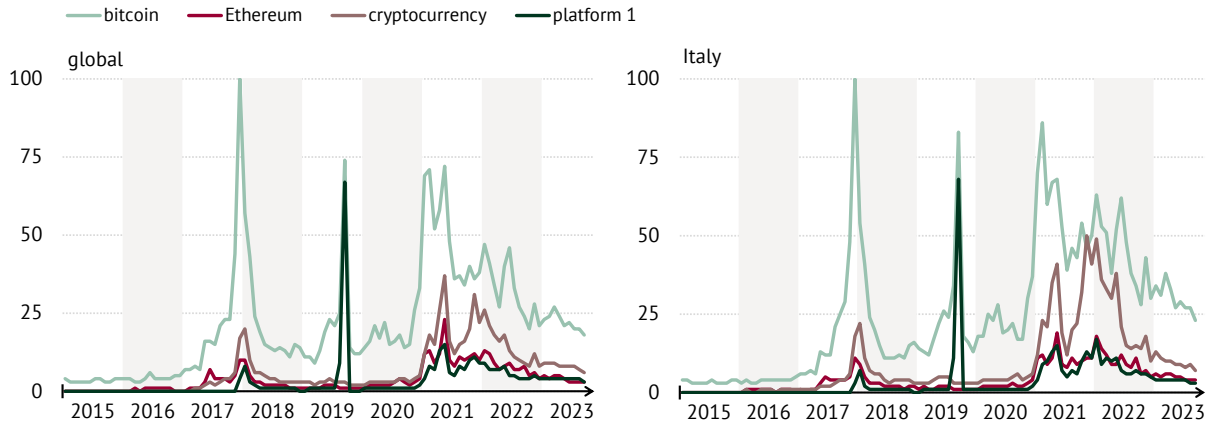
Fig. 2.26 – Amount of stolen funds from DeFi projects by hackers
(monthly data up to September 2023; amounts in millions of USD)



Source: The Block, https://www.theblockcrypto.com/data/decentralized-finance/exploits. Flash loans are undercollateralised lending features commonly used in DeFi hacks.

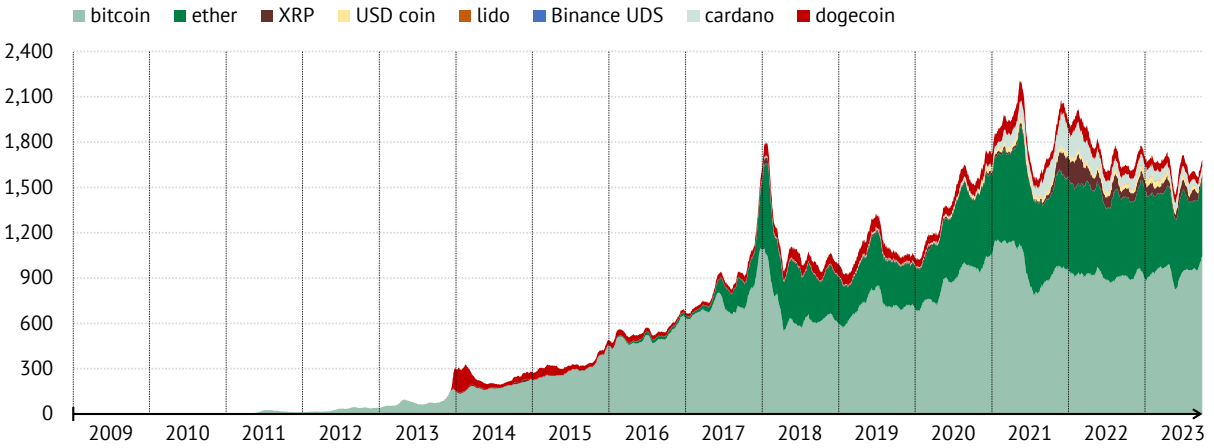
INTEREST IN CRYPTOASSETS

Fig. 2.27 – Interest in cryptocurrencies over time based on web searches
(monthly data up to September 2023)



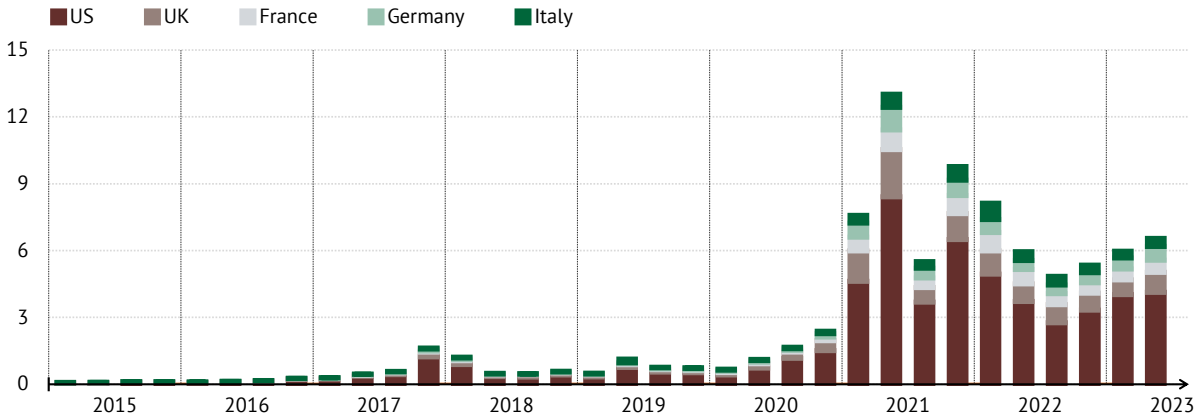
Source: Google Trends. Volume of searches made on Google of the words 'bitcoin', 'Ethereum', 'cryptocurrency' and the name of the largest crypto exchange platform (platform 1 in the graphs). Indices are calculated as the ratio between the number of searches on a topic and the total number of searches made in each geographical area over the period considered. Indices range between 0 and 100, where 100 represents the highest frequency of searches detected.

Fig. 2.28 – Active addresses of the main cryptocurrencies
(daily data up to 30 September 2023, thousands of addresses)



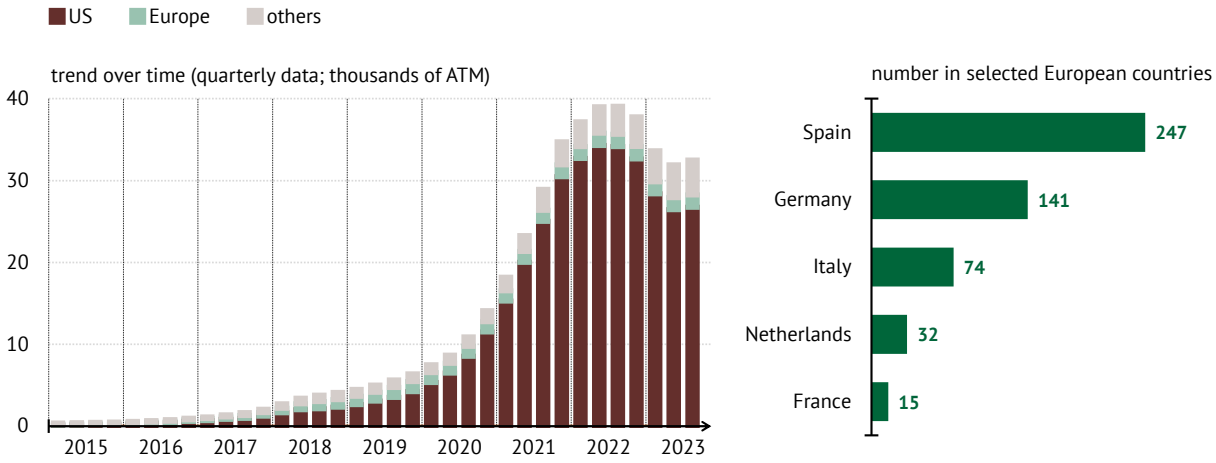
Source: calculations on Coinmetrics data.

Fig. 2.29 – Biggest wallets for cryptocurrency storage in selected countries
(quarterly data up to Q2 2023; millions of downloads)



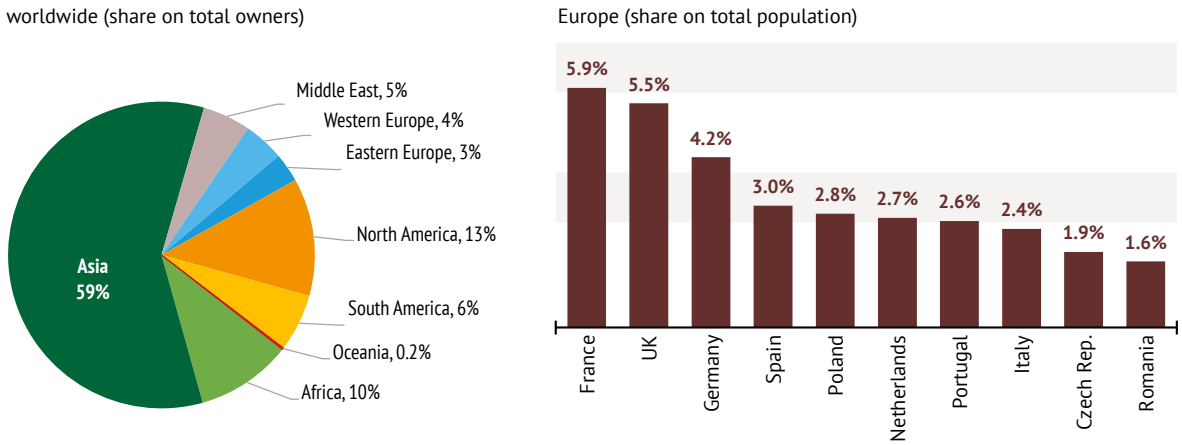
Source: calculations on Statista data.

Fig. 2.30 – Number of crypto ATM installations worldwide



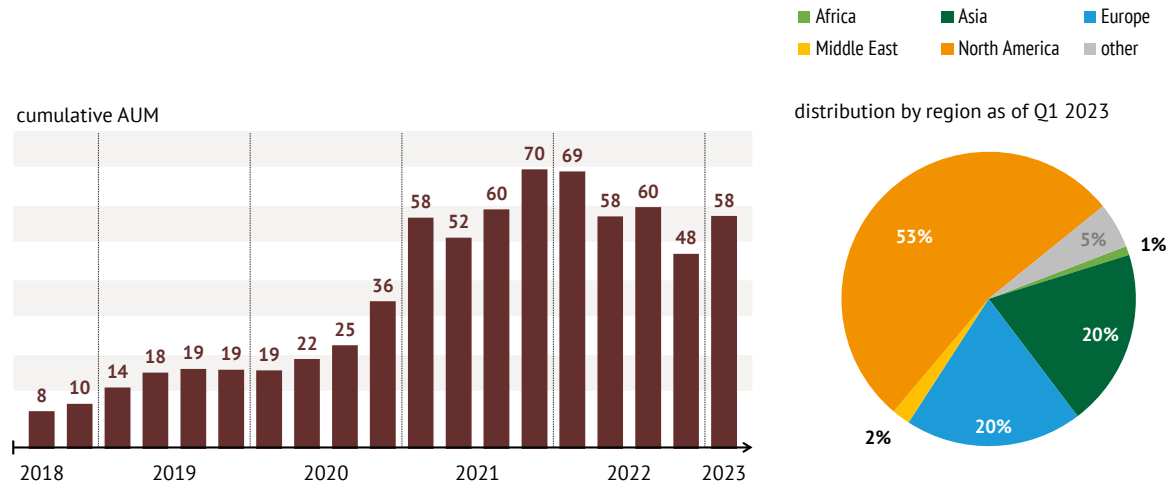
Source: calculations on Crypto ATM radar data, https://coinatmradar.com/charts/growth/ and https://coinatmradar.com/charts/geo-distribution/.

Fig. 2.31 – Owners of cryptoassets by area and country
(annual data as of 2022)



Source: TripleA; https://triple-a.io/crypto-ownership/.

Fig. 2.32 – Assets under management of funds investing in cryptoassets
(quarterly data up to Q1 2023; amounts in billions of USD)



Source: Crypto Fund Research; https://cryptofundresearch.com/q3-2023-crypto-fund-report/. Figures refer to crypto hedge funds, venture funds, hybrid funds, private equity funds, fund of funds, and passive funds. Regional composition is based on the fund's primary office location.