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Abstract

In recent years, cryptocurrencies have transitioned from experimental assets, traded in the dark corners of the internet, to widespread investment alternatives found in the portfolios of everyday investors. This paper investigates the extent of cryptocurrency investment in Norway and identifies who owns these cryptocurrencies. First, we use Norwegian tax records to investigate the cryptocurrency portfolios reported for tax purposes. All Norwegian taxpayers are obliged to report the market value of their cryptocurrency at year-end. The tax records reveal that almost 1 percent of Norwegian taxpayers declare owning cryptocurrencies. They also let us map out cryptocurrency ownership across the income, wealth, and age distribution in Norway. We show that, although distinctly younger, cryptocurrency owners are similar to owners of other kinds of assets in terms of wealth. Nonetheless, as cryptocurrencies are self-reported, the figures observed in tax returns are likely under-reported. In the second part of the paper, we attempt to account for this by merging tax record abstracts of all Norwegian taxpayers in 2021 with the list of depositors on the cryptocurrency platform Celsius as of April 2022. Less than half of the Norwegian taxpayers with a Celsius account reported any cryptocurrency wealth to the tax administration three months prior.

1 Introduction

The emergence of entirely new asset classes is rare. The invention of Bitcoin in 2008, followed by the widespread adoption of it and other digital currencies in the decade that followed, was such an event. The rise of cryptocurrency as a brand-new asset class raises a series of questions: Who are the adopters of this new asset class? How can tax administrations monitor and tax an asset that exists outside the traditional financial system and current reporting channels? Can the adoption rate in the population be measured by surveys?

The work on cryptocurrency is still limited, due to the novelty of the asset class and its position outside traditional reporting channels. However, some studies have started to emerge using survey data or data from platforms, either directly or through observing bank account payments into them (Weber et al. (2023), Aiello et al. (2023a), Kogan et al. (2023)). This paper is the first of our knowledge to use the information registered in tax records to describe the investors in cryptocurrency. Crucially, we also attempt to measure and correct for the potential under-reporting of cryptocurrency in tax records using independent evidence on under-reporting.

This lets us document four key facts. First, maybe not surprisingly, investors in cryptocurrencies are younger than the general population. Second, the majority of cryptocurrency investors do not report their holdings to the tax administration. Third, there is a clear wealth gradient to ownership of cryptocurrency, even when ranking by non-cryptocurrency wealth. Fourth, according to our estimates, the overall adoption of cryptocurrency in the Norwegian population, at the end of 2021, is around 2.3 percent. This is markedly below prior estimates from surveys of the Norwegian population, which have pointed to an adoption rate of around 10 percent in early 2022 (Arcane Research and EY, 2022).

To provide these insights, we rely on the creative use of novel data sources. The first data source is the universe of Norwegian tax records in 2021. These have something rather unique in that all Norwegian taxpayers are obliged to report their cryptocurrency holdings in detail at the end of each calendar year. Concretely, every tax return includes dedicated entries for the market value of each taxpayer's cryptocurrencies. These dedicated items allow us to observe how the reported cryptocurrency portfolio relates to other items reported in the current and prior tax returns, as well as in other administrative data sources. As of 31 December 2021, we find that almost 37 thousand Norwegians reported owning a total of nearly USD 2.4 billion in cryptocurrency. The cryptocurrency reporters represent less than 1 percent of the population of Norwegian taxpayers. Nonetheless, their average holding, around USD 64 thousand, is substantial and nearly as high as the average annual income in Norway. This is partly driven by a small

group with extremely high cryptocurrency wealth. While 11 individuals hold cryptocurrency worth over USD 25 million, the median cryptocurrency owner reports around USD 4.7 thousand. The tax returns reveal that cryptocurrency owners are younger than the general population. For instance, taxpayers aged 30-49 own around 75 percent of the cryptocurrency reported in the tax returns but less than 35 percent of the remaining wealth reported in the tax returns. Cryptocurrency owners are also overwhelmingly male, highly educated, earn a higher income, and live in more densely populated areas. They are also more likely to invest in other sophisticated ways (e.g., owning single shares, using foreign bank accounts), to have a very high debt-to-income ratio, and to have recently received inheritance or gambling proceeds. This is mostly in line with research on American households (Weber et al. (2023), Aiello et al. (2023a)). We also observe a wealth gradient as the likelihood of reporting cryptocurrency ownership increases with the level of non-cryptocurrency wealth. This wealth gradient becomes steeper when we correct for the under-reporting of cryptocurrency wealth, a feature of our analysis which the second data source provides.

The second data source emerges from the bankruptcy files of *Celsius Network LLC* (hereafter Celsius), a major U.S. cryptocurrency platform. The bankruptcy files provide a unique and independent perspective on global cryptocurrency ownership through its lists of depositors and recent transactions. The files let us recreate each customer's cryptocurrency holdings in Celsius on 14 April 2022. We combine this overview of holdings with a third data source: An extract of Norwegian tax returns that includes each taxpayer's full name and age, overall statistics about reported income and wealth, and, crucially, the specific cryptocurrency items. Matching on names, and under some assumptions, lets us place Norwegian Celsius users in the age, wealth, and income distribution. In addition, we can compare their reported cryptocurrency holdings as of 31 December 2021 to their Celsius holdings as of 14 April 2022.

Only 40 percent of the Celsius account holders we match to a Norwegian tax return seem to report their holdings on the platform. We document some heterogeneity in reporting rates with 54 percent of taxpayers aged 30-39 reporting their holdings in Celsius compared to 20 percent only for those above 60. We then use the age-specific reporting rates to adjust the statistics we produce based on the tax returns. In particular, this allows us to estimate an underreporting-corrected cryptocurrency adoption rate of 2.3 percent. After correction, taxpayers between 25 and 29 now form the group with the highest share of cryptocurrency owners (6 percent). This is almost twice the rate of cryptocurrency owners among taxpayers aged 30-39, the second most inclined to own cryptocurrency. The correction also makes the wealth gradient

more pronounced, as mentioned. Based on the tax returns alone, the ownership rate seems to increase from nearly 0.8 percent among the bottom 50 percent of the non-cryptocurrency wealth distribution to more than 1.5 percent among the top 0.1 percent. After correcting, this slope goes from around 2 percent among the bottom 50 percent to more than 5 percent among the top 0.1 percent.

Our paper contributes to three main strands of the economic literature. From a household finance perspective, the rapid ascent of cryptocurrencies has been fueled by their potential to revamp traditional financial systems, offering substantial returns to investors. Several papers in this literature have previously shed light on how the high financial sophistication of individuals toward the top of the wealth distribution, as well as their ability and willingness to take on risk, lead them to persistently higher returns (Fagereng et al. (2020), Bach et al. (2020)). We contribute to this literature by showing there is a wealth gradient in cryptocurrency investment: individuals with higher non-cryptocurrency net wealth are also more likely to have invested in cryptocurrency and to own large stakes in it. We also confirm that a series of demographic characteristics that have been found for U.S investors, like cryptocurrency investors being mainly male and, to a large extent, well-educated, also hold in the case of Norway. (Weber et al. (2023), Aiello et al. (2023a)).

Secondly, the analysis of tax compliance among cryptocurrency investors strongly relates to public economics, especially the literature on tax evasion and tax avoidance. Cryptocurrency shares similarities with offshore wealth in that, absent any third-party reporting, taxpayers have to self-report their cryptocurrency assets on their tax returns. In a seminal paper, Kleven et al. (2011) find almost perfect compliance for income subject to third-party reporting, but substantial non-compliance for income not subject to it. Regarding offshore wealth, Alstadsæter et al. (2019) notes that less than 1 in 10 offshore bank accounts in HSBC Switzerland owned by a Danes and and Norwegians were reported in the home country's tax returns.[1] In the same way, Alstadsæter et al. (2022) find that, for offshore real estate in Dubai, the reporting rate is close to 30 percent. This is to be compared with our 40 percent compliance rate estimate which, although somewhat higher, remains far from the near-perfect compliance for third-party reported income. Recent contributions have shown how also onshore wealth may be severely under-reported in the absence

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[1]Two analogous policies, the Foreign Account Tax Compliance Act (FATCA) in the United States in force since 2014, and the Common Reporting Standard (CRS) are implemented in more than 100 countries since 2017 to make wealth in offshore bank accounts subject to third-party reporting. Several papers suggest that the introduction of FATCA and CRS have decreased the amount of undeclared financial wealth in tax havens. See e.g., Menkhoff and Miethe (2019), Beer et al. (2019), Casi et al. (2020), O'Reilly et al. (2021). A similar framework for cryptocurrency, CARF (Crypto-Asset Reporting Framework), is expected to be implemented in 2026.

of third-party reporting in the context of wealth taxes in Switzerland (Brulhart et al., 2022) and France (Garbinti et al., 2024).

Lastly, the measurement of asset ownership is critical to studying wealth inequality. As we show in this paper, measuring who owns cryptocurrency is not straightforward. Existing estimates of the population-wide adoption of cryptocurrency within countries are primarily the results of surveys. But, as Dutz et al. (2021) demonstrate, surveys are prone to selective non-responses, meaning that there is a correlation between participation in surveys and the participants' survey responses, in a way that cannot be corrected for by weighting by observables.[2] We contribute to the literature by establishing it as likely that non-response bias lead to too high estimates of population-wide adoption of cryptocurrency from surveys. We estimate that around 2.3 percent in the Norwegian adult population own cryptocurrency. This is markedly below the estimates from surveys of the Norwegian population, which have pointed to an adoption rate of around 10 percent both in the time around our estimate and recently, although lower in some years (Arcane Research and EY (2022), K33 Research and EY (2024), Norges Bank (2024)). Part of the gap can be explained by conservative choices on our hand, but even our most aggressive estimates are way below the estimates from the surveys. This implies that the ownership of cryptocurrency within countries is far more concentrated than what existing surveys suggest.

Correct measurement of cryptocurrency is not only of importance for statistical purposes. It is also key for tax enforcement. Tax administrations use surveys of cryptocurrency ownership in populations to reach an estimate of the number of cryptocurrency owners in the population. This is also their starting point for estimating tax gaps. We believe our findings should be a cautionary tale about how surveys may overestimate these types of phenomena. This is underlined by our finding of higher reporting rates for the largest deposits, which results in more than half of the deposits in Celsius being reported as they should, despite that less than half of the owners report their cryptocurrency holdings.

The structure of this paper unfolds as follows: Section 2 provides an in-depth overview of the cryptocurrency market's significance within the financial system. Section 3 introduces our Norwegian tax data, detailing the demographic and financial characteristics of cryptocurrency owners. Section 4 combines these insights to assess the extent of tax compliance among cryptocurrency owners and the potential consequences of non-reporting for the statistics about

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[2]A large economic literature have shown how surveys may misguide researchers. This is especially the case for work investigating income and wealth distributions, but also other statistics that focus on socioeconomic or health outcomes. See, in addition to Dutz et al. (2021), for instance: Piketty and Saez (2003), Chetty et al. (2014), Alvaredo et al. (2013), Meyer et al. (2015), Collinson et al. (2023).

the cryptocurrency-owning population. Finally, Section 5 concludes the paper, summarising our contributions and outlining directions for future research. Through this comprehensive approach, we not only shed light on the current state of cryptocurrency ownership but also set the stage for further exploration into its implications for the global financial system.

2   Background

2.1   The rise of crypto

Cryptocurrencies started as a fringe concept, centred around the cryptocurrency Bitcoin. First mined and traded in 2009, Bitcoin has now reached a market cap of more than USD 1 trillion. The total market for cryptocurrencies exceeds USD 2 trillion. Other large cryptocurrencies in terms of market cap are Ethereum, Tether, Binance Coin, USD Coin, Binance USD, and Ripple. During the peak in November 2021, the market cap of Bitcoin alone exceeded USD 1.2 trillion, while the total cryptocurrency market cap was close to USD 3 trillion.

Cryptocurrencies have cash-like qualities and can function as a more anonymous, less regulated digital alternative to the established financial system. Individuals and corporations can trade with each other and exchange large values, with limited government oversight. However, cryptocurrency transactions are not fully anonymous but rather "pseudonymous" in that each transaction is public and tied to a set of publicly visible addresses. This means that each transaction can be traced to some degree (Chainalysis, 2023). By knowing someone's address, one can track their cryptocurrency transactions. However, identifying the actual person behind these addresses requires the allocation of large resources into traditional and investigative work, which is only done in some high-profile cases (for instance, to disrupt terror financing) (U.S. Department of Justice, 2020).

Several recent studies shed light on the characteristics of cryptocurrency investors using available data sources. Aiello et al. (2023a) examine the demographics of cryptocurrency investors, using data from banks on account holders and their transfers to cryptocurrency platforms. They reveal that, although investors now span all income levels, high-income individuals are more likely to invest in cryptocurrency, thus contributing to the majority of the investments. They also document how, initially, the market was predominantly embraced by wealthier individuals, mirroring high-income earners' propensity to explore novel investment avenues. However, as the market matured, a shift occurred, diversifying the investor demographic to include a wider income spectrum, closely resembling the distribution found among traditional equity investors.

This transition marks the cryptocurrency market's evolution from a niche investment to one with broader appeal. Weber et al. (2023) is another paper that focuses on household finance and cryptocurrency, using repeated surveys of Americans. They reveal that cryptocurrency holders tend to be young, white, male, and more libertarian, with higher expectations of returns and perception of safety compared to non-cryptocurrency holders.

Previous studies have explored various facets of financial behaviour and compliance in non-cryptocurrency assets. Fagereng et al. (2020) find significant variability and persistence in wealth returns, driven by factors like financial sophistication and risk tolerance, with wealthier individuals achieving higher returns. Similarly, Bach et al. (2020) find that wealthier households achieve higher and more consistent returns in the stock market due to their ability to take on more risk. Campbell et al. (2019) show that less diversified stock portfolios experience more volatile returns, whereas larger, well-diversified portfolios tend to have more stable and higher average returns. In the same way, we would like to understand how cryptocurrency ownership differs across the wealth distribution and document the characteristics of cryptocurrency investors.

Related research has looked into how investors in cryptocurrency behave. Kogan et al. (2023) find that retail traders exhibit different trading behaviours in cryptocurrencies compared to traditional assets, adopting a quasi-momentum strategy and displaying a willingness to hold onto investments despite price volatility. Hackethal et al. (2022) and Pursiainen and Toczynski (2022) provide further insights into the investment behaviours of cryptocurrency investors, highlighting their risk-taking tendencies, active trading patterns, and increasing adoption among a broad range of individuals across various demographic backgrounds. Aiello et al. (2023b), in a companion paper to Aiello et al. (2023a), find an marginal propensity to consume out of unrealised cryptocurrency gains of 0.21 and illustrate how the movements in cryptocurrency markets may have spillovers to the real economy.

The privacy given by pseudonymity has made cryptocurrencies popular among drug dealers, money launderers, and others who seek to evade law enforcement scrutiny. An early attempt, Foley et al. (2019) estimates that 46 percent of Bitcoin transactions — equivalent to USD 76 billion — are connected to illegal activity. The cryptocurrency analysis firm Chainalysis has much lower estimates of illicit cryptocurrency transactions. Their latest estimates describe how illicit cryptocurrency transactions (excluding money laundering) have fallen to below 1 percent of overall cryptocurrency transaction volume (Chainalysis, 2023). This can be ascribed to the broadening popularity of cryptocurrency and to the strengthening of Know Your Customer (KYC) regulations for cryptocurrency businesses. Related to this, von Luckner et al. (2023) find

that the use of Bitcoin has become an increasingly important channel to receive remittances and evade capital controls in emerging markets and challenge the dominant view that cryptocurrency is of little use for transaction purposes.

Even if some countries have made progress toward regulating cryptocurrency exchanges, policymakers still struggle to accommodate cryptocurrencies within tax systems and gaps in enforcement across countries continue to allow regulatory arbitrage (Baer et al. (2023); Nershi (2022)). Cryptocurrency ownership can still be done outside the scope of tax administrations and has striking similarities with having a deposit bank account in a secretive jurisdiction 15 years ago, before the major automatic exchange of information agreements. We discuss this further in subsection 2.3.

2.2 Geographical Patterns of Cryptocurrency Use

Even if the cryptocurrency world seems without borders, cryptocurrency owners still have to reside somewhere. Some key efforts have broken ground in inferring the geographical distribution of cryptocurrency use and ownership. The most prolific example is the annual 'Chainanlysis Geography of Cryptocurrency Report'. The report estimates how much the residents of each country have received of cryptocurrencies during the latest 12-month period. They have developed a methodology that combines the transaction volumes observed for different cryptocurrency services and protocols and the geographical distribution of web traffic data towards the same services and protocols (Chainalysis, 2022). Figure 2 gives an overview of the top countries in terms of cryptocurrency use, according to Chainalysis (2022). The US is by far the country with the most active users of cryptocurrencies, followed by India and the UK. But, scaling by GDP, the report shows that cryptocurrency is relatively more used in countries like Ukraine, Vietnam, Thailand, and Turkey.

In another study, Kogan et al. (2023) used a dataset of 200,000 traders from eToro and found that the majority of cryptocurrency investors on this platform come from European countries (UK, Germany, Italy) and Asia (mostly Singapore and Malaysia). Thiemann (2021) explored the revenue potential from a realised bitcoin capital gains tax in the EU. He found that in terms of total realised gains, Germany ranks first, followed by France and Spain. Relative to GDP, central Eastern European countries (Bulgaria, Latvia) would benefit the most. von Luckner et al. (2023) highlights the significant role of Bitcoin in facilitating international transactions and evading capital controls, particularly in emerging markets and developing economies. Through the use of high-frequency transaction data enabling trade in the currencies of more than 160 countries,

it provides evidence against the view of cryptocurrencies as merely speculative, illustrating their utility in cross-border flows and currency exchanges, especially in the context of global underground economies.

2.3   Cryptocurrency, third-party reporting and offshore wealth

Cryptocurrency has many similarities with offshore wealth. Offshore wealth is real assets located abroad and, more widely, wealth items (stock, bonds, mutual fund shares, bank deposits, real estate, art, etc.) held through bank accounts or corporations in jurisdictions of which the owner is not a tax resident. As for cryptocurrency, offshore wealth and the income derived from it has to be self-reported in tax returns. Before the main Automatic Exchange of Information (AEoI) agreements, there was no automatic dialogue between tax administrations, companies, and financial institutions (called third-party reporting) about this income, contrary to what is standard across developed economies for onshore wealth. This makes it harder for the tax administrations to detect, monitor, and tax this wealth and the income derived from its ownership. Cryptocurrency has the same characteristics as offshore wealth as it is not a part of the regular financial system while cryptocurrency platforms are not a part of the third-party reporting structures. Given the current reporting and tax compliance regime, cryptocurrency wealth can thus be considered an equivalent, or close substitute, to offshore wealth, even when held through onshore platforms[3].

The literature on offshore wealth has traditionally covered financial wealth, i.e., bank deposits and portfolios of equities, bonds, and mutual fund shares owned by households through foreign financial institutions. Zucman (2013) first documented how offshore financial wealth equivalent to around 10 percent of global GDP was held by households in 2008. Faye et al. (2023) shows that this relationship between households' offshore financial wealth and world GDP has been stable since then.[4] Figure 1 panel (a) compares the market cap of cryptocurrencies to the Faye et al. (2023) estimates of offshore financial wealth. It shows that, although the market cap of cryptocurrencies has risen, it is still markedly lower than the full extent of offshore financial wealth. More importantly, it shows that it comes close to the amount of "untaxed" offshore financial wealth globally, as AEoI agreements like FATCA and CRS brought this number lower

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[3]Norwegian Auditor General shows that only a small percentage of Norwegians' cryptocurrency wealth is held through Norwegian platforms.

[4]Økland (2024) gives a comprehensive overview of the literature on offshore financial wealth and its implications for inequality. See also Zucman (2014), Zucman (2015), Alstadsæter et al. (2018), Alstadsæter et al. (2019), Johannesen et al. (2020), Collin (2021), Leenders et al. (2021), Londoño-Vélez and Àvila-Mahecha (2021), Londoño-Vélez and Ávila-Mahecha (2022).

(Alstadsæter et al., 2023). Panel (b) compares the total cryptocurrency market share as of the end of 2021 to the Faye et al. (2023) estimates of offshore financial wealth held in the largest tax havens and shows that the wealth held in cryptocurrencies is comparable to a mid-size tax haven for financial wealth.

Later contributions to the literature on offshore wealth shed light on the other subsets of offshore wealth, predominantly offshore real estate. Alstadsæter et al. (2022) finds that Dubai (UAE) real estate worth USD 145 billion was owned by foreigners at the start of 2020, amounting to more than 25 percent of this market. A comparison of the real estate owned by Norwegian tax residents and the total real estate in UAE reported to the Norwegian tax administration for wealth tax purposes implies a compliance rate below 30 percent. Furthermore, an analysis of Norwegian tax resident owners shows that the upper echelons of the wealth distribution are over-represented in the total sample of Norwegian taxpayers owning real estate in Dubai (both among compliers and non-compliers).

To our knowledge, we are the first contribution that connects the world of cryptocurrencies to the offshore wealth literature. The quantification of investment in these alternative subsets of offshore wealth is key for two reasons. First, they are outside the scope of the AEOI agreements which have made it increasingly difficult and costly to hide true ownership of offshore financial assets. The Foreign Account Tax Compliance Act (FATCA) targets the hidden assets of US citizens and was passed in 2010. It requires that foreign financial institutions report all assets held by US citizens. The OECD, inspired by the FATCA, then introduced the Common Reporting Standard (CRS) through which tax administrations in more than 100 countries (among them many tax havens) have now committed to automatically exchange information on financial accounts held by residents of other countries to their respective home countries. This exchange started in 2017 and an increasing number of countries are participating (with the notable exception of the U.S.). Our paper also relates to the burgeoning literature studying the effects of this international exchange of bank information.[5] AEoI agreements might increase the attractiveness of holding alternatives to financial assets like real estate, art, and cryptocurrency, which are not covered by these agreements. However, the regulatory framework might change soon as transparency rules are scheduled to enter into force. In October 2022 the OECD, under the mandate of the G20, proposed the Crypto-Asset Reporting Framework (CARF) and a set of amendments to the Common Reporting Standard (CRS). CARF is set to cover cryptocurrencies with the same information exchange requirements as FATCA and the CRS impose on traditional

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[5]See e.g., Johannesen and Zucman (2014), Menkhoff and Miethe (2019), Beer et al. (2019), Casi et al. (2020), O'Reilly et al. (2021).

financial assets. Moreover, on 17 October 2023, the EU adopted the DAC8 directive, set to enter into force in January 2026. Under DAC8, crypto-asset service providers will have to report the transactions of their users.

The second is that, as Alstadsæter et al. (2019) illustrates in a theoretical model, the providers of offshore services, like banks and law firms, have an interest in limiting the client base to only a few wealthy individuals, hence leading to a strong concentration of offshore tax evasion among the wealthiest echelons of society, as documented by the empirical literature on offshore financial wealth. This prediction changes when investors can circumvent the service providers, which is the case for cryptocurrency. This means that one could expect the investment in these asset classes, also of the illicit type, to be more widespread than offshore financial wealth across the income and wealth distribution. The magnitude of and distribution of under-reporting and tax evasion for these alternative asset classes is therefore instrumental to having a complete picture of non-compliance's implications for inequality.

3   The Owners of Cryptocurrencies

We use Norway as our laboratory to study the characteristics of cryptocurrency owners. Norway's comprehensive tax system and centralised tax administration mean that the tax returns give an impeccable overview of income and wealth in the country. The wealth tax is an important feat in this regard. The Norwegian wealth tax obliges Norwegian taxpayers to report their assets by type of asset annually, where cryptocurrency is a separate asset class. Norwegian taxpayers have been taxable on their cryptocurrency wealth and cryptocurrency-related income as long as cryptocurrency has existed and have been explicitly asked to report their cryptocurrency wealth and income starting in 2019.[6] This gives the Norwegian Tax Administration, Statistics Norway, and researchers a full overview of Norwegians' capital assets annually while, in most countries, taxpayers only report capital income upon realisation.[7]

3.1   Norwegian cryptocurrency owners in aggregate

We use the wealth of Norwegian registry data to describe the owners of cryptocurrencies. Our main data source is individuals' tax returns. We have access to the full universe of tax returns from 1993 until 2022. Cryptocurrency wealth (formally "virtual assets") has been a separate

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[6]On the contrary, there is no item for cryptocurrency in companies' tax returns. Neither we nor the tax administration can thus separate the value of cryptocurrency from other financial assets owned through companies in the Norwegian tax returns. We thus have to disregard all indirect cryptocurrency ownership.

[7]With the exception of tax evasion, see more in section 4.

item in the tax return since 2019 and taxpayers are obliged to self-report the market value of their holdings as of 31 December. All individuals with a tax liability in Norway for a given year need to submit a tax return. We restrict the sample to adults (18 and older) who are complete Norwegian tax residents[8], which gives us a sample of around 4.4 million tax returns, of which more than 37,500 reported some cryptocurrency wealth in 2021. Further cleaning of the data, mostly because cryptocurrency holdings of less than USD 10 are disregarded[9], led us to drop an additional 1 percent of these values.

Table 1 summarises the basic statistics on cryptocurrency reporters after excluding those reporting trivial amounts. The top row of the table shows that 36,901 Norwegians tax residents owned cryptocurrency worth more than USD 10 at the end of 2021. Their cryptocurrency was worth USD 2.4 billion, 0.1 percent of the global cryptocurrency market cap at the time. In comparison, Norway's share of world GDP is 0.5 percent, while the Chainalysis (2022) report estimates that Norwegians were receiving 0.3 percent of cryptocurrency transfers in 2021/2022. The table also illustrates the large inequality in crypto-holdings within the subset of the population that owns cryptocurrency. The median cryptocurrency reporter owns around USD 4,700 in cryptocurrency. The average cryptocurrency wealth, USD 64,000, is nearly 14 times this amount, and the average wealth among the top five owners, 61.3 million, is almost 100 times the average holding. In all, these top five reporters represent more than 10 percent of all cryptocurrency wealth reported in 2021.

The second panel of the table presents the same statistics for different age groups. It shows how the core group of cryptocurrency reporters are individuals in their 30s. People between 30 and 39 hold half of all cryptocurrency reported. This is also the age group that includes the biggest owners and features the largest inequalities between owners. The top five owners in both the age group 30-34 and the age group 35-39 hold on average more than USD 40 million in cryptocurrency wealth. In these two groups, the average cryptocurrency wealth, USD 83,000 and USD 93,000 are more than 15 times the median cryptocurrency wealth, USD 5,400 and USD 5,800 respectively. The contrast to the younger cohorts is striking. For reporters between 18 and 24, the average cryptocurrency wealth (USD 15,000) is only 6 times the median cryptocurrency wealth (USD 2,800) while for reporters between 25 and 29, the average cryptocurrency wealth (USD 34,000) is 8 times the median cryptocurrency wealth (USD 4,100).

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[8]It is unclear to which extent non-complete tax residents are obliged to report their cryptocurrency holdings and income. The restriction to complete tax residency excludes 300 taxpayers (e.g., emigrants, temporary residents), some with substantial cryptocurrency holdings. The excluded taxpayers reported in total USD 61 million in cryptocurrency wealth, which gives an average holding of USD 203,000.

[9]Taxpayers are legally required to report any cryptocurrency holding

The rest of table 1 shows how the cryptocurrency reporters and their reported wealth is distributed along the non-cryptocurrency wealth distribution. The granular reporting of asset ownership in the tax records lets us calculate each individual's net wealth when cryptocurrency is excluded. Around 45 percent of cryptocurrency owners are located in the bottom 50 percent of the non-cryptocurrency wealth distribution and nearly 45 percent of cryptocurrency owners are in the middle 40 percent. The number of owners is thus relatively evenly split across the wealth distribution. The big gaps across the distribution arise when we look at the amounts of cryptocurrency wealth accumulated in each wealth group. The owners in the top 5 percent of the non-cryptocurrency wealth distribution hold more than 40 percent of the reported cryptocurrency wealth. The 341 owners in the top 0.5 percent of the non-cryptocurrency wealth distribution hold on average USD 1.65 million worth of cryptocurrency. This represents USD 563 billion in total, more than 20 percent of all reported cryptocurrency wealth.

3.2 Cryptocurrency owners and the general population

To learn more about what characterises the owners of cryptocurrencies, we link the individuals in the de-identified tax returns to other Norwegian government registries, like the demographic registry and the shareholder registry. This lets us produce a series of statistics about the reporters of cryptocurrencies and compare them to the same statistics for the general population. We also divide the owners of cryptocurrencies into three groups depending on whether they hold: between USD 10 and USD 2,500, between USD 2,500 and USD 25,000, or more than USD 25,000 worth of cryptocurrency. We introduce an additional sample restriction for this analysis: We exclude all individuals above 69 years old from both the cryptocurrency owner and the general population samples. We introduce this restriction to have more comparable groups, as cryptocurrency ownership is very uncommon among the older segments of the population. This restriction drops 391 cryptocurrency reporters from the sample (see table 1).

The findings are presented in table 2. The first row shows that cryptocurrency owners are in general younger than the general population. However, the average age of cryptocurrency owners increases somewhat with the amount of cryptocurrency they own. The second row highlights that cryptocurrency reporters are overwhelmingly male. 80 percent of owners with smaller cryptocurrency portfolios are male and more than 90 percent of those with more than USD 25,000 in cryptocurrency wealth are male. The next part of the table shows that cryptocurrency owners are more likely to have higher education than the general population. More than 20 percent of cryptocurrency owners have a master's degree, which is more than twice the level for the general

population. The education level is also increasing with the amount of cryptocurrency reported, as 28 percent of those with the largest holdings have a master's degree. Not surprisingly, given the above statistics, cryptocurrency owners are also more likely to live in larger municipalities. Around 1 in 4 cryptocurrency owners live in Oslo, Norway's capital city, in contrast to 14 percent of the general population between 18 and 69. In total, around half of the cryptocurrency reporters live in the 8 largest municipalities, which host 34 percent of the general population between 18 and 69.

The next sections of the table tell us more about the investment abilities and ambitions of the cryptocurrency owners. Their realised non-cryptocurrency income (from labour and capital) is on average in line with that of the general population, but a bit higher among the owners of big cryptocurrency portfolios and a bit lower among those with small cryptocurrency portfolios. The average value of cryptocurrency owners' non-cryptocurrency net wealth is also in line with the general population's non-cryptocurrency net wealth. But here, a starker heterogeneity depending on the size of the cryptocurrency portfolio arises. Those with large portfolios of cryptocurrency (more than USD 25,000) have on average far less net wealth than the general population when their cryptocurrency portfolio is excluded. On the other hand, those with medium portfolios of cryptocurrency (between USD 2,500 and USD 25,000) have more non-cryptocurrency net wealth than the general population.

This heterogeneity is partly reflected in the next figure, which shows the share of each group that reports non-cryptocurrency financial wealth over USD 10,000. Those with large portfolios of cryptocurrency (more than USD 25,000) are slightly less likely than the general population to hold substantial financial wealth, while other cryptocurrency owners are far more likely.On the contrary, cryptocurrency owners are more likely to report real estate ownership than the general population and this probability increases with the size of the cryptocurrency portfolio. More than 20 percent of cryptocurrency owners have reported foreign non-real estate wealth, compared to 3 percent of the general population.[10] Reporting of foreign wealth may indicate recent migration, sophisticated investment behaviour (like foreign currency trading), previous offshore evasion (possibly in combination with using amnesty), or other factors.

Table 2 includes three different statistics that function as proxies for underlying investors' characteristics. First, we believe stock ownership says something about the sophistication of the investor. In the Norwegian shareholder registry, we find that more than 60 percent of cryptocurrency owners were listed as owners of at least one share in a Norwegian company at

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[10]We set the threshold to more than USD 100. We set this threshold lower than for general financial wealth, as we are after all non-trivial links to foreign wealth.

the end of 2021, compared to only 21 percent of the general population. This indicates how inclined these individuals are to invest beyond standard saving accounts and mutual funds. Second, we proxy recent windfall gain or liquidity boost (either expected or unexpected) by the reporting of a gift or inheritance worth more than approximately USD 10,000 during the last 10 years. 20 percent of those with cryptocurrencies worth more than USD 25,000 reported a gift or inheritance on their tax return during the last ten years, compared to only 10 percent of the general population. The last proxy also indicates a windfall but just as much the risk preference of taxpayers. Norwegians have to report any proceeds from the state lottery and other gambling profits on their tax return. 1.5 percent of those with cryptocurrencies worth more than USD 25,000, around 100 individuals, reported such a proceed on their tax return during the last ten years, compared to only 0.3 percent of the general population.[11]

3.3 Patterns across the age, wealth and income distribution

We further illustrate how the ownership of cryptocurrencies varies across age, wealth, and income in figures 3 to 5. Both the wealth and income distributions are calculated after excluding cryptocurrency wealth and income.[12]

Figure 3 repeats some of the message from table 1. Panel (a) illustrates how the propensity to report cryptocurrency across the age distribution takes an inverse U-shape, where those between 25 and 39 are the most inclined to hold cryptocurrency, according to their tax records. Nearly 2 percent of Norwegians between 30 and 34 reported cryptocurrency holdings as of the end of 2021. Somewhat surprisingly, only around 0.7 percent of those between 18 and 24 reported cryptocurrencies. The same U-shape pattern is evident when calculating the average cryptocurrency wealth conditional on owning some, although with a clear shift towards the older age groups. Panel (b) presents how the average cryptocurrency wealth doubles from the age group 18-24 to the age group 25-29 and again from the age group 25-29 to the age group 30-34. Because Norwegians in their early 20s are hesitant to invest large amounts in cryptocurrency, while the older cohorts are hesitant to invest at all, it is the group between 30 and 39 that has the largest share of their net wealth invested in cryptocurrency. Panel (c) shows that they have close to 1.5 percent of their net wealth in cryptocurrency. The generational differences are also clear in panel (d). While younger generations (30-49) own around 75 percent of the cryptocurrency reported in tax returns, they own less than 35 percent of the remaining gross

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[11]Regression results showing the statistical importance of the different characteristics are presented in table A.1.
[12]Figures for the non-adjusted wealth and income distributions and a more extensive selection of figures is available in appendix C.

wealth reported in tax returns.

Cryptocurrency ownership varies less across the non-cryptocurrency wealth distribution than the age distribution. This is evident in Figure 4. Panel (a) reveals a slight wealth gradient among the individuals who report cryptocurrency on their tax returns. While less than 1 percent of the bottom 50 percent report cryptocurrency ownership, almost 2 percent of the top 0.1 percent do so. This wealth gradient is also evident when mapping the average cryptocurrency holding, conditional on owning any cryptocurrency. Cryptocurrency owners in the top 0.1 percent report cryptocurrency wealth of over USD 3.5 million on average, more than 100 times the average among the bottom 50 percent, as seen in panel (b). Despite the latter having the highest share of cryptocurrency investors among the population and investing large amounts, the cryptocurrency they own is only worth around 0.2 percent of their net wealth. Panel (c) of Figure 4 depicts how the rest of the top 1 percent have the highest share of cryptocurrency in their portfolio, around 0.3 percent of their net wealth. Overall, the net wealth share is much more stable than among the age groups, where it varies from above 1.5 percent among those between 30 and 34 to close to less than 0.5 percent for those above 40 years old. Overall, the distribution of cryptocurrency wealth and the remaining gross wealth is remarkably similar. The bottom 90 percent and the top 0.1 percent hold respectively close to 55 and 10 percent of both categories, as highlighted by panel (d).

Figure 5 presents the same statistics across the non-cryptocurrency income distribution. These are strikingly different from what we see for the non-cryptocurrency wealth distribution. The statistics expose the apparent proliferation of high-income, low-wealth individuals owning cryptocurrency.More than three percent of the top 1 percent and almost five percent of the top 0.1 percent in terms of non-cryptocurrency income report cryptocurrency, as seen in panel (a) of the figure. Panel (b) shows the same average level of cryptocurrency investment among the top earners as in the wealthiest top 0.1 percent: over USD 3.5 million. But the gradient is even steeper at the top of this distribution, as the average cryptocurrency holding is a bit lower in the remaining top 1 percent compared to the non-cryptocurrency wealth distribution. The combination of a steep income gradient in the likelihood of owning cryptocurrency and an even steeper income gradient in the average holdings results in a strong income gradient in the importance of cryptocurrency as a share of net wealth, in contrast to the same statistic across the wealth distribution. Panel (c) depicts that cryptocurrency is a much larger share of net wealth for the top non-cryptocurrency income groups, almost 1 percent for the top 0.1 percent, than for the top echelon of the non-cryptocurrency wealth distribution. This contrast is also

evident when we map the distribution of cryptocurrency wealth across the non-cryptocurrency income distribution against the distribution of the remaining gross wealth in the tax returns. Panel (d) shows that the top 1 percent of the non-cryptocurrency income distribution owns more than half of all cryptocurrency wealth reported, but less than a fifth of the remaining wealth.

4 Correcting for Cryptocurrency Tax Compliance

The Norwegian tax returns give a unique understanding of cryptocurrency ownership. However, one needs to bear in mind the self-reported nature of the cryptocurrency amounts, making them subject to sizeable non-compliance (Kleven et al. (2011), Garbinti et al. (2024), Brulhart et al. (2022)). We attempt to account for this issue by combining a novel data source, the list of cryptocurrency owners through the platform Celsius at a random date, and a second tax return data set, that can be linked to the list of cryptocurrency owners.

4.1 Presentation of the Datasets

Celsius data.   In July 2022, the cryptocurrency platform Celsius filed for bankruptcy protection under the so-called "Chapter 11 Bankruptcy relief". Celsius had, at this point, become a significant cryptocurrency platform[13] having customers from all over the world with the specificity of offering customers interest on their cryptocurrency deposits as well as lending USD loans against cryptocurrency securities.[14] The company collapsed in the wake of the spring 2022 cryptocurrency market turmoil that first saw the collapse of cryptocurrencies TerraUSD and LUNA in May 2022 as well as the bankruptcy of major actors such as Voyager Digital, Three Arrows Capital, and, later on, FTX.[15]

American bankruptcy law requires companies that file for bankruptcy protection under Chapter 11 to file schedules of assets and liabilities and a statement of financial affairs.[16] The schedules of assets and liabilities include tables outlining Non-Priority Unsecured Retail Customer Claims, which lists the balance of each retail customer on 13 July 2022, the bankruptcy protection

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[13]For example, as shown in table B.1, holdings through Celsius accounts for the two major cryptocurrencies Bitcoin (BTC) and Ethereum (ETH) on 14 April 2022 summed up to respectively USD 4.4 billion and USD 3.3 billion, which represented 0.6 percent and 0.9 percent of the world stock of circulating Bitcoins and Ethereum at this date.

[14]For an old pitch of the Celsius concept: https://boostylabs.com/cases/celsius-network

[15]Figure B.1 provides some context: Panel (a) shows how there were two notable spikes in net withdrawals from Celsius accounts during the spring of 2022: one around the collapse of the cryptocurrencies TerraUSD (UST, later USTC) and Terra Luna (LUNA, later LUNC) in May 2022 and another in the days before Celsius halted all withdrawals on June 12. Panel (b) shows how the market cap of cryptocurrencies fell from USD 2.2 trillion at the end of December 2021 to USD 1.9 trillion on 14 April 2022 and below USD 800 billion in November 2022.

[16]See: https://www.uscourts.gov/services-forms/bankruptcy/bankruptcy-basics/chapter-11-bankruptcy-basics

date.[17] The list includes customers' names and their balances of different cryptocurrencies deposited. This raw deposits database counts 603,496 entries. The Statements of Financial Affairs include tables featuring "certain payments or transfers to creditors within ninety days before filling this case". These ninety days are the period between 14 April and 13 July 2022. This list includes customers' names, the date of their transactions, the type of coin involved, the incoming or outgoing nature of the transactions as well as their purpose, and the amount transacted both in coin and dollar value. This transactions database counts over 3.1 million transactions from 14 April to 13 July 2022. Combining these two tables, we can obtain each customer's holdings of different cryptocurrencies in Celsius as of 14 April 2022[18], before the ensuing market turmoil in May and when Celsius users were not expecting its bankruptcy nor any outside insight into their holdings.[19]

Matchable tax return data. In collaboration with the Norwegian Tax Administration, we access a unique non-anonymised dataset covering all Norwegian taxpayers aged 18 or older for the year 2021.[20] The dataset includes basic tax return variables like the taxpayers' full name, age, municipality, taxable income, taxable wealth[21], and taxes paid. [22] This information is further enriched with taxpayers' gross reported cryptocurrency income and losses and gross reported cryptocurrency wealth (the same tax return items as section 3 is based on). The reported cryptocurrency wealth in this database is thus supposed to be the market value of the cryptocurrency portfolios of the taxpayer as of 31 December 2021.

4.2 Combining Celsius Data and Tax Returns

Using first and second names, we match the non-anonymised database of Norwegian taxpayers with Norwegian Celsius users' coin deposits as of 14 April 2022 and converted in USD using 31 December 2021 exchange rates. This lets us analyse the apparent tax compliance behaviours of Norwegian Celsius users. Note that the analysis hence relies on the assumption that the amount

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[17]For more details on the Celsius bankruptcy data and relevant context see Appendix B.

[18]With some limitations, the most important being our inability to distinguish account holders with the same first and second names.

[19]With maybe the exception of Americans, as Celsius is an American platform and there are examples of tax authorities in the U.S., the UK, and Norway requiring information about balances and transactions in domestic platforms. Other important platforms serving American customers have famously incorporated offshore.

[20]The tax return dataset used for this section can not be matched to the de-identified data we use in section 3.

[21]An important caveat is that wealth is only reported as net taxable wealth in this dataset. This leads to some discrepancies compared to actual net wealth, due to some provisions in the tax code.

[22]For any individual taxpayer, this is public information, but only searchable name-by-name after log-in. Moreover, every individual has access to the history of individuals having accessed their information. On the contrary, we received the data in bulk.

of cryptocurrency held in Celsius as of 14 April 2022 is similar to the amount held as of 31 December 2021. The general market trend does not point to a large inflow of new investment in cryptocurrency within this three-month timelapse and exchange rates remained rather constant. We also restrict the analysis to Celsius accounts with at least USD 10 worth of cryptocurrency.

Matching on names leaves some margin of error but we judge it to be of relatively little importance; Norway is a small country with a distinct naming tradition. 84 percent of adult taxpayers have a unique combination of given name and family name.[23] We match more than 7,000 Celsius accounts to a unique name among Norwegian taxpayers. This represents 76 percent of the Celsius accounts we can match to Norwegian taxpayers. We perform our baseline analysis on the sub-sample of these singular matches. An alternative is to carefully assign the remaining 24 percent matched accounts to individual tax returns based on careful selection criteria. We present alternative results for the relevant tables and figures in appendix D.

A second challenge for the matching process is the subset of the Norwegian population who, due to their families' heritage or other reasons, have names that are more common outside of Norway than in Norway. We use an algorithm provided by the company *Namsor*[24] to overcome this issue. The algorithm classifies names and returns a list of the most likely countries of residence and most likely countries of origin. We use Norway as either the most likely country of residence or the most likely country of origin as criteria for inclusion in the analysis. This impacts the number of Celsius depositors we care about. As shown in table A.2, the number of depositors matched to singular Norwegian tax records falls from 7,249 to 702 (and the aggregate value of their deposits falls from USD 458 million to USD 14 million) when we include this restriction. The impact is smaller if we allow for matching individuals whose names have Norway as the second or third most likely country of residence or country of origin (in other words a Scandinavian name, in most cases).

The restrictions placed on our sample, requiring Celsius users to have names that are likely Norwegian and unique within Norway, mean that the number of individuals presented in the paper does not estimate the total number of Norwegian Celsius account holders. However, the number of non-compliers relative to compliers and other relative patterns represent our best estimates of underlying behaviour.[25]

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[23]Other papers in the literature have followed this approach, for instance, Alstadsæter et al. (2019) did the same when they placed Scandinavian shell company owners from Panama Papers in the wealth distribution. They also had access to country information from the Panama Papers, something we do not have from Celsius.

[24]https://namsor.app/features/name-origin/#name-country-batch (link to the API documentation: https://namsor.app/api-documentation/#name-country-batch)

[25]This relies on the assumption that the reporting behaviour of those with names that are most likely Norwegian and unique within Norway is representative of the remaining population. Agersnap and Brun Bjørkheim (2024)

Matching restrictions sensitivity. We illustrate how restricting the matching of accounts to names that are most likely Norwegian impacts our results in Figure 6. Panel (a) shows how the likelihood of being matched for the different groups across non-cryptocurrency wealth distribution looks for the different matching restrictions. It highlights that the share of the population matched to Celsius is generally non-trivial across the non-cryptocurrency wealth distribution, irrespective of the matching restrictions. The exception is among the top 0.1 percent of the non-cryptocurrency wealth distribution, where we find no account holders with a name that is most likely Norwegian and also unique within Norway. The distribution of matched Celsius account holders is in contrast to the distribution of Norwegian account holders in HSBC Switzerland in 2006, revealed by the "Swiss Leaks". While cryptocurrency accounts in Celsius are held by owners across the non-cryptocurrency wealth distribution, offshore accounts are concentrated among the top echelons of the wealth distribution (Alstadsæter et al., 2019). We systematically match a larger share of the population to Celsius than Alstadsæter et al. (2019) do to the HSBC accounts except for the top 0.5 percent, the only wealth group where the likelihood of having an HSBC account is markedly higher than the likelihood of having a Celsius account.[26]

4.3 Tax Compliance

The above discussion abstracts from the fact that Norwegian taxpayers might misreport their Celsius holdings. Our main estimate is that 40 percent of Norwegian cryptocurrency owners report their cryptocurrency wealth.[27] Panel (b) of Figure 6 shows that this is stable when we look at matches with a name indicating that they are either most likely to be Norwegian residents or to be of Norwegian origin. As should be expected, the reporting rates decrease as we relax the matching restriction (i.e., as we allow Norwegian taxpayers to be matched with Celsius account holders that have the same names but are less likely to be Norwegians). The number of matches then goes from around 700 to more than 1,000 when we consider all matches for which the name has Norway among the top three most likely countries of origin or residence, while the

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show that immigrants on average are worse at legal tax optimisation compared to native-born Norwegians. This may indicate a larger willingness to pay tax, but it can also indicate informational barriers that would lead to lower reporting rates.

[26]The figure compares Norwegian matches in Celsius to Norwegian matches in HSBC Switzerland. The share of matches on the top of the distribution is even larger in HSBC Switzerland when the scope is expanded to all Scandinavian account holder. Still, we overall match a larger number of Norwegian taxpayers to Celsius cryptocurrency accounts than what Alstadsæter et al. (2019) is able to do for Scandinavians in total to HSBC Switzerland bank accounts. They obtain 520 matches across Scandinavia while we have more than 700 matched individuals to Celsius accounts, even under the most conservative matching restriction.

[27]The reporting rates are calculated by assigning the matched individuals either a compliant or non-compliant status. All individuals who report more than half of the value in their assigned Celsius account are deemed compliant. The rest is deemed non-compliant.

reporting rate falls from 40 to 25 percent. The naive matching, without any restriction on the likely nationality of Celsius holders given their names, gives a reporting rate of only 7 percent.[28]

We observe that the reporting rate varies across cryptocurrency holders' real characteristics.[29] Figure 7 panel (a) shows how the estimated reporting rate varies with the size of deposits in Celsius. Most account holders have cryptocurrency portfolios in Celsius worth USD 20,000 or less. These account holders exhibit a reporting rate close to or below our overall estimate of 40 percent. Above USD 20,000, the probability of reporting the portfolio value increases, to 52 percent for accounts worth between USD 20,000 and USD 1 million, and to 59 percent among the Celsius account holders with portfolios worth more than USD 1 million. This explains why, as shown in table 3, the majority of cryptocurrency in Celsius we match to Norwegian account holders is properly reported.

Panel (b) of Figure 7 (and table 3) depicts the striking variance in reporting rates across groups. People in their 30s are more likely to report than not doing so, with a reporting rate of 55 percent. The oldest is the least compliant group, with a reporting rate as low as 20 percent among Celsius users over 60. 28 percent of those in the age group 18-29 are reporters, while those in their 40s and 50s have a reporting rate of 39 percent. We also find a strong income gradient in reporting rates. The bottom half of the non-cryptocurrency income distribution has an average reporting rate of 28 percent while this figure increases to around 45 percent for the middle 49 percent and then to 64 percent among the top 1 percent.[30]

4.4   Cryptocurrency ownership adjusted for non-reporters

The above subsection demonstrates that not all cryptocurrency owners report their cryptocurrency holdings in their tax returns. This means that the statistics we calculated for the whole Norwegian population based on administrative data in section 3 are too low. Moreover, they are also slightly biased, as we have seen that reporting rates vary with depositors' characteristics, notably age. We therefore use the age-dependent reporting rates from Celsius to impute the real extent of cryptocurrency ownership in the Norwegian population. This gives us an estimate of cryptocurrency ownership (of more than USD 10) in the adult Norwegian population of 2.3 percent at the end of 2021. This amounts to around 100,000 individuals.

We are to our knowledge the first to estimate the population-wide adoption rate using this

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[28]Table 3 shows this in more detail.

[29]In the following, we study these variations for the most restrictive sample including only matches for which Celsius holders, based on their names, are most likely to be Norwegian residents or of Norwegian origin.

[30]In Figure A.2, we map reporting rates across non-cryptocurrency wealth groups within age groups.

approach. Tax administrations often rely on survey responses instead. However, a growing literature has shed light on how non-responses and misreporting bias survey results. Dutz et al. (2021) do for instance link a large-scale survey of Norwegian adults to administrative data and find large differences in the labour market outcomes of the respondents and non-respondents, a difference that persisted even after adjusting for observable.[31] There is, in other words, an unobservable correlation between the chance of participation in the survey and outcomes of interest. We argue that this is likely to be the case for surveys that measure the population-wide cryptocurrency adoption rate as well.[32] Surveys are often conducted through online panels and phone bank calls, of which the participation is likely to be correlated with factors that also predict cryptocurrency ownership (e.g., trust in strangers, internet use). A recent survey of cryptocurrency in Norway, Norges Bank (2024), do for instance report that 96 percent of the respondents in the survey have knowledge of cryptocurrency.

K33 Research and EY (2024) have conducted a series of surveys of cryptocurrency ownership in the Norwegian population and is often cited by the Norwegian Tax Administration. The surveys are conducted during the first quarter of each year, making the numbers most comparable to the prior year-end numbers. The survey found that around 10 percent owned cryptocurrency in early 2022, which indicates that around 10 percent owned cryptocurrency at year-end 2021 as well.[33] This is more than 4 times what we find with our bottom-up estimate from tax records and observed reporting rates. Even if we take the reporting rate we get when we relax the matching restriction to include all Celsius holders with names that are Scandinavian (25 percent), we only get a population-wide cryptocurrency adoption rate of around 4 percent.[34]

Moving beyond the overall numbers, we also explore the underlying heterogeneity. We let the reporting behaviour we observe for each age group decide the likelihood of reporting and then adjust the likelihood of owning cryptocurrency across the age and non-cryptocurrency wealth distribution. The likelihood of owning cryptocurrency in each wealth group is estimated by calculating the inferred average reporting rate in each group, which is an average that is weighted by the age profile of the groups. We also show how this increased extent of cryptocurrency ownership increases cryptocurrency's importance relative to net wealth in each group if the

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[31]See also: Piketty and Saez (2003), Chetty et al. (2014), Alvaredo et al. (2013), Meyer et al. (2015), Collinson et al. (2023).

[32]K33 Research and EY (2024) provides no details about the sample and weighting, while Norges Bank (2024) weight by gender, age and region.

[33]The survey shows a 7 percent adoption rate in 2021, 10 percent in 2022, 8 percent in 2023, and 9 percent in 2024. All surveys were conducted during the first months of the year.

[34]Given the results in Norges Bank (2024), which is similar to K33 Research and EY (2024) but presented in more detail, there is no reason to believe that the remaining difference is driven by the portion of the survey respondent that own less than USD 10 in cryptocurrency, who we do not account for.

non-compliant group is assumed to hold on average the same value of cryptocurrency as the tax-compliant subset of each age/wealth group. This is done in Figure 8. The reporting rate among those between 30 and 39 is so high compared to the rest of the population that this group is no longer the one with the highest percentage of cryptocurrency owners after adjusting for underreporting. Panel (a) points out that this is the owners between 25 and 29. Still, the negative relation between age and cryptocurrency adoption holds. In the same way, the relationship between non-cryptocurrency wealth and cryptocurrency wealth survives, and becomes a little bit stronger, as a result of the adjustment for unreported cryptocurrency. We estimate that close to 5 percent of the top 1 percent own cryptocurrency, as seen in panel (b). Correcting for tax compliance also increases the importance of cryptocurrency as a share of net wealth. Panel (c) display how correcting for tax compliance increases our estimate of cryptocurrency as a share of net wealth from less than 1 percent to nearly 3 percent for owners between 25 and 29. However, cryptocurrency is still more important for the age group 30-34, for which it represents 3.1 percent of net wealth after correcting for the unreported wealth. The correction has less impact across wealth groups. Panel (d) sheds light on how our correction mainly affects the importance of cryptocurrency wealth relative to net wealth for the top 1 percent of the non-cryptocurrency wealth distribution, except the top 0.1 percent, and with less than 1 percentage point.

5   Conclusion

Cryptocurrencies have attracted a growing number of investors. This interest is reflected by the ongoing increase in the value of different cryptocurrencies, especially Bitcoin. With some extent of secrecy provided by the blockchain, governments are facing several challenges, notably in investors identification for taxation, money laundering, and crime risks.

This paper contributes to the limited but growing literature on cryptocurrency. First, it explores the characteristics of cryptocurrency investors by using tax administrative data of self-reporting cryptocurrency investors from Norway. These data comprise the universe of tax records of all Norwegian taxpayers in 2021, including their reported cryptocurrency wealth and income. The Norwegian tax records permit a mapping of cryptocurrency ownership across income, wealth, and age distributions in Norway. We show that cryptocurrency owners are mostly young while the adoption of cryptocurrency in each wealth group is increasing in non-cryptocurrency wealth, ranging from around 0.75 to 2 percent, according to the tax returns. As for the amounts owned, those in the wealthier groups have on average larger cryptocurrency holdings.

In a second step, we take advantage of the bankruptcy of a leading cryptocurrency lending

platform in 2022, revealing the deposits of its investors as of April 2022. In the absence of third-party reporting, this database permits the identification of Celsius Norwegian investors, shedding light on their compliance with reporting requirements. We find that only 40 percent of Norwegian Celsius investors seem to report their holdings to the tax administration. The non-compliance found is crucial for policymakers, especially in light of the regulations on reporting by platforms that are to be introduced in the upcoming years (e.g., DAC8 and CARF). But also because it much lower than the level of non-compliance shown by surveys, which we argue are prone to severe bias due to selective non-responses. Our more realistic estimate of cryptocurrency-adoption should help tax administrations target their enforcement efforts.

References

Agersnap, O. and Brun Bjørkheim, J. (2024). Tax complexity as price discrimination. Technical report, Skatteforsk Working Paper No. 5.

Aiello, D., Baker, S. R., Balyuk, T., Di Maggio, M., Johnson, M. J., and Kotter, J. D. (2023a). Who Invests in Crypto? Wealth, Financial Constraints, and Risk Attitudes. Technical report, National Bureau of Economic Research.

Aiello, D., Baker, S. R., Balyuk, T., Di Maggio, M., Johnson, M. J., Kotter, J. D., and Williams, E. (2023b). The effects of cryptocurrency wealth on household consumption and investment. Technical report, National Bureau of Economic Research.

Alstadsæter, A., Godar, S., Nicolaides, P., and Zucman, G. (2023). Global Tax Evasion Report 2024. Note.

Alstadsæter, A., Johannesen, N., and Zucman, G. (2018). Who owns the wealth in tax havens? Macro evidence and implications for global inequality. *Journal of Public Economics*, 162(C):89–100.

Alstadsæter, A., Johannesen, N., and Zucman, G. (2019). Tax Evasion and Inequality. *American Economic Review*, 109(6):2073–2103.

Alstadsæter, A., Planterose, B., Zucman, G., and Økland, A. (2022). Who owns offshore real estate? evidence from Dubai. EU Tax Observatory Working Paper No. 1.

Alvaredo, F., Atkinson, A. B., Piketty, T., and Saez, E. (2013). The top 1 percent in international and historical perspective. *Journal of Economic Perspectives*, 27(3):3–20.

Arcane Research and EY (2022). Norwegian Crypto Adoption Survey 2022. Technical report.

Bach, L., Calvet, L. E., and Sodini, P. (2020). Rich pickings? risk, return, and skill in household wealth. *American Economic Review*, 110(9):2703–47.

Baer, K., De Mooij, R., Hebous, S., and Keen, M. (2023). Taxing cryptocurrencies. *Oxford Review of Economic Policy*, 39(3):478–497.

Beer, S., Coelho, M. D., and Leduc, S. (2019). Hidden treasure: The impact of automatic exchange of information on cross-border tax evasion. Working Paper No. 19/286.

Brulhart, M., Gruber, J., Krapf, M., and Schmidheiny, K. (2022). Behavioral Responses to Wealth Taxes: Evidence from Switzerland . *American Economic Journal: Economic Policy*, 14(4):111–150.

Campbell, J. Y., Ramadorai, T., and Ranish, B. (2019). Do the rich get richer in the stock market? evidence from india. *American Economic Review: Insights*, 1(2):225–40.

Casi, E., Spengel, C., and Stage, B. M. (2020). Cross-border tax evasion after the common reporting standard: Game over? *Journal of Public Economics*, 190:104240.

Chainalysis (2022). The 2022 geography of cryptocurrency report.

Chainalysis (2023). The Chainalysis Crypto Myth Busting Report. Report.

Chetty, R., Hendren, N., Kline, P., and Saez, E. (2014). Where is the land of Opportunity? The Geography of Intergenerational Mobility in the United States. *The Quarterly Journal of Economics*, 129(4):1553–1623.

Collin, M. (2021). What lies beneath: evidence from leaked account data on how elites use offshore banking. Brookings Institution Global Working Paper No. 156.

Collinson, R., Humphries, J. E., Mader, N., Reed, D., Tannenbaum, D., and van Dijk, W. (2023). Eviction and Poverty in American Cities*. *The Quarterly Journal of Economics*, 139(1):57–120.

Dutz, D., Huitfeldt, I., Lacouture, S., Mogstad, M., Torgovitsky, A., and van Dijk, W. (2021). Tax design, information, and elasticities: Evidence from the french wealth tax. Technical report, NBER Working Paper no. 29549.

Fagereng, A., Guiso, L., Malacrino, D., and Pistaferri, L. (2020). Heterogeneity and persistence in returns to wealth. *Econometrica*, 88(1):115–170.

Faye, S., Godar, S., and Zucman, G. (2023). Global Tax Evasion Report 20. Note.

Foley, S., Karlsen, J. R., and Putniņš, T. J. (2019). Sex, Drugs, and Bitcoin: How Much Illegal Activity Is Financed through Cryptocurrencies? *The Review of Financial Studies*, 32(5):1798–1853.

Garbinti, B., Goupille-Lebret, J., Munoz, M., Stantcheva, S., and Zucman, G. (2024). Tax design, information, and elasticities: Evidence from the french wealth tax. Technical report, National Bureau of Economic Research.

Hackethal, A., Hanspal, T., Lammer, D. M., and Rink, K. (2022). The characteristics and portfolio behavior of bitcoin investors: Evidence from indirect cryptocurrency investments. *Review of Finance*, 26(4):855–898.

Johannesen, N., Langetieg, P., Reck, D., Risch, M., and Slemrod, J. (2020). Taxing hidden wealth: The consequences of u.s. enforcement initiatives for evasive foreign accounts,. *American Economic Journal: Economic Policy*, 12(3):312–346.

Johannesen, N. and Zucman, G. (2014). The end of bank secrecy? an evaluation of the g20 tax haven crackdown. *American Economic Journal: Economic Policy*, 6(1):65–91.

K33 Research and EY (2024). Nordic Crypto Adoption Survey 2024. Technical report.

Kleven, H. J., Knudsen, M. B., Kreiner, C. T., Pedersen, S., and Saez, E. (2011). Unwilling or Unable to Cheat? Evidence from a Tax Audit Experiment in Denmark. *Econometrica*, 79:651–692.

Kogan, S., Makarov, I., Niessner, M., and Schoar, A. (2023). Are cryptos different? evidence from retail trading. Technical report, National Bureau of Economic Research.

Leenders, W., Lejour, A., Rabaté, S., and van 't Riet, M. (2021). Offshore tax evasion and wealth inequality: Evidence from a tax amnesty in the netherlands. working paper.

Liu, J., Makarov, I., and Schoar, A. (2023). Anatomy of a run: The terra luna crash. Working Paper 31160, National Bureau of Economic Research.

Londoño-Vélez, J. and Àvila-Mahecha, J. (2021). Enforcing wealth taxes in the developing world: Quasi-experimental evidence from colombia. *American Economic Review: Insights*, 3(2):131–148.

Londoño-Vélez, J. and Ávila-Mahecha, J. (2022). Behavioral responses to wealth taxation: Evidence from colombia. working paper.

Menkhoff, L. and Miethe, J. (2019). Tax evasion in new disguise? examining tax havens' international bank deposits. *Journal of Public Economics*, 176:53–78.

Meyer, B. D., Mok, W. K. C., and Sullivan, J. X. (2015). Household surveys in crisis. *Journal of Economic Perspectives*, 29(4):199–226.

Nershi, K. (2022). How strong are international standards in practice? evidence from cryptocurrency transactions. *Evidence from Cryptocurrency Transactions (August 9, 2022)*.

Norges Bank (2024). Undersøkelse om kryptoeiendeler i Norge. Norges Bank Memo.

O'Reilly, P., Parra Ramírez, K., and Stemmer, M. A. (2021). Exchange of information and bank deposits in international financial centres. *Hacienda Pública Española / Review of Public Economics*, 239:27–69.

Piketty, T. and Saez, E. (2003). Income Inequality in the United States, 1913–1998*. *The Quarterly Journal of Economics*, 118(1):1–41.

Pursiainen, V. and Toczynski, J. (2022). Retail investors' cryptocurrency investments. *Available at SSRN 4268236*.

Thiemann, A. (2021). Cryptocurrencies: An empirical view from a tax perspective. Technical report, JRC Working Papers on Taxation and Structural Reforms.

U.S. Department of Justice (2020). Global Disruption of Three Terror Finance Cyber-Enabled Campaigns. Press release.

von Luckner, C. G., Reinhart, C. M., and Rogoff, K. (2023). Decrypting new age international capital flows. *Journal of Monetary Economics*.

Weber, M., Candia, B., Coibion, O., and Gorodnichenko, Y. (2023). Do you even crypto, bro? cryptocurrencies in household finance. Technical report, National Bureau of Economic Research.

Zucman, G. (2013). The missing wealth of nations: Are Europe and the U.S. net debtors or net creditors? *Quarterly Journal of Economics*, 128(3):1321–1364.

Zucman, G. (2014). Taxing across borders: Tracking personal wealth and corporate profits. *Journal of Economic Perspectives*, 28(4):121–148.

Zucman, G. (2015). *The Hidden Wealth of Nations: The Scourge of Tax Havens*. University of Chicago Press.

Økland, A. (2024). Tax havens, personal tax evasion and inequality. In Lejour, A. and Schindler, D., editors, *Research Handbook on Tax Havens*. Edward Elgar Publishing.

6 Tables and figures

Table 1: Summary statistics: Reporters of crypto wealth

Group	Reporters of crypto wealth	Total (USD millions)	Median (1,000s)	Average (USD 1,000s)	Average for top 5 owners (1,000s)
Total	36,901	2,359	4.7	64	61,308
Age					
18-24	4,007	60	2.8	15	1,300
25-29	6,029	207	4.1	34	5,795
30-34	7,600	632	5.4	83	48,870
35-39	6,107	571	5.8	93	40,025
40-49	7,576	594	5.6	78	26,700
50-59	3,728	198	4.1	53	11,315
60-69	1,463	76	4.8	52	5,720
70-79	365	21	5.0	58	6,908
80-	26	1	7.8	32	203
Wealth					
P0-P50	17,064	563	3.9	33	13,615
P50-P90	15,647	707	5.1	45	17,756
P90-P95	1,838	112	7.4	61	3,796
P95-P99	1,714	261	9.3	152	14,524
P99-P99.5	297	153	11.6	515	20,631
P99.5-P99.9	266	285	15.8	1,073	37,328
Top 0.1 %	75	278	19.8	3,701	49,235
Income					
P0-P50	7,759	175	2.9	22	5,752
P50-P90	17,749	447	4.1	25	7,630
P90-P95	5,127	207	6.2	40	8,646
P95-P99	4,789	339	10.3	71	6,052
P99-P99.5	674	124	21.2	185	5,250
P99.5-P99.9	601	305	40.0	508	19,481
Top 0.1 %	202	763	159.2	3,775	61,308

Notes: The table summarises the reported cryptocurrency holdings of Norwegian complete tax residents (tax roll group 10) in 2021. All numbers are in USD (US dollars). The cryptocurrency wealth is reported for tax purposes and is the market value of their holdings as of 31 December 2021. The values are originally reported in NOK. We convert the values to USD using the USD/NOK exchange rate as of 31 December 2021. The rows report the statistics for the full population and for the different age, wealth and income groups, which is calculated after excluding any cryptocurrency wealth and income. Cryptocurrency holdings of less than USD 10 are disregarded. Total taxpaying population: 4,404,424.

Table 2: Characteristics: Reporters of crypto wealth

	Less than USD 2,500	USD 2,500 - 25,000	More than USD 25,000	General population (18-69)
Mean age	37	37	38	43
Male	80%	88%	93%	52%
Completed bachelor degree	58%	60%	62%	37%
Completed masters degree	22%	25%	28%	11%
Oslo	22%	24%	27%	14%
Other large municipality	25%	25%	26%	20%
Medium municipality	32%	30%	29%	34%
Small municipality	22%	20%	17%	32%
Mean income (crypto ex.)	67,678	74,920	82,180	76,010
Mean net wealth (crypto ex.)	174,376	214,682	131,222	179,955
Financial wealth	74%	73%	44%	55%
Real estate wealth	72%	76%	80%	61%
Foreign wealth	17%	23%	28%	3%
Large Debt	0.9%	2.0%	4.1%	0.0%
Stock ownership	60%	65%	65%	21%
Received inheritance	16%	17%	20%	10%
Won lottery	0.6%	0.6%	1.5%	0.3%
Observations	13,976	15,608	7,300	3,665,215

Notes: The table describes Norwegians who report cryptocurrency holdings in 2021 and compares them to the general population. All groups are restricted to complete tax residents (tax roll group 10) below the age of 70. All numbers are in USD (US dollars). The cryptocurrency wealth is reported for tax purposes and is the market value of their holdings as of 31 December 2021. The values are originally reported in NOK. We convert the values to USD using the USD/NOK exchange rate as of 31 December 2021. Cryptocurrency holdings of less than USD 10 are disregarded. Financial wealth: Reported financial wealth (excluding cryptocurrency) over USD 10,000. Real estate wealth: Reported real estate wealth above USD 10,000. Foreign wealth: Reported wealth above USD 100 abroad, excluding real estate. Large debt: Debt is between 6 and 30 times the income. Stock ownership: Registered as the owner of one or more shares in the Norwegian shareholder registry. Received inheritance: Reported inheritance on tax return between 2012 and 2021. Won lottery: Reported lottery winnings on tax returns between 2012 and 2021. Regression results showing the statistical importance of the different characteristics are presented in table A.1.

Table 3: Reporting Behaviour Among Celsius Owners

Group	Non-reporters	Report some	Report same or more	Report rate	Amount not reported (USD millions)	Amount reported (USD millions)
Total	412	39	251	40 %	6.2	7.3
Age						
18-24	76	5	15	28 %	0.5	0.1
25-29	82	1-4	42	28 %	0.7	0.5
30-34	58	12	70	54 %	0.8	2.5
35-39	56	8	53	54 %	0.9	1.0
40-49	64	8	48	39 %	1.2	2.3
50-59	39	1-4	15	39 %	0.3	0.9
60-69	19	1-4	8	20 %	1.8	0.1
70-79	9	0	0	20 %	0.1	0.0
80-	9	0	0	20 %	0.1	0.0
Wealth						
P0-P50	263	20	162	39 %	2.9	3.4
P50-P90	122	15	70	40 %	1.2	2.7
P90-P95	7	0	1-4	45 %	0.1	0.0
P95-P99	14	1-4	11	45 %	0.7	0.4
P99-P99.5	1-4	0	1-4	40 %	0.0	0.1
P99.5-P99.9	1-4	0	1-4	40 %	1.3	0.7
Top 0.1 %	0	0	0		0.0	0.0
Income						
P0-P50	174	10	59	28 %	1.4	0.6
P50-P90	166	22	130	45 %	1.5	4.1
P90-P95	37	1-4	29	46 %	0.8	0.7
P95-P99	31	1-4	26	46 %	1.2	1.1
P99-P99.5	1-4	0	1-4	64 %	0.0	0.0
P99.5-P99.9	1-4	0	1-4	64 %	1.3	0.8
Top 0.1 %	0	0	1-4	64 %	0.0	0.0

Notes: The table summarises the reporting of Norwegian deposit holders in Celsius. The rows report the statistics for the different wealth groups, ranked by non-cryptocurrency wealth. The reporting rates are calculated by assigning the matched individuals either a compliant or non-compliant status. All individuals who report more than half of the value in their assigned Celsius account are deemed compliant. The rest is deemed non-compliant. The granular reporting rates are calculated for groups of subsets (e.g., age groups 60-69, 70-79, and 80+ are grouped together) to overcome small sample issues in the most granular subsets. The table shows statistics for matches of names for which the Namsor algorithm indicates that Norway is either the most likely country of residence or the most likely country of origin based on the name. More statistics across the different matching restrictions are in table A.2.

Figure 1: Cryptocurrencies market cap vs. offshore financial wealth

(a) Cryptocurrencies market cap vs. offshore financial wealth (2014-2022)
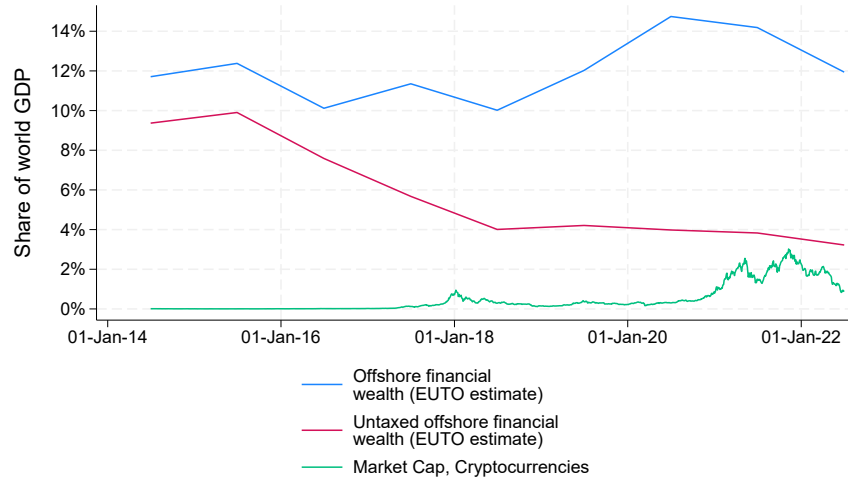
(b) Compare size of cryptocurrency market to tax havens
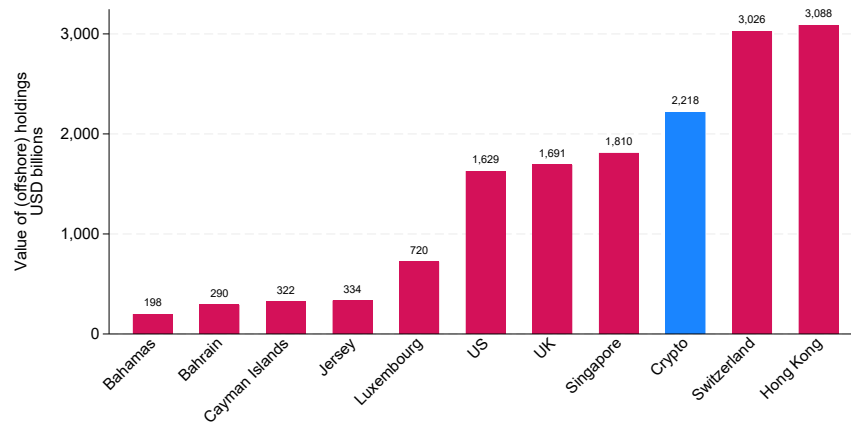
Notes: The figure shows how the market cap of cryptocurrencies has developed over time and compares the market cap to measures of offshore financial wealth. Panel (a) compares the total market cap of cryptocurrencies to the leading estimate of offshore financial wealth and accompanying estimates of offshore financial wealth not covered by automatic information exchange (AEOI) agreements. The numbers are scaled by global GDP. Panel (b) compares the market cap of cryptocurrencies to the estimate of offshore financial wealth held in major tax havens as of the end of 2021. Source: CoinMarketCap, Faye et al. (2023) and Global Evasion Report 2024 (Alstadsæter et al., 2023).

Figure 2: Geographical distribution of cryptocurrency transactions

(a) Top receivers of cryptocurrencies (2021-2022)
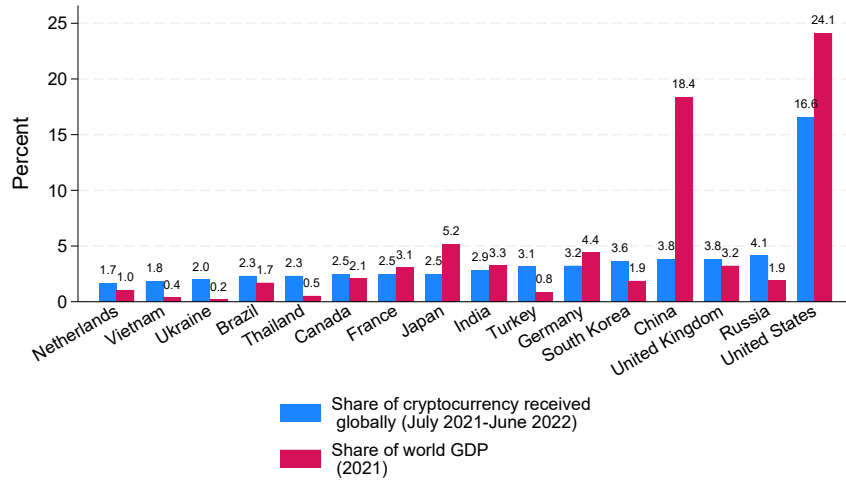
(b) Top receivers of cryptocurrencies as share of GDP
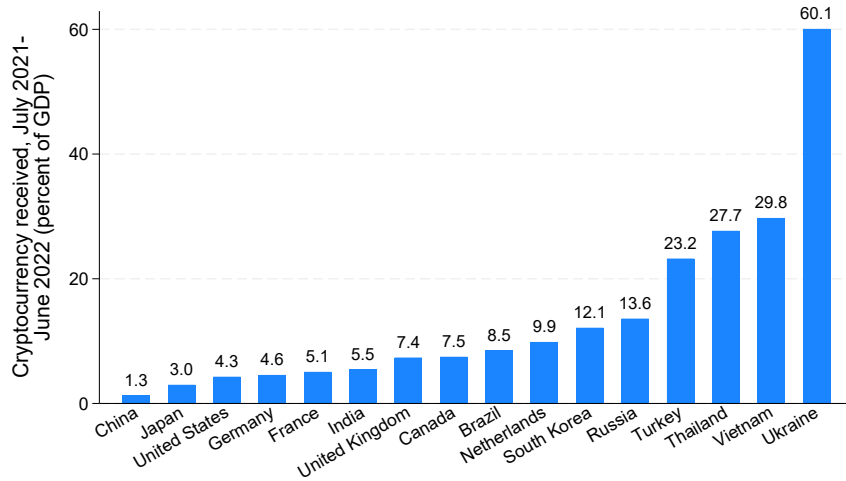
Notes: The figure shows the approximate country breakdown of cryptocurrency received, according to Chainalysis (2022). Panel (a) compares the countries' shares of total cryptocurrencies sent and their share of world GDP. Panel (b) shows the top countries in terms of GDP. Source: Chainalysis (2022)

Figure 3: Cryptocurrency Owners Across the Age Distribution

(a) Likelihood across the population
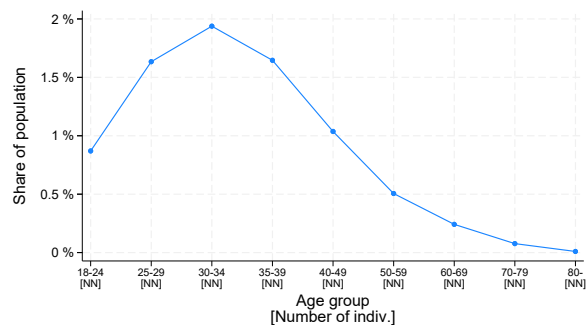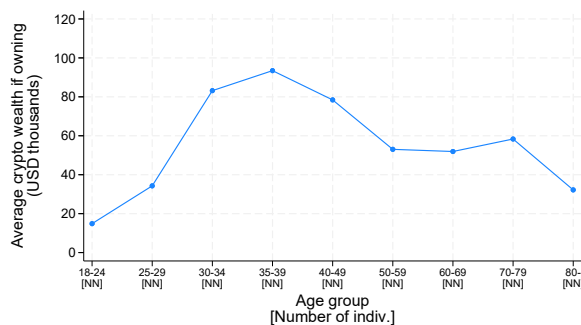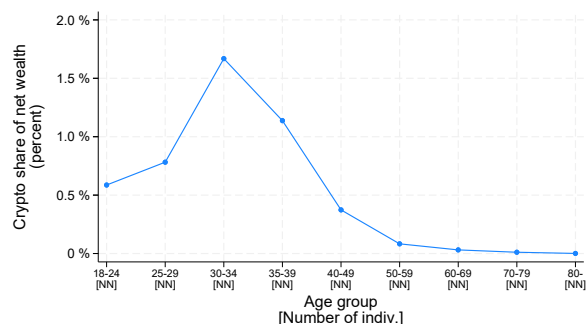
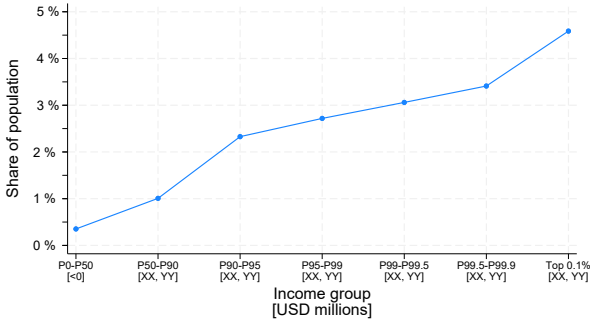
(b) Average cond. on owning

(c) % of Net Wealth

(d) Share of population total
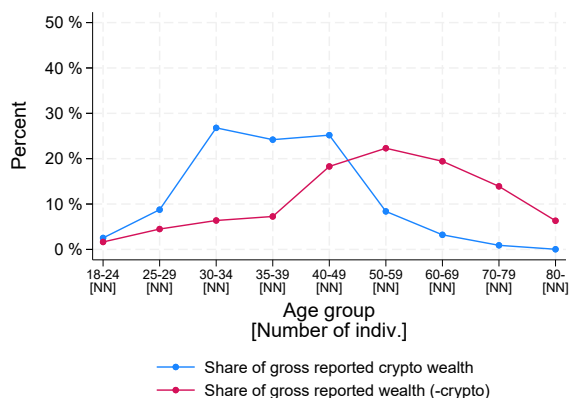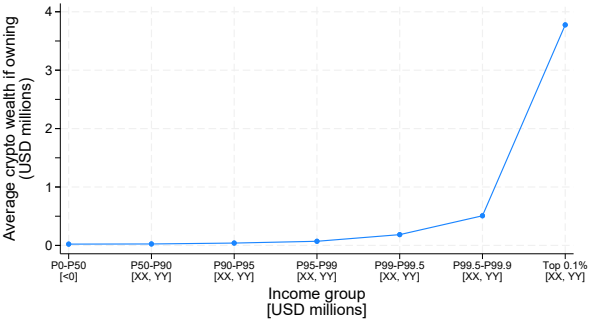

Notes: This figure shows key statistics about the reported cryptocurrency wealth of Norwegian tax residents (tax roll group 10) at the end of 2021. Panel (a) shows the likelihood of reporting cryptocurrency wealth conditional on belonging to a given age group. Panel (b) shows the average reported cryptocurrency wealth, given that the individual reports some cryptocurrency wealth, across the different age groups. Panel (c) shows reported cryptocurrency wealth as a share of net wealth across the different groups. Panel (d) compares each age group's share of total cryptocurrency wealth to the age group's share of total non-cryptocurrency wealth. All numbers are in USD (US dollars) or percent. The cryptocurrency wealth is reported for tax purposes and is the market value of their holdings as of 31 December 2021. The values are originally reported in NOK. We convert the values to USD using the USD/NOK exchange rate as of 31 December 2021. Cryptocurrency holdings of less than USD 10 are disregarded.

Figure 4: Cryptocurrency Owners Across Non-Cryptocurrency Wealth Distribution
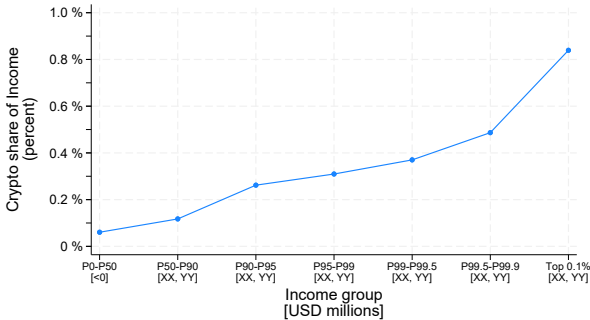
(a) Likelihood across the population
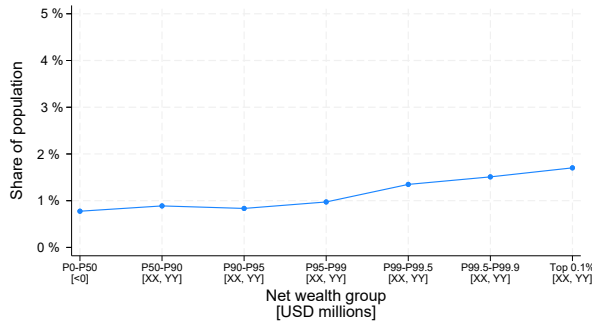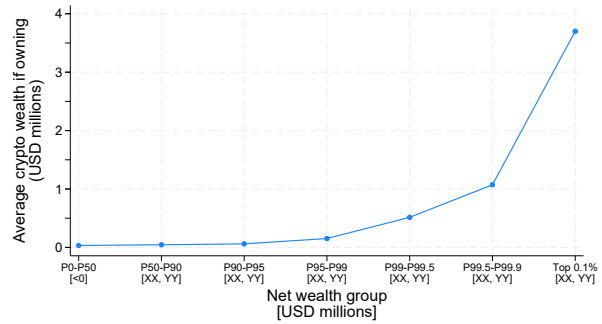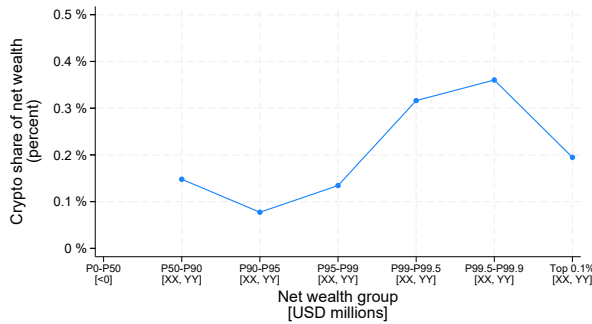
(b) Average cond. on owning


(c) % of Net Wealth


(d) Share of population total
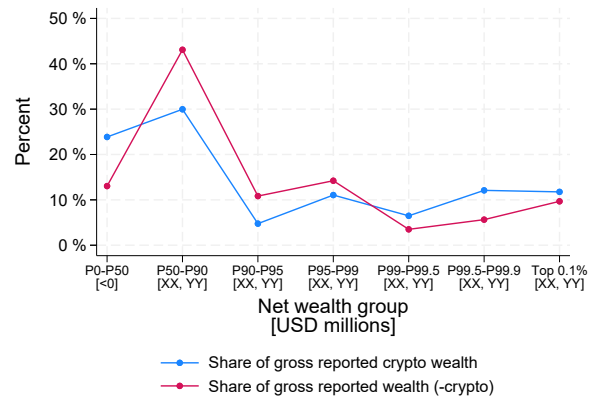
Notes: This figure shows key statistics about the reported cryptocurrency wealth of Norwegian tax residents (tax roll group 10) at the end of 2021. The tax residents are grouped by their non-cryptocurrency wealth. Panel (a) shows the likelihood of reporting cryptocurrency wealth conditional on belonging to a specific non-cryptocurrency wealth group. Panel (b) shows the average reported cryptocurrency wealth, given that the individual reports some cryptocurrency wealth, across the different non-cryptocurrency wealth groups. Panel (c) shows reported cryptocurrency wealth as a share of net wealth across the different non-cryptocurrency wealth groups. Panel (d) compares each non-cryptocurrency wealth group's share of total cryptocurrency wealth to the non-cryptocurrency wealth group's share of total non-cryptocurrency wealth. All numbers are in USD (US dollars) or percent. The cryptocurrency wealth is reported for tax purposes and is the market value of their holdings as of 31 December 2021. The values are originally reported in NOK. We convert the values to USD using the USD/NOK exchange rate as of 31 December 2021. Cryptocurrency holdings of less than USD 10 are disregarded.

Figure 5: Cryptocurrency Owners Across Non-Cryptocurrency Income Distribution

(a) Likelihood across the population

(b) Average cond. on owning

(c) % of Net Wealth

(d) Share of population total
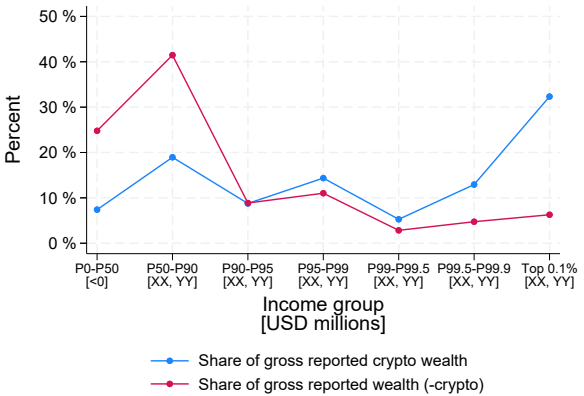
Notes: This figure shows key statistics about the reported cryptocurrency wealth of Norwegian tax residents (tax roll group 10) at the end of 2021. The tax residents are grouped by their non-cryptocurrency income. This is their total reported income in the tax return for 2021 (including both labour income and capital income). Panel (a) shows the likelihood of reporting cryptocurrency wealth conditional on belonging to a specific group. Panel (b) shows the average reported cryptocurrency, given that the individual reports some cryptocurrency, across the different non-cryptocurrency income groups. Panel (c) shows reported cryptocurrency as a share of net wealth across the different non-cryptocurrency income groups. Panel (d) compares each non-cryptocurrency income group's share of total cryptocurrency wealth to the non-cryptocurrency income group's share of total non-cryptocurrency wealth. All numbers are in USD (US dollars) or percent. The cryptocurrency wealth is reported for tax purposes and is the market value of their holdings as of 31 December 2021. The values are originally reported in NOK. We convert the values to USD using the USDNOK exchange rate as of 31 December 2021. Cryptocurrency holdings of less than USD 10 are disregarded.

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Figure 6: Celsius matching across different name-type restrictions

(a) Likelihood of being matched
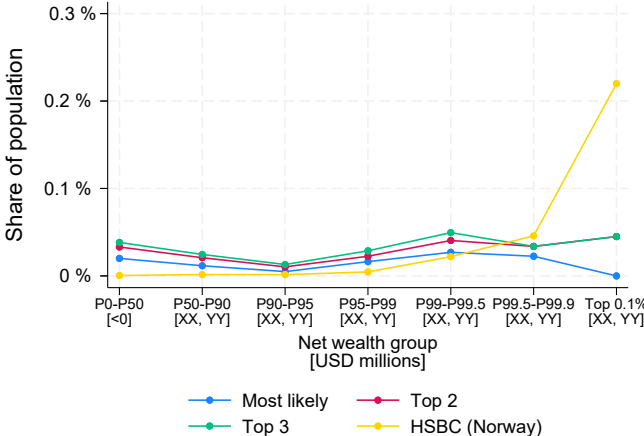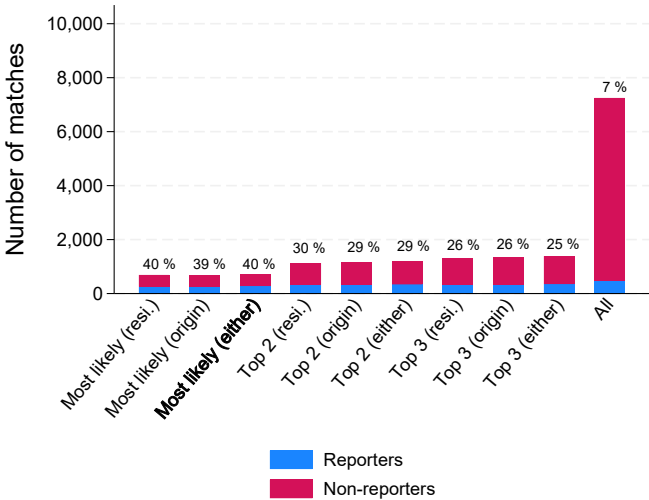
### (b) Reporters and non-reporters

Notes: This figure shows how the different matching restrictions affect the size, wealth composition, and report rate of the sample we analyse. Panel (a) illustrates the distribution of Norwegian taxpayers to the Celsius accounts across the wealth distribution. It shows the share in each wealth group (ranked by non-cryptocurrency wealth) that is matched. It compares this to the share of Scandinavians and Norwegians that was matched to bank accounts in HSBC Switzerland by Alstadsæter et al. (2019). These are grouped by wealth. Panel (b) shows the numbers of reporters and non-reporters by the matching restrictions. All individuals who report more than half of the value in their assigned Celsius account are deemed reporters. The rest are deemed non-reporters. The labels on the bars show the report rate. More statistics across the different matching restrictions are in table A.2.

Figure 7: Celsius compliance, main results

## (a) Reporting rates across account sizes
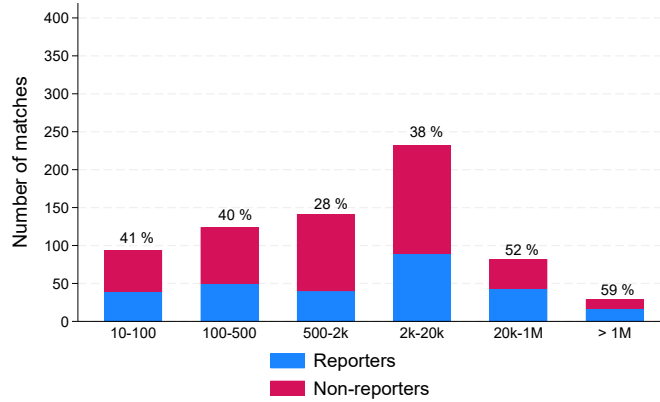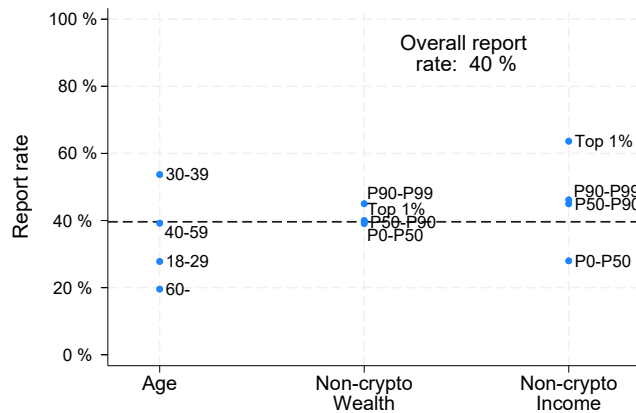
(b) Reporting rates across groups

Notes: This figure shows the reporting and non-reporting of Norwegian taxpayers matched to Celsius that have a name that is most likely to have Norway as their country of residence or country of origin, according to the Namsor algorithm. All individuals who report more than half of the value in their assigned Celsius account are deemed reporters. The rest are deemed non-reporters. Panel (a) shows the number of reporters and non-reporters across the different account sizes. The label on each bar is the share of account holders that report. The value in each account is calculated by taking the amount of each cryptocurrency in the account and converting it to USD using the exchange rate as of 31 December 2021. Panel (b) shows how the report rate for different subsets of account holders, grouped by age, non-cryptocurrency net wealth, or non-cryptocurrency income.

Figure 8: Cryptocurrency ownership adjusted for non-compliance

(a) Likelihood (age)

(b) Likelihood (wealth)

(c) % of Net Wealth (age)

(d) % of Net Wealth (wealth)
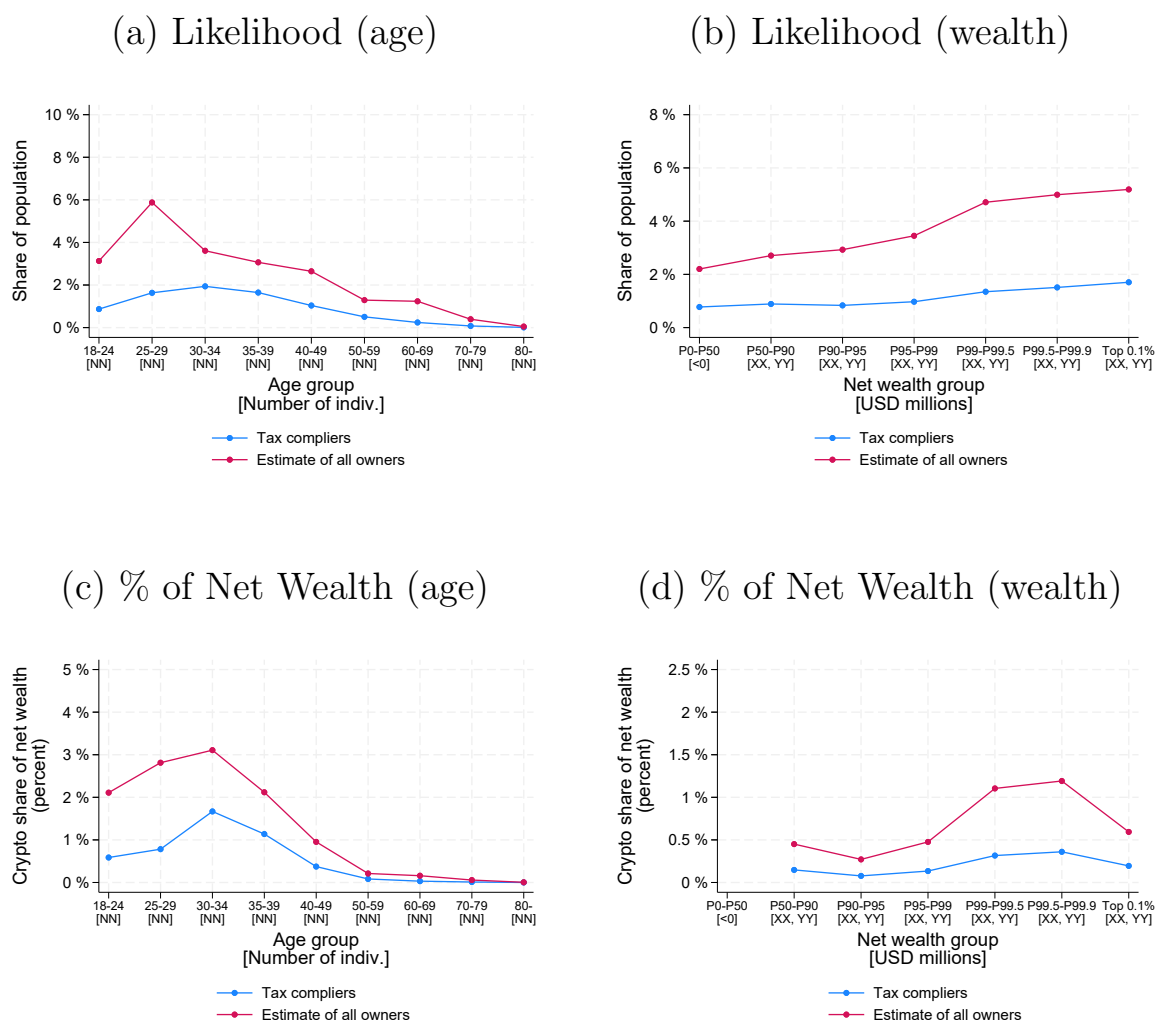
Notes: This figure presents key statistics about the reported cryptocurrency wealth of Norwegian tax residents (tax roll group 10) at the end of 2021. The percentage of self-reporters is based on the self-reporting in the tax records. Estimate of all owners is the corrected estimate of cryptocurrency ownership, which is obtained by combining the number of self-reporters with the estimated compliance rate of the group (calculated by combining the age profile of the group and the observed age-specific compliance rates). Panel (a) shows the likelihood of reporting and owning cryptocurrency wealth conditional on belonging to a given age group. Panel (b) shows the likelihood of reporting and owning cryptocurrency wealth conditional on belonging to a specific non-cryptocurrency wealth group. Panel (c) shows reported and estimated cryptocurrency wealth as a share of net wealth across the different groups. Panel (d) shows reported and estimated cryptocurrency wealth as a share of net wealth across the different non-cryptocurrency wealth groups. All numbers are in USD (US dollars) or percent. The cryptocurrency wealth is reported for tax purposes and is the market value of their holdings as of 31 December 2021. The values are originally reported in NOK. We convert the values to USD using the USD/NOK exchange rate as of 31 December 2021. Cryptocurrency holdings of less than USD 10 are disregarded.

Appendix (for Online Publication)

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A   Additional tables and figures

Table A.1: Characteristics Regression: Reporters of crypto wealth

	Cryptocurrency wealth (USD 1,000s)			Cryptocurrency ownership (1 = Report some)		
	(1)	(2)	(3)	(4)	(5)	(6)
Age	-0.011***	-0.069***	-0.065***	-0.000***	-0.000***	-0.000***
	(0.003)	(0.005)	(0.005)	(0.000)	(0.000)	(0.000)
Male	1.135***	1.296***	1.034***	0.012***	0.012***	0.009***
	(0.101)	(0.127)	(0.130)	(0.000)	(0.000)	(0.000)
Municipality pop. (log)	0.201***	0.155***	0.125***	0.002***	0.002***	0.001***
	(0.030)	(0.038)	(0.038)	(0.000)	(0.000)	(0.000)
Income (log)		0.555***	0.520***		0.002***	0.001***
		(0.045)	(0.045)		(0.000)	(0.000)
Net Wealth (log)		0.442***	0.389***		0.002***	0.001***
		(0.033)	(0.034)		(0.000)	(0.000)
Stock Owner			0.350**			0.012***
			(0.163)			(0.000)
Inheritance			0.037			0.003***
			(0.158)			(0.000)
Lottery Winner			1.936*			0.010***
			(0.991)			(0.001)
Foreign Wealth			4.888***			0.044***
			(0.367)			(0.000)
Constant	-1.563***	-9.110***	-8.160***	-0.008***	-0.034***	-0.019***
	(0.369)	(0.582)	(0.592)	(0.000)	(0.000)	(0.000)
Sample size	3,665,215	2,936,935	2,936,935	3,665,215	2,936,935	2,936,935
R^2	0.000	0.000	0.000	0.007	0.011	0.023

Notes: This table displays the regression output when reported cryptocurrency wealth is explained by other characteristics of the owner retrieved from the tax returns and other administrative records. The cryptocurrency wealth is reported for tax purposes and is the market value of their holdings as of 31 December 2021. The values are originally reported in NOK. We convert the values to USD using the USD/NOK exchange rate as of 31 December 2021. Cryptocurrency holdings of less than USD 10 are disregarded. The estimates are OLS. ***/**/* indicates 1/5/10 percent level of statistical significance.

Table A.2: Summary statistics: Norwegian Celsius Owners

Namsor criteria	Number of matches	Report rate	Total deposits (millions)	Mean deposit size	Median	Max (top 5 avg.)
All	7,249	7 %	458	63,125	2,228	38,669,680
Most likely (resi.)	690	40 %	13	19,427	1,682	749,413
Most likely (origin)	679	39 %	13	19,468	1,629	749,413
Most likely (either)	702	40 %	14	19,238	1,682	749,413
Top 2 (resi.)	1,131	30 %	24	21,401	1,546	1,410,529
Top 2 (origin)	1,143	29 %	23	20,480	1,576	1,351,594
Top 2 (either)	1,185	29 %	25	21,337	1,556	1,410,529
Top 3 (resi.)	1,312	26 %	27	20,742	1,531	1,410,529
Top 3 (origin)	1,349	26 %	29	21,180	1,589	1,410,529
Top 3 (either)	1,386	25 %	29	20,941	1,563	1,410,529

Notes: The table summarises the deposits held and the reporting of them by deposit holders we can link to a unique Norwegian tax record. All numbers are in USD (US dollars). The rows report the statistics for the different types of accounts Celsius offered.

Figure A.1: Celsius matching across different name-type restrictions

## (a) Probability of match, by matching restriction
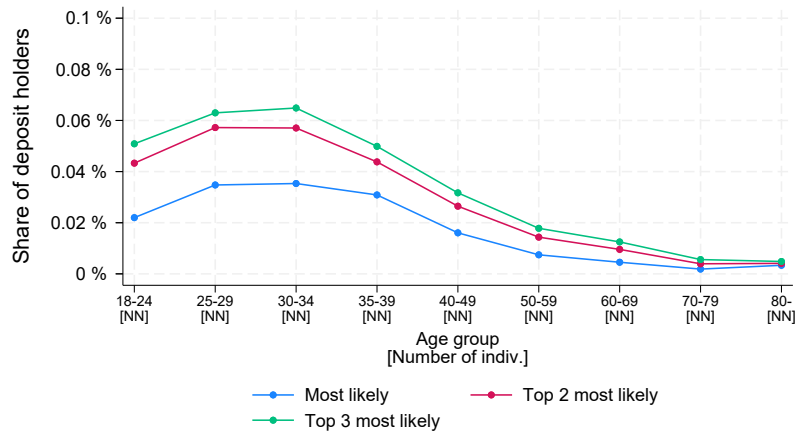
## (b) Age distribution of matched taxpayers, by matching restriction
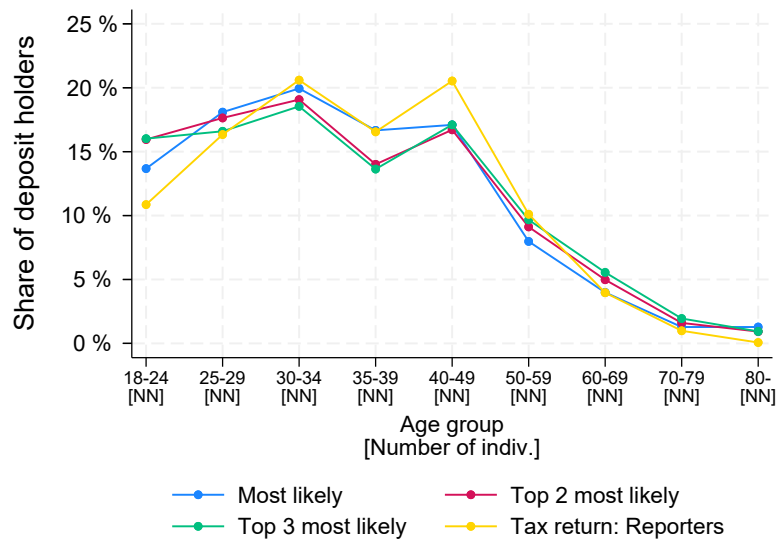
Notes: This figure illustrates the age distribution of matched individuals in Celsius in two different ways. Panel (a) shows the probability of being matched to Celsius for each age segment of the general population. The figure is analogous to figure 6 panel (a), but ranks the matched individual by their age, not their non-cryptocurrency wealth. Panel (b) shows the share of matched individuals in each age group and compares it to the share of cryptocurrency reporters in the tax returns.

Figure A.2: Reporting rates by age and non-cryptocurrency wealth group
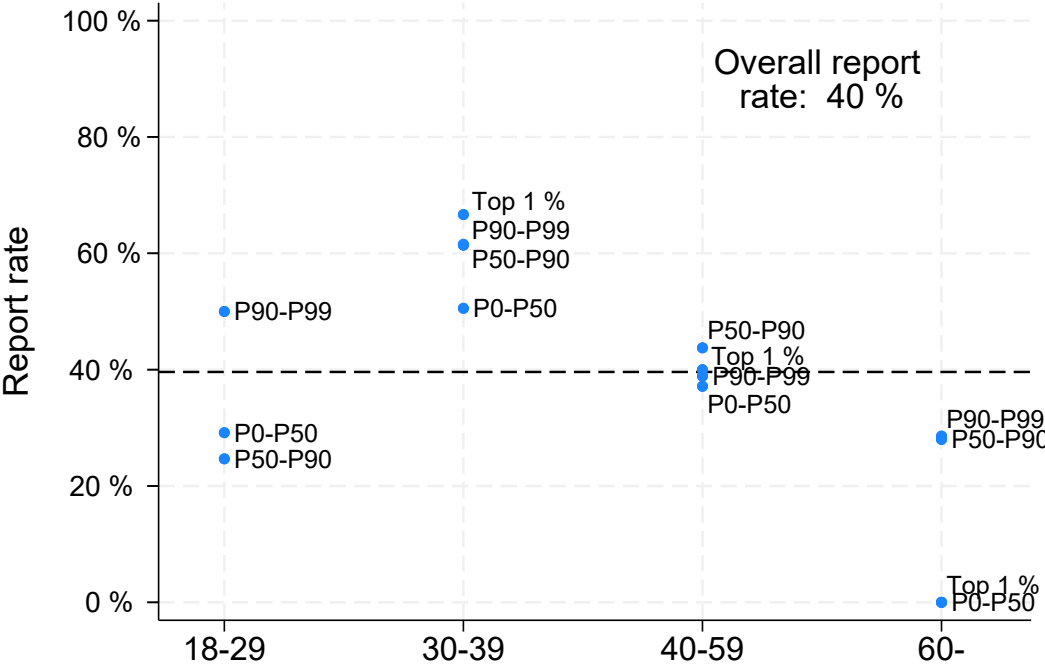
Notes: This figure shows the reporting rate for each group conditional on both age and non-cryptocurrency wealth. The individuals are ranked by their place in their overall non-cryptocurrency wealth distribution, not the age group-specific non-cryptocurrency wealth distribution. It is a more granular version of figure 7, which shows the reporting rate for different groups within the age distribution, non-cryptocurrency wealth distribution, and non-cryptocurrency income distribution.

Figure A.3: Cryptocurrency reporters, by municipality

Owners per thousand
- 10 to 50 (17)
- 7.5 to 10 (46)
- 5 to 7.5 (92)
- 2.5 to 5 (133)
- 0 to 2.5 (68)
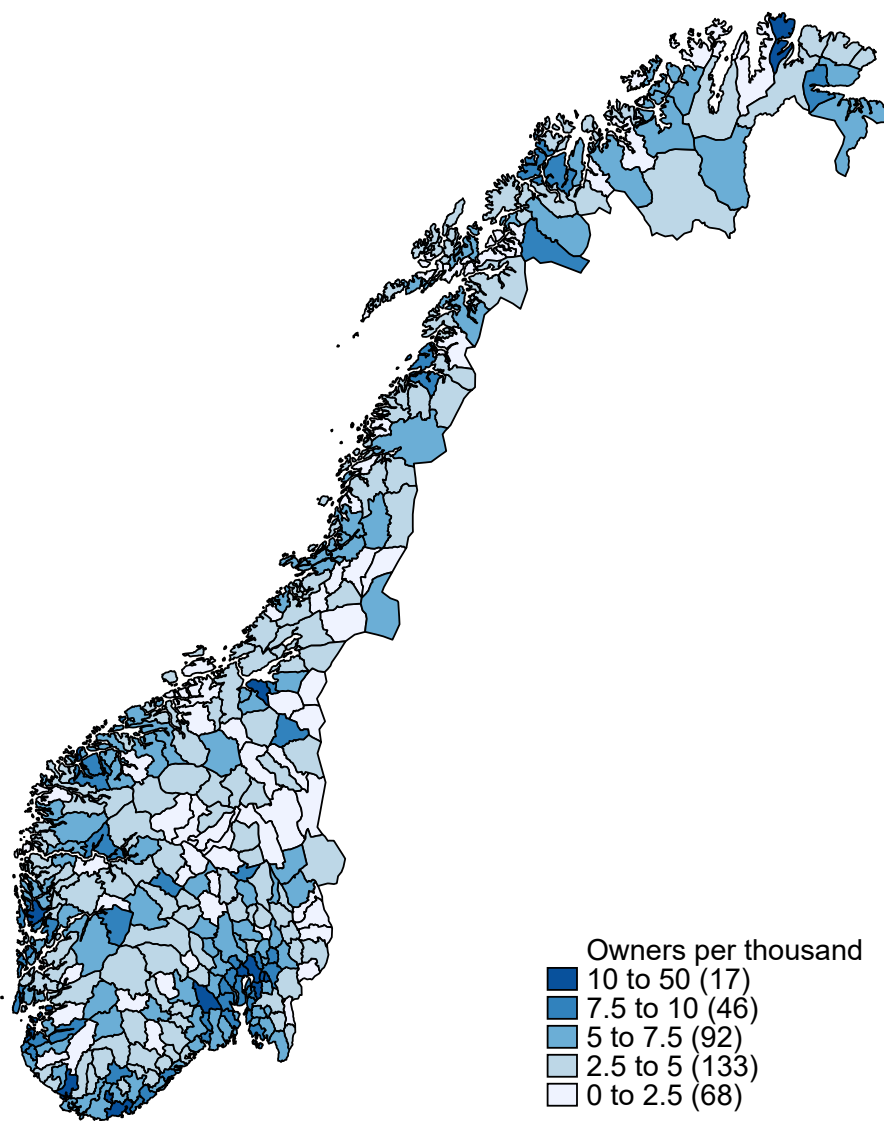
Notes: This map shows the number of cryptocurrency reporters in each municipality in Norway, scaled by the total number of adult taxpayers in the municipality.

B   The Celsius bankruptcy and data

B.1   Celsius Network

Celsius Network was founded in 2017 as a cryptocurrency lending and trading platform. The platform emerged during a period of rapid growth and innovation in the blockchain and cryptocurrency industry. As advertised by Celsius, the aspiration was to create a more inclusive financial ecosystem that leverages blockchain technology to offer banking services typically reserved for traditional financial institutions. The origin of Celsius is rooted in the broader movement towards decentralised finance (DeFi), which seeks to utilise blockchain technology to democratise access to financial services. Celsius aimed to differentiate itself by offering competitive interest rates for both depositors and borrowers. Users could deposit their cryptocurrency into the platform, earning interest that is often significantly higher than that offered by conventional banks. Additionally, Celsius allowed users to take out loans in USD using their cryptocurrency assets as collateral, analogous to borrowing against a portfolio of stocks (margin loan). After the collapse of TerraUSD (UST) and Terra (LUNA) (Liu et al., 2023) and increased market volatility in May 2022, Celsius officially filed its bankruptcy shortly after in July 2022.

As part of the bankruptcy process, on October 5, 2022, Celsius and certain of its affiliates filed the required "Schedules of Assets and Liabilities" and "Statements of Financial Affairs" in the United States Bankruptcy Court for the Southern District of New York. Scraping and cleaning these tables, we create a dataset that includes the balance of 556,557 different Celsius account holders, 469,426 of which have non-negligible holdings (worth strictly more than 1 USD). As shown in table B.1, Celsius was a major cryptocurrency platform before its collapse.

B.2   Data structure and cleaning

The "Schedules of Assets and Liabilities" include tables outlining "Non-Priority Unsecured Retail Customer Claims", which lists the balance of each retail customer on 13 July 2022, the bankruptcy protection date. Those are, in reality, the balances as of 12 June 2022, when Celsius Network paused withdrawals and transactions, plus additional rewards/interests earned between 12 June and 13 July. The list includes the name of the customer, the address in case the customer is a company (people had their addresses redacted), and the balances of different cryptocurrencies deposited in the different types of accounts (earn, custody, withheld, and collateral accounts). This raw deposits database counts 603,496 entries.

Figure B.1: Celsius movements graphs

(a) Net withdrawals from Celsius 14 April - 13 July, 2022 (USD Million)
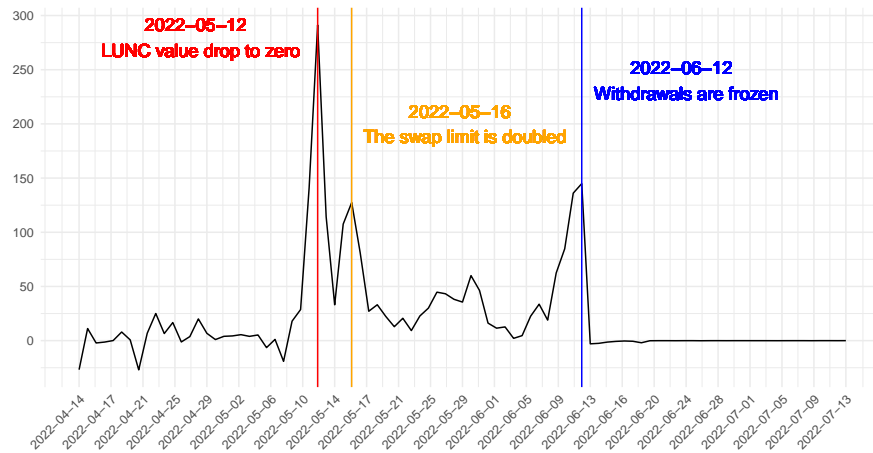
(b) Cryptocurrencies market cap (2021-2022)

Notes: This figure highlights the movements around the Celsius bankruptcy. Panel (a) shows the total market cap of cryptocurrencies. Panel (b) shows the value net outflows from Celsius between 14 April 2022 and 13 July 2022. Source: Our own calculations and CoinMarketCap.

The "Statements of Financial Affairs" include tables with what is described as "certain payments or transfers to creditors within ninety days before filling this case". These ninety days are the period between 14 April and 13 July 2022. The list includes the names of the customers, the address in case the customer is a company (again, people had their addresses redacted), the date of transaction, the type of account involved, if it was an incoming or an outgoing transaction, the purpose of the transaction (Deposit, Withdrawal, Interest and Rewards,

Loan Interest Payment, Collateral, Internal Account Transfer, etc.), the type of coin, and the amount transacted both in coin and dollar value. This transactions database counts more than 3.1 million transactions from 14 April to 13 July 2022. Over the period, on 14 April constant terms, a net of USD 6,682 million was withdrawn from Celsius accounts. Panel (a) of figure B.1 shows how there were two notable spikes in net withdrawals from Celsius accounts: one around the collapse of the cryptocurrencies TerraUSD (UST) and LUNA in May 2022 and another in the days before Celsius halted all withdrawals on June 12. Panel (b) shows how the market cap of cryptocurrencies fell from USD 2.2 trillion at the end of December 2021 to USD 1.9 trillion on 14 April 2022 and even fell below USD 800 billion in November 2022.

To produce descriptive statistics, we prefer using the balance of Celsius before these large episodes of outflows. We therefore combine the deposits and the transactions datasets to recreate the cryptocurrency holdings as of 14 April 2022. This can be done by adding the net outflows of each cryptocurrency for each individual account holder to their holdings as of 13 July. Note that the only way one can match the deposits to the transactions database is by using tuples of names and addresses of Celsius users as unique identifiers. Unfortunately, identical names with redacted addresses are present several times in the deposit database. We therefore sum together the observations with the exact same user name and same addresses before merging with the transactions database. The resulting deposits database without name duplicates counts 555,986 observations.

When merging with the transactions database, 60,526 users are found only in the deposits database (ie. they made no transactions between 14 April and 13 July 2022). In coin value, their deposits on 14 April are therefore the same as their deposits on 13 July. Moreover, 591 users present in the transactions database are eventually no longer present in the deposits database as of 13 July. We suspect that the latter closed their account on the Celsius platform between 14 April and 13 July. Assuming that their Celsius balance was zero when they closed their account, their balance on 14 April is thus simply the net transactions over the period. Once the crypto balances as of 14 April are recovered, the resulting amounts in coin value are then converted into USD using daily historical exchange rates from *coinmarketcap.com*[35]. There is a total of 556,557 users in the final deposits dataset as of 14 April 2022, which serves as our baseline database in the following descriptive figures.

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[35]Using the 14 April 2022 exchange rates: https://coinmarketcap.com/historical/20220414/

Table B.1: Top 10 cryptocurrencies held through Celsius accounts

Cryptocurrency	Ticker	Deposits, 31 December exchange rate, USD billions	Deposits 14 April exchange rate, USD billions	Market cap 14 April exchange rate, USD billions	Deposits as percent of market cap
Total		39.7	35.8	1,910	1.9 %
Terra (Classic)	LUNC	26.7	25.6	29	86.7 %
Bitcoin	BTC	5.1	4.4	759	0.6 %
Ethereum	ETH	4.1	3.3	364	0.9 %
USD Coin	USDC	0.9	0.9	50	1.8 %
Celsius	CEL	1.3	0.7	0	128.9 %
Polygon	MATIC	0.7	0.4	11	3.3 %
Cardano	ADA	0.4	0.3	31	0.8 %
Chainlink	LINK	0.2	0.1	6	2.2 %
Tether	USDT	0.1	0.1	83	0.2 %
Solana	SOL	0.2	0.1	33	0.3 %

Notes: This table shows the value of cryptocurrency held in Celsius accounts as of 14 April 2022. The aggregate holdings and holdings as a share of worldwide market capitalisation for the top 10 out of the 64 different types of cryptocurrencies held through Celsius accounts are included. The values are presented in USD and are converted using market exchange rates as of either 31 December 2021 or 14 April 2022, retrieved from coinmarketcap.com. The market capitalisation numbers are equal to the product of exchange rate and circulating supply and are also obtained from coinmarketcap.com.

B.3 Cryptocurrency holdings in Celsius

An aggregated overview of cryptocurrency holdings as of 14 April and June 12 2022 is presented in Table B.1. It shows total holdings by Celsius users across all their accounts both in constant USD using 14 April 2022 exchange rates and as a share of world market capitalisation for the top 20 out of the 64 different types of cryptocurrencies held through Celsius accounts over the period. For example, for the two major cryptocurrencies that are Bitcoin (BTC) and Ethereum (ETH), holdings through Celsius accounts on 14 April 2022 summed up to respectively 4.4 and 3.3 billion USD, which represented 0.6 and 0.9 percent of the total stock of circulating Bitcoins and Ethereum in the world at this date. Terra Classic (LUNC)[36] represented the lion's share of cryptocurrency holdings through Celsius with 71.3 percent of total holdings, or USD 27.4 billion. The value of this cryptocurrency collapsed in May 2022, following a meteoric rise during 2021. However, the value of LUNC remained relatively stable across our period of interest. It had a
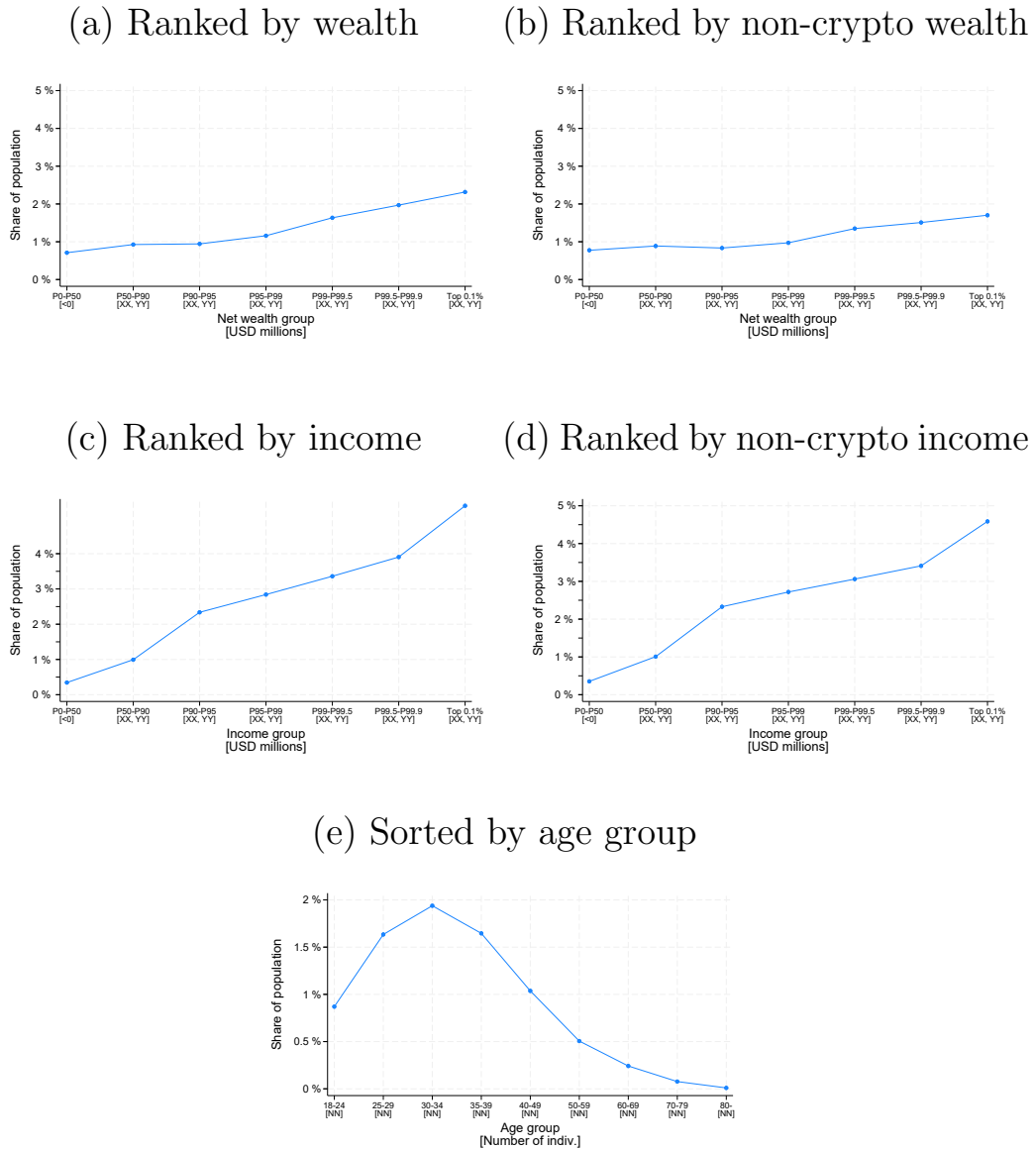
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[36]The cryptocurrency currently known as Terra Classic, with the ticker LUNC, was known as Terra (often referred to as LUNA, its then ticker) until it changed name and ticker in May 2022. The re-branding came after the collapse of the value of the cryptocurrency. More information here.

total market cap of USD 29.8 billion as of April 13, 2022, down from USD 30.7 billion as of 31 December 2021.

LUNC was concentrated among a few investors (2.8% of those on Celsius) while Bitcoin for instance was a more adopted coin on the platform being held by around 77% of investors on Celsius. The ownership of a significant amount of LUNC could be attributed to the high yields available through the Terra ecosystem's Anchor Protocol, which incentivised large holdings of LUNA to mint UST and capitalise on the substantial returns. Consequently, the high value of LUNA deposits relative to Bitcoin reflects these lucrative opportunities rather than a broader investor preference. Another explanation of the large holdings in LUNA on Celsius could be attributed to the fact that Celsius was advertising LUNA. Finally, as should be expected, virtually all of the circulating supply of Celsius' own token, CEL, was held through Celsius accounts.

C Detailed description of cryptocurrency owner characteristics

Figure C.1: Crypto Owners Across Wealth, Income and Age Groups - Likelihood across the population

(a) Ranked by wealth

(b) Ranked by non-crypto wealth

(c) Ranked by income

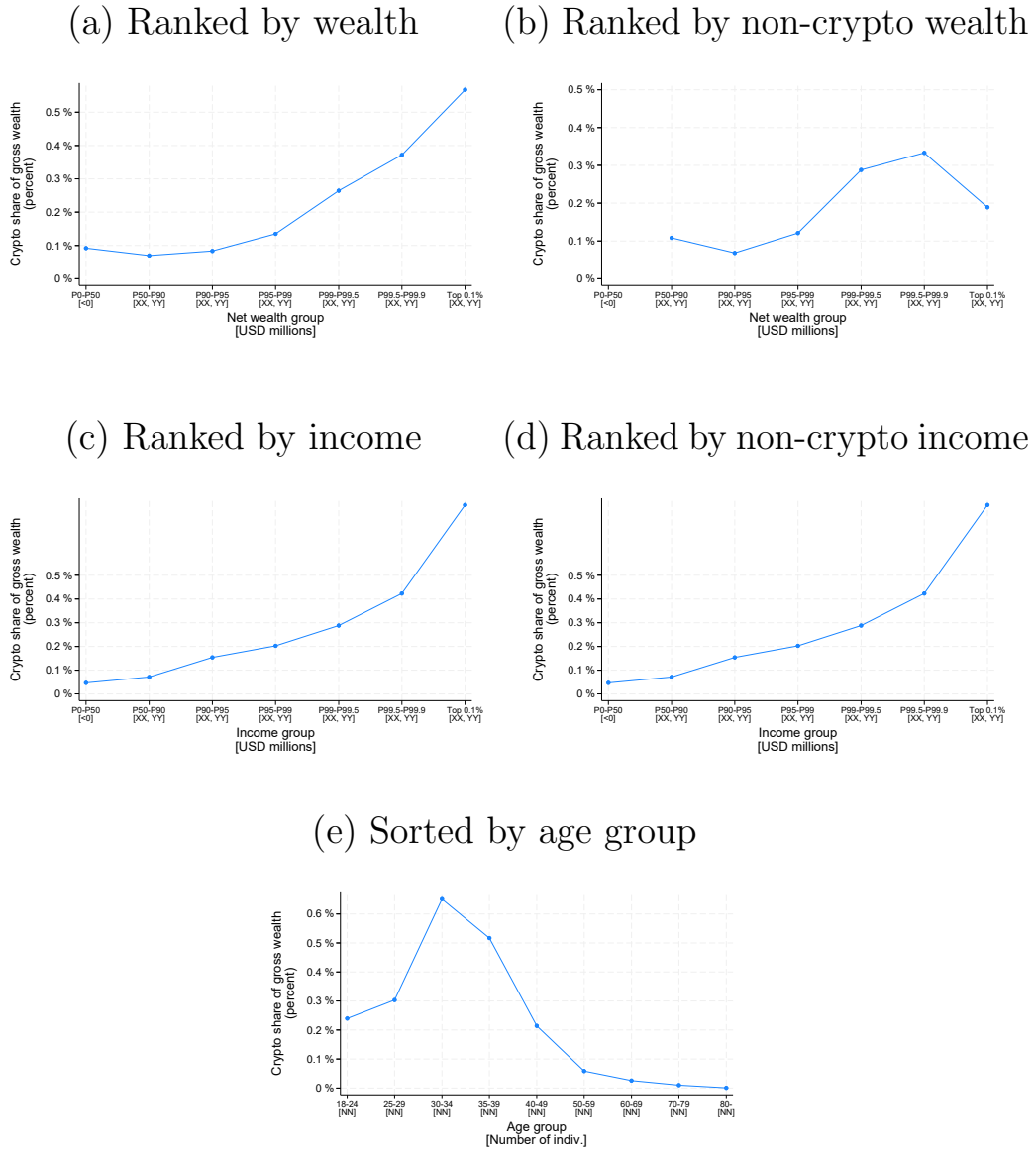(d) Ranked by non-crypto income

(e) Sorted by age group

Notes: This figure shows the likelihood of owning cryptocurrencies conditional on belonging to a specific group. Panel (a) ranks the individuals based on their net wealth. Panel (b) ranks the individuals based on their non-cryptocurrency net wealth. Panel (c) ranks the individuals based on their income. Panel (d) ranks the individuals based on their non-cryptocurrency income. Panel (e) sorts the individuals based on their age.

Figure C.2: Crypto Owners Across Wealth, Income and Age Groups - Average Crypto Wealth within Group
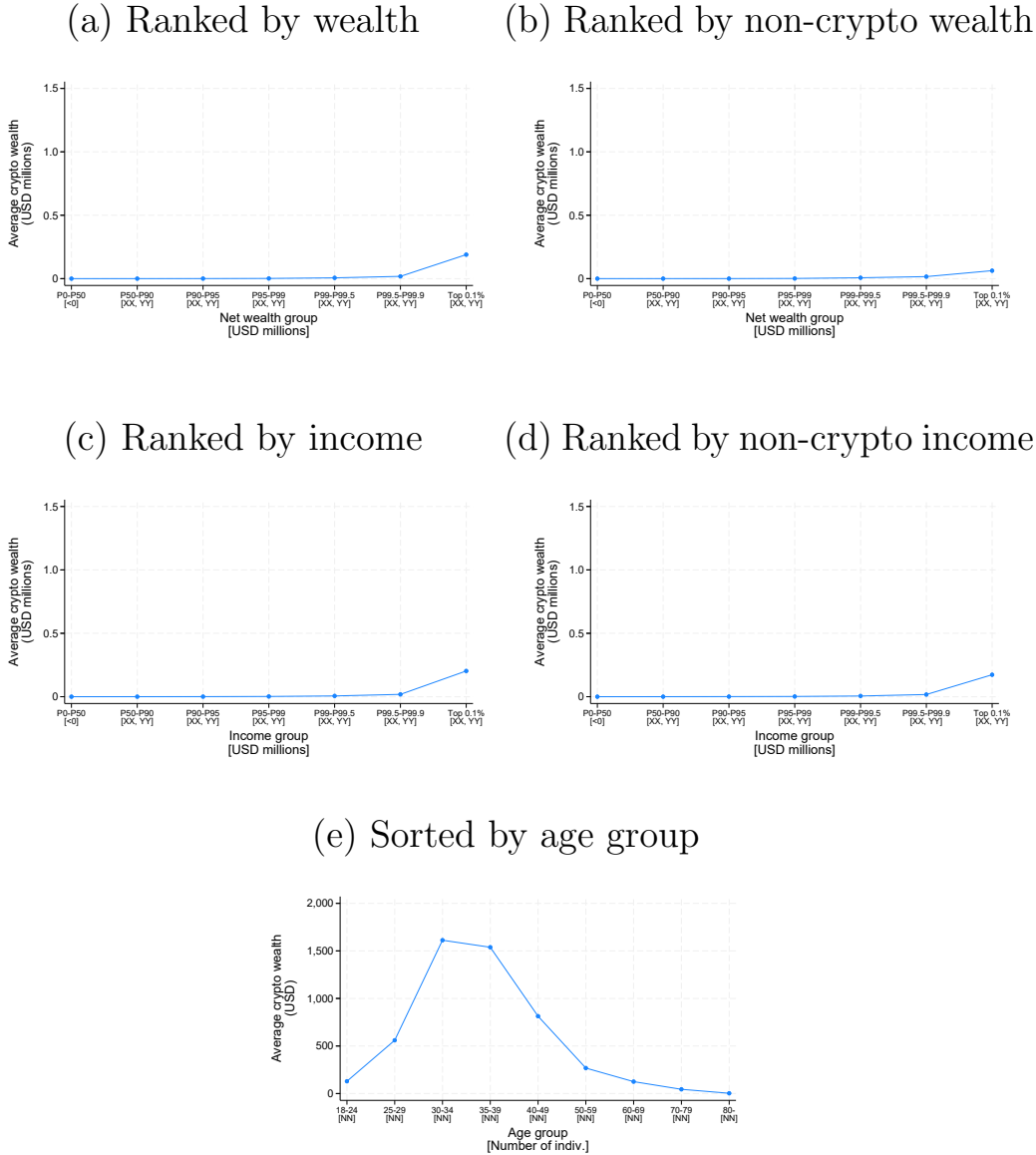
(a) Ranked by wealth

(b) Ranked by non-crypto wealth

(c) Ranked by income

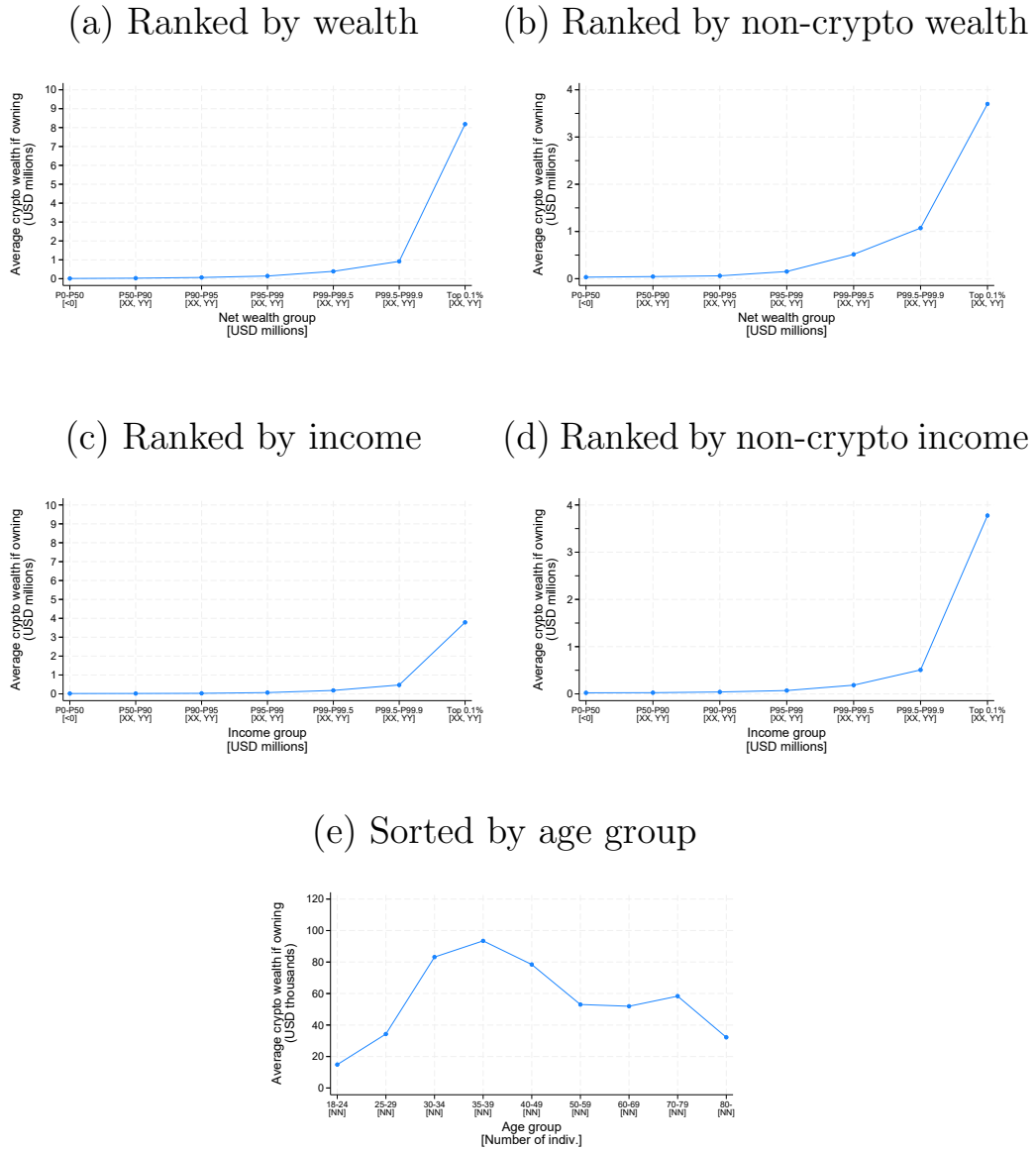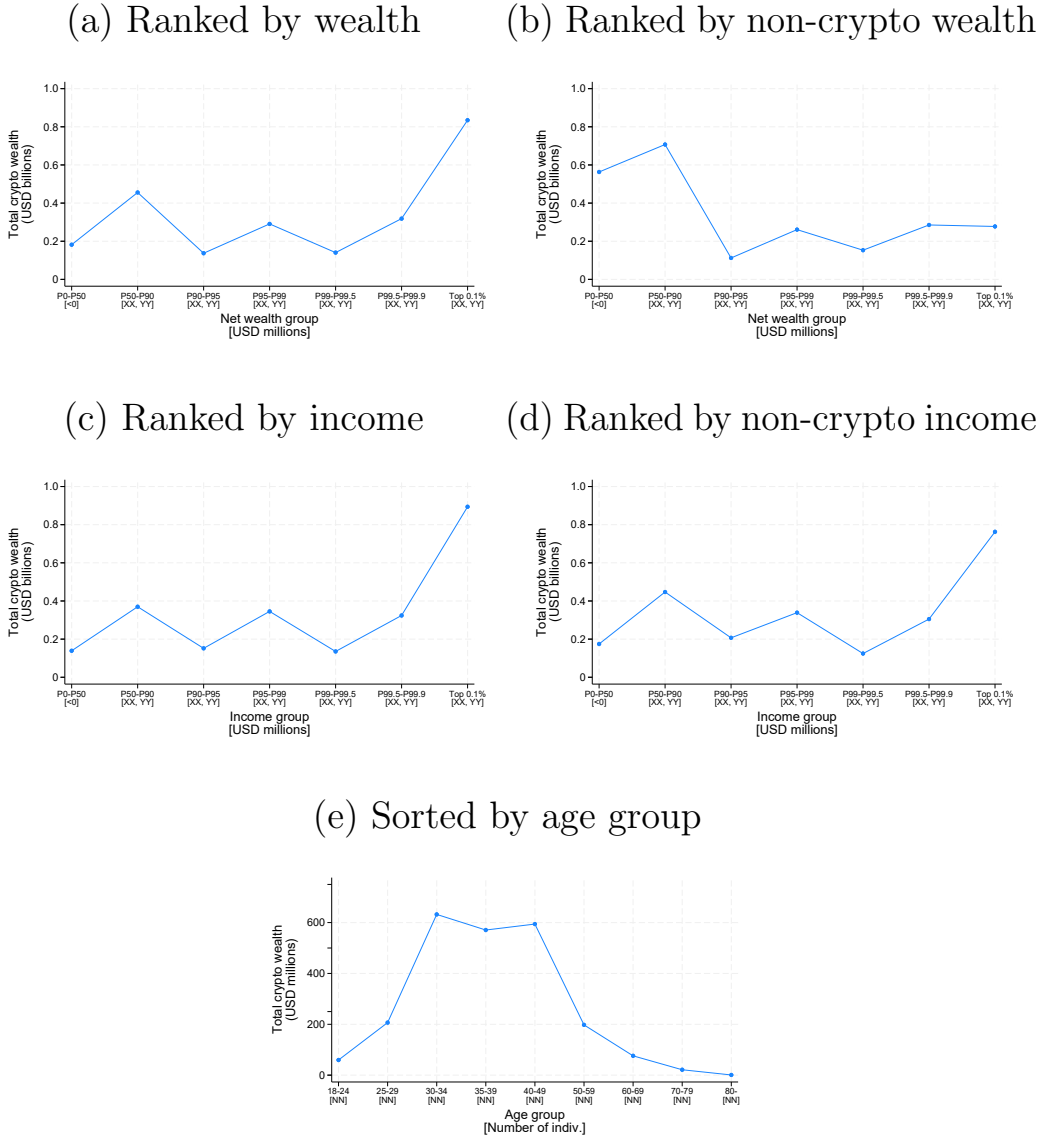### (d) Ranked by non-crypto income

(e) Sorted by age group

Notes: This figure shows the average reported crypto wealth across the different distributions. Panel (a) ranks the individuals based on their net wealth. Panel (b) ranks the individuals based on their non-cryptocurrency net wealth. Panel (c) ranks the individuals based on their income. Panel (d) ranks the individuals based on their non-cryptocurrency income. Panel (e) sorts the individuals based on their age.

Figure C.3: Crypto Owners Across Wealth, Income and Age Groups - Crypto Wealth as Share of Total Taxable Wealth

(a) Ranked by wealth

(b) Ranked by non-crypto wealth

(c) Ranked by income

(d) Ranked by non-crypto income

(e) Sorted by age group

Notes: This figure shows reported crypto wealth as a share of total taxable wealth across the different distributions. Panel (a) ranks the individuals based on their net wealth. Panel (b) ranks the individuals based on their non-cryptocurrency net wealth. Panel (c) ranks the individuals based on their income. Panel (d) ranks the individuals based on their non-cryptocurrency income. Panel (e) sorts the individuals based on their age.

Figure C.4: Crypto Owners Across Wealth, Income and Age Groups - Average Reported Crypto Wealth among Crypto Reporters in Group

(a) Ranked by wealth

(b) Ranked by non-crypto wealth

(c) Ranked by income

(d) Ranked by non-crypto income

(e) Sorted by age group

Notes: This figure shows the average reported crypto wealth, given that the individual reports some crypto wealth, across the different distributions. Panel (a) ranks the individuals based on their net wealth. Panel (b) ranks the individuals based on their non-cryptocurrency net wealth. Panel (c) ranks the individuals based on their income. Panel (d) ranks the individuals based on their non-cryptocurrency income. Panel (e) sorts the individuals based on their age.

Figure C.5: Crypto Owners Across Wealth, Income and Age Groups - Total Crypto Wealth Reported by Each Group

(a) Ranked by wealth

(b) Ranked by non-crypto wealth

(c) Ranked by income

(d) Ranked by non-crypto income
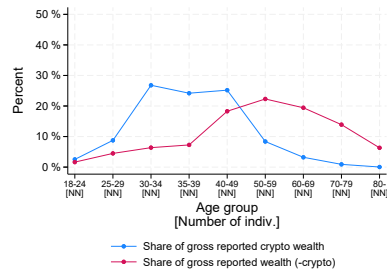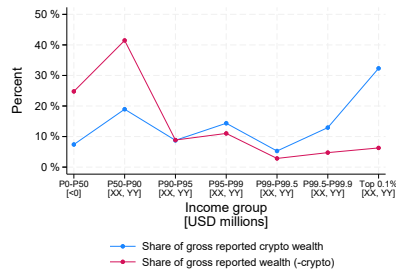

(e) Sorted by age group

Notes: This figure shows the total reported crypto wealth across the different distributions. Panel (a) ranks the individuals based on their net wealth. Panel (b) ranks the individuals based on their non-cryptocurrency net wealth. Panel (c) ranks the individuals based on their income. Panel (d) ranks the individuals based on their non-cryptocurrency income. Panel (e) sorts the individuals based on their age.

**Figure C.6: Crypto Owners Across Wealth, Income and Age Groups -
Each Group's Share of Total Reported Crypto Wealth and Non-Crypto
Taxable Wealth**

(a) Ranked by wealth

(b) Ranked by non-crypto
wealth
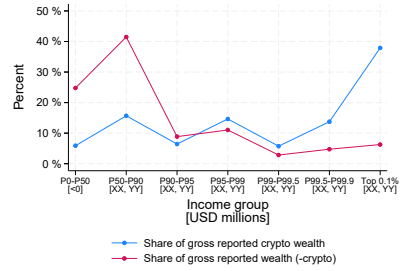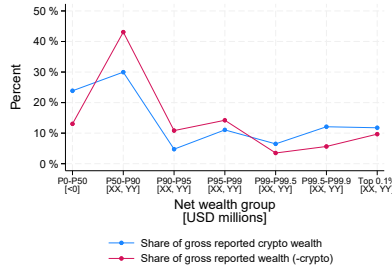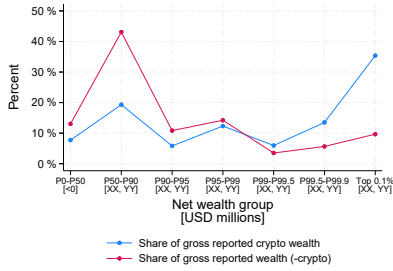
(c) Ranked by income

(d) Ranked by non-crypto
income

(e) Sorted by age group

Notes: This figure compares each group's share of total crypto wealth and total non-crypto wealth across the different distributions. Panel (a) ranks the individuals based on their net wealth. Panel (b) ranks the individuals based on their non-cryptocurrency net wealth. Panel (c) ranks the individuals based on their income. Panel (d) ranks the individuals based on their non-cryptocurrency income. Panel (e) sorts the individuals based on their age.

D Results after matching on non-singular names

We match more than 7,000 Celsius accounts to a unique name among Norwegian taxpayers. This represents 76 percent of the Celsius accounts we can match to Norwegian taxpayers. We perform our baseline analysis on the sub-sample of these singular matches. This can be found in section 4. An alternative is to carefully assign the remaining 24 percent matched accounts to individual tax returns based on careful selection criteria. We present alternative results for the relevant tables and figures in this appendix.

For the remaining 24 percent of Celsius accounts linked to Norwegian taxpayers, we match the account to one given taxpayer only. Most Celsius accounts are matched to either two (999), three (399), or four (221) different taxpayers. The average number of matches to different taxpayers is between 6 and 7. Seven accounts are each matched to more than 100 taxpayers, and one account is matched to 148 taxpayers (the largest number).

We do our matching to a single taxpayer by ranking the taxpayers with identical names by how likely they are to own cryptocurrency.

- First, we rank by reported cryptocurrency wealth (around 3 percent of the accounts are linked to a taxpayer who has reported cryptocurrency).

- Second, we rank by net wealth, which assigns another 18 percent of the accounts to a given taxpayer.

- If none of the matched taxpayers have reported wealth, which is the case for the remaining 3 percent of the Celsius accounts, we rank by income. We show in section 3 that people with large incomes compared to their wealth seem to be eager to invest in cryptocurrency.

As shown, the largest bunk of these multiple-matched Celsius accounts are distributed based on the net taxable wealth of the potential taxpayers.

Table D.1: Summary statistics: Norwegian Celsius Owners (extended matching)

| Account type	Number of matches	Report rate	Total deposits (millions)	Mean deposit size	Median	Max (top 5 avg.)
All	9,650	7 %	879	91,077	2,383	83,295,536
Most likely (resi.)	1,034	37 %	20	19,439	1,712	782,982
Most likely (origin)	1,014	37 %	20	19,701	1,712	782,982
Most likely (either)	1,050	37 %	20	19,390	1,712	782,982
Top 2 (resi.)	2,112	26 %	115	54,656	1,943	13,329,779
Top 2 (origin)	2,121	25 %	114	53,687	1,929	13,329,779
Top 2 (either)	2,199	25 %	117	53,228	1,960	13,329,779
Top 3 (resi.)	2,432	23 %	121	49,948	1,950	13,329,779
Top 3 (origin)	2,477	23 %	123	49,711	1,960	13,329,779
Top 3 (either)	2,535	22 %	124	48,955	1,955	13,329,779

Notes: The table summarises the deposits held and the reporting of them by deposit holders, both those we can link to a unique Norwegian tax record and those we assign based on characteristics. The matching of Celsius owners and tax records is extended to non-singular names. All numbers are in USD (US dollars). The rows report the statistics for the different types of accounts Celsius offered.

Figure D.1: Celsius matching across different name-type restrictions (extended matching

### (a) Likelihood of being matched
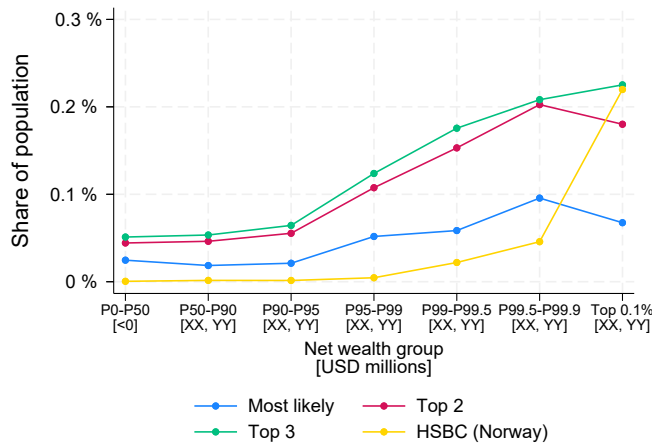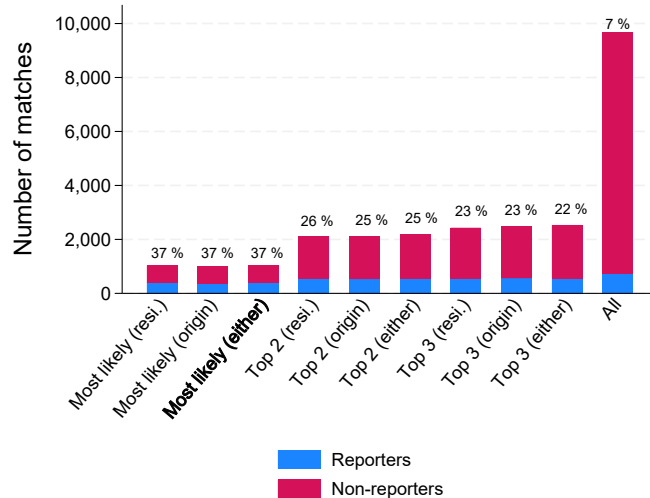
### (b) Reporters and non-reporters

Notes: This figure shows how the different matching restrictions affect the size, wealth composition, and report rate of the sample we analyse. The matching of Celsius owners and tax records is extended to non-singular names. Panel (a) illustrates the distribution of Norwegian taxpayers to the Celsius accounts across the wealth distribution. It shows the share in each wealth group (ranked by non-cryptocurrency wealth) that is matched. It compares this to the share of Scandinavians and Norwegians that was matched to bank accounts in HSBC Switzerland by Alstadsæter et al. (2019). These are grouped by wealth. Panel (b) shows the numbers of reporters and non-reporters by the matching restrictions. All individuals who report more than half of the value in their assigned Celsius account are deemed reporters. The rest are deemed non-reporters. The labels on the bars show the report rate. More statistics across the different matching restrictions in table A.2.

Figure D.2: Celsius compliance, main results (extended matching

### (a) Reporting rates across account sizes
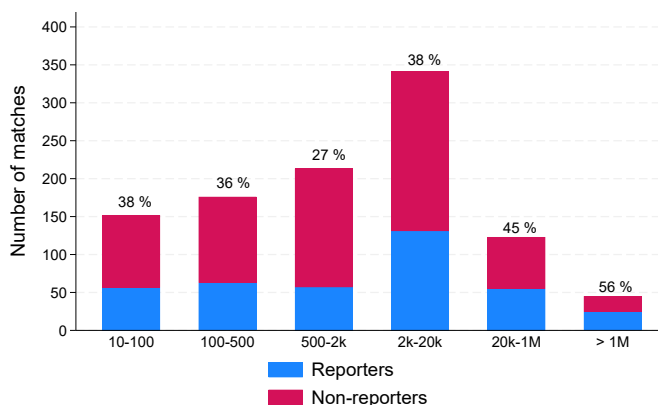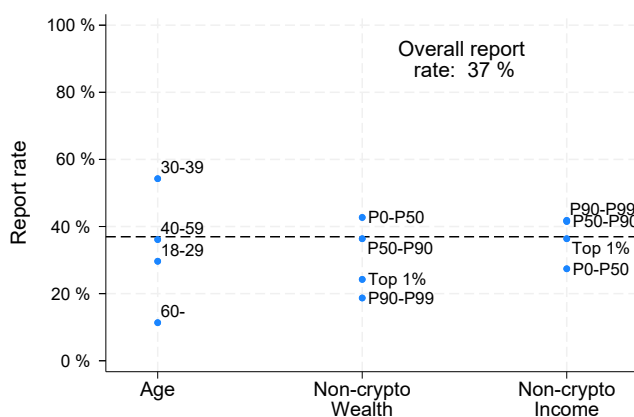
(b) Reporting rates across groups

Notes: This figure shows the reporting and non-reporting of Norwegian taxpayers matched to Celsius that have a name that is most likely to have Norway as their country of residence or country of origin, according to the Namsor algorithm. The matching of Celsius owners and tax records is extended to non-singular names. All individuals who report more than half of the value in their assigned Celsius account are deemed reporters. The rest are deemed non-reporters. Panel (a) shows the number of reporters and non-reporters across the different account sizes. The label on each bar is the share of account holders that report. The value in each account is calculated by taking the amount of each cryptocurrency in the account and converting it to USD using the exchange rate as of 31 December 2021. Panel (b) shows how the report rate for different subsets of account holders, grouped by age, non-cryptocurrency net wealth, or non-cryptocurrency income.

Figure D.3: Reporting rates by age and non-cryptocurrency wealth group (extended matching)
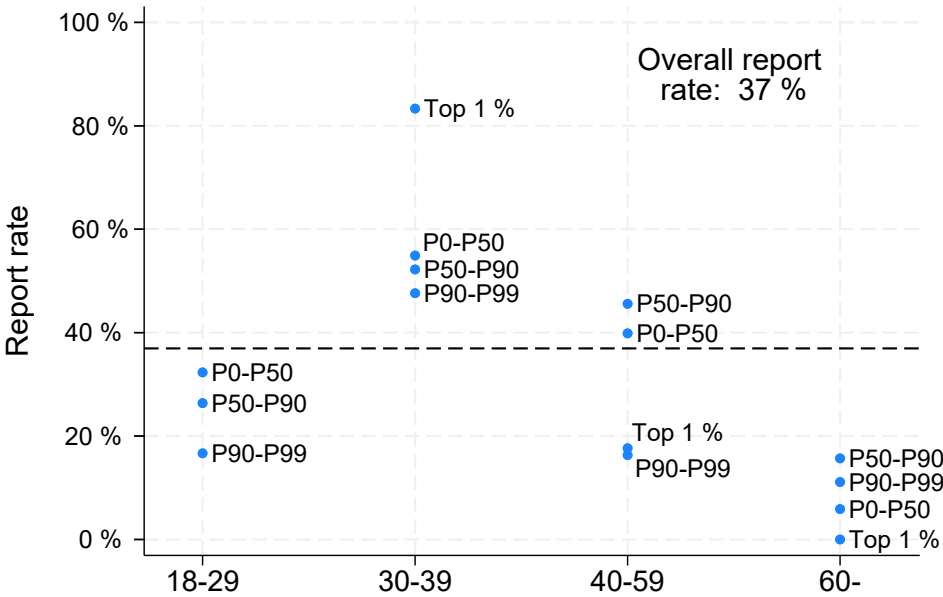
Notes: This figure shows the reporting rate for each group conditional on both age and non-cryptocurrency wealth. The matching of Celsius owners and tax records is extended to non-singular names. The individuals are ranked by their place in their overall non-cryptocurrency wealth distribution, not the age group-specific non-cryptocurrency wealth distribution. It is a more granular version of figure D.2, which shows the reporting rate for different groups within the age distribution, non-cryptocurrency wealth distribution, and non-cryptocurrency income distribution.