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Enforcing Taxes on Cryptocurrencies

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Abstract

Cryptocurrencies pose substantial challenges to tax enforcement due to their anonymous and decentralized properties, undermining conventional regulatory practices. We study the impact of an ambitious new enforcement initiative aimed at addressing these challenges: domestic third-party reporting of crypto income. We estimate tax compliance and behavioral responses to this new policy by combining unique Danish microdata from domestic crypto platforms, administrative tax records, and cross-border bank transfers. Despite the introduction of domestic third-party reporting, over 90% of crypto investors do not declare crypto income. Moreover, we identify a significant and persistent evasion response to the policy as investors shift trading activity from domestic platforms, subject to third-party reporting, to foreign platforms outside regulatory reach. Our findings underscore the limits of domestic enforcement strategies in addressing tax evasion for decentralized, borderless assets like cryptocurrencies, highlighting the need for international coordination.

Keywords: Cryptocurrencies, Tax compliance, Tax enforcement

JEL codes: D31, H24, H26, H31, G5

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1 Introduction

Cryptocurrencies (hereafter crypto) have revolutionized the financial landscape, introducing an anonymous and decentralized way to make financial transactions. Unlike traditional financial assets, crypto can be traded outside the conventional banking system, through blockchain technology, making transactions difficult to trace. The crypto market has developed with immense speed from the invention of Bitcoin in 2009 to a market valuation of close to $4 trillion by the end of 2024. Now 11% of US households hold or have held crypto, making crypto a common choice in investors' investment portfolios (Weber et al., 2023).

With the growing crypto market, the anonymous and decentralized properties of crypto pose increasing challenges for tax collection. These challenges raise important questions: Are crypto used for tax evasion? And what policies can effectively address the tax collection challenges associated with crypto? Evidence on these questions remains limited, largely due to the difficulty of accessing individual-level data on crypto investments. This information constraint hinders the development of effective regulation and enforcement strategies tailored to the distinctive nature of crypto.

In this study, we estimate tax noncompliance on crypto income and evaluate an ambitious tax enforcement initiative in Denmark: third-party reporting of crypto income. Under third-party reporting, intermediary firms - such as employers or banks - operate as enforcement agents and report taxpayers' income directly to the tax authority. This enforcement tool significantly reduces reliance on self-reporting and has been highly effective in ensuring tax compliance for various income types, including both labor and capital income (Kleven et al., 2011, Pomeranz, 2015, Jensen, 2022, Boas et al., 2024). Today, third-party reporting is the backbone of tax enforcement systems in most developed countries. However, crypto present unique challenges. As a novel asset class, they are not confined by national borders or integrated into traditional financial institutions. Instead, crypto are predominantly traded on specialized crypto platforms that largely have escaped conventional financial regulation. This makes it difficult for tax authorities to monitor and enforce compliance effectively. To address these challenges, Denmark recently implemented third-party reporting for crypto income. Despite this groundbreaking initiative, little is known about how crypto investors respond to such increased transparency. This study is the first to analyze behavioral responses to third-party reporting of crypto income, shedding light on its implications for tax compliance and

enforcement.

Third-party reporting of crypto income was introduced in 2019 when the Danish tax authority mandated all domestic crypto platforms to share individual transaction data on their customers. This crackdown enabled the identification of individual crypto investors' transactions, allowing the Danish tax authority to look through the veil of anonymity that had previously defined crypto investments. Through collaboration with the Danish tax authority, we gain access to the crypto transaction data and link it to individual-level administrative tax records, including information on demographics, income, tax liabilities, and wealth. Additionally, we have access to data on cross-border bank transfers to and from foreign bank accounts, which allows us to identify crypto investors on foreign crypto platforms. This unique combination of data sources enables us to achieve three key objectives. First, we characterize the crypto investors based on demographics as well as income and wealth metrics. Second, we estimate tax noncompliance by comparing information reported by domestic crypto platforms with self-reported income. Third, we study behavioral responses to third-party reporting of crypto income using cross-border bank transfer data.

First, we use the combination of domestic crypto platforms and tax records to compare characteristics of crypto investors to the general population. Crypto investors are younger, predominantly male, and more financially active, with a higher likelihood of holding stocks despite having lower average wealth. The detailed Danish tax records allow us to construct a comprehensive wealth measure - including financial assets, housing, pension wealth, and debt - and observe crypto investors across the wealth distribution. Crypto investors hold a substantial portion of their financial assets in crypto, with crypto accounting for nearly 50% of total gross financial assets at the bottom of the wealth distribution and 24% at the top. Given the high volatility of the crypto market and its strong correlation with other asset types, this seems to represent a very high exposure to the crypto market (Somoza et al., 2024). Nevertheless, it is consistent with findings from studies in the US and Norway (Weber et al., 2023 and Meling et al., 2024). Compared to stock investors, participation in the crypto market is more evenly distributed across wealth. While 43% of crypto investors fall within the bottom 50% of the wealth distribution, only 23% of stock investors are in this group. It also implies that crypto in terms of wealth is more equally distributed than stock wealth.

Second, we estimate tax noncompliance of crypto income. We find that more than 90%

of crypto investors with crypto sales fail to declare crypto income. We estimate this high noncompliance rate by comparing crypto sales on domestic crypto platforms with self-reported crypto income on the tax returns. Even after the crackdown in 2019, we observe high noncompliance rates above 90%. It indicates that the crackdown did not substantially affect the compliance behavior of crypto investors on domestic platforms. Our approach also enables us to compare noncompliance across wealth. Noncompliance is high throughout the wealth distribution, ranging from 95% in the bottom 10% to 86% in the top 10%. In sum, crypto tax evasion is not limited to the wealthiest investors but is widespread across all parts of the wealth distribution. This contrasts with other financial assets, where tax evasion is predominantly concentrated among the wealthiest individuals (Alstadsæter et al., 2019).

Third, we explore behavioral responses to the crackdown. Given crypto's borderless and decentralized properties, crypto investors can easily shift trading activity from domestic to foreign crypto platforms, which are not subject to the same transparency requirements. We identify individuals with trading activity on foreign crypto platforms by leveraging comprehensive cross-border bank transfer data to trace transactions to and from these platforms. It allows us to employ a difference-in-differences framework, comparing investors active on domestic platforms before the crackdown to those solely using foreign platforms. The results indicate a significant and permanent shift in trading activity from domestic to foreign platforms following the crackdown. This response highlights the substitutability between domestic and foreign platforms and underscores the challenges regulators face in addressing tax compliance in a global and decentralized market.

2 Related Literature

Our paper contributes to three strands of literature. First, we contribute to the literature on third-party reporting and tax compliance. Prior research has firmly established the importance of third-party reporting in enhancing tax compliance. In a seminal paper, Kleven et al. (2011) demonstrate that automatic third-party reporting can reduce tax evasion to nearly zero by creating a verifiable paper trail for the tax base. The effectiveness of third-party reporting has led to a higher reliance on taxation of income types that can readily be third-party reported (Jensen, 2022). Pomeranz (2015) and Boas et al. (2024) examine third-party reporting in the

contexts of VAT enforcement and foreign financial income, respectively, highlighting that its success depends on the tax authority's ability to credibly use the information for enforcement. We extend this literature by studying third-party reporting of crypto income. Third-party reporting is effective if it can credibly be used for enforcement and if escaping third-party reporting is too costly. However, crypto investors can easily move between platforms with varying levels of regulation or avoid centralized platforms entirely by transacting directly on the blockchain, making it less costly to escape third-party reporting. Given these challenges, it remains an open question whether third-party reporting is effective for income that is designed to circumvent traditional regulation. Our paper is the first to provide empirical evidence on the efficacy of third-party reporting for crypto income.

Second, we add to the extensive body of research on tax compliance of various income types. The anonymous and decentralized nature of crypto poses significant challenges in linking crypto transactions to individual taxpayers' tax returns, making it difficult to measure tax compliance. Consequently, evidence on crypto tax compliance is very limited, as highlighted by Baer et al. (2023). Cong et al. (2023) indirectly address this issue by analyzing crypto transactions on trading platforms, finding an increase in tax-loss harvesting following increased tax scrutiny in the US. Hoopes et al. (2022) examine taxpayers who report crypto income on their tax returns, noting that approximately one percent of taxpayers declared crypto sales in 2020. However, they do not observe crypto transactions making it difficult to draw conclusions on tax compliance. Our study bridges these gaps by linking crypto investors' transactions to their tax returns to estimate tax compliance directly. Two contemporaneous studies from Norway take a similar approach by integrating data on crypto transactions and holdings with tax records (Meling et al., 2024, Barake et al., 2024). Meling et al. (2024) combine domestic crypto platform data, tax returns, and survey data to estimate tax compliance. They find noncompliance rates similar to ours, with a noncompliance rate of 88%. Barake et al. (2024) use data from a foreign crypto platform to adjust observed crypto holdings in tax returns and draw inferences about the distributional aspects of crypto ownership.

Third, we extend a burgeoning literature on crypto investor characteristics by leveraging detailed administrative tax data to analyze crypto investors' position within the wealth distribution and compare them to other types of investors. Our findings align with previous studies, showing that crypto investors are predominantly male, younger, and more risk-seeking than

the general population (Hasso et al., 2019, Hackethal et al., 2021, Weber et al., 2023, Aiello et al., 2023, Kogan et al., 2024). While earlier research has relied on surveys or transaction data from specific banks or trading platforms, our paper contributes by linking crypto investors to comprehensive tax records for the entire population. This combination allows us to compare crypto investors not only with the broader population but also with other investor types. We show that crypto holdings are concentrated at the top of the wealth distribution but not as much as stock holdings. These findings highlight the distinct characteristics of crypto investors compared to other types of investors.

3 The advent of a new asset and its tax implications

3.1 The Crypto Market

The crypto market started with the first Bitcoin transaction in 2009. Since then, thousands of different crypto have emerged, and the expansion of this new type of financial asset has been remarkable. Over the past decade, the market valuation of crypto has proliferated, rising from \$5 billion in 2014 to nearly \$4 trillion by the end of 2024. In 2022, 11% of households in the US directly held crypto, up from less than 2% in 2018 (Weber et al., 2023). In comparison, 21% of American households directly own stocks (Federal Reserve, 2023).

Crypto are founded on the principles of anonymity and decentralized financial transactions. This is made possible through blockchain technology, where a distributed network of contributors validates transactions, eliminating the need for a centralized intermediary. Nonetheless, today most crypto transactions are executed on centralized crypto platforms, which ease the accessibility of the crypto market. Crypto transactions can generally be executed in two ways: 1) through centralized crypto platforms and 2) via decentralized peer-to-peer transactions. Centralized crypto platforms facilitate the exchange of crypto for fiat currency and function similarly to traditional online investment platforms, allowing users to deposit fiat currency to buy and sell crypto. In Denmark, these centralized platforms are regulated by the Danish financial authorities and, since 2019, they have been subject to know-your-customer rules, mandating the identification of all customers. According to a population-wide survey conducted by the Danish tax authority in 2021, 80% of all crypto transactions in Denmark occur on centralized platforms (Skattestyrelsen, 2021). Alternatively, crypto investors can choose to

avoid centralized platforms by engaging in peer-to-peer transactions. In these transactions, buyers and sellers interact directly on the blockchain without the need for an intermediary. Crypto investors can connect through decentralized platforms, which facilitate matching buyers and sellers but do not handle any funds themselves, or through social media and personal networks. 20% of crypto transactions in Denmark are executed via peer-to-peer methods.

3.2 Taxation and Self-Reporting Obligations

Since the first Bitcoin transaction in 2009, countries have adopted various practices to incorporating crypto income into their tax systems. As a relatively new asset class with unique properties, there is still no consensus on how to regulate crypto income effectively (Baer et al., 2023). In this section, we will describe Denmark's tax regulation on crypto income and crypto investors' self-reporting obligations.

Asymmetric taxation. In Denmark, crypto income is taxed under the personal income tax scheme, which includes e.g. salaries, self-employment income, and pension income. Crypto gains are not taxed net of losses; instead gains and losses are treated separately with asymmetric tax and deduction rates. Crypto gains are taxed at the marginal tax rate reaching up to 53%, while only up to 26% of crypto losses can be deducted from the tax liability.[1]

Crypto income calculation. Crypto income must be calculated with the First-In-First-Out (FIFO) principle assuming that the crypto purchased first is sold first. It means that the oldest purchase price of the remaining crypto in the portfolio is used to calculate the crypto income after each sale. The more yearly trades, the more complex the income calculation becomes since crypto investors need to calculate the income for each sale they have.

Self-reporting obligations. Most income in Denmark is third-party reported to the tax authority and prepopulated on the tax return, including income from securities held in domestic financial institutions. Exceptions from prepopulation are income from self-employment, foreign

[1]Example: A crypto investor has two crypto sales during a year: One sale with a gain of \$100K and one with a loss of \$100K, so the net income at the end of the year is 0. Tax due on the gain is \$53K, and \$26K can be deducted, so the total tax payment is 53K - 26K = 27K. The crypto investor has not earned positive crypto income but still owes taxes.

labor and capital income, and crypto income. Instead, crypto investors are required to self-report crypto income to the tax authority. Crypto gains and losses have to be declared in two separate tax return fields for 'other gains' and 'other losses'. The fields are not uniquely dedicated to crypto and work as residual fields combining different types of income that do not fit into other fields, e.g. income from rental services, taxable scholarships, or taxable employee benefits. To test whether the residual fields are primarily used for declaring crypto income or other types of income, we plot the share of crypto investors on Danish crypto platforms reporting in the fields from 2006 to 2021 in appendix figure A1. The fields were rarely used before 2017 when the first big expansion of the crypto market began, but in 2017 the propensity to report other income jumps. We interpret this as an increase in the use of the residual fields for reporting crypto income.

4 Data

In the next subsections, we describe the Danish crypto platform data and how we link it to the tax records. We also describe the cross-border bank transfer data, which we use to retrieve information about foreign crypto platforms.

4.1 Danish Crypto platforms

Before 2019, the tax authority received no third-party information about crypto investors' activity. It made it virtually impossible to enforce taxation on crypto income. In January 2019, the Danish tax authority announced a crackdown on three Danish crypto platforms in an attempt to improve enforcement on crypto income. This data enables us to study an otherwise anonymous world.

The tax authority obtained detailed transaction-level data from all Danish customers of three Danish crypto platforms from 2016 to 2018. The information exchange was repeated in 2022 on transactions from 2019 to 2021. We observe 27,583 crypto investors on the Danish platforms from 2016 to 2021 and all the transactions they have made on the Danish platforms. The data includes information on name, birth date, address, taxpayer identification number when available, crypto wallet address, type of transaction (purchase or sale), crypto type (BTC, ETH, etc.), transaction date, transaction fee, and transaction amount in Danish currency

(DKK).

The Danish tax authority matches the transaction data to Danish taxpayers based on taxpayer identification numbers, names, birth dates, and addresses. In some cases information is missing or the customer is not taxable in Denmark, which makes it impossible to match transactions and taxpayers. Table 1 provides an overview of the transaction sample and the link to Danish taxpayers. 13,484 investors with 55,000 transactions can be linked to a Danish tax return. That is half of all investors on the Danish platforms and 60% of the transactions. They have crypto purchases of DKK 269 million ($38 million) and crypto sales of DKK 121 million ($17 million).

Table 1: Summary of Transactions on the Danish Platforms from 2016 to 2021

	Number of Investors	Number of Transactions	Aggregate Purchases	Aggregate Sales
All crypto investors	**27,583**	**91,101**	**465,288,282**	**220,524,466**
No match to Danish individual	13,611	34,002	182,198,054	95,565,034
- Firms	83	573	17,048,096	65,179,755
- Individuals	13,528	33,429	165,149,958	30,385,279
Match to Danish individual	13,972	57,099	283,090,228	124,959,431
- No tax return	532	2,099	14,357,502	4,029,746
Crypto investors with tax returns	**13,484**	**55,000**	**268,732,726**	**120,929,685**

Notes: This table summarizes the transaction data from domestic crypto platforms, aggregated over the period 2016 to 2021. We categorize all crypto investors into those who cannot be matched to a Danish individual with a tax return and those who can.

4.2 Tax Register Data

We link the crypto transactions from the Danish platforms to a variety of administrative tax data. For the full sample of taxpayers in Denmark we have information about 1) individual taxable income, 2) demographics such as age and gender, and 3) individual wealth. The Danish tax authorities collect third-party reported information on wealth from financial institutions, real estate and business registries, and other sources, which enables us to construct an individual-level measure of wealth for the full population. The detailed collection of wealth data also allows us to split the wealth by type of wealth (housing, pension wealth, financial wealth, debt) and by type of asset (stocks, bonds, deposits). The Danish wealth data have been used in other research to study for example the distribution of offshore wealth and tax evasion (Boas et al., 2024, Alstadsæter et al., 2019). We supplement the Danish platform data on domestic crypto transactions with cross-border bank transfers to indirectly observe foreign

crypto transactions. We will elaborate on the bank transfer data in the next section.

4.3 Cross-border Bank Transfers

The crackdown on crypto platforms was restricted to Danish crypto platforms, but the crypto market also consists of international crypto platforms with a large market share in Denmark. Therefore, information on crypto transactions on foreign crypto platforms is important to attain a comprehensive picture of crypto investors in Denmark. With data on cross-border bank transfers, we identify bank transfers sent from or to foreign crypto platforms, and thereby we can identify crypto investors in foreign platforms.

We have information on all bank transfers made to/from the five largest banks in Denmark from/to foreign bank accounts from 2005 to 2022. Each bank transfer includes information on transfer amount, date, foreign bank, foreign account number, foreign account holder, and accompanying text messages about the transfers made by the sender. We use the information on account numbers and text messages to search for bank transfers going to or from foreign crypto platforms. We apply a list of account numbers, known to belong to foreign crypto platforms, and other search words related to crypto (e.g., 'bitcoin' or 'cryptocurrency') to search for all bank transfers that are related to crypto.[2] Our approach results in a sample of crypto-related bank transfers made by Danish taxpayers to or from foreign crypto platforms. To test whether our approach finds crypto-related bank transfers, we compare the number of people making crypto-related bank transfers to or from foreign platforms with the Bitcoin price change in appendix figure A2. The figure highlights three surges in the number of individuals making crypto-related bank transfers - around 2013Q4, 2017Q4, and 2021Q1 - coinciding with three peaks of interest in crypto investing and huge Bitcoin price increases. We interpret this as validation of our approach.

Not all bank transfers to or from foreign crypto platforms include crypto-related information, so we are not able to find all crypto investors on foreign platforms with this method. However, it provides a subsample of taxpayers who have invested in crypto through foreign platforms. We can link the bank transfers to Danish tax returns and the Danish crypto platform data with the taxpayer identification numbers included in the bank transfer data. Hence, we have information about crypto investors on both Danish and foreign platforms.

[2]We cannot disclose the entire list for confidentiality reasons.

5 Crypto Investor Characteristics

In this section, we characterize the crypto investor. First, we compare crypto investors to the full population of Denmark in terms of demographics, wealth, and income. Second, we present results on the participation in and exposure to the crypto market across the wealth distribution.

Crypto investors compared to the full population. Crypto investors differ substantially from the rest of the population. Table 2 presents descriptive statistics of crypto investors, comparing them to the full population in Denmark in the most recent year of the study, 2021. Crypto investors are younger and predominantly male. Although their wealth is below the population average, crypto investors appear to be more financially active; 44% of them hold stocks compared to 28% in the general population. These findings align with other studies suggesting that crypto investors are more financially sophisticated and more risk-seeking than the general population (Hasso et al., 2019, Hackethal et al., 2021). The higher debt level further supports this characterization.

Table 2: Crypto Investors and Full Population in 2021

	Full Population	**Crypto Investors**
Panel A: Demographics		
Age	48	41
Male (%)	50%	87%
Panel B: Wealth Measures		
Net wealth (excluding crypto)	1,319,380	909,203
Gross financial assets (excluding crypto)	364,814	324,883
- Stocks	191,509	171,516
– Stock Ownership (%)	28%	44%
Housing	614,854	694,902
Pension wealth	855,981	672,448
Debt	523,041	789,917
Other net wealth	6,772	6,887
Crypto	-	161,413
Panel C: Income Measures		
Total income	278,460	386,555
Financial income	11,957	22,288
Number of observations	5,083,289	11,979

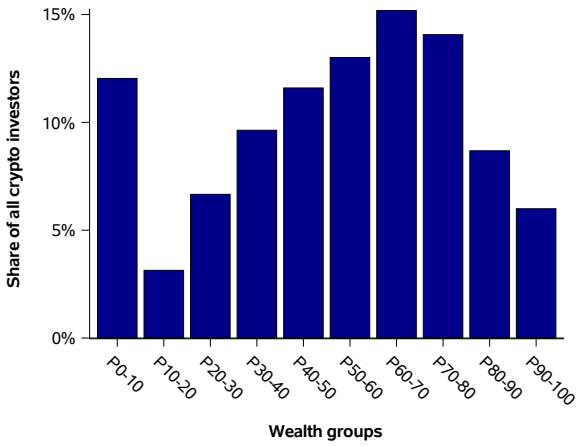
Notes: This table compares mean demographics, wealth, and income of the full population to crypto investors on Danish platforms. The sample of crypto investors includes all fully taxable crypto investors with positive crypto wealth in 2021.

Participation in and exposure to the crypto market. Panel (a) in figure 1 presents the number of crypto investors in each wealth group relative to the total number of crypto investors on the Danish crypto platforms in 2021. The bottom 50%, except for the bottom 10%, and the top 10% of the wealth distribution are underrepresented in crypto investment. They account for 43% and 6% of the crypto investors, respectively. While the top 10% are less likely to participate in the crypto market, panel (b) reveals that their mean crypto wealth is nearly four times as high as the second-highest group; crypto investors in the top 10% own on average DKK 1.05 million ($0.15 million) in crypto. It implies that the top 10% own 39% of total crypto wealth, as shown in panel (c). Panel (d) shows that crypto investors generally have a high exposure to the crypto market. Among those in the bottom 30% of the wealth distribution, crypto constitutes around 50% of their total gross financial wealth. While lower, the top 10% of wealthiest investors also allocate a substantial share to crypto, averaging 24%. As a result, crypto investors expose their financial portfolios to considerable risk due to the high volatility of the crypto market and its strong correlation with the stock market (Kogan et al., 2024, Somoza et al., 2024).

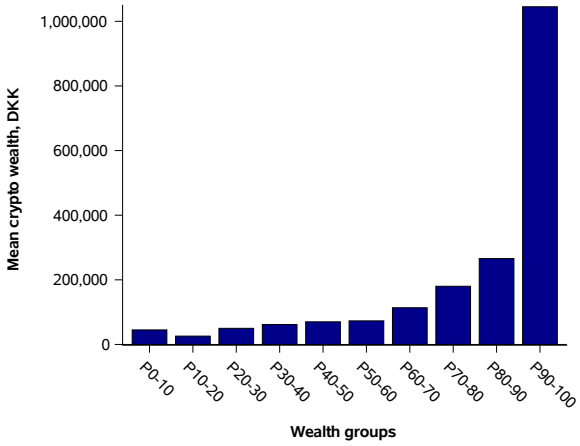
Appendix figure A3 compares crypto investors with investors in the more traditional investment asset; stocks. Stock ownership is heavily concentrated, with the top 10% wealthiest holding 77% of total stocks in Denmark, as shown in panel (c) in figure A3. Compared to stocks, participation in crypto is more equally distributed across wealth. 43% of crypto investors are in the bottom 50% of the wealth distribution but only 23% of stock investors. These findings underscore the diverse profile of crypto investors.

Figure 1: Crypto Ownership in the Wealth Distribution in 2021

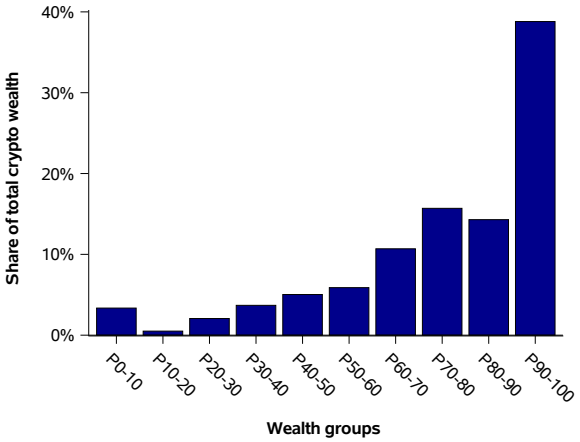
(a) Number of Crypto Investors



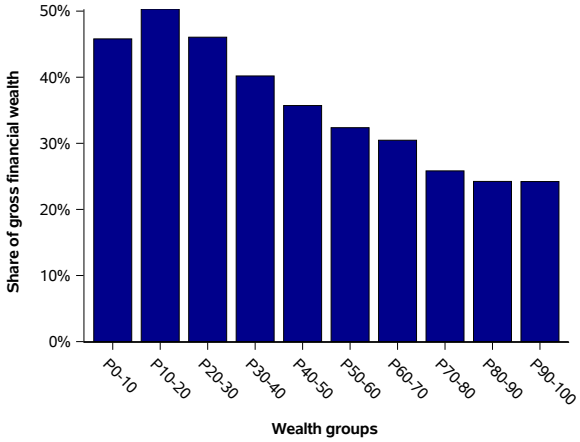
(b) Mean Crypto Wealth



(c) Crypto Ownership



(d) Crypto Wealth of Total Gross Financial Wealth



Notes: Panel (a) shows the distribution of crypto investors on the Danish platforms by wealth groups. Panel (b) shows the mean crypto wealth in the wealth distribution conditional on having crypto wealth. Panel (c) shows the distribution of crypto wealth by wealth groups. Panel (d) shows the crypto wealth share of total gross financial wealth conditional on having crypto wealth.

6 Tax Noncompliance

In this section, we combine transaction-level data from the Danish crypto platforms with the tax returns of crypto investors to estimate tax noncompliance on crypto income from 2017 to 2021. First, we define noncompliance on crypto income based on the transaction data from the Danish crypto platforms. Second, we present the evolution of noncompliance. Third, we exploit the detailed platform and tax return data to study differences in noncompliance across crypto sale sizes and wealth.

Definition of tax noncompliance on crypto income. The Danish crypto platforms provide us with information about each crypto sale made on the platforms. We exploit that for each sale, the crypto investor will either experience a gain or loss on his crypto investment. The gain or loss must be reported on the tax return as either "other gains" or "other losses". We define a *tax noncomplier* as a taxpayer having a crypto sale in a given year but not declaring either a gain or loss on the tax return.

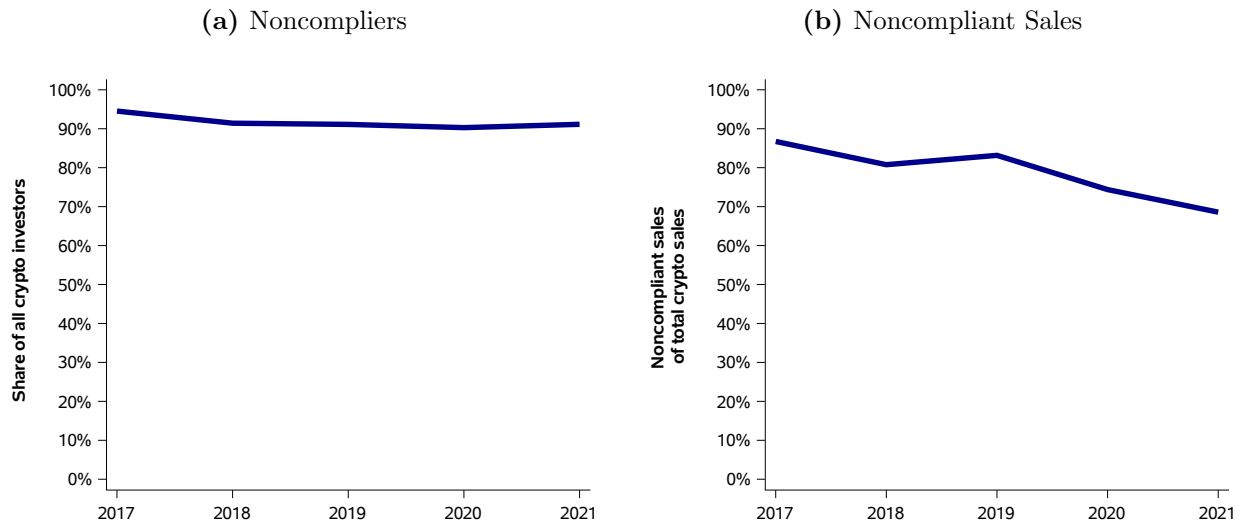
Our definition is conservative for two reasons. First, we do not consider the income amounts to define noncompliers. Crypto investors just need to report non-zero amounts in either "other gains" or "other losses" to be categorized as compliers. Even if the actual crypto income is higher than what is reported on the tax return, the crypto investor will be categorized as a complier as long as the reported income is not zero. Second, the tax return fields "other gains" and "other losses" work as residuals, which means that not only crypto income needs to be reported in these fields. With our conservative definition of noncompliance, we assume that all income reported in these fields is crypto income. If crypto investors also report other types of income in the fields, they will be categorized as compliers according to our definition. Hence, we consider our estimate of noncompliance a lower-bound of the actual noncompliance.

Evolution of tax noncompliance. Crypto tax noncompliance is very high in the whole period we observe from 2017 to 2021.[3] Panel (a) in figure 2 shows a constant share of noncompliant crypto investors above 90% in all years. Panel (b) shows the share of crypto sales made by noncompliant crypto investors. The noncompliant share of sales has been declining from 87% in 2017 to 69% in 2021. This reflects that crypto investors with larger sales have become more likely to self-report crypto income during the period. Similarly, Meling et al. (2024) finds a crypto noncompliance rate of 88% in Norway. Other income types with limited third-party reporting also exhibit high noncompliance rates; Johannesen and Zucman (2014) show that 90% of foreign financial income was noncompliant before third-party reporting initiatives, and Kleven et al. (2011) finds that 45% of Danish self-employed evade taxes.

Ditribution of tax noncompliance. Crypto investors with larger sales have a higher propensity to self-report crypto income. That is evident from panel (a) in figure 3 which

[3]Less than five crypto investors sold crypto on the Danish crypto platforms in 2016, so we exclude 2016 from the tax noncompliance analysis to avoid conflict with non-disclosure rules.

Figure 2: Crypto Tax Noncompliance



Notes: Panel (a) shows the share of noncompliant crypto investors over time. These shares reflect investors who sold crypto on Danish platforms but did not report either gains or losses on their tax returns. Panel (b) shows the share of sales in amount sold by noncompliant crypto investors. Sales are winsorized at the 99th percentile.

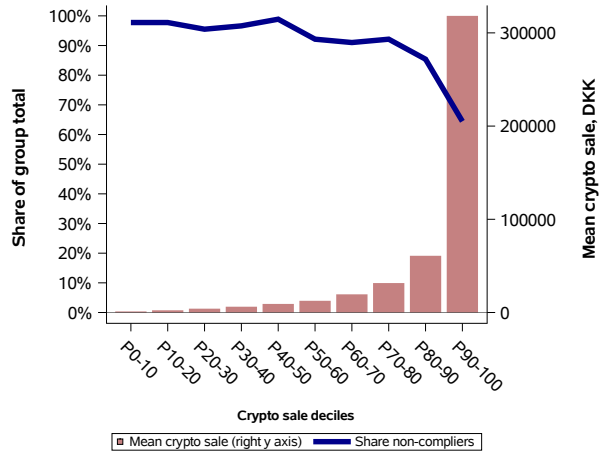
shows the share of noncompliers by sale size deciles in 2021 along with the mean crypto sale. The bottom 50% of crypto investors with the smallest crypto sales exhibit high noncompliance rates above 90%, but as the crypto sales increase, the noncompliance rate decreases. The top 10% crypto investors with the highest sales have the lowest propensity to be noncompliant with 64%. The Danish tax authority selects crypto investors for audits based on the size of their observed crypto sales, with the probability of an audit increasing as sale size grows. Consequently, the lower noncompliance among investors with larger sales aligns with the predictions of a standard tax evasion model, where taxpayers weigh the benefits of evasion against the increasing probability of audits and potential penalties (Allingham and Sandmo, 1972). However, the high noncompliance rates throughout the distribution, even after the crackdown on the Danish platforms, may reflect a generally low perceived audit risk or low penalties.

Panel (b) in figure 3 shows the share of noncompliers by wealth groups. Noncompliance is high throughout the wealth distribution, ranging from 95% in the bottom 10% of the distribution to 86% among the wealthiest 10%. Hence, tax evasion of crypto income is not confined to the wealthiest investors. This stands in contrast to tax evasion on offshore financial income, which, like crypto income, has been characterized by the lack of third-party reporting. Offshore tax evasion is carried out mainly by the wealthiest individuals in the population (Alstadsæter

et al., 2019).

Figure 3: Distribution of Noncompliance in 2021

(a) Noncompliers by Sale Size



(b) Noncompliers by Wealth

Notes: Panel (a) presents the share of crypto noncompliers by crypto sale decile. Panel (b) presents the share of crypto noncompliers by wealth group.

7 Behavioral Responses to Third-Party Reporting of Crypto Income

In this section, we study the behavioral responses of crypto investors to the crackdown on Danish crypto platforms, with a particular focus on their efforts to maintain secrecy by shifting activity from domestic to foreign platforms. First, we explore the potential for such shifts between domestic and foreign platforms. Second, we outline our methodological framework for identifying this transition. Third, we present the results.

Domestic and foreign crypto platforms. The crackdown on Danish crypto platforms represents a major step toward increasing transparency in crypto transactions. By incorporating the newly reported transaction data into its audit sampling, the Danish tax authority raised the audit risk for investors on domestic platforms. How crypto investors respond to this increased transparency is key to understanding the effect of enforcement. One potential response we examine is the shift of activity to foreign crypto platforms. Since only domestic platforms were required to report transaction data to the tax authority, investors seeking to maintain

anonymity may move their activity to foreign platforms, which remain outside the scope of third-party reporting. Shifting between domestic and foreign platforms is relatively seamless for investors due to the global nature of crypto and the accessibility of foreign platforms. Most platforms operate online, allowing users to open accounts and transfer assets with minimal friction. Additionally, many foreign platforms offer services in multiple languages and accept several payment methods, making it easy for users to transition from domestic platforms. One of these payment methods is bank transfers from customers' domestic bank accounts to the platforms' accounts. We leverage these transactions to measure shifts in activity from domestic to foreign platforms.

Methodological framework. The goal is to identify a shift in trading activity from Danish crypto platforms, which are now transparent, to foreign platforms, which still do not exchange information with the tax authority. This is inherently difficult as we do not observe transactions on foreign platforms. Instead, we use cross-border bank transfers to and from foreign crypto platforms to proxy for trading activity. By linking a list of account numbers of accounts known to be owned by foreign platforms and other keywords associated with crypto (e.g., "bitcoin" or "cryptocurrency") to the bank transfers, we identify transfers made to and from foreign crypto platforms. We call these transfers *crypto-related bank transfers*. The result is a subsample of bank transfers made to and from foreign crypto platforms from the second quarter of 2016 to 2022.[4]

Some crypto investors invest both on Danish and foreign platforms. We use this to construct treatment and control groups. To identify shifts from Danish to foreign platforms, we compare crypto investors with investments on Danish platforms before 2019 (*Danish platform investors*), to crypto investors with no investments on Danish platforms before 2019 (*foreign platform investors*). The Danish platform investors are treated by the transparency shock on the domestic platforms, whereas the foreign platform investors are unaffected by the shock and therefore function as a control group. The identifying assumption is that crypto investments by Danish platform investors would have evolved as investments by foreign platform investors

[4]To avoid conflict with non-disclosure rules, we exclude all quarters with less than five transfers. As a result, all quarters before 2016Q2 are excluded.

if there was no transparency shock. We estimate the following difference-in-differences model:

$$\frac{C_{i,q}}{\bar{C}_{x,2018Q4}} = \alpha_q + \beta_q D_i + \epsilon_{i,q,x} \tag{1}$$

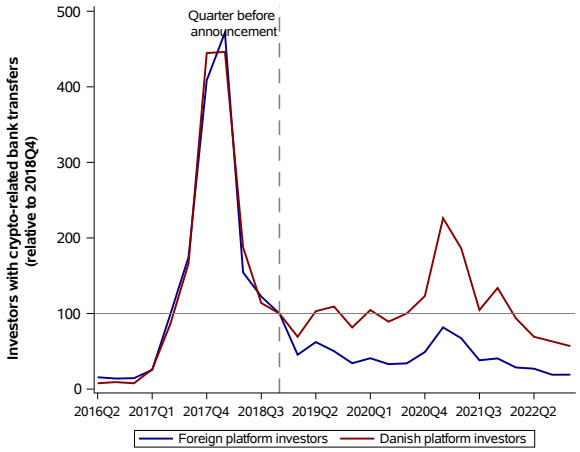
where $C_{i,q}$ indicates whether individual i makes a crypto-related transfer in quarter q. $\bar{C}_{x,2018Q4}$ is the average probability of making a crypto-related transfer for investor group x (Danish versus foreign platform investors) in 2018Q4, and D_i indicates whether individual i is a Danish platform investor. β_q captures the percentage change (in quarter q relative to 2018Q4) in Danish platform investors' probability of making a transfer relative to the percentage change in foreign platform investors' probability of making a transfer. Standard errors are robust and clustered at the individual level.

Results. We find a significant shift in trading activity from Danish to foreign platforms after the crackdown. Panel (a) in figure 4 shows the number of Danish and foreign platform investors who make bank transfers to or from foreign platforms relative to the quarter before the announcement of the crackdown, 2018Q4. The large jump in crypto investors with crypto-related transfers at the end of 2017 and beginning of 2018 is not unique to our sample but reflects the spike of interest in crypto around that time. Despite the volatile preperiod, the treatment and control groups evolve in parallel until the announcement, whereafter they start diverging. After the announcement, Danish platform investors start making more crypto-related bank transfers to or from foreign crypto platforms than foreign crypto investors. This pattern continues throughout the observation period suggesting a permanent shift from Danish to foreign platforms.

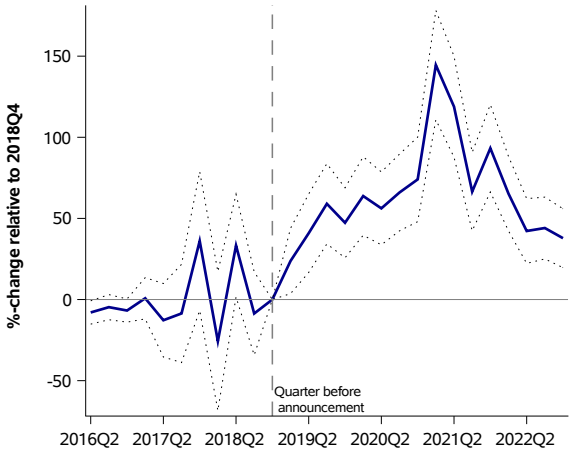
Panel (b) in figure 4 plots the difference-in-differences estimates from equation 1. The difference in pretend between Danish and foreign crypto investors is insignificantly different from zero. Danish platform investors respond immediately in the first quarter after the announcement suggesting that domestic and foreign crypto platforms are strong substitutes and crypto wealth can quickly be transferred from one platform to another. In sum, we find that crypto investors on Danish platforms shift their trading activity to foreign platforms in response to the crackdown and the shift seems to be permanent. Hence, some crypto investors respond to the crackdown by seeking more secrecy.

Figure 4: Response to the Crackdown on Domestic Platforms

(a) Transfers to/from Foreign Crypto Platforms



(b) DiD Estimates



Notes: Panel (a) reports the number of foreign and Danish platform investors with crypto-related bank transfers normalized to 100 in 2018Q4, the quarter before the Danish tax authority announced the crackdown on Danish crypto platforms. Panel (b) reports the β_q estimates from equation 1 with 95% confidence intervals based on robust standard errors clustered at the individual level in dashed lines.

8 Conclusion

This study sheds light on the challenges of enforcing taxes on crypto, focusing on the introduction of domestic third-party reporting for crypto income. Despite the policy's ambition, more than 90% of crypto investors fail to declare their income. Additionally, we observe a significant shift in trading activity to foreign platforms, effectively undermining the policy's scope and efficacy. These findings highlight the limitations of unilateral enforcement efforts in addressing tax evasion for decentralized, borderless assets like crypto.

The persistent evasion behavior underscores the need for coordinated global action. In this context, the OECD's Crypto-Asset Reporting Framework (CARF) and the European Union's counterpart, DAC8, represent promising steps forward. By establishing standardized international reporting obligations for crypto-asset transactions from 2026, CARF and DAC8 aim to close regulatory gaps and reduce opportunities for evasion across jurisdictions. Our findings strongly support such multilateral initiatives, suggesting that domestic reporting alone is insufficient to tackle the unique compliance challenges posed by crypto.

However, our results also emphasize that for CARF to be effective, its scope must be comprehensive, covering crypto platforms worldwide. The ease with which crypto can be

transferred across platforms and jurisdictions presents a significant threat to the efficacy of global initiatives if they only cover a fraction of the world. Furthermore, the use of decentralized peer-to-peer crypto transactions, not covered by CARF, presents an additional challenge to tax enforcement. For future research, it would be interesting to study the uptake of decentralized transactions in response to increased global transparency on centralized crypto platforms.

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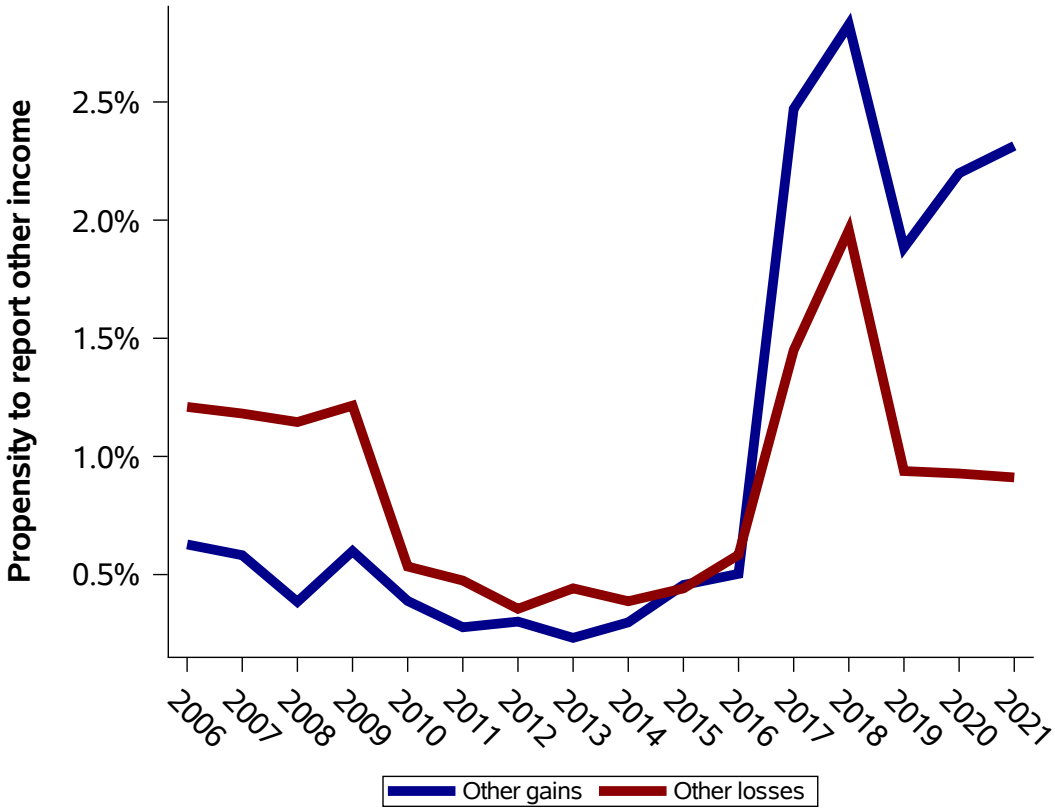
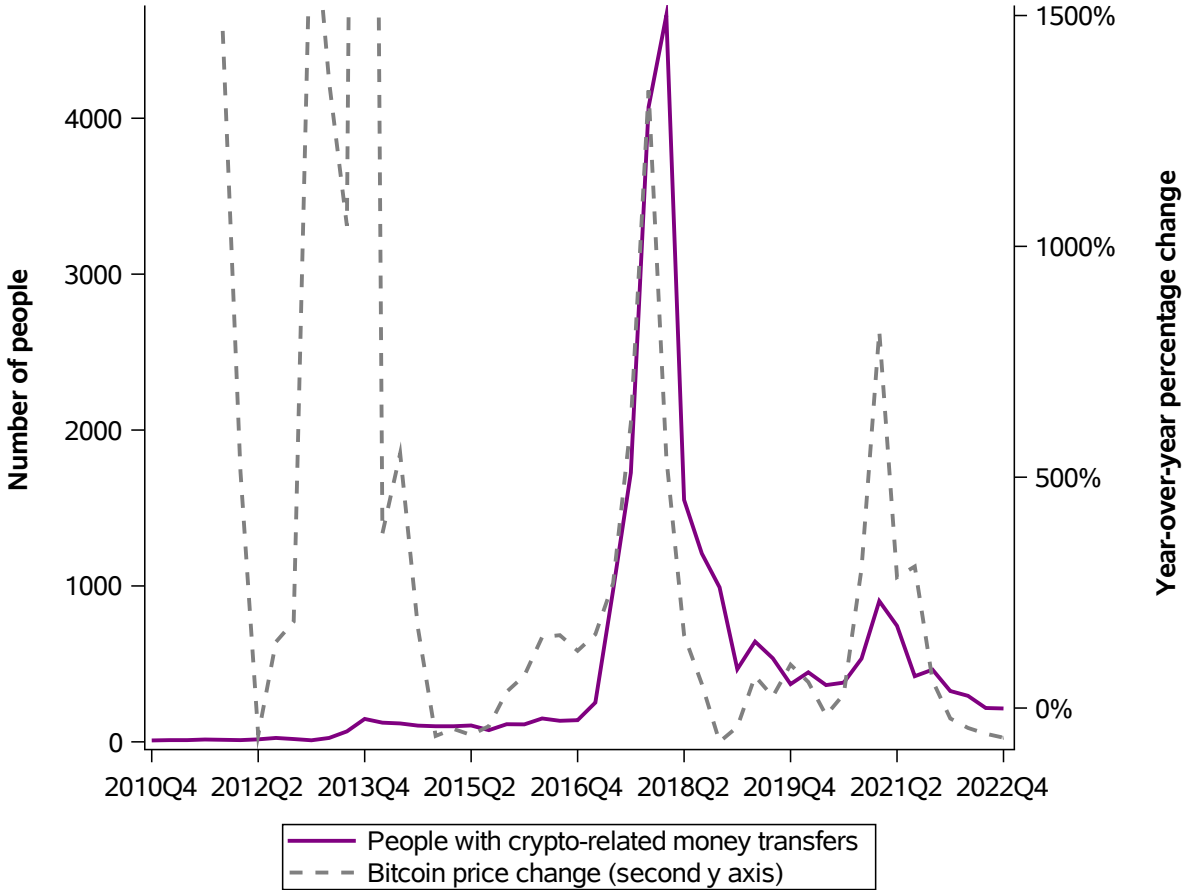
Appendix

Figure A1: Propensity to report other income (gains or losses) by the crypto investors on the Danish crypto platforms



Notes: This figure presents the share of all crypto investors on the Danish crypto platforms - including investors with and without crypto sales - who report income in the tax fields 'other gains' or 'other losses' on their tax returns.

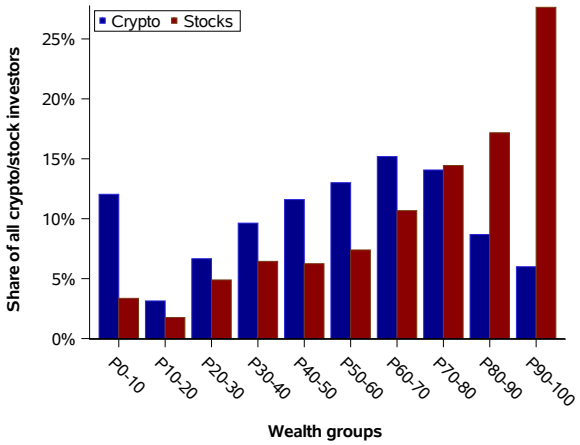
Figure A2: People with bank transfers to or from foreign crypto platforms and the Bitcoin price change



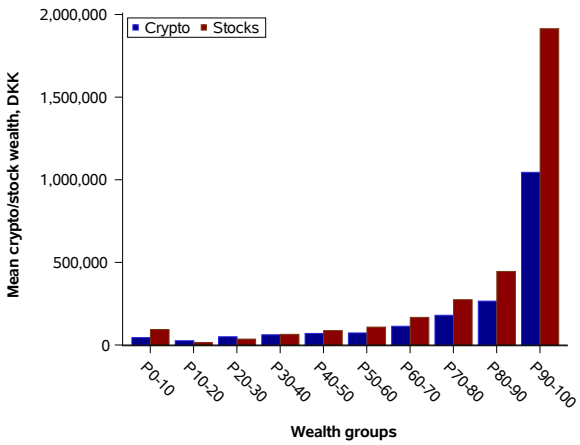
Notes: This figure presents the number of people with crypto-related bank transfers (purple line) along with the year-over-year percentage change in the Bitcoin price (dashed line). The second y axis is truncated at 1500% to ease comparison with the number of people with crypto-related bank transfers.

Figure A3: Crypto and Stock Ownership in the Wealth Distribution in 2021

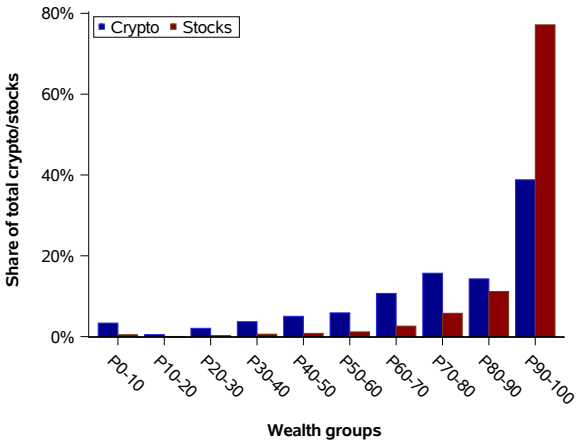
(a) Number of Crypto and Stock Investors



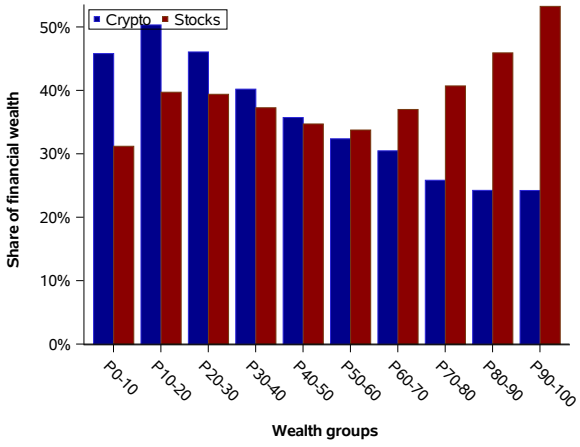
(b) Mean Crypto and Stock Wealth



(c) Crypto and Stock Ownership

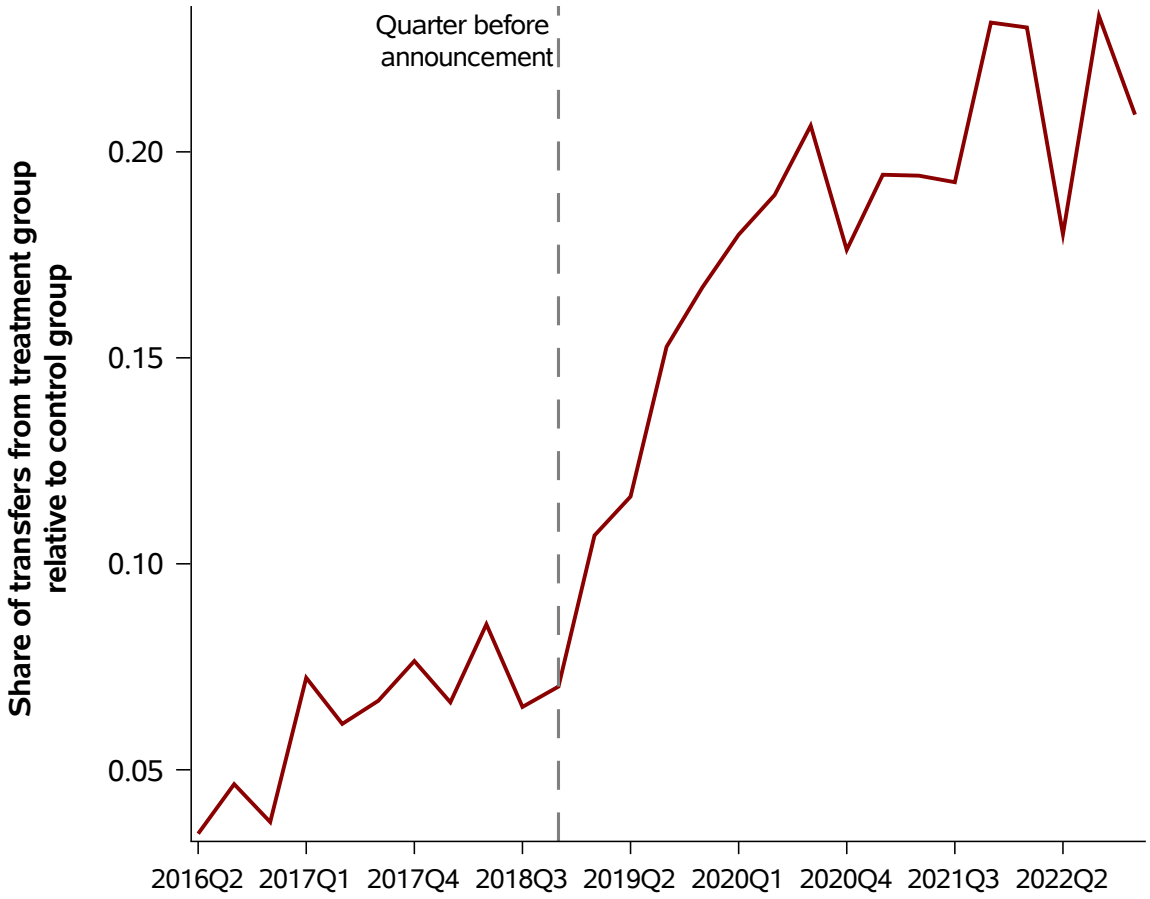


(d) Crypto and Stock Wealth of Total Gross Financial Wealth



Notes: Panel (a) shows the distribution of crypto/stock investors by wealth groups. Panel (b) shows the mean crypto/stock wealth in the wealth distribution conditional on having crypto/stock wealth. Panel (c) shows the distribution of crypto/stock wealth by wealth groups. Panel (d) shows the crypto/stock wealth share of total gross financial wealth conditional on having crypto/stock wealth.

Figure A4: Crypto-related bank transfers by Danish platform investors (treatment group) relative to crypto-related bank transfers by foreign platform investors (control group)



Notes: This figure presents the ratio of the number of crypto-related bank transfers made by the treatment group to the number of crypto-related bank transfers made by the control group over the observation period.