CBDC and the Shadow of Bank Disintermediation:
US Stock Market Insights on Threats and Remedies

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Abstract

Highly deposit-dependent banks might be strongly negatively affected by the introduction of a central bank digital currency (CBDC). Particularly a retail CBDC, focusing on the use by consumers, may constrain cheap funding and thus erode profits of banks (deposit channel). Our empirical study reveals that stock market reactions of US banks to speeches by US Federal Reserve (FED) executives indicating a CBDC introduction are indeed more negative the more these banks depend on deposits. However, as soon as protection against disintermediation is promised by the FED, e.g., via a non-interest bearing CBDC or a CBDC holding limit per person, we observe positive stock market reactions for highly deposit-dependent banks.

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1 Introduction

In recent years, the use of cash declined (Khiaonarong and Humphrey, 2022), while the popularity of digital payments increased (Caswell et al., 2020). In particular, enormous interest in cryptocurrencies, such as Bitcoin, relying on decentralization rather than a central issuing authority is observable (Pagnotta, 2022). In response to these developments and to preserve monetary sovereignty, central banks around the world are considering the introduction of a central bank digital currency (CBDC) (Chiu et al., 2023). Because a CBDC can, in principle, be used by private individuals both as a form of payment and as a form of savings[1], a particularly significant concern of banks is that deposits could be substituted to some extent by CBDC holdings (e.g., Mancini-Griffoli et al., 2018; Ahnert et al., 2022). This substitution of deposits would cause banks' funding to become more expensive and thus challenge their existing business models – typically referred to as the deposit channel. Moreover, such a disintermediation of banks could have severe consequences not only for individual institutions but for the entire financial system.

There is a growing strand of theoretical literature trying to anticipate possible implications of a CBCD introduction on banks and their deposits. For example, Whited et al. (2023) build a dynamic banking model and find that the introduction of a CBDC leads to a sizeable decrease in bank deposits. Contrary, Chiu et al. (2023) study a general equilibrium model and conclude that bank deposits may, under certain conditions, increase following a CBDC introduction. This is in line with Andolfatto (2021), who investigates the reaction of a monopoly bank to a CBDC introduction and finds that the bank retains deposits if the interest on CBDC is below a certain limit.[2] Empirical studies are rather scarce.[3] Burlon et al. (2023) develop a quantitative dynamic stochastic general equilibrium model, incorporating the trade-off between CBDCs' operational merits as a payment device and the risks for bank stability induced by disintermediation, and enrich their study with important empirical observations. For an unbalanced panel of 53 listed banks from the

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[1] In this study, we refer to this form of a CBDC, called retail CBDC.

[2] For a more comprehensive overview of the literature on the economics of a CBDC introduction, see, for example, Ahnert et al. (2022).

[3] This is not surprising as only a few countries, the Bahamas, Jamaica, Nigeria, and eight tiny countries in the Eastern Caribbean (see https://www.atlanticcouncil.org/cbdctracker/), none of them representative for the US or other leading economies, have factual experience with a CBDC.

euro area, they find that market participants expect highly deposit-dependent banks to suffer more from a CBDC introduction, unless a holding limit is introduced. The simulation exercise by Vollmar and Wening (2023), studying non-listed German savings banks and cooperative banks, indicates that the deposit channel works as assumed and even a low CBDC holding limit per person may not safeguard these mostly deposit-dependent institutions against detrimental impacts of a CBDC introduction.

To shed light on possible consequences of a CBDC introduction for banks and on the effectiveness of specific protective measures against disintermediation suggested by central banks, we conduct an empirical study. Using speeches on CBDC by US Federal Reserve (FED) executives, taken from a database maintained by the Bank for International Settlements (BIS) and established in the academic literature by Auer et al. (2020), we conduct an event study. We thereby investigate the stock market reaction to those speeches analyzing US banks' cumulative abnormal returns (CARs). Market reactions cannot ultimately prove how banks will be affected by the introduction of a CBDC. Yet, given the lack of data on this issue, they are arguably the closest empirical approximation available as they aggregate the impact market participants anticipate.

In a nutshell, it turns out that the deposit-dependency of banks is negatively related to the stock market reaction for speeches of FED executives indicating an increased probability of a CBDC introduction.[4] However, as soon as such a speech is combined with an assertion that banks will be protected from disintermediation, the market participants' reaction is reversed. Most interestingly, in terms of specific protective measures, we find that stock prices of highly deposit-dependent US banks react positively to FED executives' considerations of a non-interest bearing CBDC and a CBDC holding limit per person. Thus, market participants perceive the two specific protective measures suggested by the FED as effective instruments to prevent bank disintermediation.

With these empirical findings, we add to the growing strand of literature on the impact of a CBDC introduction on banks – a strand of literature that has so far relied mainly on theoretical models. First, we provide empirical evidence in line with theoretical models proposing a deposit channel such as Whited et al. (2023). Second, we gauge the effec-

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[4] The opposite holds for speeches implying a less probable CBDC introduction.

tiveness of central banks' protective measures, a research direction that has received little attention to date. Moreover, our study has important practical implications. As most central banks around the world are still investigating whether to introduce a CBDC and, if so, how to design such a currency, we provide indicative evidence of potential consequences for banks with and without certain protective measures. A more comprehensive understanding of the consequences of a CBDC introduction for the financial system is also helpful for banks and supervising authorities.

The rest of the paper is structured as follows. Section 2 presents the data upon which our analysis is based, followed by Section 3 describing our research methodology. Section 4 presents our results regarding possible consequences of a CBDC introduction on banks in the US and the effectiveness of specific protective measures suggested by the FED. Section 5 concludes.

2 Data

Using a database maintained by the BIS, we define events as days on which there is a speech on CBDC from FED executives. Conveniently, the BIS database includes a sentiment score (*Stance*) for each event indicating the probability of a CBDC introduction in the US. *Stance* = 1 indicates an increased, *Stance* = 0 an unchanged, and *Stance* = −1 a decreased introduction probability (Auer et al., 2020).[5] We use all CBDC speeches by FED executives from the BIS database until December 2022. In total, our data set includes 21 events, six with *Stance* = 1, ten with *Stance* = 0, and five with *Stance* = −1.

Our data on US banks is derived from the Center for Research in Security Prices (CRSP) and Compustat. We define banks as listed firms located in the US with available stock market information on CRSP between 2016 and 2022 whose North American Industry Classification System (NAICS) code starts with 52 (i.e., finance and insurance companies). We further require those firms to have some balance sheet and income information available on Compustat's quarterly bank fundamentals database between 2016 and 2022. The final sample comprises 162 US banks.[6]

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[5] Table A.3 in the appendix lists all relevant events and states their date, speaker, speech title, and *Stance*.

[6] 122 banks are categorized as commercial banks (NAICS code 522110), 20 as saving institutions (522120), and 20 as savings institutions and other depository credit intermediaries (522180).

3 Methodology

Using daily stock price data from CRSP, we calculate CARs for each bank i for an event e taking place on $t = 0$ [7] over a seven-day window from $t = -1$ to $t = 5$ using a market model as lined out in MacKinley (1997).[8] The CRSP value-weighted portfolio serves as a proxy for the market portfolio (see e.g., Dessaint et al., 2021) and expected returns are estimated over a 200-day period ending 30 days before an event (see e.g., Aktas et al., 2021).[9]

Using quarterly balance sheet and income information from Compustat, we calculate our main explanatory variable, *Deposit Ratio*, as total customer deposits over total liabilities as well as the control variables *Total Assets*, *ROA*, *NPL*, *Equity Ratio*, and *Int − Inc Ratio* (cf. Burlon et al., 2023). We lag all these variables by one quarter with respect to the quarter in which each event took place to ensure that the information is publicly known at the time of the event.[10]

Investigating the deposit channel proposed by Whited et al. (2023) among others, we regress the stock market reaction of US banks around CBDC events on their respective deposit ratio. We employ the following interacted fixed effects model:

$$\widehat{CAR}_i^e = \alpha + \beta \times \textit{Deposit Ratio}_{i,e} \times \textit{Stance}_e + \delta' \times X_{i,e} \times \textit{Stance}_e$$
$$+ \zeta_e \times \textit{Stance}_e + \zeta_i \times \textit{Stance}_e + \varepsilon_{i,e}, \quad (1)$$

where for each bank i on event e $\widehat{CAR}_i^e$ is the bank's estimated CAR during the seven-day window around the CBDC event, *Deposit Ratio*$_{i,e}$ is the bank's deposit ratio reported in the quarter before event e and $X_{i,e}$ is a set of characteristics of bank i in the quarter before event e that may explain some variation in bank i's CARs. These controls include a proxy for a bank's size (*Total Assets*), a proxy for a bank's profitability (*ROA*), a bank's non-performing loan ratio (*NPL*) to estimate the quality of a bank's loan portfolio, and two further standard banking control variables, a bank's equity ratio (*Equity Ratio*), and

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[7] Events occurring on non-trading days are treated as if the next consecutive trading day is the event date.

[8] Our findings are robust to using alternative reference models, e.g., the Fama-French three-factor model, or alternative event windows, e.g., $[-1, 3]$ or $[-5, 5]$. Results are available upon request.

[9] We require a minimum of 100 valid returns during the 200-day estimation window.

[10] Table A.1 in the appendix gives a descriptive overview of the distribution of all variables. Table A.2 in the appendix defines the variables.

a bank's interest-income ratio ($Int - Inc\ Ratio$) (cf. Burlon et al., 2023). The fixed effects, ζ_e and ζ_i, capture event- and bank-specific unobserved variation in CARs following Burlon et al. (2023). The explanatory variable as well as all controls and fixed effects are interacted with *Stance*, allowing their coefficients to vary with the sentiment score assigned by Auer et al. (2020) (see e.g., Dessaint et al., 2021). The base level is set to *Stance* = 0. Singletons, i.e., cases with a single observation for a given fixed effect, are dropped before the model is estimated (see e.g., Dessaint et al., 2021). The standard errors are clustered at the bank level following Burlon et al. (2023).[11]

Investigating the effect of *Deposit Ratio* on *CAR* for single events, Equation 1 is simplified to:

$$\widehat{CAR}_i^e = \alpha + \beta \times Deposit\ Ratio_{i,e} + \delta' \times X_{i,e} + \zeta_{naics} + \varepsilon_{i,e}, \tag{2}$$

where the fixed effect ζ_{naics} captures business-model-specific unobserved variation in CARs.[12] All other variables are defined as before. Singletons are dropped before the model is estimated (see e.g., Dessaint et al., 2021) and standard errors are clustered at the bank level as in Burlon et al. (2023).

4 Empirical Results

4.1 Substitutability between Bank Deposits and CBDC

In our empirical analysis, we first examine how the deposit dependency of banks is related to their market reaction to speeches by FED executives on the introduction of a CBDC using the model described by Equation 1. The statistically significant results in Table 1 show that the higher a bank's deposit ratio, the lower its CARs for speeches that increase the probability of introducing a CBDC (p_{up}). Equivalently, the higher a bank's deposit ratio, the higher its CARs for speeches that decrease the probability of a CBDC introduction (p_{down}).[13] The results are also economically significant, as one standard deviation (7.1 percentage points) higher deposit ratio leads to 0.8 percentage points lower CARs in the

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[11] Our findings are robust to clustering the standard errors at the bank and event level instead. Results are available upon request.

[12] ζ_{naics} is defined using the three NAICS code groups 522110, 522120, and 522180.

[13] Our results are qualitatively unchanged if we split the sample according to *Stance* instead. Results are available upon request.

case of probability-increasing speeches, and to 0.9 percentage points higher CARs in the case of probability-decreasing speeches. This clearly speaks for the presence of a deposit channel and suggests that market participants perceive a level of substitutability between bank deposits and a CBDC.

Table 1: Deposit Channel

	(1)	(2)	(3)
Deposit Ratio $\times$ p_{up}(CBDC Introduction)	-0.1134*		-0.1134*
	(-1.89)		(-1.89)
Deposit Ratio $\times$ p_{down}(CBDC Introduction)		0.1260**	0.1260**
		(2.14)	(2.14)
Total Assets (interacted)	Yes	Yes	Yes
ROA (interacted)	Yes	Yes	Yes
NPL (interacted)	Yes	Yes	Yes
Equity Ratio (interacted)	Yes	Yes	Yes
Int-Inc Ratio (interacted)	Yes	Yes	Yes
Event FE (interacted)	Yes	Yes	Yes
Bank FE (interacted)	Yes	Yes	Yes
N	2,553	2,546	2,546
Adj. R^2	0.2938	0.3004	0.2928

This table presents the estimates of the sensitivity of the CARs of a bank's stock during the seven-day window around an event (*CAR*) to its deposit ratio (*Deposit Ratio*). Events are defined using the BIS database as days on which there is a speech on CBDC from FED executives. The sample period is January 2017 to December 2022. p_{up}(*CBDC Introduction*) and p_{down}(*CBDC Introduction*) are dummy variables in column (1) and column (2). They respectively take a value of one if there is an event with *Stance* = 1 or *Stance* = −1 and otherwise take a value of zero. In column (3) p_{up}(*CBDC Introduction*) and p_{down}(*CBDC Introduction*) represent the attributes *Stance* = 1 and *Stance* = −1 of the factor variable *Stance*. The base level is set to *Stance* = 0. (*Interacted*) indicates that all control variables and fixed effects are interacted with either the respective dummy variable in column (1) and (2) or *Stacne* in column (3). *N* represents an unbalanced sample of 162 banks and 21 events. Table A.2 in the appendix define the variables. *t*-statistics, based on standard errors clustered at the bank level, are reported in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

In addition to categorizing all speeches in terms of a CBDC introduction probability, the content of individual speeches can be used to examine whether there is empirical evidence for the deposit channel of a CBDC introduction in the US. The FED announced the first specific research projects and experiments on the introduction of a CBDC on August 13th, 2020. This speech is categorized as probability-increasing by Auer et al. (2020). Looking at Table 2 we find that the higher a bank's deposit ratio, the significantly lower its CARs for this event. This underlines the perceived substitutability between bank deposits and

a CBDC by market participants.

Table 2: Speech on Specific CBDC Research Projects

	(1)	(2)	(3)	(4)	(5)
Deposit Ratio	-0.1079*	-0.1015**	-0.1025**	-0.0907*	-0.0871*
	(-1.97)	(-2.05)	(-2.07)	(-1.87)	(-1.71)
Total Assets	-1.9786***	-1.9044***	-1.9075***	-1.8274***	-1.8847***
	(-6.28)	(-6.38)	(-6.41)	(-6.47)	(-5.80)
ROA		-1.4651	-1.5087	-1.6879*	-1.6398
		(-1.39)	(-1.36)	(-1.75)	(-1.65)
NPL			-0.1170	-0.2215	-0.1666
			(-0.16)	(-0.31)	(-0.22)
Equity Ratio				-0.2640*	-0.2562*
				(-1.72)	(-1.68)
Int-Inc Ratio					-1.2645
					(-0.41)
NAICS FE	Yes	Yes	Yes	Yes	Yes
N	121	121	121	121	121
Adj. R^2	0.3511	0.3696	0.3643	0.3778	0.3731

This table presents the estimates of the sensitivity of the CARs of a bank's stock during the seven-day window around the event (*CAR*) to its deposit ratio (*Deposit Ratio*). The event takes place on August, 13th 2020 and is defined using the BIS database as a day with a speech on CBDC from a FED executive. Tables A.2 in the appendix define the variables. *t*-statistics, based on standard errors clustered at the bank level, are reported in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

## 4.2 The Effectiveness of Central Bank Protective Measures

As central banks anticipate that banks with certain business models, e.g., highly deposit-dependent banks, might be negatively affected by the introduction of a CBDC, they are discussing the need to safeguard banks from disintermediation and are debating the implementation of various protective measures. Key considerations are, first, not paying interest on CBDC holdings, and second, limiting the maximum CBDC holding amount per person (Brainard, 2022). So far, there is little empirical evidence on the effectiveness of protective measures suggested by central banks.

In our analysis, we first empirically investigate the effect of the FED announcement to protect banks against a possible disintermediation induced by a CBDC introduction. Second, we examine empirically the perceived effectiveness of the above-mentioned specific protective measures. For these purposes, we analyze two speeches in detail using the same approach as for the speech underlying Table 2. On May 24th, 2021, the FED announced for the first time that "[...] the design of any CBDC would need to include safeguards

to protect against disintermediation of banks [...]" (Brainard, 2021). On February 18th, 2022 the FED, for the first time, specifically suggested the above-mentioned protective measures by stating that "[...] design features [...] could be introduced to limit [disintermediation] risks, such as offering a non-interest bearing CBDC and limiting the amount of CBDC an end user could hold or transfer" (Brainard, 2022).

Figure 1: Stock market reaction to FED executives' CBDC speeches by US banks
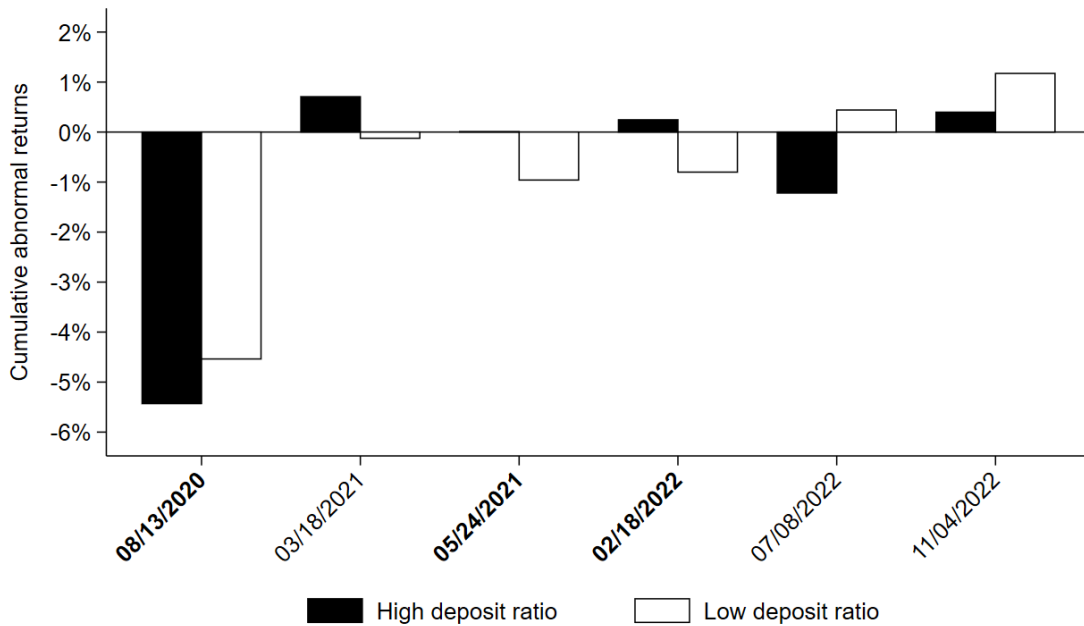
This figure displays the average CARs for two groups of US banks for each speech with *Stance* = 1. The filled bars represent the average stock market reaction of banks with a deposit ratio above the 75th percentile. The unfilled bars represent the average stock market reaction of banks with a deposit ratio below the 25th percentile. The three dates in bold font mark the single events studied in detail. First, we investigate the FED speech of August, 13th 2020, which addressed concrete CBDC research projects for the first time. Second, we analyze the FED speech of May, 24th 2021, when the need to protect against disintermediation was raised for the first time. Third, we examine the FED speech of February, 18th 2022, when specific protective measures against disintermediation were proposed for the first time.

For an initial overview, Figure 1 plots the CARs of all speeches with a probability-increasing stance on CBDC introduction, including the speeches on May 24th, 2021 and February 18th, 2022. Despite both speeches having a *Stance* = 1, two aspects are striking. First, high deposit ratio banks react substantially more positively to both speeches than low deposit ratio banks. Second, high deposit ratio banks react even slightly positively overall to both speeches. This observation contrasts with the regression results in Table 1 and 2 showing that the higher a bank's deposit ratio, the lower its CARs for speeches that

increase the probability of introducing a CBDC. This is a first indication that the plan to prevent bank disintermediation as well as the specific protective measures discussed by the FED are perceived as effective by market participants.

Table 3: Speech on Protection against Disintermediation

	(1)	(2)	(3)	(4)	(5)
Deposit Ratio	0.0922**	0.0907**	0.0801**	0.0819**	0.0876**
	(2.55)	(2.53)	(2.29)	(2.28)	(2.40)
Total Assets	0.5089***	0.5199***	0.4999***	0.5143***	0.3159*
	(3.79)	(3.81)	(3.69)	(3.71)	(1.71)
ROA		-0.7273	-1.2739	-0.7556	0.6936
		(-0.51)	(-0.84)	(-0.52)	(0.44)
NPL			-0.5542	-0.5623	-0.4070
			(-1.36)	(-1.40)	(-1.13)
Equity Ratio				-0.0907	-0.0840
				(-0.67)	(-0.62)
Int-Inc Ratio					-3.4657
					(-1.55)
NAICS FE	Yes	Yes	Yes	Yes	Yes
N	120	120	120	120	120
Adj. R^2	0.1076	0.1029	0.1038	0.1169	0.1094

This table presents the estimates of the sensitivity of the CARs of a bank's stock during the seven-day window around the event (*CAR*) to its deposit ratio (*Deposit Ratio*). The event takes place on May, 24th 2021 and is defined using the BIS database as a day with a speech on CBDC from a FED executive. Tables A.2 in the appendix define the variables. *t*-statistics, based on standard errors clustered at the bank level, are reported in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

To examine the effectiveness of the FED's plan to protect banks from disintermediation and their suggested specific protective measures statistically, we run regressions for both speeches considered. The statistically significant results for the speech on protection against disintermediation in Table 3 show that the higher a bank's deposit ratio the higher its CARs, despite the speech's stance indicating an increased probability of a CBDC introduction. The results are also economically significant, as an increase in a bank's deposit ratio by one standard deviation (7.1 percentage points) leads to 0.6 percentage points higher CARs. The results of the analysis are striking for the following reason. As shown in Table 1 there is a strong tendency of banks with a high deposit ratio to react negatively to speeches that increase the probability of a CBDC introduction. But for the speech held on May 24th, 2021, we observe a slightly positive reaction for high deposit ratio banks as shown in Figure 1. On the contrary, the expected negative reaction is only observable for

low deposit ratio banks. A possible explanation for this surprising effect is the specific content of the speech as banks that could suffer the most from the possible negative consequences of an eventual CBDC introduction shall be protected against disintermediation. Table 3 implies that for highly deposit-dependent banks investors weigh the positive implications of the speech's content more than the negative possible consequences of an increasing probability of a CBDC introduction. Overall, this indicates that the FED's intended plan to protect banks against disintermediation is perceived positively by market participants.

Table 4: Speech on Protective Measures against Disintermediation

	(1)	(2)	(3)	(4)	(5)
Deposit Ratio	0.1526**	0.1535**	0.1533**	0.1549**	0.1515**
	(2.25)	(2.24)	(2.24)	(2.29)	(2.31)
Total Assets	0.0875	0.0800	0.0792	0.0880	0.2692
	(0.29)	(0.26)	(0.26)	(0.29)	(1.00)
ROA		1.1697	1.1510	1.3117	-0.6931
		(0.37)	(0.36)	(0.42)	(-0.20)
NPL			-0.0393	-0.0259	-0.2107
			(-0.07)	(-0.04)	(-0.35)
Equity Ratio				0.0960	0.0895
				(1.22)	(1.09)
Int-Inc Ratio					3.1665
					(0.82)
NAICS FE	Yes	Yes	Yes	Yes	Yes
N	116	116	116	116	116
Adj. R^2	0.0478	0.0407	0.0319	0.0324	0.0350

This table presents the estimates of the sensitivity of the CARs of a bank's stock during the seven-day window around the event (*CAR*) to its deposit ratio (*Deposit Ratio*). The event takes place on February, 18th 2022 and is defined using the BIS database as a day with a speech on CBDC from a FED executive. Tables A.2 in the appendix define the variables. *t*-statistics, based on standard errors clustered at the bank level, are reported in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

On February 18th, 2022 the FED concretized its plans to protect banks against disintermediation suggesting a non-interest bearing CBDC and a CBDC holding limit per person as specific protective measures. The statistically significant results for this speech displayed in Table 4 show that the higher a bank's deposit ratio the higher its CARs, despite the speech's stance indicating an increased probability of a CBDC introduction. Again, the results are economically significant and in addition, turn out to be substantially larger than for the speech on protection against disintermediation. An increase in a bank's deposit

ratio by one standard deviation (7.1 percentage points) leads to 1.1 percentage points higher CARs. As is the case for the speech on protection against disintermediation, the high deposit ratio banks react positively to this speech, whereas the low deposit ratio banks react negatively as shown in Figure 1. Looking at the content of the speech, suggesting to implement the specific protective measures of a non-interest bearing CBDC and a CBDC holding limit per person, helps in explaining the otherwise unexpected market reaction. Table 4 reveals that for deposit-dependent banks market participants value the positive implications of the specific protective measures more than potential disadvantages of a likelier CBDC introduction. Therefore, market participants perceive the specific protective measures suggested by the FED, namely a non-interest bearing CBDC and a CBDC holding limit per person, as effective instruments to prevent bank disintermediation.

5 Conclusion

Central banks around the world are considering the introduction of a CBDC. So far there is hardly any empirical evidence on the implications of a CBDC introduction for banks. By analyzing FED executives' speeches on CBDC, we find that for those speeches indicating an increased probability of a CBDC introduction the deposit-dependency of US banks is negatively related to their stock market reaction. This is in line with the deposit channel established by Whited et al. (2023) among others. The picture is reversed, however, for speeches promising protection against disintermediation. In particular, if the FED suggests specific protective measures, namely a non-interest bearing CBDC and a CBDC holding limit per person, stock market reactions of highly deposit-dependent banks even turn positive. This implies that market participants perceive the two specific protective measures suggested by the FED as effective instruments to prevent bank disintermediation shedding light on a previously little explored research area. Therefore, our study offers crucial insights into the potential implications of a CBDC introduction for banks and the perceived effectiveness of suggested protective measures. It not only informs central banks deliberating on a CBDC introduction and the design specifics but also guides banks and supervising authorities about the possible consequences of a CBDC with or

without protective measures.

The main focus of this paper is the deposit channel. Yet, a CBDC may also affect financial intermediaries' profitability through a lending channel (e.g., Whited et al., 2023). Fewer or more expensive deposits imply less lending or if funding from capital markets replaces customer deposits, more costly lending. This channel, and disentangling its effects from those of the deposit channel, is an issue for further research.

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6 Appendix

Table A.1: Summary Statistics

	N	Mean	SD	Min	p25	Median	p75	Max
CAR (%)	2,562	-0.6037	3.9754	-30.4206	-2.5448	-0.5938	1.6654	32.1889
Deposit Ratio (%)	2,562	90.4951	7.0858	61.0028	87.4545	92.5834	95.4925	99.5585
Total Assets	2,562	8.4383	1.4181	5.6121	7.4410	8.3176	9.2256	15.1904
ROA (%)	2,562	0.2764	0.1495	-4.1319	0.2181	0.2804	0.3390	1.2742
NPL (%)	2,562	0.6867	0.6106	0.0000	0.2767	0.5245	0.8549	4.7259
Equity Ratio (%)	2,562	10.7419	2.9188	3.8244	8.7863	10.2703	12.0305	28.1171
Int-Inc Ratio (%)	2,562	0.8875	0.1621	0.1467	0.7851	0.8839	0.9919	1.4787

This table presents descriptive statistics for our sample of US banks between 2017 and 2022. *CAR* is the bank's cumulative abnormal return around FED speeches on CBDC in percent. *Deposit Ratio* is the bank's deposit ratio in percent. *Total Assets* is the natural logarithm of the bank's total assets. *ROA* is the bank's return on assets in percent. *NPL* is the bank's non-performing loan ratio in percent. *Equity Ratio* is the bank's equity ratio in percent. *Int − Inc Ratio* is the bank's interest-income ratio in percent. All values are rounded to four decimals. Table A.2 in the appendix defines the variables.

Table A.2: Variables

Variable	Calculation	Description
CAR_i	$\sum_{t=-1}^{5} [r_{i,t} - (r_f + \widehat{\alpha_i} + \widehat{\beta_i} \times (r_{m,t} - r_f))] \times 100$	Cumulative abnormal return of a bank's stock over the $[-1, 5]$ days relative to a speech given by FED executives on $t = 0$ in percent. Abnormal returns are based on a market model estimated over the $[-230, -30]$ days relative to the speech date using the CRSP value-weighted portfolio as a proxy for the market portfolio.
Deposit Ratio	$\frac{\text{Total Deposits}}{\text{Total Liabilities}} \times 100$	Deposit ratio defined as total customer deposits (Compustat item: DPTCQ) over total liabilities (LTQ) in percent.
Total Assets	ln(Total Assets)	Total assets defined as the natural logarithm of total assets (ATQ).
ROA	$\frac{\text{Net Income}}{\text{Total Assets}} \times 100$	Return on assets defined as net income (or loss) (NIQ) over total assets (ATQ) in percent.
NPL	$\frac{\text{Total Nonperforming Assets}}{\text{Gross Loans}} \times 100$	Non-performing loan ratio defined as total nonperforming assets (NPATQ) over gross loans net of unearned income loans (LGQ) in percent.
Equity Ratio	$\frac{\text{Total Common Equity}}{\text{Total Assets}} \times 100$	Equity ratio defined as total common/ordinary equity (CEQQ) over total assets (ATQ) in percent.
Int-Inc Ratio	$\frac{\text{Total Interest Income}}{\text{Total Assets}} \times 100$	Interest-income ratio defined as total interest income (IDITQ) over total assets (ATQ) in percent.

Table A.3: CBDC Speeches

Date	Speaker	Speech	Stance
03/03/2017	Jerome H. Powell	Innovation, technology, and the payments system	-1
11/30/2017	Randal K. Quarles	Thoughts on prudent innovation in the payment system	-1
05/15/2018	Lael Brainard	Cryptocurrencies, Digital Currencies, and Distributed Ledger Technologies: What Are We Learning?	-1
10/16/2019	Lael Brainard	Digital Currencies, Stablecoins, and the Evolving Payments Landscape	0
12/03/2019	Michael Held	U.S. Regulations and Approaches to Cryptocurrencies	0
12/18/2019	Lael Brainard	Update on Digital Currencies, Stablecoins, and the Challenges Ahead	0
02/05/2020	Lael Brainard	The Digitalization of Payments and Currency: Some Issues for Consideration	0
08/13/2020	Lael Brainard	An update on digital currencies	1
03/18/2021	Jerome H. Powell	Closing remarks – "Pushing the frontiers of payments: towards faster, cheaper, more transparent and more inclusive cross border payments"	1
05/24/2021	Lael Brainard	Private Money and Central Bank Money as Payments Go Digital: an Update on CBDCs	1
06/28/2021	Randal K. Quarles	Parachute pants and central bank money	0
08/05/2021	Christopher J. Waller	CBDC – A Solution in Search of a Problem?	-1
02/18/2022	Lael Brainard	Preparing for the Financial System of the Future	1
02/21/2022	Michelle W. Bowman	High inflation and the outlook for monetary policy	0
06/01/2022	John C. Williams	The Song Remains the Same	0
06/17/2022	Jerome H. Powell	Welcoming Remarks – International Roles of the U.S. Dollar	0
07/08/2022	Lael Brainard	Crypto-Assets and Decentralized Finance through a Financial Stability Lens	1
08/17/2022	Michelle W. Bowman	Technology, innovation and financial services	0
10/12/2022	Michael S. Barr	Managing the promise and risk of financial innovation	-1
10/14/2022	Christopher J. Waller	The US dollar and central bank digital currencies	0
11/04/2022	Michelle Neal	Advances in digital currency experimentation	1

Stance takes a value of -1 if the speech stance was clearly negative or if it was explicitly said that there was no specific plan at present to issue a CBDC. *Stance* takes a value of 0 in the case of a neutral speech stance. *Stance* takes a value of 1 if the speech stance was clearly positive or if a CBDC project/pilot was launched or was in the pipeline (see Burlon et al., 2023).