Corporate social responsibility disclosure and cash holdings

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Abstract

Purpose: the demand for firms to disclose their corporate social responsibility (CSR) activities has risen steeply over the last two decades, pushing many jurisdictions to implement mandatory non-financial reporting. We exploit the European non-financial reporting directive (NFRD) to study how companies change their cash management policies in response to additional mandatory CSR disclosure requirements.
Methodology: we adopted a difference-in-differences (DID) approach, which is designed to estimate causality between the mandatory adoption of the NFRD and firms' cash holdings. We implemented a two-way fixed effect model in the context of mandatory disclosure and staggered adoption of regulation, in order to study how firms changed their cash holdings following the introduction of the NFRD.
Findings: we find that firms increased cash holdings following enactment of the NFRD, which is in line with the theory that cash is held for precautionary reasons. The growth in cash holdings is not equally distributed, as it is less pronounced in firms that are in a high-investment phase. Our findings reveal that mandatory non-financial disclosure can have real effects.
Originality/value: This research shows that, in the short-term, mandatory CSR disclosure can have real effects on cash holding. Long-term effects should be considered further by future research.

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Practical implications (optional): Policymakers should consider that additional CSR requirements are costly to firms, and thus find mechanisms that induce firms to adopt these requirements despite their costs

Keywords: corporate social responsibility, non-financial disclosure, mandatory disclosure, cash holdings, real effects

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1. Introduction

Over the last two decades, corporate non-financial reporting has seen unprecedented attention from top executives and stakeholders (Haller *et al.*, 2017). From the largest corporations in the world to the smallest, firms have begun to publish non-financial information to show their emphasis on ethical business practices (Connolly and Quinn, 2017), partially in response to mounting societal pressure to do business responsibly, known as corporate social responsibility (CSR). CSR activities and policies are those that assess, manage, and govern a firm's responsibility for and impact on society and the environment (Christensen, Hail, and Leuz, 2021). CSR activities' effects are commonly measured with regard to their environmental, social, and governance (ESG) effects (Marin, Rubio, and Ruiz, 2009; Servaes and Tamayo, 2013).

Despite this growing interest in non-financial disclosure (Cohen *et al*., 2015; Costa and Agostini, 2016), most of it is still disclosed voluntarily (Amel-Zadeh and Serafeim, 2018). Yet, voluntarily reporting suffers from the limit of being endogenous and linked to firms' cost-benefit tradeoffs because companies can choose whether and what to disclose (Christensen, Hail, and Leuz, 2021). Therefore, to improve the reliability and comparability of the data companies divulge, many jurisdictions have implemented mandatory requirements for disclosure of non-financial information (Van der Lugt, Van de Wijs, and Petrovics, 2020; Coates, 2021), focusing primarily on the CSR domain[1].

[1] From 2013 to 2016, the number of non-financial reporting mandates increased globally from 130 to almost 250 (Bartels *et al.*, 2016). In the US, the Security Exchange Commission's (SEC) Investor Advisory Committee now requires SEC registrants to provide information related to ESG issues that are relevant to investors' investment and voting decisions (IAC, 2020; Coates, 2021).

Empirical evidence on the real effects of CSR reporting is scarce but growing rapidly (Christensen, Hail, and Leuz, 2021). The CSR literature mainly studies sustainable and socially responsible activities' effects on firm value (Mackey *et al.*, 2007; Kitzmueller and Shimshack, 2012) and on financial performance (Herremans *et al.*, 1993; Simpson and Kohers, 2002; Flammer, 2015; Cornett *et al.*, 2016), as well as voluntary non-financial reporting's effects on firm value (Plumlee *et al.*, 2015). However, real effects are more likely to stem from mandatory disclosure than from voluntary disclosure because rational firms do not tend to make decisions that may have negative real effects voluntarily. Nonetheless, academic evidence on the consequences of mandatory CSR disclosure is thin and focuses on CSR-related activities, rather than corporate financial policies (Chen *et al.*, 2017; Christensen *et al.*, 2017; Fiechter *et al.*, 2020; Johnson, 2020; Jouvenot and Krueger, 2020; Downar *et al.*, 2021; Grewal, 2021). Therefore, additional study is required before we can fully understand how firms respond to specific non-financial reporting requirements (Christensen, Hail, and Leuz, 2021).

In particular, we still lack specific evidence about the incidence of mandatory CSR disclosure on corporate financial policies. Our paper exploits this gap by assessing a binding non-financial disclosure rule's impact on firms' cash holding policies. We focus on cash holdings because cash is one of the principal assets that firms manage (Han and Qiu, 2007; Song and Lee, 2012). Corporate needs for external information can influence future management strategies (Leuz and Wysocki, 2016; Roychowdhury *et al.*, 2019; Christensen, Hail, and Leuz, 2021) and thus cash, as one of the main corporate assets. Our research question goes to this point in asking: do companies change their cash holdings in reaction to an exogenous mandate to report more CSR information?

The answer to our research question is far from obvious. On one hand, some scholars show that issuing a stand-alone CSR report increases cash holdings' marginal value, arguing that information in CSR reports can facilitate monitoring of insiders, leading to more efficient use of cash holdings (Lu, Shailer, and Yu, 2017). A high level of CSR disclosure has a positive influence on the quality of earnings, reduces the cost of capital, enhances the firm's reputation and value, and increases the accuracy of analysts' forecasts (De Villiers and Marques, 2016; Qiu, Shaukat, and Tharyan, 2016; Brooks and Oikonomou, 2018; Li *et al.*, 2018), thus improving profitability and liquidity and affecting decisions about cash pay-outs (De Villiers, Ma, and Marques, 2023). This evidence supports the idea that firms reduce cash holdings when they comply with an additional mandatory CSR report, because information in CSR reports can foster monitoring and, thus, induce more efficient use of cash.

On the other hand, part of the literature envisages several costs associated with additional disclosures of information (Christensen, Hail, and Leuz, 2021) like proprietary costs (Verrecchia, 1983; Feltham and Xie, 1992; Berger and Hann, 2007), reputational costs (Bradford *et al.*, 2017), reduced innovation (Breuer *et al.*, 2020), and litigation risks (Johnson *et al.* 2001; Rogers *et al.*, 2011)[2]. All of these costs may lead to stockpile of cash reserves in anticipation of them. Therefore, a CSR reporting mandate, despite being a desirable tool for social or environmental change, could have financial consequences for firms and cause behavior that could be undesirable to investors.

Motivated by the importance of CSR reporting and the lack of research on its effects on corporate cash management, we examine the impact of mandatory CSR disclosure on firms' cash holdings. While a mandatory CSR disclosure can be beneficial at the societal level by reducing information asymmetry, increasing the monitoring of managers, and fostering genuine CSR activities (Lu, Shailer, and Yu, 2017), such a disclosure can be costly at the corporate level (Christensen, Hail, and Leuz, 2021), inducing firms to retain additional cash for precautionary reasons. Therefore, the introduction of new CSR disclosure requirements may generate trade-offs between desirable social benefits and companies' financial policies.

To contribute to this debate, we analyzed whether firms held more or less cash following their adoption of the European Union (EU) Non-Financial Reporting Directive (2014/95/EU-NFRD). Starting in 2016, the NFRD compelled large companies to publish a CSR report that describes their business model and provides non-financial data about CSR activities and policies. The NFRD embraces a double materiality perspective, ensuring that firms not only disclose how sustainability issues affect them, but also how their activities affect the society and the environment. This imposes strict disclosure requirements to firms and thus constitute an ideal setup for our experiments.

We find strong evidence that companies keep more cash following the NFRD implementation. On average we report an increase of 0.84 basis points (bps) in the ratio of cash to total assets for firms subject to the NFRD relative to firms that are not subject to it. This increase is economically relevant, as

[2] Proprietary costs can occur because others (e.g., competitors, suppliers) use information provided to investors (Verrecchia, 1983; Feltham and Xie, 1992; Berger and Hann, 2007). Reputational costs stem principally from misalignment between the CSR practices and stakeholders' preferences (Bradford *et al.*, 2017). Detailed reporting can also impair firms' willingness to innovate (Breuer *et al.*, 2020), which could be relevant in a CSR context. Besides, over-optimistic disclosure could increase firms' litigation risk (Johnson *et al.* 2001; Rogers *et al.*, 2011).

it corresponds to the 8.8% of the median corporate cash holdings. Our findings remain robust even after controlling for agency costs and credit cycle.

A second set of results is related to cash management in firms based on their investment patterns, as we know that investments are associated with cash management (Opler *et al.*, 1999; Dunchin, 2010; Hugonnier, Malamud, and Morellec, 2015). Specifically, we investigate whether firms with high investment expenditures reacted to the NFRD differently from firms with low investment expenditures and find that the latter had higher increases in cash holdings, at least in the short-term. The size of the difference between the two groups of firms (high- and low-investment) is remarkable, as firms that are in an intense phase of their investment cycle increase cash holdings by 78 percent less than firms with lower investment needs do. This finding relates to the extensive literature on investment and cash(flow) sensitivity (e.g. Fazzari, Hubbard, and Petersen, 1988; Baker, Stein, and Wurgler, 2003; Lewellen and Lewellen, 2016) and provides evidence that the real effects of mandatory CSR disclosure can depend on firms' characteristics.

By shedding light on how corporations react, financially and at least in the short run, to a new CSR disclosure requirement, our results contribute to and are consistent with the literature that supports the view that mandatory disclosure can force firms to change their financial policies (e.g., Kanodia and Sapra, 2016; Leuz and Wysocki, 2016; Roychowdhury *et al.*, 2019). We find that disclosure, especially mandatory disclosure, can have real effects from a corporate financial perspective (Dranove *et al.*, 2003; Leuz and Wysocki, 2016), at least in the short-term, as CSR reporting rules demand rigorous and in-depth economic analysis before being implemented (Christensen, Hail, and Leuz, 2021). While an increase in the extent, depth and quality of sustainability reporting can have positive effects for society (e.g., increased transparency, greater attention to social and environmental behaviors), it may also have financial implications that policy makers should consider carefully in order to incentivize firms to implement good CSR disclosure practices.

The rest of the paper is structured as follows. Section 2 presents the literature review, Section 3 summarizes the NFRD framework and requirements, Section 4 provides the research hypotheses, Section 5 describes the data and the empirical setting, Section 6 presents the results of the empirical analysis, and Section 7 concludes.

2. Literature review

A primary benefit of corporate disclosure is mitigation of information asymmetries between firms and investors, as well as among investors (Chris-

tensen, Hail, and Leuz, 2021). As the literature on CSR disclosure is extensive (Christensen, Hail, and Leuz, 2021), we focus on the real effects of CSR mandatory disclosure by disentangling CSR-related effects (§2.1) from cash management effects (§ 2.2).

2.1. Mandatory CSR disclosure and CSR-related real effects

A CSR reporting mandate is likely to have direct and real effects on firms' CSR activities. Firms are likely to modify their CSR engagements when stakeholders use newly disclosed CSR information to exert meaningful pressure to, for example, reduce emissions, waste, or consumption. Stakeholders' reactions to new CSR disclosures can create a feedback loop that leads firms to respond to both actual and anticipated responses (Christensen, Hail, and Leuz, 2021). Specifically, the main channels through which standardized CSR disclosures could influence corporate CSR activities are nourished market and societal pressure in response to new CSR-related information (Dyck *et al.*, 2008; Dai *et al.*, 2021), better monitoring and governance of firms' CSR activities (Marquis and Qian, 2014; Dyck *et al.*, 2019), a stronger link between CSR and economic performance (Mackey *et al.*, 2007; Kitzmueller and Shimshack, 2012; Cao and Rees, 2020), and learning about or benchmarking against peers' CSR practices (Cao *et al.*, 2019). These influences on firms' CSR activities can eventually raise aggregate CSR performance in the economy (Tomar, 2021) but may also reduce companies' incentives to innovate (Breuer *et al.*, 2020).

These mechanisms are documented also empirically. A number of studies provide insights into how firms respond to mandatory CSR disclosures, by reducing waste and emissions (Chen *et al.*, 2017; Jouvenot and Krueger, 2020; Downar *et al.*, 2021; Grewal, 2021), by improving working conditions (Christensen *et al.*, 2017; Johnson, 2020), and by increasing firms' CSR engagement (Fiechter *et al.*, 2020). All this evidence shows that benchmarking and peer pressure can push poor CSR performers to increase their CSR activities, which supports the view that a CSR reporting mandate could positively affect firms' CSR undertakings.

In sum, most academic studies find that firms tend to expand and adjust their CSR activities based on disclosure requirements (Christensen, Hail, and Leuz, 2021). However, our research takes a different angle by pointing on how companies change their cash holdings in response to more demanding CSR reporting requirements.

2.2. Mandatory disclosure of CSR and cash holdings

The literature is rich in studies that analyze the determinants of cash holdings. The seminal work from Keynes (1936) indicates that firms hold cash for three main reasons: transaction costs, speculation, and precaution. First, firms hold cash to reduce transaction costs by using it to make payments without having to borrow or deploy other assets (Miller and Orr, 1966). Second, liquidity can also be exploited for undertaking speculative investment projects, particularly in the presence of financial constraints (Almeida *et al.*, 2004; Arslan, Florackis, and Ozkan, 2006; Duchin-Ozbas and Sensoy, 2010). Third, cash can also be held as a precaution in response to increases in cash flow volatility to hedge against risks of future liquidity shortages (Kim, Mauer, and Sherman, 1998; Opler *et al.*, 1999; Han and Qiu, 2007), especially for financially constrained firms (Minton and Schrand, 1999)[3].

Despite the extensive literature on corporate cash holdings, evidence on CSR and its impacts on cash management is scarce. Arouri and Pijourlet (2017) find that investors assign higher value to cash held by firms that have high CSR ratings, which is consistent with the idea that CSR policies can mitigate agency conflicts and give managers incentives to act (and use cash) in shareholders' interests. Chang *et al.* (2019) elaborate on commitment theory, showing that socially responsible firms use cash holdings to signal their willingness to fulfill stakeholders' desires. Firms that rank well in social performance tend to retain larger amounts of cash, especially if their social performance depends on stakeholders' actions or requires investment.

However, none of these studies directly relates CSR reporting to cash holdings. Only recently, Benjamin *et al.* (2020) find that voluntary waste disclosure significantly increases cash holdings in Australia, but only for firms that have strong corporate governance and firms that operate in environmentally sensitive industries. Finally, in a recent article, De Villiers, Ma, and Marques (2023) find that firms with high levels of voluntary CSR disclosure pay higher dividends, but the authors do not focus on mandatory disclosure.

Our paper, instead, assesses the role of mandatory CSR disclosure in the level of corporate cash holdings, at least in the short-term, by exploiting an exogenous change to CSR reporting regulation across the EU in the form of

[3] More recent literature identified other drivers of keeping cash on hand, such as tax optimization (Foley *et al.*, 2007), diversification (Duchin, 2010; Tong, 2011), product and market competition (Fresard, 2010), the firm's life cycle stage (Dittmar and Duchin, 2011), and the credit cycle (Sun and Xia, 2022).

the NFRD. To the best of our knowledge, the paper is the first to link mandatory CSR disclosure to corporate cash management.

3. NFRD Framework

The EU is at the frontier of CSR disclosure requirements (Christensen, Hail, and Leuz, 2021). The NFRD requires large companies to provide a detailed CSR report that includes a description of the firm's business model and relevant non-financial data about CSR policies and practices. Companies that are subject to the NFRD must include in the management report a non-financial statement with enough information to explain the development, performance, position, and impact of their activities.

The NFRD requires that the disclosure address at least environmental, social, employee, human rights, anti-corruption, and bribery issues as they relate to the firm's CSR activities. The report must include a description of the firm's business model; a description of the policies the firm pursues in relation to the required topics, including due diligence processes; the outcome of these policies; the main risks related to the topics that stem from the firm's operations, including its business relationships, products, or services that are likely to cause adverse impacts; how the firm manages these risks; and non-financial key performance indicators for the firm's business. Therefore, the NFRD embraces a double materiality perspective, requiring that firms not only disclose how sustainability issues affect them but also how their activities affect society and the environment.

Such disclosure requirements are pervasive in that they increase both the depth and the extent of information that a company must release. Therefore, the introduction of the NFRD presents an ideal setting for studying how firms react financially to an exogenous and potentially substantial change in their non-financial disclosure.

The EU introduced the directive to establish a minimum legal requirement for CSR information that should be publicly available and to enhance the consistency and comparability of non-financial information disclosed throughout the EU. The CSR minimum disclosure requirements apply to all listed companies in the EU in any industry that have more than 500 employees and either total assets or net turnover that exceeds certain thresholds set by individual countries[4]. The NFRD was adopted by state members of the

[4] In most countries, the thresholds are €20 million in total assets and €40 million in net turnover.

EU at various times between the fiscal years 2016 and 2018, a staggered adoption rate that we exploit in our empirical analysis (§ 5.2).

The directive sets the minimum requirements for compliance, but beyond these requirements, the regulation is flexible in terms of the content to be disclosed. However, the EU Commission recommends using international standards like the UN Global Compact, OECD Guidelines, ISO 2600, the Global Reporting Initiative (GRI), or other recognized international frameworks.

Breijer and Orij (2022) explore the NFRD's impact on the comparability of non-financial information of listed firms in the EU and show that enforcement of the directive entailed extending the use of investor-oriented non-financial reporting frameworks (e.g., that of the Sustainability Accounting Standards Board). Voluntary adopters tend to use reporting frameworks that are oriented to a wide range of stakeholders (e.g., GRI).

4. Research hypotheses

Although corporate cash holdings are clearly affected by investment policies (Almeida *et al.*, 2004; Arslan, Florackis, and Ozkan, 2006; Duchin-Ozbas and Sensoy, 2010; Lewellen and Lewellen, 2016), the net effect of compulsory CSR disclosure on cash holdings or the direction of any change is not so clear (Christensen, Hail, and Leuz, 2021). On one hand, disclosures can mitigate the adverse-selection problem and level the playing field among investors (Verrecchia, 2001). Enhanced transparency is usually seen as a moderator of information asymmetries between firms and investors and among investors, as more transparency improves CSR monitoring by outside shareholders (Marquis and Qian, 2014; Dyck *et al.*, 2019) and fosters investment efficiency (Biddle and Hilary, 2006; McNichols and Stubben, 2008; Shroff *et al.*, 2014). Therefore, to the extent that non-financial disclosure provides an additional and unbiased source of information, the result should be tangible market benefits in the form of lowered agency costs and better liquidity management. Stronger monitoring that is due to additional CSR reporting can also boost CSR activities themselves (Christensen, Hail, and Leuz, 2021), thus increasing the marginal value of cash for investors (Arouri and Pijourlet, 2017).

However, on the other hand, most studies on agency costs are based on financial reporting, which is specifically addressed to investors who have the technical knowledge needed to understand the data and make decisions based on them. Financial reporting follows a rigid structure and is subject to well

enforced audit procedures to prevent fraud or omissions. Conversely, non-financial reporting is intended also for a public that generally lacks technical knowledge and does not require any certification procedure other than one that is voluntary. This framework could facilitate opportunistic behavior, where managers exploit information asymmetries to engage in biased reporting. Such behavior would increase information asymmetries, as recently documented with regard to the NFRD (Breijer and Orij, 2022).

At the same time, hovewer non-financial reporting is undeniably costly (Christensen, Hail, and Leuz, 2021), and mandatory reporting is particularly costly for firms that had not previously made any voluntary disclosures (Grewal et al., 2019), as could be the case for companies that are subject to the NFRD. The costs that disclosure can entail are both direct and indirect and include proprietary costs (Verrecchia, 1983; Feltham and Xie, 1992; Berger and Hann, 2007), reputational costs (Bradford *et al.*, 2017), and reduced innovation (Breuer *et al.*, 2020). These costs could reduce investors' expectations and increase the volatility of cash flows. Firms may seek to mitigate these costs by extending their boilerplate language (Dyer *et al.*, 2017), but boilerplate can increase the complexity and reduce the readability of corporate information (Li, 2008), which may increase the risks of negative public reaction and litigation.

All of these potentially negative outcomes can induce managers to increase cash holdings as a precaution (Kim, Mauer, and Sherman, 1998; Opler *et al.*, 1999; Han and Qiu, 2007) against the possibility of the future lower cash flows or higher cash-flow volatility that can have negative impacts on other financing channels, such as banks (Stiglitz and Weiss, 1981; Petersen and Rajan, 1994; Elsas and Krahnen, 1998). Consequently, we pose the following hypothesis:

H1: Following implementation of the NFRD, corporate cash holdings increased.

5. Empirical Setting

5.1. Data

The main sources of our data are the Eikon and Orbis databases. To minimize missing observations, we started data collection from Eikon and complemented it with Orbis, collecting data at a yearly frequency for firms that were active between 2014 and 2019. This time interval allowed us to trace cash holdings before and after implementation of the NFRD.

The initial sample consisted of all listed firms incorporated in 19 EU countries for which financial data were continuously available in our sample period. We excluded firms that operated in the financial sector because of the peculiarity of their businesses in managing cash. This filtering process yielded 6,291 firm-year observations, distributed by country and year as reported in Table 1.

Table 1 – Sample distribution by country and year

Country	2014	2015	2016	2017	2018	2019	Total	%
Austria	33	36	35	-	35	36	175	2.78
Belgium	53	56	56	-	60	60	285	4.65
Cyprus	6	5	11	-	15	13	50	0.79
Estonia	10	10	-	10	12	12	54	0.86
Finland	79	76	75	-	75	82	387	6.09
France	305	275	269	-	289	320	1,458	23.30
Germany	310	307	308	-	309	327	1,561	24.69
Greece	50	37	-	34	38	39	198	3.16
Ireland	38	39	38	-	39	42	196	2.98
Italy	133	126	127	-	130	143	659	10.53
Latvia	8	8	8	-	10	10	44	0.70
Lithuania	13	15	17	-	16	15	76	1.21
Luxembourg	28	29	32	-	30	33	152	2.35
Malta	7	7	7	-	6	6	33	0.52
Netherlands	72	69	71	-	73	74	359	5.66
Portugal	21	22	21	-	20	22	106	1.68
Slovak Republic	4	5	4	-	4	3	20	0.32
Slovenia	9	7	6	-	9	8	39	0.62
Spain	89	87	87	84	-	92	439	7.14
TOTAL	**1,268**	**1,216**	**1,172**	**128**	**1,170**	**1,337**	**6,291**	**100.00**

This table reports the number of firms per country and per year that compose the sample. According to our econometric specification, for each country, we provide no value in the year in which a given country adopted the NFRD.

Not surprisingly, most of the firms in the sample came from the most advanced economies, such as Germany, France, and Italy. The number of firms per year, excluding the year of NFRD implementation, is well balanced

at above 1,100 firms each year. We had data for 1,484 unique firms, as shown in Table 2, of which 949 unique firms were subject to the NFRD requirements after the adoption of the directive.

Table 2 – Data filtering and sample composition

Search step		Search result
1. Country	Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, Spain	2,968
2. Fiscal Year	2014, 2015, 2016, 2017, 2018, 2019	2,134
3. Firms with all available data	Cash & Equivalents, Total Assets, Total Revenue	1,513
4. Firms after merge with Orbis		1,484
Final Sample		**1,484**

This table reports the search criteria and results of data filtering. The results refer to unique firms. Data are sourced from Eikon.

5.2. Research Design

To test the research hypothesis, we adopted a difference-in-differences (DID) approach, designed to estimate causality between the mandatory adoption of the NFRD and firms' cash holding. We implemented a two-way fixed effect model[5], which is extensively validated by the accounting literature in the context of mandatory disclosure and staggered adoption of regulation/policy intervention (e.g., Christensen, Hail, and Leuz, 2013, Christensen *et al.*, 2017, Chircop *et al.*, 2023). We estimated the DID model using the following OLS equation:

$$Cash\ Holdings_{i,t,c} = \alpha_0 + \alpha_1 NFRD_c + \beta Controls_{i,t,c} + \gamma_i + \delta_t + \varepsilon_{i,t,c} \qquad (1)$$

where:

- *Cash Holdings* is the dependent variable and is equal to the cash and cash equivalents over the total assets of firm *i*, incorporated in country *c* in year *t*;
- *NFRD* is a dummy variable that equals 1 when a firm incorporated in country *c* is required to report its CSR activities under the NFRD, and 0 otherwise;

[5] Please refer to Wooldridge (2021) for a review of this model.

- *Controls* captures five conventional variables that the literature identifies as being determinants of cash holdings (e.g., Han and Qiu, 2007; Cheung, 2016): *Leverage*, measured as non-current liabilities over total assets; *Size*, defined as the natural logarithm of total revenue; *Profitability*, defined as the ratio of earnings before interests, taxes, depreciation, and amortization (EBITDA) to total revenue; *CAPEX*, defined as the ratio of capital expenditures to total assets; net working capital (*NWC*), measured as current assets, excluding cash and cash equivalents, minus current liabilities, all divided by total assets; and *RD*, which is the ratio of research and development expenses to total revenue.

We added a control for the credit cycle to verify that our results are not influenced by the phase of the cycle (Sun and Xia, 2022). Our proxy for the expected credit cycle is *BLS*, defined as the three months forward-looking net percentage change in bank credit supply conditions, as sourced from the Bank Lending Survey of the European Central Bank. Finally, we included in our robustness tests (see § 6.2) controls for agency costs, as proxied by the literature (Ang, Cole and Lin, 2000; Singh and Davidson, 2003; Florackis and Ozkan, 2009) as either the ratio of total revenue to total assets (*Agency Costs*) or the ratio of selling, general, and administrative expenses to total revenue (*Agency SGA*).

In addition to time-varying control variables, our identification strategy relies on a set of fixed effects. The model includes both firm (γ_i) and year (δ_t) fixed effects to rule out firm-invariant characteristics and other shocks concomitant with the NFRD enactment, respectively. This specification allowed us to estimate the change in *Cash Holdings* in each individual firm. To exclude outliers, we winsorized all variables at the 1% level. Appendix 1 provides the detailed definitions and sources of each variable.

Given our research questions, the main coefficient of interest is α_1, which is the DID coefficient on *NFRD*. The NFRD was adopted by the EU countries in various years. We exploit the staggered adoption of the directive to determine how changes in the *Cash Holdings* between firms that were required to comply with the NFRD disclosure (treated group) and firms that were not (control group) changed following the adoption of the NFRD itself. The DID coefficient estimates this change.

Table 3 reports the descriptive statistics of variables in the model. The summary statistics show that, on average, firms held 13.6 percent of their assets in cash and cash equivalents, had *Leverage* of 25 percent, invested 4.6 percent of their assets in capital expenditures (*CAPEX*), and invested 7.0 percent of their revenues in *R&D*. All of these values are comparable to those from previous research (e.g., Cheung, 2016; Chang *et al.*, 2019).

Table 3 – Summary statistics

	N	Mean	St. Dev.	p25	Median	p75
NFRD	6,291	0.2864	0.4521	0	0	1
Cash Holdings	6,291	0.1360	0.1365	0.0465	0.0947	0.1738
Size	6,291	19.759	2.3024	18.261	19.720	21.390
Leverage	6,291	0.2524	0.1807	0.1112	0.2361	0.3655
NWC	6,291	0.0137	0.1684	-0.0787	0.0018	0.1108
Profitability	6,291	-0.1123	1.1569	0.0646	0.1223	0.2146
CAPEX	6,291	0.0465	0.0444	0.0167	0.0348	0.0618
RD	6,291	0.0699	0.3628	0.0000	0.0000	0.0152
BLS	6,255	-2.2964	9.8169	-6.2500	0.0000	0.0000
Agency Costs	6,291	0.8695	0.5800	0.4737	0.7845	1.1590
Agency SGA	6,260	0.3761	0.5283	0.1438	0.2549	0.4301

This table provides cross-sectional summary statistics for the variables used in the main regression model. Appendix 1 provides detailed definitions of all the variables.

Table 4 shows the correlations among the variables. In line with previous studies (e.g., Dittmar, Mahrt-Smith, and Servaes, 2003; Aftab, Yavid, and Akhter, 2018), *Size*, *Leverage*, *NWC*, *CAPEX*, and *Profitability* are negatively correlated with *Cash Holdings*, suggesting that the bigger, the more indebted, or the more profitable the firm, and the higher its investments, the lower the percentage of cash that it can or must accumulate.

Table 4 – Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) *Cash Holdings*	1.0000									
(2) *Size*	-0.2878***	1.0000								
(3) *Leverage*	-0.3240***	0.0781**	1.0000							
(4) *NWC*	-0.0870***	-0.0572***	-0.2645***	1.0000						
(5) *Profitability*	-0.4023***	0.3601***	0.1033***	0.0570***	1.0000					
(6) *CAPEX*	-0.0822***	-0.0105	0.0653***	-0.0929***	0.0428***	1.0000				
(7) *RD*	0.4347***	-0.2962***	-0.0964***	0.0539***	-0.7029***	-0.0694***	1.0000			
(8) *BLS*	0.0274	0.0248	0.0257	0.0011	-0.0006	-0.0070	-0.0054	1.0000		
(9) *Agency Costs*	-0.0258	0.2006***	-0.2356***	0.1114***	0.1405***	0.0163	-0.1995***	0.0264	1.0000	
(10) *Agency SGA*	0.3515***	-0.4567***	-0.0838***	-0.0977***	-0.7837***	0.0005	0.5388***	-0.0458***	-0.2294***	1.0000

This table reports Pearson correlation coefficients among the variables included in the analysis. Appendix 1 provides a detailed definition of all the variables. ***, **, and * denote p-value levels at the 1%, 5%, and 10% (two-tailed) levels of significance, respectively.

6. Results

Our first set of analyses verifies whether, on average, firms that adopted the NFRD's requirements changed their cash holdings differently from how firms that were not subject to such additional disclosure treated their cash holdings. Table 5 shows our main findings. Column (1) includes only *NFRD* as a regressor. Column (2) also considers the main set of control variables, and column (3) adds *BLS* as a further control to rule out the possibility that change in *Cash Holdings* may reflect fluctuations in the credit cycle. The *NFRD* coefficient is positive and statistically significant across all three specifications.

Table 5 – Baseline regression results

	Cash Holdings	**Cash Holdings**	**Cash Holdings**
	(1)	*(2)*	*(3)*
NFRD	0.0073*	0.0084**	0.0084**
	[1.89]	[2.23]	[2.23]
Size		-0.0191***	-0.0195***
		[-6.17]	[-6.25]
Leverage		-0.1412***	-0.1426***
		[-12.69]	[-12.73]
Profitability		0.0027	0.0028
		[1.24]	[1.28]
CAPEX		-0.1718***	-0.1717***
		[-5.02]	[-4.93]
NWC		-0.1785***	-0.1782***
		[-15.02]	[-14.93]
RD		0.0222***	0.0222***
		[2.98]	[2.97]
BLS			-0.0000
			[-0.24]
Constant	0.1203***	0.5468***	0.5548***
	[35.65]	[8.85]	[8.92]
Year Fixed Effects	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2 (within)	0.0001	0.2103	0.2118
N	6,291	6,291	6,291

This table reports the OLS regression results according to equation (1). The dependent variable is Cash Holdings, which is equal to cash and cash equivalents over total assets. NFRD is a dummy variable that equals 1 for firms that are subject to NFRD disclosure, and 0 otherwise. Appendix 1 provides detailed definitions of all the variables. T-stats are reported in brackets. ***, **, and * denote p-value levels at the 1%, 5%, and 10% (two-tailed) levels of significance, respectively.

Consistent with our hypothesis, our results confirm that mandatory adoption of the NFRD in the EU led to an average increase in corporate cash holdings of 0.84 basis points (bps) over those of firms that were not subject to the NFRD. This increase is economically relevant, as it corresponds to 8.8 percent of the median cash holdings of the firms in our sample.

Coefficients on the control variables seem reasonable and are in line with other studies (e.g., D'Mello, Krishnaswami, and Larkin, 2008; Chang *et al.*, 2019). We found that firms that have higher R&D expenditures hold more cash than firms that have low R&D expenditures do, which provides support for the tradeoff theory of capital structure (Opler *et al.*, 1999). In addition, larger firms hold less cash than smaller firms do, and more profitable firms hold more cash than less profitable firms do.

Our main finding suggests that some drawbacks stem from an additional disclosure of information, especially information about a sensitive issue like CSR. Therefore, companies may decide to increase their liquid holdings in anticipation of possible negative externalities that are driven by the additional disclosures, a precautionary motive for holding cash (Kim, Mauer, and Sherman, 1998; Opler *et al.*, 1999; Han and Qiu, 2007). This finding supports the view that the economic consequences of new mandatory CSR disclosures should be assessed carefully (Christensen, Hail, and Leuz, 2021), as the direct and indirect costs of implementing the mandate could exceed its benefits at the firm level and ultimately produce negative real effects (Dranove *et al.*, 2003; Leuz and Wysocki, 2016). The non-standardized format of the NFRD requirements may also have increased information asymmetry (Breijer and Orij, 2022), increasing the amount of cash held by firms as a result. Nonetheless, these findings do not suggest that deeper and better CSR disclosure is not beneficial or desirable for society as a whole, even though it might be costly for firms.

6.1. Robustness tests

We ran robustness tests to exclude the possibility that our baseline results are driven by additional factors or issues related to our regression model. The results are reported in Table 6.

First, we alternately excluded *Profitability* and *RD* from the set of controls. *Profitability* is the only control variable that is not significant in the baseline results, despite being negatively and statistically significantly correlated with our dependent variable, as shown in Table 4. Therefore, we exclude such a variable from the controls in column (1). *RD* distribution is skewed to the right, with a mean of 7.0 percent and a median of 0. This result could be driven by the accounting treatment of R&D expenses, rather than by economic investments in R&D, so we ran a test that excluded *RD* from the regression model.

Second, we tested the sensitivity of our results to the presence of agency costs at the firm level. Agency costs may influence cash holdings. For example, Dittmar, Mahrt-Smith, and Servaes (2002) reveal that companies that operate in countries that have relevant agency problems hold high levels of cash holdings. Therefore, the findings of our main analysis could just reflect firms' agency problems, rather than the effect of adopting the NFRD mandate. We augment the baseline regression model with two alternative proxies for agency costs that we borrowed from the literature: *Agency Costs* and *Agency SGA* (Ang, Cole, and Lin, 2000; Singh and Davidson, 2003; Florackis and Ozkan, 2009), respectively in column (3) and (4). *Agency Costs* is a proxy for the loss in revenue that is attributable to inefficient use of assets, which can result from poor investment decisions or from management's shirking. *Agency SGA* captures excessive expenses, including consumption or perks.

Table 6 – Robustness tests

	Cash Holdings	**Cash Holdings**	**Cash Holdings**	**Cash Holdings**
	(1)	*(2)*	*(3)*	*(4)*
NFRD	0.0084**	0.0085**	0.0083**	0.0088**
	[2.26]	[2.29]	[2.22]	[2.35]
Size	-0.0178***	-0.0198***	-0.0158***	-0.0221***
	[-6.11]	[-6.42]	[-4.84]	[-6.76]
Leverage	-0.1411***	-0.1405***	-0.1478***	-0.1382***
	[-12.69]	[-12.62]	[-13.08]	[-12.40]
Profitability		-0.0002	0.0022	-0.0016
		[-0.11]	[1.00]	[-0.65]
CAPEX	-0.1730***	-0.1698***	-0.1705***	-0.1739***
	[-5.05]	[-4.95]	[-4.98]	[-5.08]

NWC	-0.1789***	-0.1795***	-0.1795***	-0.1744***
	[-15.06]	[-15.11]	[-15.12]	[-14.66]
RD	0.0180***		0.0220***	0.0241***
	[2.71]		[2.95]	[3.23]
Agency Costs			-0.0190***	
			[-3.22]	
Agency SGA				-0.0203***
				[-3.54]
Constant	0.1203***	0.5621***	0.4982***	0.6133***
	[35.65]	[9.12]	[7.84]	[9.31]
Year Fixed Effects	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R^2 (within)	0.2182	0.1858	0.2090	0.1961
N	6,291	6,291	6,291	6,260

This table reports the OLS regression results of the robustness tests according to equation (1). In column (1) we consider RD as a control but not Profitability; in column (2) we do the inverse. Columns (3) and (4) are augmented by the variables that proxy for agency costs. The dependent variable is Cash Holdings, which is equal to cash and cash equivalents over total assets. NFRD is a dummy variable that equals 1 for firms that are subject to NFRD disclosure, and 0 otherwise. Appendix 1 provides detailed definitions of all the variables. T-stats are reported in brackets. ***, **, and * denote p-value levels at the 1%, 5%, and 10% (two-tailed) levels of significance, respectively.

The results of the robustness tests completely confirm our baseline analysis. The DID coefficient on *NFRD* is always positive, statistically significant, and around 0.85 bps. After implementing NFRD, companies that were subject to additional CSR disclosures kept more cash than companies that were not.

6.2. Investments and NFRD

As the CSR reporting mandate introduced by the NFRD forces firms to issue new information, it can, like any other corporate disclosure, affect firms' investments. The disclosure literature suggests that more transparency reduces over- and under-investment and increases firms' investment effi-

ciency (Biddle and Hilary, 2006; Biddle *et al.*, 2009). However, the investment responses to new CSR information are still unclear (Christensen, Hail, and Leuz, 2021). For example, a CSR reporting regulation is likely to affect firms' CSR activities themselves (Chen *et al.*, 2017; Christensen *et al.*, 2017; Fiechter *et al.*, 2020; Johnson, 2020; Jouvenot and Krueger, 2020; Downar *et al.*, 2021; Grewal, 2021). Stakeholders' reactions to CSR information may encourage firms to augment their CSR investments while contracting other investments, or companies may add CSR investments to their more traditional investments, which would require more cash and leave them with less ability to accumulate precautionary cash (as suggested by our baseline results). Therefore, we expect that how companies respond to the NFRD adoption in terms of cash management depends on their investment cycle.

As we could not observe the exact amount of CSR-related investments, our analysis distinguished firms according to the amount of their investments before the NFRD's introduction. Hugonnier, Malamud, and Morellec (2015) state that, when investment costs are low (as for innovative firms), companies retain less cash because they are using it to fund their activities; however, when investment costs are high, the amount of cash held is higher because it is too costly to use internal sources. The percentage of good investment opportunities is related to the amount of investment expenditures (Fazzari, Hubbard, and Petersen, 1988; Baker, Stein and Wurgler, 2003) and forges firms' liquidity-accumulation path (Lewellen and Lewellen, 2016). Therefore, we expected that firms that had higher investment expenditures and, thus, more investment opportunities, increased their cash holdings after the NFRD by less than other firms did.

To test this expectation, we segmented our sample based on the amount of capital expenditures made in 2013, the year before the NFRD was issued. Companies whose *CAPEX* was in the top quartile of the distribution are considered high-investment firms, while companies whose *CAPEX* was in the bottom quartile are considered low-investment firms. We introduced a dummy variable, *High Investment*, that equals 1 for high-investment firms and 0 for low-investment firms.

As a first step, we ran a univariate analysis, whose results are presented in Table 7 that tested for the difference in the means of *Cash Holding* between high- and low-investment firms.

Table 7 – High- and low-investment firms univariate analysis

	High Investment	Low Investment	Difference
Cash Holdings (Mean)	0.1211	0.1548	-0.0337***
N	1,483	1,250	2,733

This table reports the univariate test of the difference in the means of Cash Holdings between high- and low-investment firms. Firms whose CAPEX are in the top quartile of the distribution before NFRD (i.e., 2013) are classified as high-investment firms, and those whose CAPEX are in the bottom quartile of that distribution are classified as low-investment firms. Cash Holdings is cash and cash equivalents over total assets, and CAPEX is capital expenditures over total assets. ***, **, and * denote p-value levels at the 1%, 5%, and 10% levels of significance, respectively.

Consistent with the literature, we found that *Cash Holding* is smaller for high-investment firms (12.11%) than it is for low-investment firms (15.48%). The difference between the two groups is statistically significant at the 1% level.

In the second step, we augmented our baseline regression model (equation (1)) with the *High Investment* variable and interacted it with *NFRD* and with all the controls we had in the baseline regression. Table 8 reports the results of the regression estimations.

Table 8 – High-investments firms and NFRD

	Cash Holdings	Cash Holdings
	(1)	*(2)*
NFRD	0.0150**	0.0155**
	[2.13]	[2.21]
Size	-0.0110**	-0.0065
	[-2.49]	[-1.18]
Leverage	-0.0464***	-0.0890***
	[-3.88]	[-4.50]
Profitability	0.0049	-0.0014
	[1.38]	[-0.31]
CAPEX	-0.0126	-0.0213
	[-0.31]	[-0.25]
NWC	-0.1388***	-0.1204***
	[-8.42]	[-5.44]

RD	0.0491***	0.0511***
	[3.64]	[3.10]
High Investment x NFRD	-0.0117*	-0.0114*
	[-1.74]	[-1.66]
High Investment x Size		-0.0133
		[-1.47]
High Investment x Leverage		0.0665***
		[2.67]
High Investment x Profitability		0.0187**
		[2.57]
High Investment x CAPEX		-0.0018
		[-0.02]
High Investment x NWC		-0.0356
		[-1.07]
High Investment x RD		0.0009
		[0.03]
Constant	0.3488***	0.4051***
	[4.01]	[4.36]
Year Fixed Effects	Yes	Yes
Firm Fixed Effects	Yes	Yes
Adjusted R^2 (within)	0.0671	0.2028
N	2,733	2,733

This table reports the OLS regression results according to equation (1), augmented with interactions of each variable with High Investment. The dependent variable is Cash Holdings, equal to cash and cash equivalents over total assets. NFRD is a dummy variable equal to 1 for firms subject to NFRD disclosure, and 0 otherwise. High Investment is a dummy variable equal to 1 for firms whose CAPEX are in the top quartile of the distribution before the issuance of the NFRD (i.e., 2013), and 0 for firms whose CAPEX are in the bottom quartile of the distribution. Appendix 1 provides a detailed definition of all the variables. T-stats are reported in brackets. ***, **, and * denote p-value levels at the 1%, 5%, and 10% (two-tailed) significance, respectively

The main coefficient of interest is that of the interaction *High Investment* × *NFRD*, which returns the change in *Cash Holdings*, upon the adoption of

the NFRD, for high-investment firms relative to low-investment firms. Our tests show that, following implementation of the NFRD, high-investment firms still accumulated cash but significantly less cash than low-investment corporations did. The average coefficient of *NFRD* is 15 bps, but it is -11.7 bps for *High Investment* × *NFRD*, so high-investment firms increased their cash holding by 78 percent less than the low-investment ones did. All these results are statistically significant.

These results show that firms that had higher investments' expenditures retain less liquidity, perhaps because these firms used part of their retained cash to continue to invest. We cannot conclude a transfer of funds from traditional operating investments to CSR-related investments, but at least in the short-term, our findings show that a firm's investment phase affects its cash accumulation following adherence to the compulsory requirements of the NFRD.

7. Conclusions

This paper investigates the impact of the NFRD, a CSR reporting mandate, on corporate cash holdings in the EU. We show that, after the NFRD was implemented, firms raised their cash holdings by an average of about 0.85 bps, which corresponds to an additional accumulation of cash equal to 8.8 percent of the median cash balance.

The theory behind our findings relies on the expectation that a mandatory disclosure of information about CSR may expose firms to several risks and costs (Christensen, Hail, and Leuz, 2021) that may induce management to raise corporate liquidity as a precaution. Our results, which are in line with economic theory about possible unintended consequences of mandatory disclosure (Dranove *et al.* 2003; Leuz and Wysocki, 2016), suggest that the economic effects of compulsory disclosure should be evaluated carefully before implementing a new CSR disclosure mandate (Christensen, Hail, and Leuz, 2021).

We ran tests based on firms' investment expenditures to identify differences in patterns of cash accumulation and found that companies that were in an intense phase of investing before the new requirements were introduced accumulated about 78 percent less cash than firms that were not in such a phase, thus providing evidence that the investment phase intersects firms' reactions to implementation of mandatory CSR disclosures. However, our result is limited to the short-term because we observe the effect on cash holdings

only in the short-term and cannot conclude that firms' investment and cash holding policies will be similar in the long term.

Although our tests and empirical framework allow us to claim a causality effect between adoption of the NFRD mandate and companies' cash-management policies, important questions remain unanswered. For example, we do not know whether companies accumulate more cash to prepare for an increase in proprietary costs, reduced innovation, or other real effects. Moreover, our study does not reveal whether firms that were affected by the regulation increased the quantity and the quality of their CSR activities or whether doing so was beneficial or detrimental for society as a whole. Finally, CSR is often viewed as a strategic activity that forgoes short-term profits in return for long-term benefits to the firm (Bénabou and Tirole, 2010). Therefore, the CSR reporting that frequently has to deal with long-term prospects that are difficult to quantify is not addressed by our work. These questions leave room for additional research.

Overall, our analysis sheds light on another possible financial implication of non-financial reporting at the corporate level. We address a context that is increasingly moving toward progressive regulation in the light of the 2022 Corporate Sustainability Reporting Directive (2022/2464/EU – CSRD), which strengthens the rules concerning the social and environmental information that companies must report and enlarges the group of firms that are subject to mandatory CSR reporting relative to the NFRD requirements. The EU Council estimates that the CSRD will affect approximately 50,000 companies.

Our study does not assess the validity of new CSR disclosure requirements. Deeper, broader, and more transparent disclosure about CSR policies and activities may be desirable for society and generate positive results that are central to the motivations behind CSR disclosure itself (Christensen, Hail, and Leuz, 2021), but additional disclosure requirements may be particularly costly to firms. Therefore, the need for a trade-off between the social benefits and corporate costs of mandatory CSR disclosure could open the door to careful evaluation from policymakers about the implementation of additional CSR disclosure requirements, especially if these requirements are not symmetric across the world, which could affect firms' competitiveness, location, and financial strategy. To this end, the real future challenge for policymakers will be encouraging firms to implement good CSR disclosure practices beyond the costs associated with them.

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Appendix 1 – Definition of variables

Variable	Definition	Source
NFRD	Dummy variable that equals 1 for firms that are subject to NFRD disclosure, and 0 otherwise	Accountancy EU
Cash Holdings	Ratio of cash and cash equivalents to total assets	Orbis
Size	Natural logarithm of total revenue	Orbis
Leverage	Ratio of non-current liabilities to total assets	Eikon
NWC	Ratio of current assets, excluding cash and cash equivalents, minus current liabilities to total assets	Eikon and Orbis
Profitability	Ratio of earnings before interest rates, taxes, depreciation, and amortization (EBITDA) to total revenue	Orbis
CAPEX	Ratio of capital expenditures to total assets	Eikon and Orbis
RD	Ratio of research and development expenses to total revenue	Eikon and Orbis
BLS	Net percentage change in loan supply forecasts 3 months looking forward. Methodology is available at https://www.ecb.europa.eu/stats/ecb_surveys/bank_lending_survey/html/index.en.html	ECB
Agency Costs	Ratio of total revenue over to total assets	Orbis
Agency Costs SGA	Ratio of selling, general, and administrative expenses to total revenue	Eikon and Orbis
High Investment	Dummy variable that equals 1 for firms whose *CAPEX* are in the top quartile of the distribution before the issuance of the NFRD (i.e., 2013), and 0 for firms whose *CAPEX* are in the bottom quartile of the distribution	Eikon and Orbis