Thirsty for Returns?
The Impact of Water Risk on the Global Stock Market

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Abstract Economic expansion, population growth, and climate change have placed increasing pressure on global freshwater resources. As freshwater levels decline and water demand increases, many regions face growing water stress, exposing companies to potential operational disruptions. But do investors care? In this study, we examine the relation between corporate water use and global stock returns from 2013 to 2024. We find that investors perceive water use as a systematic risk, demanding an annual premium of 2.15% for investing in firms with high water consumption. By combining company water demand and granular water supply data from NASA satellites, we construct a novel monthly company-level water stress measure. Our findings provide initial evidence of a potential water stress premium for firms in high-water-use industries.

Keywords: water stress, water use, global stock returns, climate finance, spatial finance

JEL classification: G12, D62, Q25, Q51

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"Water is an essential economic input and our economy is a thirsty system."

— Global Commission on the Economy of Water, *2024*

1. Introduction

The world is facing a growing water crisis. Global water demand is increasing by almost 1 percent each year, driven by shifting consumption patterns, urbanization, and an increase of water in industrial use (Zucchinelli, Spinelli, Corrado, and Lamastra, 2021). Simultaneously, climate change, irresponsible groundwater extraction, and extreme weather events threaten water availability (Gleick, 2023). Together, these dynamics increase the risk of local water stress, the notion that water supply does not meet water demand. Companies that rely on water directly in their operations or indirectly through their supply chains may face challenges due to increased water stress, leading to operational disruptions, reduced sales, and lower profitability (UN Water, 2024). Given the increasing shortages of freshwater across geographies and the economic effects when supply exceeds demand for this vital resource, we study how global financial markets respond to water stress.

In this paper, we address this question by estimating the relation between water stress and global stock returns from 2013 to 2024. As water stress is a global issue, with an estimated 69 percent of listed equities facing water risks that could substantially change their businesses (Lamb et al., 2022), we test the relation on global stock markets. The relation between stock markets and water-related risks is complex. For example, Hong, Li, and Xu (2019) and Kim, Jeon, and Kim (2024) find that drought risk is not priced in publicly-traded food companies or the U.S. energy stock market, finding negative expected returns. These findings suggest that investors do not consider drought a systemic risk requiring a return, which might be valid; drought conditions reducing levels of water supply might not be economically relevant when water demand is even lower. The mechanism underlying a potential effect of drought on stock returns is that of a reduction in water supply, accounting for levels of water demand. Therefore, we focus on water use and water stress - defined more broadly than drought alone. Following the pervasiveness of water stress globally and across industries, we hypothesize that investors cannot diversify away from water stress risk and

consider water stress a systematic risk for which they require a return. We expect to find a positive relation between firm-level water stress and stock returns.

We collect water data from three primary sources: the S&P Global Sustainable (2024a) Trucost Environmental dataset provides firm-level water use data, the S&P Global Sustainable (2024b) Trucost Climate Change Physical Risk dataset provides headquarter and asset locations data, and NASA GRACE and GRACE-FO satellites provide monthly water level data for a granular global grid (F. Landerer, 2021, F. W. Landerer and Swenson, 2012). As a proxy for a company's water demand, we use direct, indirect and total (direct plus indirect) water usage from the Trucost Environmental Dataset. For our water supply measure, we consider each company's assets and headquarters locations provided by the Trucost Climate Change Physical Risk Dataset. We match these locations on latitude-longitude with the NASA GRACE and GRACE-FO data, which measures Liquid Water Equivalent (LWE). LWE indicates total water storage (i.e. surface water, like lakes and rivers, groundwater, soil moisture, snow and ice) at a particular location and point in time. To capture seasonal water availability patterns, we calculate how much the observed Liquid Water Equivalent (LWE) at each location deviates from its historical monthly average. We then standardize this deviation by calculating a z-score using the location's historical monthly standard deviation. A negative z-score indicates water availability below the location's average, while a positive z-score suggests above-average water availability. Finally, we calculate our monthly water stress measure by combining this standardized water availability (supply) measure with each company's water usage (demand).

We start by analyzing whether water use (direct and total) itself is associated with stock returns. We combine global monthly stock return data from 2013-2024, covering 14,650 companies in 76 countries, with the Trucost water use data. We use a panel regression model to estimate the relation and regress the excess stock return on the water use variables. Contrary to Fernandez-Perez, Indriawan, and Tse (2024), we find a statistically significant positive relation between our water use variables and stock returns, using time, region, and industry fixed effects. The differences could be due to different periods in which we estimate our relation. Furthermore, we do not include lagged water use variables, as we always use the last available reported water use information (following

the matching technique of Zhang (2025)). In our regressions, we include several stock-level control variables (market beta, size, book-to-market, momentum, leverage, investment, return on equity, plant, property, and equipment (PPE), volatility, and sales growth) to avoid capturing other return predictors.

Our main finding is a positive relation between water use and excess stock returns when we control for industry effects. We do not see a statistically significant relation between water use and stock returns when we only control for time and cross-sectional differences in water use by region. Our results suggest that broad regional differences in water use are not driving return variation. We argue that the relation comes from analyses between or within industries. Hence, we include industry fixed effects and observe that water use is priced when we account for heterogeneity across industries. These analyses also hold for country fixed effects instead of region fixed effects. We find that a standard deviation increase in direct and total water use is associated with a 0.93% and a 2.15% p.a. increase, respectively, in excess stock returns. These results suggest that investors require a risk premium for companies with higher water usage, particularly the importance of considering indirect water use within supply chains, as reflected by the higher premium associated with total water use.

Given that our water use results become statistically significant after controlling for industry fixed effects—consistent with findings by Fernandez-Perez et al. (2024)—we follow the approach of Pástor, Stambaugh, and Taylor (2022) to determine whether our results are driven by industry-level water usage or by company-specific water use relative to its industry water use. For our direct, indirect and total water use variables, we find a statistically significant positive relation of the *within* variation and no significant relation for the *across* industry variable. There is a notably higher premium for total and indirect company water use than direct water use. An increase in standard deviation in within industry total, indirect and direct water use is associated with an 1.86%, 1.98% and 0.86% increase in stock return, respectively. We then explore whether these findings differ for companies operating in industries characterized by low water use (e.g., health care and media) compared to those in high water-use industries (e.g., water utilities and food production). Intuitively, for a company in a low-water-use industry, consuming more water than

its peers does not seem like an obvious material risk factor. Nevertheless, our primary results remain consistent irrespective of whether a company operates in a low- or high-water-use industry. Our findings indicate that investors price water use based on company variations in water usage within industries rather than broad industry-level differences.

We compute our monthly water stress measure by combining the spatial water supply data with the company's water use. Our previous results show that company water use is associated with higher stock returns; however, when there is ample water supply at the locations where water is needed, there does not necessarily have to be a risk. Therefore, we are interested in the relation between water stress - the notion that water supply cannot meet water demand - and stock returns. We hypothesize that increased water stress is associated with increased stock returns, a water stress premium. Our initial result, in which we use different lags and moving averages to capture different timings in which the potential consequences of water stress come to light, does not provide any statistical evidence for our hypothesis. We observe a negative sign, albeit zero, and an increase in t-statistics when using moving averages rather than monthly lags.

We continue our water stress analyses to explore whether our initial findings differ for companies operating in high or low water-use industries. Intuitively, experiencing more water stress is a more substantial material risk factor for a company in a high water-use industry. We include a dummy for high direct water-use industries—we use direct water use to capture water stress as we know the company's headquarters and asset locations, not its suppliers. We observe a statistically significant negative relation between water stress - in low water-use industries - and stock returns. The water stress and high water-use dummy interaction is statistically significantly positive. These results suggest that water stress is being priced for companies in low water-use industries and is already priced, and thus is seen as a water stress premium for companies in high water-use industries. Specifically, we observe that a one standard deviation increase in water stress (3-month lag) is associated with a -0.55% p.a. decrease in stock return for companies in low water-use industries and 0.20% p.a. increase for companies in high water-use industries. Overall, these findings suggest that investors differentiate the pricing of water stress risk across industries and firms, indicating an economically small water stress premium for firms operating in high water-use industries.

Next, we examine the relation between water stress and global stock returns in light of two climate conferences. The first is the Paris Agreement in 2015, and the second is the UN COP26, in which the Glasgow Declaration for Fair Water Footprints was drawn. We find some initial results that investors price water stress differently after the Paris Agreement, but we remain careful in our conclusions as the relation is not statistically significant for all our model specifications.

Our findings provide evidence for a water use premium for firms using more water than industry peers. The within-industry variation positively relates to stock returns, while the across-industry variation is insignificant. This relation remains consistent regardless of whether companies operate in low or high-water-use industries, although indirect and total water use have a higher premium than direct water use. Furthermore, our findings provide initial evidence of a potential water stress premium for firms in high-water-use industries. While economically small, the statistically significant relation we identify provides a foundation for ongoing analysis to establish further robustness and assess the dynamics of the relation between water stress and global stock returns.

Our research contributes to a growing body of climate finance research. We add to the existing literature of, among others, Hong et al. (2019), Afrin, Peng, and Bowen (2021), Kim et al. (2024), Bolton and Kacperczyk (2023), Fernandez-Perez et al. (2024) and Huynh, Nguyen, and Truong (2020). We also contribute to the growing literature on spatial finance by integrating geospatial data with financial information (Caldecott, McCarten, Christiaen, and Hickey, 2022). Specifically, we use NASA's GRACE and GRACE-FO geospatial data to obtain water supply information that is both location- and time-specific. We extend the existing literature by uniquely combining company-level water demand with location-specific water supply, creating a corporate water stress exposure measure. Previous literature primarily examined company-level water demand or supply, such as droughts, rather than their combination. Furthermore, we include the water stress levels of companies' production locations rather than having to focus solely on the location of a company's headquarters. Additionally, we include a global set of companies for our analyses.

As climate change and human activities—including pollution, the transition to green energy, and advancements in artificial intelligence— increase the pressure on freshwater, and considering that water is a non-substitutable resource, our findings should attract the interest of both companies and

investors. Our results indicate that companies' water use is priced, and we find a potential water stress premium for companies operating in high-water-use industries. These insights can potentially help companies develop strategies to improve water conservation, use water more efficiently, and adopt sustainable water management practices. Additionally, our results can help investors make more informed investment decisions.

2. Background and Motivation

2.1. Water Use and Financial Markets

Companies that rely heavily on water in their operations may face several water-related risks. First, not having enough water to operate is a physical risk that will disrupt a company's day-to-day operations. Even though companies might hold contracts allowing them to obtain water from certain aquifers, lakes, or groundwater wells, when water levels run low, municipalities prioritize basic human needs over corporate agreements (Cole, Narayanan, Connors, Tewari, and Onda, 2023). Second, companies may also encounter transition risks. Petrovic and Cirovic (2013) argue that governmental interference and regulation in water will undoubtedly increase, potentially impacting the price of water or requiring companies to reduce water consumption in their operations. Finally, the companies can face reputation risks when water use impacts the local population or biodiversity. These physical, transition, and reputation risks might impact firms' operations, sales, and profitability.

Most companies depend on water within their supply chains rather than in direct operations, with agriculture being the main exception. For instance, in the retail sector, 10 to 40 percent of water use typically occurs at the supplier level, 60 to 90 percent among sub-suppliers, while a company's headquarters only consumed around 1 percent (McKinsey and Company, 2009). Given this complexity in water use, investors may not perceive company water use uniformly and instead differentiate between direct operations and supply chain exposure.

The demand for freshwater is projected to increase even more. Li, Yang, Islam, and Ren

Agricultural companies are direct water users, particularly those growing crops.

(2023) explain that the 'rise' of artificial intelligence (AI) is expected to demand 4.2 – 6.6 billion cubic meters of water withdrawal in 2027, which is half of the annual water demand of the United Kingdom. In the United States, there are growing concerns about who uses water and for what purpose, as dry conditions are evident across the country (Temple-West, 2025). The green transition requires an increase in battery production, which translates to an increase in the mining of lithium, cobalt, and nickel (International Energy Agency, 2024). Lithium mining is very water-intensive and sometimes done in extremely arid regions which causes aquifers to deplete (Kaunda, 2020). The transformation towards a more sustainable, carbon-low future puts pressure on water supplies.

Previous research on water use and stock returns shows that increased company water use is associated with decreased stock returns (Fernandez-Perez et al., 2024). However, awareness of these water-related, technology, and energy transition pressures has intensified significantly in recent years. Therefore, it is possible that investors now examine the company's water use and demand differently, potentially reversing the previously documented negative relation with stock returns and demanding a water use premium.

- Hypothesis 1 (H1a): Higher company-level water use is associated with higher stock returns.
- Hypothesis 1 (H1b): The relation between higher company-level water use and higher stock returns is stronger for higher indirect company-level water use.

2.2. Water Use and Industries

Water demand varies across industries: in manufacturing, significant water use occurs in raw material extraction, while the textile industry often relies on water for crop production. In contrast, the tech industry's water needs are often indirect for cooling or electricity generation (Cole et al., 2023). In the energy sector, gas, coal, and oil extraction use much water (UN Water, 2024). Several industries, such as media, health care, and consumer services, require little water. For companies where water is a critical input for production, water use should represent a more material operational risk, thus attracting a higher premium from investors.

- Hypothesis 2 (H2): The positive relation between water use and stock returns is stronger for

companies operating in high water-use industries than low water-use industries

2.3. Water Stress and Financial Risk

Water stress refers to situations where the available water supply fails to meet the regional water demand. Climate change exacerbates the risk of longer dry periods, decreasing the water supply. In addition, global water quality is decreasing due to, for one, the expansion of urban lands (Shi et al., 2024). Water supply cannot keep up with rapid urbanization, changing consumption patterns, and economic growth.

Water stress in the supply chain differs much from other sustainability risks in the supply chain, e.g., carbon dioxide emissions, as water stress can have direct repercussions for companies. Byrareddy, Kouadio, Mushtaq, Kath, and Stone (2021), for example, find that robusta coffee yield declines on average 6.5 percent during a drought in Vietnam. In the commodity market, this translates to an increase in the price of robusta beans and, inevitably, in consumer prices of espressos (Kazmin and Savage, 2024). Similar problems occur in the cacao market, increasing consumers' prices for chocolate bars (Savage, 2024). These examples show how water stress may directly impact a company's supply chain and operations and, consequently, affect a company's profitability and market stability. Water stress represents an additional risk dimension beyond company water usage levels. Companies operating in areas with lower water supply face greater disruption risks and investors might want to be compensated for these risks.

- Hypothesis 3 (H3): Exposure to water stress is associated with higher stock returns.

2.4. Industry Differences in Water Stress Impacts

Companies in industries highly reliant on water could experience more significant operational disruptions or financial consequences from water stress than industries less dependent on water. Therefore, we argue that investors price water stress more strongly for companies operating in high-water use industries.

- Hypothesis 4 (H4): The positive relation between water stress exposure and stock returns is

stronger for companies operating in high water-use industries.

2.5. Conference impact

Conferences, such as the COP conferences from the United Nations, are broadcast extensively in the global media. These climate conferences could heighten investors' attention to sustainability and potentially impact investors' inclusion of climate variables in their investment decisions. We hypothesize that water use and stress will be considered risks requiring a higher return, such as a water premium, after a global climate conference.

- Hypothesis 5 (H5): The positive relation between water stress exposure and stock returns is stronger after a global climate conference (i.e., COP)

3. Data

3.1. Water Demand, Supply and Stress

Our first variable of interest is the company's water use. In this study, the terms 'water use' and 'water demand' are used interchangeably to refer to the same measure of company water use from the Trucost Environmental Data (S&P Global Sustainable, 2024a). Within the Trucost Environmental universe, we focus on two variables, namely the 'Absolute: Water Direct and Purchased' and 'Absolute: Cooling, Process, and Purchased', which we renamed *Direct Water Use* and *Total Water Use* respectively. The direct and total (direct + indirect) water use variables are measured in m^3 and encompass the volume of water a company obtains from natural sources and purchases from utility companies. The total water use variable also contains the company's indirect water usage, including water sourced from upstream suppliers (S&P Global Sustainable, 2024a). We also use the variable *Indirect Water Use* which we calculated by taking the difference between the total and direct water use reported.

We match the companies' water use data to the returns data following the method of Zhang (2025) to prevent forward-looking bias. In short, we use Trucosts' effective data release dates

and take the next calendar day if releases occur after 18:00 hours. We shift weekend releases to the following Monday and then align these adjusted dates with returns data from the subsequent month.

We must first obtain our water supply measure to then create our monthly company water stress measure. We use the Trucost Physical Risk dataset to extract the company's asset and headquarters locations S&P Global Sustainable (2024b), and we match these locations (defined by latitude and longitude) with the NASA Gravity Recovery and Climate Experiment (GRACE) and the Gravity Recovery and Climate Experiment Follow-on (GRACE-FO) data. The NASA GRACE and GRACE-FO data entails the Liquid Water Equivalent Thickness (LWE). The LWE indicates the total water storage at a specific location over time, including surface water, groundwater, soil moisture, snow, and ice. The LWE variable represents an anomaly with respect to a mean state and can be called a water storage anomaly (F. Landerer, 2021, F. W. Landerer and Swenson, 2012). Positive anomalies indicate more water is stored than in the baseline period, while negative anomalies imply water loss compared to the baseline. The baseline is the location's average computed over all months from 2005-2010. Because the baseline is an average over the years, there might be residual seasonal patterns—different months can have systematically higher or lower anomalies. Therefore, we calculate deviations from the location's long-term monthly average (i.e., the average for each month) to adequately capture the seasonality that is so obvious in water data.

First, we calculate the average LWE ($\bar{x}_{im}$) for asset i in month m over the period 2005–2010. Second, we calculate the difference between the assets i LWE value in month m in year y with the $\bar{x}_{im}$. Finally, we divide the difference by the standard deviation for asset i in month m over the period (2005–2010) to create a z-score. Even though x is already an anomaly, the further adjustment (subtracting the month's mean and standardizing) allows us to control for any residual seasonality or heterogeneity in variability across different months and assets. The final company-level z-score, obtained by equally weighting these individual assets i z-scores, represents an average measure of how 'unusual' the underlying assets are regarding their water anomaly deviations for that month. In addition to the equally weighted company z-score, we also create a weighted z-score in which we weigh water-intense asset locations twice. Our dataset contains the following asset types: branch,

broadcast station, headquarters, coal mine, gas facility, global branch, LNG facility, mine project, pipeline facility, and power plant site. Of these asset types, we double-count the coal mine, mine project, and power plant site to create the weighted z-score. Thus, our final measures effectively capture company-level water supply by considering both overall and water-intensive asset-specific locations.

Our monthly company water stress measure is the interaction between the direct water use from S&P Global Sustainable (2024a) and our company-level water supply z-score. We use the direct water use of a company rather than the total water use because we only have information on the company's asset locations, not the supplier's assets location. Hence, we do not want to include the indirect water use of a company. The z-score is negative when the company's asset locations experience lower water supply than usual. When we interact the z-score with the company's direct water use by construction, the water stress variable indicates a negative relation. The lower the water stress variable (due to negative z-score), the higher the water stress. Therefore, we multiply the water stress variable by -1 to improve the readability of the results. A higher water stress value now indicates a higher water stress level.

3.2. Global stock return data

We create a global database of monthly stock returns and characteristics covering January 2013 to December 2024, using data from the Center for Research in Security Prices (CRSP), Compustat North America, and Compustat Global. We clean the stock data following Alves et al. (2023). In our regressions, we include several stock-level control variables: market beta, size, book-to-market, momentum, leverage, investment, return on equity, plant, property, and equipment (PPE), volatility, and sales growth (Bolton and Kacperczyk, 2021). We winsorized the stock returns at 0.1% and 99.9% each month (Jensen, Kelly, and Pedersen, 2023). In addition, we also winsorized the market beta, momentum, leverage, investment, return on equity, volatility, and sales growth control variables at 0.1% and 99.9%, and we use the natural logarithm of the PPE control variable.

3.3. Descriptive statistics

Table A.1 shows the summary statistics of the variables in our analyses. The variables *Direct Water Use* and *Total (D+I) Water Use* were in m^3 and displayed significant differences among companies and industries. Therefore, we decide to take the natural logarithm of both variables. Before taking the logarithm, we create the *Indirect Water Use* variable, which is simply the difference between the *Total* and *Direct* variable. We also took the natural logarithm of the *Indirect Water Use*. Table A.1 shows that all three variables have similar variability, as demonstrated by the standard deviation. The variables *Total* and *Indirect Water Use* have very similar descriptive statistics, and as shown in Table A.2, their correlation is 96%.

Although the variables *Water Supply* and *Weighted Water Supply* exhibit nearly perfect correlation, the weighted measure provides additional nuance by explicitly emphasizing locations with higher water intensity. Given that our dataset contains relatively few high water-intensity assets compared to, for example, headquarters for all companies, this weighting only somewhat adjusts the variable, leading naturally to similar empirical outcomes. Nevertheless, substituting *Water Supply* with the *Weighted Water Supply* measure enables us to demonstrate that our results remain robust across different weighting approaches.

The *Water Stress* measure ranges from −223.18 to 207.88 with a standard deviation of 8.92. This means that most observations are clustered near the mean, and only a few cases drive the range's extreme ends. We also observe this in Figure A.1, the histogram of the *Water Stress* variable. Checking the extreme values, we notice that the negative values are mostly from Japan from 2020-2024. The region experienced notably wet conditions in this time period, compared to the 2005-2010 baseline, marked by increased rainfall (Japan Meteorological Agency, 2025). These higher *Water Supply* values of around 10 are then multiplied by the company's water use. Some of these companies operate in high water use industries, as seen in Figure A.2, such as 'Auto components', 'Food products' and 'Oil, Gas & Consumable Fuels'. Which explains the high negative values. Similarly we observe that for the high water stress values, companies operate in high water use industries.

Table A.2 portays the correlations between our variables. We observe a negative correlation

between our *Water Stress* variables and our *RET (%)* variable. This initial relation seems to look as if water stress is being priced in. Furthermore, we observe a high correlation between the *Total/Indirect Water Use* and the *Size* variable of 58% and 59% respectively. This seems to make sense intuitively, the larger the company, the more water it might need to operate. Similarly, we observe a a 70% correlation between the *ln (PPE)* variable and the *Water Use* variables. We control for both size and PPE in our regression analyses.

We winsorize our dependent variable RET (%), and the control variables *Beta*, *Momentum*, *Volatility*, *Leverage*, Invest/A, *Sales Growth* and *Return on Equity* at 0.1% and 99.9%.

4. Empirical Approach

4.1. Water Use

To assess the relation between our water use variables and global stock returns, we estimate the following panel model:

$$\text{RET}_{i,t} = \beta_0 + \beta_1 \log(\text{Water Use}_{i,t}) + \lambda' X_{i,t} + \alpha_{\text{FEs}} + \varepsilon_{i,t}, \tag{1}$$

where $RET_{i,t}$ is the monthly excess stock return (%) of firm i in month t. $Water\ Use_{i,t}$ is the generic term that alternately stands for *Total Water Use* and *Direct Water Use*. The *Water Use* variables are the company-level natural logarithm of the total and direct water use (in m^3). α_{FEs} represents a set of fixed effects that alternately stands for year/month fixed effects (α_t), region $\times$ year/month fixed effects ($\alpha_{t \cdot r(i)}$), industry $\times$ year/month fixed effects ($\alpha_{t \cdot ind(i)}$) or both interaction fixed effects ($\alpha_{t \cdot r(i)} + \alpha_{t \cdot ind(i)}$). The vector of stock-level control variables, X, includes the following variables: market beta, size, book-to-market, momentum, leverage, investment, return on equity, plant, property, and equipment (PPE), volatility, and sales growth. We cluster standard errors at the firm and month/year levels. Our coefficient of interest is β_1.

We opt for fixed effects interacting year/month with region and year/month with industry

To save space in Table A.3, we omit the *Indirect Water Use* in this analysis; it will feature in the rest of the water use regressions.

for several reasons. First, these interaction terms help reduce the risk of look-ahead bias and provide a more conservative specification. Second, using region×year/month fixed effects allows the model to absorb any broader regional shocks occurring each month, such as localized droughts or other climate-related events, and prevents the model from mistakenly attributing these effects to firm-specific water use and stress measures. Third, choosing region×year/month (rather than country×month) fixed effects preserves variation in our water stress measures that would otherwise be removed by country×year/month interactions, given that the country-level fixed effects correlate with our water stress variable. We prefer to use similar fixed effects across our regressions, so we favor the region×year/month fixed effects over the country×year/month. Finally, we hypothesize that investors are likely to make decisions at a regional rather than purely national level. Thus, incorporating these fixed effects aligns more closely with realistic investor decision-making behavior.

Following Pástor et al. (2022), we are interested in whether the relation between water use and stock returns is an across or within-industry relation. Hence, we decompose *Water Use* variables into *Water Use Across* and *Water Use Within*, representing across- and within-industry variation. The across-industry component at time t for industry *ind* is calculated as the industry-month average water use:

$$\text{Water Use } \mathit{Across}_{ind,t} = \frac{1}{N_{ind,t}} \sum_{i \in \{ind,t\}} \text{Water Use}_{i,t}, \tag{2}$$

where $N_{ind,t}$ is the number of firms in industry *ind* in month t. The within-industry component measures how much a firm's water use deviates from this industry-month average:

$$\text{Water Use } \mathit{Within}_{i,t} = \text{Water Use}_{i,t} - \text{Water Use } \mathit{Across}_{ind,t}. \tag{3}$$

To assess the relation between our across and within water use variables and global stock returns, we estimate the following panel model:

$$\text{RET}_{i,t} = \beta_0 + \beta_1 \log(\text{Water Use } \mathit{Across}_{ind,t}) + \beta_2 \log(\text{Water Use } \mathit{Within}_{i,t}) + \lambda' X_{i,t} + \alpha_{\text{FEs}} + \varepsilon_{i,t}, \tag{4}$$

where $RET_{i,t}$ is the monthly excess stock return (%) of firm i in month t. *Water Use Across*$_{ind,t}$

and *Water Use Within*$_{i,t}$ are the generic terms that alternately stand for the *Across* and *Within* variables of *Total Water Use*, *Direct Water Use* and *Indirect Water Use*. α_{FEs} represents a set of fixed effects that alternately stands for year/month fixed effects (α_t) and region×year/month fixed effects ($\alpha_{t \cdot r(i)}$). X represents the vector of stock-level control variables. We cluster standard errors at the firm and month/year levels. Our coefficients of interest are β_1 and β_2.

Further, we explore whether the relation between water use and global stock returns differs for companies operating in low-water use industries (e.g., health care and media) compared to those in high water-use industries (e.g., water utilities and food production). We construct a dummy variable equal to 1 if firm i's industry-average total water use is above the median across all industries (see Table A.1 Panel A). We do not interact this dummy with the *Water Use Across* measure, as the dummy already captures across-industry variation. Such an interaction would be redundant since *Water Use Across* inherently reflects industry-level differences in water use. Instead, we interact this dummy with *Water Use Within*, which allows us to examine whether the relation between water use and global stock returns differs for companies operating in industries characterized by low or high water use.

4.2. Water Stress

To assess the relation between our water use variables and global stock returns, we estimate the following panel model:

$$\begin{aligned} \text{RET}_{i,t} = \beta_0 + \beta_1 \log(\text{Direct Water Use } \textit{Across}_{ind,t}) + \beta_2 \log(\text{Direct Water Use } \textit{Within}_{i,t}) \\ + \beta_3 \text{Water Supply}_{i,t-\tau} + \beta_4 \text{Water Stress}_{i,t-\tau} + \lambda' X_{i,t} + \alpha_{\text{FEs}} + \varepsilon_{i,t} \end{aligned} \tag{5}$$

where $RET_{i,t}$ denotes the excess stock return (%) of firm i in month t. *Direct Water Use Across* and *Direct Water Use Within* capture industry-level and firm-specific deviations in direct water consumption, respectively. The variables *Water Supply* and *Water Stress* are lagged by various horizons ($\tau = 1, 3, 6$ months) or represented as moving averages (3- and 6-months). These different lag structures allow us to capture delayed effects, as reductions in water supply or increases in water stress may not immediately impact firm performance but instead unfold gradually over time.

Specifically, *Water Stress* is defined as the negative interaction between *Direct Water Use Within* and lagged *Water Supply* to enhance interpretability, with higher values indicating greater water stress. α_{FEs} represents a set of fixed effects that alternately stands for year/month fixed effects (α_t) and region×year/month fixed effects ($\alpha_{t \cdot r(i)}$). X represents the vector of stock-level control variables. We cluster standard errors at the firm and month/year levels. Our coefficient of interest is β_4.

Similar to our water use variables, we explore whether the relation between water stress and global stock returns varies among firms operating in high and low-water-use industries. We construct a dummy variable equal to 1 if firm i's industry-average direct water use exceeds the median direct water use across all industries (see Table A.1, Panel A). We specifically choose *Direct Water Use* over *Total Water Use* because our water stress regressions exclusively focus on direct water consumption. We interact this dummy with the variables *Direct Water Use Within*, *Water Supply*, and *Water Stress*. Given that the *Water Stress* variable itself is constructed as an interaction between *Direct Water Use Within* and *Water Supply*, we interact the dummy with all these variables to provide a consistent and comprehensive analysis.

5. Results

5.1. Water Use

Table A.3 shows the results of the relation between company water use and global stock returns by estimating Eq. 1. Columns (1)-(2) show the results using year/month fixed effects. Columns (3)-(4) show the relation using region×year/month fixed effects. Columns (5)-(6) display the relation using industry×year/month fixed effects and columns (7)-(8) display the relation using region×year/month and industry×year/month fixed effects.

The results of Table A.3 indicate a positive relation between company water use and global stock returns. The relation becomes statistically significant when we include industry×year/month

We do not include specifications using the *Total Water Use* or *Indirect Water Use*, as we construct the *Water Stress* variable using *Direct Water Use* and by construction we include the interactions main variables.

fixed effects in our model. This result is intriguing as it suggests that broad regional differences in water use alone are not driving return variation. Using separate fixed effects instead of interactions or country fixed effects instead of regional fixed effects yields similar results. We hypothesize that the relation comes from differences within industries, which would explain the significant results when including industry-fixed effects. We find that an increase of one standard deviation in *total* company water use is associated with 2.15% p.a. increase in stock returns. In comparison, an increase of one standard deviation in *direct* company water use is associated with a return increase of 0.93% p.a.. Our results suggest that investors require a risk premium for companies with higher water usage, particularly the importance of considering indirect water use within supply chains, as reflected by the higher premium associated with total water use.

Given that our water use results become statistically significant after controlling for industry fixed effects—consistent with findings by Fernandez-Perez et al. (2024)—we follow the approach of Pástor et al. (2022) to determine whether our results are driven by industry-level water usage or by company-specific water use relative to its industry peers. Using Eq. 2 and Eq. 3, we construct the water use *Across* and *Within* variables. Where *Across* indicates the average monthly water use of the firm i's industry, the *Within* variable indicates the firm i's deviation from that industry average. We omit industry-fixed effects in all subsequent analyses, as the two variables capture these effects.

Table A.4 shows the results of the relation between industry and company water use and global stock returns by estimating Eq.4. Columns (1)-(4) show the results using year/month fixed effects. Columns (5)-(8) show the relation using region×year/month fixed effects. Columns (1) and (5) show the results for total company water use, columns (2) and (6) for direct company water use, columns (3) and (7) for indirect company water use, and finally, columns (4) and (8) show a 'horse race' between direct and indirect company water use. We find a statistically significant positive relation of the *within* water use variable and no significant relation for the *across* industry water use. These results also hold when we use country×year/month fixed effects. Our results suggest that investors demand a water use premium for companies that consume more water than their industry peers but do not require a premium for investing in an industry that consumes more water

than other industries. We find that an increase in one standard deviation within industry total, indirect, and direct water use is associated with 1.68% p.a., 1.98% p.a., and 0.86% p.a. increase in stock return, respectively. Furthermore, we observe the importance of considering indirect water use within supply chains, as reflected by the higher premium associated with total and indirect water use and the 'horse race' regression results with direct water use. The within-industry direct water use is not statistically significant, whereas the within-indirect water use is significant with an s.d. increase associated with a 2.39% p.a. increase in stock return.

We continue our analyses by estimating whether water use and global stock returns vary between companies operating in low- versus high-water-use industries. Intuitively, for a company in a low-water-use industry, consuming more water than its peers is not an obvious material risk factor. Table A.5 shows the results of this hypothesis by estimating Eq.4 and including a dummy that equals 1 if firm i's industry operates in a high-water use industry, and the interaction with the dummy and *within* water use variables. Columns (1)-(3) show the results using year/month fixed effects. Columns (4)-(6) show the relation using region×year/month fixed effects.

We find a statistically significant positive relation for the water use *within* variables for all model specifications. Which, in this regression, should be interpreted as the within-water use variable for firms operating in low-water-use industries. The interaction of the high-water-use dummy and *within* water-use variables is not statistically significant. These results show no evidence that investors demand a different water use premium - for companies that consume more water than their industry peers - for firms operating in high- or low-water-use industries. These findings also hold when we use country×year/month fixed effects.

The high-water-use dummy is statistically insignificant in most columns except column (5), giving us some suggestive evidence that firms operating in high-water-use industries are associated with, on average, lower returns than those operating in low-water-use industries. However, we remain cautious in our conclusions as the dummy is only statistically significant in one specification.

5.2. Water Stress

Our previous results show that company water use is associated with higher stock returns; however, when there is ample water supply at the locations where water is needed, there does not necessarily have to be a risk. Therefore, we are interested in the relation between water stress - the notion that water supply cannot meet water demand - and stock returns. We hypothesize that increased water stress is associated with increased stock returns, a water stress premium. Table A.6 shows the results of estimating Eq. 5. Water Supply and Water Stress are lagged by various horizons (τ = 1, 3, 6 months) or represented as moving averages (3- and 6-months). Columns (1)-(3) present the regression results for different lag periods, specifically τ = 1, 3, and 6 months, respectively. Columns (4) and (5) report results based on moving averages over 3-month and 6-month windows. Table A.6 Panel A shows the regression results using year/month fixed effects, and Panel B shows the results when we use region×year/month fixed effects.

Our initial result, in which we use different lags and moving averages to capture different timings in which the potential consequences of water stress come to light, does not provide any statistical evidence for our hypothesis. We observe a negative sign for the water stress variable, albeit close to zero, and an increase in t-statistics when using moving averages rather than monthly lags. Furthermore, in all model specifications, we observe a statistically significant positive coefficient for the log *Direct Water Use Within* variable. Highlighting the robustness of our previous water use findings. Using country×year/month fixed effects or the weighted water stress variable yields similar results.

We continue our water stress analyses to explore whether our initial findings differ for companies operating in high or low-water-use industries. Intuitively, experiencing more water stress is a more substantial material risk factor for a company operating in a high water-use industry. We include a dummy for high *direct* water-use industries—we use direct water use to capture water stress as we know the company's headquarters and asset locations, not its suppliers. We include the *High Direct Water Use* Dummy in Eq. 5 and add the interactions between the dummy and the variables:

This dummy is different than in Table A.5, as the *High-Water-Use* dummy was constructed using the industries' total water use.

Log (*Water Use Within*), *Water Supply* and *Water Stress*. Table A.7 shows us the result of these regressions. Columns (1)–(3) present the regression results for different lag periods for the water supply and water stress variables, specifically $\tau = 1$, 3, and 6 months, respectively. Columns (4) and (5) report results based on moving averages of the water supply and water stress variables over 3-month and 6-month windows, respectively. Panel A shows the regression results using year/month fixed effects, and Panel B shows the results when we use region×year/month fixed effects.

We observe a statistically significant negative relation for the water stress variable for the 3- and 6-month moving averages and, in Panel B, also for the 3-month lag model. These results suggest that, for firms operating in low-water-use industries, an increase in water stress is associated with a decrease in stock returns. Specifically, a one standard deviation increase in water stress (3-month lag, Panel B) is associated with 0.55% p.a. decrease in stock return. We observe a significant positive relation between the water stress × dummy interaction for all models. For the firms operating in high-water-use industries, a standard deviation increase in water stress (3-month lag) is associated with approximately 0.20% p.a. increase in stock return. Similarly, for the 3-month moving average and 6-month moving average, the economic magnitude of a one standard deviation increase in water stress for firms operating in high-water use industries is associated with an increase of 0.30% p.a., 0.15% p.a., respectively, in stock return. Our results suggest that an increase in water stress is associated with a decrease in stock returns for firms operating in low-water-use industries. However, a small water stress premium seems to exist for firms operating in high-water-use industries. Moreover, these findings indicate a potential combination of pricing in risk and demanding a risk premium. An increase in water stress may signal negative cash flow news for companies in low-water use industries (e.g., higher operational costs) or a potential increase in discount rate - in other words, the gradual pricing of water stress and/or preferences. The positive relation for companies operating in high-water use industries could indicate a water stress premium as investors want compensation for holding stocks with higher water stress in already high-water use industries.

We remain cautious in our conclusions as these results are solely visible when including the high direct water use dummy and not by estimating Eq. 5; nevertheless, we do observe a difference

in the pricing of water stress for firms operating in low- and high-water use industries and using country×year/month fixed effects or substituting the water stress by the weighted water stress variable yields the same results.

Furthermore, in Panel B, we observe that the high direct water use dummy is not statistically significant in any specification. Our log *Direct Water Use Within* is statistically positively related to global stock returns, similar to our previous findings. The interaction of the log *Direct Water Use Within* with the high direct water use dummy is statistically negatively significant in the one-month lag model. These results suggest that firms operating in low-water-use industries generate a higher return than their peers, and more so than firms operating in high-water-use industries. The relatively lower returns for firms in high-water-use industries might be due to materializing cashflow effects.

5.3. Conferences

Next, we examine the relation between water stress and global stock returns based on two climate conferences. The first conference is the Paris Agreement, adopted by 196 Parties at the UN Climate Change Conference (COP21) in December 2015. The other conference is the Glasgow Declaration for Fair Water Footprints for Climate Resilient, Inclusive, and Sustainable Development, a UN Climate Change Conference (COP26) Initiative, held in Glasgow in November 2021. We create two dummies, the *Post Paris* Dummy equals 1 for 2016-2024, and the *Post Glasgow* Dummy that equals 1 for the years 2022-2024. We argue that investors may have started incorporating climate variables in their investment decisions after the Paris event. We hypothesize that water use and stress will be considered risks requiring a higher return, such as a water premium. In addition, as the Glasgow event specifically targeted water sustainability, we follow a similar hypothesis, expecting a positive water premium after the conference.

Table A.8 shows the result of estimating Eq. 5, including the Post Paris dummy that equals 1 for the 2016-2024 years, and the interaction terms, and Table A.9 shows the result of estimating Eq. 5, including the Post Glasgow dummy that equals 1 for the 2022-2024 years and the interaction terms. Water Supply and Water Stress are lagged by various horizons (τ = 1, 3, 6 months) or

represented as moving averages (3- and 6-months). Columns (1)–(3) present the regression results for different lag periods, specifically $\tau = 1$, 3, and 6 months, respectively. Columns (4) and (5) report results based on moving averages over 3-month and 6-month windows. Table A.8 and Table A.9 Panel A shows the regression results using year/month fixed effects, and Panel B shows the results when we use region×year/month fixed effects.

From Table A.8, we observe a significant negative relation for the *Water Stress* measure in Panel A and B in columns (4) and (5). This result indicates that pre-Paris, an increase in water stress is associated with approximately -3.70% p.a. decrease in stock return. In Panel B, column (5), the water stress interaction with the Post-Paris dummy is positive with a coefficient magnitude similar to that of the water stress variable. Post-Paris, a standard deviation increase in water stress is associated with -0.30%. These results seem to suggest that the negative relation pre-Paris between water stress and stock returns is partially or entirely offset by the positive coefficient on the interaction term, which helps explain why the full-sample estimate, presented in TableA.6, yields a near-zero, statistically insignificant coefficient. Nevertheless, our results suggest that investors responded differently to water stress after 2015.

We also observe a statistically significant negative relation between the log *Direct Water Use Across* variable in Panel A and Panel B of Table A.8. This result indicates that pre-Paris, a standard deviation increase in across-industry water use is associated with a decrease in excess returns of approximately -3.40% p.a. In contrast, a standard deviation increase in water use relative to other industries after Paris is associated with a 0.68% p.a. increase in stock return. Similar to the results on water stress, these results suggest a potential combination of pricing in risk and demanding a risk premium after Paris.

We observe a similar relation in Panel B for the *Water Supply* variable and interaction with the Post-Paris dummy. An increase in water supply, pre-Paris, is associated with a decrease in stock return. This result is counterintuitive, as water availability might not hurt a company's operation. However, it is possible that too much water could hurt a company and location. The positive and significant interaction term indicates that post-2016, the negative relation is reversed or mitigated, as the interaction term coefficient is similar in magnitude to that of the water supply variable.

Although these findings support the hypothesis that the Paris Agreement changed the pricing of water variables, caution is warranted given the relatively short pre-Paris period and the potential for other concurrent global factors confounding the results.

Table A.9 shows a statistically significant positive relation for the interaction term between the log *Direct Water Use Within* and Post-Glasgow dummy. These results indicate that the positive relation we observe in our previous findings is driven by the later years in our sample. We also observe these statistically significant positive coefficients for the interaction in Table A.8. Strengthening the idea that the relation between within-industry water use and stock returns is driven in the later part of our sample period. We cannot draw conclusions for the other variables, as statistical significance is scattered in Panel A and diminishes in Panel B. Table A.8 and Table A.9 using country×year/month fixed effects or substituting the water stress by the weighted water stress variable yield the same results.

6. Conclusion

The world faces an intensifying water crisis driven by rising global demand and threats to freshwater availability. Companies dependent on water resources may face future operational and financial risks. The primary purpose of our research is to better understand the relation between water stress and global stock returns, contributing to the expanding literature on climate and spatial finance. Our findings can be summarized as follows. Firstly, we find evidence for a water use premium for firms consuming more water than industry peers. This relation remains consistent regardless of whether companies operate in low or high-water-use industries. Secondly, we observe that indirect and total water use have a higher premium than direct water use. These results highlight the importance of including indirect water use within supply chains. Thirdly, investors respond differently to water use and stress after the Paris Agreement. Finally, our findings provide initial evidence of a potential water stress premium for firms in high-water-use industries. While economically small, the statistically significant relation we identify provides a foundation for future research.

Considering that water is a non-substitutable resource and as climate change and human activities—including pollution, the transition to green energy, and advancements in artificial intelligence— increase the pressure on freshwater, our findings should attract the interest of both companies and investors. Our results indicate that companies' water use is priced, and we find a water stress premium for companies operating in high-water-use industries. These insights can help companies create strategies to improve water conservation, use water more efficiently, and adopt sustainable water management practices. Additionally, our results can help investors make more informed investment decisions. Moreover, we hope our findings will encourage investors and companies to pursue more efficient and responsible water usage.

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A. Tables and Figures

Table A.1 Descriptive Statistics

This table presents the summary statistics (the number of observations, mean, standard deviation, median, minimum and maximum values) of the variables used in our research. **Panel A** reports the water variables. The *log (Total Water Use)*, *log (Direct Water Use)* and *log (Indirect Water Use)* are the company-level natural logarithm of total, direct and indirect water use (in m^3) from S&P Global Sustainable (2024a). The *Across* and *Within* variables of the three water use variables are constructed using Eq. 2 and Eq. 3 respectively. **Panel B** reports the water supply and water stress variables. *Water Supply* is the equally weighted z-score, which represents an average measure of how 'unusual' the underlying assets are regarding their water supply deviations for that month. *Weighted Water Supply* is the weighted z-score in which we weigh water-intense asset locations (coal mine, mine project, power plant site) twice. *(Weighted) Water Stress* is the interaction between company *log (Direct Water Use)* and *(Weighted) Water Supply*. The *3 and 6 month m.a.* are the appropriate month moving averages of the *(Weighted) Water Stress* variable. For readability we multiplied all *Water Stress* variables by -1, so that a higher *(Weighted) Water Stress* now indicates higher water stress for a company.

VARIABLES	Obs.	Mean	S.D.	Min	P25	Median	P75	Max
Panel A: Water Use								
log (Total Water Use)	994,331.00	16.68	2.33	3.77	15.24	16.66	18.15	25.65
log (Direct Water Use)	994,042.00	13.58	2.85	-13.82	11.86	13.48	15.24	25.64
log (Indirect Water Use)	994,305.00	16.46	2.22	3.38	15.11	16.50	17.91	24.44
log (Total Water Use *Across*)	1,747,549.00	16.95	1.44	12.83	16.05	16.93	17.85	21.89
log (Total Water Use *Within*)	994,331.00	0.00	1.84	-13.75	-1.09	-0.00	1.15	8.73
log (Direct Water Use *Across*)	1,747,549.00	13.89	1.89	8.93	12.87	13.75	15.10	21.53
log (Direct Water Use *Within*)	994,042.00	0.00	2.17	-27.37	-1.21	-0.00	1.28	11.95
log (Indirect Water Use *Across*)	1,747,549.00	16.73	1.35	12.50	15.88	16.75	17.60	21.89
log (Indirect Water Use *Within*)	994,305.00	0.00	1.78	-13.49	-1.07	-0.01	1.11	7.94
Panel B: Water Supply and Water Stress								
Water Supply	1,411,421.00	0.39	4.06	-34.11	-1.76	-0.08	1.58	41.07
Weighted Water Supply	1,411,421.00	0.39	4.07	-34.11	-1.76	-0.07	1.59	41.07
Water Stress	875,399.00	0.39	8.92	-223.18	-1.73	0.03	2.06	207.88
Water Stress (3 month m.a.)	935,072.00	0.36	7.97	-115.74	-1.62	0.03	1.93	137.04
Water Stress (6 month m.a.)	950,734.00	0.35	7.74	-106.20	-1.61	0.03	1.92	129.71
Weighted Water Stress	875,399.00	0.39	8.94	-223.18	-1.74	0.03	2.06	207.88
Weighted Water Stress (3 month m.a.)	935,072.00	0.36	7.99	-115.74	-1.63	0.03	1.94	137.04
Weighted Water Stress (6 month m.a.)	950,734.00	0.35	7.76	-106.20	-1.61	0.03	1.92	129.71

Table A.1 continued

This table presents the summary statistics (the number of observations, mean, standard deviation, median, minimum and maximum values) of the variables used in our research. **Panel C** reports the cross-sectional returns and company characteristics. *RET* (%) is the monthly excess stock return; log(*Size*) is the natural logarithm of market capitalization (in $ million) as of June of each year and held that value constant until May of the following year; The book-to-market ratio log(*B/M*) is the natural logarithm of the book value of equity to market capitalization computed every June of each year t, using the last book equity value in June of the previous calendar year and the market capitalization value in December of the previous year; *Beta* is the monthly market beta computed at the end of month t as the regression slope of a regression of monthly excess stock returns on market excess returns over the previous 24 months, where we require at least 12 months of non-NA excess returns data; *Momentum* is computed as the cumulative return during an 11-month period between months $t-1$ and $t-11$, where we require at least 9 months of return data during the 11-month period; *Volatility* is computed as the standard deviation of the returns of a stock i over a 12-month period ($ret_{i,t-12}$, $ret_{i,t-11}$, ..., $ret_{i,t-1}$, measured at the end of month t, excluding the current period's ret_t) where we require at least 9 non-NA returns observations during the 12-month period; *Leverage* is defined as the ratio of debt to the book value of assets, where we allow the long-term debt or the current debt to be missing, but not both, and we set negative values to missing; *Invest/A* is calculated as the ratio of capital expenditures to the book value of total assets; *log(PPE)* is the natural logarithm of the property, plant, and equipment cost of tangible fixed property used in the production of revenue; *Sales Growth* is defined as the percentage change in net sales; *Return on Equity* is computed every June by taking the net income divided by the market capitalization value in December of the previous calendar year.

VARIABLES	Obs.	Mean	S.D.	Min	P25	Median	P75	Max
Panel C: Stock Return								
RET (%) (winsorized at 0.1%)	1,754,695.00	0.85	13.77	-78.72	-6.11	-0.08	6.37	225.38
log (Size)	1,691,241.00	6.53	1.63	0.05	5.40	6.51	7.57	14.64
log (B/M)	1,299,618.00	-0.61	1.06	-13.19	-1.21	-0.53	0.09	5.43
Beta (winsorized at 0.1%)	1,565,432.00	1.14	0.89	-3.14	0.62	1.08	1.59	6.48
Momentum (winsorized at 0.1%)	1,597,473.00	0.12	0.60	-0.91	-0.20	0.02	0.28	6.74
Volatility (winsorized at 0.1%)	1,582,929.00	0.12	0.08	0.02	0.07	0.10	0.14	0.88
Leverage (winsorized at 0.1%)	1,427,009.00	0.22	0.20	0.00	0.06	0.20	0.34	1.97
Invest/A (winsorized at 0.1%)	1,424,094.00	0.04	0.05	0.00	0.01	0.03	0.06	0.44
log (PPE)	1,424,694.00	5.07	2.35	-9.14	3.75	5.14	6.56	12.76
Sales Growth (winsorized at 0.1%)	1,411,697.00	0.17	1.41	-1.00	-0.06	0.04	0.17	33.48
Return on Equity (winsorized at 0.1%)	1,300,416.00	0.03	0.36	-6.96	0.01	0.04	0.08	2.85

Table A.2 Correlation matrix

This table shows the correlations between the variables in our study. We refer to Table A.1 for a description of the variables. *TWU* stands for *Total Water Use*, *DWU* stands for *Direct Water Use* and *IWU* stands for *Indirect Water Use*. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively

	RET (%)	log (TWU)	log (DWU)	log (IWU)	Water Supply	Weighted Water Supply	Water Stress	Water Stress (3m.m.a.)	Water Stress (6m.m.a.)	Weighted Water Stress	W. Water Stress (3m.m.a.)	W. Water Stress (6m.m.a.)	Beta	log (Size)	B/M	Momentum	Leverage	Invest/A	Return on Equity	log (PPE)	Volatility	Sales Growth
RET (%)	1.00***																					
log (TWU)	0.01***	1.00***																				
log (DWU)	0.01***	0.88***	1.00***																			
log (IWU)	0.01***	0.96***	0.77***	1.00***																		
Water Supply	-0.00***	-0.07***	-0.09***	-0.06***	1.00***																	
Weighted Water Supply	-0.00***	-0.07***	-0.09***	-0.06***	1.00***	1.00***																
Water Stress	-0.00***	-0.10***	-0.10***	-0.10***	0.10***	0.10***	1.00***															
Water Stress (3m.m.a)	-0.00***	-0.10***	-0.10***	-0.10***	0.11***	0.11***	0.92***	1.00***														
Water Stress (6m.m.a)	-0.00***	-0.10***	-0.10***	-0.10***	0.11***	0.11***	0.90***	0.98***	1.00***													
Weighted Water Stress	-0.00***	-0.10***	-0.10***	-0.10***	0.10***	0.10***	1.00***	0.92***	0.90***	1.00***												
W. Water Stress (3m.m.a)	-0.00***	-0.10***	-0.10***	-0.10***	0.11***	0.11***	0.92***	1.00***	0.98***	0.92***	1.00***											
W. Water Stress (6m.m.a)	-0.00***	-0.10***	-0.10***	-0.10***	0.11***	0.11***	0.90***	0.98***	1.00***	0.90***	0.98***	1.00***										
Beta	0.02***	-0.04***	-0.03***	-0.03***	-0.09***	-0.09***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	1.00***									
log (Size)	-0.02***	0.58***	0.47***	0.59***	-0.11***	-0.11***	-0.10***	-0.11***	-0.10***	-0.10***	-0.10***	-0.10***	-0.00	1.00***								
B/M	0.01***	0.29***	0.29***	0.27***	0.07***	0.07***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.02***	-0.05***	-0.24***	1.00***							
Momentum	0.02***	0.02***	0.02***	0.02***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	-0.01***	0.03***	0.01***	-0.01***	1.00***						
Leverage	-0.00**	0.19***	0.19***	0.16***	-0.05***	-0.05***	-0.04***	-0.04***	-0.05***	-0.04***	-0.04***	-0.04***	0.09***	0.04***	0.04***	-0.00	1.00***					
Invest/A	0.00***	0.11***	0.14***	0.10***	-0.06***	-0.06***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	-0.03***	0.04***	0.08***	-0.05***	0.00*	0.09***	1.00***				
Return on Equity	-0.00***	0.13***	0.10***	0.13***	0.02***	0.02***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***	-0.06***	0.15***	0.04***	-0.00***	-0.15***	0.02***	1.00***			
log (PPE)	-0.01***	0.79***	0.71***	0.77***	-0.08***	-0.08***	-0.11***	-0.12***	-0.12***	-0.11***	-0.12***	-0.12***	-0.01***	0.62***	0.35***	-0.06***	0.30***	0.25***	0.09***	1.00***		
Volatility	0.02***	-0.27***	-0.21***	-0.27***	-0.07***	-0.07***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.33***	-0.18***	-0.18***	0.29***	0.08***	0.01***	-0.19***	-0.26***	1.00***	
Sales Growth	-0.00***	-0.11***	-0.08***	-0.11***	-0.02***	-0.02***	0.00	0.00	0.00	0.00	0.00	0.00	0.02***	0.00***	-0.08***	-0.01***	-0.01***	0.03***	0.00	-0.07***	0.06***	1.00***

Figure A.1 Histogram Water Stress

Figure A.1 portrays the histogram of the *Water Stress* variable. The variable is an interaction between the *log (Direct Water Use)* and *Water Supply* variables and indicates whether the company experiences water stress. The higher the *Water Stress* variable the higher the water stress.

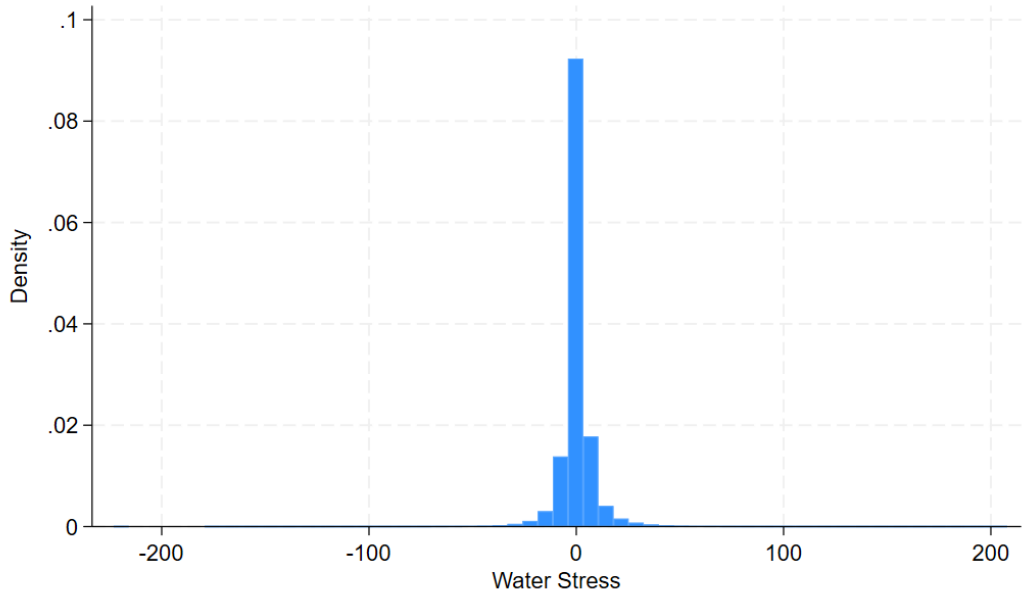
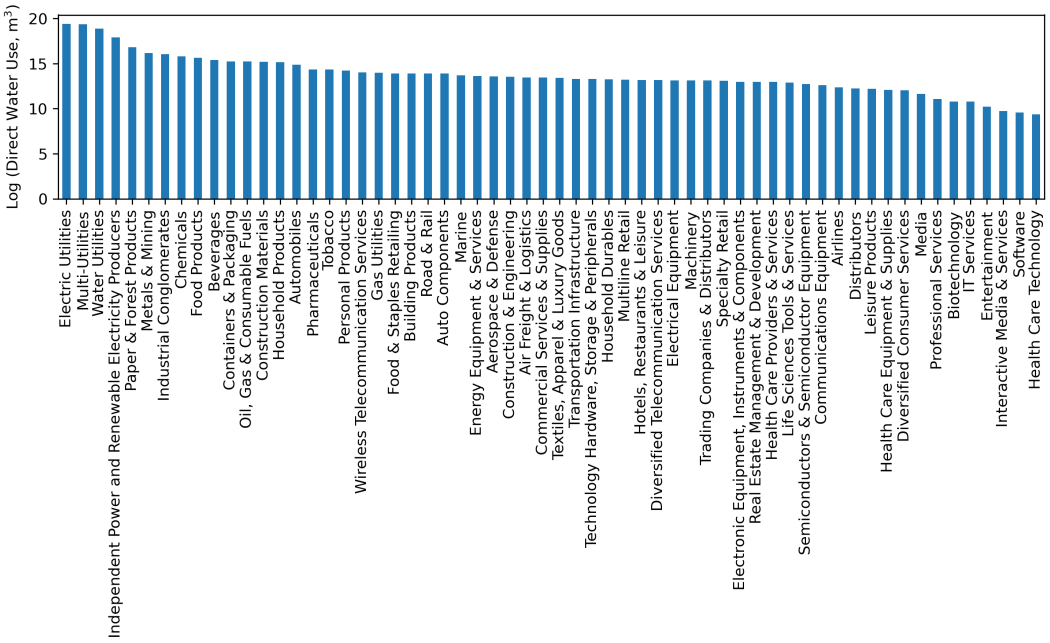
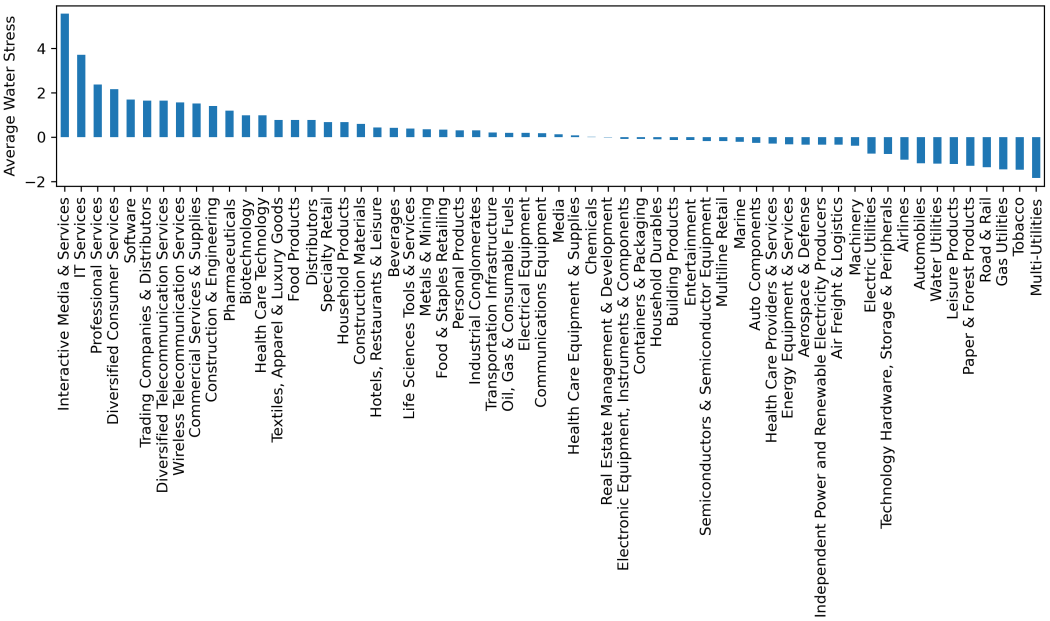


Figure A.2 Direct Water Use and Water Stress by Industry

Figure A.2 **Panel A** showcases the average log (Direct Water Use) by industry. In addition, **Panel B** shows the Water Stress by industry.



Panel A: log (Direct Water Use) by Industry



Panel B: Water Stress by Industry

Table A.3 Water Use and Stock Returns

This table shows the results of regressions to examine the relation between company water use and global stock returns. The dependent variable is the monthly excess stock return for company i in month t. As independent variables, we include the natural logarithm of our total and direct water use variables and the stock-level control variables. We refer to Table A.1 for a description of these variables. Columns (1)-(2) show the results of Eq. 1 using year/month fixed effects. Columns (3)-(4) show the relation using region×year/month fixed effects. Columns (5)-(6) display the relation using industry×year/month fixed effects and columns (7)-(8) display the relation using region×year/month and industry×year/month fixed effects. The uneven columns show the relation for the log (*Total Water Use*) variable. The even columns display the relation for the log (*Direct Water Use*). Intercepts are suppressed to conserve space. The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Dependent Variable: RET	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log (Total Water Use)	0.0432		0.0451		0.0743*		0.0768**	
	(1.3696)		(1.5113)		(1.9726)		(2.1520)	
log (Direct Water Use)		0.0252		0.0236		0.0285		0.0271*
		(1.1827)		(1.4622)		(1.6126)		(1.6954)
Beta	0.3402	0.3392	0.3785	0.3781	0.3018	0.3010	0.3329	0.3331
	(1.0209)	(1.0180)	(1.1046)	(1.1035)	(0.9374)	(0.9347)	(1.0068)	(1.0071)
Size	0.0317	0.0423	-0.0082	0.0031	0.0105	0.0372	-0.0264	0.0015
	(0.3399)	(0.4809)	(-0.0913)	(0.0361)	(0.1091)	(0.4328)	(-0.2897)	(0.0189)
B/M	0.1539**	0.1604**	0.1317*	0.1390*	0.1274	0.1458*	0.1079	0.1271*
	(1.9926)	(2.0902)	(1.7449)	(1.8393)	(1.6284)	(1.9256)	(1.4053)	(1.7024)
Momentum	0.0805	0.0786	0.2200	0.2181	-0.0135	-0.0174	0.1261	0.1220
	(0.3065)	(0.2996)	(0.8839)	(0.8776)	(-0.0560)	(-0.0723)	(0.5632)	(0.5451)
Leverage	-0.1211	-0.1122	-0.2475	-0.2371	-0.0001	0.0356	-0.1365	-0.0994
	(-0.3474)	(-0.3234)	(-0.9687)	(-0.9342)	(-0.0002)	(0.1040)	(-0.5602)	(-0.4193)
INV/A	0.2146	0.1040	0.1623	0.0515	0.2463	0.0499	0.1789	-0.0216
	(0.1841)	(0.0873)	(0.1571)	(0.0491)	(0.2508)	(0.0481)	(0.2013)	(-0.0233)
Return on Equity	-0.1227	-0.1216	-0.1877	-0.1861	-0.0911	-0.0875	-0.1540	-0.1502
	(-0.9220)	(-0.9105)	(-1.5993)	(-1.5808)	(-0.7296)	(-0.6960)	(-1.4105)	(-1.3691)
ln (PPE)	-0.0304	-0.0243	-0.0257	-0.0170	-0.0299	-0.0128	-0.0310	-0.0120
	(-0.5658)	(-0.4133)	(-0.4946)	(-0.2991)	(-0.6423)	(-0.2511)	(-0.7320)	(-0.2523)
Volatility	-0.1679	-0.2533	-1.8789	-1.9569	-0.4270	-0.5172	-2.0662	-2.1472
	(-0.0892)	(-0.1332)	(-1.1674)	(-1.2057)	(-0.2457)	(-0.2955)	(-1.3974)	(-1.4421)
Sales Growth	-0.0565**	-0.0594**	-0.0563**	-0.0594**	-0.0389*	-0.0430*	-0.0385*	-0.0428**
	(-2.3488)	(-2.3938)	(-2.3598)	(-2.4184)	(-1.7870)	(-1.9620)	(-1.8161)	(-1.9848)
Year/month F.E.	Yes	Yes						
Region*Year/month F.E.			Yes	Yes			Yes	Yes
Industry*Year/month F.E.					Yes	Yes	Yes	Yes
Observations	893,153	892,867	893,153	892,867	893,153	892,867	893,153	892,867
R-squared	0.1439	0.1439	0.1854	0.1855	0.1861	0.1861	0.2242	0.2242

Table A.4 Water Use and Stock Returns: Industry variation

This table shows regressions results to examine the relation between company water use and global stock returns within and across industries. The dependent variable is the monthly excess stock return for company i in month t. As independent variables, we include the natural logarithm of our total, direct and indirect water use variables decomposed into *Water Use Across* and *Water Use Within.* and the stock-level control variables. The *Across* and *Within* variables are constructed using Eq. 2 and Eq. 3, respectively. We refer to Table A.1 for a description of the independent variables. Columns (1)-(4) show the results of Eq. 4 using year/month fixed effects. Columns (5)-(8) show the relation using region×year/month fixed effects. Columns (1) and (5) display the relation between the log (*Total Water Use*) variables, whereas columns (2) and (6) depict the results of log (*Direct Water Use*), columns (3) and (7) show the results for log (*Indirect Water Use*). In columns (4) and (8) we include both the log (*Direct Water Use*) and log (*Indirect Water Use*) variables in the analyses. Intercepts and control variables are suppressed to conserve space.The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Dependent Variable: RET (%)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log (Total Water Use *Across*)	0.0074				0.0100			
	(0.1520)				(0.2298)			
log (Total Water Use *Within*)	0.0750**				0.0760**			
	(2.3610)				(2.4801)			
log (Direct Water Use *Across*)		0.0121		0.0428		0.0116		0.0379
		(0.3282)		(1.1981)		(0.3979)		(1.2036)
log (Direct Water Use *Within*)		0.0358**		-0.0046		0.0329**		-0.0098
		(2.1153)		(-0.2145)		(2.2163)		(-0.8752)
log (Indirect Water Use *Across*)			0.0050	-0.0301			0.0099	-0.0215
			(0.0998)	(-0.5863)			(0.2085)	(-0.4152)
log (Indirect Water Use *Within*)			0.0892**	0.1052**			0.0927***	0.1117***
			(2.3839)	(2.3584)			(2.6584)	(3.0508)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year/month F.E.	Yes	Yes	Yes	Yes				
Region*Year/month F.E.					Yes	Yes	Yes	Yes
Observations	893,153	892,867	893,127	892,841	893,153	892,867	893,127	892,841
R-squared	0.1439	0.1439	0.1439	0.1440	0.1855	0.1855	0.1855	0.1855

Table A.5 Water Use and Stock Returns: Industry Variation for High and Low Water Users

This table presents regression results examining whether the relation between water use and global stock returns varies between companies operating in low- versus high-water-use industries. The dependent variable is the monthly excess stock return for company i in month t. As independent variables, we include the natural logarithm of our total, direct and indirect water use variables decomposed into *Water Use Across* (constructed using Eq. 2) and *Water Use Within.* (constructed using Eq. 3) and the stock-level control variables. We refer to Table A.1 for a description of the independent variables. Columns (1)-(3) show the results of Eq. 4 including the *High Water Use* Dummy and the interaction with the *Water Use Within* variables, using year/month fixed effects. Columns (4)-(6) show the relation using region×year/month fixed effects. Columns (1) and (4) display the relation between the log (*Total Water Use*) variables, whereas columns (2) and (5) depict the results of log (*Direct Water Use*), columns (3) and (6) show the results for log (*Indirect Water Use*). Intercepts and control variables are suppressed to conserve space. The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Dependent Variable: RET (%)	(1)	(2)	(3)	(4)	(5)	(6)
High Water Use Dummy	-0.1582	-0.1694	-0.1269	-0.1550	-0.1627*	-0.1284
	(-1.3284)	(-1.5300)	(-1.1754)	(-1.6083)	(-1.6582)	(-1.4369)
log (Total Water Use *Across*)	0.0517			0.0530		
	(0.9057)			(1.2063)		
log (Total Water Use *Within*)	0.1005***			0.0961***		
	(2.9268)			(2.7453)		
log (Total Water Use *Within*) x Dummy	-0.0473			-0.0383		
	(-1.3632)			(-1.2552)		
log (Direct Water Use *Across*)		0.0387			0.0370	
		(0.9675)			(1.3037)	
log (Direct Water Use *Within*)		0.0473*			0.0412*	
		(1.7520)			(1.8697)	
log (Direct Water Use *Within*) x Dummy		-0.0253			-0.0198	
		(-0.8739)			(-0.7967)	
log (Indirect Water Use *Across*)			0.0394			0.0443
			(0.7362)			(0.9506)
log (Indirect Water Use *Within*)			0.1069***			0.1048***
			(2.9925)			(2.9057)
log (Indirect Water Use *Within*) x Dummy			-0.0438			-0.0332
			(-1.2314)			(-1.0799)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year/month F.E.	Yes	Yes	Yes			
Region*Year/month F.E.				Yes	Yes	Yes
Observations	893,153	892,867	893,127	893,153	892,867	893,127
R-squared	0.1440	0.1440	0.1440	0.1855	0.1855	0.1855

Table A.6 Water Stress and Stock Returns

This table shows the results of regressions to examine the relation between company water stress and global stock returns. The dependent variable is the monthly excess stock return for company i in month t. As independent variables, we include the natural logarithm of the direct water use variable decomposed into *Direct Water Use Across* (constructed using Eq. 2) and *Direct Water Use Within* (constructed using Eq. 3), the water supply and water stress variables and the stock-level control variables. We refer to Table A.1 for a description of these variables. **Panel A** show the results of Eq. 5 using year/month fixed effects. **Panel B** depicts the results of Eq. 5 using region×year/month fixed effects. The variables Water Supply and Water Stress are lagged by various horizons ($\tau = 1$, 3, 6 months) or represented as moving averages (3- and 6-months). Columns (1)–(3) present the regression results for different lag periods, specifically $\tau = 1$, 3, and 6 months, respectively. Columns (5) and (6) report results based on moving averages over 3-month and 6-month windows, respectively. Intercepts are suppressed to conserve space. The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Panel A: Year/month F.E.					
Dependent Variable: RET (%)	(1)	(2)	(3)	(4)	(5)
	Lag 1	Lag 3	Lag 6	Mov. Av. 3	Mov. Av. 6
log (Direct Water Use *Across*)	0.0263	0.0232	0.0243	0.0231	0.0222
	(0.6662)	(0.5922)	(0.6120)	(0.6118)	(0.5982)
log (Direct Water Use *Within*)	0.0394**	0.0385**	0.0396**	0.0392**	0.0402**
	(2.1233)	(2.0492)	(2.1074)	(2.1935)	(2.2923)
Water Supply	-0.0132	-0.0173	-0.0291	-0.0150	-0.0223
	(-0.6214)	(-0.9319)	(-1.4038)	(-0.6686)	(-1.0212)
Water Stress	-0.0011	-0.0028	-0.0035	-0.0039	-0.0045
	(-0.3184)	(-0.9658)	(-1.0214)	(-1.1677)	(-1.3270)
Controls	Yes	Yes	Yes	Yes	Yes
Year/month F.E.	Yes	Yes	Yes	Yes	Yes
Observations	787,832	777,658	764,233	839,553	853,949
R-squared	0.1454	0.1483	0.1478	0.1471	0.1460

Table A.6 continued

Columns (1)–(3) present the regression results for different lag periods for the water supply and water stress variables, specifically $\tau = 1$, 3, and 6 months, respectively. Columns (5) and (6) report results based on moving averages of the water supply and water stress variables over 3-month and 6-month windows, respectively. Intercepts are suppressed to conserve space.The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Panel B: Region*Year/month F.E.					
Dependent Variable: RET (%)	(1)	(2)	(3)	(4)	(5)
	Lag 1	Lag 3	Lag 6	Mov. Av. 3	Mov. Av. 6
log (Direct Water Use *Across*)	0.0186	0.0171	0.0249	0.0172	0.0178
	(0.5756)	(0.5297)	(0.7694)	(0.5614)	(0.5908)
log (Direct Water Use *Within*)	0.0357**	0.0313*	0.0366**	0.0342**	0.0350**
	(2.2157)	(1.9026)	(2.2141)	(2.1942)	(2.2832)
Water Supply	-0.0002	0.0010	-0.0035	0.0003	-0.0003
	(-0.0212)	(0.1073)	(-0.4082)	(0.0358)	(-0.0340)
Water Stress	-0.0008	-0.0026	-0.0031	-0.0032	-0.0037
	(-0.2732)	(-1.1119)	(-1.1013)	(-1.1466)	(-1.3180)
Controls	Yes	Yes	Yes	Yes	Yes
Region*Year/month F.E.	Yes	Yes	Yes	Yes	Yes
Observations	787,832	777,658	764,233	839,553	853,949
R-squared	0.1869	0.1891	0.1891	0.1887	0.1875

Table A.7 Water Stress and Stock Returns: High Direct Water Use Industries

This table presents regression results examining whether the relation between water stress and global stock returns varies between companies operating in low- versus high-water-use industries. The dependent variable is the monthly excess stock return for company i in month t. As independent variables, we include the natural logarithm of the direct water use variable decomposed into *Direct Water Use Across* (constructed using Eq. 2) and *Direct Water Use Within* (constructed using Eq. 3), the water supply and water stress variables and the stock-level control variables. We refer to Table A.1 for a description of all these variables. We include a dummy variable equal to 1 if firm i's industry-average direct water use exceeds the median direct water use across all industries. We interact the dummy with all variables expect the *Across* variable which already captures between industry direct water use. **Panel A** show the results of Eq. 5 using year/month fixed effects. **Panel B** depicts the results of Eq. 5 using region×year/month fixed effects. The variables Water Supply and Water Stress are lagged by various horizons (τ = 1, 3, 6 months) or represented as moving averages (3- and 6-months). Columns (1)–(3) present the regression results for different lag periods, specifically τ = 1, 3, and 6 months, respectively. Columns (4) and (5) report results based on moving averages over 3-month and 6-month windows, respectively. Intercepts are suppressed to conserve space.The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Panel A: Year/month F.E.					
Dependent Variable: RET (%)	(1)	(2)	(3)	(4)	(5)
	Lag 1	Lag 3	Lag 6	Mov. Av. 3	Mov. Av. 6
High Direct Water Use Dummy	-0.1253	-0.0964	-0.1122	-0.1315	-0.1199
	(-0.8668)	(-0.6585)	(-0.7633)	(-0.9590)	(-0.8848)
log (Direct Water Use *Across*)	0.0534	0.0448	0.0488	0.0512	0.0479
	(1.3381)	(1.1313)	(1.2065)	(1.3356)	(1.2705)
log (Direct Water Use *Within*)	0.0638**	0.0601**	0.0617**	0.0598**	0.0608**
	(2.4718)	(2.2870)	(2.3437)	(2.3875)	(2.4663)
log (Direct Water Use *Within*) x Dummy	-0.0456**	-0.0408*	-0.0413*	-0.0394*	-0.0388*
	(-2.0502)	(-1.7910)	(-1.7850)	(-1.8356)	(-1.8330)
Water Supply	-0.0134	-0.0127	-0.0274	-0.0131	-0.0210
	(-0.5841)	(-0.6505)	(-1.3320)	(-0.5516)	(-0.9225)
Water Supply x Dummy	0.0013	-0.0123	-0.0042	-0.0043	-0.0028
	(0.1018)	(-0.9374)	(-0.3151)	(-0.3132)	(-0.2007)
Water Stress	-0.0036	-0.0052	-0.0055	-0.0075*	-0.0074*
	(-0.8275)	(-1.4126)	(-1.3424)	(-1.7426)	(-1.7416)
Water Stress x Dummy	0.0077**	0.0069*	0.0060*	0.0103***	0.0086**
	(2.0675)	(1.9642)	(1.7919)	(2.6279)	(2.3293)
Controls	Yes	Yes	Yes	Yes	Yes
Year/month F.E.	Yes	Yes	Yes	Yes	Yes
Observations	787,832	777,658	764,233	839,553	853,949
R-squared	0.1454	0.1483	0.1478	0.1471	0.1460

Table A.7 continued

Columns (1)–(3) present the regression results for different lag periods for the water supply and water stress variables, specifically $\tau = 1$, 3, and 6 months, respectively. Columns (5) and (6) report results based on moving averages of the water supply and water stress variables over 3-month and 6-month windows, respectively. The dummy variable equals 1 if firm i's industry-average direct water use exceeds the median direct water use across all industries. Intercepts are suppressed to conserve space.The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Panel B: Region*Year/month F.E.					
Dependent Variable: RET (%)	(1)	(2)	(3)	(4)	(5)
	Lag 1	Lag 3	Lag 6	Mov. Av. 3	Mov. Av. 6
High Direct Water Use Dummy	-0.1251	-0.1053	-0.1004	-0.1304	-0.1179
	(-0.8832)	(-0.7331)	(-0.7000)	(-0.9713)	(-0.8900)
log (Direct Water Use *Across*)	0.0449	0.0400	0.0466	0.0445	0.0426
	(1.4738)	(1.2882)	(1.4913)	(1.4993)	(1.4555)
log (Direct Water Use *Within*)	0.0560**	0.0503**	0.0552**	0.0517**	0.0523**
	(2.5707)	(2.2556)	(2.4655)	(2.4333)	(2.5093)
log (Direct Water Use *Within*) x Dummy	-0.0383*	-0.0361	-0.0349	-0.0339	-0.0330
	(-1.7728)	(-1.6338)	(-1.5602)	(-1.6219)	(-1.6116)
Water Supply	-0.0003	0.0046	-0.0016	0.0017	0.0008
	(-0.0375)	(0.4124)	(-0.1568)	(0.1599)	(0.0787)
Water Supply x Dummy	0.0010	-0.0097	-0.0049	-0.0032	-0.0027
	(0.0760)	(-0.7419)	(-0.3695)	(-0.2349)	(-0.1932)
Water Stress	-0.0033	-0.0051*	-0.0047	-0.0068**	-0.0066**
	(-0.9633)	(-1.7951)	(-1.5559)	(-2.0452)	(-2.0657)
Water Stress x Dummy	0.0075**	0.0069**	0.0049*	0.0100***	0.0082***
	(2.5247)	(2.3521)	(1.7612)	(3.2693)	(2.9233)
Controls	Yes	Yes	Yes	Yes	Yes
Region*Year/month F.E.	Yes	Yes	Yes	Yes	Yes
Observations	787,832	777,658	764,233	839,553	853,949
R-squared	0.1870	0.1892	0.1892	0.1888	0.1875

Table A.8 Water Stress and Stock Returns: Paris

This table presents regression results examining whether the relation between water stress and global stock returns changes after the Paris conference. The dependent variable is the monthly excess stock return for company i in month t. As independent variables, we include the natural logarithm of the direct water use variable decomposed into *Direct Water Use Across* (constructed using Eq. 2) and *Direct Water Use Within* (constructed using Eq. 3), the water supply and water stress variables and the stock-level control variables. We refer to Table A.1 for a description of all these variables. The Post Paris dummy variable equals 1 during the years 2016-2024. We interact the dummy with all water use and water stress variables. **Panel A** show the results of Eq. 5, including the dummy and interactions using year/month fixed effects. **Panel B** depicts the results of Eq. 5, including the dummy and interactions using region×year/month fixed effects. The variables Water Supply and Water Stress are lagged by various horizons (τ = 1, 3, 6 months) or represented as moving averages (3- and 6-months). Columns (1)–(3) present the regression results for different lag periods, specifically τ = 1, 3, and 6 months, respectively. Columns (4) and (5) report results based on moving averages over 3-month and 6-month windows, respectively. Intercepts are suppressed to conserve space. The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Panel A: Year/month F.E.					
Dependent Variable: RET (%)	(1)	(2)	(3)	(4)	(5)
	Lag 1	Lag 3	Lag 6	Mov. Av. 3	Mov. Av. 6
log (Direct Water Use *Across*)	-0.0967	-0.1701*	-0.1596	-0.1677**	-0.1691**
	(-1.1429)	(-1.7471)	(-1.6295)	(-2.1554)	(-2.1620)
log (Direct Water Use *Across*) x Dummy	0.1263	0.1993*	0.1893*	0.1981**	0.1985**
	(1.3247)	(1.8659)	(1.7615)	(2.2366)	(2.2415)
log (Direct Water Use *Within*)	0.0175	-0.0368	-0.0025	-0.0205	-0.0222
	(0.1967)	(-0.5129)	(-0.0301)	(-0.3198)	(-0.3387)
log (Direct Water Use *Within*) x Dummy	0.0227	0.0781	0.0438	0.0625	0.0653
	(0.2504)	(1.0590)	(0.5078)	(0.9489)	(0.9705)
Water Supply	-0.0579	-0.0598	-0.0401	-0.0586	-0.0545
	(-1.1754)	(-1.3087)	(-0.4955)	(-1.2031)	(-1.1306)
Water Supply x Dummy	0.0452	0.0432	0.0112	0.0443	0.0328
	(0.8434)	(0.8719)	(0.1338)	(0.8230)	(0.6159)
Water Stress	-0.0201	-0.0155	-0.0357	-0.0408**	-0.0477*
	(-0.8037)	(-1.0593)	(-0.9183))	(-2.0906)	(-1.8395)
Water Stress x Dummy	0.0192	0.0128	0.0325	0.0373*	0.0437*
	(0.7627)	(0.8729)	(0.8354)	(1.9050)	(1.6811)
Controls	Yes	Yes	Yes	Yes	Yes
Year/month F.E.	Yes	Yes	Yes	Yes	Yes
Observations	787,832	777,658	764,233	839,553	853,949
R-squared	0.1454	0.1483	0.1478	0.1471	0.1460

Table A.8 continued

Columns (1)–(3) present the regression results for different lag periods for the water supply and water stress variables, specifically $\tau = 1$, 3, and 6 months, respectively. Columns (4) and (5) report results based on moving averages of the water supply and water stress variables over 3-month and 6-month windows, respectively. The Post Paris dummy variable equals 1 during the years 2016-2024. Intercepts and control variables are suppressed to conserve space. The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Panel B: Region*Year/month F.E.					
Dependent Variable: RET (%)	(1)	(2)	(3)	(4)	(5)
	Lag 1	Lag 3	Lag 6	Mov. Av. 3	Mov. Av. 6
log (Direct Water Use *Across*)	-0.1100	-0.1561**	-0.1476*	-0.1533**	-0.1552**
	(-1.3705)	(-2.0402)	(-1.7793)	(-2.2675)	(-2.2931)
log (Direct Water Use *Across*) x Dummy	0.1320	0.1788**	0.1777*	0.1772**	0.1797**
	(1.4711)	(2.0614)	(1.9263)	(2.2737)	(2.3133)
log (Direct Water Use *Within*)	-0.0195	-0.0844	-0.0463	-0.0588	-0.0610
	(-0.2800)	(-1.3550)	(-0.6817)	(-1.1189)	(-1.1596)
log (Direct Water Use *Within*) x Dummy	0.0568	0.1195*	0.0855	0.0969*	0.1000*
	(0.7959)	(1.8640)	(1.2290)	(1.7880)	(1.8443)
Water Supply	-0.0852**	-0.0861***	-0.0713	-0.1079***	-0.1130***
	(-2.3152)	(-3.6718)	(-1.2273)	(-2.9327)	(-2.8530)
Water Supply x Dummy	0.0863**	0.0886***	0.0688	0.1102***	0.1146***
	(2.2978)	(3.4997)	(1.1711)	(2.9014)	(2.8150)
Water Stress	-0.0093	-0.0049	-0.0311	-0.0328*	-0.0399*
	(-0.4113)	(-0.2906)	(-1.0771)	(-1.7605)	(-1.8751)
Water Stress x Dummy	0.0086	0.0023	0.0282	0.0299	0.0365*
	(0.3770)	(0.1343)	(0.9749)	(1.5946)	(1.7092)
Controls	Yes	Yes	Yes	Yes	Yes
Region*Year/month F.E.	Yes	Yes	Yes	Yes	Yes
Observations	787,832	777,658	764,233	839,553	853,949
R-squared	0.1869	0.1892	0.1892	0.1888	0.1875

Table A.9 Water Stress and Stock Returns: Glasgow

This table presents regression results examining whether the relation between water stress and global stock returns varies after the Glasgow conference. The dependent variable is the monthly excess stock return for company i in month t. As independent variables, we include the natural logarithm of the direct water use variable decomposed into *Direct Water Use Across* (constructed using Eq. 2) and *Direct Water Use Within* (constructed using Eq. 3), the water supply and water stress variables and the stock-level control variables. We refer to Table A.1 for a description of all these variables. The Post Glasgow dummy variable equals 1 during the years 2022-2024. We interact the dummy with all water use and water stress variables. **Panel A** show the results of Eq. 5, including the dummy and interactions using year/month fixed effects. **Panel B** depicts the results of Eq. 5, including the dummy and interactions using region×year/month fixed effects. The variables Water Supply and Water Stress are lagged by various horizons (τ = 1, 3, 6 months) or represented as moving averages (3- and 6-months). Columns (1)–(3) present the regression results for different lag periods, specifically τ = 1, 3, and 6 months, respectively. Columns (4) and (5) report results based on moving averages over 3-month and 6-month windows, respectively. Intercepts are suppressed to conserve space. The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Panel A: Year/month F.E.					
Dependent Variable: RET (%)	(1)	(2)	(3)	(4)	(5)
	Lag 1	Lag 3	Lag 6	Mov. Av. 3	Mov. Av. 6
log (Direct Water Use *Across*)	-0.0453	-0.0496	-0.0444	-0.0426	-0.0413
	(-0.9695)	(-1.0905)	(-0.9267)	(-0.9762)	(-0.9690)
log (Direct Water Use *Across*) x Dummy	0.1566	0.1566	0.1456	0.1521	0.1495
	(1.4741)	(1.4791)	(1.3697)	(1.4506)	(1.4362)
log (Direct Water Use *Within*)	-0.0162	-0.0131	-0.0137	-0.0078	-0.0052
	(-0.5782)	(-0.4588)	(-0.4689)	(-0.3029)	(-0.2074)
log (Direct Water Use *Within*) x Dummy	0.1153**	0.1061**	0.1075**	0.1032**	0.1012**
	(2.3415)	(2.1154)	(2.1301)	(2.1467)	(2.1201)
Water Supply	-0.0452	-0.0635*	-0.0728*	-0.0562	-0.0620
	(-1.2596)	(-1.8420)	(-1.7863)	(-1.4411)	(-1.6296)
Water Supply x Dummy	0.0600	0.0865**	0.0802	0.0796	0.0770
	(1.2878)	(2.0253)	(1.6214)	(1.5613)	(1.5353)
Water Stress	-0.0062	-0.0037	-0.0070	-0.0064	-0.0073
	(-1.2262)	(-0.8610)	(-1.3856)	(-1.2739)	(-1.4644)
Water Stress x Dummy	0.0092	0.0015	0.0059	0.0045	0.0050
	(1.3836)	(0.2531)	(0.8620)	(0.6658)	(0.7290)
Controls	Yes	Yes	Yes	Yes	Yes
Year/month F.E.	Yes	Yes	Yes	Yes	Yes
Observations	787,832	777,658	764,233	839,553	853,949
R-squared	0.1457	0.1486	0.1481	0.1474	0.1462

Table A.9 continued

Columns (1)–(3) present the regression results for different lag periods for the water supply and water stress variables, specifically $\tau = 1$, 3, and 6 months, respectively. Columns (4) and (5) report results based on moving averages of the water supply and water stress variables over 3-month and 6-month windows, respectively. The Post Glasgow dummy variable equals 1 during the years 2022-2024. Intercepts and control variables are suppressed to conserve space.The t-statistics are double clustered at the firm and month/year level. ***, **, * indicate statistical significance at 1%, 5%, and 10% levels, respectively.

Panel B: Region*Year/month F.E.					
Dependent Variable: RET (%)	(1)	(2)	(3)	(4)	(5)
	Lag 1	Lag 3	Lag 6	Mov. Av. 3	Mov. Av. 6
log (Direct Water Use *Across*)	-0.0485	-0.0486	-0.0333	-0.0414	-0.0389
	(-1.1603)	(-1.1648)	(-0.8060)	(-1.0743)	(-1.0382)
log (Direct Water Use *Across*) x Dummy	0.1483	0.1437	0.1252	0.1381	0.1359
	(1.5328)	(1.4862)	(1.3028)	(1.4514)	(1.4375)
log (Direct Water Use *Within*)	-0.0148	-0.0217	-0.0125	-0.0106	-0.0081
	(-0.5238)	(-0.7503)	(-0.4253)	(-0.4094)	(-0.3215)
log (Direct Water Use *Within*) x Dummy	0.1048**	0.1089**	0.0993**	0.0985**	0.0963**
	(2.1735)	(2.2389)	(2.0248)	(2.1086)	(2.0845)
Water Supply	0.0043	-0.0078	-0.0104	-0.0048	-0.0050
	(0.3558)	(-0.6497)	(-0.8031)	(-0.3587)	(-0.3780)
Water Supply x Dummy	-0.0079	0.0174	0.0135	0.0109	0.0102
	(-0.5087)	(0.9681)	(0.7916)	(0.5974)	(0.5649)
Water Stress	-0.0043	-0.0036	-0.0052	-0.0047	-0.0050
	(-1.0020)	(-1.1267)	(-1.4443)	(-1.1908)	(-1.3472)
Water Stress x Dummy	0.0064	0.0015	0.0036	0.0028	0.0024
	(1.1469)	(0.3373)	(0.6661)	(0.5067)	(0.4472)
Controls	Yes	Yes	Yes	Yes	Yes
Region*Year/month F.E.	Yes	Yes	Yes	Yes	Yes
Observations	787,832	777,658	764,233	839,553	853,949
R-squared	0.1870	0.1892	0.1892	0.1888	0.1875