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Corporate payout, cash holdings, and the COVID-19 crisis: Evidence from the G-7 countries

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ABSTRACT

This paper examines the impact of the COVID-19 pandemic on the adjustments of dividends and share repurchases of publicly listed firms in the G-7 countries. Firms in the United Kingdom, Germany, France, and Italy experienced a widespread cut in dividends, while firms in the United States and Canada cut cash payout more via share repurchases, with Japanese firms in between. Corporate cash holdings helped mitigate the negative impact of COVID on payout adjustments, but the impact was less significant for European firms.

1. Introduction

COVID-19, declared by the World Health Organization (WHO) as a global pandemic in March 2020, is a health crisis that caused tremendous economic disruption around the world. For many businesses, it led to a significant drop in their cash flows and induced higher uncertainty about the future business perspective. Hence, surviving the pandemic became a top priority for corporate executives, especially during the early stage of the COVID crisis. As Iyer and Simkins (2022, p. 13) point out, “The corporate response to the COVID crisis with respect to survival mode financing, investing, and payout policies is still emerging across the world. More research is needed in this area”. In this study, we aim to bring new insights on the business impacts of COVID by exploring corporate adjustments of payout policies, including both dividends and share repurchases, in an international setting, with emphasis on potential differences across countries.

Cash dividends and share repurchases are the two channels employed by corporations to distribute cash to their shareholders. Corporations are very conservative on dividend decisions because maintaining historical dividend levels is regarded as a strong commitment to shareholders, and dividend cuts are only considered in extreme situations. Share repurchases tend to be more flexible and are often considered a substitute for dividends (DeAngelo and DeAngelo, 1990; Gruillon and Michaely, 2002; Brav et al., 2005). In recent years, firms in the U.S. have distributed more cash via share repurchases than dividends, and in many other countries share repurchases have gradually grown after regulatory restrictions were eased (Lee and Suh, 2011; Floyd et al., 2015; Wang et al., 2021). Hence, a comprehensive analysis of COVID impacts on payout policy requires us to examine both dividends and share repurchases.

Further, we should be aware of potential differences in payout adjustments across countries. As reviewed by Booth and Zhou (2017), past studies have found that legal protection, financial market development, economic growth, politics, and culture contribute to differences in corporate payout policies across countries. During the COVID crisis, governments differed in their responses, and some may have impact on corporate cash payouts. For example, the Coronavirus Large Business Interruption Loan Scheme (CLBILS)
provided by the UK government required that “companies borrowing more than £50 million through CLBILS will be subject to restrictions on dividend payments, senior pay and share buy-backs during the period of the loan”. However, the Canada Emergency Wage Subsidy (CEWS) program provided by the federal government imposed no restrictions on corporate payout. Thus, studying payout adjustments in an international setting may offer new insights.

Using a sample of listed firms from G-7 countries, we find that many firms reduced cash payout through dividends and share repurchases during the COVID year of 2020, compared to pre-COVID years. However, the scales of adjustment through these two channels vary across countries. Firms in Europe (UK, Germany, France, and Italy) experienced a widespread cut in dividends, while firms in the United States and Canada cut cash payout more via share repurchases, with Japanese firms in between. Furthermore, we use logistic regressions to quantify COVID’s impact on these adjustments, and explore whether corporate cash holdings provided a mitigating effect. Due to costly external financing, firms have incentives to hoard cash to mitigate the negative impacts of unexpected shocks to cash flows or investment opportunities (Opler et al., 1999; Bates et al., 2009). This precautionary cash holding—an important component of financial flexibility—was particularly important during the onset of COVID. Several recent studies on COVID show that

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1 https://www.gov.uk/government/news/larger-businesses-to-benefit-from-loans-of-up-to-200-million
2 In Appendix 1, we provide more details on some COVID relief programs provided by governments in G-7 countries.

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Table 1
Sample breakdown and summary statistics.
This table presents the sample distribution by year (Panel A), country (Panel B), and industry (Panel C), as well as the summary statistics of variables used in our analysis (Panel D).

Panel A

| Year   | N     | %   |
|--------|-------|-----|
| 2015   | 6087  | 16.07 |
| 2016   | 6295  | 16.62 |
| 2017   | 6493  | 17.14 |
| 2018   | 6512  | 17.19 |
| 2019   | 6325  | 16.70 |
| 2020   | 6173  | 16.29 |
| Total  | 37,885| 100  |

Panel B

| Country                | N  | %   |
|------------------------|----|-----|
| Canada                 | 2130 | 5.62 |
| France                 | 2339 | 6.17 |
| United Kingdom (UK)    | 3658 | 9.66 |
| Germany                | 1711 | 4.52 |
| Italy                  | 1091 | 2.88 |
| Japan                  | 15,256 | 40.27 |
| United States (USA)    | 11,700 | 30.88 |
| Total                  | 37,885 | 100  |

Panel C

| Fama–French 12 industries | N    | %   |
|---------------------------|------|-----|
| Consumer Non-Durables     | 2880 | 7.60 |
| Consumer Durables         | 1459 | 3.85 |
| Manufacturing             | 5739 | 15.15 |
| Energy                    | 1335 | 3.52 |
| Chemicals                 | 1539 | 4.06 |
| Business Equipment        | 7015 | 18.52 |
| Telecommunication         | 766  | 2.02 |
| Shops                     | 5679 | 14.99 |
| Healthcare                | 2410 | 6.36 |
| Other (Mines, Construction, etc.) | 9063 | 23.92 |
| Total                     | 37,885 | 100  |

Panel D

|                         | Mean | Std Dev | p25  | Median | p75  | N  |
|-------------------------|------|---------|------|--------|------|----|
| Cash/TA                 | 0.197| 0.187   | 0.063| 0.140  | 0.269| 37,702|
| TD/TA                   | 0.217| 0.197   | 0.043| 0.183  | 0.333| 37,487|
| Volatility              | 0.099| 0.061   | 0.061| 0.084  | 0.118| 36,511|
| Cash Flow/TA            | 0.051| 0.175   | 0.026| 0.064  | 0.111| 37,524|
| Size                    | 13.216| 2.104 | 11.816| 13.152 | 14.595| 37,772|
| RE/TA                   | 0.033| 1.164   | 0.058| 0.256  | 0.443| 37,402|
| SGR                     | 0.096| 0.279   | -0.011|0.047  | 0.129| 37,229|
firms with more cash reserves suffered milder declines in stock returns (Fahlenbrach et al., 2021; Ding et al., 2021), had better operating performance, and experienced less several impact on investments (Zheng, 2022; Tawiah and Keefe, 2022), compared with cash-poor peers. Corporate payout policy is about distributing cash to shareholders. When COVID hit, firms with more cash in hand should face less pressure to preserve and enhance financial flexibility by cutting cash payout, or have more financial capacity to maintain or increase payout. Hence, cash holdings should help mitigate the negative impact of COVID shock on corporate payouts. This prediction is supported by the findings of our empirical tests. We show that firms are more (less) likely to decrease (increase) their dividends or share repurchases after COVID hit, but COVID’s impact is less severe for firms with more cash holdings. The mitigating effect of cash holdings is strong in North America and Japan, but lacks statistical significance for European firms.

Table 2
Annual percentage of dividend-paying firms and repurchasing firms.
This table presents the number and percentage of firms that pay dividends or repurchase shares each year among all G-7 countries (Panel A) and in each country (Panel B). The sample contains observations of firms that had ever distributed cash payout through dividends or repurchases during the sample period.

Panel A: All G-7 countries

| Year | Dividend-paying Firms | Repurchasing firms |
|------|-----------------------|--------------------|
|      | N                     | N                  | N                  |
| 2015 | 6087                  | 4412               | 3135               |
| 2016 | 6295                  | 4495               | 3185               |
| 2017 | 6493                  | 4611               | 3255               |
| 2018 | 6512                  | 4619               | 3391               |
| 2019 | 6325                  | 4530               | 3353               |
| 2020 | 6173                  | 4083               | 3129               |

Panel B: Country-by-Country

USA

| Year | Dividend-Paying | Repurchasing | Dividend-Paying | Repurchasing |
|------|-----------------|--------------|-----------------|--------------|
|      | N               | N            | N               | N            |
| 2015 | 1889            | 942          | 1210            | 64.1%        |
| 2016 | 1957            | 949          | 1234            | 63.1%        |
| 2017 | 2032            | 971          | 1212            | 59.6%        |
| 2018 | 2015            | 962          | 1277            | 63.4%        |
| 2019 | 1929            | 921          | 1239            | 64.2%        |
| 2020 | 1878            | 886          | 1177            | 62.7%        |

Canada

| Year | Dividend-Paying | Repurchasing | Dividend-Paying | Repurchasing |
|------|-----------------|--------------|-----------------|--------------|
|      | N               | N            | N               | N            |
| 2015 | 359             | 235          | 126             | 35.1%        |
| 2016 | 364             | 217          | 117             | 32.1%        |
| 2017 | 369             | 214          | 138             | 37.4%        |
| 2018 | 361             | 214          | 166             | 46.0%        |
| 2019 | 345             | 209          | 167             | 48.4%        |
| 2020 | 332             | 199          | 165             | 49.7%        |

United Kingdom

| Year | Dividend-Paying | Repurchasing | Dividend-Paying | Repurchasing |
|------|-----------------|--------------|-----------------|--------------|
|      | N               | N            | N               | N            |
| 2015 | 591             | 470          | 193             | 32.7%        |
| 2016 | 621             | 488          | 198             | 31.9%        |
| 2017 | 654             | 506          | 216             | 33.0%        |
| 2018 | 635             | 491          | 207             | 32.6%        |
| 2019 | 596             | 474          | 226             | 37.9%        |
| 2020 | 561             | 305          | 198             | 35.3%        |

Germany

| Year | Dividend-Paying | Repurchasing | Dividend-Paying | Repurchasing |
|------|-----------------|--------------|-----------------|--------------|
|      | N               | N            | N               | N            |
| 2015 | 274             | 219          | 50              | 18.2%        |
| 2016 | 279             | 220          | 46              | 16.5%        |
| 2017 | 285             | 220          | 49              | 17.2%        |
| 2018 | 294             | 235          | 52              | 17.7%        |
| 2019 | 290             | 220          | 49              | 16.9%        |
| 2020 | 289             | 180          | 48              | 16.6%        |

France

| Year | Dividend-Paying | Repurchasing | Dividend-Paying | Repurchasing |
|------|-----------------|--------------|-----------------|--------------|
|      | N               | N            | N               | N            |
| 2015 | 382             | 256          | 158             | 41.4%        |
| 2016 | 399             | 255          | 164             | 41.1%        |
| 2017 | 401             | 263          | 173             | 43.1%        |
| 2018 | 401             | 264          | 204             | 50.9%        |
| 2019 | 387             | 249          | 158             | 40.8%        |
| 2020 | 369             | 155          | 153             | 41.5%        |

Italy

| Year | Dividend-Paying | Repurchasing | Dividend-Paying | Repurchasing |
|------|-----------------|--------------|-----------------|--------------|
|      | N               | N            | N               | N            |
| 2015 | 157             | 98           | 42              | 26.8%        |
| 2016 | 169             | 116          | 60              | 35.5%        |
| 2017 | 188             | 120          | 51              | 27.1%        |
| 2018 | 199             | 131          | 73              | 36.7%        |
| 2019 | 194             | 131          | 78              | 40.2%        |
| 2020 | 184             | 72           | 68              | 37.0%        |

Japan

| Year | Dividend-Paying | Repurchasing | Dividend-Paying | Repurchasing |
|------|-----------------|--------------|-----------------|--------------|
|      | N               | N            | N               | N            |
| 2015 | 2435            | 2192         | 1356            | 55.7%        |
| 2016 | 2506            | 2250         | 1366            | 54.5%        |
| 2017 | 2564            | 2317         | 1416            | 55.2%        |
| 2018 | 2607            | 2322         | 1412            | 54.2%        |
| 2019 | 2584            | 2326         | 1436            | 55.6%        |
| 2020 | 2560            | 2286         | 1320            | 51.6%        |
Our paper adds to several strands of literature. First, we contribute to the emerging literature examining COVID-19 impacts on corporate decisions, such as corporate investments, financing, and payout policies (Krieger et al., 2021; Zheng, 2022; Tawiah and Keefe, 2022; Ali, 2022; Pettenuzzo et al., 2021). In particular, the pioneering work by Krieger et al. (2021) and Ali (2022) study the adjustment of dividend policy in the U.S. and a pooled sample of G-13 countries, and Pettenuzzo et al. (2021) examine reductions in dividends and share repurchases in the U.S. We add new insights by examining changes in both dividends and share repurchases, and documenting the differences and similarities across countries. Second, we add to the literature exploring the importance of financial flexibility on corporate decisions, particularly during challenging situations caused by unexpected exogenous shocks. Bliss et al. (2015) study U.S. firms’ payouts during the 2008–09 financial crisis and find that payout reductions are more likely in firms with less financial Table 3
Annual aggregate dividends, repurchases, and total payout.

This table presents aggregate dividends, repurchases, and total payout each year for all G-7 countries (Panel A) and for each country (Panel B). All the amounts have been converted into 2020 U.S. dollars. The last two columns of each table report the portions of aggregate cash payout distributed through dividends and through share repurchases each year.

| Panel A: All G-7 countries | In Millions USD (2020 constant) | As the percentage of Aggregate Total Payout | Aggregate Dividends | Aggregate Repurchase | Aggregate Dividends | Aggregate Repurchase |
|-----------------------------|---------------------------------|--------------------------------------------|---------------------|---------------------|---------------------|---------------------|
| Year                        | Aggregate Total Payout          | Aggregate Total Payout                     |                      |                      |                      |                      |
| 2015                        | 1261,405                        | 623,580                                    | 50.6%               | 49.4%               |
| 2016                        | 1229,273                        | 626,920                                    | 50.6%               | 49.4%               |
| 2017                        | 1216,268                        | 679,696                                    | 55.9%               | 44.1%               |
| 2018                        | 1551,743                        | 724,535                                    | 53.3%               | 46.7%               |
| 2019                        | 1483,019                        | 757,655                                    | 48.9%               | 51.1%               |
| 2020                        | 1198,664                        | 672,548                                    | 43.9%               | 56.1%               |

| Panel B: Country-by-Country | In Millions USD (2020 constant) | As the percentage of Aggregate Total Payout | Aggregate Dividends | Aggregate Repurchase | Aggregate Dividends | Aggregate Repurchase |
|-----------------------------|---------------------------------|--------------------------------------------|---------------------|---------------------|---------------------|---------------------|
| Year                        | Aggregate Total Payout          | Aggregate Total Payout                     |                      |                      |                      |                      |
| USA                         | 909,723                         | 363,814                                    | 40.0%               | 60.0%               |
| 2016                        | 905,168                         | 382,447                                    | 42.3%               | 57.7%               |
| 2017                        | 844,278                         | 393,988                                    | 46.7%               | 53.3%               |
| 2018                        | 1115,642                        | 416,909                                    | 61.6%               | 38.4%               |
| 2019                        | 1006,036                        | 411,905                                    | 60.9%               | 39.1%               |
| 2020                        | 844,458                         | 398,180                                    | 52.8%               | 47.2%               |
| Canada                      | 33,135                          | 21,336                                     | 64.4%               | 35.6%               |
| 2016                        | 29,262                          | 18,423                                     | 63.0%               | 37.0%               |
| 2017                        | 38,199                          | 20,876                                     | 54.7%               | 45.3%               |
| 2018                        | 51,746                          | 21,800                                     | 57.9%               | 42.1%               |
| 2019                        | 42,547                          | 23,686                                     | 44.3%               | 55.7%               |
| 2020                        | 31,722                          | 9,660                                      | 30.3%               | 69.7%               |
| UK                          | 94,593                          | 79,840                                     | 84.4%               | 15.6%               |
| 2015                        | 82,100                          | 67,919                                     | 82.7%               | 17.3%               |
| 2016                        | 102,675                         | 82,387                                     | 80.2%               | 19.8%               |
| 2017                        | 112,036                         | 85,263                                     | 76.1%               | 23.9%               |
| 2018                        | 124,994                         | 98,062                                     | 78.5%               | 21.5%               |
| 2019                        | 85,430                          | 75,609                                     | 85.5%               | 11.6%               |
| Germany                     | 38,964                          | 34,471                                     | 88.5%               | 11.5%               |
| 2015                        | 36,224                          | 33,602                                     | 92.8%               | 7.2%                |
| 2016                        | 49,209                          | 43,960                                     | 93.9%               | 6.1%                |
| 2017                        | 51,681                          | 40,826                                     | 85.4%               | 14.6%               |
| 2018                        | 49,161                          | 37,522                                     | 73.8%               | 26.2%               |
| 2019                        | 50,954                          | 39,966                                     | 78.4%               | 21.6%               |
| 2020                        | 50,430                          | 40,392                                     | 78.2%               | 21.8%               |
| France                      | 9166                            | 8666                                       | 94.5%               | 5.5%                |
| 2015                        | 8402                            | 7234                                       | 86.1%               | 13.9%               |
| 2016                        | 10,124                          | 9087                                       | 89.8%               | 10.2%               |
| 2017                        | 10,663                          | 8924                                       | 83.7%               | 16.3%               |
| 2018                        | 16,816                          | 14,223                                     | 84.6%               | 15.4%               |
| 2020                        | 6699                            | 5797                                       | 86.5%               | 13.5%               |
| Japan                       | 124,143                         | 77,302                                     | 62.3%               | 37.7%               |
| 2015                        | 118,957                         | 80,174                                     | 67.4%               | 32.6%               |
| 2016                        | 125,827                         | 92,794                                     | 73.7%               | 26.3%               |
| 2017                        | 149,539                         | 99,725                                     | 66.7%               | 33.3%               |
| 2018                        | 173,704                         | 109,978                                    | 63.3%               | 36.7%               |
| 2019                        | 136,009                         | 93,887                                     | 69.0%               | 31.0%               |

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3. Empirical results

Descriptive statistics

Our sample includes firms that distributed cash to shareholders via dividends or share repurchases during 2015–2020. Table 2 Panel A shows an overall larger portion of dividend payers than repurchasing firms in the G-7 countries, with the portions of both dividend-paying firms and repurchasing firms dropping after the COVID pandemic started. Panel B reports the statistics across countries. USA is the only country with more firms repurchasing shares than paying dividends, while Japan has the highest proportion of dividend payers. Moreover, four European countries (UK, Germany, France, Italy) experienced large drops in dividend payers in 2020, while the other three countries experienced very small drops.

Table 3 reports aggregate amounts of dividends, repurchases, and total cash payout for each year. All values are converted to 2020 U.S. dollars for easier comparison. The aggregate amounts in all G-7 countries, as reported in Panel A, show a higher portion of cash being distributed via dividends in most years. Further, COVID caused a decrease in both dividends (about $85 billion) and share repurchases (about $199 billion) in 2020. Panel B shows that large variations exist among countries. U.S. firms spent much more cash repurchasing shares than paying dividends, but in European countries repurchases accounted for less than a quarter of aggregate payout amount. More importantly, the impact of COVID on total amount of dividends and share repurchases varies across countries. In USA, Canada, and Japan, the aggregate amount of share repurchases dropped much more than dividend payout. Compared to 2019 amounts, American firms have cut dividends (repurchases) by about $13.73 ($147.85) billion, Canadian firms cut dividends (repurchases) by $1.57 ($9.26) billion, and Japanese firms cut dividends (repurchases) by $16.09 ($21.60) billion. In contrast, European countries cut more dividends than share repurchases. For example, the reduction of dividends (repurchases) in 2020 relative to 2019 is $16.41 ($2.87) billion in France, $8.43 ($1.69) billion in Italy, and $22.45 ($17.11) billion in the UK. In Germany, aggregate dividend amount dropped by $6.44 billion but aggregate repurchases increased by $1.15 billion.

In Table 4 we examine payout changes by reporting the percentage of firms that adjusted cash payouts, including dividend decrease, dividend omission, dividend increase, repurchase decrease, and repurchase increase, before and after COVID. To make it easier to compare to the changes during the COVID year of 2020, we average the annual percentages during the pre-COVID period of 2015–2019. In the pooled sample of all G-7 countries, there are more dividend reductions and fewer dividend increases after COVID hit, which is similar to the finding of Ali (2022) for the G-13 countries. Meanwhile, we notice COVID had a similar impact on share repurchases, i.e. relatively more firms reducing repurchases and fewer firms increasing repurchases after COVID, but the impact on repurchases is smaller than on dividends. More interesting observations come from checking the changes in each country. Compared to other countries, the four European countries have experienced the largest increase in the percentage of firms cutting their dividends and the largest drop in the percentage of firms increasing dividends, but much smaller adjustments in repurchases. About 45% (in Germany) to 56% (in UK) of firms cut their dividends after COVID hit, compared with about 14% to 17% of firms doing so on average during pre-COVID years. The percent of firms omitting dividends also jumped from single digit (3.1% to 5.4%) to double-digit (16.6% to 32.1%). In contrast, more firms in the USA and Canada reduce share repurchases than dividends, and the difference increases after

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3 Our specification of fiscal years relative to the COVID timeline helps define pre- and post-COVID periods more accurately. For example, 30% of observations in our sample, mostly from Japan, end their fiscal years on March 31. Fiscal years ending in March 2020 should be classified into the pre-COVID period.
COVID hit in 2020. In that year, 43.4% of American firms cut share repurchase and 18.2% cut dividends, while 37.3% of Canadian firms cut share repurchases and 26.5% cut dividends. In Japan, the adjustments of dividends and repurchases triggered by COVID relative to earlier years are more moderate, compared with companies in North America and Europe.

Overall, these descriptive statistics show that COVID has caused firms to cut cash payout in 2020, but the relative impact on dividends and share repurchases varies across countries.

Regression results

Following the research design of Bliss et al. (2015), Tawiah and Keefe (2022), and Zheng (2022), we formally estimate the impact of COVID-19 on corporate decisions to adjust dividends or share repurchases, as well as the role of corporate cash holdings, by estimating the following logistic regression model.

\[
\Pr(\text{Payout Change}_{i,t} = 1) = \alpha + \beta_1 \text{COVID}_t + \beta_2 \text{COVID}_t \ast \frac{\text{Cash}}{\text{TA}}_{i,t-1} + \beta_3 \ast \frac{\text{Cash}}{\text{TA}}_{i,t-1} + \gamma \text{X}_{i,t-1} + \mu_{i,t}
\]

We consider four types of payout changes, i.e. dividend decrease, repurchase decrease, dividend increase, and repurchase increase, respectively. For each type, the dependent variable, Payout Change, is set to 1 if firm i makes the change in year t, and 0 otherwise. COVID is an indicator variable, equal to 1 for fiscal year ends between April 2020 and March 2021, the 12-month period after COVID-19 was declared a global pandemic, and 0 otherwise. The impact of COVID on a given type of payout change is measured by \(\beta_1\). The mitigating effect of cash holdings during COVID year is measured by \(\beta_2\). Control variables, X, include leverage (TD/TA), stock return volatility (Volatility), profitability, size, retained earnings (RE/TA), and sales growth rate (SGR). Variable definitions are presented in Appendix 2. Industry fixed effects and country fixed effects are included, and standard errors are clustered at firm level. Besides running regressions for the pooled sample of all G-7 countries, we consider differences across geographic regions as identified in the previous section by running separate regressions for three subgroups: North America (USA and Canada), Europe (UK, Germany, France, Italy, Japan), and Japan.

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\Pr(\text{Payout Change}_{i,t} = 1) = \alpha + \beta_1 \text{COVID}_t + \beta_2 \text{COVID}_t \ast \frac{\text{Cash}}{\text{TA}}_{i,t-1} + \beta_3 \ast \frac{\text{Cash}}{\text{TA}}_{i,t-1} + \gamma \text{X}_{i,t-1} + \mu_{i,t}
\]

We consider four types of payout changes, i.e. dividend decrease, repurchase decrease, dividend increase, and repurchase increase, respectively. For each type, the dependent variable, Payout Change, is set to 1 if firm i makes the change in year t, and 0 otherwise. COVID is an indicator variable, equal to 1 for fiscal year ends between April 2020 and March 2021, the 12-month period after COVID-19 was declared a global pandemic, and 0 otherwise. The impact of COVID on a given type of payout change is measured by \(\beta_1\). The mitigating effect of cash holdings during COVID year is measured by \(\beta_2\). Control variables, X, include leverage (TD/TA), stock return volatility (Volatility), profitability, size, retained earnings (RE/TA), and sales growth rate (SGR). Variable definitions are presented in Appendix 2. Industry fixed effects and country fixed effects are included, and standard errors are clustered at firm level. Besides running regressions for the pooled sample of all G-7 countries, we consider differences across geographic regions as identified in the previous section by running separate regressions for three subgroups: North America (USA and Canada), Europe (UK, Germany, France, Italy, Japan), and Japan.

COVID hit in 2020. In that year, 43.4% of American firms cut share repurchase and 18.2% cut dividends, while 37.3% of Canadian firms cut share repurchases and 26.5% cut dividends. In Japan, the adjustments of dividends and repurchases triggered by COVID relative to earlier years are more moderate, compared with companies in North America and Europe.

Overall, these descriptive statistics show that COVID has caused firms to cut cash payout in 2020, but the relative impact on dividends and share repurchases varies across countries.
Table 5
Logit regression of reduction in dividends.
This table reports the coefficient estimates of logistic regressions used to explain a firm’s decision to decrease its dividends. Column [1] reports the results for the pooled sample of firms from all G-7 countries, while Columns [2]–[4] are for subsamples of firms from Europe (UK, Italy, Germany, France), North America (Canada and USA), and Japan, respectively. The dependent variable is Dividend Decrease, equal to 1 if a firm’s dividend amount decreases 1% or more from the previous year’s dividend amount, and 0 otherwise. The sample includes firms with positive dividend payout in the prior year. Industry fixed effects are included in all the regressions. Country fixed effects are included except for the regression for Japan. Standard errors are clustered at firm level. Robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1. Panel B reports the change in probability of dividend decrease due to COVID for an average firm in each sample. It is estimated by using the coefficient estimates reported in Panel A and the mean values of explanatory variables in the corresponding sample.

| Panel A: | Dividends Decrease | All G-7 Countries [1] | Europe [2] | North America [3] | Japan [4] |
|----------|--------------------|----------------------|-----------|-------------------|---------|
| COVID    | 1.440***           | 2.203***             | 0.872***  | 1.297***          |         |
|          | [0.057]            | [0.125]              | [0.100]   | [0.089]           |         |
| COVID*Cash/TA | -1.404***         | -0.924               | -1.359**  | -1.500***         |         |
|          | [0.254]            | [0.679]              | [0.596]   | [0.347]           |         |
| Cash/TA  | 1.030***           | 0.348                | 0.907***  | 1.466***          |         |
|          | [0.168]            | [0.355]              | [0.349]   | [0.229]           |         |
| TD/TA    | 0.613***           | 0.575**              | 1.013***  | 0.712***          |         |
|          | [0.133]            | [0.265]              | [0.236]   | [0.197]           |         |
| Volatility | 2.500***           | 6.141***             | 8.581***  | -0.042            |         |
|          | [0.359]            | [0.847]              | [0.913]   | [0.503]           |         |
| Profitability | -4.725***         | -4.214***            | -2.941*** | -6.668***         |         |
|          | [0.381]            | [0.554]              | [0.595]   | [0.952]           |         |
| Size     | -0.085***          | -0.091***            | -0.150*** | -0.044***         |         |
|          | [0.011]            | [0.019]              | [0.026]   | [0.017]           |         |
| RE/TA    | -0.396***          | -0.245*              | -0.353*** | 0.054             |         |
|          | [0.093]            | [0.139]              | [0.109]   | [0.181]           |         |
| SGR      | -1.651***          | -1.657***            | -0.933*** | -2.872***         |         |
|          | [0.179]            | [0.349]              | [0.188]   | [0.395]           |         |
| Constant | -0.162             | -0.024               | 0.050     | -0.971***         |         |
|          | [0.184]            | [0.314]              | [0.386]   | [0.258]           |         |
| Industry FE | Yes               | Yes                 | Yes       | Yes               |         |
| Country FE | Yes               | Yes                 | Yes       | No                |         |
| Observations | 25,767            | 6111                | 6380      | 13,276            |         |
| Pseudo R-squared | 0.097            | 0.164               | 0.108     | 0.088             |         |

Panel B:
Change in the probability of dividend decrease due to COVID
+24.8% +47.3% +13.2% +17.0%

France, and Italy), and Japan.

Table 5 presents the results of our regression model with Dividend Decrease as the dependent variable, and here the sample includes firms with positive dividend payout in the prior year. The coefficient estimates on COVID are all positive and statistically significant, indicating that firms were more inclined to cut their dividends after COVID hit. The coefficient estimate of the interaction term is negative, indicating that cash holdings help firms mitigate the negative impact of COVID. Although the mitigation effect is strong for North America and Japan, it lacks statistical significance for European firms. We further examine the economic significance of COVID’s impact by calculating the change in the probability of dividend decrease due to COVID for an average firm in each region; we report the results in Panel B. The largest impact is observed for Europe where COVID increased the probability of dividend decrease by 47.3 percentage points, while the smallest impact is observed for North America (13.2 percentage points). These are consistent with the descriptive statistics in Table 4 of much higher percentages of dividend decreases in the UK, Germany, France, and Italy, compared with the USA and Canada. In Table 6, the dependent variable is the reduction in share repurchases, and here the sample only includes firms with positive share repurchase in the prior year. The positive coefficient estimate of COVID indicates that firms are more inclined to reduce share repurchase after COVID, and coefficient estimates vary across regions. Moreover, the mitigation effect of cash holdings is strong for firms in North America and Japan, but lacks statistical significance for European firms. In terms of economic significance, as measured by the change in probability of repurchase decrease due to COVID, the impact of COVID is smaller for firms in Europe than for those in North America and Japan.

The statistics reported in Table 4 show that every year some firms increased dividends or repurchases, but the percentage of those firms has dropped after COVID hit. In Tables 7 and 8, we formally test the impact of COVID on the decision to increase cash payout via dividends and repurchases, respectively. The results reported in Table 7 (Table 8) show that firms are less likely to increase their dividends (share repurchases) after COVID hit, as shown by the negative coefficient estimates for COVID indicator variable. The positive coefficient estimates of COVID*Cash/TA interaction term indicate that the negative impact of COVID on payout increases is less severe for firms with more cash holdings. For European firms, the negative impact of COVID on dividend increase is much greater.
than other regions, while the negative impact on share repurchase increase is much smaller than other regions and lacks statistical significance, and the mitigation effect of cash holdings lacks statistical significance.

In all four sets of regressions, the coefficient estimates of control variables in general have signs as expected. Firms with higher risk and financial leverage are more (less) likely to decrease (increase) dividends or repurchases, while more profitable, larger firms with greater sales growth are less (more) likely to decrease (increase) dividends and repurchases. Accumulated retained earnings have significant impacts on dividend changes, but less on share repurchase.

Overall, our regression analysis has confirmed the negative impact of COVID on corporate payout policy, i.e. firms are more likely to cut dividends or repurchases and less likely to increase dividends or repurchases after COVID hits. Moreover, we find evidence that cash holdings can help mitigate the negative impact of COVID in an international setting, complementing previous studies on corporate investments and performance for American firms (Tawiah and Keefe, 2022; Zheng, 2022).

4. Conclusion

In this paper, we examine the impact of the COVID-19 pandemic on corporate payout policy, for both dividends and share repurchases, of publicly listed firms in the G-7 countries. Our study shows that more (fewer) companies decrease (increase) their dividends or share repurchases after COVID started, but the scale of adjustments and the choice of payout channels vary across countries. Although corporate cash holdings helped mitigate the negative impacts of COVID on payout adjustments in North America and Japan, the impact was less significant for European firms.

One possible explanation for the widespread cut of dividends after COVID hit, and the lack of mitigating effect of corporate cash

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Table 6

Logit regression of reduction in share repurchases.

This table reports the coefficient estimates of logistic regressions used to explain a firm’s decision to decrease its share repurchases. Column [1] reports the results for the pooled sample of firms from all G-7 countries, while Columns [2]–[4] are for subsamples of firms from Europe (UK, Italy, Germany, France), North America (Canada and USA), and Japan, respectively. The dependent variable is Repurchase Decrease, equal to 1 if a firm’s share repurchase amount decreases 1% or more from the previous year’s repurchase amount, and 0 otherwise. The sample includes firms with positive share repurchases in the prior year. Industry fixed effects are included in all the regressions. Country fixed effects are included except for the regression for Japan. Standard errors are clustered at firm level. Robust standard errors are reported in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Panel B reports the change in probability of repurchase decrease due to COVID for an average firm in each sample. It is estimated by using the coefficient estimates reported in Panel A and the mean values of explanatory variables in the corresponding sample.

| Panel A: | Repurchase Decrease | All G-7 Countries | Europe | North America | Japan |
|---|---|---|---|---|---|
| | [1] | [2] | [3] | [4] |
| COVID | 0.561*** | 0.334* | 0.663*** | 0.543*** |
| Cash/TA | -0.863*** | -0.554 | -0.962** | -0.897** |
| Cash/TA | [0.237] | [0.855] | [0.385] | [0.355] |
| Cash/TA | [0.109] | [0.298] | [0.158] | [0.199] |
| TD/TA | 0.541*** | -0.114 | 0.505*** | 0.781*** |
| TD/TA | [0.087] | [0.274] | [0.121] | [0.168] |
| Volatility | 1.583*** | 2.644** | 0.898 | 1.739*** |
| Volatility | [0.343] | [1.137] | [0.561] | [0.512] |
| Profitability | -0.772*** | -0.816** | -0.959*** | -0.881** |
| Profitability | [0.136] | [0.338] | [0.187] | [0.167] |
| Size | -0.084*** | -0.119** | -0.064*** | -0.085*** |
| Size | [0.008] | [0.020] | [0.014] | [0.013] |
| RE/TA | 0.031 | -0.036 | 0.004 | 0.260** |
| RE/TA | [0.020] | [0.085] | [0.023] | [0.109] |
| SGR | -0.440*** | -0.268* | -0.611*** | -0.113 |
| SGR | [0.068] | [0.140] | [0.096] | [0.159] |
| Constant | 1.171*** | 2.169*** | 1.168*** | 1.029*** |
| Constant | [0.139] | [0.351] | [0.231] | [0.195] |
| Industry FE | Yes | Yes | Yes | Yes |
| Country FE | Yes | Yes | Yes | No |
| Observations | 18,402 | 2729 | 7558 | 8115 |
| Pseudo R-squared | 0.019 | 0.029 | 0.023 | 0.013 |

| Panel B: | Change in the probability of repurchase decrease due to COVID | +9.6% | +5.4% | +11.5% | +8.2% |

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Following a reviewer’s suggestion, we also analyze the magnitude of payout reduction, measured by the percentage changes in annual dividends and repurchases, for firms that decreased their dividends or share repurchases, respectively. The results reported in in Table A4 of the online appendix show that firms tended to have a larger cut in payout after COVID hit and cash holdings helped mitigate the COVID impact.
holdings in European countries, may lie with payout restrictions tied to COVID relief programs provided by governments. As detailed in Appendix 1, European countries have set strict restrictions on corporate payouts for companies receiving aid from some COVID relief programs, while such restrictions were less clear or did not exist for relief programs in the USA, Canada, and Japan. A more in-depth analysis would require researchers to identify firms that have received COVID aid, but this is beyond the scope of our paper. Regardless, we hope our study will motivate more research to explore cross-country differences in adjustments of corporate finance decisions in response to COVID, as well as the potential impacts of government aid on those differences.

CRediT authorship contribution statement

Christos Ntantamis: Methodology, Formal analysis, Writing – review & editing. Jun Zhou: Conceptualization, Methodology, Data curation, Software, Formal analysis, Project administration, Funding acquisition, Writing – original draft, Writing – review & editing.

Data availability

The authors do not have permission to share data.
Table 8
Logit regression of increase in share repurchases.
This table reports the coefficient estimates of logistic regressions used to explain a firm’s decision to increase repurchases. Column [1] reports the results for the pooled sample of firms from all G-7 countries, while Columns [2]–[4] are for the subsamples of firms from Europe (UK, Italy, Germany, France), North America (Canada and USA), and Japan, respectively. The dependent variable is Repurchase Increase, equal to 1 if a firm’s share repurchase amount increases 1% or more from the previous year’s repurchase amount, and 0 otherwise. Industry fixed effects are included in all the regressions. Country fixed effects are included except for the regression for Japan. Standard errors are clustered at firm level. Robust standard errors are reported in brackets. *** \( p<0.01 \), ** \( p<0.05 \), * \( p<0.1 \). Panel B reports the change in probability of repurchase increase due to COVID for an average firm in each sample. It is estimated by using the coefficient estimates reported in Panel A and the mean values of explanatory variables in the corresponding sample.

| Panel A: Repurchase Increase | All G-7 Countries | Europe | North America | Japan |
|-----------------------------|-------------------|--------|---------------|-------|
|                             | [1]               | [2]    | [3]           | [4]   |
| COVID                       | -0.398***         | -0.168 | -0.456***     | -0.476*** |
|                             | [0.049]           | [0.109]| [0.071]       | [0.085]|
| COVID*Cash/TA               | 0.818***          | 0.543  | 0.887***      | 0.947*** |
|                             | [0.179]           | [0.493]| [0.281]       | [0.278]|
| Cash/TA                     | 0.594***          | 1.059***| 0.302**       | 0.411*** |
|                             | [0.091]           | [0.244]| [0.129]       | [0.158]|
| TD/TA                       | -0.351***         | -0.027 | -0.423***     | -0.619*** |
|                             | [0.077]           | [0.221]| [0.197]       | [0.138]|
| Volatility                  | -1.102***         | -1.179*| -1.338***     | -1.145*** |
|                             | [0.246]           | [0.657]| [0.391]       | [0.378]|
| Profitability               | 0.677***          | 0.127  | 0.542***      | 1.385*** |
|                             | [0.101]           | [0.264]| [0.126]       | [0.273]|
| Size                        | 0.071***          | 0.175***| 0.078***      | 0.000  |
|                             | [0.008]           | [0.017]| [0.013]       | [0.013]|
| RE/TA                       | 0.001             | -0.089**| 0.001         | -0.051 |
|                             | [0.014]           | [0.045]| [0.016]       | [0.059]|
| SGR                         | 0.304***          | 0.240**| 0.341***      | 0.204* |
|                             | [0.046]           | [0.096]| [0.061]       | [0.109]|
| Constant                    | -1.431***         | -3.512***| -1.596***     | -0.584*** |
|                             | [0.128]           | [0.278]| [0.204]       | [0.195]|
| Industry FE                 | Yes               | Yes    | Yes           | Yes    |
| Country FE                  | Yes               | Yes    | Yes           | Yes    |
| Observations                | 35,205            | 8143   | 12,504        | 14,558 |
| Pseudo R-squared            | 0.029             | 0.045  | 0.022         | 0.013  |

| Panel B: Change in the probability of repurchase increase due to COVID |
|---------------------------------------------------------------|
| All G-7 Countries | Europe | North America | Japan |
|-------------------|--------|---------------|-------|
| -5.4%             | -1.4%  | -6.3%         | -5.5% |

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.frl.2022.103275.

Appendix 1. A brief review of some COVID relief programs in G-7 countries

In Europe, governments put clear restrictions on corporate payout for companies that received financial aid from some COVID relief programs. In May 2020, the European Commission announced that “virus-hit companies bailed out by EU governments will face a ban on dividends, share buybacks and bonuses for so long as the state holds a stake in them.” In the UK, several government support schemes, such as the Covid Corporate Financing Facility and the Coronavirus Large Business Interruption Loan Scheme, require business to put restrictions on dividends and share repurchases. In Italy, loan guarantees issued through Garanzia Italia by SACE S.p.A. came with a clear requirement that companies benefiting from this program should not approve the distribution of dividends or share buyback in 2020. Companies that applied for a loan guaranteed by the state or the deferral of tax and social security payments in France and companies that applied for the Corona loans from KfW, the German state-owned investment and development bank, are

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6 https://www.reuters.com/article/us-health-coronavirus-eu-recapitalisation-idUSKBN22K2HH
7 Clifford Chance, COVID-19 UK government aid: impact on dividend payments and executive pay, November 2020. https://www.cliffordchance.com/content/dam/cliffordchance/briefings/2020/11/covid-19-uk-government-aid-impact-on-dividend-payments-and-executive-pay.pdf
8 https://home.kpmg/xx/en/home/insights/2020/04/italy-government-and-institution-measures-in-response-to-covid.html
restricted from distributing dividends (Müller and Schulten, 2020).

In the United States, only firms receiving loans or guarantees from certain loan programs under the Coronavirus Aid, Relief, and Economic Security (CARES) Act were subject to restrictions on dividends and share repurchases. The Emergency Economic Measures to Cope with COVID-19 in Japan had no restrictions on corporate payout. The Canada Emergency Wage Subsidy (CEWS) program offered by the federal government put no restriction on dividends or share repurchases. Some companies receiving CEWS were found to have distributed dividends and repurchased shares, which caused a public outrage in late 2020.

Appendix 2. Variable definitions

| Variable name       | Description                                                                 |
|---------------------|-----------------------------------------------------------------------------|
| Dividend Decrease   | A firm-year observation is classified as Dividend Decrease (Increase) if the dividend amount decreases (increases) 1% or more from the previous year’s dividend amount. |
| Repurchase Decrease | A firm-year observation is classified as Repurchase Decrease (Increase) if the share repurchase amount decreases (increases) 1% or more from the previous year’s share repurchase amount. |
| Cash/TA             | Cash and short-term investment divided by total assets                        |
| TD/TA               | Total debt divided by total assets                                           |
| Volatility          | Stock return volatility measured as the standard deviation of monthly stock returns for a fiscal year |
| Profitability       | Operating income divided by lagged total assets                               |
| Size                | Natural logarithm of total assets in U.S. dollars                            |
| RE/TA               | Retained income divided by lagged total assets                                |
| SGR                 | Sales growth rate as measured by change in sales scaled by previous year’s sales. |

References

Ali, H., 2022. Corporate dividend policy in the time of COVID-19: evidence from the G-12 countries. Finance Res. Lett. 46, 102493.
Bates, T.W., Kahle, K.M., Stulz, R.M., 2009. Why do U.S. firms hold so much more cash than they used to? J. Finance 64 (5), 1985–2021.
Bliss, B.A., Cheng, Y., Denis, D.J., 2015. Corporate payout, cash retention, and the supply of credit: evidence from the 2008–2009 credit crisis. J. Financ. Econ. 115 (3), 521–540.
Booth, L., Zhou, J., 2017. Dividend policy: a selective review of results from around the world. Glob. Finance J. 34, 1–15.
Brav, A., Graham, J.R., Harvey, C.R., Michaely, R., 2005. Payout policy in the 21st century. J. Financ. Econ. 77 (3), 483–527.
DeAngelo, H., DeAngelo, L., 1990. Dividend policy and financial distress: an empirical investigation of troubled NYSE firms. J. Finance 45 (5), 1415–1431.
Ding, W., Levine, R., Lin, C., Xie, W., 2021. Corporate immunity to the COVID-19 pandemic. J. Financ. Econ. 141 (2), 802–830.
Fahlenbrach, R., Rageth, K., Stulz, R.M., 2021. How valuable is financial flexibility when revenue stops? Evidence from the COVID-19 crisis. Rev. Financ. Stud. 34 (11), 5474–5521.
Floyd, E., Li, N., Skinner, D.J., 2015. Payout policy through the financial crisis: the growth of repurchases and the resilience of dividends. J. Financ. Econ. 118 (2), 299–316.
Grullon, G., Michaely, R., 2002. Dividends, share repurchases, and the substitution hypothesis. J. Finance 57 (4), 1649–1684.
Iyer, S.R., Simkins, B.J., 2022. COVID-19 and the economy: summary of research and future directions. Finance Res. Lett. 102801.
Krieger, K., Mauck, N., Pruitt, S.W., 2021. The impact of the COVID-19 pandemic on dividends. Finance Res. Lett. 42, 101930.
Lee, B.S., Suh, J., 2011. Cash holdings and share repurchases: international evidence. J. Corp. Finance 17 (5), 1306–1329.
Müller, T., & Schulten, T. (2020). Ensuring fair short-time work - a European overview. European Trade Union Institute (ETUI) Research Paper - Policy Brief 07/2020.
Opler, T., Pinkowitz, L., Stulz, R., Williamson, R., 1999. The determinants and implications of corporate cash holdings. J. Financ. Econ. 52 (1), 3–46.
Pettenuzzo, D., Sabbatucci, R., Timmermann, A., 2021. Outlasting the pandemic: corporate payout and financing decisions during COVID-19. SSRN Electronic J.
Tawiah, B., Pettenuzzo, D., Sabbatucci, R., Timmermann, A., 2021. Outlasting the pandemic: corporate payout and financing decisions during COVID-19. SSRN Electronic J.

Appendix 2. Variable definitions

| Variable name          | Description                                                                 |
|------------------------|-----------------------------------------------------------------------------|
| Dividend Decrease      | A firm-year observation is classified as Dividend Decrease (Increase) if the dividend amount decreases (increases) 1% or more from the previous year’s dividend amount. |
| Repurchase Decrease    | A firm-year observation is classified as Repurchase Decrease (Increase) if the share repurchase amount decreases (increases) 1% or more from the previous year’s share repurchase amount. |
| Cash/TA                | Cash and short-term investment divided by total assets                        |
| TD/TA                  | Total debt divided by total assets                                           |
| Volatility             | Stock return volatility measured as the standard deviation of monthly stock returns for a fiscal year |
| Profitability          | Operating income divided by lagged total assets                               |
| Size                   | Natural logarithm of total assets in U.S. dollars                            |
| RE/TA                  | Retained income divided by lagged total assets                                |
| SGR                    | Sales growth rate as measured by change in sales scaled by previous year’s sales. |

References

Ali, H., 2022. Corporate dividend policy in the time of COVID-19: evidence from the G-12 countries. Finance Res. Lett. 46, 102493.
Bates, T.W., Kahle, K.M., Stulz, R.M., 2009. Why do U.S. firms hold so much more cash than they used to? J. Finance 64 (5), 1985–2021.
Bliss, B.A., Cheng, Y., Denis, D.J., 2015. Corporate payout, cash retention, and the supply of credit: evidence from the 2008–2009 credit crisis. J. Financ. Econ. 115 (3), 521–540.
Booth, L., Zhou, J., 2017. Dividend policy: a selective review of results from around the world. Glob. Finance J. 34, 1–15.
Brav, A., Graham, J.R., Harvey, C.R., Michaely, R., 2005. Payout policy in the 21st century. J. Financ. Econ. 77 (3), 483–527.
DeAngelo, H., DeAngelo, L., 1990. Dividend policy and financial distress: an empirical investigation of troubled NYSE firms. J. Finance 45 (5), 1415–1431.
Ding, W., Levine, R., Lin, C., Xie, W., 2021. Corporate immunity to the COVID-19 pandemic. J. Financ. Econ. 141 (2), 802–830.
Fahlenbrach, R., Rageth, K., Stulz, R.M., 2021. How valuable is financial flexibility when revenue stops? Evidence from the COVID-19 crisis. Rev. Financ. Stud. 34 (11), 5474–5521.
Floyd, E., Li, N., Skinner, D.J., 2015. Payout policy through the financial crisis: the growth of repurchases and the resilience of dividends. J. Financ. Econ. 118 (2), 299–316.
Grullon, G., Michaely, R., 2002. Dividends, share repurchases, and the substitution hypothesis. J. Finance 57 (4), 1649–1684.
Iyer, S.R., Simkins, B.J., 2022. COVID-19 and the economy: summary of research and future directions. Finance Res. Lett. 102801.
Krieger, K., Mauck, N., Pruitt, S.W., 2021. The impact of the COVID-19 pandemic on dividends. Finance Res. Lett. 42, 101930.
Lee, B.S., Suh, J., 2011. Cash holdings and share repurchases: international evidence. J. Corp. Finance 17 (5), 1306–1329.
Müller, T., & Schulten, T. (2020). Ensuring fair short-time work - a European overview. European Trade Union Institute (ETUI) Research Paper - Policy Brief 07/2020.
Opler, T., Pinkowitz, L., Stulz, R., Williamson, R., 1999. The determinants and implications of corporate cash holdings. J. Financ. Econ. 52 (1), 3–46.
Pettenuzzo, D., Sabbatucci, R., Timmermann, A., 2021. Outlasting the pandemic: corporate payout and financing decisions during COVID-19. SSRN Electronic J.
Tawiah, B., Pettenuzzo, D., Sabbatucci, R., Timmermann, A., 2021. Outlasting the pandemic: corporate payout and financing decisions during COVID-19. SSRN Electronic J.

Appendix 2. Variable definitions

| Variable name | Description |
|---------------|-------------|
| Dividend Decrease | A firm-year observation is classified as Dividend Decrease (Increase) if the dividend amount decreases (increases) 1% or more from the previous year’s dividend amount. |
| Repurchase Decrease | A firm-year observation is classified as Repurchase Decrease (Increase) if the share repurchase amount decreases (increases) 1% or more from the previous year’s share repurchase amount. |
| Cash/TA | Cash and short-term investment divided by total assets |
| TD/TA | Total debt divided by total assets |
| Volatility | Stock return volatility measured as the standard deviation of monthly stock returns for a fiscal year |
| Profitability | Operating income divided by lagged total assets |
| Size | Natural logarithm of total assets in U.S. dollars |
| RE/TA | Retained income divided by lagged total assets |
| SGR | Sales growth rate as measured by change in sales scaled by previous year’s sales. |