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Brand equity and the Covid-19 stock market crash: Evidence from U.S. listed firms

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ABSTRACT

Brand equity has played an important role in firms' stock performance, especially during the stock market crash provoked by Covid-19. Our manuscript investigates how brand equity impacts stock performance during the Covid-19 crash. Firms with top brands should be a particularly attractive "safe harbor" in the crash to investors since consumer loyalty and demand advantages brought by brand equity enable firms to retain stable cash flows and mitigate the macroeconomic shock. Based on U.S. listed firms, we find that firms with top brands experience higher stock returns, lower systematic risk and lower idiosyncratic risk in the Covid-19 crash than other firms. Moreover, our findings are used to distinguish the brand equity effect from the corporate social responsibility (CSR) effect on stock performance during the Covid-19 crash.

1. Introduction

At the end of 2019, a new disease, Covid-19, broke out around the world. Covid-19 affected people's health and caused a large number of deaths. Moreover, Covid-19 and the stay-at-home orders and lockdowns triggered by Covid-19 brought huge environmental uncertainty. Because of this epidemic, Erdem (2020) reveals that market indices of 75 countries dropped and Rizwan et al. (2020) find a significant increase in systemic risk for bank sector. In particular, from February 24 to March 23, 2020, the stock market experienced a dramatic crash in response to the Covid-19 outbreak. Over just 21 trading days, the Dow Jones Industrials dropped 33.5%, the Nasdaq Index dropped 25.6%, and the Standard & Poor's (S&P) 500 Index lost 30.6%. We call this crash the Covid-19 crash, which provides a window to reappraise the value of brand equity in an uncertain environment. At the time of this writing, Covid-19 is still spreading worldwide. In the context of this epidemic, it is of great practical significance to study investors' reaction to brand equity. Our paper explores the role of brand equity when firms face that epidemic, which is embodied in investigating the impact of brand equity on stock performance, such as stock returns, systematic risk and idiosyncratic risk.

Brand equity is considered an intangible asset that can bring value to firms. Aaker and Jacobson (1994) and Brexendorf et al. (2015) indicate that brand equity is positively associated with future cash flows because firms with brand equity enjoy the advantages from the demand side and the supply side, especially in economic downturns (Pauwels et al., 2004; Hsu et al., 2016).

The value of brand equity can be reflected in the stock market. Early studies find that brand equity has a positive impact on stock returns (Aaker and Jacobson, 1994; Mizik and Jacobson, 2008) and a negative impact on stock risks (Rego et al., 2009; Bharadwaj

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et al., 2011). Johansson et al. (2012) provide evidence that shows that brand equity improved stock performance during the 2008 financial crisis.

The Covid-19 crash provides an opportunity to reassess whether brand equity mitigates stock crashes. In particular, we collected top brands from the "100 Best Global Brands" of Interbrand of 2019 and finally matched 45 US listed firms with top brands. Then, following the literature on stock performance, we adopt four typical stock performance indicators: *Raw_Return, Abnormal_Return, Systemic_Risk* and *Idiosyncratic_Risk*. Specifically, *Raw_Return* is the firm's buy-and-hold return during this period. *Abnormal_Return* is the *Raw_Return* minus the expected return, and *Systemic_Risk* and *Idiosyncratic_isk* stand for stock systemic risk and idiosyncratic risk during this period, respectively. More importantly, the observation window is from February 24 to March 23, 2020, when the Dow Jones Industrials, the Nasdaq Index and the Standard and Poor (S&P) 500 Index experienced a stock crash caused by Covid-19. Then, comparing the stock performance of firms with top brands with other firms from February 24 to March 23, 2020, we assess the impact of brand equity on stock performance.

Using a sample of US listed firms from February 24 to March 23, 2020, we find strong support for this hypothesis that brand equity improves stock returns and reduces stock risks during the Covid-19 crash. After controlling for firm characteristics, our empirical results show that firms with top brands have a 0.178 higher raw return, a 0.054 higher abnormal return, a 0.236 lower systemic risk and a 0.002 lower idiosyncratic risk than firms without top brands during the Covid-19 crash. With regard to economic significance, given that the stock of an average firm during the Covid-19 crash has a −0.464 raw return, −0.087 abnormal return, 0.948 systemic risk and 0.015 idiosyncratic risk, the increase in stock returns and the decrease in stock risks of firms with top brands are also economically significant. These estimated results provide evidence that brand equity indicates a "soft harbor" in stock crash, which is consistent with the literature about the association between brand equity and stock performance, such as Bharadwaj et al. (2011) and Rego et al. (2009).

Moreover, to control potential endogeneity concerns, we compare the effect of brand equity on stock performance before and during the Covid-19 crash. Through this approach, we can find that during this crash, the effect of brand equity on stock performance could pronounce more than usual. In other words, we can obtain the pure impact of brand equity on stock performance during the Covid-19 crash.

Next, we further investigate whether brand equity and corporate social responsibility (CSR) performance are independent effects that can coexist. Lins et al. (2017) provide evidence that shows that CSR performance mitigates stock crash during the 2008 financial crisis. Meanwhile, Albuquerque et al. (2019) reveal that due to a role in risk hedge, there is a negative association between CSR and systemic risk. Thus, we include CSR in our baseline regression to assess the impact of CSR and brand equity on stock performance. Our empirical results support two conclusions: the CSR effect does not reduce the brand equity effect in the Covid-19 crash; furthermore, there is no interaction effect between the CSR effect and the brand equity effect during the Covid-19 crash.

This study contributes to the existing literature in three ways. First, our findings provide the evidence for the economic outcome of the Covid-19. Previous literatures focus on investor sentiment and global stock market synchronization (e.g. Lyócsa et al., 2020; Lyócsa and Molnár, 2020; Rizwan et al., 2020; Goodell and Huynh, 2020; Cepoi, 2020). Second, our paper extends the literature on the market value of brand equity. Especially, our paper investigates the effect of brands during the epidemic. Third, our paper compares the impact of brand and corporate social responsibility during the stock market crash, and finds that brand mitigate the stock crash independently and do not rely on corporate social responsibility.

2. Data and methodology

2.1. Sample construction

We employ a sample of U.S. public firms in the Covid-19 crash (from February 24 to March 23, 2020), constructed by merging brand data from the "100 Best Global Brands" of Interbrand with accounting data in Compustat and daily stock return data from the Centre for Research in Security Prices (CRSP). We obtain data for the Fama and French (1996) factors and Treasury bond rates from Dr. Kenneth French.[1] Following the previous brand equity studies, we exclude financial firms since the financial characteristics in these industries are not the same as in other industries (Kim et al., 2011). To mitigate the effect of outliers, we winsorize all variables at their 1st and 99th percentiles. After applying these data selection filters, our effective sample contains 2866 firms, which allows us to track brand equity and stock performance in the Covid-19 crash while controlling for relevant firm characteristics.

2.2. Dependent variable: stock performance

The main focus of this paper is to study the empirical relation between brand equity and stock performance during the Covid-19 crash. Following the previous brand equity literature, we take four typical stock performance indicators: *Raw_Return, Abnormal_Return, Systemic_Risk* and *Idiosyncratic_Risk*. Specifically, *Raw_Return* is the firm's buy-and-hold return over the period. We gather CRSP daily stock returns for the period from February 24 to March 23, 2020 and then sum up the daily stock returns to obtain cumulative stock returns during this period.

[1] See http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. Dr. Kenneth French is a website that updates data for the value-weighted market portfolio, the Fama and French factors and Treasury bond rates, which is widely used in academic research (Bharadwaj et al., 2011; Lins et al., 2017).

Table 1
Summary statistics.

Panel A. Full sample. This table presents the summary statistics of all variables used in our empirical tests. The sample merges the CRSP, Interbrand and Compustat databases during the Covid-19 crash. The number of observations, means, standard deviation, 25th percentile, median, and 75th percentile of each variable are successively reported from left to right. The detailed definitions of all variables can be found in Appendix A2.

Variable	Obs.	Mean	S.D.	p25	Median	p75
Dependent Variables						
Raw_Return	2866	−0.464	0.318	−0.635	−0.438	−0.286
Abnormal_Return	2866	−0.087	0.302	−0.257	−0.079	0.082
Systematic_Risk	2866	0.948	0.503	0.711	0.951	1.194
Idiosyncratic_Risk	2866	0.015	0.009	0.009	0.013	0.018
Independent variable						
Brand	2866	0.016	0.124	0.000	0.000	0.000
Control variables						
Size	2866	7.364	2.330	5.813	7.549	8.994
Q	2866	1.904	1.866	0.832	1.254	2.286
Leverage	2866	0.302	0.208	0.123	0.294	0.448
Shortdebt	2866	0.049	0.153	0.006	0.019	0.048
Longdebt	2866	0.270	0.241	0.077	0.241	0.396
Rating	2866	0.324	0.468	0.000	0.000	1.000
Profit	2866	−0.055	0.231	−0.064	0.019	0.059
Cash	2866	0.144	0.172	0.031	0.084	0.186
Firmage	2866	2.662	0.997	1.792	2.944	3.401
Liquidity	2866	0.000	0.002	0.000	0.000	0.000

Panel B. Univariate comparison of stock performance. This panel presents the univariate comparison test results. The mean and median of stock performance variables are reported for firms with top brands and without top brands. The last two columns report the differences in mean and median between firms included in and excluded from the "100 Best Global Brands" from Interbrand. Detailed definitions of all variables can be found in Appendix A. The statistics from the t-tests on the mean difference and the statistics from the Wilcoxon tests on the median difference are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	Top Brands		Nontop Brands		Difference	
	Mean	Median	Mean	Median	t-value	Wilcoxon test
Raw_Return	−0.331	−0.303	−0.466	−0.443	0.135***	0.044***
					(2.824)	(3.982)
Abnormal_Return	0.000	−0.004	−0.089	−0.082	0.089*	0.045***
					(1.956)	(2.712)
Systematic_Risk	0.904	0.889	0.949	0.953	−0.045	−0.064
					(−0.588)	(0.975)
Idiosyncratic_Risk	0.007	0.006	0.015	0.013	−0.008***	−0.007***
					(−5.962)	(−8.931)

Abnormal_Return is the *Raw_Return* minus the expected return. Based on the four-factor Fama-French model (Fama and French, 1996) in Eq. (1), we chose 252 trading days as the estimation window to obtain ordinary least squares parameter estimates. The regressions were run separately for each firm. We then use these estimators to calculate daily expected returns. We take daily stock returns minus the estimated daily expected returns to obtain the daily abnormal returns and then compute cumulative abnormal returns by summing the daily abnormal returns during this period.

$$r_{it} - r_{ft} = \alpha_i + \beta_{it}\left(r_{mt} - r_{ft}\right) + s_{it}SMB_t + h_{it}HML_t + m_{it}MOM_t + \varepsilon_{it} \tag{1}$$

where r_{it} is stock return for firm i on time t, r_{ft} is the risk-free rate of return on time t, r_{mt} is the market rate of return on time t, SMB_{t} is Fama and French size portfolio returns for time t, HML_{t} is Fama and French book-to-market value portfolio returns of time t, MOM_{t} is Fama and French momentum portfolio return of time t, ε is the residual term for firm i on time t.

For *Systemic_Risk and Idiosyncratic_Risk*, based on the CAPM model in Eq. (2), we regress daily returns against the market returns minus the risk-free returns during the Covid-19 crash and obtain the firm's systematic and idiosyncratic risk. The regressions were run separately for each firm. *Systemic_Risk* is the "β" from this model, and *Idiosyncratic_Risk* is the standard deviation of residuals from this model.

$$r_{it} - r_{ft} = \alpha_i + \beta_{it}\left(r_{mt} - r_{ft}\right) + \varepsilon_{it} \tag{2}$$

where r_{it} is stock return for firm i on time t, r_{ft} is the risk-free rate of return on time t, r_{mt} is the market rate of return on time t, and ε is

Table 2
Brand equity and stock performance.

	(1) *Raw_Return*	(2) *Abnormal_Return*	(3) *Systematic_Risk*	(4) *Idiosyncratic_Risk*
Brand	0.178***	0.054**	−0.236***	−0.002***
	(6.240)	(2.018)	(−5.088)	(−3.508)
Size	−0.006	0.020***	0.058***	−0.001***
	(−1.414)	(4.723)	(8.400)	(−10.646)
Q	0.016***	0.007*	0.007	0.000
	(4.349)	(1.725)	(1.283)	(−0.954)
Leverage	−0.348***	−0.226***	0.298**	0.008***
	(−4.948)	(−3.363)	(2.343)	(3.782)
Shortdebt	0.066*	−0.046	−0.302***	−0.003***
	(1.754)	(−0.842)	(−2.680)	(−3.611)
Longdebt	0.144**	0.093*	−0.118	0.001
	(2.359)	(1.816)	(−1.173)	(0.643)
Rating	−0.033**	−0.017	0.062**	0.001**
	(−2.161)	(−1.105)	(2.495)	(2.511)
Profit	0.028	−0.064	−0.186**	−0.009***
	(0.640)	(−1.385)	(−2.488)	(−6.871)
Cash	−0.091**	−0.070	0.057	−0.006***
	(−2.117)	(−1.433)	(0.797)	(−4.693)
Firmage	0.020***	0.012*	−0.040***	−0.001***
	(2.876)	(1.679)	(−3.369)	(−3.859)
Liquidity	4.839***	−2.827**	−10.231***	0.035
	(2.617)	(−2.199)	(−2.600)	(0.790)
Constant	−0.416***	−0.09	0.550***	0.024***
	(−6.591)	(−0.660)	−5.797	−14.943
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	2866	2866	2866	2866
R^2	0.297	0.246	0.221	0.394

This table reports the OLS regression results for the relation between brand equity and stock performance. The sample covers firm observations with nonmissing values for all variables during the Covid-19 crash. The coefficients of the three-digit SIC industry are suppressed for brevity in the respective columns. The detailed definitions of all variables can be found in Appendix A2. The t-values reported in parentheses are based on standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

the residual term for firm *i* on time *t*.

2.3. Brand equity, control variables, and the baseline model

The main explanatory variable in our study is *Brand*. *Brand* is an indicator variable that takes a value of 1 when a firm belongs to the "100 Best Global Brands" of Interbrand[2] and zero otherwise. To examine the empirical association between brand equity and stock performance, we begin by estimating the following baseline model:

$$Performance_i = \beta_0 + \beta_1 Brand_i + \beta_2 Control\ variables_i + \beta_j + \varepsilon_i \quad (3)$$

where *i* and *j* are indicators for the firm and industry, respectively. β_j captures the industry fixed effect, which is included in all models to account for possible differences and changes in the reliance on stock performance across industries. In particular, industries are based on three-digit Standard Industrial Classification (SIC) industry codes. $Performance_i$ means the stock performance of firm i, which is measured by *Raw_Return, Abnormal_Return, Systemic_Risk and Idiosyncratic_Risk*. *Brand* is a proxy for brand equity, as described above. Following previous studies on the determinants of stock performance (e.g., Bharadwaj et al., 2011; Johansson et al., 2012; Zhao et al., 2018), we include a set of control variables that may influence the relation between brand equity and stock performance: $Size_i$, Q_i, $Leverage_i$, $Shortdebt_i$, $Longdebt_i$, $Rating_i$, $Profit_i$, $Cash_i$, $Firmage_i$ and $Liquidity_i$. Detailed definitions of all variables are described in Appendix A2. In particular, we use control variables for the end of 2019 to guard against the possibility that these variables were also affected by the Covid-19 crash.

Size might be a proxy for a firm's information asymmetry level (Houston and James, 1996). *Q* measures a firm's future growth opportunities, which have been proven to be positively correlated with the systemic risk of stocks (Chung et al., 1991). *Cash and Profit* represent a firm's present and future cash flows, respectively. Stock returns reflect investors' expectations about a firm's future cash flows, and cash flows could be a predictor for stock performance (McAlister et al., 2007; Hirshleifer et al., 2009). *Leverage, Shortdebt*

[2] Interbrand is a website that publishes the "100 Best Global Brands" every year, which is widely used to measure brand equity (Madden et al., 2006; Johansson et al., 2012; Hsu et al., 2016). We gather the Interbrand top 100 brands list in 2019. See www.interbrand.com for the full list of the 100 brands. Not all 100 brands in the Interbrand rankings could be included in our sample. Some firms in Interbrand rankings are not listed. Additionally, we limited the sample to stocks listed on NYSE, ASE and NASDAQ. Our final sample includes 45 firms with top brands; details can be found in Appendix A1.

Table 3
Brand equity and stock performance: Before vs. during the Covid-19 crash.

	(1) *Raw_Return*	(2) *Abnormal_Return*	(3) *Systematic_Risk*	(4) *Idiosyncratic_Risk*
Brand × *Covid*	0.157***	0.128***	−0.544***	−0.004***
	(6.320)	(5.789)	(−5.935)	(−9.091)
Brand	0.016	−0.035**	0.264***	0.002***
	(1.125)	(−2.346)	(3.031)	(4.089)
Covid	−0.526***	−0.121***	0.284***	0.009***
	(−84.036)	(−19.172)	(9.019)	(50.059)
Size	−0.006***	0.005**	0.055***	−0.001***
	(−2.646)	(2.106)	(4.702)	(−16.030)
Q	0.008***	−0.001	−0.010	0.000
	(3.893)	(−0.375)	(−0.866)	(−1.116)
Leverage	−0.130***	−0.089**	0.294	0.006***
	(−2.913)	(−2.195)	(1.317)	(5.009)
Shortdebt	0.035	−0.015	−0.150	−0.002**
	(1.499)	(−0.502)	(−1.278)	(−2.490)
Longdebt	0.033	0.020	−0.088	−0.001
	(0.830)	(0.613)	(−0.489)	(−0.626)
Rating	−0.014	−0.006	0.013	0.001***
	(−1.570)	(−0.646)	(0.325)	(3.368)
Profit	−0.067**	−0.128***	−0.436***	−0.009***
	(−2.571)	(−4.702)	(−3.022)	(−10.290)
Cash	−0.042	−0.042	0.219	−0.003***
	(−1.554)	(−1.434)	(1.373)	(−3.412)
Firmage	0.010**	0.008**	−0.037*	−0.001***
	(2.524)	(2.007)	(−1.914)	(−4.674)
Liquidity	0.476	−2.578***	3.616	0.035
	(0.404)	(−2.700)	(0.360)	(1.258)
Constant	0.087**	0.000	0.117	0.014***
	(2.451)	(0.006)	(0.595)	(16.522)
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	5726	5726	5726	5726
R^2	0.601	0.143	0.09	0.488

This table reports the regression results for the relation between brand equity and stock performance before and during the Covid-19 crash. The sample covers observations 21 trading days before and 21 trading days in the Covid-19 crash. In particular, on January 21, 2020, the human-to-human transmission of Covid-19 was officially recognized, and the first case in the United States was documented. Thus, to exclude the effect of Covid-19, the pre 21 trading days are between December 18, 2019, and January 17, 2020. The dependent variables are indictors of stock performance: *Raw_Return, Abnormal_Return, Systemic_Risk* and *Idiosyncratic_Risk. Brand* is a dummy variable that is equal to one for firms with top brands and zero otherwise. *Covid* is a dummy variable that is one when firms are after Covid-19 crash and zero otherwise. The coefficients of the three-digit SIC industry are suppressed for brevity in the respective columns. Detailed definitions of all variables can be found in Appendix A2. The t-values reported in parentheses are based on standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

and *Longdebt* might be signals of stock risks. Ferreira and Laux (2007) and Dang et al. (2018) reveal that investors might be exposed to greater risk in firms with a higher proportion of leverage or short-term debt. *Rating* indicates whether a firm has a long-term debt rating. Cheng and Subramanyam (2008) suggest that firms with debt ratings exhibit less information asymmetry. *Firmage* measures the current stage of a firm's life cycle. Johansson et al. (2012) propose that mature firms are survivors that have experienced disruption and may be more attractive to investors. *Liquidity* means stock liquidity, which is important for stock performance, especially in crisis. As suggested by Amihud (2002) and Chang et al. (2017), stock liquidity is related to the excess return of stock and stock price crash risk.

2.4. Descriptive statistics

In Panel A of Table 1, we report the descriptive statistics of the variables used in our main empirical regression. For stock returns in the Covid-19 crash, the mean and median of *Raw_Return* are −46.4% and -43.8%, respectively, and the mean and median of *Abnormal_Return* are -8.7% and -7.9%, respectively, which suggest that the Covid-19 crash damaged the stock performance of all U.S. listed firms. For stock risks, the mean and median of systematic risk are 0.948 and 0.951, and the mean and median of idiosyncratic risk are 0.015 and 0.013, suggesting that stock performance is more associated with systematic risk than idiosyncratic risk in the Covid-19 crash. Panel A also shows that firms with top brands represent approximately 1.6% of 2866 nonfinancial firms in our sample.

Panel B of Table 1 reports the summary statistics of stock performance during the Covid-19 crash partitioned by top brands. The last two columns report the tests of differences in the variables' means and medians between firms with top brands and others. Firms with top brands have higher raw (abnormal) returns and lower idiosyncratic risk than firms without top brands.

3. Empirical results

3.1. Basic results

Table 2 reports the empirical results of our baseline model, which examines the impact of brand equity on firms' stock performance. In Column 1, we can obtain the statistically positive relation between *Brand* and *Raw_Return*, revealing that on average, firms with top brands have a 0.178 higher raw return than firms without top brands during the Covid-19 crash. Relatively to the mean value of *Raw_Return*, the increase in raw return for brand equity is also economically significant. In Column 2, the effect of *Brand* on *Abnormal_Return* is also positive and statistically significant at the 1% level. Our empirical results are consistent with Johansson et al. (2012), who also find that brand equity is positively associated with abnormal returns in the stock crashe of financial crisis.

In Columns 3 to 4, we further consider the effect of brand equity on stock risks. In Column 3, the coefficient of *Brand* is negative and statistically significant at the 1% level, suggesting that brand equity can decrease systematic risk. Additionally, we can obtain similar estimated results for the negative impact of brand equity on idiosyncratic risk in Column 4. Relatively to the mean value of *Systematic_Risk* and *Idiosyncratic_Risk*, firms with top brands have a 0.236 lower systematic risk and a 0.002 lower idiosyncratic risk than firms without top brands, respectively, suggesting that the decrease in systematic risk and idiosyncratic risk are economically significant. Our empirical results are similar to those of Johansson et al. (2012), revealing that brand equity can mitigate the risk during a stock crash.

3.2. Endogeneity concern

We extend our sample into before Covid-19 crash and during Covid-19 crash to mitigate concerns about unobservable and time-invariant idiosyncrasies, which helps to identify the causal impact of brand equity on stock performance during the Covid-19 crash. In particular, on January 21, 2020, the human-to-human transmission of Covid-19 was officially recognized, and the first case in the United States appeared. Firms and investors may have been impacted by these so that stock prices were affected. Thus, our critical periods include two periods: The period from February 24, 2020 to March 23, 2020 represents the period during the shock of the Covid-19 crash, and the period from December 18, 2019 to January 17, 2020 represents the period before the impact of the Covid-19 crash. We require a firm have both daily stock data before and during the Covid-19 crash. Thus, we introduce a dummy variable (*Covid*), which is equal to one during Covid-19 crash and zero before Covid-19 crash. We include *Covid* in our benchmark equation, as follows.

$$\begin{aligned} Performance_i = {} & \beta_0 + \beta_1 Brand_i \times Covid_i + \beta_2 Brand_i + \beta_3 Covid_i \\ & + \beta_4 Control\ variables_i + \beta_j + \varepsilon_i \end{aligned} \tag{4}$$

Where *Brand* × *Covid* is our interesting variable, which estimate the pure effect of brand on the stock performance. Control variables are consistent with those in the basic regression.

Table 3 reports the empirical results after excluding the unobservable heterogeneity. First, the estimated coefficients of *Brand* illustrate that firms with top brands have worse stock performance than firms without top brands after excluding the effect of Covid-19, such as lower abnormal return, higher systematic risk and idiosyncratic risk. Meanwhile, the coefficients of *Covid* also illustrate that the Covid-19 reduces stock returns and increases systemic risk and idiosyncratic risk, which is similar with Erdem (2020) and Rizwan et al. (2020). Our interest variables of *Brand* × *Covid* are significantly positive in Columns 1 to 2 and negative in Columns 3 to 4, revealing that firms with top brands can obtain more premium and lower risk compared with firms without top brands. Therefore, these estimated results signify that brand equity mitigate the Covid-19 crash after excluding the effect of unobservable and time-invariant firm idiosyncrasies.

Additionally, we adopt other methods to check the robustness of our baseline results. First, endogeneity concerns omitted variables. We add financial constraints (*WW_Index*) and corporate governance (*E_Index*) into our baseline regression. Second, endogeneity concerns unobservable heterogeneity at the industry level. Following Petersen (2009), we cluster standard errors at the industry level and re-estimate our basic regression. Third, we adopt a placebo experiment to check our baseline results. Fourth, we adopt propensity score matching to control the selection bias, and re-estimate our benchmark regression. These robustness results are consistent with our baseline results. Due to limited length, these results are not presented in this paper.

3.3. Brand equity vs. corporate social responsibility

In our hypothesis, the impact of brand equity on stock performance is due to the signal of a "safe harbor" during the Covid-19 crash. However, many mechanisms also provide this signal to investors during stock crashes, such as CSR. Lins et al. (2017) show that CSR performance is positively associated with stock performance in the 2008 financial crisis. Albuquerque et al. (2019) also suggest that CSR performance is positively correlated with stock returns and is negatively correlated with systematic risk. Following Lins et al. (2017) and Albuquerque et al. (2019), CSR, as a representative of corporate reputation, signals the stable demands of consumers to improve stock performance. Therefore, during the Covid-19 crash, we need to ask the question of whether brand equity and CSR are independent effects that can coexist.

In this section, we investigate the following two questions: first, whether the impact mechanism of brand equity and CSR performance on stock performance exist separately during the Covid-19 crash, and second, whether there are significant interactions

Table 4
Brand equity vs. Corporate social responsibility.

	(1) *Raw_Return*	(2) *Abnormal_Return*	(3) *Systematic_Risk*	(4) *Idiosyncratic_Risk*
Brand	0.176***	0.052*	−0.223***	−0.001*
	(4.741)	(1.711)	(−3.881)	(−1.751)
CSR × Brand	0.010	0.009	−0.079	−0.003
	(0.074)	(0.065)	(−0.400)	(−1.626)
CSR	−0.769	−2.607***	−1.781**	0.000
	(−1.247)	(−14.969)	(−1.964)	(0.013)
Size	−0.006	0.020***	0.058***	−0.001***
	(−1.413)	(3.472)	(8.397)	(−11.417)
Q	0.016***	0.007*	0.007	0.000
	(4.348)	(1.769)	(1.284)	(−1.381)
Leverage	−0.348***	−0.226***	0.298**	0.007***
	(−4.945)	(−3.440)	(2.345)	(3.767)
Shortdebt	0.066*	−0.046	−0.302***	−0.003***
	(1.754)	(−0.842)	(−2.680)	(−3.664)
Longdebt	0.144**	0.093**	−0.118	0.001
	(2.359)	(1.972)	(−1.175)	(0.792)
Rating	−0.033**	−0.017	0.062**	0.001**
	(−2.161)	(−0.966)	(2.496)	(2.574)
Profit	0.028	−0.064*	−0.186**	−0.009***
	(0.640)	(−1.718)	(−2.488)	(−7.427)
Cash	−0.091**	−0.070*	0.057	−0.006***
	(−2.116)	(−1.759)	(0.801)	(−5.318)
Firmage	0.020***	0.012*	−0.039***	−0.001***
	(2.874)	(1.848)	(−3.364)	(−3.815)
Liquidity	4.839***	−2.828**	−10.231***	−0.001
	(2.617)	(−2.158)	(−2.600)	(−0.015)
Constant	−0.334***	0.186***	0.739***	0.028***
	(−2.952)	(10.192)	(4.532)	(21.365)
Industry Fixed Effect	Yes	Yes	Yes	Yes
Observations	2866	2866	2866	2866
R^2	0.297	0.246	0.221	0.34

This table reports the effect of CSR on the relation between brand equity and stock performance. The sample covers firm observations with nonmissing values for all variables during the Covid-19 crash. The dependent variables are indictors of stock performance: *Raw_Return, Abnormal_Return, Systemic_Risk* and *Idiosyncratic_Risk*. The independent variable is *Brand*. The moderate variable of interest is *CSR*. We measure *CSR* as the difference between the number of strengths and that of concerns. In particular, we divide both the number of strengths and the number of concerns across all six CSR attributes (community, diversity, employee relations, environment, product, and human rights) for each firm by the sum of the maximum possible number of strengths and concerns across the six attributes in 2018 (the KLD database is only updated to 2018). The coefficients of the three-digit SIC industry are suppressed for brevity in the respective columns. The detailed definitions of all variables can be found in Appendix A2. The t-values reported in parentheses are based on standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

between these two impact mechanisms. Table 4 shows the empirical results for these two impact mechanisms of brand equity and CSR performance. Columns 1–4 adopt *Raw_Return, Abnormal_Return, Systemic_Risk* and *Idiosyncratic_Risk* as independent variables of stock performance. Table 4 shows that brand equity is still positively associated with stock returns and negatively associated with stock risks. However, we obtain statistical significance only for the negative relation between CSR performance and *Abnormal_Return* (*Systemic_Risk*). Meanwhile, we cannot obtain a significant coefficient for the interaction between Brand and CSR, suggesting that there is no evidence to support the significant interactions between these two effects. Moreover, when the impact mechanism of CSR performance is included in our empirical regression, the magnitude and significance of the Brand coefficients are remarkably similar to the baseline results in Table 2. These results suggest that the CSR effect does not reduce the effect of brand equity during the Covid-19 crash. In conclusion, our results thus confirm that the CSR effect and brand equity effect are independent of each other. Furthermore, there is no interaction effect between the CSR effect and brand equity effect during the Covid-19 crash (Table 4).

4. Conclusion

In this paper, we focus on the impact of brand equity on stock performance during the Covid-19 crash. Our empirical results reveal that firms with top brands experience higher stock returns, lower systematic risk and lower idiosyncratic risk during the Covid-19 crash. Meanwhile, after excluding potential endogeneity concerns, our empirical results are robust. Moreover, our empirical result reveals that the influence of brand equity is independent rather than dependent on corporate social responsibility. Overall, our study provides evidence on the effect of brand equity on stock performance during the Covid-19 crash. First, it makes a contribution to the literature on Covid-19 and business strategy. Second, we extend the literature on the value of brand equity during stock crashes.

Table A1
This table provides detailed information on the 45 brands in our sample, which comes from Interbrand.

Brand	Rank	Equity value
Apple	1	234,241
Google	2	167,713
Amazon	3	125,263
Microsoft	4	108,847
Coca Cola	5	63,365
Toyota	7	56,246
McDonald's	9	45,362
Disney	10	44,352
IBM	12	40,381
Intel	13	40,197
Facebook	14	39,857
Cisco	15	35,559
Nike	16	32,376
Oracle	18	26,288
General Electric	19	25,566
SAP	20	25,092
Honda	21	24,422
Pepsi	24	20,488
UPS	27	18,072
Ford	35	14,325
Gillette (Acquired by P & G)	37	13,753
Adobe	39	12,937
eBay	44	12,010
Starbucks	48	11,798
Philips	49	11,661
Loreal	51	11,589
HP	54	10,891
Sony	56	10,514
Kellogg	57	10,419
Canon	61	9482
Dell	63	9086
3M	64	9035
Colgate	66	8824
Sifos	70	8004
Huihe	71	7909
PAYPAL	72	7604
FEDEX	73	6998
Caterpillar	76	6791
Ferrari	77	6458
Deere	84	5883
Land Rover	85	5855
Johnson	86	5720
discovery	91	5525
Tiffany	94	5335
Halley	99	4793

CRediT authorship contribution statement

Yuxuan Huang: Methodology, Resources, Data curation, Writing - original draft. **Shenggang Yang:** Supervision, Project administration, Funding acquisition. **Qi Zhu:** Formal analysis, Data curation, Writing - original draft, Writing - review & editing, Funding acquisition.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.frl.2021.101941.

Appendix

Tables A1 and A2

Table A2
This table provides the definitions of the variables and corresponding data sources.

Variables	Definitions	Source
Dependent Variables		
Raw_Return	Raw stock return, the firm's buy-and-hold return during the Covid-19 crash (from February 24 to March 23, 2020)	CRSP
Abnormal_Return	Abnormal stock return, the market model-adjusted return during the Covid-19 crash, with four-factor Fama-French model parameters computed over 252 trading days ending on March 23, 2020	CRSP and Dr. Kenneth French
Systematic_Risk	Systematic risk, the "beta" from the CAPM model during the Covid-19 crash	CRSP and Dr. Kenneth French
Idiosyncratic_Risk	The standard deviation of residuals from the CAPM model during the Covid-19 crash	CRSP and Dr. Kenneth French
Independent Variables		
Brand	Brand equity, an indicator variable that takes a value of 1 for firms included in the "100 Best Global Brands" from Interbrand and zero otherwise.	Interbrand
Control Variables		
Size	Firm size, the natural logarithm of the market value of assets (item 6 − item 60 + item 25 × item 24)	Compustat
Q	Market-to-book ratio, the ratio of the market value of assets (item 6 − item 60 + item 25 × item 24) to the book value of assets (item 6)	Compustat
Leverage	Book leverage, the sum of current liabilities (item 34) and long-term debt (item 9) normalized by the book value of assets (item 6)	Compustat
Shortdebt	Short-term debt, current liabilities (item 34) divided by total assets (item 6)	Compustat
Longdebt	Long-term debt (item 9) divided by the book value of assets (item 6)	Compustat
Rating	Debt rating, an indicator variable equal to one if a firm has a long-term debt rating from Standard & Poor's and zero otherwise (Huang et al., 2016).	Compustat
Profit	Firm profitability, the ratio of income before extraordinary items (item 18) to the book value of assets (item 6)	Compustat
Cash	Cash holdings, cash and short-term investments scaled by total assets (item 6)	Compustat
Firmage	Firm age, the natural logarithm of the number of years a firm's stock has been covered by CRSP	CRSP
Liquidity	Liquidity of stock, calculated as cumulative ratio of absolute daily return to the daily dollar volume during the estimated period	CRSP

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