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Do DJIA Firms Reflect Stationary Debt Ratios?

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Abstract: To form optimum firm capital structure strategies to face unanticipated economic events, firm managers should understand the stability of a firm's capital structure. The aim of this research was to study whether the debt ratio is stationary in listed firms on the Dow Jones Industrial Average (DJIA). Two vital capital structure concepts regarding pecking order and trade-off theory are fairly contradictory. Using opposing theoretical contexts, the Sequential Panel Selection Method apparently categorizes which and how many series are stationary processes in the panel. This method was used to test the mean reverting properties of the 25 companies listed on Dow Jones Industrial Average between 2001 and 2017 in this study, which is expected to fill the current gap in the literature. The overall results show that stationary debt ratios exist in 10 of the 25 studied firms, supporting the trade-off theory. Moreover, the 10 firms utilizing trade-off theory are affected by firm size, profitability, growth opportunity, and dividend payout ratio. These results provide vital information for firms to certify strategies to optimize capital structure.

Keywords: debt ratio; trade-off theory; Sequential Panel Selection Method; stationarity

JEL Classification: C32; F31

1. Introduction

The Dow Jones Industrial Average (DJIA) represents 30 of the most highly influential as well as capitalized firms in the US economy. Examining the capital structure of these firms restrains their capability to manage external combative circumstances (Abor 2005), with each firm requiring optimization of the capital structure regarding financial system stability. To form an optimum firm capital structure policy to deal with unanticipated economic events, firm managers ought to understand the stability of a firm's capital structure. The aim of this research was to study whether debt ratios are stationary in listed firms on the DJIA.

Two major theories describing the corporate capital structure are pecking order and trade-off theory, with Modigliani and Miller (1958) offering optimal capital structures replicating both with debtless, default-cost tax advantages. As a trade-off between interest tax shields and financial distress costs (Miller 1977; Leland 1994; Brealey and Myers 2003; Frank and Goyal 2009), trade-off theory sustains the occurrence of an optimal debt ratio to maximize firm value; this static theory predicts reversion of the factual debt ratio to an optimal or objective value. In terms of the pecking order theory, no definite optimal debt ratio is obvious because of information asymmetry costs. Following the financing hierarchy, companies utilize less risky debt prior to risky external equity financing while favoring internal financing (retained earnings) over other sources, e.g., issuing and debt security (Myers and Majluf 1984; Myers 1984).

The trade-off concept was previously studied at a quantitative level as well as in terms of speediness of adjusting company debt ratios to the assumed target. DeAngelo and Roll (2015) utilized a time-varying target approach to study inter-firm variation, with a 15,096-industrial-firm sample from CRSP/Compustat files between 1950 and 2008. Capital structure stability was observed to be uncommon and occurring mainly at low leverage; overall, it was shown to be essentially interim, with several firms discarding low leverage during post-war economic expansion. Nehrebecka and Dzik-Walczak (2018) presented a meta-study on 187 regressions from 33 papers regarding leverage and leverage adaptions in Polish listed firms between 1998 and 2015, thereby verifying publication selection bias. Polish listed firms were shown to alter present leverage levels to the yearly optimum rate of 41.55%, thereby requiring 1.3 years to lessen the half-distance to achieve optimum leverage. Compared with outcomes presented by other researchers, this was a rather high adjustment rate. Judging from a partial adjustment model assessed via the GMM estimation procedure utilizing information regarding an unbalanced 390-UK-firm panel between 1984 and 1996, Ozkan (2001) showed the target capital structure occurrence and indicated a yearly 43% adjustment rate for these firms. Flannery and Rangan (2006) discussed the existence of the target capital structure and specified 33% and 34% adjustment rates for Compustat firms and the US, respectively. Elsas and Florysiak (2011) indicated a 26% adjustment rate for all Compustat firms.

Much previous research in this field supports the static trade-off theory (Solomon 1963; Shyam-Sunder and Myers 1999; Hovakimian et al. 2001; Ozkan 2001; Sogorb Mira and López-Gracia 2003; Leary and Roberts 2005; Flannery and Rangan 2006; Hackbarth et al. 2007; Chang and Yu 2010; Elsas and Florysiak 2011; Chen et al. 2019; and Dierker et al. 2019). In contrast, other studies do not support the trade-off concept, for example, Fama and French (2002); Banerjee et al. (2004); Christopher and Tong (2005); Ju et al. (2005); Botta (2019); Jarallah et al. (2019); and Chen et al. (2019). Empirical evidence of trade-off theory (stationarity) is abundant, however, a crucial point worth noting is that structural breaks are generally not considered in any prior studies. By identifying the structural change points, specific economic factors resulting in debt ratios fluctuating significantly in individual firms during the sample period can be analyzed.

The motivation for this study was to determine whether shock economic events relevant to time–debt ratio paths are permanent or temporary, as seen from 425 firm-year observations listed on the DJIA from 2001 to 2017. These DJIA samples can be treated as representatives for verification of firm finance trade-off theory in that the 30-stock index is considered to serve as a proxy for the health of the wider US economy, being one of the most cited financial barometers in the world (Paul 2019). Whether or not debt ratios are characterized by a unit root has important policy implications. If debt ratios are an I (0) stationary process, then any shock effect is temporary. Moreover, diverting the debt ratios from one level to another would return the ratio to its original stability level. Thus, controlling the trend path or mean value in the long run is critical.

There are several contributions to this study. First, to the best of our knowledge, this study is the first to utilize the panel unit root test from Kapetanios, Snell, and Shin (Kapetanios et al. 2003) with a critical target for firm managers rather than simply using a temporary strategy in the short run. We use the Fourier function via the Sequential Panel Selection Method (SPSM) process to study the astringent debt ratio of listed firms on the DJIA. In contradiction to panel-based unit root tests (PURTs) that involve a-unit root allied testing for whole units in the panel and that are incapable of deciding I (0) and I (1) series mixtures, the SPSM, proposed by Chortareas and Kapetanios (2009), divides an entire panel into sets of nonstationary and stationary series, respectively, to classify which and how many series are stationary procedures of the panel. Secondly, the debt ratios of various firms are renowned to be contemporaneously correlated since independence is considered to be a realistic presumption. To check for any cross-section dependency among the data sets, we approximate the tests' bootstrap distribution, which was not previously attempted, assuming that the individuals are cross-section independent. Hence, our study is expected to fill the current gap in the literature. The overall panel test results show that 10 of the 25 studied companies (40%) have stationary debt, i.e., 10 firms support the trade-off theory, consistent with previous findings regarding company profitability, size, market value (growth opportunity), and dividend payout ratio. The outcomes of this study demonstrate vital policy applications for managers in the US.

This research work is classified according the following sections: Section 2 presents the empirical model and sample, Section 3 displays the empirical results, and Section 4 presents the conclusions.

2. Data and Empirical Model

2.1. Data

The yearly sample panel covered all the firms listed on the Dow Jones Industrial Average (DJIA) between 2001 and 2017 employed in this study. Data were extracted from the yearly Compustat files. After exclusion of five firms with missing continuous data from 2001 to 2017, the final sample consisted of 25 publicly traded companies listed on the DJIA (namely, 3M Co., American Express Co., Boeing Co., Caterpillar Inc., Chevron Corp., Coca-Cola Co., Disney (Walt) Co., DowDuPont Inc., Exxon Mobil Corp., Goldman Sachs Group Inc., Home Depot Inc., Intel Corp., Intl Business Machines Corp., Johnson & Johnson, JPMorgan Chase & Co., McDonald's Corp., Merck & Co., Nike Inc-Club, Pfizer Inc., Procter & Gamble Co., Travelers Cos Inc., United Technologies Corp., Verizon Communications Inc., Walgreens Boots Alliance Inc., and Walmart Inc.).

2.2. Empirical Model

Several studies indicated that panel-based unit root tests (PURTs) and conventional tests with and without nonlinearities can be used for accounting, macroeconomics, and financial purposes. In addition, the ADF (Augmented Dickey-Fuller) unit root test uses almost less power to find a mean reversion trend for the series. Although the nonlinear modification finding unnecessarily indicated nonlinear mean reversion, stationarity tests via a nonlinear system were employed.

A nonlinear PURT is employed by Ucar and Omay (2009) and in a nonlinear context in Kapetanios, Snell, and Shin (Kapetanios et al. 2003, KSS) according to the PURT process designed by Im et al. (2003), thereby verifying the time-series data mean reversion. Perron (1989) proposed that the power to refuse a unit root reduces if a structural break is neglected; further, the stationary alternative becomes true if a structural break occurs. Furthermore, structural fluctuations occur in a sample-producing procedure, although these were later disregarded, with the investigation switched toward an a-unit root null assumption. Hence, Chortareas and Kapetanios (2009) suggested mixing the SPSM with the KSS PURTs, with the Fourier function employed to estimate the mean reverting properties for 25 companies listed on the DJIA between 2001 and 2017.

In agreement with previous research, KSS PURT is used here to identify the occurrence of nonstationarity in contradiction with a nonlinear but wholly stationary exponential smooth transition autoregressive (ESTAR) procedure. The equation is as follows:

$$\Delta Debt_t = \gamma Debt_{t-1}\Big\{1 - exp(-\theta Debt_{t-1}^2)\Big\} + \nu_t \quad (1)$$

where $Debt_t$ is the ratio of total liabilities to total assets, v_t defines an i.i.d. error with constant adjustment as well as nil mean, and $\theta \geq 0$ represents the ESTAR procedure transition variable for controlling the transition rate. $\mathrm{Debt_t}$ abides by a PURT for the null hypothesis, but a nonlinear stationary ESTAR for the substitute. A weakness of such basis is the variable γ, which is unidentified for the null assumption. Kapetanios et al. (2003) utilize the 1st-order Taylor series estimation on $\{1 - exp(-\theta Debt_{t-1}^2)\}$ regarding the null hypothesis $\theta = 0$. The resulting estimated Formula (1) via supplementary expression is therefore as follows:

$$\Delta Debt_t = \xi + \delta Debt_{t-1}^3 + \sum_{i=1}^{k} \theta_i \Delta Debt_{t-i} + \nu_t \quad (2)$$

These alternative and null assumptions on this basis are specified as $\delta = 0$ in contradiction of $\delta < 0$. A nonlinear PURT via regression [1] is extended by Ucar and Omay (2009), with the equation being

$$\Delta Debt_{i,t} = \gamma_i Debt_{i,t-1}\{1 - exp(-\theta_i Debt_{i,t-1}^2)\} + \nu_{i,t} \quad (3)$$

Ucar and Omay (2009) employ the first-order Taylor formula estimation to Equation (1) if $\theta_{\mathrm{i}} = 0$ for whole i, resulting in the following supplementary equation:

$$\Delta Debt_{i,t} = \xi_i + \delta_i Debt^3_{i,t-1} + \sum_{j=1}^{k} \theta_{i,j} \Delta Debt_{i,t-j} + \nu_{i,t} \quad (4)$$

where $\delta_i = \theta_i\, \gamma_i$. The hypotheses developed for PURT via regression (4) are shown as:

$$\begin{array}{l} \mathrm{H}_0\text{: } \delta_i = 0\text{, regarding whole } i\text{, (linear nonstationarity);} \\ \mathrm{H}_0\text{: } \delta_i < 0\text{, regarding certain } i\text{, (nonlinear stationarity).} \end{array} \quad (5)$$

Moreover, SPSM with the KSS PURT and the Fourier function is represented by

$$\Delta Debt_{i,t} = \xi_i + \delta_i Debt^3{}_{i,t-1} + \sum_{j=1}^{k1} \theta_{i,j} \Delta Debt_{i,t-j} + a_{i,1} sin(\frac{2\pi kt}{T}) + b_{i,1} cos(\frac{2\pi kt}{T}) + \varepsilon_{i,t} \quad (6)$$

where t = 1, 2, 3, … T and normal regarding choosing [$sin(2\pi kt/T)$, $cos(2\pi kt/T)$] under the Fourier equation are able to unconditionally approximate the accuracy level according to the integrable equation. If k denotes the frequency chosen for the estimation, $[a_i,b_j]'$ estimates this frequency element amplitude and displacement, displaying no less than one frequency element existing for the structural break. Gallant (1981); Becker et al. (2004), as well as Enders and Lee (2012), indicated that Fourier estimation enables catching an unidentified behavior despite its unperiodical process. Without previous information regarding the data-break shape, a grid-pursuit is initially completed to discover the optimal frequency.

Although there are two significant capital structure concepts of pecking order and trade-off theory that contradict each other, the SPSM in this study is employed for both opposing theoretical contexts, seemingly classifying which and how many series are stationary processes in the panel. This is carried out via KSS PURT to test time-series mean reverting properties, such as the debt ratios of the 25 firms listed on the DJIA from 2001 to 2017. Relevant advantages of this model include:

(1) The flexibility and power to detect mean reversion trend for the series;
(2) Classification of the whole panel into two group series, i.e., stationary and nonstationary, respectively;
(3) Clear identification of how many and which series in the panel are stationary processes;
(4) Use of stationarity tests based on a nonlinear framework for the nonlinear adjustment of economic variables because of the cycle and government policy implementation.

The SPSM flowchart in Figure 1 shows the following:

(1) KSS PURTs with a Fourier function are associated with the whole panel debt ratio. The process discontinues and whole panel series are not stationary, therefore, the null assumption is not refused. Step 2 is initiated if the null is refused;
(2) The series is removed via the minimum KSS statistic due to its classified stationarity;
(3) The first step is returned to in case of the rest of the series, otherwise, the process is stopped with the whole panel-disconnected series.

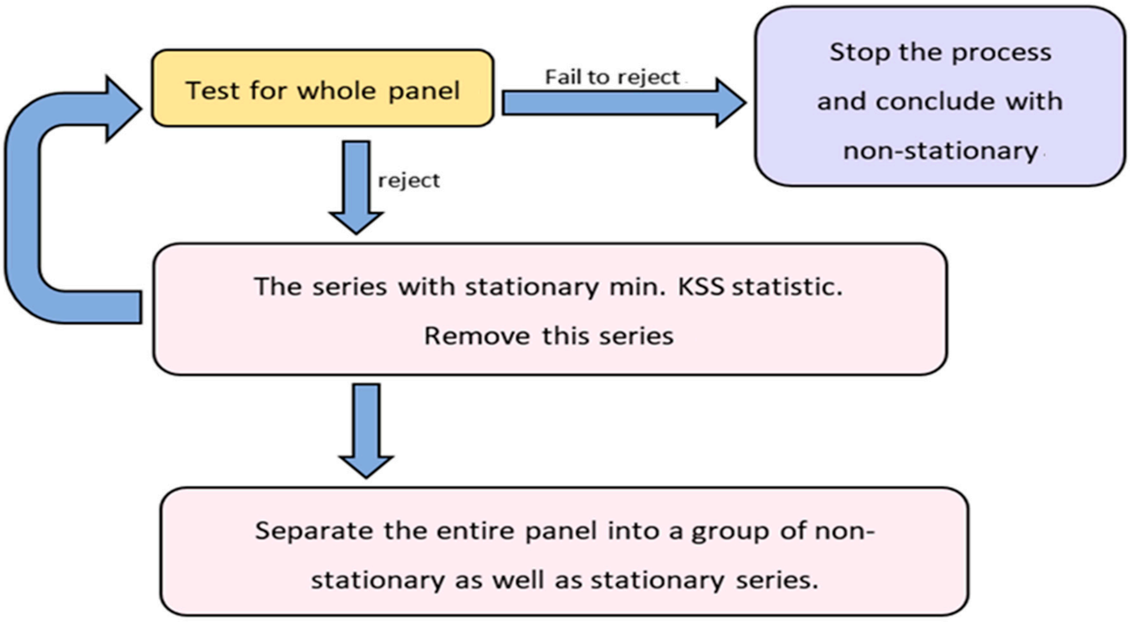

Figure 1. Sequential Panel Selection Method (SPSM) flowchart.

The final outcome is a separation of all panels into groups of nonstationary and stationary series.

3. Empirical Results

3.1. Results

Table 1 displays the annual debt ratio description statistics in each company regarding panel samples from 2001 to 2017. The total number of firms is 25, with 425 firm-year observations. Except for McDonald's Corp., the debt ratio is non-normally distributed for all firms, according to the Jarque–Bera (J–B) statistics results. Some traditional unit root tests, e.g., the ADF, PP (Phillips and Perron 1988); and KPSS (Kwiatkowski et al. 1992), were initially carried out.

Some univariate unit root and PURTs were carried out. Table 2 indicates the outcomes of the ADF, PP, and KPSS unit root tests for debt ratio, proposing that the debt ratios of nine firms (i.e., Chevron Corp., Disney (Walt) Co., Exxon Mobil Corp., Goldman Sachs Group Inc., Intel Corp., McDonald's Corp., Merck & Co., Verizon Communications Inc., and Walmart Inc.) were all non-stationary in univariate unit root tests in terms of constants and trend. Two firms (i.e., American Express Co. and JPMorgan Chase & Co.) with nonstationary constants and trend changed to stationary in the first instance. Whichever other firms' unit root tests were chosen, their ADF, PP, and KPSS unit root test outcomes for debt ratio generated ambiguous outcomes.

Table 1. Summary statistics of the debt ratio.

Companies	Mean	Max.	Min.	Std.Dev.	Skew.	Kurt.	J-B
3M CO.	0.217	0.369	0.119	0.073	0.994	2.922	2.807
AMERICAN EXPRESS CO.	0.375	0.548	0.227	0.094	−0.074	2.066	0.633
BOEING CO.	0.172	0.275	0.091	0.061	0.508	1.979	1.468
CATERPILLAR INC.	0.498	0.547	0.425	0.043	−0.306	1.517	1.823
CHEVRON CORP.	0.110	0.225	0.048	0.058	0.620	2.145	1.605
COCA-COLA CO.	0.317	0.543	0.153	0.128	0.519	1.822	1.748
DISNEY (WALT) CO.	0.225	0.289	0.179	0.034	0.225	1.910	0.984
DOWDUPONT INC.	0.274	0.342	0.177	0.049	−0.429	2.234	0.937
EXXON MOBIL CORP.	0.064	0.129	0.035	0.031	1.044	2.737	3.140
GOLDMAN SACHS GROUP INC.	0.584	0.641	0.510	0.041	−0.510	2.056	1.368
HOME DEPOT INC.	0.267	0.607	0.040	0.180	0.348	2.165	0.836
INTEL CORP.	0.092	0.223	0.019	0.076	0.712	1.886	2.316
INTL BUSINESS MACHINES CORP.	0.285	0.374	0.210	0.054	0.176	1.794	1.117
JOHNSON & JOHNSON	0.128	0.220	0.046	0.048	−0.032	2.356	0.296
JPMORGAN CHASE & CO.	0.250	0.317	0.195	0.039	0.265	1.769	1.273
MCDONALD'S CORP.	0.440	0.874	0.291	0.173	1.759	4.647	10.684 ***
MERCK & CO.	0.190	0.278	0.119	0.046	0.507	2.260	1.115
NIKE INC-CLUB	0.087	0.172	0.025	0.046	0.724	2.371	1.764
PFIZER INC.	0.192	0.255	0.069	0.054	−0.800	2.556	1.955
PROCTER & GAMBLE CO.	0.280	0.395	0.225	0.056	0.886	2.314	2.556
TRAVELERS COS INC.	0.058	0.064	0.041	0.006	−1.048	3.542	3.322
UNITED TECHNOLOGIES CORP.	0.198	0.284	0.140	0.042	0.698	2.304	1.722
VERIZON COMMUNICATIONS INC.	0.307	0.487	0.167	0.101	0.543	1.940	1.632
WALGREENS BOOTS ALLIANCE INC.	0.098	0.262	0.001	0.077	0.590	2.355	1.280
WALMART INC.	0.259	0.281	0.227	0.016	−0.556	2.393	1.137

Note: The sample period is from 2001 to 2017. *** indicates significance at the 5% and 1% levels, respectively.

Table 2. Univariate unit root tests with constants and trend.

	Level			1st Difference		
	ADF	**PP**	**KPSS**	**ADF**	**PP**	**KPSS**
3M CO.	−2.732(2)	−1.265(0)	0.114[2]	−3.096(0)	−3.129(1)	0.062(1)
AMERICAN EXPRESS CO.	−5.745(3) **	−1.097(1)	0.157[2] **	−4.002(0) **	−4.024(1) **	0.076(0)
BOEING CO.	−3.613(3) *	−2.028(2)	0.124[0] *	−3.581(0) *	−4.739(6) ***	0.231(5) ***
CATERPILLAR INC.	−2.726(3)	−2.028(2)	0.107[1]	−3.389(1)	−3.278(11)	0.261[8] ***
CHEVRON CORP.	−1.286(2)	−1.555(5)	0.177[2] **	−2.178(1)	−1.876(4)	0.185[5] **
COCA-COLA CO.	−5.75(3) ***	−3.541(15) *	0.166[2] **	−3.874(0) **	−3.939(6) **	0.500[15] ***
DISNEY (WALT) CO.	−1.215(0)	−1.587(1)	0.142[1] *	−4.663(0) ***	−4.877(3) ***	0.147[1] **
DOWDUPONT INC.	−2.681(2)	−1.550(1)	0.085[2]	−2.693(2)	−2.502(1)	0.103[1]
EXXON MOBIL CORP.	−1.403(0)	−1.381(2)	0.169[2] **	−3.202(0)	−2.842(4)	0.161[4] **
GOLDMAN SACHS GROUP INC.	−2.834(0)	−2.821(3)	0.144[1] **	−3.801(0) **	−4.621(5) ***	0.296[10] ***
HOME DEPOT INC.	−2.677(1)	−1.734(1)	0.087[2]	−2.400(0)	−2.396(2)	0.094[0]
INTEL CORP.	−1.993(0)	−1.996(12)	0.163[2] **	−4.730(1) ***	−5.001(13) ***	0.394[12] ***
INTL BUSINESS MACHINES CORP.	−3.398(1) *	−4.006(7) **	0.137[1] *	−3.503(1) *	−4.186(14) **	0.216[5] **
JOHNSON & JOHNSON	−3.164(1)	−1.686(0)	0.067[1]	−2.903(0)	−2.903(0)	0.073[1]
JPMORGAN CHASE & CO.	−2.347(2)	−1.832(1)	0.100[2]	−3.270(0) *	−3.333(1) *	0.082[0]
MCDONALD’S CORP.	0.376(2)	0.616(4)	0.163[2] **	−3.652(1) *	−3.081(7)	0.115[3]
MERCK & CO.	−1.770(0)	−1.741(6)	0.176[2] **	−4.616(0) ***	−8.472(14) ***	0.500[15] ***
NIKE INC-CLUB	0.019(3)	−0.987(15)	0.183[2]	−6.111(2) ***	−8.907(8) ***	0.302[8] ***
PFIZER INC.	−3.679(3) *	−2.387(3)	0.123[1] *	−4.660(0) ***	−4.602(1) ***	0.187[6] **
PROCTER & GAMBLE CO.	−2.083(0)	−2.022(2)	0.149[1]	−3.998(1) **	−8.487(13) ***	0.469[14] ***
TRAVELERS COS INC.	−4.999(0) ***	−4.999(0) ***	0.099[3]	−7.270(0) ***	−16.669(14) ***	0.500[15] ***
UNITED TECHNOLOGIES CORP.	−3.394(0) *	−3.535(8) *	0.155[2] **	−4.809(2) ***	−12.878(11) ***	0.500[15] ***
VERIZON COMMUNICATIONS INC.	−2.134(0)	−2.570(8)	0.163[2] **	−3.524(1) *	−3.506(12) *	0.228{8} ***
WALGREENS BOOTS ALLIANCE INC.	−2.904(2)	−8.148(13) ***	0.153[3] **	−7.117(1) ***	−4.954(7) ***	0.235[9] ***
WALMART INC.	−2.521(0)	−2.521(0)	0.141[1] **	−5.883(0) ***	−7.958(5) ***	0.500[15] ***

Note: ***, ** and * indicate significance at the 0.01, 0.05, and 0.1 levels, respectively. The numbers in parentheses indicate the lag order selected based on the recursive t-statistic, as suggested by Perron (1989). The numbers in the brackets indicate truncation for the Bartlett Kernel, as suggested by the Newey–West test (1987).

In Table 3, three of the first-generation PURTs were adopted; their relevant outcomes showed that Levin et al. (2002) and Im et al.'s (2003) unit root tests for debt ratio results were stationary in contrast with Maddala and Wu's (1999) nonstationary testing results. However, this major first generation PURT advantage is the hypothesis of cross-sectional independence crosswise data. Without contemplating simultaneous connections among data, the PURT is biased toward refusing the joint unit root assumption. Cross-sectional dependencies are recognized in second-generation PURTs, suggesting a greater method to estimate the debt ratios. Four second-generation PURTs (Bai and Ng 2004; Moon and Perron 2004; Choi 2002; and Pesaran 2007) were used for this study.

Table 3. Panel unit root tests (first generation).

Levin et al. (2002)	t_ρ^*	$\hat{\rho}$	t_ρ^{*B}	t_ρ^{*C}	
	10.059 (1.000)	−0.333 *** (0.001)	10.965 (1.000)	16.755 (1.000)	
Im et al. (2003)	t_bar_{NT}	$W_{t,bar}$	$Z_{t,bar}$	$t\_bar_{NT}^{DF}$	$Z_{t,bar}^{DF}$
	−2.042	0.591 (0.723)	−2.748 *** (0.003)	−2.048	−2.778 *** (0.003)
Maddala and Wu (1999)	P_{MW}	Z_{MW}			
	46.049 (0.633)	−0.395 (0.654)			

Notes: Levin et al. (2002): t_p^* specifies the modified t-statistic calculated via the Bartlett kernel function and a common lag truncation variable achieved using $\overline{K} = 3.21T^{1/3}$ (Levin et al. 2002). Relevant p-values are in parentheses. $\hat{\rho}$ is the pooled least squares estimator. Relevant standard error values are in parentheses. t_p^{*B} represents the modified t-statistic calculated via the Bartlett kernel function and separate bandwidth variables (Newey and West 1994). t_p^{*C} indicates the modified t-statistic calculated via a quadratic spectral kernel function and separate bandwidth parameters. Lastly, t_p^* means the modified t-statistic calculated via the Bartlett kernel function and a common lag truncation parameter. Relevant p-values are in parentheses. * indicates significance at the 5% level. Im et al. (2003): $t\_bar_{NT}^{DF}$ (respectively t_bar_{NT}) specifies the mean of Dickey Fuller (respectively, Augmented Dickey Fuller) individual statistics. $Z_{t,bar}^{DF}$ is the standardized $t\_bar_{NT}^{DF}$ statistic, with relevant p-values in parentheses. $Z_{t,bar}$ is the standardized t_bar_{NT} statistic based on Dickey Fuller distribution. $W_{t,bar}$ specifies the standardized t_bar_{NT} statistic via simulated approximated moments (Im et al. 2003, Table 3). Corresponding p-values are in parentheses. * shows significance at the 5% level. Maddala and Wu (1999): P_{MW} specifies the Fisher's test statistic defined as $P_{MW} = -2\sum \log(p_i)$, where p_i are the p-values from the ADF unit root tests for each cross-section. Under H_0, P_{MW} has χ^2 distribution with 2N of freedom, where T is infinite and N is fixed. ZMW is the standardized statistic utilized for big N samples. Under H0, Z_{MW} has an N (0, 1) distribution, with T and N being infinite.

Table 4 indicates the results of Moon and Perron (2004), who proposed that debt ratio is stationary. However, considering our three findings of second-generation PURTs as evidence contradicting trade-off theory, only one supports trade-off theory. Due to the outcomes of second-generation PURTs being inconsistent, the SPSM procedure besides the KSS PURT was carried out to ratify debt ratio in this study.

As mentioned earlier, PURTs that are a-unit root allied testing for whole panel units are incapable of deciding (0) and I (1) series mixtures. Therefore, an SPSM course via KSS PURT was used to identify which and how many series are stationary procedures in the panel.

Table 5 specifies the outcomes of the KSS PURT trends without Fourier functions of the 25 firms, including the order for KSS PURTs of bootstrap p-values, specific minimum KSS statistics, and stationary series recognized via the process. Furthermore, when the KSS PURT was initially used for the entire panels described in Table 5, OU statistics were generated using a PURT value of 2.1923, indicating a p-value at 1% significance. By subsequently applying the SPSM process, Verizon Communications Inc. was revealed to be stationary with a value of −3.8103; it was then excluded in the panel. KSS PURT was reused for the rest of the series. KSS PURT still rejected the null with a value of −2.1249; Travelers Cos Inc. became stationary here, as the minimum KSS value was −3.7087. Travelers Cos Inc. was then eliminated in the panel, with KSS PURT reused for the rest of the series.

Table 4. Panel unit root tests (second generation).

Bai and Ng (2004)	$\hat{r}$	$Z^c_{\hat{e}}$	$P^c_{\hat{e}}$	MQ_c	MQ_f
	4.0	0.482 (0.315)	54.824 (0.297)	3	4
Moon and Perron (2004)	t^*_a	t^*_b	$\hat{\rho}^*_{pool}$	t^{*B}_a	t^{*B}_b
	−10.29 *** (0.000)	−5.964 *** (0.000)	0.777	−9.487 *** (0.000)	−5.824 *** (0.000)
Choi (2002)	P_m	Z	L^*		
	−0.077 (0.531)	0.349 (0.637)	0.571 (0.716)		
Pesaran (2007)	P^*	$CIPS$	$CIPS^*$		
	2	−1.747 (0.460)	−1.747 (0.460)		

Notes: Bai and Ng (2004): $\hat{r}$ is the calculated common factor number via IC criteria functions. $P^c_{\hat{e}}$ is a Fisher's type statistic via p-values of the individual ADF tests. $Z^c_{\hat{e}}$ is a standardized Choi's type statistic for big N samples. p-values are in parentheses. The first computed value $\hat{r}_1$ comes from the filtered test MQ_f and the second comes from the rectified test MQ_c. * denotes significance at the 5% level. Moon and Perron (2004): t^*_a and t^*_b are the unit root test statistics obtained via defactored panel data (Moon and Perron 2004). Relevant p-values are in parentheses. $\hat{\rho}^*_{pool}$ is the rectified pooled estimate of the autoregressive variable. t^{*B}_a and t^{*B}_b are calculated using the Bartlett kernel function according to a quadratic spectral kernel function. Choi (2002): The P_m test is an adjusted Fisher's inverse chi-square test (Choi 2001). The Z test is an inverse normal test. The L^* test is an adjusted logit test. P-values are in parentheses. Pesaran (2007): $CIPS$ is the mean of individual cross-sectionally augmented ADF statistics (CADF). $CIPS^*$ denotes the mean of truncated individual CADF statistics. Relevant p-values are in parentheses. P^* specifies the nearest integer of the mean of individual lag lengths obtained from ADF tests.

Table 5. Results of panel KSS test with trend and without Fourier function.

Sequence	OU Statistic	Min. KSS Statistic	Series
1	**−2.1923 (0.0000)**	**−3.8103**	**VERIZON COMMUNICATIONS INC**
2	**−2.1249 (0.0000)**	**−3.7087**	**TRAVELERS COS INC.**
3	**−2.0560 (0.0000)**	**−3.6905**	**JPMORGAN CHASE & CO.**
4	**−1.9817 (0.0000)**	**−3.5692**	**PROCTER & GAMBLE CO.**
5	**−1.9061 (0.0004)**	**−3.4705**	**JOHNSON & JOHNSON**
6	**−1.8279 (0.0002)**	**−3.4109**	**WALGREENS BOOTS ALLIANCE INC**
7	**−1.7446 (0.0002)**	**−2.9576**	**CHEVRON CORP.**
8	**−1.6772 (0.0008)**	**−2.7664**	**INTL BUSINESS MACHINES CORP**
9	**−1.6131 (0.0004)**	**−2.6667**	**EXXON MOBIL CORP.**
10	**−1.5473 (0.0020)**	**−2.4373**	**MCDONALD'S CORP.**
11	**−1.4879 (0.0094)**	**−2.1723**	**GOLDMAN SACHS GROUP INC.**
12	**−1.4390 (0.0022)**	**−2.1411**	**UNITED TECHNOLOGIES CORP.**
13	**−1.3850 (0.0114)**	**−2.1392**	**INTEL CORP.**
14	**−1.3222 (0.0336)**	**−2.1057**	**COCA-COLA CO.**
15	**−1.2510 (0.1056)**	**−1.828**	**PFIZER INC.**
16	−1.1933 (0.1580)	−1.8243	MERCK & CO.
17	−1.1231 (0.3002)	−1.7788	NIKE INC-CLUB
18	−1.0412 (0.4726)	−1.7505	AMERICAN EXPRESS CO.
19	−0.9399 (0.4806)	−1.6941	WALMART INC.
20	−0.8141(0.6098)	−1.3689	CATERPILLAR INC.
21	−0.7032 (0.5528)	−1.1822	DOWDUPONT INC.
22	−0.5835 (0.5634)	−1.1095	3M CO.
23	−0.4081 (0.7492)	−0.5161	BOEING CO.
24	−0.3541 (0.4586)	−0.3554	HOME DEPOT INC.
25	−0.3529 (0.4456)	−0.3529	DISNEY (WALT) CO.

Notes: OU statistic is the invariant average KSS statistic. Entries in parentheses stand for the asymptotic p-value. The significance level is 10%. The maximum lag is 1.

This process remained until the KSS PURT was unable to refuse the null assumption at 10% significance, and the process finally discontinued during order 15, when the debt ratios for 15 companies (i.e., Verizon Communications Inc., Travelers Cos Inc., JPMorgan Chase & Co., Procter & Gamble CO., Johnson & Johnson, Walgreens Boots Alliance Inc., Chevron Corp., Intl Business Machines Corp., Exxon Mobil Corp., McDonald's Corp., Goldman Sachs Group Inc. and United Technologies Corp., Intel Corp., Coca-Cola Co., and Pfizer Inc.) were excluded from the panel. To estimate the robustness of the testing, the procedure continued until the last sequence.

The KSS PURT statistic is incapable of rejecting the null assumption for whole orders. Ostensibly, the SPSM process via KSS PURT with trends and without Fourier function offers some evidence regarding long-term debt-ratio stationarity. As mentioned earlier, Fourier approximation is used to evaluate structural break likelihood to analyze unidentified behaviors despite the unperiodical method (Enders and Lee 2009). Thus, KSS PURT with Fourier function was carried out as follows. First, without previous information regarding the data-break shape, a grid-pursuit was completed to discover the optimal frequency. Equation (6) was used for every number of $k = 1, \ldots 5$, as per the suggestions of Enders and Lee (2012), where a sole frequency seized an extensive diversity of breaks. The residual sum of squares (RSS) specified the sole frequency as $k = 2$, which was carried out the most in the whole series.

Table 6 reveals the outcomes of KSS PURT with both trends and Fourier function regarding debt ratios, where a given order for KSS PURT bootstrap p-values in the lessened panel represented each minimum KSS statistic; the stationary series was found via the process every time. Table 6 shows that the unit root null assumption for debt ratio was excluded after KSS PURT with both trend and Fourier function, which was initially used for the entire panel, generating a value of −3.0469 (1% p-value significance). Via the SPSM process, Verizon Communications Inc. was found to be stationary for a panel minimum KSS amount of −3.8103. Meanwhile, Verizon Communications Inc. was eliminated while the KSS PURT was reused in the rest series. The KSS PURT was then observed to be discarded; before the unit root null reached a value of −2.9080, Travelers Cos Inc. became stationary for a panel minimum KSS value of −3.7087, and was also excluded from the panel while KSS PURT was reused for the rest of the series. In addition, KSS PURT was shown to be discarded before the unit root null at a value of −2.5176, where Procter & Gamble Co. became stationary with a minimum KSS amount of −3.5692 and was eliminated from the panel; KSS PURT was then reused for the rest of the series. This course was continued until KSS PURT was unable to refuse the null assumption for p-values of 10% significance; the course was eventually discontinued at the 10th and final sequence, while the debt ratios of all 10 companies (i.e., Verizon Communications Inc., Travelers Cos Inc., JPMorgan Chase & Co., Procter & Gamble Co., Johnson & Johnson, Walgreens Boots Alliance Inc., Chevron Corp., Intl Business Machines Corp., Exxon Mobil Corp., and McDonald's Corp.) were excluded from the panel. In particular, the SPSM procedure using the KSS PURT with both trend and Fourier functions offered robust proof approving debt-ratio stationarity for 10 of 25 companies.

Figures 2 and 3 show plots for the debt ratios of 10 stationary and 15 nonstationary series companies derived from the KSS PURT with trend and Fourier functions, respectively. Both figures demonstrate that debt ratios are more volatile in the 15 nonstationary series companies (as seen in Figure 3) than those of the 10 stationary series companies (as seen in Figure 2).

Table 6. Results of panel KSS test with both trend and Fourier functions.

Sequence	OU Statistic	Min. KSS	Fourier (*K*)	Series
1	**−3.0469 (0.0000)**	**−3.8103**	**2**	**VERIZON COMMUNICATIONS INC.**
2	**−2.9080 (0.0002)**	**−3.7087**	**2**	**TRAVELERS COS INC.**
3	**−2.5176 (0.0018)**	**−3.5692**	**2**	**PROCTER & GAMBLE CO.**
4	**−2.4212 (0.0026)**	**−3.4705**	**2**	**JOHNSON & JOHNSON**
5	**−2.4163 (0.0038)**	**−3.4109**	**2**	**WALGREENS BOOTS ALLIANCE INC.**
6	**−2.3273 (0.0064)**	**−2.9576**	**2**	**CHEVRON CORP**
7	**−2.2102 (0.0092)**	**−2.9001**	**2**	**JPMORGAN CHASE & CO.**
8	**−2.1989 (0.0098)**	**−2.7664**	**2**	**INTL BUSINESS MACHINES CORP.**
9	**−2.2092 (0.0102)**	**−2.755**	**2**	**EXXON MOBIL CORP.**
10	**−2.0459 (0.0266)**	**−2.4373**	**2**	**MCDONALD'S CORP.**
11	−1.8590 (0.1128)	−2.1723	2	GOLDMAN SACHS GROUP INC.
12	−1.8014 (0.1190)	−2.1411	2	UNITED TECHNOLOGIES CORP.
13	−1.7682 (0.1110)	−2.1392	2	INTEL CORP.
14	−1.7444 (0.1260)	−2.1057	2	COCA-COLA CO.
15	−1.6280 (0.2860)	−1.828	2	PFIZER INC.
16	−1.7476 (0.1892)	−1.8243	2	MERCK & CO.
17	−1.7021 (0.3084)	−1.7788	2	NIKE INC-CLUB
18	−1.4255 (0.5604)	−1.7505	2	AMERICAN EXPRESS CO.
19	−1.0974 (0.7500)	−1.7238	2	3M CO.
20	−1.0386 (0.8828)	−1.6941	2	WALMART INC.
21	−0.7026 (0.9342)	−1.3689	2	CATERPILLAR INC
22	−0.3800 (0.9428)	−1.1822	2	DOWDUPONT INC
23	0.1372 (0.9512)	−0.5161	2	BOEING CO.
24	0.2777 (0.8470)	−0.3554	2	HOME DEPOT INC.
25	−1.0739 (0.4550)	−0.3529	2	DISNEY (WALT) CO.

Notes: OU statistics are the invariant average KSS $t_{i,NL}$ statistics (Ucar and Omay 2009). Entries in parentheses stand for the asymptotic *p*-value. The significance level is 10%. The maximum lag is 8. The asymptotic *p*-values were computed by bootstrap simulations using 5000 replications. Fourier (*k*) was chosen according to the minimum sum square of residuals for Fourier function.

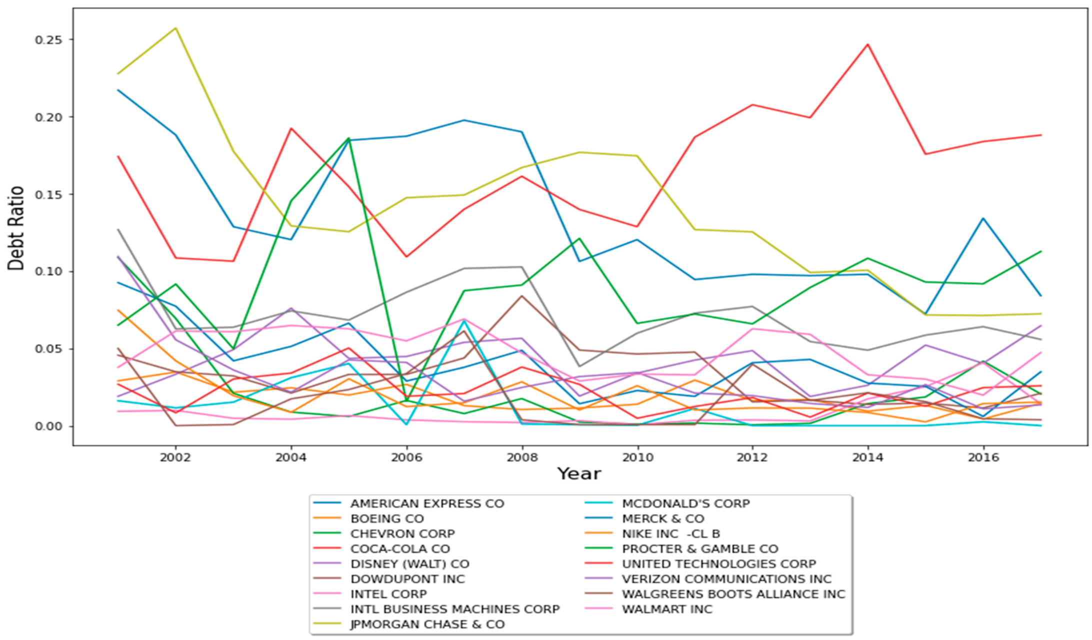

Figure 2. KSS panel-based unit root test (PURT) for trend and Fourier function stationary series companies.

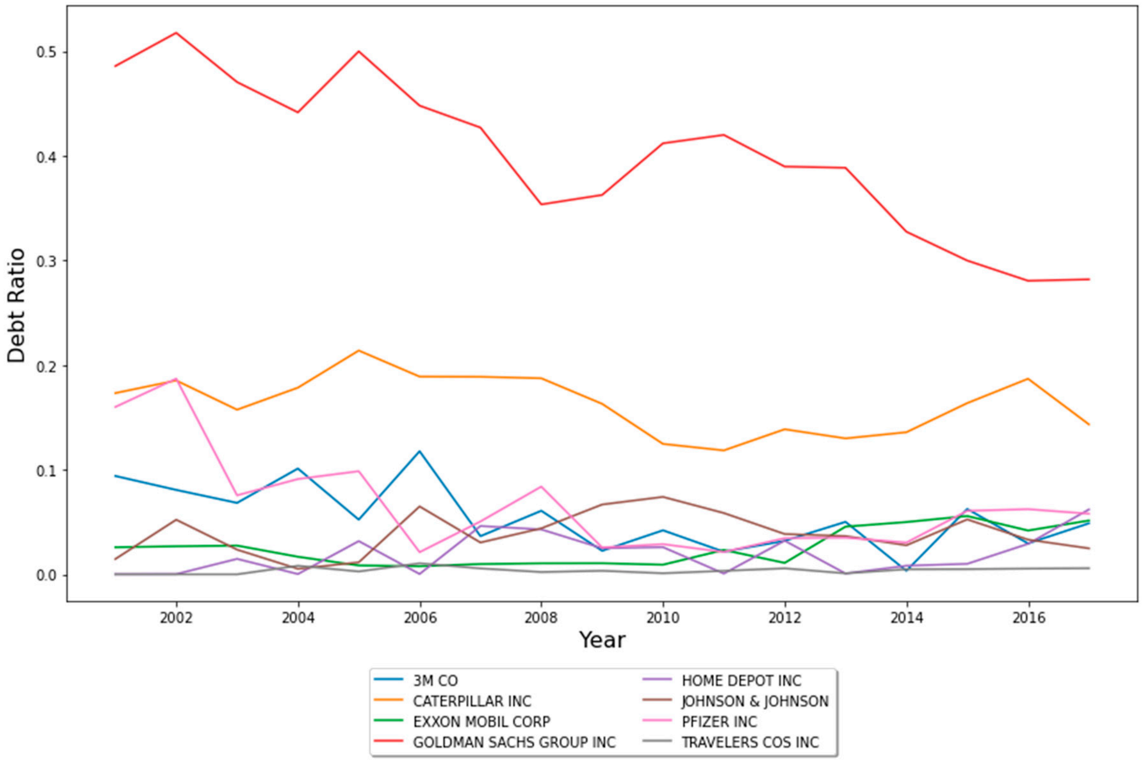

Figure 3. KSS PURT for trend and Fourier function nonstationary series companies.

These companies were proven by previous researchers to practice target capital structure via trade-off theory as influenced by firm size (Daskalakis and Psillaki 2008; Lin et al. 2018; and Sani and Alifiah 2020) and profitability (Abor 2005; Chang et al. 2009; Črnigoj and Mramor 2009; Chadha and Sharma 2015; and Sani and Alifiah 2020). Similarly, total assets (proxy for firm size), earnings per share and dividend payout ratio (proxy for profit), and market value (proxy for growth opportunities) can be used to further study the causality shown in Table 6. Figures 4–9 show plots regarding the average total assets, the average EPS (Earnings Per Share) basic from operation, EPS basic with extraordinary items, EPS basic without extraordinary items, dividend payout ratios, and market value of 10 stationary series firms and 15 nonstationary series firms from 2001 to 2017, respectively. Apart from some missing data not used in the calculations, the dividend payout ratios from 2009 to 2017 are included in Figure 8. In Figures 4–9, the total assets, EPS basic from operation, EPS basic with extraordinary items, EPS basic without extraordinary items, dividend payout ratios, and market value were clearly higher in the 10 stationary series firms than in the 15 nonstationary series firms. These outcomes propose firm size, with profitability and growth opportunities influencing capital structure and supporting trade-off theories.

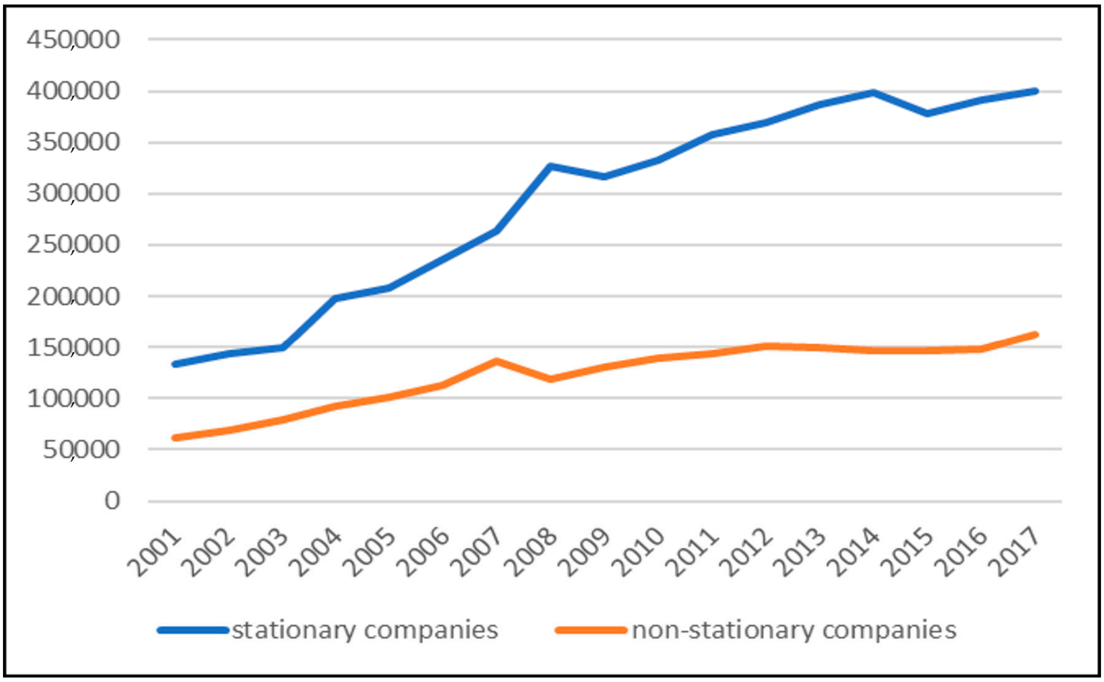

Figure 4. Firm assets (firm size).

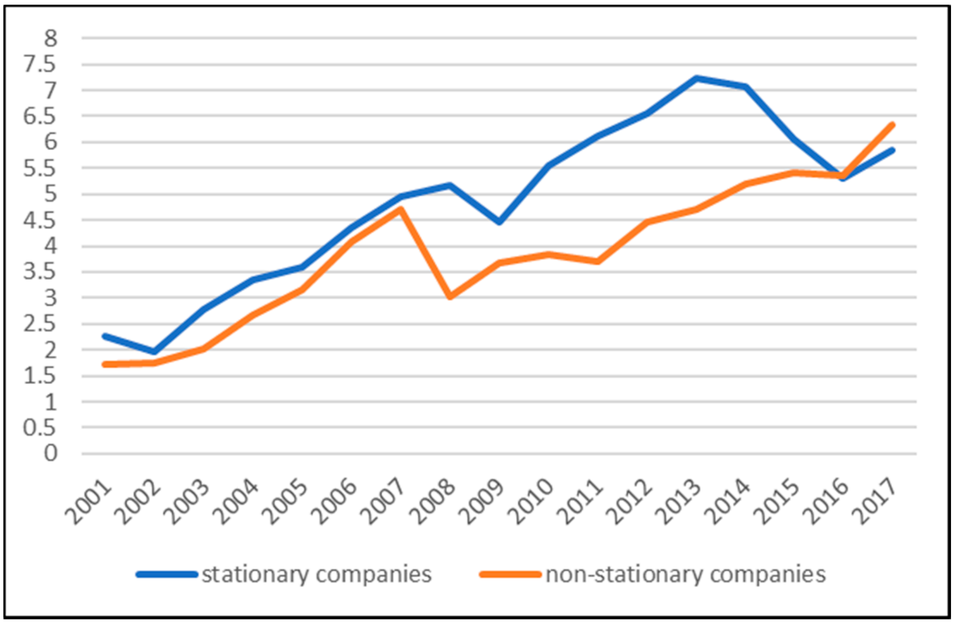

Figure 5. EPS basic from operations.

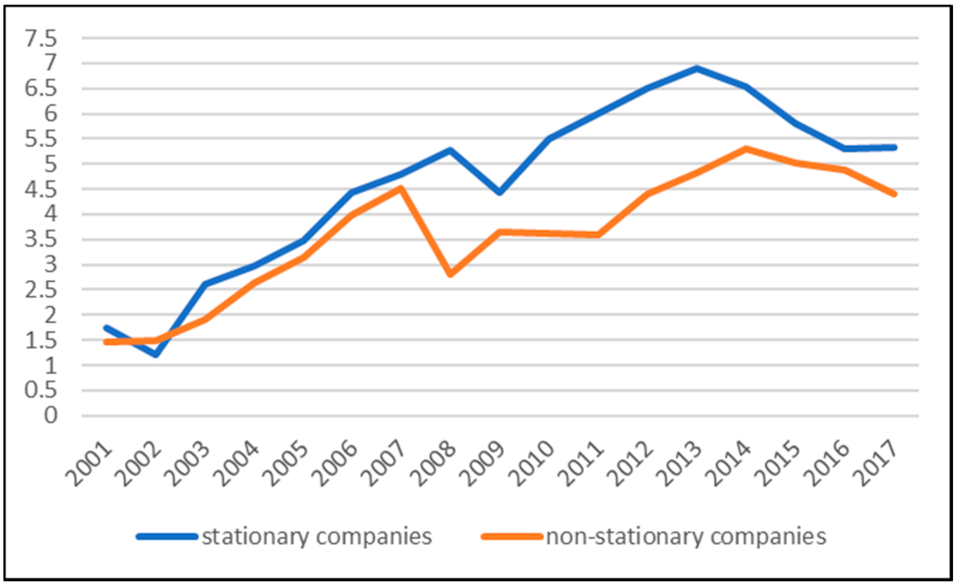

Figure 6. EPS basic with extraordinary items.

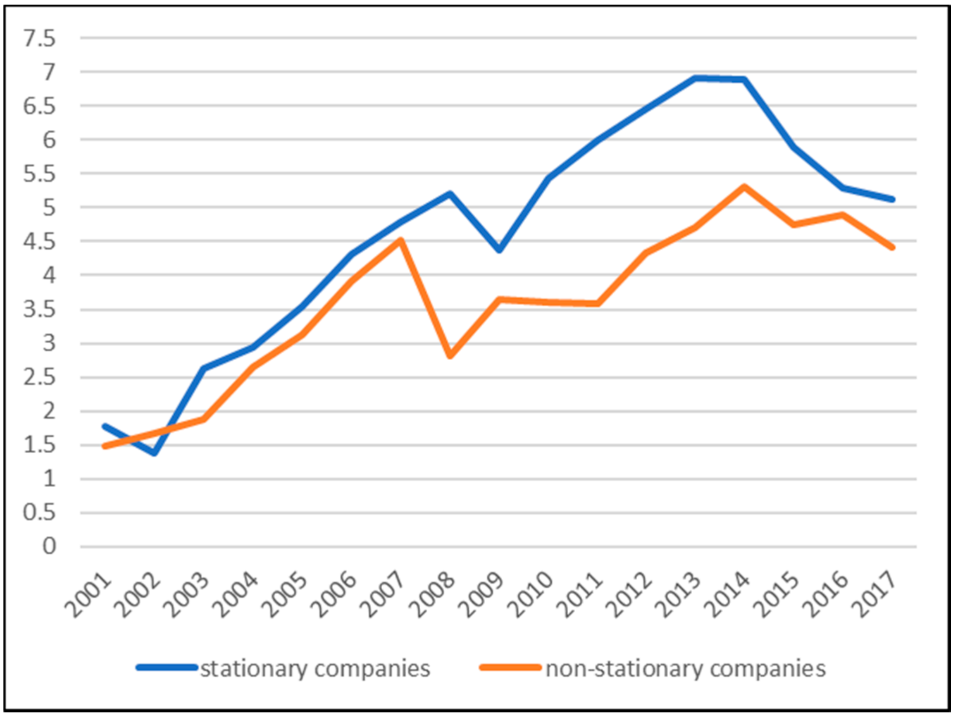

Figure 7. EPS basic without extraordinary items.

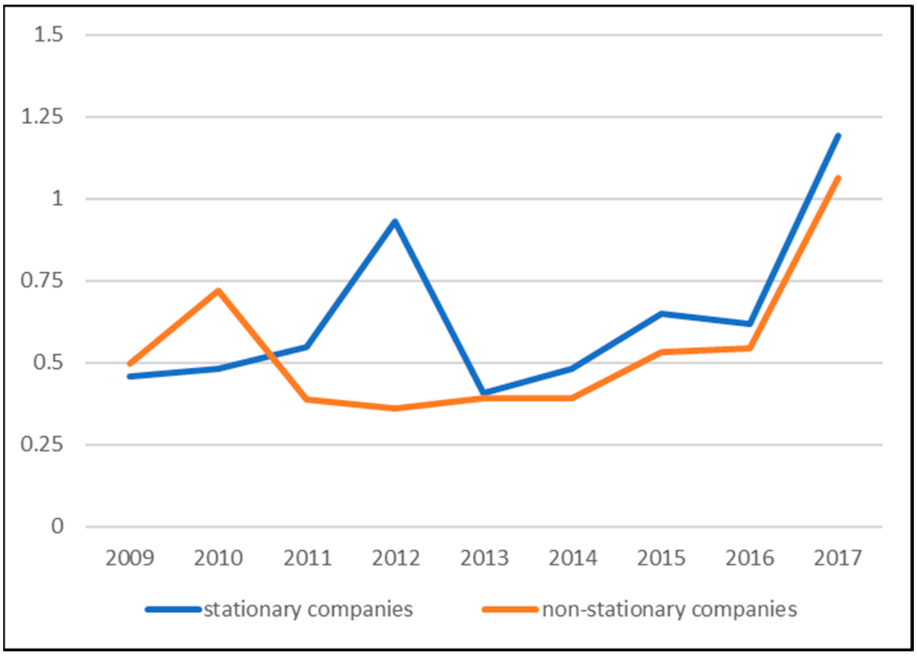

Figure 8. Dividend payout ratios.

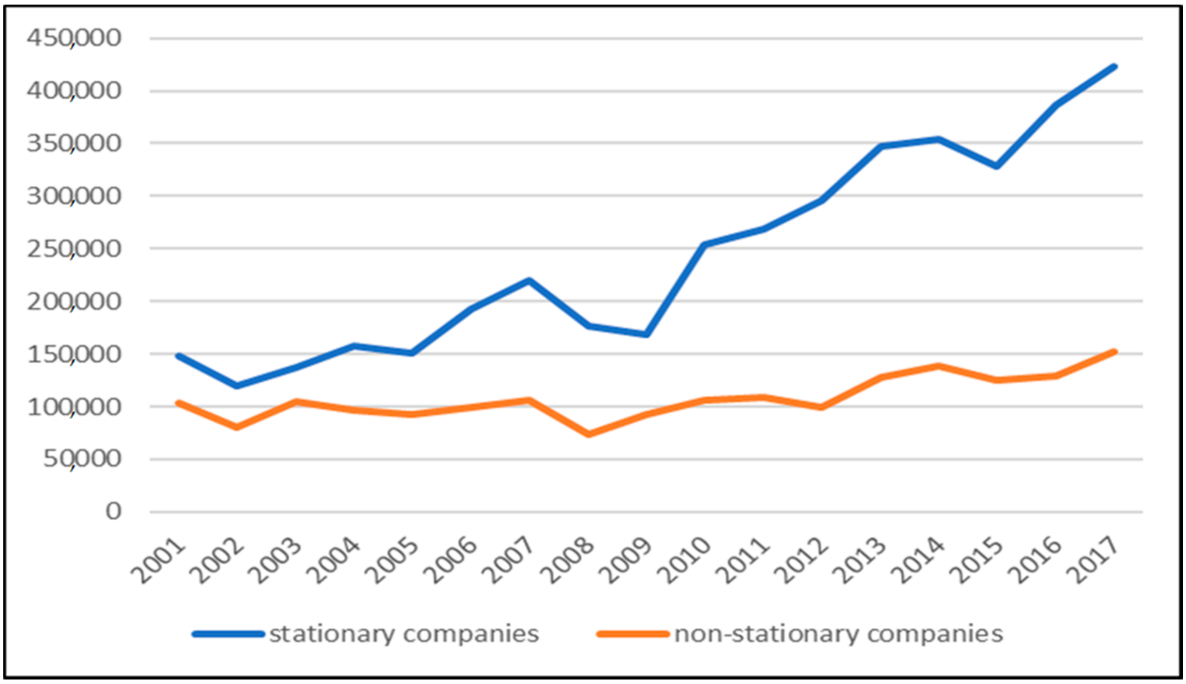

Figure 9. Market value.

3.2. *Discussion of the Results*

In particular, the SPSM process using the KSS PURT with the trend and Fourier functions offers robust proof showing the debt-ratio stationarity for 10 of 15 firms. These results are consistent with supporting trade-off theory (e.g., Solomon 1963; Shyam-Sunder and Myers 1999; Hovakimian et al. 2001; Ozkan 2001; Sogorb Mira and López-Gracia 2003; Leary and Roberts 2005; Flannery and Rangan 2006; Hackbarth et al. 2007; Chang and Yu 2010; Elsas and Florysiak 2011; Chen et al. 2019; and Dierker et al. 2019). In particular, the outcomes of this study were consistent with those of Flannery and Rangan (2006); Elsas and Florysiak (2011); and Ozkan (2001) in developed countries. Flannery and Rangan

(2006) mentioned the existence of the target capital structure and specified 33% and 34% adjustment rates of target capital structure for Compustat firms and US firms, respectively. Elsas and Florysiak (2011) show a 26% adjustment rate for all Compustat companies. Ozkan (2001) displayed target capital structure and indicated a yearly 43% adjustment rate for an unbalanced panel of 390 UK firms from 1984 to 1996. These outcomes were consistent with those of Sani and Alifiah (2020) and Ahsan et al. (2016) for developing countries. Ahsan et al. (2016) indicated that short-term, long-term, and total leverage supported trade-off financing behavior, whereas individual firm results did not. Individual firm results specified that only 16%, 25%, and 12% of firms had short-term and long-term targets and total target leverage ratio for firms in Pakistan between 1973 and 2010, respectively. Sani and Alifiah (2020) proposed that Nigerian listed firms apply dynamic adjustment to reach an optimum leverage ratio.

Furthermore, the causality of debt-ratio stationarity for 10 of the 25 companies showed that the total assets, EPS basic from operation, EPS basic with extraordinary items, EPS basic without extraordinary items, dividend payout ratios, and market capitalization (market value) are clearly higher in the 10 stationary series firms than in the 15 nonstationary series firms, because large-market capitalization (market value) firms frequently receive fame regarding the generation of quality services, as well as goods, a history of dependable dividend payments, and stable development. Thus, investments in large-market capitalization stocks are perhaps more conservative than in small-market capitalization stocks, possibly decreasing the risk as well as the cost of debt finance. These results propose that firm size, profitability, and growth opportunities influence capital structure, thereby supporting trade-off theory. These results are consistent with findings of prior studies, which demonstrated that capital structure supporting trade-off theory is influenced by firm size (Daskalakis and Psillaki 2008; Lin et al. 2018; Nehrebecka and Dzik-Walczak 2018; and Sani and Alifiah 2020) and profitability (Abor 2005; Chang et al. 2009; Črnigoj and Mramor 2009; Chadha and Sharma 2015; and Sani and Alifiah 2020). In particular, these outcomes are consistent with those of Sani and Alifiah (2020); Nehrebecka and Dzik-Walczak (2018); Ahmad and Etudaiye-Muhtar (2017); and Ahsan et al. (2016) for developing countries. Nehrebecka and Dzik-Walczak (2018) showed that the firm size and growth opportunities positively influenced the debt ratio for Polish listed firms, consistent with trade-off theory. Ahsan et al. (2016) displayed that profitable firms abide by trade-off financing behavior for Pakistan firms. Ahmad and Etudaiye-Muhtar (2017) showed that firm size, growth opportunity, and profitability affected the optimum capital structure of Nigerian firms. Sani and Alifiah (2020) proposed that firm size, return on assets, and tangibility account for target-leverage achievement of Nigerian listed firms.

Several significant policy implications were brought to light in this study. First, overwhelming evidence in favor of the I (1) nonstationary hypothesis was found, implying that the debt ratios of 15 out of the 25 DJIA samples do not converge. This suggests that shock economic events that affect debt ratios are permanent. This outcome implies that, following a large structural variation from an economic event, the debt ratio would not return to its initial stability for a period of time. The fact that the debt ratio shows I (1) nonstationarity suggests that it should not be possible for the series to predict future debt ratio movement based on past behavior. Therefore, policymakers ought to look for more valid methods to attain optimum capital structure for financial system stability.

4. Conclusions

The 30-stock DJIA index is considered to serve as not only a proxy for the health of the wider US economy, but also represents one of the most cited financial barometers in the world (Paul 2019). An optimum capital structure is a crucial factor in the success of facing unanticipated economic events, with all firms attempting to achieve this structure to maintain financial system stability. To fulfil the optimum capital structure strategy, firm managers should comprehend the stability of their firms' capital structure. The goal of this study was to examine whether or not the debt ratio is stationary in listed firms of the DJIA.

Empirical evidence for trade-off theory is copious but generally does not consider structural breaks. The SPSM and KSS PURTs with Fourier function were employed in this work to verify the mean-reverting properties of 25 firms listed on the DJIA between 2001 and 2017. In contrast to PURTs, which join PURT of all the units in the panel and are incapable of deciding I (0) and I (1) series mixtures, this SPSM apparently categorizes which and how many series are stationary. To the best of our knowledge, this study is the first to use the KSS PURT with Fourier function via SPSM to evaluate debt-ratio convergence for listed firms on the DJIA. We hope that this study effectively fills the current gap in the literature.

The overall results showed debt-ratio stationarity in 10 of 25 firms, supporting trade-off theory. Moreover, 10 firms were shown to support trade-off theory influenced by corporation size, profitability, growth opportunity, and dividend payout ratio. For firm managers, whatever structural change exists in financial markets, the debt ratio temporarily deviates from the target and ultimately returns to its target. Therefore, control of the trend path or mean value in the long-term is a critical target for the managers rather than only a temporary policy in the short-term. The widest stock-leverage measure is the ratio of total liabilities to total assets in this study, which can be thought of as a proxy for what is kept for shareholders should liquidation occur. However, this does not offer a good denotation of whether firm default risk was recent. Total liabilities comprise items such as current, provisional, and reserve liabilities for unpaid salaries, as well as other liabilities for deferred and accrued income and employee expenses; this might exaggerate the leverage amount (Rajan and Zingales 1995). This study limitation may help indicate possible research areas in the future.

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References

Abor, Joshua. 2005. The effect of capital structure on profitability: An empirical analysis of listed firms in Ghana. *Journal of Risk Finance* 6: 438–45. [CrossRef]

Ahmad, Rubi, and Oyebola Fatima Etudaiye-Muhtar. 2017. Dynamic model of optimal capital structure: Evidence from Nigerian listed firms. *Global Business Review* 18: 590–604. [CrossRef]

Ahsan, Tanveer, Man Wang, and Muhammad Azeem Qureshi. 2016. Mean reverting financial leverage: Theory and evidence from Pakistan. *Applied Economics* 48: 379–88. [CrossRef]

Bai, Jushan, and Serena Ng. 2004. A Panic Attack on Unit Roots and Cointegration. *Econometrica* 72: 1127–77. [CrossRef]

Banerjee, Saugata, Almas Heshmati, and Clas Wihlborg. 2004. The dynamics of capital structure. *Research in Banking and Finance* 4: 275–97.

Becker, Ralf, Walter Enders, and Stan Hurn. 2004. A general test for time dependence in parameters. *Journal of Applied Econometrics* 19: 899–906. [CrossRef]

Botta, Marco. 2019. Financing Decisions and Performance of Italian SMEs in the Hotel Industry. *Cornell Hospitality Quarterly* 60: 335–54. [CrossRef]

Brealey, Richard A., and Stewart Myers. 2003. *Principles of Corporate Finance*, 7th ed. Pennsylvania: McGraw Hill Irwin.

Chadha, Saurabh, and Anil K. Sharma. 2015. Determinants of capital structure: An empirical evaluation from India. *Journal of Advances in Management Research* 12: 3–14. [CrossRef]

Chang, Chun, and Xiaoyun Yu. 2010. Informational efficiency and liquidity premium as the determinants of capital structure. *Journal of Financial and Quantitative Analysis* 45: 401–40. [CrossRef]

Chang, Chingfu, Alice C. Lee, and Cheng F. Lee. 2009. Determinants of capital structure choice: A structural equation modeling approach. *The Quarterly Review of Economics and Finance* 49: 97–213. [CrossRef]

Chen, Zhiyao, Jarrad Harford, and Avraham Kamara. 2019. Operating leverage, profitability, and capital Structure. *Journal of Financial and Quantitative Analysis* 54: 369–92. [CrossRef]

Choi, In. 2001. Unit root tests for panel data. *Journal of International Money and Finance* 20: 249–272. [CrossRef]

Choi, In. 2002. Combination unit root tests for cross-sctionally correlated panels. In *The Econometric Theory and Practice: Frontiers of Analysis and Applied Research*. Edited by Peter Charles Bonest Phillips, Dean Corbae, Steven N. Durlauf and Bruce E. Hansen. Cambridge: Cambridge University Press, pp. 311–33. [CrossRef]

Chortareas, Georgios, and George Kapetanios. 2009. Getting PPP right: Identifying mean-reverting real exchange rates in panels. *Journal of Banking and Finance* 33: 390–404. [CrossRef]

Christopher, Green, and Guanqun Tong. 2005. Pecking order or trade-off hypothesis? Evidence on the capital structure of Chinese companies. *Applied Economics* 37: 2179–89. [CrossRef]

Črnigoj, Matjaž, and Dušan Mramor. 2009. Determinants of capital structure in emerging European economies: Evidence from Slovenian firms. *Emerging Markets Finance & Trade* 45: 72–89. [CrossRef]

Daskalakis, Nikolaos, and Maria Psillaki. 2008. Do country or firm factors explain capital structure? Evidence from SMEs in France and Greece. *Applied Financial Economics* 18: 87–97. [CrossRef]

DeAngelo, Harry, and Richard Roll. 2015. How stable are corporate capital structures? *The Journal of Finance* 70: 373–418. [CrossRef]

Dierker, Martin, Inmoo Lee, and Sung Won Seo. 2019. Risk changes and external financing activities: Tests of the dynamic trade-off theory of capital structure. *Journal of Empirical Finance* 52: 178–200. [CrossRef]

Elsas, Ralf, and David Florysiak. 2011. Heterogeneity in the speed of adjustment toward target leverage. *International Review of Finance* 11: 181–211. [CrossRef]

Enders, Walter, and Junsoo Lee. 2009. The Flexible Fourier Form and Testing for Unit Roots: An Example of the Term Structure of Interest Rates. Working Paper. Tuscaloosa: Department of Economics, Finance & Legal Studies, University of Alabama. Available online: http://cba.ua.edu/~{}wenders2/wp-content/uploads/2009/11/enders_lee_april_29_20091.pdf (accessed on 22 August 2020).

Enders, Walter, and Junsoo Lee. 2012. A unit roots test using a Fourier series to approximate smooth Breaks. *Oxford Bulletin of Economics and Statistics* 74: 574–99. [CrossRef]

Fama, Eugene F., and Kenneth R. French. 2002. Testing trade-off and pecking order predictions about dividends and debt. *Review of Financial Studies* 15: 1–3. [CrossRef]

Flannery, Mark, and Kasturi P. Rangan. 2006. Partial adjustment toward target capital structures. *Journal of Financial Economics* 79: 469–506. [CrossRef]

Frank, Murray Z., and Vidhan K. Goyal. 2009. Capital structure decisions: Which factors are reliably important? *Financial Management* 38: 1–37. [CrossRef]

Gallant, Ronald. 1981. On the basis in flexible functional form and an essentially unbiased form: The flexible Fourier form. *Journal of Econometrics* 15: 211–353. [CrossRef]

Hackbarth, Dirk, Christopher Hennessy, and Hayne Leland. 2007. Can the tradeoff theory explain debt structure? *Review of Financial Studies* 20: 1389–428. [CrossRef]

Hovakimian, Armen, Tim Opler, and Sheridan Titman. 2001. The debt-equity choice. *Journal of Financial and Quantitative Analysis* 36: 1–24. [CrossRef]

Im, Kyung So, M. Hashem Pesaran, and Yongcheol Shin. 2003. Testing for unit roots in heterogeneous panels. *Journal of Econometrics* 115: 53–74. [CrossRef]

Jarallah, Shaif, Ali. Salman Saleh, and Ruhul Salim. 2019. Examining pecking order versus trade-off theories of capital structure: New evidence from Japanese firms. *International Journal of Finance & Economics* 24: 204–11. [CrossRef]

Ju, Nengjiu, Robert Parrino, Allen M. Poteshman, and Michael S. Weisbach. 2005. Horses and rabbits? Trade-Off Theory and Optimal Capital Structure. *The Journal of Financial and Quantitative Analysis* 40: 259–81. [CrossRef]

Kapetanios, George, Andy Snell, and Yongcheol Shin. 2003. Testing for unit root in the nonlinear STAR framework. *Journal of Econometrics* 112: 359–79. [CrossRef]

Kwiatkowski, Denis, Peter C. B. Phillips, Peter Schmidt, and Yongcheol Shin. 1992. Testing the null hypothesis of stationarity against the alternative of a unit root. *Journal of Econometrics* 54: 159–78. [CrossRef]

Leary, Mark T., and Michael Roberts. 2005. Do firms rebalance their capital structures? *Journal of Finance* 60: 2575–619. [CrossRef]

Leland, Hayne E. 1994. Corporate debt value, bond covenants, and optimal capital structure. *Journal of Finance* 49: 1213–52. [CrossRef]

Levin, Andrew, Chien-Fu Lin, and Chia-Shang Chu. 2002. Unit root in panel data: Asymptotic and finite-sample properties. *Journal of Econometrics* 108: 1–24. [CrossRef]

Lin, Woon Leong, Nick Yip, Murali Sambasivan, and Jo Ann Ho. 2018. Corporate debt policy of Malaysian SMEs: Empirical evidence from firm dynamic panel data. Int. *Journal of Economics and Management* 12: 491–508.

Maddala, Gangadharrao S., and Shaowen Wu. 1999. A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics* 61: 631–52. [CrossRef]

Miller, Merton H. 1977. Debt and taxes. *The Journal of Finance* 32: 261–75. [CrossRef]

Modigliani, Franco, and Merton H. Miller. 1958. The cost of capital, corporation finance, and the theory of investment. *American Economic Review* 48: 261–97.

Moon, Hyungsik Roger, and Benoit Perron. 2004. Testing for a unit root in panels with dynamic factors. *Journal of Econometrics* 122: 81–126. [CrossRef]

Myers, Stewart C. 1984. The capital structure puzzle. *Journal of Finance* 39: 574–92. [CrossRef]

Myers, Stewart C., and Nicholas S. Majluf. 1984. Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics* 13: 187–221. [CrossRef]

Nehrebecka, Natalia, and Aneta Dzik-Walczak. 2018. The dynamic model of partial adjustment of the capital structure: Meta-analysis and a case of Polish enterprises. *Zbornik radova Ekonomskog fakulteta u Rijeci/Proceedings of Rijeka Faculty of Economics* 36: 55–81. [CrossRef]

Newey, Whitney K., and Kenneth D. West. 1994. Automatic lag selection in covariance matrix estimation. *Review of Economic Studies* 61: 631–653. [CrossRef]

Ozkan, Aydin. 2001. Determinants of capital structure and adjustment to long run target: Evidence from UK company panel data. *Journal of Business Finance & Accounting* 28: 175–98. [CrossRef]

Paul, Kosakowski. 2019. Why the Dow Matters. *Investopedia*. November 14. Available online: https://www.investopedia.com/articles/stocks/08/dow-history.asp (accessed on 23 August 2020).

Perron, Pierre. 1989. The great crash, the oil price shock and the unit root hypothesis. *Econometrica* 57: 1361–401. [CrossRef]

Pesaran, M. Hashem. 2007. A Simple Panel Unit Root Test in the Presence of Cross Section Dependence. *Journal of Applied Econometrics* 22: 265–312. Available online: https://www.jstor.org/stable/25146517 (accessed on 22 August 2020).

Phillips, Peter C. B., and Pierre Perron. 1988. Testing for a unit root in time series regression. *Biometrica* 75: 335–46. [CrossRef]

Rajan, Raghran. G., and Luigi Zingales. 1995. What do we know about capital structure? Some evidence from international data. *The Journal of Finance* 50: 1421–60. [CrossRef]

Sani, Abdullahi, and Mohd Norfian Alifiah. 2020. Determinants of the capital structure of Nigerian listed firms: A dynamic panel model. *International Journal of Psychosocial Rehabilitation* 24: 991–99. [CrossRef]

Shyam-Sunder, Lakshmi, and Stewart C. Myers. 1999. Testing static tradeoff against pecking order models of capital structure. *Journal of Financial Economics* 51: 219–44. [CrossRef]

Sogorb Mira, Francisco, and José López-Gracia. 2003. Pecking Order versus Trade-Off: An Empirical Approach to the Small and Medium Enterprise Capital Structure. Working Paper. Valencia: Instituto Valenciano de Investigationes Económicas, S.A. [CrossRef]

Solomon, Ezra. 1963. *Theory of Financial Management*. New York: Columbia University Press. [CrossRef]

Ucar, Nuri, and Tolga Omay. 2009. Testing for unit root in nonlinear heterogeneous panels. *Economics Letters* 104: 5–8. [CrossRef]