

# Dividend Dynamics in the Shipping Industry: A Panel Data Analysis of Partial Adjustment Models

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## Abstract

This study explores the dividend dynamics of globally-listed firms in the idiosyncratic maritime sector. Employing an array of dynamic panel estimators in a sample of globally-listed shipping firms for the period 1988 to 2019 we provide empirical evidence that the degree of dividend smoothing (speed of adjustment) in the maritime sector is comparatively lower (higher). We also show that the speed of adjustment after deviations from the target is significantly higher in recession states. Our results document higher flexibility in the shipping industry's dividend payouts, reflecting its distinct traits that amplify the adverse impacts of financing shocks.

## Keywords

Dividend Smoothing, Speed of Adjustment, Maritime Industry, Recession, Shipping Companies

## 1. Introduction

The theoretical and empirical analysis of the dividend decision constitutes a focal point in corporate finance research. Lintner's (1956) seminal study evidences the tendency of firms to exercise a stable dividend policy, where current dividends are set according to their former levels. Moreover, firms appear to have a long-term target payout to which they adjust slowly after unexpected increases in earnings. This behavior, known as dividend smoothing is one of the most pronounced and well-documented phenomena in corporate finance research (Leary & Michaely, 2011). Relevant<sup>1</sup> empirical studies utilize national and inter-

<sup>1</sup>See the meta-analysis by Fernau & Hirsch (2019).

national, across-industry samples. The current study rides this wave of research and focuses on the global maritime industry. It tries to fill the relevant gap in the literature motivated by the importance and distinct traits of this sector. Commercial ships facilitate 90% of global trade while the maritime sector is characterized by high leverage, cyclicity, assets risk and financial constraints (Grammenos et al., 2008; Drobetz et al., 2013; Maniati & Sambracos, 2017). The maritime sector's high-risk profile has shaped certain aspects of firm's financial decision-making such as a conservative cash-holding policy (Ahrends et al., 2018) and a higher capital structure speed of adjustment (Drobetz et al., 2013). However, dividend dynamics in this sector have not been investigated (Alexandridis et al., 2018). Moreover, considering that payout decisions relate to liquidity and internal financing capabilities (Iyer et al., 2017) it is of particular significance to improve our understanding of dividend behavior in this sector.

Therefore, in this study, we analyze the dividend dynamics of 147 globally-listed maritime companies to explore the presence and the degree of dividend smoothing. By estimating Lintner's (1956) model we document that shipping companies' smooth dividends. However, the degree of dividend smoothing (speed of adjustment) in the maritime sector is lower (higher) than the one estimated for the "average" industrial firm in earlier studies (see Fernau & Hirsch, 2019). Moreover, we document that recessions in the macroeconomic and shipping environment exert a positive impact on the speed of adjustment. Our results indicate that the maritime sector exhibits a comparatively higher flexibility in dividends which is further amplified in recession states. This dividend behavior is in line with the sector's high-risk distinct traits. It appears that as earnings and external financing capabilities decline during recessions, maritime companies lower the degree of dividend smoothing to become more flexible. Thereby, increasing their ability to secure sufficient liquidity and investment capital. This study adds to the strand of the literature that documents the impact of the maritime industry's particularities in financial decision-making. Financial analysts have a keen interest in evaluating a firm's ability to avoid (i.e., financial flexibility) when deriving a firm's intrinsic value. Given that payout flexibility can have a direct impact on investment efficiency and financial distress, our findings provide useful insights to researchers, financial analysts and market participants in this sector.

## 2. Methodology

Lintner's (1956) seminal study documents several empirical observations regarding dividend decisions. Dividend stability represents a major managerial concern due to the belief that the market places a premium on stable dividend policies. Instead of deciding dividends *de novo* each year, firms appear to have a long-term dividend payout target. If there is an unexpected increase in earnings firms will only adjust their dividends slowly. Finally, managers are reluctant to cut dividends.

To explore the dividend dynamics of maritime companies we employ [Lintner's \(1956\)](#) empirically testable partial adjustment model. In any given year, the target dividend payout  $D_{it}^*$  is determined by a desired dividend payout ratio  $r_i$  of current earnings  $E_{it}$ .

$$D_{it}^* = r_i E_{it} \quad (1)$$

However, each year a firm will only adjust partially to the target dividend payout.

$$\Delta D_{it} = D_{it} - D_{it-1} = \alpha_i + \lambda_i (D_{it}^* - D_{it-1}) + \varepsilon_{i,t} \quad (2)$$

where  $\alpha_i$  is a constant,  $\lambda_i$  is the speed-of-adjustment coefficient,  $\Delta D_{it}$  is the actual change in dividends,  $D_{it}^* - D_{it-1}$  is the desired change in dividends and  $\varepsilon_{i,t}$  is the error term.

A speed of adjustment coefficient ( $\hat{\lambda}_i$ ) with values between 0 and 1 suggests dividend smoothing, that is, firms partially adjust their dividend payout towards the target in a given period. If  $\hat{\lambda}_i$  is estimated 0(1) then this implies a zero (perfect) adjustment. Equation (3) stems after rearranging Equation (2):

$$D_{it} = \alpha_i + \lambda_i D_{it}^* + (1 - \lambda_i) D_{it-1} + \varepsilon_{i,t} \quad (3)$$

Equation (4) is derived by substituting Equation (1) to Equation (3)

$$D_{it} = \alpha_i + \beta_{1i} E_{it} + \beta_{2i} D_{it-1} + \varepsilon_{i,t} \quad (4)$$

where  $\beta_{1i} = \lambda_i r_i$  and  $\beta_{2i} = 1 - \hat{\lambda}_i$  represents the degree of dividend smoothing. We estimate Equation (3) with three different estimation techniques. We utilize a left-censored Tobit regression to adjust for the fact that we have censored observations, since dividends have a lower bound at zero. We also use a firm fixed-effects estimator to account for time invariant firm characteristics. Finally, we employ a GMM-in-differences estimator as it yields unbiased coefficient estimates of the lagged variable  $\hat{\beta}_2$  ([Baltagi, 2008](#)).

Considering the distinct traits of the maritime sector we expect that maritime companies will exhibit a lower degree of dividend smoothing ( $1 - \hat{\lambda}_i$ ) and a higher speed of adjustment ( $\hat{\lambda}_i$ ). The maritime sector is highly levered and cyclical, which hampers the financial flexibility of shipping firms. Specifically, uncertain and fluctuating profits as well a significant part of cash flows committed to interest payments lower the internal financing capabilities of the shipping industry and increase external financing costs. However, financial flexibility and the need to preserve it is identified as one the most important factors in shaping financial decision making (see surveys by [Graham & Harvey, 2001](#); [Bancel & Mittoo, 2004](#); [Brav et al., 2005](#); [Brounen et al., 2006](#)). In this respect [Ahrends et al. \(2018\)](#) find that maritime companies practice a more conservative cash-holding policy, indicating an effort to maintain financial flexibility. Thus, we expect that maritime companies will exhibit a lower degree of dividend smoothing, where dividend changes trace more closely changes in profitability. Consider the cyclical nature of the maritime sector this will lead to more volatile dividend pay-

ments and a higher speed of adjustment. Moreover, we expect that the need for flexibility in dividends will increase in recession states where the supply of credit diminishes, collateral values decline and costs of financial distress increase, thus deteriorating financing capabilities further. Accordingly, [Drobtetz et al. \(2013\)](#) find that the capital structure speed of adjustment of maritime companies increases during recessions arguing that highly-levered shipping companies are pressured by their banks to swiftly readjust to the target.

### 3. Data

Our sample consists of global maritime companies and the firm-level data are retrieved from the Compustat Global database. Compustat global is a world-leading database of financial, statistical and market information and is provided by Standard and Poors. Following the literature, we exclude the following companies 1) shipyards and shipping 2) involved passenger shipping, 3) operate drilling ships 4) supply vessels, and 5) inland vessels. Our final sample includes 2158 firm-year observations from 147 maritime companies for the time period from 1988 to 2019. **Table 1** provides the number of maritime firms including firm-year observations per country of incorporation. In total, the 147 maritime companies in our sample represent 33 countries. However, 40% of our firm-year observations and 45% of total firms come from 6 Asian countries and regions (Malaysia, Singapore, China, Hong-Kong (China), Thailand and Chinese Taipei) and one European (Norway).

**Table 1.** Maritime companies and firm years observations by country.

Country/Region	firm-years	%	firms	%	Country/Region	firm-years	%	firms	%
AUS	11	0.5%	1	0.68%	KOR	44	2.04%	3	2.03%
BEL	46	2.1%	3	2.03%	LKA	14	0.65%	1	0.68%
BGD	11	0.5%	1	0.68%	LTU	20	0.93%	2	1.35%
BMU	48	2.2%	5	3.38%	LUX	15	0.70%	1	0.68%
BRA	25	1.2%	1	0.68%	MCO	3	0.14%	2	1.35%
CHL	69	3.2%	3	2.03%	MHL	2	0.09%	1	0.68%
CHN	110	5.1%	5	3.38%	MYS	176	8.16%	9	6.08%
DEU	33	1.5%	3	2.03%	NLD	15	0.70%	1	0.68%
DNK	87	4.0%	5	3.38%	NOR	237	10.98%	25	16.89%
FIN	31	1.4%	1	0.68%	SGP	87	4.03%	8	5.41%
FRA	5	0.2%	4	2.70%	SWE	75	3.48%	10	6.76%
GBR	74	3.4%	5	3.38%	THA	115	5.33%	7	4.73%
GRC	4	0.2%	1	0.68%	Chinese Taipei	120	5.56%	6	4.05%
HKG (China)	110	5.1%	5	3.38%	USA	23	1.07%	3	2.03%
HRV	7	0.3%	1	0.68%	VNM	9	0.42%	1	0.68%
IDN	68	3.2%	5	3.38%	ZAF	6	0.28%	1	0.68%
IND	99	4.6%	3	2.03%					
Total						2158	100%	147	100%

## 4. Results

**Table 2** shows the results from estimating Linter's (1965) partial adjustment model for our sample. Results indicate that maritime companies smooth dividends with a degree of dividend smoothing ( $\beta_{2t} = 1 - \hat{\lambda}_t$ ) ranging from 0.56 (diff GMM—Panel B) to 0.83 (left-censored Tobit—Panel B) across different estimators. **Table 3** reports the corresponding speed of adjustment-SOA ( $\hat{\lambda}_t$ ) as a percentage. Results show that  $\hat{\lambda}_t$  ranges from 17% (left-censored Tobit—Panel B)

**Table 2.** Partial adjustment regressions.

	Panel A	Left-censored Tobit	FE	Diff-GMM
EPS		0.041*** (0.003)	0.002*** (0.000)	0.003*** (0.001)
DPS <sub>t-1</sub>		0.798*** (0.010)	0.682*** (0.078)	0.567*** (0.059)
Macroeconomic Recessions		10.255 (6.544)	1.218 (1.136)	44.381 (27.160)
DPS <sub>t-1</sub> * Macroeconomic Recessions		-0.673** (0.342)	-0.421** (0.189)	-0.492*** (0.155)
Constant		-67.265** (27.253)	5.897*** (0.665)	1.493 (2.588)
Observations		2158	2158	2158
	Panel B	Left-censored Tobit	FE	Diff-GMM
EPS		0.023*** (0.001)	0.001*** (0.000)	0.002** (0.001)
DPS <sub>t-1</sub>		0.830*** (0.254)	0.711*** (0.188)	0.560** (0.258)
Shipping Recessions		-11.308 (7.037)	-2.213 (3.064)	-29.080 (68.147)
DPS <sub>t-1</sub> * Shipping Recessions		-0.318 (0.266)	-0.445*** (0.109)	-0.402** (0.165)
Constant		-66.794*** (23.611)	7.431** (3.543)	20.509 (29.284)
Observations		2158	2158	0.002**

The dependent variable is dividend per share (DPS). Robust Standard errors are reported in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Table 3.** Speed of adjustment results (SOA),  $\hat{\lambda}_t = 1 - \hat{\beta}_{2t}$ .

	Panel A	Left-censored Tobit	FE	Diff-GMM
SOA		20.2%	31.8%	46.7%
SOA-Macroeconomic Recessions		28.7%	37.2%	49.6%
	Panel B	Left-censored Tobit	FE	Diff-GMM
SOA		17%	28.9%	44.0%
SOA-Shipping Recessions		29.8%	46.8%	60.3%

to 46.7% (diff GMM—Panel A). This relatively wide range is generally documented in SOA estimations in national and international sample and can be at least to some extent attributed to biased coefficient estimated from applying different methods (Fernau & Hirsch, 2019). Taking into consideration that the GMM-in-differences estimators yields unbiased coefficient (Baltagi, 2008) it appears that maritime companies exhibit a relatively low (high) degree of dividend smoothing (SOA)<sup>2</sup>. A higher SOA indicates more volatility in dividend payouts of shipping firms suggesting that dividends in the maritime sector exhibit a higher level of flexibility. Specifically, dividend changes track more closely changes in profitability. This appears in line with the industry's particular need for flexibility stemming from its distinct characteristic such as high leverage, cyclicity, high asset risk and financial constraints. In further support of this contention the SOA increases in recession states. In both macroeconomic and shipping recessions the SOA appears elevated across all methods, with the estimated increase ranging from 3% to 18%. Similar results regarding the impact of recessions on the SOA are reported by Rhee & Park (2018) for a panel of Korean firms. It seems that as profitability and external financing opportunities deteriorate during recession states maritime companies adjust dividends more flexibly to secure sufficient liquidity and secure investment capital.

## 5. Conclusion

The current study investigates the dividend dynamics of globally-listed maritime companies. Our findings show that maritime companies exhibit a lower degree of dividend smoothing and a higher SOA than the “average” firm. Moreover, according to our evidence SOA increases in recession states both in the macroeconomic and the shipping environment. The increased dividend flexibility of maritime companies appears to be in line to the sector's high-risk profile. It seems that as profitability and external financing opportunities deteriorate during recession states maritime companies adjust dividends more flexibly to secure sufficient liquidity and investment capital. Our findings provide further insight in the shipping industry's distinctive financial decision-making. Therefore, considering fundamental sectoral differences, across-industry samples which report a single coefficient may not be as informative since they mask heterogeneous behavior. Finally, our findings confirm the impact of the macroeconomic environment on maritime firms' payout policy. Our results suggest that shipping companies follow a “flexible” payout policy. However, we do not explicitly control for other sources of financial flexibility such increased cash holdings, unused debt capacity or the use of freight derivatives. The interdependence or substitution between these financial decisions is as an interest avenue for future research which may shed further insight into the decision-making of maritime companies.

<sup>2</sup>The meta-analysis of dividend smoothing-studies using across-industry samples by Fernau & Hirsch (2019) reports a “true” smoothing coefficient of 0.728 and thus a 27.2% speed of adjustment.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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