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# **Hedging Effectiveness In Shipping Industry During Financial Crises**

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# The aim of the paper

- This paper investigates the significance of financial derivatives in shipping firms and its potential impact on their firm value during financial crises.
- Focus on shipping firms which are listed in US Stock Exchanges where the impact of financial crisis was first seen.
- Financial crisis 2008 caused many problems in world markets and shipping sector couldn't be an exception.
- This paper proposes Tobin's Q to measure the hedging effectiveness.

# Contribution

- We examine whether shipping firms get a premium when they use risk management tools.
- No other research studying hedging effectiveness in shipping during financial crisis 2008, to the best of our knowledge.

# Shipping Market

- Since the end of 20th century, shipping industry grew rapidly.
- This development was portrayed to the increased demand about its services, high freights' levels and increased orders and demolitions numbers (see Table 1 and Table 2).
- In May 2008, Baltic dry index (BDI) reached the best historical level of 11973.
- High freights' levels expected to continue for the next years. This was the main reason which led shipping firms to huge investments.

# Shipping Market

**Table 1** Annual Dry Bulk Fleet Statistics (Tonnage in excess of 10.000dwt)

Year	Delivered/Orderbook		Scrapped		Change
	No. of Vessels	Dwt tonnes	No. of Vessels	Dwt tonnes	Dwt tonnes
1995	253	15.383.914	70	2.205.298	13.178.616
1996	269	17.767.024	229	8.841.431	8.925.593
1997	298	19.153.351	283	8.346.580	10.806.771
1998	216	11.632.807	408	14.270.883	-2.638.076
1999	204	13.305.105	315	10.388.739	2.916.366
2000	181	13.111.990	222	5.624.963	7.487.027
2001	309	20.538.762	329	10.175.465	10.363.297
2002	228	14.344.902	221	6.961.240	7.383.662
2003	169	11.840.201	165	5.008.826	6.831.375
2004	265	19.649.307	34	865.359	18.783.948
2005	308	23.153.090	31	1.147.608	22.005.482
2006	313	25.912.494	78	2.437.722	23.474.772
2007	315	23.964.177	19	511.368	23.452.809
2008	333*	23.434.464*	121	5.481.371	17.953.093
2009	962	71.265.194	-	-	-
2010	1.246	113.258.706	-	-	-
2011	853	77.295.596	-	-	-
2012	297	28.840.510	-	-	-
2013	49	5.613.400	-	-	-
2014	5	1.392.800	-	-	-

Note:

1. Figures are in excess of 10.000dwt.

2. New building orderbook include bulk carriers and tweendeckers and Demolition figure include bulk carriers, tweendeckers and dry trading combination carriers.

3. \*Trading

Source: Allied Shipbroking Inc.

# Shipping Market

**Table 2** Annual Tanker Fleet Statistics (Tonnage in excess of 10.000dwt)

Year	Delivered/Orderbook		Scrapped		Change
	No. of Vessels	Dwt tonnes	No. of Vessels	Dwt tonnes	Dwt tonnes
1997	101	8.589.468	35	3.678.663	4.910.805
1998	156	13.179.104	52	7.300.683	5.878.421
1999	212	20.573.210	114	15.454.531	5.118.679
2000	182	21.199.934	135	12.416.207	8.783.727
2001	126	14.168.230	116	13.801.976	366.254
2002	207	23.537.223	149	12.400.587	11.136.636
2003	312	30.790.160	177	13.752.938	17.037.222
2004	330	28.012.183	118	7.515.321	20.496.862
2005	346	29.789.749	72	4.188.794	25.600.955
2006	373	25.978.153	80	3.466.745	22.511.408
2007	415	30.268.254	85	3.872.462	26.395.792
2008	504*	35.304.254*	80	5.739.885	29.564.369
2009	844	64.309.106	-	-	-
2010	583	52998.103	-	-	-
2011	375	51.600.584	-	-	-
2012	58	8.462.177	-	-	-
2013	5	471.000	-	-	-
2014	2	214.000	-	-	-

Note:

1. Figures are in excess of 10.000dwt and include tankers and wet trading combination carriers.

2. \*Trading

Source: Allied Shipbroking Inc.

# Shipping Market

- Vessels' prices and the orders for new building vessels were sky-high, too.
- Many owners of new building ships used to sell vessels which were still in shipyards.
- Buyers of these new buildings expected to gain big profits as market seemed to offer them promptly.
- Even though market conditions were auspicious, dangers lurk and their management was necessary.

# Shipping Market

- Beyond the functional risk, market risk was another danger that shipping firms had to face.
- Apart from good market conditions, they wished to lock their profits, keep a good cash flow level and secure their survival and growth.
- So, some of them adopted risk management tools in order to gain aforementioned targets.

# Shipping Derivatives

- Shipping derivatives: bunker derivatives, freight forward agreements (FFA's) and vessel value derivatives.
- Shipping derivatives market is mainly over the counter and this is a crucial issue for their development.
- Banks and shipping related companies offered these products.
- Banks' knowledge weakness for this particular market helped the growth of newly established companies which were usually subsidiaries of shipping related firms.

# 1. Bunker Derivatives

- Cap agreement: Shippers can use this right when market is over the cap level.
- Fixed price: shipping firms know exactly what they will pay and they just need to take care of their freight rates.
- Swaps: stabilize firms' bunkers cost, but refer to main ports. Port differential is a way to expand their use in other ports too.
- Collar derivatives are agreements based on a cap and a floor price level.
- Tailor-made solutions.

## 2. Freight Derivatives

- Freight derivatives are based on various freight indices which constructed by Platts' or Baltic Exchange.
- Swap: two parties pre-agree the freight for a specific route(s), a specific period or voyage and a certain quantity.
- Freight options, widely known as Asian options, are available and they refer to specific routes of both 'wet' and 'dry' market.
- Shippers might adopt a specific strategy and not only buy or sell an option. Such strategies are the following: Bull and Bear spreads, Butterfly spreads, Calendar (or time) spreads, Diagonal spreads, Bottom or Top Straddless, Bottom or Top Strip, Bottom or Top Strap and Bottom or Top Strangle (Kavussanos and Visvikis, 2006a).

### **3. Vessel Value Derivatives**

- Vessel scrapping derivatives started trading in July 2004, refer to second hand vessels' scrap value and they are called Baltic Demolition Assessments (BDAs).
- On the other hand, shippers are able to hedge their vessels' value by using Sale and Purchase Forward Agreements (SPFA) and Baltic Sale and Purchase Assessments (BSPA).
- Due to the fact that underlying assets volatility is not big enough, reporting is not on a daily basis like freight rates.
- Moreover, hedging assets like vessels is not easy because both indices refer to five years old vessels which cannot be portrayed to older fleets.

# Literature Review (1)

- Allayannis and Weston (2001) investigated the relationship between the usage of foreign currency derivatives and firms' value and concluded that there is a positive relationship between them and derivatives help firms to add financial value significantly.
- On the other hand, Jin and Jorion (2006) found that oil and gas companies' value in US have no positive impact by using derivatives. The benefit they gain is that their stocks do not follow oil's and gases price volatility.
- Kavussanos and Visvikis (2006) confirmed that risk management in shipping and shipping derivatives help ship-owners and charterers stabilize their income and their costs.

## Literature Review (2)

- Carter, Roger and Simkins (2004) disclosed that hedging creates firm value on US airline industry.
- Bartram, Brown and Fehle (2003) investigated the usage of derivatives in financial and non financial US firms and found that hedging is a process that significantly adds firm value.
- El-Masry (2006), also, found that UK non financial companies use derivatives in order to manage the volatility and ensure good cash flow levels.

## Literature Review (3)

- Kavussanos and Nomikos (1999) disclosed that future market is a good signal for spot prices and gives useful information to shipping market participants.
- Kavussanos *et al* (2005) investigated the usage of hedging in Greek shipping market and they disclosed that traditional ways of thinking have to change and Greek ship-owners have to adopt new risk management strategies.
- Moreover, Kavussanos (2003) found that the spot freight rates are fixed by demand's level, bunkers' price and fleet's size.

# Data

- The sample of our study consisted of 29 US listed shipping firms which are trading in various markets.
- Data selected from DataStream, Bloomberg and firms' websites.
- The sample period is from January 02<sup>nd</sup> 2005 till December 31<sup>st</sup> 2008.
- The period that we examine includes quarterly observations, in order to check the hedging efficiency during last years' crisis.
- Table 3 presents the firms of our sample as well as the exchanges listed, the ticket they traded with and their fleets' type(s).

# Data

**Table 3** Sample

Company	Ticket	Exchange	Fleet Type		
Hedgers					
B&H Ocean Carriers	BHO	AMEX	BC	OBO	
General Maritime	GMR	NYSE	TSH		
Ship Fin. International LTD	SFL	NYSE	TSH	BC	CN
Teekay Corporation	TK	NYSE	TSH		
Tsakos Energy Navigation	TNP	NYSE	TSH		
Excel Maritime Carriers	EXM	NYSE	BC		
Frontline	FRO	NYSE	TSH		
Grupo TMM	TMM	NYSE	TSH		
Non Hedgers					
Alexander & Baldwin	AXB	NYSE	CN		
Aries Maritime	RAMS	NASDAQGS	PT	CN	
Arlington Tankers	ATB	NYSE	TSH		
Danaos Corporation	DAC	NYSE	CN		
Eagle Bulk Shipping	EGLE	NASDAQGS	BC		
Euroseas	ESEA	NASDAQGS	BC	CN	
Freeseas Inc.	FREE	NASDAQGM	BC		
Genco Shipping & Trading	GNK	NYSE	BC		
Horizon Lines Inc.	HRZ	NYSE	CN		
International Ship.	ISH	NYSE	RORO		
Kirby Corporation	KEX	NYSE	TSH	CT	
Knightbridge Tankers	VLCCF	NASDAQGS	VLCC		
Oceanfreight	OCNF	NASDAQGM	BC	TSH	
Overseas Shipholding Group	OSG	NYSE	TSH	BC	
Paragon Shipping	PRGN	MASDAQGM	BC		
Rand Logistics	RLOG	NASDAQCM	BC		
Seaspan	SSW	NYSE	CN		
Top Ships	TOPS	NASDAQGS	TSH	BC	
Ultrapetrol	ULTR	NASDAQGS	TSH	BC	
Nordic Amer. Tkr. Ship.	NAT	NYSE	TSH		
Stealth Gas	GASS	NASDAQGS	LPG		

Source: Bloomberg and Tradewinds

# Methodology (1)

- Sample is divided according to whether firms use derivatives or not. The variable used in order to measure firms' value is Tobin's Q.
- Literature provides many different definitions of Tobin's Q, but we adopt the Market price to Book value (MV/BV) as the proxy of firms' value.
- In order to draw the requested results, Ordinary Least Squares (OLS) regression is used. OLS is a method to analyze panel data and used to several previous studies [Chung and Pruitt (1994); Choudhry (2000); Allayannis and Weston (2001); Anderson *et al.* (2004); Rao *et al.* (2004); Matzler *et al.* (2005); Mittal *et al.* (2005)].

# Methodology (2)

- Our model is as follows:

$$\ln(\text{Tobin's } Q) = \alpha + \beta \text{hedge} + \gamma X + \varepsilon$$

where: Tobin's Q is the proxy for firm value, hedge is the hedging dummy, X is the number of control variables and  $\varepsilon$  is the error term.

- The independent variables we use are firms' net cash (NC) and firms' net debts (ND) and the dependent variable is MV/BV.

# Empirical results (1)

- Table 4 contains the summary statistics of our sample as well as of our sub-samples.
- The mean value of Tobin's Q in the whole sample is 1.85 which is higher than the median value (1.728). This means that there is a right skewed distribution.
- The natural logarithm of Tobin's Q is adopted in order to get a symmetric distribution.

**Table 4** Summary Statistics

	Firms Using Derivatives (1)			Firms Not Using Derivatives (2)			Total		
	Tobin's Q	Net Debt	Net Cash	Tobin's Q	Net Debt	Net Cash	Tobin's Q	Net Debt	Net Cash
Mean	2.159063	1185154	135280.7	1.735256	462604.7	67380.54	1.852168	661928.7	86111.61
Median	1.999375	1117653	120750.5	1.624524	395059.3	77147.41	1.727931	594395.4	89175.86
Maximum	3.58	1785099	207344.7	2.657143	932143.7	117481.5	2.911724	1167442	142271.3
Minimum	1.285	690523.4	92276.83	0.96	142100.7	-2498.03	1.049655	293389.7	23646.76
Std. Dev.	0.681465	401988.9	50550.86	0.562641	295218.6	52751.85	0.59542	324672.5	52144.68
Skewness	0.204911	-0.01311	0.492405	-0.0163	0.15096	-0.05698	0.044725	0.1057	0.094571
Kurtosis	2.787292	2.534398	1.894016	2.445493	2.173636	1.59062	2.539782	2.273157	1.674315
Jarque-Bera	2.98265	4.383989	2.934883	1.205288	1.776494	2.309845	1.695594	2.495803	2.482269
Probability	0.458722	0.319785	0.239994	0.581923	0.497225	0.330358	0.547936	0.448276	0.30543

## Empirical results (3)

- We investigate for stationarity using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests. Results determine that there is no stationarity.
- Several diagnostic tests were carried out like Breusch-Godfrey test for higher order autocorrelation and White test for heteroskedasticity.
- The evidence from our sample indicates that the results produce 78% premium on shipping firms' value.

# Empirical results (4)

**Table 5** Regression Results

Panel A - Firms Using Derivatives

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Net Debt	0.132439	0.4462215	0.011026	0.444213
Net Cash	-0.817393	0.553597	0.91682	0.2241
Hedge Dummy	0.777998	0.996940857	1.650253	0.324357

(R-squared=0.359357625, Adjusted R-squared=0.229212, Log Likelihood=1.612518)

Panel B - Firms Not Using Derivatives

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Net Debt	-0.111066	0.349409095	0.3283	0.455686
Net Cash	0.369163	0.413940762	0.062402	0.339495

(R-squared=0.370825, Adjusted R-squared=0.183036, Log Likelihood=2.870596)

Panel C - Total Sample

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Net Debt	-0.043892	0.376115966	0.240776	0.452521
Net Cash	0.041838	0.452466621	0.20773	0.307662
Hedge Dummy	0.777998	0.996940857	1.650253	0.324357

(R-squared=0.367661, Adjusted R-squared=0.195774, Log Likelihood=2.52354)

## Empirical results (5)

- Applying the Tobin's Q methodology the results indicate that shipping firms can take advantage and produce development during crises.
- Hedging importance is big and its usage essential for all firms.
- A company is considered a hedger when it uses any kind of derivative contract for risk management purposes and in this case the hedge dummy takes the value of 1.
- In this sample only 33.4% of them used derivatives during the examined period.

## Empirical results (6)

- Firms which used derivatives had bigger debts than the one which didn't. This might be a sign that firms that proceeded to big investments, like orders for new building vessels or purchasing "expensive" vessels when market was sky high, tried to handle their exposure by using derivatives.
- Moreover, firms using hedging instruments had better net cash than the non hedgers. Volatility is not a problem for firms which secure their operating costs or their freight rates.

## Empirical results (7)

- In Panel A regression's results for firms using hedging tools verified that these firms valued higher. Hedge dummy's coefficient was 0.778 and represented a positive impact on firms' value.
- So, there was a premium for firms which used any kind of derivatives. Regarding the other two independent variables, net debt had a positive impact on their value, but net cash affected them negatively.

## Empirical results (8)

- On the other hand, Panel B presents regression's results for firms which didn't use any hedging tools.
- This category was characterized by a negative impact on firms' value from net debts and a positive one from their net cash.
- Furthermore, significance level was low and the impact of the independent variables was not ensured that it was true, both for hedgers and non hedgers.

## Empirical results (9)

- Panel C provides evidence that firms' net debt was a crucial factor with a negative impact on firms' value. However, the net cash impact was positive.
- Risk management's positive impact is clear for hedgers. Premium was high and a significant factor for other companies to start using risk management tools.

## Empirical results (10)

- Family owned firms faced difficulties in adopting hedging tools, but last months uncertainty might lead them to start thinking of it.
- Results are in line with many of the previous studies. Hedging as a factor for additional firm value found to be significant positive.
- Similar studies confirm positive impact on firms' value [Allayanis and Weston (2001); Bartram et al. (2003); Allayannis et al. (2003); Carter et al. (2004); Hagelin et al. (2004)].

# Empirical results (11)

- According to above mentioned authors, independent variables and time horizon vary per study. Premiums on firms' value found to be significant and vary between 0.09 and 0.172.
- This study apart from hedging usage, adopts two other basic parameters for firms' value, the net debt and the net cash.
- Even though, this is a very simple model as there are many other variables which might influence firms' value, net cash and net debt give a prompt view for firms' value.

# Concluding Remarks (1)

- In this paper, we propose Tobin's Q in order to study risk management's effectiveness in shipping industry.
- Using Tobin's Q as a proxy for firms' value, study's findings supported a positive impact.
- Furthermore, taking into consideration last months' drop on freight rates there were a lot of challenges for charterers.
- It is also found that hedging has a positive effect on shipping firms' value during crises periods.

## Concluding Remarks (2)

- Despite shipowners' desires, charterers might take advantage regarding freight rates.
- FFAs' prices followed spot freight rates and dropped dramatically too. So, they could fix better futures contracts with shipowners and lock required freight levels.
- Results could be seen promptly as market reacted positively after several months' decrease.
- Low vessels' prices allowed shipowners to buy assets which might be anchored for the next months, but they will get their money back in the near future.

Thank you for your attention.