

**CITY UNIVERSITY OF HONG KONG**  
香港城市大學

**On Shipping and Shipbuilding Cycles: The  
Perspective of Volatility Analysis**  
中國航運業和造船產業的週期研究——  
基於波動分析理論

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by

**Li Sheng**  
李勝

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## **Abstract**

Historically speaking, the extent of the development of shipping and shipbuilding industries of individual country represent the certain strength of international trade and economic capacity that the same country has reached. The development path of Western Europe, USA, Japan, Korea and China are good examples for this argument.

Although last two decades saw air cargo volume increased by multi-folds, international shipping still dominates 90% of market share among the world's total transportation volume. As the supplier in the lower reach of the logistic supply chain, the development of shipbuilding industry is so crucial to the development of national shipping industry and over-all economy that Japan, Korea and China consider it as corner stone industry of national economy.

Many studies showed that international shipping and shipbuilding are cyclical, same as global economy. However, few studies have been made so far as to how shipping and shipbuilding are related to the global economy especially under worldwide financial crisis in 2008.

Differing from previous research, this thesis applies the *volatility analysis of capital assets in financial institutions under systemic risks that are associated with global crisis* (e.g., Engle 2002) and expands it to study empirical risk characteristics of national shipbuilding industries of China, Japan and South Korea during a global crisis. With these empirical characteristics, risk resistance and recovery ability can then be statistically analyzed and assessed.

**The key findings of this thesis are:**

1) The risks in shipbuilding and shipping industries are heteroskedastic (i.e., autoregressive). This necessitates the use of ARCH (auto-regressive conditional heteroskedasticity, Engel 1982) based estimates, as opposed to the ordinary least-square (OLS) estimates, because of the fact that the presence of heteroskedasticity can invalidate statistical tests of significance that assume i.i.d. (identically and independently distributed) modeling errors.

2) The risks are pairwise correlated but with different degree and pattern among national shipbuilding industries of China, Japan and Korea. Specifically, the risks between China and Japan, and that between China and S. Korea, are strongly correlated, while the risks between Japan and S. Korea are found less correlated. Empirical explanation and insight are obtained and provided in the thesis.

3) The risks of a national shipbuilding industry (e.g., that of China, Japan and Korea) and international trade markets (e.g., BDI) are serially correlated (or contagious). This necessitates the use of modeling frameworks of multi-dimension dynamic GARCH type, such as DCC-GARCH (i.e., dynamic-conditional-correlation generalized auto-regressive conditional heteroskedasticity). Volatility measures are found to be significant factor of performance assessment of national shipbuilding industries (e.g., China, Japan and S. Korea) under economic crisis, which has not been reflected in the classical cost-benefit measures.

**Key words:** Shipping and Shipbuilding; Business Cycles; Volatility; Risk

## Analysis

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