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A STUDY ON FOREIGN CURRENCY DERIVATIVES UTILIZATION IN KOREA SHIPBUILDING INDUSTRY

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This dissertation, which is an original research work written by Ashurov Abdulaziz Rustamovich in partial fulfillment of requirements for the degree of Master on International Trade, is in accordance with regulations governing the preparation and presentation of dissertations at the Graduate School in Korea Maritime and Ocean University, Busan, Republic of Korea.

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Abstract

A STUDY ON FOREIGN CURRENCY DERIVATIVES UTILIZATION IN KOREA SHIPBUILDING INDUSTRY

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During the Global Financial Crisis in 2007-2009, most of Korean shipbuilding companies confronted to currency risk because of the volatility of exchange rate. The use of hedging, in particular foreign currency derivatives, to take a risk in the financial exposure gives the good effect to companies. The overall aim of the research is to advance an understanding of how the FCD utilization gave an effect to the Korean shipbuilding industry in relation with its foreign sales by company types and through years as well as its importance before and after periods of the crisis. This research is based on the statistical data presented by KOSHIPA and KOSIC and it is analyzed by t-test and ANCOVA. The results of the analysis show that there is a significant relationship between the foreign currency derivatives and foreign currency exposure through company types and volatility period of exchange rate.

논문초록

한국 조선 산업에서 외환 파생 상품 활용에 관한 연구

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2007-2009 년도 글로벌 금융 위기 동안에 대한민국 조선 업체의 대부분이 환율의 변동성으로 인해 환율 위험에 직면되었다. 금융 노출 위험을 감수는 헤징, 즉 외환 파생 상품 사용은 기업에 좋은 영향을 준다. 연구의 일반적인 목표는 회사의 유형과 연도에 따라, 그리고 금융 위기 이전과 이후 해외 판매와 관계가 있는 외환 파생 사용률이 한국의 조선 산업에 어떤 영향을 준 것에 대한 이해를 발전하는 것이다. 이 연구는 KOSHIPA 및 KOSIC 가 제시 한 통계 자료에 기초하고 t-검정과 ANCOVA 로 분석된다. 분석의 결과는 회사의 종류와 환율의 변동성의 기간에 외환 파생 상품 및 외환 노출 사이에 상당한 관계가 있다는 것을 보여준다.

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In the way of writing the thesis, I have many people to thank for listening to and, at times, having to tolerate me. I express my gratitude and appreciation for their friendship.

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Chapter One: Introduction

1.1 Background

The shipbuilding industry has been the core of South Korea's economic development over the past few decades. And it has been playing a leading role in bringing its people out of poverty. In 1960 South Korea had 25% unemployment. After the government launched its first five-year plan in 1962, South Korea had an income per capita of just \$87. By 2010, South Korea's per capita income had risen to just about \$21,000. In achieving rapid economic development of the country, the shipbuilding industry aided with its transformations.

Shipbuilding capacity in South Korea also grew from 190,000 gross tonnes (GT) in 1971 to 1.3 million GT by 1976. In 2011, the nation built 13 million GT of ships for a total value of \$565.5 billion. This number represented over 15% of nation's total export by just only shipbuilding industry.¹

Korean shipbuilding supplier has a great importance in the world market too. Over 30% of ships in the world are produced in South Korea. According to the KOSHIPA², Korean shipbuilders produced 16.1 million CGT (32.33%) from 49.8 million CGT of world ships in 2011. Especially, they supply with producing medium and large sized of container, bulk, tanker, LNG and naval ships to the market.

The shipbuilding is an industry fraught with huge risk too³. Even

¹ www.worldslargestship.com, "Shipbuilding's importance to Korea", 2013.

² Korea Offshore and Shipbuilding Association (KOSHIPA), 『Shipbuilding Yearbook』, 2012.

³ M. Basuki, D. Manfaat, S. Nugroho, A. Dinariyana, "Improvement of the process of

Korean shipbuilding industry has a big experience over years in how to survive over peaks and slumps of economy, the last global financial crisis hit the shipbuilding industry rather severely. The doubling of world's shipbuilding capacity from 2007 to 2010 and a record number of deliveries scheduled up to 2012/2013 will add a huge tonnage extra capacity to an already existing dramatic unbalance between supply and demand⁴. But the order book after the end of 2008 was 4 times lower than previous year. With such a decline, the world's shipbuilding industry is one of the worst sectors affected by the financial and economic crisis. It can also have the most painful impact on many shipbuilding countries of the world due to the biggest overcapacity of shipyards ever seen and far greater supply of fleet than required by the market.

This financial impact to the Korean shipbuilding industry led me to research on how much shipbuilding industry is ready to hold its financial condition in exchange rate exposure.

Actually, in the attempts to produce new ships and offshore, to become shipbuilding market leaders and to maintain profitability in global markets, the Korean shipbuilding companies face a variety of challenges. One of the challenges faced by them throughout their dealing in foreign markets is fluctuations in currency exchange rates. Fluctuations in exchange rates can cause instability in profit margins as well as significant losses to an industry's bankruptcy. For example,

new business of shipbuilding industry”, *Journal of Economics, Business, and Accountancy*, Ventura, 2012, vol. 15, No. 2, pp. 187-204.

⁴ F. S. Lauro, “Shipbuilding transactions in jeopardy: fighting or renegotiating?”, The seventh International Conference on Maritime Law, Shanghai, China, 2009.

Dhanani⁵ states that companies come into contact with new types of risks and they incur costs and expensive security measures through going global. In dealing with, and settling these costs, companies often have to communicate with foreign country business partners in their respective foreign currencies. Furthermore, when dealing in foreign currencies, any sort of currency exchange rate fluctuations can affect the firm's expected future cash flows. Variability in exchange rate is a major source of macroeconomic uncertainty affecting firms.

After the 1970's, the rapid expansion in international trade and adoption of floating exchange rate regimes by many countries led to increase exchange rate volatility and the firm's exposure to exchange rate risk increased as trade volume (M. Bergbrant and etc, 2010)⁶. For example, according to the UNCTADStat⁷, the foreign exchange market has sharply increased from \$208 billion in daily turnover in 1986 to \$3.9 trillion in 2008, at the same time trade volume has dramatically risen from over \$2 trillion to approximately \$200 trillion.

Shipbuilding industry also gets pains by currency rate risk. When a Korean shipbuilder receives an order from the overseas client who wants to settle in dollars, the company is exposed to risks from currency volatility. Because payments will be paid several times through the course of a project's progress. To hold the actual cost of the shipbuilding, the company agrees to the foreign exchange

⁵ A. Dhanani, "Risky Business," *Financial Management* (CIMA), 2000, pp. 30-31.

⁶ M. Bergbrant and D. M. Hunter, *Credit Market Constraints and Firms' Exchange Rate Exposure*, University of South Florida, Tampa, Florida, 2010.

⁷ Statistical Data Base of United Nations Conference on Trade and Development, 2010.

derivative (FCD) contracts. This kind of FCD contracts mitigate against the won strengthening against the dollar, which would see shipbuilders make less money when it converts payments into the local currency. For example, due to the GCaptain website⁸ on Maritime and Offshore, Samsung Heavy Industries Co. Ltd. has used FCD contracts to hedging exposure to foreign exchange risks since 2001. Because the company receives most of its payments for shipbuilding contracts in U.S. dollars.

This research focuses to the use of such foreign currency derivatives (FCD) and its benefits to Korea shipbuilding industry. How does FX rate effect to the shipbuilding industry? How can shipbuilding companies use hedging when the companies get effect from the FX rate risk? How much influence the FCD utilization disclose to the shipbuilding company when it faces to foreign exchange exposure? Can the shipbuilding companies get benefit by using FX derivatives? To aware of these issues related to the FX derivatives, some activities must be tackled on study current research findings on FX rate effect and hedging practices; and data collection on FCD utilization in the shipbuilding sector.

The overall aim of the research is to advance an understanding of how the FCD utilization gave an effect to the Korean shipbuilding industry in relation with its foreign sales through sample years and companies as well as its importance in high and low currency exchange volatility periods. In turn, two main bases help to generalize this study: by reviewing the relevant literature and the analysis of the data. The section of Research Design contains the

⁸ K. A. Choi, "Samsung Heavy to Continue Hedging 100% of FX Exposure", 2011.

details of the research model, variables, hypothesis as well as methodology.

Furthermore, the objectives of the research will be as follow based on the aims above:

1. Identify the impact of the FX rate to the financial condition of the shipbuilding companies and the methods to hedge the exposure by utilizing FCD;
2. Evaluate relevant models and hypotheses on the FCD utilization based on prior researches.
3. Analyze the collected data according to the research methodology.
4. Summarize the findings and give implementations of the research.

For simplification of the purpose and the value of each objective, Objective 1 focuses the current issues and studies on research area; Objective 2 constructs the model and hypothesis based on prior researches; while Objective 3 provides to analyze the relevant sample data, Objective 4 summarizes the findings and gives implications on the obtained analysis results.

This research gives contribution on developing the FCD utilization in a number of ways:

- 1) by providing the prior study issues on the important role of use the FCD to hedge the losses and get opportunity from risks, especially in high volatility period of FX;
- 2) by using a regression model and hypothesizes to support to understand the study area deeply;

3) by using an updated primary and secondary data in relation with Korea shipbuilding industry.

In the next subsection, time and place limitation of the research will be given in detail.



1.2 Research scope

As above mentioned, the research focuses to analysis the utilization of notional amounts of FCD in relation with foreign sales. It covers early 12 years of this century from 2001 to 2012. Mennon and Viswanathan (2005)⁹ stated that the use of notional amounts of FCD increased in the Asian financial crisis and the severe structural problems faced by Russia and Brazil in 1997 and 1998. The Asian financial crisis was occurred the huge volatility which influenced severely to the most countries' economy. However, the crisis influences were not fully cleared yet, another Global Financial Crisis occupied widely. So, the research period covers the period between two financial crisis from 2001 to 2009, and extra 3 years till 2012 and the period is divided into three groups: Pre-crisis period from the Global Financial Crisis (2001-2006), Global Financial Crisis period (2007-2009) and Post-crisis period after Global Financial Crisis (2010-2012). In detail, Pre-crisis period is explained with low volatility and devaluation of US Dollar to Korean Won; oppositely to the Prior period, the Global Financial Crisis period is mentioned as high volatility and devaluation of Korean Won; lastly, Post-crisis period is recorded as remained high volatility, as the same time devaluation of US Dollar.

Further, the top 5 large shipbuilding companies listed in KOSHIPA and 33 small and medium shipbuilding entities given in

⁹ S. Menon, and K. G. Viswanathan, "Foreign Currency Risk Management Practices in U.S. Multinationals" *The Journal of International Business and Law*, 2005, Vol. 4, No. 1, pages 57-67.

KOSIC¹⁰ are examined in the research. The list of shipbuilding companies are selected due to their disclosed information in Annual reports about the notional amount of foreign currency contracts which are recorded in “Notes to non-consolidated reports section” and Statistical data upload by KOSIC. The other Korean shipbuilding companies and shipyards are omitted because of lack of data on the notional amount of foreign currency contracts.



¹⁰ *Abbr* of Korea Shipbuilding Industry Cooperative, Seoul, Korea, Rep of.

1.3 Method of study

This research paper tests Korea shipbuilding industry's activities on FCD utilization from 2001 to 2012. It tries to give a better understanding about the utilization of FCD and its benefits to the industry. The primary variable is the notional amounts of FCD utilized by the Korea shipbuilding companies. Furthermore, changes of the passage of time are examined by dividing into before and after period of the global financial crisis from 2007 to 2009.

The sample for this study consists of 5 large shipbuilding companies and 33 small and medium shipbuilding companies that used FCD from 2001 through 2012. The large companies are selected from Korea shipbuilding industry listed in KOSHIPA and other small and medium companies are taken from KOSIC. Moreover, the company should have disclosed information about its use of FCD in its annual reports or their financial statements. Firm-specific data used in the analysis, such as total assets, notional amounts of FCDs and foreign sales, was obtained from company annual reports and statistical data base. The notional amounts of FCDs are intended to measure the company's extent of involvement in transactions that have off-balance-sheet risk which means an asset or liability isn't given on the company's balance sheet. It is given in the part "Notes to Financial statements" in Annual reports according to the Statement No.14 of KASB (Korea Accounting Standards Board).

Because the research is a quantitative study, I use 4 hypothesizes to test the relation between two dependent (FCD/A) and independent (FS/A) variables:

The first variable is FCD/A, the notional amount of foreign currency derivatives divided by the total assets of the company.

The notional amount of foreign exchange is the nominal or face amount that is used to calculate payments made on financial instrument. For example, if you have a call option on USD/KRW struck at 1100, and you select to buy one of these. If you choose the option to pay 100 USD, you'll receive $1100 \times 100 = 110,000$ KRW. So the USD notional is 100 USD, and the KRW notional is 110,000 KRW.

The second variable is FS/A, the foreign sales divided by the consolidated assets of the company.

FS/A measures the efficiency of total assets in generating sales: The number of dollars in sales produced for every \$1 invested in total assets. For example, a FS/A of 2.35 means that for every \$1 invested in total assets, the company generates \$2.35 in sales.

The t-test is used for estimation the sample data and ANCOVA analysis technique is used to analysis the outlined data.

1.4 Structure of thesis

The research consists of five chapters which come step-by-step and filling each other on one goal and objectives of research mentioned above section.

Chapter 1: Introduction

This chapter provides the reader with background information on the impact of current financial events to Korea shipbuilding industry's financial situations. The focus of this study is presented and the main goal, objectives and methods are also outlined and identified.

Chapter 2: Theoretical review

This chapter describes the prior scholars' work, method and techniques, theories and ideas on this research path. It also provides the need of research on the field of financial exchange derivatives.

Chapter 3: Research design

The chapter presents the model of the research, describes variables and data collection with diagrams and tables, outlines hypothesizes in detail and provides the method and techniques of analysis the statistical sample data collected.

Chapter 4: Result of analysis

This chapter of the research focuses to analysis the data with defining the sample and its results, estimating the outcomes and summarizing the results for hypothesis examined.

Chapter 5: Conclusion and Implication

The last chapter provides the reader to read the main findings and to give implication for further researches, and also presents the limitations of the research on scope of time series and area of the industry. At last, general summary is outlined to disperse the research in full.



Chapter Two: Theoretical framework

2.1 Exchange rate exposure

According to the theory, exchange rate volatility can significantly impact to the firm's value (Shapiro 1975¹¹; Dumas 1978¹²; Adler and Dumas 1984¹³; Bartov and Bodnar 1994¹⁴). The exchange rate exposure is the sensitivity of firm's value or stock price to exchange rate changes (Heckman 1983¹⁵).

The estimation of the exchange rate exposure has become new area in the international finance since 1973. The scholars and researches become concerned about the exchange rate fluctuations and have been empirically investigating the exchange rate exposure of the firms. Shapiro (1975) states that firm value are related to the exchange rate movements and predict an increase in the value of home country firm with depreciation of home country currency. Hodder (1982¹⁶) in his empirical findings established a relation between corporate value and foreign currency exposure particularly

¹¹ A. C. Shapiro, "Exchange rate changes, inflation, and the value of the multinational corporation", *Journal of Finance*, 1975, Vol. 30, No.2, pp.485-502.

¹² B. Dumas, "The theory of the trading firm revisited", *Journal of Finance*, 1978, Vol.33, pp.1019-1029.

¹³ M. Adler and B. Dumas, "Exposure to currency risk: Definition and Measurement", *Financial Management*, 1984, Vol.13, pp. 41-50.

¹⁴ E. Bartov and G. M. Bodnar, "Firm valuation, earnings expectations, and the exchange rate exposure effect", *Journal of Finance*, 1994, Vol.49, pp. 1755-1785.

¹⁵ C. R. Heckman, "Measuring foreign exchange exposure: a practical theory and its application", *Financial Analysts Journal*, 1983, Vol. 39, pp. 59-65.

¹⁶ J. Hodder, "Exposure to exchange rate movements", *Journal of International Economics*, 1982, Vol. 13, pp. 375-386.

those with international trade.

Follow to Shapiro and Hodder, Adler and Dumas (1984) measured the exposure as the elasticity between change in the firm value and exchange rate and argued that companies in home country can also be influenced from exchange rate fluctuations. Jorion (1990)¹⁷ and Luetherman (1991)¹⁸ suggested its validity by analyzing the hypothesis that local currency depreciation which give opportunity for domestic producers than foreign one. They also argued that firms do not have any significant benefit from depreciation of local currency, but a large downward in turnover of the industry was found as a result of the depreciation of the local currency.

Following to above, Bodnar and Gentry (1993)¹⁹ found that companies in studied countries are significantly exposed. For confirmation of the finding above, Choi and Prasad (1995)²⁰ devised a model for analyze the effect of the influence of foreign currency exposure and found about 60% of the companies to be influenced by foreign currency volatility. Choi and Prasad also find a connection

¹⁷ P. Jorion, "The exchange rate exposure of U.S. multinationals", *Journal of Business*, 1990, Vol. 63, pp. 331-345.

¹⁸ T. A. Luehrman, "Exchange Rate Changes and the Distribution of Industry Value", *Journal of International Business Studies*, 1991, Vol. 22, pp. 619-649.

¹⁹ G. M. Bodnar and W. M. Gentry, "Exchange rate exposure and industry characteristics: evidence from Canada, Japan and the USA", *Journal of International Money and Finance*, 1993, Vol.12, pp. 29-45.

²⁰ J. J. Choi and A. M. Prasad, "Exchange Risk Sensitivity and its Determinants: A Firm and Industry Analysis of U.S. Multinationals", *Financial Management*, 1995, Vol. 24, No.3, pp. 77-88.

between exchange rate risk and declines in cash flows and market values.

Furthermore, Donnelly and Sheehy (1996)²¹ also found that same connection between foreign currency variability and company's export.

According to Kim and Lim (2008)²², the export of Korean shipbuilding companies are significantly influenced by foreign exchange rates and steel prices. The exchange rate between Korean Won and US Dollar is a critical factor for shipbuilders (Won, 2010²³; Moon H.S, 2011²⁴). Because the most of the payment for ship construction is paid in USD by the foreign ship-owners. So, a little change of spot currency value agreed in contract gives effect to both sides of contractors. Additionally, several studies focused on the some companies by analyzing the exposure elasticity. This exposure elasticity is obtained from regression of stock returns on an exchange rate change (Bodnar and Wong, 2000)²⁵.

²¹ R. Donnelly and E. Sheehy, "The Share Price Reaction of UK Exporters to Exchange Rate Movements: An Empirical Study", *Journal of International Business Studies*, 1996, Vol. 27, pp. 157-65.

²² M. H. Kim and D. B. Lim, "The effect of Foreign Exchange rate and Thick Steel Plate Price on the International Competitiveness of Korean Shipbuilding Industry", *Korea-German Social Science Publication*, 2011, Vol. 18, No.2, pp. 107-128.

²³ D. H. Won, *A study of Korean Shipbuilders' Strategy for Sustainable Growth*, Master's Thesis, Massachusetts Institute of Technology, 2010.

²⁴ H. S. Moon, "The effect of shipbuilding industry foreign exchange hedge on exchange rate, volatility of exchange rate and the policy implication", *Journal of Korea Port Economic Association*, 2011, Vol. 27, No. 1, pp. 235-245.

²⁵ G. M. Bodnar and M. H. Wong, 『Estimating exchange rate exposure some 'weighty' issues』, *National Bureau of Economic Research*, 2000.

2.2 Exchange rate exposure hedging

Most companies use hedging to reduce the value of exposure and to get opportunity by using it properly. Why companies choose to hedge is a debatable issue, and it depends on who in the end will carry the risk that originates from exchange rates volatility.

According to Modigliani and Miller paradigm²⁶, the financial risk management activities of a company are irrelevant to shareholder wealth. Because a well diversified owner should not be willing to pay in order to avoid this type of exposure as it only will reduce the single firm's volatility due to shareholders thought. In other words, this paradigm implies that companies have no reasons to engage in hedging activities whereas shareholders of the company who wish to mitigate their risk exposures always have the possibility to perform the necessary hedging transactions on their own.

However, capital markets are imperfect and financial distress, information asymmetries, agency problems and taxes are costly for companies. Some scholars show why these market imperfections lead to an increase in firm value by using hedging activities. The theory maintains that management will act opportunistically to increase their personal wealth at the expense of the owners of an organization. Mathur²⁷ states that most companies use a hedging to reduce the negative effects of foreign exchange rate volatilities on their cash

²⁶ F. Modigliani and M. H. Miller, "The Cost of Capital, Corporate Finance and the Theory of Investment", *American Economic Review*, 1958, Vol. 48, pp. 261-297.

²⁷ I. Mathur, "Managing Foreign Exchange Risk Profitably", *Columbia Journal of World Business*, 1982, Vol. 17, pp. 23-30.

flows and reported earnings. Stulz (1984)²⁸ and Smith and Stulz (1985)²⁹ propose that risk management activities initiated by managerial incentives may not be beneficial to shareholders. Stulz (1984) says that corporate risk management is an outgrowth of the risk aversion of managers. While outside stockholders' ability to diversify will effectively make them indifferent to the amount of hedging activity undertaken, the same cannot be said for managers, whose human capital and wealth are poorly diversified. Additionally, the fact the companies may face market inefficiencies like transaction costs of financial distress may make short term hedging profitable (Smith and Stulz, 1985).

The following research by Froot and etc. (1993)³⁰ also found that hedges can be profitable at short horizons, not at long horizons. According to Nance and etc. (1993)³¹, the hedged firms have more growth options in their investment opportunity set. Mian (1996)³² suggests that hedging firms tend to be larger. According to Moon (2011), the exchange rate hedge has high importance of business cycles in the shipbuilding industry and he requires the policy authority should monitor deeply the shipbuilding industry fir the

²⁸ R. Stulz, Optimal hedging policies, *Journal of Financial and Quantitative Analysis*, 1984, Vol.19, pp. 127-140.

²⁹ C. Smith and R. Stulz, "The determinants of firms' hedging policies", *Journal of Financial and Quantitative Analysis*, 1985, Vol. 20, pp. 391-402.

³⁰ K. Froot, D. Scharfstein, and J. Stein, "Risk management: coordinating corporate investment and financing policies", *Journal of Finance*, 1993, Vol. 48, pp.1629-1658.

³¹ D. Nance, C. Smith and C. Smithson, "On the determinants of corporate hedging", *Journal of Finance*, 1993, Vol.48, pp. 267-284.

³² S. L. Mian, "Evidence on Corporate Hedging Policy", *Journal of Financial and Quantitative Analysis*, 1996, Vol. 31, No. 1 pp. 267-284.

stability of foreign exchange market.

In recent times, researchers have started to examine the relation firm value and hedging. Due to Allayannis and Weston (2001)³³, the market value of the firms using foreign currency derivatives is higher than non-users. Bartov, Bodnar and Kaul³⁴ find a relationship between exchange rate variability and stock return volatility, and attribute this to foreign currency transactions. They also find that US multinational companies do not use hedging strategies that are more dangerous to losses because of exchange rate fluctuations. Graham and Rogers (2002)³⁵ also suggests that derivatives can increase the value of company by even a little average. Carter and etc. (2006)³⁶ argue that firm value is affected statistically and significantly by derivatives positions.

However, Bartram and etc. (2007)³⁷ found there is no relationship between derivative hedging and firm value. Jin and Jorion (2006)³⁸ also found no connection between hedging and firm

³³ G. Allayannis and J. Weston, "The use of foreign currency derivatives and firm market value", *Review of Financial Studies*, 2001, Vol.14, pp. 243-276.

³⁴ E. Bartov, G. M. Bodnar and A. Kaul, "Exchange Rate Variability and the Riskiness of U.S. Multinational Firms: Evidence from the breakdown of the Bretton Woods System," *Journal of Financial Economics*, 1996, Vol. 42, No. 1, pp. 105-132.

³⁵ J. R. Graham and D. A. Rogers, "Do firms hedge in response to tax incentives?", *Journal of Finance*, 2002, Vol. 57, pp. 815-839.

³⁶ D. A. Carter, D. A. Rogers and B. J. Simkins, "Does hedging affect firm value? Evidence from the US airline industry", *Financial Management*, 2006, Vol. 35, pp. 53-88.

³⁷ S. M. Bartram, G. W. Brown, and J. E. Hund. "[Estimating Systemic Risk in the International Financial System](#)" *Journal of Financial Economics*, 2007, Vol. 86, pp. 835-869.

³⁸ Y. Jin and P. Jorion, "Firm value and hedging: Evidence from U.S. oil and gas producers", *Journal of Finance*, 2006, Vol. 61, pp. 893-919.

value by examining the sample of US oil and gas producers. Because of limited evidence and poor data availability, it is difficult to say that there is significantly association between derivative usage and exchange rate exposure.



2.3 Literature review on FCD utilization

The studies on management of foreign currency risk are surveyed based on data and evidence which is fitted with a risk-averse hedging strategy. Studies by Mathur (1982)³⁹, Bodnar, Hayt, Marston and Smithson (1995)⁴⁰ have shown that non-financial firms are increasingly using derivatives to manage their exchange rate risks. Analyzing the impact of currency fluctuations on three developed countries' industry, Bodnar and Gentry (1993)⁴¹ suggest that the exposure of exchange rates is too low, cause of having used various hedging techniques to hedge the exposure.

Because of the dependence to the international financial markets, it will be helpful to use hedging to maintain the value for Korean shipbuilding companies (Kim and Lim, 2008). Park and Kwon (2010)⁴² found the impact of FX is high among Korean shipbuilding companies. After getting examined the effect of hedging to Korean companies, Koh and So (2012)⁴³ found that hedging on foreign exchange can get profit 5.8% more than non-used companies.

³⁹ I. Mathur, "Managing Foreign Exchange risk Profitably", *Columbia Journal of World Business*, 1982, Vol. 17, No. 4, pp. 23-30.

⁴⁰ G. M. Bodnar, G. S. Hayt, R. C. Marston, and C. W. Smithson, "Wharton Survey of Derivatives Usage by US Nonfinancial Firms," 1995, *Financial Management*, pp. 104-114.

⁴¹ G. M. Bodnar and W. M. Gentry, Exchange rate exposure and industry characteristics: evidence from Canada, Japan and the USA, *Journal of International Money and Finance*, 1993, Vol. 12, pp. 29-45.

⁴² K. M. Park and K. H. Kwon, "Impact of FX hedges by Shipbuilding Companies on Foreign Exchange", *Bank of Korea Monthly Bulletin*, 2010, pp. 65-89.

⁴³ S. K. Koh and J. I. So, "Foreign exchange risk hedge and Firm value", *Journal of Financial Management*, 2012, Vol. 29, No.3, pp.23-54.

Contrary, some scholars suggests that the use from derivatives has no connection with firm's risk exposure. According to Guay (1999)⁴⁴, found firm risk exposure is in statistically negative relationship with derivative usage. Hentschel and Kothary (2001)⁴⁵ suggest there is a little difference between the firms which hedge the exposure with derivatives and the firms which not to hedge. Bartram and etc. (2004)⁴⁶ also finds that derivatives usage can effect to firm value when it has not any exposure. Belk and Glaum (1990)⁴⁷ suggest some companies hedging decisions are affected by the how their competitors manage currency risk. Marshall (2000)⁴⁸ found the solution to this issue that the degree of utilization of derivatives with certain techniques is associated with an increase in variability of certain financial measures, not its only usage.

Furthermore, most of studies on the evidence of the relationship between foreign derivative usage and risk exposure are researched on North American and European companies. American scholars Allayannis and Ofek (2001)⁴⁹ identify that firms use foreign

⁴⁴ W. R. Guay, "The impact of derivatives on firm risk: An empirical examination of new derivative users", *Journal of Accounting and Economics*, 1999, Vol. 26, pp. 319-351.

⁴⁵ L. Hentschel and S. P. Kothari, "Are corporations reducing or taking risks with Derivatives", *Journal of Financial and Quantitative Analysis*, 2001, Vol.36, pp. 93-118.

⁴⁶ S. Bartram, G. W. Brown and F. R. Fehle, International evidence on financial derivative usage, Working Paper, Lancaster University, 2004.

⁴⁷ P. A. Belk and M. Glaum, "The Management of Foreign Exchange Risk in UK Multinationals; An Empirical Investigation", *Accounting and Business Research*, 1990, Vol 21, pp.3-13.

⁴⁸ A. P. Marshall, "Foreign exchange risk management in UK, USA and Asia Pacific multinational companies", *Journal of Multinational Financial Management*, 2000, Vol.10, pp. 185-211.

⁴⁹ G. Allayannis and E. Ofek, "Exchange rate exposure, hedging and the use of foreign currency derivatives", *Journal of International Money and Finance*, 2001, Vol. 20, pp.

currency derivatives for hedging reduce the foreign currency risk exposure they face. Makar and Huffman (1997)⁵⁰ find that the amount of FCD used by U.S. MNCs is positively relationship with the degree of foreign currency exposure. Continually, Mennon and Viswanathan (2005)⁵¹ tested the validity of this relationship for U.S. MNCs for the 1995 to 2000 period and suggest that the FCD utilization is high when the existence of FCD volatility is high. In contrast, Simkins and Laux (1997)⁵² find that the impact of FCD utilization on exchange risk exposure is weak.

One of the reasons - why some studies fail on finding the relationship between the FCD utilization and FX rate risk - may be the possibility to make disclosers choices that unshared derivative usages and positions; and the investors face with a multiple of different disclosed methods and they make regular errors when identifying the link between derivatives disclosures and risk exposures.

Whereas notional value disclosers of derivative positions are limited, the discussion on its treatments or solutions has increased to one of the most widely discussed issues among scholars. The relevant data on notional value disclosers of derivative positions in US and

273-296.

⁵⁰ S. D. Makar and S. P. Huffman, "Foreign Currency Risk Management Practices in U.S. Multinationals", *Journal of Applied Business research*, 1997, Vol. 13, No.2, pp. 73-86.

⁵¹ S. Menon and K. G. Viswanathan, Foreign Currency Risk Management Practices in U.S. Multinationals, Master's Thesis, Hofstra Univ., Hempstead, 2005.

⁵² B. Simkins and P. Laux, 1997, Derivatives Use and the Exchange Rate Risk of Large U.S. Corporations, Proceeding of the Chicago Risk Management Conference, 1998.

Europe is available since 1990 and 1998. While Makar and Huffman (1995) researched that the disclosers of notional value of derivative contracts are significantly positive relationship with foreign exchange rate risk based on the statement on the disclose of the notional amount of FCD in Financial Accounting Standards Board (FASB)⁵³ in US, Woods and Marginson (2004)⁵⁴ investigate the usefulness of notional derivative disclosers under FRS 13⁵⁵ statement of Accounting Standards Board in Europe. In Korea, according to the Statement No.14 par.4 of SKAS⁵⁶, the small and medium sized company might or not disclose its FCD:

“For derivatives whose fair values cannot be determined because they are not traded in a standardized market, accounting for valuation of such derivatives after the time of contractual agreement may be omitted.”

However, if paragraph 4 has been applied in accounting for derivatives, the following shall be disclosed in the notes to the financial statements:

- a. Objectives for holding those derivatives
- b. Contexts necessary for understanding such objectives (such as those on the nature and source of risks born by the

⁵³ Statement of Financial Accounting Standards (SFAS) No. 105 is part of the FASB's financial instruments project (June, 1990) which is designed to improve disclosers of information about financial instruments

⁵⁴ M. Woods and D. Marginson, “Accounting for Derivatives: An Evaluation of Reporting Practice by UK Banks”, *European Accounting Review*, 2004, Vol. 13, No.2, pp. 373-390.

⁵⁵ European Accounting Standards Board (ASB), “Derivatives and other Financial Instruments: Disclosers”, 1998.

⁵⁶ Korean Accounting Standards Board (KASB), 『Exceptions to Accounting for Small and Medium-Sized Entities』, 2003.

economic entity and the entity's policies on dealing with such risks)

c. General nature and context of relevant contracts (including items such as contracted amounts, quantities, and foreign exchange rates)

By getting this statement, we'll face an issue that the accounting statements aren't focused to disclose of the derivatives usage in companies' annual statements. Only large shipbuilding companies given in KOSPI disclose their derivatives usage in notes of their annual statements. Other small and medium shipbuilding companies don't share their statements publicly because of high competitiveness within the country.

However, in recent decades Korean firms are highly using derivatives to manage their exchange rate risks. According to the Gcaptain⁵⁷, Hyundai Heavy Industries (HHI), Daewoo Shipbuilding & Marine Engineering (DSME) and Samsung Heavy Industries (SHI) Companies have been using currency forward contracts with the Korea Development Bank and others to hedge risks, such as those that may arise from fluctuation of foreign exchange rates in association with receipt of payments for future shipbuilding contracts. By addressing the question of whether there is a direct relationship between the disclose FCD utilization and risk exposure in the Korean shipbuilding industry, the research will tests the validity of the results of the US researchers Mennon and Viswanathan (2005) and attempt to give a proper results in this misjudged discussion.

⁵⁷ Ibid.

Chapter Three: Research design

3.1 Research Model

The model of the study is created according to the prior studies of Makar and Huffman (1997)⁵⁸ and Mennon and Viswanathan (2005)⁵⁹. According to the scholars, the notional amount of Foreign Currency Derivatives divided by Consolidated Assets (FCD/A) is dependent to the change of Amount of Foreign Sales (FS/A) in foreign currency exposure divided by Consolidated Assets.

Table 1. Variables

Independent Variables	Dependent Variable
FSA (Foreign Sales / Assets)	FCDA (Foreign Currency Derivatives / Assets)
Company Size (Large / Small)	
Years (2001-2012)	
Periods (Pre-Crisis / Crisis / Post-Crisis)	

The model shows that FCD/A is changeable due to Years of Sample period, the Size of companies in shipbuilding industry, as well as three different cluster periods to the Global Financial Crisis.

⁵⁸ Ibid.

⁵⁹ Ibid.

The model is obtained as following a log formula to correlate and identify the relationship of the independent and dependent variables:

$$\ln(Y)=\alpha+\beta_1\ln(X)+\varepsilon$$

where,

Y is the dependent variable – FCD/A

X is the independent variable – FS/A

α is the intercept in regression

β is the slope of the regression line

ε is the error of random

The reason of using Log 10 (Ln) transformations in the formula is the evidence relationship of two variables is nonlinear⁶⁰. Also log transformations give opportunity to identify that the slope coefficient measures the elasticity of FCD utilization with relation to foreign currency exposure⁶¹. Follow to the formula, β can be interpreted as elasticity. Shortly, FCD/A tends to change by β percent for a 1 percent change in FS/A ⁶². For the need for scaling to reduce heteroscedasticity, the total (consolidated) asset is selected as deflator of both variables that is both variables are obtained from the division by total assets.

⁶⁰ T. E. Dielman, Applied regression analysis for business and economics, PWS-Kent Pub Co., Boston, 1991.

⁶¹ J. F. Hair, W. C. Black, B. L. Babin, R. E. Anderson, Multivariate Data Analysis, 9th ed., Prentice Hall, 2009.

⁶² G. Koop, Analysis of Economic Data, 3rd ed., John Wiley & Sons Ltd., 2009.

3.2 Definition of Variables

The variables of the study are definite for the purpose of study hypothesis tests in next section. As mentioned above, we have one dependent (FCD/A) and a main independent variable (FS/A), as well as 3 dummy independent variables (Company types, Years, and Crisis Period) for analyzing. Definitions of them are given one by one.

1. FCD/A (Foreign Currency Derivatives divided by Assets)

FCD/A is obtained from the deflation of the notional value of the foreign currency derivatives by the consolidate assets for the shipbuilding companies given. As nowadays most of foreign currency derivatives is contracted by using forward currency contracts. The definition for the notional amount of the foreign forward derivatives is given as:

The notional value of a *forward currency contract* is the underlying amount that an investor company has contracted to buy and sell. For example, an investor company might enter into a contract to purchase 1 billion Korean won (KRW) with U.S. dollars (USD) in one month's time, at an exchange rate of 0.000962. The notional value for this contract in USD terms is therefore \$962,000.

2. FS/A (Foreign Sales divided by Assets)

This independent variable is obtained from the deflation of the Foreign Sales by Total Assets of the company. According to Jorion (1990) the foreign sales is high relation with the change of foreign currency rate which is the source of the foreign risk exposure to the

multinational company.

FS/A measures the efficiency of total assets in generating sales: The number of dollars in sales produced for every \$1 invested in total assets. For example, a FS/A of 2.35 means that for every \$1 invested in total assets, the company generates \$2.35 in sales.

3. Company types

There 2 types of shipbuilding companies in the industry:

- 1) Large shipbuilding companies;
- 2) Small and Medium (SM) shipbuilding companies

This type of shipbuilding companies differs by their capacity, type of production, and business management. While each large companies in the industry owns over than 5 trillion of KRW, each small ones' assets are not over 200 billion of KRW.

SM companies produce little type of ships such as FRP and yachts and repair them. They also consist of small steel, dry-liner and construction companies. Differ from small and medium, large shipbuilding companies produce bulk carriers, container ships, tankers, VLCC, product carriers, multipurpose cargo ships, ore-bulk-oil carriers, LPG and LNG carriers, RO-RO ships, chemical tankers, and offshore rigs.

While SM shipbuilding companies active domestically, large ones do their business not only domestic, but also globally. They have invested the shipyards through Asia, Europe and South America.

4. Years in the sample

This dummy variable is selected to according to the rate of KRW to USD. These currencies play a main role in Korea shipbuilding industry's financial activities. Diagram 1 shows how much the rate of Won to Dollar changed by years.

Figure 1. The exchange rate of KRW to USA in 2001 - 2012



Source: www.fxtop.com.

Table shows that the rate of KRW to USD was in a high fluctuation in 12-years period. From 2002 to 2007, the rate decreased gradually. While the lowest rate was about 900 KRW in the end of 2007, the value of the rate raised to the highest over 1580 KRW in the beginning of 2009. It was the highest volatile time of the rate with -75.7% of devaluation of KRW. Even sharp drop of this value to 1150KRW, the last years of that period also remain fluctuatively

with range of 15%.

5. Periods

In base of the effect of the Global financial crisis, I divided the table above into three periods:

- 1) Pre-crisis;
- 2) Global crisis
- 3) Post-crisis

The Pre-crisis period includes the time before 6 years (2001-2006) to the crisis. This time is characterized by the Korean currency increase to US Dollar. While the Global crisis period (2007-2009) is described by the devaluation of KRW and its high volatility to USD, the Post-crisis period (the last three years) is outlined with KRW's fluctuations. According to the result of Mennon and Viswanathan (2005)⁶³, the derivatives usage was increased among US multinational companies in the period of IMF crisis in 1997-98. Additionally, Choi and Prasad (1995)⁶⁴ also found that more than half of sample companies exposure in currency volatility period.

⁶³ Ibid.

⁶⁴ Ibid.

3.3 Research Hypothesis

Following Makar and Huffman (1997)⁶⁵ and Mennon and Viswanathan(2005)⁶⁶, I develop and test the four hypotheses that clarify the utilization of FCD by Korea shipbuilding industry.

According to the formula in Research model, the first hypothesis tests the relationship between FCD utilization and level of foreign involvement by Korea shipbuilding companies:

Hypothesis 1:

H₀: There is a significant and positive link between the utilization of foreign currency derivatives and exposure to changes in exchange rates faced by Korea shipbuilding companies.

Hypothesis H₁ states that as foreign currency exposure increases, the FCD utilization by Korea shipbuilding companies will also increase. The model uses the relative level of foreign sales to test the hypothesis. The expectation is that as the foreign currency exposure variable FS/A changes, these differences will also explain the variations in notional amounts of FCD.

The regression model used to test this hypothesis is:

$$\ln(\text{FCD}/A_{it}) = \alpha + \beta_1 \ln(\text{FS}/A_{it}) + \Sigma_{it}$$

where,

FCD/A_{it} is the notional amount of foreign currency derivatives of the company i in year t ;

⁶⁵ Ibid.

⁶⁶ Ibid.

FS/A_{it} is the amount of foreign sales for companies i in year t .

Using the logarithm of one or more variables makes the effective relationship non-linear, and it preserves the model in linearity. Logarithmic transformations are also a convenient means of transforming a highly skewed variable into one that is more approximately normal. By using the logarithmic transformations, the study can obtain the result that the 1% of change in FS/A of companies affect how much percent of change in FCD/A used by the companies in Korea Shipbuilding Industry.

Hypothesis 2:

The second hypothesis examines that:

H₀: There is no significant and positive relationship between the use of foreign currency derivatives and the size of Korea shipbuilding industry.

The basis of this hypothesis is that if a statistically significant and positive coefficient exists on the foreign currency exposure variable (FS/A), this suggests that the dependant variable, FCD, is insensitive to shipbuilding industry effects. This possibility will be tested using a model that includes dummy variables representing various financial sizes of shipbuilding companies in addition to FS/A.

The model tested is:

$$\ln(FCD/A_{it}) = \alpha + \beta_1 \ln(FS/A_{it}) + \beta_2 SMSC_{1it} + \beta_3 LSC_{2it} + \sum_{it}$$

where,

SMSC – is the dummy variable representing small and middle shipbuilding companies listed in KOSIC

LSC – is the dummy variable representing large shipbuilding companies listed in KOSHIPA.

Hypothesis 3:

Next, it is important to test for time effects on the utilization of FCD by shipbuilding companies in the industry. Based on the results of previous studies, it can be expected that foreign currency exposure has a significant and positive relationship with the utilization of FCD. In turn, it also requires discussion that because of the impact of this relationship, other factors such as time may not have significant effects on a firm's use of FCD.

The third hypothesis tested is:

H₀: There is no significant and positive relationship between the use of foreign currency derivatives and the passage of time across shipbuilding companies.

The model tested is:

$$\ln(\text{FCD}/A_{it}) = \alpha + \beta_1 \ln(\text{FS}/A_{it}) + \beta_2 \text{Year2001}_i + \beta_3 \text{Year2002}_i + \dots + \beta_{13} \text{Year2012}_i + \sum_{it}$$

where,

Year_i is a dummy variable representing each year in the study period. The expectation is that the dummy variables will allow the intercept to change over time and across shipbuilding companies. However, because the point is changing, this will not reflect a significant effect of time on the utilization of FCD. Rather, the FS/A will be seen as maintaining the significant and positive relationship with FCD utilization by shipbuilding companies.

Hypothesis 4:

The last hypothesis will be about the relationship between the utilization of foreign currency derivatives and the global financial crisis. Based on Hypothesis H₃, it can be supposed that there is no relationship between the utilization of FCD and the passage of time. But I suppose that the utilization of FCD has a positive relationship with the period (2007-2009) of Global Financial Crisis.

So, last hypothesis examines:

H₀: *There is positive relationship between the utilization of the foreign currency derivatives and the period of global financial crisis across shipbuilding companies.*

The model tested is:

$$\ln(\text{FCD}/A_{it}) = \alpha + \beta_1 \ln(\text{FS}/A_{it}) + \beta_2 BFC_i + \beta_3 GFC_i + \beta_4 NFC_i + \sum_{it}$$

where,

BFC_i is a dummy variable representing the Prior (Pre-crisis) period to Global Financial Crisis (from 2001 till 2006).

GFC_i is a dummy variable representing the Global Financial Crisis period (from 2007 till 2009).

NFC_i is a dummy variable representing the Next (Post-crisis) period from Global Financial Crisis (from 2010 till 2012).

In the next section, the techniques and style of analysis the data and hypothesis will be given.

3.4 Research Methodology

The research is a quantitative one which tests the relationship between the financial derivatives utilization and the foreign sales through type of companies; through time; and through period to crisis. Before testing the sample data, the descriptive form of it is given. Hypotheses are tested by ANCOVA through SPSS package.

ANCOVA is an extension of ANOVA that provides a way of statistically controlling the linear effect of variables one does not want to examine in a study. These extraneous variables are called covariates. ANCOVA can remove covariates from the list of possible explanations of variance in the dependent variable. (Vogt, 1999)

ANCOVA has two advantages than ANOVA. It can give more increased statistical power and control in the result than its counterpart. By using covariates it can reduce the probability of Type II error. A Type II error is only an error in the sense that an opportunity to reject the null hypothesis correctly was lost. Because the probability of a Type II error is significantly related to statistical power, the ANCOVA will be more powerful than ANOVA. If the F-tests associated with a standard ANOVA are computed by dividing the MS for error into the MS for the main effect. If MS_{error} can somehow be made smaller, then the calculated F will be larger, the calculated p -value will also be smaller, and as a result, there's a better chance that null hypotheses will be rejected. When a good covariate is used within a covariance analysis, this is exactly what happens. Data on the covariate function to explain away a portion of within-group variability, thus resulting in a smaller value for MS_{error} . Additionally, the covariate in an ANCOVA has another function. This

second function can be defined by the word control. Actually, some researchers will refer to the covariate of their ANCOVA studies as the control variable.

We will analyze the hypothesis above by using the ANCOVA on SPSS in following steps. Firstly, before testing each hypothesis, description statistics on mean, standard deviation and standard error mean are calculated. Secondly, correlation of two variables will be identified. Thirdly, for obtaining the difference of variable means, t-test will be used. If the variables are three and more, then we'll use ANOVA. ANOVA determines whether there are any significant differences between the means of independent groups. Lastly, differ from ANOVA; ANCOVA will be used to conduct the tests between the groups.



Chapter Four: Results of analysis

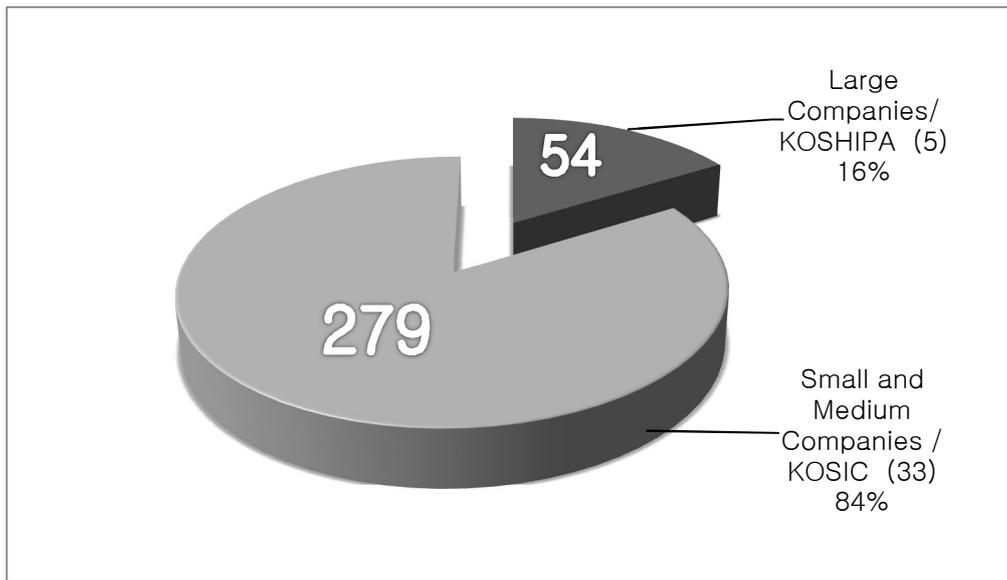
4.1 Definition of Samples

With connecting with the Research methodology, this research paper tests Korea shipbuilding industry's activities on foreign exchange derivatives usage from 2001 to 2012. In the early stages of the research, 41 shipbuilding companies were selected to analyze (Table 2). The companies selected are the large companies in Korea shipbuilding industry listed in KOSHIPA and small and medium shipbuilding companies presented by KOSIC.

Table 2. Selection criteria of data collection

No	Choice of criteria	Size of company	Number of companies	Total number of sample
	Sample selected companies in Korea shipbuilding industry	Large	7	84
		Small and Medium	34	408
		Total	41	492
1	Companies not sharing annual reports	Large	2	24
		Small and Medium	1	12
2	Companies missing the statistical data	Large		
		Small and Medium		99
3	Companies not providing the discloser of information	Large		
		Small and Medium		8
4	Companies owns low amount of assets (low than 100mln. KRW)	Large		
		Small and Medium		10
	Total sample size	Large	5	54
		Small and Medium	33	279
		Total	38	333

Figure 2. Data collection



However, the number of sample is minimized due to four selection criteria requests. 36 samples with 3 companies are decreased due to not sharing annual reports or statistical data; 99 samples are reduced due to not giving the data in 2001-20013; and 8 samples on the discloser of data in some years are also minimized, as well as 10 samples of companies owns assets less than 100mln KRW is cut down. So, total sample of the research data consists of 333 ones, including 54 samples from 5 large companies and other 279 samples from 33 small companies (Figure 1). Totally, amount of samples of small sized shipbuilding companies are 84%, and large companies are 16% in sample in this research.

4.2 Results for the Research samples

Table 3 shows the general descriptive results for the sample data in the period 2001 - 2012. The mean of the sample companies' asset values is 1813217 million KRW with standard deviation 5737134 million; the average sales is 1452094 million KRW with standard deviation 5323071 million; the average value of foreign exchange derivatives used is over 2 trillion KRW with standard deviation 8 trillion. Lastly, the mean of the relative amount of FCD, the deflation of each company's FCD to its sales in the same period, is .36 with standard deviation .04.

Table 3. Descriptive statistics of sample in general (Thousands of KRW)

	Number	Mean (thousands of KRW)		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
Assets	333	1 813 217 426	314 393 010,6	5 737 134 073,6
Sales	333	1 452 094 028	291 702 547,2	5 323 071 972,3
FCD	333	2 284 814 304	440 816 076,4	8 044 138 536,9
Rel. of FCD	333	,3606	,04468	,81527

Continuously, Table 4 presents the averages of the amount of foreign sales and exchange derivatives divided by assets 1.44 and .29, as well as standard deviation 1.21 and .54 respectively.

Table 4. Descriptive statistics of FS/A and FCD/A

	Number	Mean		Std. Deviation
	Statistic	Statistic	Std. Error	Statistic
FS/A	333	1,4359	,06605	1,20526
FCD/A	333	,2924	,02979	,54360

In base of the general sample descriptions above, I create the group statistics to show the difference on means of assets, sales, FCD

and relative amount of FCD in large and small size shipbuilding companies. (Table 5)

Table 5. Descriptive statistics of sample by group (Thousands of KRW)

Company Type		Number	Mean	Std. Deviation	Std. Error Mean
Assets	Large	54	11 117 691 005	10 044 817 601	1 366 926 537,9
	Small	279	12 351 572	32 047 617	1 918 640,7
Sales	Large	54	8 899 765 963	10 489 988 752	1 427 506 658,4
	Small	279	10 609 138	23 114 901	1 383 853,0
FCD	Large	54	14 085 663 406	15 362 030 958	2 090 507 625,6
	Small	279	778 994	1 707 140	102 203,8
Relative of FCD	Large	54	1,6335	1,45753	,19834
	Small	279	,1143	,11461	,00686

According to Table 5, the mean difference between two group sizes in sample is significantly high. While the large companies use on average over 11 trillion KRW as assets, about 9 trillion KRW for sales, and over 14 trillion KRW for FCD in sample over 12 years, the small and medium companies use 12,4 billion KRW as asset, 10,6 billion for sales and about 800 million for derivatives. This high percentage of sales requests the higher hedging activities against the exposure. Following to this principal, the large companies use average 1.6 times more derivatives to hedge their sales, alternatively small companies use derivatives approximately 10 times lower. The significant difference on size and derivative utilization presents the need of the analysis group by group.

However, Table 6 outlines the result of mean difference of FS/A and FCD/A in two groups is mixed. Whereas the large companies' sales amount is less than their assets on average .73, the value of FCD is slightly more than the assets on average 1.17.

Table 6. Descriptive statistics of FS/A and FCD/A by group

Company Size	Number	Mean	Std. Deviation	Std. Error Mean
FS/A	Large	54	,7342	,21456
	Small	279	1,5717	1,26960
FCD/A	Large	54	1,1774	,92261
	Small	279	,1211	,09505

And despite of small companies sales' amount is 1.6 times higher than the assets, their derivatives is about 10 times less than the assets. As you see, Table 5 shows that the mean of sales (10.6 billion KRW) of small companies is lower than the assets (12.4 billion KRW). It's differently from the result of Table 6. This provides the need of analyze year by year.

In this section, the significance of two main variables are examines by t-test. Student t-test is used to compare the actual difference between two means in relation to the variation in the data.

According to the Table 7, both variables FS/A and FCD/A in significance level for Levene's Test are small; it means two population variances for both variables are equal. From the obtained t-test results, t-value for FS/A is -10,286, and for FCD/A is 8,405. The observed difference for FS/A is .08 times, and for FCD/A is .13 times. Moreover, the degrees of freedom for FS/A are 329, and for FCD/A is 53.

The observed two-tailed significance level is less than 0.001. This tells us that fewer than 10 times in 10,000 we expect to see a sample difference of 0.08 times for FS/A and 0.13 times for FCD/A when the two population means are equal. Since this is less than 10%,

Table 7. *t*-test for equalities of means in two groups of the shipbuilding industry

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	90% Confidence Interval of the Difference	
								Lower	Upper
FS/A	30,933	,000	-4,829	331	,000	-,83752	,17345	-1,12362	-,55141
			-10,286	328,570	,000	-,83752	,08142	-,97183	-,70321
FCD/A	410,347	,000	18,731	331	,000	1,05631	,05639	,96329	1,14933
			8,405	53,218	,000	1,05631	,12568	,84592	1,26669

we may expect that large and small shipbuilding companies' sales and derivative usage amounts to their assets differs about 10 times.

By getting out the results on both variables are significantly high in general and group, the estimating and analyzing the hypothesis moves to regression of ANOVA and ANCOVA, when the there is a covariance in the model.

4.3 Estimation of the outcome results

In prior section the results of general and group sample outlined the mean difference is high. In this section the hypothesis of the research will be estimated and analyzed.

Primarily, the Hypothesis 1 is analyzed that there is a relationship between the FCD utilization and foreign sales in Korea shipbuilding industry. Because the regression of them is non-linearity, logarithmic transformations are used to obtain the result of regression in linearity.

According to Table 8, the relationship between two variables is too weak, $R=.027$ and adjusted $R^2= (-.002)$. However, the result of Durbin-Watson ($=.27$) states the regression is high positive autocorrelation.

Table 8. Results for Hypothesis 1

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.027 ^a	.001	-.002	1,18073	.268

ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	.327	1	.327	.235	.628 ^b
Residual	461,452	331	1,394		
Total	461,779	332			

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-2,088	.065		-31,956	.000
Ln (FS/A)	.044	.090	.027	.484	.628

According to the ANOVA results, the analysis is significant, $F(1, 331) = .327, p = .628$. As the result $\alpha (0.10) < 0.628$, we reject the hypothesis that there is a relationship between FCD utilization and foreign sales in shipbuilding industry. The result from estimated coefficient indicates shows Korea shipbuilding companies increase their use of FCD just by .04 percent for each 1% increase in relative level of foreign sales.

$$\text{Ln}(\text{FCD}/\text{A}) = -2,088 + .044\text{Ln}(\text{FS}/\text{A})$$

Next, Hypothesis 2 states there is no any relationship between FCD utilization and size of shipbuilding industry. By calculating the data on ANCOVA we get the results as follows (Table 9):

Table 9. ANCOVA results for Hypothesis 2

Descriptive Statistics				
Com_Type	Mean	Std. Deviation	Number	
Large	-.5243	1,60914	54	
Medium	-2,3850	,77715	279	
Total	-2,0833	1,17936	333	

Tests of Between-Subjects Effects				
Source	df	Mean Square	F	Sig.
Corrected Model	2	87,430	100,558	,000
Intercept	1	364,832	419,612	,000
Ln(FS/A)	1	18,216	20,951	,000
Com_Type	1	174,533	200,739	,000
Total	333			

a. R Squared = .379 (Adjusted R Squared = .375)

Parameter Estimates				
Parameter	B	Std. Error	t	Sig.
Intercept	-2,449	,058	-42,552	,000
Ln(FS/A)	,339	,074	4,577	,000
[Com_Type=1]	2,047	,144	14,168	,000

In this analysis, we can see that Foreign sales is in significant on using foreign exchange derivatives, $F(1,130)=20,95$, $p<.10$.

Results indicated industry size is a significant and positive effect to usage of FCD through companies, $F(1,330) = 200.74$, $p < .10$, ($R^2=.379$). And large companies used FCD ($M=-.524$) than small companies ($M=-2.385$).

The model will be as follows in the equation:

$$\ln(\text{FCD}/A) = -2.449 + .339 \ln(\text{FS}/A) + 2.047(\text{Com_Size})$$

In this analysis, there is a significant and positive relationship between variables. If the foreign sales increase to 1% in each size of shipbuilding industry, the foreign exchange derivatives usage also increases to .34%.

However, alternatively to the Hypothesis 2, industry size is significant and positive. So, Hypothesis 2 is also rejected.

Table 10 is the estimation results for Hypothesis 3 which defines there is no relationship between FCD utilization of the shipbuilding companies and time in sample period. We can see the numbers of samples through year are differently: because of the lack of information in early 3 years only large 3 companies' samples are selected; alternatively samples of all companies are presented in 2009. (See also Table 1).

Table 10. ANCOVA results for Hypothesis 3

Tests of Between-Subjects Effects

Source	df	Mean Square	F	Sig.
Corrected Model	12	2,397	1,772	,052
Intercept	1	380,154	280,939	,000
Ln(FS/A)	1	,767	,566	,452
Year	11	2,586	1,911	,037
Error	320	1,353		
Total	333			

a. R Squared = .062 (Adjusted R Squared = .027)

Parameter Estimates

Parameter	B	Std. Error	t	Sig.
Intercept	-2,262	,191	-11,816	,000
Ln(FS/A)	,068	,090	,753	,452
Year 2001	1,660	,699	2,375	,018
Year 2002	1,267	,699	1,812	,071
Year 2003	1,137	,699	1,625	,105
Year 2004	,173	,289	,600	,549
Year 2005	,181	,275	,659	,510
Year 2006	,152	,270	,561	,575
Year 2007	,301	,270	1,111	,267
Year 2008	,634	,270	2,344	,020
Year 2009	-,073	,269	-,271	,786
Year 2010	-,048	,271	-,179	,858
Year 2011	-,049	,270	-,183	,855

According to the test result between subjects effect each other, the independent variable – FCD/A is a significant and positive to the dummy variable – Year in general, $F(11,320)=1,911$, $p(0.10)>.037$, ($R^2=.062$). However, by observing each year, the results are obtained differently. Only four years' outcomes are significant to p-value, 2001, 2002, 2003 and 2008 years with significance, p-value $(0.10)>.018$ / $.071$ / $.105$ / $.020$. This result shows the most of shipbuilding

companies used FCD significantly more, especially in 2008 not early years (2001~2003) of the sample even they are more significant than 2008. As I mentioned above the early 3 years of the sample consists of from only largest shipbuilding companies. They use significantly more FCD than small ones according to the result of Hypothesis 2. Moreover, Due to Year 2008 was the most volatility year, shipbuilding companies used more FCD for save their business from crisis and bankruptcy.

From this estimation, we can conclude that the Hypothesis 3 is also rejected, because the outcome on relationship with FCD/A and Year is in significant and positive. However, most of the significances presents higher value than the estimated one ($\alpha > 0.10$). Additionally, FS/A remains in no relationship with FCD/A in the model, $F(1,320) = .566$, $p\text{-value} < .452$.

The equation of the model is as follows:

$$\begin{aligned} \text{Ln(FCD/A)} = & -2.26 + 0.68 \text{ Ln(FS/A)} + 1.66 (\text{Year2001}) + 1.27 \\ & (\text{Year2002}) + 1.14 (\text{Year2003}) + .17 (\text{Year2004}) + .18 \\ & (\text{Year2005}) + .15 (\text{Year2006}) + .30 (\text{Year2007}) + .63 \\ & (\text{Year2008}) - .07 (\text{Year2009}) - .05 (\text{Year2010}) - 0.5 \\ & (\text{Year2011}) \end{aligned}$$

Table 11 provides the results of ANCOVA analysis for Hypothesis 4 which identifies whether there is a significant and positive relationship between FCD utilizations of shipbuilding industry with crisis group periods. Descriptive statistics shows that whereas the proportion of FCD to assets is high in Global crisis

period (M= -1.97; SD=1.14), the proportion is low in Post crisis period (M=-2.29; SD=1.16). Amounts of samples in groups are about same.

Table 11. ANCOVA results for Hypothesis 4

Tests of Between-Subjects Effects

Source	df	Mean Square	F	Sig.
Corrected Model	3	2,461	1,782	,150
Intercept	1	1422,809	1030,171	,000
Ln(FS/A)	1	,248	,179	,672
Period	2	3,529	2,555	,079
Error	329	1,381		
Total	333			
Corrected Total	332			

a. R Squared = .016 (Adjusted R Squared = .007)

Parameter Estimates

Parameter	B	Std. Error	t	Sig.
Intercept	-2,293	,112	-20,520	,000
Ln(FS/A)	,038	,090	,424	,672
[Period=1]	,299	,158	1,892	,059
[Period=2]	,318	,157	2,018	,044

The results of ANCOVA presents that the crisis periods have a significant and weak positive relationship with the usage of shipbuilding companies, $F(2,329)=2.56$, $p(0.10)>0.079$, ($R^2=.016$). However, the sales outlined with no significance with FCD utilization as same as above mentioned, $F(1,329)=.18$, $p(0.10)<0.672$.

All groups of the period are significant and positive, especially Global financial crisis period is more significantly in using FCD by shipbuilding companies, $p(0.10)>.04$. This means the hypothesis 4 will be accepted.

The model for equation will be as below:

$$\text{Ln(FCD/A)} = -2.29 + 0.38 \text{ Ln(FS/A)} + 0.30(\text{BFC}) + 0.32 (\text{GFC})$$

4.4 Summary of the Hypotheses test

In prior section 4 hypothesizes on FCD/A utilization in Korea shipbuilding industry are tested by using ANCOVA analysis in SPSS package. Because the difference sample means is high through size of the industry, a logarithmic model is used to avoid nonlinearity of the relationship.

This study is based to the prior studies by North American scholars Makar and Huffman (1997)⁶⁷ and Mennon and Viswanathan (2005)⁶⁸. Whereas they researched throughout US multinational companies, this study analysis Korea shipbuilding industry.

Hypothesis tests are summarized in Table 12. In this study three hypothesizes are rejected; only last one is accepted.

Table 12. Final results for Hypothesises

	Expected hypothesis	Decision	Result
H1	Relationship between FCD utilization and Sales	Rejected	No relationship between them
H2	No relationship between FCD utilization and Size of the industry	Rejected	Relationship across size of industry is high
H3	No relationship between FCD utilization and Sample Years	Rejected	Relationship is significant when currency rate is volatile
H4	Relationship between FCD utilization and Crisis periods	Accepted	Relationship is significant across the periods

⁶⁷ Ibid.

⁶⁸ Ibid.

According to the Hypothesis 1, the estimated results presented the significant of two variables FCD and Sales are not significant ($\alpha < 0.05$). Despite of the relationship is positive ($R^2 = 0.27$); the effect to each other is too low (0.04). Prior researches show that the relationship between two variables was significant and positive across US MNCs. Difference from US MNCs, Korea shipbuilding industry results the effect of sales has low effect and no significance. However, Hypothesis 2 outlined alternative results to Hypothesis 1.

Corresponding to the Hypothesis 2, defines whether there is a relationship between FCD utilization and Size of shipbuilding industry, the estimated results outlined the significance between them is significance which means large companies use FCD highly; low companies use it low. Amazingly, the relationship between FCD utilization and sales is too significant due to its size, the effect of sales to FCD utilization presented highly than the general results in Hypothesis 1. This result fits to the one of Makar and Huffman (1997):

“The absolute levels of FCD use and foreign sales are not statistically significant; however, companies in cluster one are larger and use relatively more”.

Like to the results above we can find from other scholars researches mentioned in literature review, such as Booth, Smith, and Stolz (1984)⁶⁹, Nance, Smith and Smithson (1993)⁷⁰.

Hypothesis 3 defines if there is a connection between FCD use and exchange rate changes, explained with dummy variable Year, in

⁶⁹ Ibid.

⁷⁰ Ibid.

the shipbuilding industry. The results are outlined that they are too significant and positive relationship. Especially, the industry entities used FCD significantly more in when the currency exchange rate was too volatile; they didn't use derivatives in when the exchange rate was low fluctuate. When KRW is stronger to USD, large shipbuilding companies used derivatives low, while small companies used differently. But both groups in the industry used FCD considerable high when KRW is too volatile and more devaluated to USD in 2008. Among the scholars in this field, Choi and Prasad(1995), Mennon and Viswanathan (2005), Kim and Lim (2008) and Won (2010) suggested that the most of shipbuilding companies are significantly influenced by foreign exchange rates between domestic and foreign currency which is a critical factor for them.

By the result of Mennon and Viswanathan's study that IMF crisis in 1997 and 1998 influenced dramatically to US MNCs, I presented the Hypothesis 4 describes if the financial crisis time influence to the shipbuilding companies to use FCD significantly. As the prior scholars suggested the result obtained from this research that financial crisis makes companies to use FCD highly in general than before and after crisis period which the value of KRW increased relative to USD. Till the financial crisis period, the shipbuilding companies used FCD with low in the average; alternatively, they used the derivatives significantly high in the average. However, after the global financial crisis, the large companies still have been using derivatives more to hedge the exposure, while small and medium companies have been using differently from each other.

Chapter Five: Conclusion and Implications

5.1 Research Findings and Implications

The overall aim of this research was to advance an understanding of how the FCD utilization gave an effect to the Korean shipbuilding industry in relation with its foreign sales through sample years and companies as well as its importance in high and low currency exchange volatility periods. And the specific research objectives were as follow based on the aim:

1. Identify the impact of the FX rate to the financial condition of the shipbuilding companies and the methods to hedge the exposure by using FCD.
2. Evaluate relevant models and hypothesis on the utilization of FCD based on prior researches.
3. Analyze the collected data according to the research methodology.
4. Summarize the findings and give implementations of the research.

This section will review the research objectives above, summarize the findings of this research work and suggest conclusions based on findings. The last section just summarized the analysis of hypothesis; however, this section summarizes all findings in connection with objectives of the research.

Research objective 1: the impact of currency exchange rate and hedge the exposure with using derivatives.

The literature identified that FX is one of the most effective

reasons to companies' value and their financial conditions. This FX change affects to the companies differently due to their financial wealth and business strategy if they act globally or domestically. Theoretical reviews predict an increase in the value of domestic company with devaluation of domestic currency, but in practice, some researches were identified its alternative impact. While some studies found that FX changes did not cause to the domestic companies, other researches was found that support its converse.

The main conclusion which can be described from this research on this issue is the foreign exchange rate with its change impact to the value of the company even with minimum exposure.

As the company has exposure on exchange rate variability, the hedging activity has more importance to avoid the exposure from it. Despite the early researches proved with their theory that the financial risk management didn't effect to the shareholder wealth, recent researches supported the theory is invalid. When the company face to market inefficiencies, hedging is profitable in short term and the hedging give growth in more options for them. And studies among US MNCs outlined that non hedged companies are more dangerous than hedged ones. The same result was taken from Korean shipbuilding industry that the companies used FCD to hedge the exposure profited more than non-users.

Despite of some scholars idea that hedging didn't effect to company's wealth, most researchers found the hedging is more qualitative way to avoid the exposure increased from foreign exchange rate fluctuations. However, the technique of hedging

remains its importance in how to use.

Objective 2: model and hypothesis to analysis

Through connection with literature, the FCD utilization is presented into relationship with foreign sales. And their relationship was identified across the size of the industry, sample time and period of current crisis in presented hypothesis. As a main technique, ANCOVA analysis is used to identify the significance among them.

Objective 3: analyze the data

The sample selected from Korea shipbuilding industry from two groups: large companies from KOSHIPA, small ones from KOSIC. Even the number of sample of shipbuilding companies are more than large ones; the mean of assets of large companies are significantly high than small ones. The result outlined that despite there was no relationship between FCD utilization and sales in the industry, the FCD utilization was too significant to the change of exchange rate fluctuations. Furthermore, there is a difference between two groups of the industry on FCD utilization: large companies use it significantly more than small ones. By getting the result of hypothesis, FCD was used significantly high in Crisis period, but the number was low in Pre and Post crisis periods. It means that the FCD is used more when domestic currency devaluated to foreign currency. This result doesn't match with some other research results which outlined the devaluation of domestic currency has no effect to domestic companies.

Objective 4: finding summary and implications.

The summary of findings is based on the objectives of the

research. By summarizing the research in this style provides the better connection of the chapters of the research and to fit them to objectives of the study. As the summary for the aim of the research, I can say that the large companies are too sensitive in facing to FX exposure. Firstly, due to they have huge wealth more than trillion KRW, a little change in exchange rate decrease their value. So, they use the FCD to hedge over than 80% of their sales and outcomes from unexpected risk. Secondly, the reason that they build ships ordered from overseas countries in currency USD presents they considerably depend to foreign currency. Thirdly, because the small shipbuilding companies are domestic not depend on foreign business, they can survive without hedging their wealth; but the result shows that the non-hedged companies before crisis got difficulties in financial situations.

So, the findings of this study suggest the implication that the shipbuilding companies should use FCD with different kind of currencies, not only in USD, such as Chinese Yuan, because of its strength and low fluctuation; and also with different type of techniques, such as swap, options futures. Small shipbuilding companies used derivatives lower after Financial Crisis in 2007-2009 than before that time, because they are afraid of high devaluation of the domestic currency to USD again. Note that the shipbuilding industry was impacted with loss from unexpected high devaluation of the domestic currency.

It will be better advice for shipbuilding companies using FCD in short period, because our global market is too volatile and fluctuate in currency trade.

5.2 Limitations

The findings in this study are generalized to at three limitations.

First, these sample data is consist of different range of numbers in size; the amount of large companies is too low, because they secure their balance sheets from share. This effect to the result of the analysis that F-value of large group were too big than expected.

Secondly, despite the shipbuilding companies share out their financial balance sheets, they especially hide the information about their operating income and expenses. This made me difficult to find and collect the relevant information about the companies' sales and FCD. Additionally, the expected deep and full findings weren't appeared in quality because of low valuable information. For example, the information on which type of FCD the companies use, on which type of currencies they use (they do not use only USD in FX contract), the type of companies' manufacture strategy, the derivative contract life time, etc.

Thirdly, this study analyzed within one industry; the research couldn't be summarized with difference with another industry, such as shipping, automobile, electronics etc.

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www.worldslargestship.com



Appendix: Sample Data

Company	Com_Type	Year	Period	Assets (thousand KRW)	Sales (thousand KRW)	FXD (thousand KRW)	FS/A	FXD/A	Rel.FXD	Ln(FS/A)	Ln(FXD/A)
A	Large	31-Dec-2001	BGFC	9 057 130 344	7 404 230 486	34 752 178 033	,82	3,84	4,69	-,20	1,34
A	Large	31-Dec-2002	BGFC	9 777 911 387	8 134 062 780	14 081 509 553	,83	1,44	1,73	-,18	,36
A	Large	31-Dec-2003	BGFC	10 604 056 876	8 153 499 952	14 137 160 000	,77	1,33	1,73	-,26	,29
A	Large	31-Dec-2004	BGFC	11 062 313 662	9 084 484 155	8 593 748 548	,82	,78	,95	-,20	-,25
A	Large	31-Dec-2005	BGFC	11 593 108 115	10 354 421 886	7 407 413 106	,89	,64	,72	-,11	-,45
A	Large	31-Dec-2006	BGFC	12 996 156 878	12 554 744 430	12 546 484 737	,97	,97	1,00	-,03	-,04
A	Large	31-Dec-2007	GFC	16 824 095 659	15 533 013 307	17 201 542 046	,92	1,02	1,11	-,08	,02
A	Large	31-Dec-2008	GFC	25 280 400 921	19 957 080 881	20 379 476 178	,79	,81	1,02	-,24	-,22
A	Large	31-Dec-2009	GFC	24 872 583 501	21 142 196 736	18 794 324 337	,85	,76	,89	-,16	-,28
A	Large	31-Dec-2010	NGFC	28 888 131 096	22 405 181 314	16 301 599 001	,78	,56	,73	-,25	-,57
A	Large	31-Dec-2011	NGFC	49 000 816 098	53 711 665 784	42 019 307 740	1,10	,86	,78	,09	-,15
A	Large	31-Dec-2012	NGFC	49 273 175 894	54 973 701 392	39 791 209 530	1,12	,81	,72	,11	-,21
B	Large	31-Dec-2001	BGFC	3 279 693 000	3 015 589 000	2 684 534 000	,92	,82	,89	-,08	-,20
B	Large	31-Dec-2002	BGFC	3 555 468 000	3 367 832 000	2 515 754 534	,95	,71	,75	-,05	-,35
B	Large	31-Dec-2003	BGFC	3 962 219 000	4 330 421 000	3 216 808 470	1,09	,81	,74	,09	-,21
B	Large	31-Dec-2004	BGFC	5 378 380 000	4 760 138 000	3 482 716 791	,89	,65	,73	-,12	-,43
B	Large	31-Dec-2005	BGFC	5 255 292 000	4 714 244 000	5 491 238 706	,90	1,04	1,16	-,11	,04
B	Large	31-Dec-2006	BGFC	5 954 751 000	5 400 661 000	9 196 323 372	,91	1,54	1,70	-,10	,43
B	Large	31-Dec-2007	GFC	8 282 477 000	7 104 792 000	16 989 445 170	,86	2,05	2,39	-,15	,72
B	Large	31-Dec-2008	GFC	15 953 554 000	11 074 644 000	26 336 164 460	,69	1,65	2,38	-,37	,50
B	Large	31-Dec-2009	GFC	15 136 358 000	12 442 519 000	15 532 187 280	,82	1,03	1,25	-,20	,03
B	Large	31-Dec-2010	NGFC	14 176 729 000	12 074 505 000	13 140 691 380	,85	,93	1,09	-,16	-,08
B	Large	31-Dec-2011	NGFC	14 550 579 000	12 257 626 000	12 573 945 260	,84	,86	1,03	-,17	-,15
B	Large	31-Dec-2012	NGFC	14 183 472 000	12 565 402 000	11 835 003 780	,89	,83	,94	-,12	-,18
C	Large	31-Dec-2001	BGFC	2 781 492 974	1 834 118 654	138 620 480	,66	,05	,08	-,42	-3,00
C	Large	31-Dec-2002	BGFC	2 709 029 365	1 636 367 322	127 538 000	,60	,05	,08	-,50	-3,06
C	Large	31-Dec-2003	BGFC	3 547 476 247	1 543 948 233	104 638 660	,44	,03	,07	-,83	-3,52
C	Large	31-Dec-2004	BGFC	3 339 066 506	1 953 431 889	87 330 440	,59	,03	,04	-,54	-3,64
C	Large	31-Dec-2005	BGFC	3 518 550 000	2 217 330 000	145 873 970	,63	,04	,07	-,46	-3,18
C	Large	31-Dec-2006	BGFC	4 245 532 000	2 595 845 000	257 384 205	,61	,06	,10	-,49	-2,80

Appendix: Sample Data

C	Large	31-Dec-2007	GFC	4 881 845 000	1 218 728 000	354 718 300	,25	,07	,29	-1,39	-2,62
C	Large	31-Dec-2008	GFC	6 235 995 000	3 403 175 000	431 979 919	,55	,07	,13	-,61	-2,67
C	Large	31-Dec-2009	GFC	6 894 968 000	3 227 619 000	273 925 172	,47	,04	,08	-,76	-3,23
C	Large	31-Dec-2010	NGFC	6 181 212 000	1 724 878 000	179 410 290	,28	,03	,10	-1,28	-3,54
C	Large	31-Dec-2011	NGFC	7 036 680 000	2 891 499 000	82 984 106	,41	,01	,03	-,89	-4,44
C	Large	31-Dec-2012	NGFC	6 585 093 000	2 549 319 000	77 740 921	,39	,01	,03	-,95	-4,44
D	Large	31-Dec-2004	BGFC	1 521 152 738	814 945 923	2 848 190 235	,54	1,87	3,49	-,62	,63
D	Large	31-Dec-2005	BGFC	1 686 663 424	1 147 908 929	3 630 076 978	,68	2,15	3,16	-,38	,77
D	Large	31-Dec-2006	BGFC	1 994 032 098	1 639 221 384	2 215 450 595	,82	1,11	1,35	-,20	,11
D	Large	31-Dec-2007	GFC	3 529 147 451	2 129 017 290	8 142 484 753	,60	2,31	3,82	-,51	,84
D	Large	31-Dec-2008	GFC	8 617 385 684	3 005 654 793	13 831 808 200	,35	1,61	4,60	-1,05	,47
D	Large	31-Dec-2009	GFC	7 622 834 234	4 191 256 694	8 859 271 398	,55	1,16	2,11	-,60	,15
D	Large	31-Dec-2010	NGFC	6 732 072 918	3 940 166 896	10 344 859 770	,59	1,54	2,63	-,54	,43
D	Large	31-Dec-2011	NGFC	6 229 213 000	4 269 210 000	7 818 214 179	,69	1,26	1,83	-,38	,23
D	Large	31-Dec-2012	NGFC	5 067 029 000	6 353 608 000	7 089 327 450	1,25	1,40	1,12	,23	,34
E	Large	31-Dec-2004	BGFC	7 486 510 070	4 770 150 667	12 473 984 700	,64	1,67	2,62	-,45	,51
E	Large	31-Dec-2005	BGFC	6 827 640 411	5 546 704 459	15 748 372 935	,81	2,31	2,84	-,21	,84
E	Large	31-Dec-2006	BGFC	8 989 184 715	6 351 690 726	20 476 309 505	,71	2,28	3,22	-,35	,82
E	Large	31-Dec-2007	GFC	10 560 624 429	8 519 066 253	31 754 920 989	,81	3,01	3,73	-,21	1,10
E	Large	31-Dec-2008	GFC	26 084 117 668	10 664 465 459	68 070 334 210	,41	2,61	6,38	-,89	,96
E	Large	31-Dec-2009	GFC	20 187 524 290	13 094 943 604	42 853 201 090	,65	2,12	3,27	-,43	,75
E	Large	31-Dec-2010	NGFC	17 995 485 764	13 053 908 616	43 041 028 130	,73	2,39	3,30	-,32	,87
E	Large	31-Dec-2011	NGFC	16 047 569 783	13 358 610 841	46 720 601 930	,83	2,91	3,50	-,18	1,07
E	Large	31-Dec-2012	NGFC	16 321 334 070	14 423 916 279	43 444 476 410	,88	2,66	3,01	-,12	,98
F	Small	31-Dec-2004	BGFC	2 795 558	2 886 493	556 780	1,03	,20	,19	,03	-1,61
F	Small	31-Dec-2005	BGFC	2 656 972	2 932 566	600 650	1,10	,23	,20	,10	-1,49
F	Small	31-Dec-2006	BGFC	2 634 219	2 919 559	674 490	1,11	,26	,23	,10	-1,36
F	Small	31-Dec-2007	GFC	3 011 575	2 883 377	965 980	,96	,32	,34	-,04	-1,14
F	Small	31-Dec-2008	GFC	3 148 683	3 245 974	1 670 940	1,03	,53	,51	,03	-,63
F	Small	31-Dec-2009	GFC	3 547 213	4 289 655	875 450	1,21	,25	,20	,19	-1,40
F	Small	31-Dec-2010	NGFC	3 672 398	3 555 716	987 670	,97	,27	,28	-,03	-1,31
F	Small	31-Dec-2011	NGFC	3 176 192	2 707 331	970 280	,85	,31	,36	-,16	-1,19

Appendix: Sample Data

F	Small	31-Dec-2012	NGFC	3 378 851	3 547 539	1 045 070	1,05	,31	,29	,05	-1,17
G	Small	31-Dec-2004	BGFC	1 566 741	1 770 870	430 600	1,13	,27	,24	,12	-1,29
G	Small	31-Dec-2005	BGFC	1 649 055	2 272 341	456 300	1,38	,28	,20	,32	-1,28
G	Small	31-Dec-2006	BGFC	1 384 230	1 853 833	486 550	1,34	,35	,26	,29	-1,05
G	Small	31-Dec-2007	GFC	1 624 038	2 494 303	539 800	1,54	,33	,22	,43	-1,10
G	Small	31-Dec-2008	GFC	1 657 495	3 050 732	1 005 600	1,84	,61	,33	,61	-,50
G	Small	31-Dec-2009	GFC	2 198 990	1 494 943	550 300	,68	,25	,37	-,39	-1,39
G	Small	31-Dec-2010	NGFC	1 862 007	2 930 833	570 220	1,57	,31	,19	,45	-1,18
G	Small	31-Dec-2011	NGFC	1 982 348	2 904 263	593 060	1,47	,30	,20	,38	-1,21
G	Small	31-Dec-2012	NGFC	1 982 348	2 904 263	660 050	1,47	,33	,23	,38	-1,10
H	Small	31-Dec-2004	BGFC	432 804	1 287 022	55 340	2,97	,13	,04	1,09	-2,06
H	Small	31-Dec-2005	BGFC	674 226	1 199 873	57 320	1,78	,09	,05	,58	-2,46
H	Small	31-Dec-2006	BGFC	463 501	1 200 297	49 050	2,59	,11	,04	,95	-2,25
H	Small	31-Dec-2007	GFC	621 506	1 167 894	53 700	,27	,09	,32	-1,31	-2,45
H	Small	31-Dec-2008	GFC	563 975	1 394 585	96 430	2,47	,17	,07	,91	-1,77
H	Small	31-Dec-2009	GFC	441 855	1 111 709	56 590	2,52	,13	,05	,92	-2,06
H	Small	31-Dec-2010	NGFC	493 260	253 695	67 890	,51	,14	,27	-,66	-1,98
H	Small	31-Dec-2011	NGFC	460 295	303 936	62 400	,66	,14	,21	-,42	-2,00
H	Small	31-Dec-2012	NGFC	450 273	690 900	65 390	1,53	,15	,09	,43	-1,93
I	Small	31-Dec-2005	BGFC	939 684	1 659 233	140 370	1,77	,15	,08	,57	-1,90
I	Small	31-Dec-2006	BGFC	1 083 060	472 004	130 590	,44	,12	,28	-,83	-2,12
I	Small	31-Dec-2007	GFC	1 147 244	360 226	178 900	,31	,16	,50	-1,16	-1,86
I	Small	31-Dec-2008	GFC	1 176 219	488 341	484 790	,42	,41	,99	-,88	-,89
I	Small	31-Dec-2009	GFC	1 342 178	2 348 660	146 030	1,75	,11	,06	,56	-2,22
I	Small	31-Dec-2010	NGFC	1 223 860	488 985	163 590	,40	,13	,33	-,92	-2,01
I	Small	31-Dec-2011	NGFC	1 619 163	1 544 995	248 870	,95	,15	,16	-,05	-1,87
I	Small	31-Dec-2012	NGFC	1 265 152	562 632	290 440	,44	,23	,52	-,81	-1,47
J	Small	31-Dec-2004	BGFC	5 853 067	20 310 206	359 260	3,47	,06	,02	1,24	-2,79
J	Small	31-Dec-2005	BGFC	6 814 718	23 937 249	570 890	3,51	,08	,02	1,26	-2,48
J	Small	31-Dec-2006	BGFC	17 864 067	20 925 647	843 780	1,17	,05	,04	,16	-3,05
J	Small	31-Dec-2007	GFC	8 615 491	14 783 585	879 450	1,72	,10	,06	,54	-2,28
J	Small	31-Dec-2008	GFC	10 526 588	13 589 709	1 843 330	1,29	,18	,14	,26	-1,74

Appendix: Sample Data

J	Small	31-Dec-2009	GFC	18 699 280	29 671 180	850 370	1,59	,05	,03	,46	-3,09
J	Small	31-Dec-2010	NGFC	19 794 096	30 284 267	894 450	1,53	,05	,03	,43	-3,10
J	Small	31-Dec-2011	NGFC	25 947 482	42 190 403	928 560	1,63	,04	,02	,49	-3,33
J	Small	31-Dec-2012	NGFC	26 246 598	34 279 787	1 096 770	1,31	,04	,03	,27	-3,18
K	Small	31-Dec-2005	BGFC	3 857 814	6 813 983	599 680	1,77	,16	,09	,57	-1,86
K	Small	31-Dec-2006	BGFC	6 075 217	8 966 937	610 780	1,48	,10	,07	,39	-2,30
K	Small	31-Dec-2007	GFC	5 483 683	9 716 708	655 750	1,77	,12	,07	,57	-2,12
K	Small	31-Dec-2008	GFC	7 457 452	10 381 600	950 650	1,39	,13	,09	,33	-2,06
K	Small	31-Dec-2009	GFC	7 267 305	4 907 209	590 550	,68	,08	,12	-,39	-2,51
K	Small	31-Dec-2010	NGFC	7 941 790	9 303 970	630 450	1,17	,08	,07	,16	-2,53
K	Small	31-Dec-2011	NGFC	9 897 171	5 112 755	703 890	,52	,07	,14	-,66	-2,64
K	Small	31-Dec-2012	NGFC	8 114 618	10 626 394	823 570	1,31	,10	,08	,27	-2,29
L	Small	31-Dec-2004	BGFC	165 744	268 882	37 340	1,62	,23	,14	,48	-1,49
L	Small	31-Dec-2005	BGFC	163 997	1 013 381	43 780	6,18	,27	,04	1,82	-1,32
L	Small	31-Dec-2006	BGFC	148 961	1 155 140	44 550	7,75	,30	,04	2,05	-1,21
L	Small	31-Dec-2007	GFC	273 132	1 408 127	57 450	5,16	,21	,04	1,64	-1,56
L	Small	31-Dec-2008	GFC	259 778	1 268 513	79 350	4,88	,31	,06	1,59	-1,19
L	Small	31-Dec-2009	GFC	254 753	2 880 700	48 490	11,31	,19	,02	2,43	-1,66
L	Small	31-Dec-2010	NGFC	201 306	612 937	50 480	3,04	,25	,08	1,11	-1,38
L	Small	31-Dec-2011	NGFC	287 730	719 360	57 580	2,50	,20	,08	,92	-1,61
L	Small	31-Dec-2012	NGFC	430 338	1 561 390	67 220	3,63	,16	,04	1,29	-1,86
M	Small	31-Dec-2004	BGFC	2 002 442	5 067 771	95 660	2,53	,05	,02	,93	-3,04
M	Small	31-Dec-2005	BGFC	2 238 375	3 461 219	95 790	1,55	,04	,03	,44	-3,15
M	Small	31-Dec-2006	BGFC	2 907 085	6 869 868	97 900	2,36	,03	,01	,86	-3,39
M	Small	31-Dec-2007	GFC	3 369 224	7 316 104	103 380	2,17	,03	,01	,78	-3,48
M	Small	31-Dec-2008	GFC	3 341 373	6 695 498	145 050	2,00	,04	,02	,70	-3,14
M	Small	31-Dec-2009	GFC	3 552 569	9 819 244	80 780	2,76	,02	,01	1,02	-3,78
M	Small	31-Dec-2010	NGFC	4 002 746	10 532 331	76 540	2,63	,02	,01	,97	-3,96
M	Small	31-Dec-2011	NGFC	7 162 841	15 986 378	85 040	2,23	,01	,01	,80	-4,43
M	Small	31-Dec-2012	NGFC	6 345 138	11 870 138	97 940	1,87	,02	,01	,63	-4,17
N	Small	31-Dec-2004	BGFC	18 975 218	6 529 642	1 340 790	,34	,07	,21	-1,07	-2,65
N	Small	31-Dec-2005	BGFC	19 390 036	21 578 227	1 380 450	1,11	,07	,06	,11	-2,64

Appendix: Sample Data

N	Small	31-Dec-2006	BGFC	23 871 581	15 560 413	1 557 900	,65	,07	,10	-,43	-2,73
N	Small	31-Dec-2007	GFC	137 812 808	70 429 948	5 594 650	,51	,04	,08	-,67	-3,20
N	Small	31-Dec-2008	GFC	177 060 923	184 353 391	10 347 500	1,04	,06	,06	,04	-2,84
N	Small	31-Dec-2009	GFC	100 195 209	161 975 640	3 394 420	1,62	,03	,02	,48	-3,38
N	Small	31-Dec-2010	NGFC	85 728 966	66 884 749	4 235 470	,78	,05	,06	-,25	-3,01
N	Small	31-Dec-2011	NGFC	39 841 220	103 818 513	4 978 000	2,61	,12	,05	,96	-2,08
N	Small	31-Dec-2012	NGFC	13 862 331	29 049 688	1 390 570	2,10	,10	,05	,74	-2,30
O	Small	31-Dec-2004	BGFC	4 554 942	5 396 862	583 440	1,18	,13	,11	,17	-2,06
O	Small	31-Dec-2005	BGFC	6 881 290	6 422 464	644 680	,93	,09	,10	-,07	-2,37
O	Small	31-Dec-2006	BGFC	26 678 558	23 128 975	1 680 330	,87	,06	,07	-,14	-2,76
O	Small	31-Dec-2007	GFC	43 606 944	62 742 688	1 840 500	1,44	,04	,03	,36	-3,17
O	Small	31-Dec-2008	GFC	60 393 175	90 637 142	4 059 400	1,50	,07	,04	,41	-2,70
O	Small	31-Dec-2009	GFC	56 833 832	97 358 189	1 584 350	1,71	,03	,02	,54	-3,58
O	Small	31-Dec-2010	NGFC	35 612 962	17 234 337	1 445 350	,48	,04	,08	-,73	-3,20
O	Small	31-Dec-2011	NGFC	15 967 353	22 327 754	1 035 490	1,40	,06	,05	,34	-2,74
O	Small	31-Dec-2012	NGFC	12 435 607	4 436 958	934 550	,36	,08	,21	-1,03	-2,59
P	Small	31-Dec-2004	BGFC	5 277 420	4 093 248	740 280	,78	,14	,18	-,25	-1,96
P	Small	31-Dec-2005	BGFC	4 565 970	7 630 768	741 575	1,67	,16	,10	,51	-1,82
P	Small	31-Dec-2006	BGFC	5 182 020	6 750 511	804 390	1,30	,16	,12	,26	-1,86
P	Small	31-Dec-2007	GFC	6 979 328	7 021 145	844 520	1,01	,12	,12	,01	-2,11
P	Small	31-Dec-2008	GFC	6 827 027	9 666 433	1 304 980	1,42	,19	,14	,35	-1,65
P	Small	31-Dec-2009	GFC	8 040 388	11 745 876	795 400	1,46	,10	,07	,38	-2,31
P	Small	31-Dec-2010	NGFC	7 855 418	18 075 839	806 800	2,30	,10	,04	,83	-2,28
P	Small	31-Dec-2011	NGFC	8 825 607	25 143 656	856 050	2,85	,10	,03	1,05	-2,33
P	Small	31-Dec-2012	NGFC	10 531 587	23 303 152	923 800	2,21	,09	,04	,79	-2,43
Q	Small	31-Dec-2009	GFC	427 861	1 749 402	96 500	4,09	,23	,06	1,41	-1,49
Q	Small	31-Dec-2010	NGFC	403 445	1 126 519	77 560	2,79	,19	,07	1,03	-1,65
Q	Small	31-Dec-2011	NGFC	414 496	1 108 191	65 470	2,67	,16	,06	,98	-1,85
Q	Small	31-Dec-2012	NGFC	770 706	2 107 021	85 650	2,73	,11	,04	1,01	-2,20
R	Small	31-Dec-2004	BGFC	2 882 291	1 748 375	269 500	,61	,09	,15	-,50	-2,37
R	Small	31-Dec-2005	BGFC	1 870 300	5 108 545	225 470	2,73	,12	,04	1,00	-2,12
R	Small	31-Dec-2006	BGFC	1 724 441	3 152 677	207 550	1,83	,12	,07	,60	-2,12

Appendix: Sample Data

R	Small	31-Dec-2007	GFC	1 552 660	4 691 778	233 570	3,02	,15	,05	1,11	-1,89
R	Small	31-Dec-2008	GFC	1 912 413	6 415 163	435 320	3,35	,23	,07	1,21	-1,48
R	Small	31-Dec-2009	GFC	4 626 553	10 349 220	233 530	2,24	,05	,02	,81	-2,99
R	Small	31-Dec-2010	NGFC	6 192 652	16 754 390	243 340	2,71	,04	,01	1,00	-3,24
R	Small	31-Dec-2011	NGFC	6 581 595	11 055 357	299 560	1,68	,05	,03	,52	-3,09
R	Small	31-Dec-2012	NGFC	5 656 019	16 098 786	315 880	2,85	,06	,02	1,05	-2,89
S	Small	31-Dec-2005	BGFC	1 610 516	2 882 262	125 400	1,79	,08	,04	,58	-2,55
S	Small	31-Dec-2006	BGFC	5 101 620	1 951 768	157 450	,38	,03	,08	-,96	-3,48
S	Small	31-Dec-2007	GFC	3 004 288	8 155 338	135 480	2,71	,05	,02	1,00	-3,10
S	Small	31-Dec-2008	GFC	5 717 439	3 423 173	165 730	,60	,03	,05	-,51	-3,54
S	Small	31-Dec-2009	GFC	9 268 477	7 772 737	90 220	,84	,01	,01	-,18	-4,63
S	Small	31-Dec-2010	NGFC	10 212 711	11 430 665	197 400	1,12	,02	,02	,11	-3,95
S	Small	31-Dec-2011	NGFC	12 113 967	6 093 620	125 320	,50	,01	,02	-,69	-4,57
S	Small	31-Dec-2012	NGFC	13 787 414	7 713 068	144 880	,56	,01	,02	-,58	-4,56
T	Small	31-Dec-2006	BGFC	1 369 670	326 503	155 680	,24	,11	,48	-1,43	-2,17
T	Small	31-Dec-2007	GFC	1 392 583	583 327	160 590	,42	,12	,28	-,87	-2,16
T	Small	31-Dec-2008	GFC	1 415 519	499 182	195 480	,35	,14	,39	-1,04	-1,98
T	Small	31-Dec-2009	GFC	1 426 990	547 638	132 270	,38	,09	,24	-,96	-2,38
T	Small	31-Dec-2010	NGFC	1 541 315	566 167	145 770	,37	,09	,26	-1,00	-2,36
T	Small	31-Dec-2011	NGFC	1 515 457	596 010	185 550	,39	,12	,31	-,93	-2,10
T	Small	31-Dec-2012	NGFC	1 470 964	186 572	97 340	,13	,07	,52	-2,06	-2,72
U	Small	31-Dec-2004	BGFC	16 619 467	25 344 017	138 450	1,52	,01	,01	,42	-4,79
U	Small	31-Dec-2005	BGFC	17 802 945	23 272 996	112 480	1,31	,01	,00	,27	-5,06
U	Small	31-Dec-2006	BGFC	21 324 866	19 470 964	134 870	,91	,01	,01	-,09	-5,06
U	Small	31-Dec-2007	GFC	25 807 971	8 364 730	480 330	,32	,02	,06	-1,13	-3,98
U	Small	31-Dec-2008	GFC	40 796 574	13 678 030	1 255 370	,34	,03	,09	-1,09	-3,48
U	Small	31-Dec-2009	GFC	31 018 961	12 780 002	875 330	,41	,03	,07	-,89	-3,57
U	Small	31-Dec-2010	NGFC	31 397 520	25 486 656	1 154 300	,81	,04	,05	-,21	-3,30
U	Small	31-Dec-2011	NGFC	34 108 584	26 972 058	1 225 440	,79	,04	,05	-,23	-3,33
U	Small	31-Dec-2012	NGFC	36 033 889	25 350 929	1 435 000	,70	,04	,06	-,35	-3,22
V	Small	31-Dec-2004	BGFC	1 762 978	4 733 692	154 430	2,69	,09	,03	,99	-2,44
V	Small	31-Dec-2005	BGFC	1 246 997	2 995 371	132 490	2,40	,11	,04	,88	-2,24

Appendix: Sample Data

V	Small	31-Dec-2006	BGFC	872 646	1 193 795	138 730	1,37	,16	,12	,31	-1,84
V	Small	31-Dec-2007	GFC	808 126	1 309 333	125 470	1,62	,16	,10	,48	-1,86
V	Small	31-Dec-2008	GFC	587 850	1 193 697	213 290	2,03	,36	,18	,71	-1,01
V	Small	31-Dec-2009	GFC	612 490	1 343 450	144 850	2,19	,24	,11	,79	-1,44
V	Small	31-Dec-2010	NGFC	590 635	1 177 637	112 700	1,99	,19	,10	,69	-1,66
V	Small	31-Dec-2011	NGFC	558 065	1 111 647	97 390	1,99	,17	,09	,69	-1,75
V	Small	31-Dec-2012	NGFC	555 157	976 215	123 550	1,76	,22	,13	,56	-1,50
W	Small	31-Dec-2005	BGFC	20 727 382	20 868 226	2 876 460	1,01	,14	,14	,01	-1,97
W	Small	31-Dec-2006	BGFC	20 369 006	21 831 601	2 945 700	1,07	,14	,13	,07	-1,93
W	Small	31-Dec-2007	GFC	39 488 689	26 504 497	3 498 790	,67	,09	,13	-,40	-2,42
W	Small	31-Dec-2008	GFC	37 402 637	27 529 233	6 587 220	,74	,18	,24	-,31	-1,74
W	Small	31-Dec-2009	GFC	34 031 940	25 173 527	2 483 900	,74	,07	,10	-,30	-2,62
W	Small	31-Dec-2010	NGFC	35 813 691	29 201 972	2 945 340	,82	,08	,10	-,20	-2,50
W	Small	31-Dec-2011	NGFC	40 310 412	20 626 726	4 220 060	,51	,10	,20	-,67	-2,26
W	Small	31-Dec-2012	NGFC	53 629 754	38 582 897	4 578 300	,72	,09	,12	-,33	-2,46
X	Small	31-Dec-2004	BGFC	1 261 526	810 660	87 340	,64	,07	,11	-,44	-2,67
X	Small	31-Dec-2005	BGFC	1 044 894	785 204	96 330	,75	,09	,12	-,29	-2,38
X	Small	31-Dec-2006	BGFC	874 300	764 918	83 440	,87	,10	,11	-,13	-2,35
X	Small	31-Dec-2007	GFC	981 202	760 235	95 390	,77	,10	,13	-,26	-2,33
X	Small	31-Dec-2008	GFC	1 051 699	1 088 778	197 400	1,04	,19	,18	,03	-1,67
X	Small	31-Dec-2009	GFC	1 070 144	936 512	85 200	,88	,08	,09	-,13	-2,53
X	Small	31-Dec-2010	NGFC	1 038 026	933 754	85 300	,90	,08	,09	-,11	-2,50
X	Small	31-Dec-2011	NGFC	918 242	939 606	90 450	1,02	,10	,10	,02	-2,32
X	Small	31-Dec-2012	NGFC	956 630	1 235 867	92 430	1,29	,10	,07	,26	-2,34
Y	Small	31-Dec-2004	BGFC	1 406 847	1 118 850	93 580	,80	,07	,08	-,23	-2,71
Y	Small	31-Dec-2005	BGFC	1 356 650	2 564 847	94 400	1,89	,07	,04	,64	-2,67
Y	Small	31-Dec-2006	BGFC	1 313 850	2 210 296	95 670	1,68	,07	,04	,52	-2,62
Y	Small	31-Dec-2007	GFC	1 290 567	1 414 634	93 790	1,10	,07	,07	,09	-2,62
Y	Small	31-Dec-2008	GFC	1 247 357	2 616 046	238 400	2,10	,19	,09	,74	-1,65
Y	Small	31-Dec-2009	GFC	1 176 781	1 634 472	73 600	1,39	,06	,05	,33	-2,77
Y	Small	31-Dec-2010	NGFC	1 113 411	1 807 930	74 210	1,62	,07	,04	,48	-2,71
Y	Small	31-Dec-2011	NGFC	1 173 408	2 987 950	78 480	2,55	,07	,03	,93	-2,70

Appendix: Sample Data

Y	Small	31-Dec-2012	NGFC	1 095 519	1 349 833	86 220	1,23	,08	,06	,21	-2,54
Z	Small	31-Dec-2005	BGFC	602 317	366 322	47 390	,61	,08	,13	-,50	-2,54
Z	Small	31-Dec-2006	BGFC	743 743	578 577	47 340	,78	,06	,08	-,25	-2,75
Z	Small	31-Dec-2007	GFC	653 360	345 028	49 590	,53	,08	,14	-,64	-2,58
Z	Small	31-Dec-2008	GFC	793 675	495 105	96 380	,62	,12	,19	-,47	-2,11
Z	Small	31-Dec-2009	GFC	991 647	892 381	47 530	,90	,05	,05	-,11	-3,04
Z	Small	31-Dec-2010	NGFC	1 009 505	661 826	43 270	,66	,04	,07	-,42	-3,15
Z	Small	31-Dec-2011	NGFC	1 061 524	657 164	58 330	,62	,05	,09	-,48	-2,90
Z	Small	31-Dec-2012	NGFC	1 242 319	936 069	70 660	,75	,06	,08	-,28	-2,87
AA	Small	31-Dec-2004	BGFC	152 482 761	131 303 121	10 487 740	,86	,07	,08	-,15	-2,68
AA	Small	31-Dec-2005	BGFC	55 824 727	131 817 478	5 444 910	2,36	,10	,04	,86	-2,33
AA	Small	31-Dec-2006	BGFC	131 817 478	45 834 118	5 039 940	,35	,04	,11	-1,06	-3,26
AA	Small	31-Dec-2007	GFC	148 601 494	54 138 535	6 753 020	,36	,05	,12	-1,01	-3,09
AA	Small	31-Dec-2008	GFC	149 362 715	45 529 285	11 566 200	,30	,08	,25	-1,19	-2,56
AA	Small	31-Dec-2009	GFC	161 893 243	56 460 910	6 240 790	,35	,04	,11	-1,05	-3,26
AA	Small	31-Dec-2010	NGFC	171 380 311	53 049 088	7 540 990	,31	,04	,14	-1,17	-3,12
AA	Small	31-Dec-2011	NGFC	171 271 885	56 281 819	8 954 300	,33	,05	,16	-1,11	-2,95
AA	Small	31-Dec-2012	NGFC	222 020 162	45 135 147	7 537 380	,20	,03	,17	-1,59	-3,38
AB	Small	31-Dec-2005	BGFC	712 560	1 680 756	62 460	2,36	,09	,04	,86	-2,43
AB	Small	31-Dec-2006	BGFC	810 692	1 048 766	83 590	1,29	,10	,08	,26	-2,27
AB	Small	31-Dec-2007	GFC	810 692	1 048 766	68 370	1,29	,08	,07	,26	-2,47
AB	Small	31-Dec-2008	GFC	387 092	1 227 772	93 290	3,17	,24	,08	1,15	-1,42
AB	Small	31-Dec-2009	GFC	1 031 246	2 413 150	65 300	2,34	,06	,03	,85	-2,76
AB	Small	31-Dec-2010	NGFC	1 105 576	2 023 559	69 450	1,83	,06	,03	,60	-2,77
AB	Small	31-Dec-2011	NGFC	1 487 365	2 160 418	77 730	1,45	,05	,04	,37	-2,95
AB	Small	31-Dec-2012	NGFC	1 512 280	3 668 249	83 200	2,43	,06	,02	,89	-2,90
AC	Small	31-Dec-2004	BGFC	987 800	1 051 795	128 660	1,06	,13	,12	,06	-2,04
AC	Small	31-Dec-2005	BGFC	879 876	932 440	158 570	1,06	,18	,17	,06	-1,71
AC	Small	31-Dec-2006	BGFC	1 285 179	1 552 901	149 950	1,21	,12	,10	,19	-2,15
AC	Small	31-Dec-2007	GFC	1 285 179	1 552 901	175 400	1,21	,14	,11	,19	-1,99
AC	Small	31-Dec-2008	GFC	1 285 179	1 552 901	250 370	1,21	,19	,16	,19	-1,64
AC	Small	31-Dec-2009	GFC	3 987 026	2 611 254	399 450	,65	,10	,15	-,42	-2,30

Appendix: Sample Data

AC	Small	31-Dec-2010	NGFC	3 971 723	5 882 216	429 940	1,48	,11	,07	,39	-2,22
AC	Small	31-Dec-2011	NGFC	3 983 007	3 109 638	425 390	,78	,11	,14	-,25	-2,24
AC	Small	31-Dec-2012	NGFC	3 983 007	3 109 638	440 580	,78	,11	,14	-,25	-2,20
AD	Small	31-Dec-2006	BGFC	1 466 486	4 400 781	156 300	3,00	,11	,04	1,10	-2,24
AD	Small	31-Dec-2007	GFC	980 687	3 583 972	98 390	3,65	,10	,03	1,30	-2,30
AD	Small	31-Dec-2008	GFC	1 700 782	3 216 926	169 240	1,89	,10	,05	,64	-2,31
AD	Small	31-Dec-2009	GFC	1 259 123	2 921 542	65 400	2,32	,05	,02	,84	-2,96
AD	Small	31-Dec-2010	NGFC	2 621 914	2 124 774	77 230	,81	,03	,04	-,21	-3,52
AD	Small	31-Dec-2011	NGFC	2 286 732	2 835 748	118 450	1,24	,05	,04	,22	-2,96
AD	Small	31-Dec-2012	NGFC	2 370 253	8 056 185	174 480	3,40	,07	,02	1,22	-2,61
AE	Small	31-Dec-2004	BGFC	790 890	1 560 761	56 630	1,97	,07	,04	,68	-2,64
AE	Small	31-Dec-2005	BGFC	1 849 875	1 465 789	76 740	,79	,04	,05	-,23	-3,18
AE	Small	31-Dec-2006	BGFC	1 849 875	1 465 789	56 880	,79	,03	,04	-,23	-3,48
AE	Small	31-Dec-2007	GFC	1 136 542	1 774 509	60 680	1,56	,05	,03	,45	-2,93
AE	Small	31-Dec-2008	GFC	1 059 991	2 225 342	110 380	2,10	,10	,05	,74	-2,26
AE	Small	31-Dec-2009	GFC	1 773 881	4 391 554	78 340	2,48	,04	,02	,91	-3,12
AE	Small	31-Dec-2010	NGFC	2 234 524	5 558 673	86 220	2,49	,04	,02	,91	-3,25
AE	Small	31-Dec-2011	NGFC	4 928 154	7 427 513	95 380	1,51	,02	,01	,41	-3,94
AE	Small	31-Dec-2012	NGFC	3 547 213	5 196 377	129 440	1,46	,04	,02	,38	-3,31
AF	Small	31-Dec-2004	BGFC	1 966 716	730 760	137 430	,37	,07	,19	-,99	-2,66
AF	Small	31-Dec-2005	BGFC	2 003 213	1 496 293	179 450	,75	,09	,12	-,29	-2,41
AF	Small	31-Dec-2006	BGFC	2 102 332	723 881	211 850	,34	,10	,29	-1,07	-2,29
AF	Small	31-Dec-2007	GFC	2 410 031	1 070 340	298 570	,44	,12	,28	-,81	-2,09
AF	Small	31-Dec-2008	GFC	2 725 360	1 605 680	354 730	,59	,13	,22	-,53	-2,04
AF	Small	31-Dec-2009	GFC	3 104 233	1 913 854	176 490	,62	,06	,09	-,48	-2,87
AF	Small	31-Dec-2010	NGFC	3 351 734	2 147 375	186 500	,64	,06	,09	-,45	-2,89
AF	Small	31-Dec-2011	NGFC	3 801 135	2 540 340	263 840	,67	,07	,10	-,40	-2,67
AF	Small	31-Dec-2012	NGFC	4 184 757	2 806 901	268 430	,67	,06	,10	-,40	-2,75
AG	Small	31-Dec-2004	BGFC	5 705 609	1 746 942	388 320	,31	,07	,22	-1,18	-2,69
AG	Small	31-Dec-2005	BGFC	5 984 207	3 689 239	349 320	,62	,06	,09	-,48	-2,84
AG	Small	31-Dec-2006	BGFC	3 053 584	2 274 297	363 480	,74	,12	,16	-,29	-2,13
AG	Small	31-Dec-2007	GFC	2 630 025	2 476 272	395 430	,94	,15	,16	-,06	-1,89

Appendix: Sample Data

AG	Small	31-Dec-2008	GFC	2 630 025	6 121 957	438 490	2,33	,17	,07	,84	-1,79
AG	Small	31-Dec-2009	GFC	3 490 474	3 480 115	265 320	1,00	,08	,08	,00	-2,58
AG	Small	31-Dec-2010	NGFC	3 490 474	2 250 000	219 360	,64	,06	,10	-,44	-2,77
AG	Small	31-Dec-2011	NGFC	3 745 837	2 335 548	228 390	,62	,06	,10	-,47	-2,80
AG	Small	31-Dec-2012	NGFC	4 403 086	5 386 396	309 330	1,22	,07	,06	,20	-2,66
AH	Small	31-Dec-2004	BGFC	1 454 485	1 548 379	173 550	1,06	,12	,11	,06	-2,13
AH	Small	31-Dec-2005	BGFC	1 514 807	2 033 790	178 320	1,34	,12	,09	,29	-2,14
AH	Small	31-Dec-2006	BGFC	1 082 976	1 856 483	148 330	1,71	,14	,08	,54	-1,99
AH	Small	31-Dec-2007	GFC	1 254 779	1 382 406	229 430	1,10	,18	,17	,10	-1,70
AH	Small	31-Dec-2008	GFC	2 470 016	957 766	287 380	,39	,12	,30	-,95	-2,15
AH	Small	31-Dec-2009	GFC	2 470 016	957 766	133 940	,39	,05	,14	-,95	-2,91
AH	Small	31-Dec-2010	NGFC	2 229 395	1 675 229	267 440	,75	,12	,16	-,29	-2,12
AH	Small	31-Dec-2011	NGFC	3 655 456	9 082 522	490 410	2,48	,13	,05	,91	-2,01
AH	Small	31-Dec-2012	NGFC	3 705 500	3 209 179	527 750	,87	,14	,16	-,14	-1,95
AI	Small	31-Dec-2004	BGFC	1 026 785	3 292 244	127 440	3,21	,12	,04	1,17	-2,09
AI	Small	31-Dec-2005	BGFC	1 029 680	1 848 491	198 310	1,80	,19	,11	,59	-1,65
AI	Small	31-Dec-2006	BGFC	1 029 680	1 848 491	138 990	1,80	,13	,08	,59	-2,00
AI	Small	31-Dec-2007	GFC	205 742	1 209 364	88 340	5,88	,43	,07	1,77	-,85
AI	Small	31-Dec-2008	GFC	154 825	463 814	75 270	3,00	,49	,16	1,10	-,72
AI	Small	31-Dec-2009	GFC	537 391	2 696 665	68 430	5,02	,13	,03	1,61	-2,06
AI	Small	31-Dec-2010	NGFC	813 951	4 011 304	78 390	4,93	,10	,02	1,59	-2,34
AI	Small	31-Dec-2011	NGFC	1 124 158	4 567 134	89 340	4,06	,08	,02	1,40	-2,53
AI	Small	31-Dec-2012	NGFC	973 952	3 447 964	115 470	3,54	,12	,03	1,26	-2,13
AJ	Small	31-Dec-2004	BGFC	798 224	715 456	67 390	,90	,08	,09	-,11	-2,47
AJ	Small	31-Dec-2005	BGFC	773 434	1 165 125	88 150	1,51	,11	,08	,41	-2,17
AJ	Small	31-Dec-2006	BGFC	935 982	1 595 104	85 350	1,70	,09	,05	,53	-2,39
AJ	Small	31-Dec-2007	GFC	1 127 304	2 085 500	109 450	1,85	,10	,05	,62	-2,33
AJ	Small	31-Dec-2008	GFC	966 838	1 792 585	160 450	1,85	,17	,09	,62	-1,80
AJ	Small	31-Dec-2009	GFC	1 006 903	1 771 873	78 500	1,76	,08	,04	,57	-2,55
AJ	Small	31-Dec-2010	NGFC	1 198 752	2 358 842	84 350	1,97	,07	,04	,68	-2,65
AJ	Small	31-Dec-2011	NGFC	1 447 755	3 121 291	124 690	2,16	,09	,04	,77	-2,45
AJ	Small	31-Dec-2012	NGFC	1 111 546	3 506 068	112 650	3,15	,10	,03	1,15	-2,29

Appendix: Sample Data

AK	Small	31-Dec-2004	BGFC	1 061 854	1 166 218	58 210	1,10	,05	,05	,09	-2,90
AK	Small	31-Dec-2005	BGFC	1 350 269	1 438 434	67 300	1,07	,05	,05	,06	-3,00
AK	Small	31-Dec-2006	BGFC	1 299 591	1 442 676	74 830	1,11	,06	,05	,10	-2,85
AK	Small	31-Dec-2007	GFC	1 237 593	1 351 810	94 620	1,09	,08	,07	,09	-2,57
AK	Small	31-Dec-2008	GFC	1 250 480	1 031 363	196 410	,82	,16	,19	-,19	-1,85
AK	Small	31-Dec-2009	GFC	588 433	137 376	74 230	,23	,13	,54	-1,45	-2,07
AK	Small	31-Dec-2010	NGFC	685 121	226 248	98 500	,33	,14	,44	-1,11	-1,94
AK	Small	31-Dec-2011	NGFC	713 133	366 309	90 380	,51	,13	,25	-,67	-2,07
AK	Small	31-Dec-2012	NGFC	712 251	410 192	98 390	,58	,14	,24	-,55	-1,98
AL	Small	31-Dec-2004	BGFC	134 338	671 932	48 320	5,00	,36	,07	1,61	-1,02
AL	Small	31-Dec-2005	BGFC	310 869	1 146 578	45 310	3,69	,15	,04	1,31	-1,93
AL	Small	31-Dec-2006	BGFC	114 201	225 073	43 220	1,97	,38	,19	,68	-,97
AL	Small	31-Dec-2007	GFC	105 877	222 882	44 380	2,11	,42	,20	,74	-,87
AL	Small	31-Dec-2008	GFC	105 877	222 882	50 470	2,11	,48	,23	,74	-,74
AL	Small	31-Dec-2009	GFC	127 039	565 101	30 110	4,45	,24	,05	1,49	-1,44

