South Korean Stock Exchange and Currency

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I pledge my honor that I have neither received nor provided any unauthorized assistance during the completion of this work.

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Executive Summary

After being left impoverished by the 1948 Korean War, South Korea restructured its political atmosphere and experienced rapid economic expansion in the decades that followed by becoming an export driven economy. This has led South Korea to become the fourth largest Asian economy by GDP, which means today more than ever it is influenced by and exposed to international economies. We wanted to see the extent to which the Korean stock market and its currency, the Won, is affected by some of its neighboring East Asian countries, namely China, Japan, Hong Kong and Indonesia. We also wanted to find out if the relationship was stronger during times of growth or during periods of crisis. Thus, our paper examines the interdependency of the Korean Stock Exchange and the Won with the economies and currencies of the above mentioned countries during a growth period, 2002-07, and 2 crisis periods, the 1997-98 East Asian Crisis and the 2008 global financial crisis.

In terms of the stock markets, the results were that the Korean stock market is strongly correlated with Hong Kong and Indonesia, and only with China and Japan during a crisis. We also found that these economies more correlated during a period of crisis than a period of economic growth.

In terms of currencies, the data we analyzed showed that the Korean Won is not linked to any of the currencies of some of its East Asian neighbors, regardless of the economic environment.

The purpose of this paper is to find some trends of the South Korean market and currency with some of its neighbors in order to forecast how the Korean economy would behave, depending on the performance of our chosen countries and the economic environment.

Korea Exchange overview

The Korea Exchange (KRX) was created in 2005 through the integration of the Korea Stock Exchange, Korea Futures Exchange, and the Korean Securities Dealers Automated Quotations (KOSDAQ).[1] However, prior to that the three components of the KRX have been around for much longer. "The Stock Market division has been operating since 1956 and operated as the sole stock exchange in Korea until 1996 when the Stock Index Futures Market was launched. Prior to this development, electronic trading was introduced in 1988. The Stock Index Options Market kicked off operations in 1997 and subsequently, the portfolio of trading instruments was increased at the turn of the century to include warrant trading, equity options and exchange traded funds (ETFs)." [2] "As of October 2012, Korea Exchange had 1,796 listed companies with a combined market capitalization of $1.1 trillion."[3]

The three main divisions of the KRX are the Korea Composite Stock Price Index (KOSPI) division, the KOSDAQ division, as well as the derivatives market division. The Korea Exchange provides an electronic platform for the trading, clearing and settlement of cash equities, bonds and derivatives.[4] The Korea Exchange's main stock index is the KRX KOSPI which will also be the main focus of this paper. "The KOSPI Index is a capitalization-weighted index of all common shares on the Korean Stock Exchanges. The Index was developed with a base value of 100 as of January 4th, 1980."[5]

Going Global

Through the Korea Exchanges recently acquired partnerships with Eurex and the CME Group, they have expanded their position into the international derivative markets. This allows for distribution and trading in options and futures on its benchmark KRX KOSPI 200 stock index.[6]

[1] Korea Exchange. http://www.marketswiki.com/mwiki/Korea_Exchange
[2] All About the Korea Exchange. http://www.etoro.com/education/all-about-korea-exchange.aspx
[3] Korea Exchange. http://en.wikipedia.org/wiki/Korea_Exchange
[4] Ibid. 1
[5] Bloomberg. Korea Stock Exchange KOSPI Index. http://www.bloomberg.com/quote/KOSPI:IND
[6] Ibid. 1

"In November 2009 KRX launched a joint agreement with Chicago-based CME Group to provide after-hours electronic trading access to KOSPI 200 Futures contracts via the CME Globex platform. KRX and the CME also agreed on a bi-directional order-routing system similar to that successfully implemented between the CME and BM&FBOVESPA, Brazil's largest securities-trading exchange."[7]

"In August 2010, KRX began listing its KOSPI 200 options contract, also during non-Korean market hours, on Eurex. The partnership allows Eurex members to trade and clear Kospi 200 options during European and North American trading hours. The Eurex KOSPI product is a daily futures contract based on the KOSPI 200 options. These futures contracts expire at the end of each trading day and open positions are transferred to KRX in the form of a KOPSI option."[8]

Largest constitutes of the KRX

The largest firms listed on the KRX in terms of market capitalization include Hyundai Motor, POSCO, as well as Samsung Electronics. Founded in 1968, POSCO is the third largest company on the KRX and the world's fourth largest multinational steel making company. Today POSCO has become USS-POSCO forming some partnerships with some US companies and has a cap of $32.6 billion.[9]

Subsequently, Hyundai Motor is the largest automaker in Korea and the second largest firm on the KRX. Established in 1967, it is now the fifth largest car manufacturer in the world by expanding its presence into many overseas economies such as China, the USA, and India etc. It has a market cap of $49.8 billion.[10]

Lastly, more than three times bigger than the second largest firm listed on the KRX in terms of market cap, Samsung Electronics has a market cap of $165.2 billion. Founded in 1969, the conglomerate

[7] Ibid. 1
[8] Ibid. 1
[9] South Korea's 10 biggest companies. http://www.cnbc.com/id/48237596/page/9
[10] South Korea's 10 biggest companies. http://www.cnbc.com/id/48237596/page/10

is now the world's largest producer of smartphones, memory chips, and televisions. Accounting for one-fifth of the Korean GDP, the Samsung group has a significant impact on Korea's economy.[11]

Gaining Competitive Advantage

Korea Exchange is responding to global changes in the stock exchange industry and securing market competitiveness by implementing the Vertical Silo model in order to run the stocks and derivatives market.[12] "This means that KRX is equipped with stable and efficient stock trading infrastructure that provides one-stop services for core capital markets functions, such as trading, order execution, clearing, and settlement."[13] In order to build a Vertical Silo model, many exchanges worldwide such as the NYSE Euronext, Nasdaq OMX, and LSE etc. are taking over clearing houses such as LCH.Clearnet. The KRX has a much better advantage as its derivatives market has abundant liquidity. Along with that, due to Korea's remarkable information technologies, KRX has pushed forward into overseas markets, in particular South Asian markets, as there is a tremendous prospective for growth.[14] For example: "In Laos, KRX took over the Lao Securities Exchange's stakes and jointly opened a stock exchange; it exported Korea's IT trading infrastructure for bond trading, supervision, and market making monitoring to Bursa Malaysia. Furthermore, KRX has plans to export its stock trading system, market monitoring system, and expertise to Cambodia, Vietnam, and Philippines."[15] Along with that, the KRX plans to move into central Asia, where the infrastructure for stock trading is not as developed, starting with Uzbekistan.

In addition, the KRX has been developing a new generation IT system called the New Exture which will increase stock trading stability, allow for progressive transaction services such as high frequency trading, and allow for KRX to secure a strong position in the global markets for stock trading

[11] South Korea's 10 biggest companies. http://www.cnbc.com/id/48237596/page/11
[12] Competition in the Global Capital Markets and Challenges Ahead for the KRX
[13] Ibid. at Page 3
[14] Ibid. at Page 3
[15] Ibid. at Page 4

IT systems.[16] "KRX rivals include NYSE Euronext, which exported its stock trading system to Malaysia and Philippines, and Nasdaq OMX, which exported its stock trading system to Singapore and Indonesia and sold its derivatives system to Thailand."[17] However, the New Exture system will allow the KRX to provide more advantages than other competitors. Pushing KRX's stocking trading model overseas will help increase awareness as well as competitiveness, permitting for an increase in revenue.

Regulation

The Korean stock market is regulated by the Korea Exchange. The Financial Supervisory Services (FSS) has given the KRX the self-regulatory authority. The main roles of the KRX involve "maintaining a fair and orderly organized market, regulating and supervising the member firms, setting listing requirements, surveillance of securities transactions and regulating corporate disclosure"[18]. In order for companies to receive acceptance on listing they must submit the listing application to KRX, which must then be approved by the Financial Supervisory Service (FSS).[19] The KRX is primarily responsible for settling all transaction on the stock exchange and is liable for all the damages. The secondary bond market has been divided into three segments, namely the KRX, an organized exchange and the OTC market[20]. The KRX market for bonds is a competitive trading of listed bonds, whereas the OTC market is the most dominant form of bind trading in South Korea[21]. With the introduction of several derivatives products, there were increased supervision and compliance procedures for financial institutions under the amended Financial Investment Services and Capital Markets Act[22]. The KRX introduced a system of "Circuit Breaker" for the KOSPI 200 Futures financial product when the derivative hits ±5% of previous

[16] Ibid. at Page 4
[17] Ibid. at Page 4
[18] Financial Supervisory System in Korea. Page 24. Retrieved from http://www.fsc.go.kr/downManager?bbsid=BBS0049&no=61122
[19] Ibid. at Page 109
[20] Ibid. at Page 111
[21] Ibid. at Page 111
[22] Ibid. at Page 111

closing.[23] The use of circuit breakers would allow market participants to accumulate more information so as to make informed choices during the period when trading is halted on a particular derivatives product.

Comparison between Futures Trading Act and Financial Investment Services and Capital Markets Act

The Futures Trading Act was enacted in 1995 in South Korea in order to make sure that the Futures derivatives were traded in a safe manner for the protection of investors. [24]The Act talks about the manner in which a futures product can only be traded on the futures exchange and only a corporation with certain equity capital be allowed to trade in futures. [25]The Act mentions the fines and punishment that will be imposed for indulging in unfair practices on the futures trading market.[26] But the Act fails to talk about the manner in which futures trading corporations can eliminate futures trading manipulation.

The Financial Investment Services and Capital Markets Act passed in 2009 talks about the manner in which financial investment firms would require to have a full time auditor as well as an audit committee that would look into the financial statements of the firm.[27] The Act also mentions that financial firms require to appoint a "Compliance Officer", who would look into the internal controls and procedures followed by the firm and report his or her findings to the audit committee.[28]

[23] Ibid. at Page 112
[24] Financial Supervisory System in Korea. Page 113. Retrieved from http://www.fsc.go.kr/downManager?bbsid=BBS0049&no=61122
[25] Futures Trading Act. Page 1 Retrieved from http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan011495.pdf
[26] Ibid.
[27] Ibid.
[28] Korea Financial Investment Association (KOFIA). Financial Investment Services and Capital Markets Act. Rerieved from http://www.kofiabond.or.kr/ENG/DATA/Financial%20Investment%20Services%20and%20Capital%20Markets%20Act.pdf

New Amendments in the Korean Stock Exchanges

There have been a few amendments in the past year that have brought about a change in the way trading is executed on the Korean Stock Exchanges. The first area in which there is a new rule is the area of short selling. The FSS, FSC and the KRX have come to a conclusion that all individual investors who have a position on short selling in the market have to report their positions to the regulator at the end of each trading day.[29] The threshold set by the regulators of the short selling position on investors is set at "0.01% of the issued share capital of a listed company".[30] This move is particularly helpful during uncertain domestic as well international economics conditions and keeps a check on fair trading during these volatile economic times.

Statistical Analysis of KOSPI vs. East Asian Neighbors

As we wanted to see how correlated the Korean markets are to China, Japan, Hong Kong and Indonesia, we ran regressions of the Korean KOSPI against the major benchmark indexes of the other countries. Due to the fact that we also wanted to see if the East Asian markets are more correlated during growth periods or crisis periods, we used data from the East Asian Crisis during 1997-98, the global financial crisis during 2008-12, and the growth period that occurs in-between, from 2002-07.

In terms of the crisis periods, we chose the two most recent crises that have affected Asian markets. The first was the East Asian Crisis that began due to the outflow of money from East Asia to other parts of the world with higher interest rates.[31] "Thailand was the first to have to float the Thai Bhat, this caused a rapid devaluation, which triggered a loss of confidence throughout the Asian economies."[32]

[29] FSC, FSS, and KRX plan introduction of short position reporting rules. Retrieved from http://www.theasianbanker.com/updates?&docid=0008109725031185%20312081208

[30] Ibid.

[31] The 1997-1997 Asian Financial Crisis http://www.economicshelp.org/dictionary/f/financial-crisis-asia-1997.html

[32] Ibid.

This began a ripple effect, where economies of other Asian countries also began decreasing. The South Korean economy in particular dropped 30 percent at the peak of the crisis, and was eventually given $57 billion USD by the IMF in order to stabilize its currency and economy.[33] The second was the 2008 global financial crisis that began in the United States. The depression had worldwide repercussions, affecting most of the world's economies and had aftereffects until the present day as many economies are still struggling to recover.

The reason we chose the five year time period from 2002-2007 was because the economies of the world collectively saw positive GDP growth.[34] World output grew 3.22% per year, and in particular, East Asian economies during the time period averaged 7.48% GDP growth per year.[35]

Our data is based on monthly data. Regressions with a p-value of less than 0.05 are considered significant.

Growth; 2002-2007

Comparing the KOSPI with the SHCOMP (Shanghai Composite Index), we got an R^2 value of 0.0%, which indicates there is absolutely no correlation of the Korean markets with the Chinese markets during this growth period. This is mitigated by the fact that the p value is 0.913, which indicates the regression is not statistically significant. Thus, it cannot be said that the SCHOMP is completely un-correlated with the KOSPI during this period.

Comparing the KOSPI with the NIKKEI, we got an R^2 value of 13.0%, with a p value of 0.033 indicating the test is statistically significant. This data shows that the Korean markets and the Japanese markets are not very correlated.

[33] Ibid.

[34] World Economic Situation and Prospects 2007 http://www.un.org/en/development/desa/policy/wesp/wesp_archive/2007wespupdate.pdf; source; http://www.un.org/en/development/desa/index.html

[35] Ibid.

Unlike the other two markets, the regressions we ran with the KOSPI against the Hang Seng Composite Index and the JCI (Jakarta Composite Index) showed that the Hong Kong market and the Indonesian markets were quite strongly correlated with the Korean market. Against the Hang Seng, we got an R^2 value of 57%, and against the JCI, an R^2 value of 83.3%. Both the p values were under 0.05, showing the regression was statistically significant.

Thus, during the growth period of 2002-2007, the regressions we ran showed us that the Korean stock exchange was quite strongly correlated with the Hong Kong exchange and the Jakarta exchange, and not so much with the Chinese and the Japanese stock markets.

Crisis 1; 1997-1998

Comparing the KOSPI with the SHCOMP we got an R^2 value of 9.2%. The p value we got was 0.013, indicating the regression was statistically significant. This low R^2 value suggests almost no correlation between the two markets, and goes against our hypothesis that the Korean and Chinese stock markets would be linked.

This was an exception though, as the KOSPI was extremely correlated to the other stock exchanges; there was a 83.3% correlation with the NIKKEI, 80.5% with the Hang Seng, and 76.5% with the JCI. All of the p values were below 0.05, which indicates all of these regressions were statistically significant. This data shows that during the East Asian Crisis, the Korean markets are linked with most of the countries we chose.

Crisis 2; 2008-2012

Comparing the KOSPI with the SHCOMP, we got an R^2 value of 31.4%, with a p value of 0.001 showing statistical significance. Against the NIKKEI, we got an R^2 value of 5.5%, showing that during this crisis period, the Japanese markets were not correlated with the Korean markets. Although this goes against our hypothesis, the p value for this test was 0.196, which means it was not statistically significant.

The Hang Seng and the JCI were strongly correlated during the global financial crisis. This is shown with the R^2 values we got regressing against the KOSPI, which were 65.6% and 84.3% respectively. The p values under 0.05 show the regression was statistically significant.

Thus, during the global financial crisis period of 2008-2012, the regression data shows the Korean stock exchange was strongly correlated with Hong Kong and Jakarta, and fairly correlated with Shanghai. We had to dismiss the regression against Japan because it was not statistically significant.

Statistical Analysis of Korean Won Vs. East Asian Neighbors

The data that we compiled for each time period was monthly. Regressions with a p-value of less than 0.05 are considered significant. The x-values in our regression represent the Korean Won and the y-values include the currencies of China, Japan, Hong Kong and Jakarta.

Growth; 2002-2007

First, we ran a regression between the Korean Won and the Chinese Yuan during the growth period. The linear regression equation is y = - 235 + 3.24x and its p-value is 0.000, thereby indicating that the regression is statistically significant. The R-sq of the above equation is 61.2%, which shows that a 61% of the variation in the Yuan can be explained by the variation in the Korean Won. This is particularly a high number looking at the number of data points that we had while running the regression. Thus the Chinese Yuan shows a strong correlation with the Korean Won during this time period.

Then we ran a regression between the Korean Won and the Japanese Yen and the equation that we get is y = 35.0 + 0.553x and the p-value is 0.007, which shows that the regression is statistically significant. The R-sq of the equation is 10.9%, which indicates that the currencies are not strongly correlated during the growth period. Next, we ran a regression between the Won and the Hong Kong dollar. The equation of the regression is y = - 1033 + 11.2x and the p-value was 0.015, which shows that the regression was statistically significant. The positive x-variable shows a positive relation between the

currencies but the R-sq of the regression is 9%, which shows that the currencies do not have strong correlation during the time period.

The last regression we ran during the growth period was between the Won and the Indonesian Rupiah. The linear regression we get is y= 116 - 0.369x and a p-value of 0.117, which shows that the regression was not statistically significant. The R-sq we get is 3.8%, which is extremely low and shows that the currencies are not strongly correlated. Thus by running all the regressions during the period of growth, we see a general trend that the currencies are not strongly correlated with the exception of the Chinese Yuan.

Crisis 1; 1997-1998

During the Asian crisis of 1997 and 1998, we ran a simple regression between the Korean Won and the above mentioned currencies. The regression equation for the relation with the Yuan is y= 33972 – 339x with a p-value of 0.00, which shows that regression is statistically significant. The R-sq is 72.9%, which is very high, shows a strong correlation between the currencies. The regression equation with the Japanese Yen is y= - 114 + 2.32x, with a p-value of 0.004, which shows the regression is statistically significant. The R-sq is 31.9%, which is low and confirms our hypothesis of a weak correlation between the currencies.

The regression equation with the Hong Kong dollar is regression equation is y = - 4547 + 46.8x with a p-value of 0.599, which shows that the regression is not statistically significant. The R-sq is 1.3%, which confirms our hypothesis of a low correlation between the currencies. The regression equation with the Indonesian Rupiah is y = 99.9 + 0.140x with a p-value of 0.00 that shows that the regression is statistically significant. The R-sq is 61.7%, which is particularly high, which shows a strong correlation between the currencies during that time period.

Crisis 2; 2008-2012

During the global financial crisis, the regression equation that we get for the Chinese Yuan is y = 116 - 0.369x and a p-value of 0.013, which shows the regression is statistically significant. The R-sq of 9.3% and the negative x-variable coefficient shows a weak correlation between the currencies. When we compared the Korean Won to the Japanese Yen, the regression equation we get is y = 155 - 0.417x, with a p-value of 0.012, which indicates statistical significance. The R-sq of 9.6% suggests not a very strong correlation between the two currencies during the crisis.

The Hong Kong dollar's regression equation is y = 3423 - 33.2x and a p-value of 0.000 shows that the regression is statistically significant. The R-sq is 34.4%, which is relatively low, showing little correlation in the two country's currencies. When we compared the Indonesian Rupiah to the Won, the regression equation we get is y = 7.7 + 1.12x with a p-value of 0.00 indicating statistical significance. The R-sq of 53% shows that there was a relatively strong correlation between the two currencies in comparison to the others. Thus, during the second crisis period, the general trend again shows the currencies are not strongly correlated, with the exception of the Rupiah.

Reasons for Correlation

From the time period of 2002 till 2007, we see a high correlation between the Chinese Yuan and the Korean Won. A possible explanation for that could be the fact that the Chinese Yuan had stabilized at the 8.28 RMB/USD rate for about 10 years till 2005. [36] After that though, the Chinese Yuan started depreciating rapidly till the end of our model at, the end of 2006. The Korean Won's depreciation had since the beginning of the model (1st Jan 2002) combined with the Yuan's rapid depreciation from 2005-2007 explains the correlation between the currencies.

[36] The Case for Stabilizing China'sExchange Rate: Setting the Stage for Fiscal Expansion. Retrieved from http://www.stanford.edu/~mckinnon/papers/fulltext_McKinnon%20and%20Schnabl.pdf Page 5

The Japanese central bank intervened between 2003 and 2004 on several occasions in order to weaken the Yen.[37] Thus the Yen depreciated and appreciated at several occasions between the time periods of our model, whereas the Korean Won consistently depreciated during the time period. This explains the weak correlation in the Japanese and Korean currencies as Japan intervened several times bringing down the value of its currency and appreciating briefly again.

The Hong Kong dollar has been firmly pegged to the US dollar since 1983, thus the Hong Kong dollar was trading in a very narrow trading range due to its hard peg to the US dollar.[38] The Korean Won's constant depreciation during the regression model's time period and the wide range that the currency was trading combined by the narrow range the Hong Kong dollar was trading was the reason for the low correlation of their currencies.

During the financial crisis of 2008, the South Korean central bank and the Indonesian central bank intervened in the foreign exchange markets in order to buy dollars to keep a check on their country's currency appreciation.[39] This was particularly done by the country's central banks in order to keep their competitive advantage in the international exports markets.The similar proportions of USD buying during the central bank interventions may be the reason for the relatively strong correlations in comparison to other currencies.

Japan also intervened during the financial crisis at multiple occasions but the proportions in comparison to the rest of the countries were much higher. Between September 2010 and October 2011, the Japanese central bank intervened by buying as much as $100 billion USD.[40] The Japanese central bank did this in order to weaken the value of the Yen in order to remain competitive in the international

[37] An Assessment of the Impact of Japanese Foreign Exchange Intervention: 1991-2004 . Retrieved from http://www.federalreserve.gov/pubs/ifdp/2005/824/ifdp824.pdf . Page 11
[38] Hong Kong faces heat on dollar peg. Retrieved from http://www.ft.com/intl/cms/s/0/6a6988b6-e774-11df-b5b4-00144feab49a.html#axzz2Dq9YuxCB
[39] Asian Central Banks Intervene as Currencies Rise. Retrieved from http://online.wsj.com/article/SB10001424052748704503104576250402542030250.html
[40] Does Foreign Exchange Intervention Volume Matter?. Retrieved from http://www.dallasfed.org/assets/documents/institute/wpapers/2012/0115.pdf Page 2

exports market, being an export driven nation themselves. This number is extraordinary high in comparison to the interventions of Korea, Indonesia and Hong Kong. Thus we can conclude that during the financial crisis, the Yen appreciated at multiple occasions and the central bank intervened in the FX market buying USD's in a much higher proportion as opposed to the Korean central bank. This could be a cause for the weak correlation between their currencies.

Conclusion

Our data showed us that during a period of growth, the markets of only Hong Kong and Jakarta moved with Korea, but during a period of crisis, Japan and China also joined that list. This shows that during a crisis period, the East Asian economies are more linked with one another. We speculate that a reason for this is market sentiment is stronger during a crisis period; the fear of losing money is a stronger driver of decision making than the speculation of making money.

While the stock markets show some signs of interdependency, this is not the case with currencies. We say this because we did not find a general trend when analyzing the data. For example, one country's currency correlation might have happened during one crisis, but the same correlation did not occur during the other crisis. We found reasons that shed light to why this was happening, which ultimately led us to the conclusion that there is no definitive correlation between the currencies of the East Asian countries we chose, regardless of economic environment.

The reason we performed these regressions was in order to find some trends with some of South Korea's East Asian neighbors in order to make a forecast how the Korean stock market would behave. Through our analysis, we can say that the Korean market is strongly correlated with the markets of Hong Kong and Indonesia, regardless of economic environment. Thus, our recommendation to foreign investors looking to add South Korea to their investment portfolio would be to look at how the stock markets of Hong Kong and Indonesia are performing and invest accordingly.

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Exhibits

Regression Analysis: KOSPI2 Index versus SHCOMP Index

Asian crisis of 1997-1998 Minitab Output

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The regression equation is
KOSPI2 Index = 157 - 0.796 SHCOMP Index


Predictor        Coef  SE Coef      T      P
Constant       157.11    31.27   5.02  0.000
SHCOMP Index  -0.7964   0.3132  -2.54  0.013


S = 17.4332   R-Sq = 9.2%   R-Sq(adj) = 7.8%


Analysis of Variance

Source          DF       SS      MS     F      P
Regression       1   1964.5  1964.5  6.46  0.013
Residual Error  64  19450.7   303.9
Total           65  21415.3


Unusual Observations

     SHCOMP  KOSPI2
Obs   Index   Index    Fit  SE Fit  Residual  St Resid
 59     117   87.41  63.65    5.97     23.76      1.45 X

X denotes an observation whose X value gives it large leverage.
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Regression Analysis: KOSPI2 Index versus NKY Index

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The regression equation is
KOSPI2 Index = - 82.7 + 1.89 NKY Index


Predictor     Coef  SE Coef      T      P
Constant   -82.698    9.022  -9.17  0.000
NKY Index   1.8864   0.1055  17.88  0.000


S = 7.46961   R-Sq = 83.3%   R-Sq(adj) = 83.1%


Analysis of Variance

Source          DF     SS     MS       F      P
Regression       1  17844  17844  319.82  0.000
Residual Error  64   3571     56
Total           65  21415


Unusual Observations

       NKY  KOSPI2
Obs  Index   Index     Fit  SE Fit  Residual  St Resid
```

```
  1     80  47.220  67.696   1.079   -20.476     -2.77R

R denotes an observation with a large standardized residual.
```

Regression Analysis: KOSPI2 Index versus HSI Index

```
The regression equation is
KOSPI2 Index = - 5.04 + 1.04 HSI Index


Predictor     Coef  SE Coef      T      P
Constant    -5.043    5.194  -0.97  0.335
HSI Index  1.03702  0.06381  16.25  0.000


S = 8.07910   R-Sq = 80.5%   R-Sq(adj) = 80.2%


Analysis of Variance

Source          DF     SS     MS       F      P
Regression       1  17238  17238  264.09  0.000
Residual Error  64   4177     65
Total           65  21415


Unusual Observations

       HSI  KOSPI2
Obs  Index   Index     Fit  SE Fit  Residual  St Resid
 22     59  75.416  55.828   1.679    19.588      2.48R
 23     59  72.436  55.690   1.685    16.746      2.12R

R denotes an observation with a large standardized residual.
```

Regression Analysis: KOSPI2 Index versus JCI Index

```
The regression equation is
KOSPI2 Index = 2.70 + 1.00 JCI Index


Predictor     Coef  SE Coef      T      P
Constant     2.704    5.314   0.51  0.613
JCI Index  1.00036  0.06927  14.44  0.000


S = 8.86415   R-Sq = 76.5%   R-Sq(adj) = 76.2%


Analysis of Variance

Source          DF     SS     MS       F      P
Regression       1  16387  16387  208.55  0.000
Residual Error  64   5029     79
Total           65  21415


Unusual Observations

       JCI  KOSPI2
```

```
Obs  Index   Index    Fit  SE Fit  Residual  St Resid
  1     64   47.22  66.42    1.35    -19.20     -2.19R
  2     60   44.96  62.83    1.51    -17.87     -2.05R
 43     69   93.91  71.64    1.17     22.27      2.54R

R denotes an observation with a large standardized residual.
```

Period of growth 2002-07 Minitab Output

Regression Analysis: KOSPI2 Index versus SHCOMP Index

```
The regression equation is
KOSPI2 Index = 115 + 0.041 SHCOMP Index


Predictor       Coef  SE Coef     T      P
Constant      115.39    36.25  3.18  0.003
SHCOMP Index  0.0410   0.3715  0.11  0.913


S = 46.5429   R-Sq = 0.0%   R-Sq(adj) = 0.0%


Analysis of Variance

Source          DF     SS    MS     F      P
Regression       1     26    26  0.01  0.913
Residual Error  33  71486  2166
Total           34  71512


Unusual Observations

     SHCOMP  KOSPI2
Obs   Index   Index     Fit  SE Fit  Residual  St Resid
  1     163  213.16  122.05   26.20     91.11      2.37RX

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KOSPI2 Index versus NKY Index

```
The regression equation is
KOSPI2 Index = 50.8 + 0.539 NKY Index


Predictor    Coef  SE Coef     T      P
Constant    50.76    31.67  1.60  0.118
NKY Index  0.5394   0.2424  2.22  0.033


S = 43.4097   R-Sq = 13.0%   R-Sq(adj) = 10.4%


Analysis of Variance

Source          DF     SS    MS     F      P
Regression       1   9327  9327  4.95  0.033
Residual Error  33  62185  1884
Total           34  71512
```

```
Unusual Observations

       NKY  KOSPI2
Obs  Index   Index     Fit  SE Fit  Residual  St Resid
 35    150   39.52  131.75    9.23    -92.23     -2.17R

R denotes an observation with a large standardized residual.
```

Regression Analysis: KOSPI2 Index versus HSI Index

```
The regression equation is
KOSPI2 Index = - 31.5 + 1.33 HSI Index


Predictor    Coef  SE Coef      T      P
Constant   -31.53    23.40  -1.35  0.187
HSI Index  1.3251   0.2005   6.61  0.000


S = 30.5386   R-Sq = 57.0%   R-Sq(adj) = 55.7%


Analysis of Variance

Source          DF     SS     MS      F      P
Regression       1  40737  40737  43.68  0.000
Residual Error  33  30776    933
Total           34  71512


Unusual Observations

       HSI  KOSPI2
Obs  Index   Index     Fit  SE Fit  Residual  St Resid
  1    175  213.16  200.58   13.34     12.58      0.46 X
  5    131  204.01  141.42    6.15     62.59      2.09R
 25    132   72.84  143.97    6.37    -71.13     -2.38R
 26    137   87.81  150.40    6.99    -62.59     -2.11R

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KOSPI2 Index versus JCI Index

```
The regression equation is
KOSPI2 Index = 41.3 + 0.434 JCI Index


Predictor     Coef  SE Coef      T      P
Constant    41.291    6.869   6.01  0.000
JCI Index  0.43386  0.03377  12.85  0.000


S = 19.0024   R-Sq = 83.3%   R-Sq(adj) = 82.8%


Analysis of Variance
```

```
Source          DF     SS     MS       F      P
Regression       1  59596  59596  165.05  0.000
Residual Error  33  11916    361
Total           34  71512


Unusual Observations

       JCI  KOSPI2
Obs  Index   Index     Fit  SE Fit  Residual  St Resid
  1    461  213.16  241.10   10.01    -27.94     -1.73 X
 35    114   39.52   90.64    3.91    -51.12     -2.75R

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.
```

2008-2012 crisis data

Regression Analysis: KOSPI versus SHANGHAI

```
The regression equation is
KOSPI = 67.9 + 0.312 SHANGHAI


Predictor     Coef  SE Coef     T      P
Constant    67.929    8.378  8.11  0.000
SHANGHAI   0.31211  0.08421  3.71  0.001


S = 18.0290   R-Sq = 31.4%   R-Sq(adj) = 29.1%


Analysis of Variance

Source          DF       SS      MS      F      P
Regression       1   4465.7  4465.7  13.74  0.001
Residual Error  30   9751.3   325.0
Total           31  14217.0


Unusual Observations

Obs  SHANGHAI   KOSPI     Fit  SE Fit  Residual  St Resid
 20       192  113.00  127.95    9.03    -14.95     -0.96 X
 21       203  115.77  131.27    9.87    -15.49     -1.03 X

X denotes an observation whose X value gives it large leverage.
```

Scatterplot of KOSPI vs SHANGHAI

Regression Analysis: KOSPI versus NIKKEI

```
The regression equation is
KOSPI = 116 - 0.213 NIKKEI
```

```
Predictor     Coef  SE Coef      T      P
Constant    115.82    14.97   7.74  0.000
NIKKEI     -0.2134   0.1614  -1.32  0.196


S = 21.1612   R-Sq = 5.5%   R-Sq(adj) = 2.4%


Analysis of Variance

Source          DF       SS     MS     F      P
Regression       1    783.2  783.2  1.75  0.196
Residual Error  30  13433.8  447.8
Total           31  14217.0


Unusual Observations

Obs  NIKKEI  KOSPI    Fit  SE Fit  Residual  St Resid
 32      85  53.98  97.63    3.81    -43.66     -2.10R

R denotes an observation with a large standardized residual.
```

Regression Analysis: KOSPI versus HANG SENG

```
The regression equation is
KOSPI = 7.1 + 1.02 HANG SENG


Predictor    Coef  SE Coef     T      P
Constant     7.09    12.04  0.59  0.561
HANG SENG  1.0216   0.1349  7.57  0.000


S = 12.7592   R-Sq = 65.6%   R-Sq(adj) = 64.5%


Analysis of Variance

Source          DF       SS      MS      F      P
Regression       1   9333.1  9333.1  57.33  0.000
Residual Error  30   4883.9   162.8
Total           31  14217.0


Unusual Observations

     HANG
Obs  SENG   KOSPI     Fit  SE Fit  Residual  St Resid
 20   126  113.00  135.64    5.62    -22.65     -1.98 X

X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KOSPI versus JAKARTA

```
The regression equation is
KOSPI = 51.7 + 0.438 JAKARTA


Predictor     Coef  SE Coef      T      P
```

```
Constant    51.705    3.858  13.40  0.000
JAKARTA    0.43813  0.03455  12.68  0.000


S = 8.63124   R-Sq = 84.3%   R-Sq(adj) = 83.8%


Analysis of Variance

Source          DF     SS     MS       F      P
Regression       1  11982  11982  160.84  0.000
Residual Error  30   2235     74
Total           31  14217


Unusual Observations

Obs  JAKARTA   KOSPI    Fit  SE Fit  Residual  St Resid
 21      100  115.77  95.71    1.53     20.07      2.36R

R denotes an observation with a large standardized residual.
```

Period of growth 2002-07 Minitab Output

Regression Analysis: KOSPI2 Index versus SHCOMP Index

```
The regression equation is
KOSPI2 Index = 115 + 0.041 SHCOMP Index


Predictor       Coef  SE Coef     T      P
Constant      115.39    36.25  3.18  0.003
SHCOMP Index  0.0410   0.3715  0.11  0.913


S = 46.5429   R-Sq = 0.0%   R-Sq(adj) = 0.0%


Analysis of Variance

Source          DF     SS    MS     F      P
Regression       1     26    26  0.01  0.913
Residual Error  33  71486  2166
Total           34  71512


Unusual Observations

     SHCOMP  KOSPI2
Obs   Index   Index     Fit  SE Fit  Residual  St Resid
  1     163  213.16  122.05   26.20     91.11      2.37RX

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```

Regression Analysis: KOSPI2 Index versus NKY Index

```
The regression equation is
KOSPI2 Index = 50.8 + 0.539 NKY Index
```

```
Predictor    Coef  SE Coef     T      P
Constant    50.76    31.67  1.60  0.118
NKY Index  0.5394   0.2424  2.22  0.033


S = 43.4097   R-Sq = 13.0%   R-Sq(adj) = 10.4%


Analysis of Variance

Source          DF     SS    MS     F      P
Regression       1   9327  9327  4.95  0.033
Residual Error  33  62185  1884
Total           34  71512


Unusual Observations

       NKY  KOSPI2
Obs  Index   Index     Fit  SE Fit  Residual  St Resid
 35    150   39.52  131.75    9.23    -92.23     -2.17R

R denotes an observation with a large standardized residual.
```

Regression Analysis: KOSPI2 Index versus HSI Index

```
The regression equation is
KOSPI2 Index = - 31.5 + 1.33 HSI Index


Predictor    Coef  SE Coef      T      P
Constant   -31.53    23.40  -1.35  0.187
HSI Index  1.3251   0.2005   6.61  0.000


S = 30.5386   R-Sq = 57.0%   R-Sq(adj) = 55.7%


Analysis of Variance

Source          DF     SS     MS      F      P
Regression       1  40737  40737  43.68  0.000
Residual Error  33  30776    933
Total           34  71512


Unusual Observations

       HSI  KOSPI2
Obs  Index   Index     Fit  SE Fit  Residual  St Resid
  1    175  213.16  200.58   13.34     12.58      0.46 X
  5    131  204.01  141.42    6.15     62.59      2.09R
 25    132   72.84  143.97    6.37    -71.13     -2.38R
 26    137   87.81  150.40    6.99    -62.59     -2.11R

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KOSPI2 Index versus JCI Index

```
The regression equation is
KOSPI2 Index = 41.3 + 0.434 JCI Index


Predictor     Coef  SE Coef      T      P
Constant    41.291    6.869   6.01  0.000
JCI Index  0.43386  0.03377  12.85  0.000


S = 19.0024   R-Sq = 83.3%   R-Sq(adj) = 82.8%


Analysis of Variance

Source          DF     SS     MS       F      P
Regression       1  59596  59596  165.05  0.000
Residual Error  33  11916    361
Total           34  71512


Unusual Observations

       JCI  KOSPI2
Obs  Index   Index     Fit  SE Fit  Residual  St Resid
  1    461  213.16  241.10   10.01    -27.94     -1.73 X
 35    114   39.52   90.64    3.91    -51.12     -2.75R

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.
```

2008-2012 crisis data Minitab Output

Regression Analysis: KOSPI versus SHANGHAI

```
The regression equation is
KOSPI = 67.9 + 0.312 SHANGHAI


Predictor     Coef  SE Coef     T      P
Constant    67.929    8.378  8.11  0.000
SHANGHAI   0.31211  0.08421  3.71  0.001


S = 18.0290   R-Sq = 31.4%   R-Sq(adj) = 29.1%


Analysis of Variance

Source          DF       SS      MS      F      P
Regression       1   4465.7  4465.7  13.74  0.001
Residual Error  30   9751.3   325.0
Total           31  14217.0


Unusual Observations
```

```
Obs  SHANGHAI   KOSPI     Fit  SE Fit  Residual  St Resid
 20       192  113.00  127.95    9.03    -14.95     -0.96 X
 21       203  115.77  131.27    9.87    -15.49     -1.03 X

X denotes an observation whose X value gives it large leverage.
```

Scatterplot of KOSPI vs SHANGHAI

Regression Analysis: KOSPI versus NIKKEI

```
The regression equation is
KOSPI = 116 - 0.213 NIKKEI


Predictor     Coef  SE Coef      T      P
Constant    115.82    14.97   7.74  0.000
NIKKEI     -0.2134   0.1614  -1.32  0.196


S = 21.1612   R-Sq = 5.5%   R-Sq(adj) = 2.4%


Analysis of Variance

Source          DF       SS     MS     F      P
Regression       1    783.2  783.2  1.75  0.196
Residual Error  30  13433.8  447.8
Total           31  14217.0


Unusual Observations

Obs  NIKKEI  KOSPI    Fit  SE Fit  Residual  St Resid
 32      85  53.98  97.63    3.81    -43.66     -2.10R

R denotes an observation with a large standardized residual.
```

Regression Analysis: KOSPI versus HANG SENG

```
The regression equation is
KOSPI = 7.1 + 1.02 HANG SENG


Predictor    Coef  SE Coef     T      P
Constant     7.09    12.04  0.59  0.561
HANG SENG  1.0216   0.1349  7.57  0.000


S = 12.7592   R-Sq = 65.6%   R-Sq(adj) = 64.5%


Analysis of Variance

Source          DF       SS      MS      F      P
Regression       1   9333.1  9333.1  57.33  0.000
Residual Error  30   4883.9   162.8
Total           31  14217.0
```

```
Unusual Observations

     HANG
Obs  SENG   KOSPI     Fit  SE Fit  Residual  St Resid
 20   126  113.00  135.64    5.62    -22.65     -1.98 X

X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KOSPI versus JAKARTA

```
The regression equation is
KOSPI = 51.7 + 0.438 JAKARTA


Predictor     Coef  SE Coef      T      P
Constant    51.705    3.858  13.40  0.000
JAKARTA    0.43813  0.03455  12.68  0.000


S = 8.63124   R-Sq = 84.3%   R-Sq(adj) = 83.8%


Analysis of Variance

Source          DF     SS     MS       F      P
Regression       1  11982  11982  160.84  0.000
Residual Error  30   2235     74
Total           31  14217


Unusual Observations

Obs  JAKARTA   KOSPI    Fit  SE Fit  Residual  St Resid
 21      100  115.77  95.71    1.53     20.07      2.36R

R denotes an observation with a large standardized residual.
```

Regression Analysis: KRW Curncy versus CNY Curncy

```
The regression equation is
KRW Curncy = 33972 - 339 CNY Curncy


Predictor      Coef  SE Coef      T      P
Constant      33972     4396   7.73  0.000
CNY Curncy  -338.92    44.04  -7.70  0.000


S = 16.5734   R-Sq = 72.9%   R-Sq(adj) = 71.7%


Analysis of Variance

Source          DF     SS     MS      F      P
Regression       1  16269  16269  59.23  0.000
Residual Error  22   6043    275
Total           23  22312
```

Unusual Observations

Obs	CNY Curncy	KRW Curncy	Fit	SE Fit	Residual	St Resid
11	100	194.20	159.63	4.30	34.57	2.16R
13	100	190.27	157.19	4.12	33.08	2.06R

R denotes an observation with a large standardized residual.

CURRENCY ANALYSIS MINITAB OUTPUTS

Regression Analysis: KRW Curncy versus JPY Curncy
1997-1998 Currency crisis data

The regression equation is
KRW Curncy = - 114 + 2.32 JPY Curncy

Predictor	Coef	SE Coef	T	P
Constant	-114.34	79.06	-1.45	0.162
JPY Curncy	2.3215	0.7224	3.21	0.004

S = 26.2710 R-Sq = 31.9% R-Sq(adj) = 28.9%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	7128.2	7128.2	10.33	0.004
Residual Error	22	15183.7	690.2		
Total	23	22311.9			

Unusual Observations

Obs	JPY Curncy	KRW Curncy	Fit	SE Fit	Residual	St Resid
11	109	194.20	138.68	5.36	55.52	2.16R

R denotes an observation with a large standardized residual.

Regression Analysis: KRW Curncy versus HKD Curncy

The regression equation is
KRW Curncy = - 4547 + 46.8 HKD Curncy

Predictor	Coef	SE Coef	T	P
Constant	-4547	8774	-0.52	0.609
HKD Curncy	46.80	87.62	0.53	0.599

S = 31.6417 R-Sq = 1.3% R-Sq(adj) = 0.0%

Analysis of Variance

```
Source          DF     SS    MS     F      P
Regression       1    286   286  0.29  0.599
Residual Error  22  22026  1001
Total           23  22312


Unusual Observations

        HKD
Obs  Curncy  KRW Curncy     Fit  SE Fit  Residual  St Resid
 14     100      137.35  130.20   17.96      7.15      0.27 X
 15     100      114.32  130.63   17.22    -16.31     -0.61 X

X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KRW Curncy versus IDR Curncy

```
The regression equation is
KRW Curncy = 99.9 + 0.140 IDR Curncy


Predictor      Coef  SE Coef      T      P
Constant     99.942    7.712  12.96  0.000
IDR Curncy  0.13993  0.02349   5.96  0.000


S = 19.6991   R-Sq = 61.7%   R-Sq(adj) = 60.0%


Analysis of Variance

Source          DF     SS     MS      F      P
Regression       1  13775  13775  35.50  0.000
Residual Error  22   8537    388
Total           23  22312


Unusual Observations

        IDR
Obs  Curncy  KRW Curncy     Fit  SE Fit  Residual  St Resid
 11     379      194.20  152.94    4.64     41.26      2.15R
 13     229      190.27  131.94    4.20     58.34      3.03R

R denotes an observation with a large standardized residual.
```

Exchange rates 2002-07 Period of Growth Minitab Output

Regression Analysis: KRW Curncy versus CNY Curncy

```
The regression equation is
KRW Curncy = - 235 + 3.24 CNY Curncy


Predictor      Coef  SE Coef      T      P
Constant    -235.49    32.02  -7.35  0.000
CNY Curncy   3.2356   0.3248   9.96  0.000
```

```
S = 5.68310   R-Sq = 61.2%   R-Sq(adj) = 60.6%


Analysis of Variance

Source          DF      SS      MS      F      P
Regression       1  3205.5  3205.5  99.25  0.000
Residual Error  63  2034.7    32.3
Total           64  5240.2


Unusual Observations

        CNY
Obs  Curncy  KRW Curncy     Fit  SE Fit  Residual  St Resid
  1      93      70.868  65.786   1.909     5.082      0.95 X
  2      93      70.868  65.661   1.920     5.206      0.97 X
  3      93      71.625  66.764   1.818     4.862      0.90 X
  4      94      71.694  67.163   1.781     4.531      0.84 X
 25     100      76.742  88.078   0.844   -11.336     -2.02R
 26     100      75.912  88.066   0.843   -12.155     -2.16R
 28     100      76.439  88.070   0.843   -11.631     -2.07R
 63     100     101.028  88.105   0.845    12.922      2.30R
 64     100     100.343  88.070   0.843    12.272      2.18R
 65     100      99.848  88.074   0.844    11.774      2.09R

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KRW Curncy versus JPY Curncy

```
The regression equation is
KRW Curncy = 35.0 + 0.553 JPY Curncy


Predictor     Coef  SE Coef     T      P
Constant     35.03    17.47  2.00  0.049
JPY Curncy  0.5528   0.1990  2.78  0.007


S = 8.60838   R-Sq = 10.9%   R-Sq(adj) = 9.5%


Analysis of Variance

Source          DF       SS      MS     F      P
Regression       1   571.66  571.66  7.71  0.007
Residual Error  63  4668.57   74.10
Total           64  5240.23


Unusual Observations

        JPY
Obs  Curncy  KRW Curncy    Fit  SE Fit  Residual  St Resid
 63     101      101.03  90.76    2.84     10.27      1.26 X
 64     101      100.34  91.02    2.93      9.32      1.15 X
 65     102       99.85  91.58    3.11      8.27      1.03 X

X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KRW Curncy versus HKD Curncy

```
The regression equation is
KRW Curncy = - 1033 + 11.2 HKD Curncy


Predictor      Coef  SE Coef      T      P
Constant    -1032.5    445.8  -2.32  0.024
HKD Curncy   11.177    4.464   2.50  0.015


S = 8.69781   R-Sq = 9.0%   R-Sq(adj) = 7.6%


Analysis of Variance

Source          DF       SS      MS     F      P
Regression       1   474.16  474.16  6.27  0.015
Residual Error  63  4766.06   75.65
Total           64  5240.23


Unusual Observations

        HKD     KRW
Obs  Curncy  Curncy    Fit  SE Fit  Residual  St Resid
  1     100   70.87  88.59    2.32    -17.72     -2.11R
  2     100   70.87  88.67    2.35    -17.81     -2.13R
 45      99   87.56  77.08    2.77     10.48      1.27 X

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KRW Curncy versus IDR Curncy

```
The regression equation is
KRW Curncy = 116 - 0.369 IDR Curncy


Predictor      Coef  SE Coef      T      P
Constant     115.88    20.46   5.66  0.000
IDR Curncy  -0.3689   0.2324  -1.59  0.117


S = 8.94317   R-Sq = 3.8%   R-Sq(adj) = 2.3%


Analysis of Variance

Source          DF       SS      MS     F      P
Regression       1   201.47  201.47  2.52  0.117
Residual Error  63  5038.75   79.98
Total           64  5240.23


Unusual Observations

        IDR
Obs  Curncy  KRW Curncy    Fit  SE Fit  Residual  St Resid
```

```
 21    99.0       79.36  79.34    2.82      0.02      0.00 X
 22    99.0       78.76  79.34    2.82     -0.58     -0.07 X
 63    94.5      101.03  81.03    1.89     20.00      2.29R
 64    97.6      100.34  79.87    2.52     20.47      2.39R
 65    99.2       99.85  79.30    2.85     20.55      2.42RX

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage
```

Exchange rates 2008-12 Crisis Minitab Output

Regression Analysis: KRW Curncy versus CNY Curncy

```
The regression equation is
KRW Curncy = 207 - 0.939 CNY Curncy


Predictor      Coef  SE Coef      T      P
Constant     206.75    32.85   6.29  0.000
CNY Curncy  -0.9389   0.3689  -2.55  0.013


S = 13.0488   R-Sq = 9.3%   R-Sq(adj) = 7.9%


Analysis of Variance

Source          DF       SS      MS     F      P
Regression       1   1102.9  1102.9  6.48  0.013
Residual Error  63  10727.2   170.3
Total           64  11830.0


Unusual Observations

        CNY
Obs  Curncy  KRW Curncy     Fit  SE Fit  Residual  St Resid
 45      90      150.45  122.02    1.69     28.43      2.20R
 46      90      166.90  121.95    1.70     44.96      3.47R
 47      90      150.07  121.80    1.72     28.27      2.19R
 49      90      159.77  122.01    1.69     37.75      2.92R
 63      99       99.56  113.64    4.11    -14.07     -1.14 X
 64     100      102.07  113.21    4.27    -11.14     -0.90 X
 65     100      100.00  112.86    4.39    -12.86     -1.05 X

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KRW Curncy versus HKD Curncy

```
The regression equation is
KRW Curncy = 3423 - 33.2 HKD Curncy


Predictor      Coef  SE Coef      T      P
Constant     3423.3    574.1   5.96  0.000
HKD Curncy  -33.240    5.782  -5.75  0.000


S = 11.0982   R-Sq = 34.4%   R-Sq(adj) = 33.4%
```

```
Analysis of Variance

Source          DF       SS      MS      F      P
Regression       1   4070.4  4070.4  33.05  0.000
Residual Error  63   7759.6   123.2
Total           64  11830.0


Unusual Observations

        HKD
Obs  Curncy  KRW Curncy     Fit  SE Fit  Residual  St Resid
 46      99      166.90  129.40    1.74     37.50      3.42R
 49      99      159.77  131.53    1.99     28.24      2.59R
 62      99       97.98  131.53    1.99    -33.54     -3.07R
 65     100      100.00   99.25    4.40      0.75      0.07 X

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KRW Curncy versus JPY Curncy

```
The regression equation is
KRW Curncy = 155 - 0.417 JPY Curncy


Predictor      Coef  SE Coef      T      P
Constant     155.27    12.47  12.45  0.000
JPY Curncy  -0.4170   0.1611  -2.59  0.012


S = 13.0276   R-Sq = 9.6%   R-Sq(adj) = 8.2%


Analysis of Variance

Source          DF       SS      MS     F      P
Regression       1   1137.7  1137.7  6.70  0.012
Residual Error  63  10692.3   169.7
Total           64  11830.0


Unusual Observations

        JPY
Obs  Curncy  KRW Curncy     Fit  SE Fit  Residual  St Resid
 45      83      150.45  120.48    1.94     29.98      2.33R
 46      82      166.90  120.96    1.84     45.94      3.56R
 47      76      150.07  123.65    1.62     26.42      2.04R
 49      81      159.77  121.68    1.73     38.09      2.95R
 65     100      100.00  113.56    4.08    -13.56     -1.10 X

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.
```

Regression Analysis: KRW Curncy versus IDR Curncy

```
The regression equation is
```

KRW Curncy = 7.7 + 1.12 IDR Curncy

Predictor	Coef	SE Coef	T	P
Constant	7.69	13.75	0.56	0.578
IDR Curncy	1.1226	0.1331	8.43	0.000

S = 9.39175 R-Sq = 53.0% R-Sq(adj) = 52.3%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	6273.1	6273.1	71.12	0.000
Residual Error	63	5556.9	88.2		
Total	64	11830.0			

Unusual Observations

Obs	IDR Curncy	KRW Curncy	Fit	SE Fit	Residual	St Resid
45	127	150.45	150.63	3.45	-0.18	-0.02 X
46	131	166.90	154.29	3.86	12.61	1.47 X
47	124	150.07	146.66	3.01	3.41	0.38 X
49	135	159.77	158.69	4.36	1.08	0.13 X
60	102	101.75	122.44	1.17	-20.70	-2.22R
61	102	100.20	122.19	1.17	-21.98	-2.36R
62	99	97.98	118.85	1.28	-20.87	-2.24R
63	100	99.56	119.48	1.25	-19.91	-2.14R
64	102	102.07	122.47	1.17	-20.40	-2.19R
65	100	100.00	119.95	1.23	-19.95	-2.14R

R denotes an observation with a large standardized residual.
X denotes an observation whose X value gives it large leverage.