

# **A Dynamic Model for Emerging Debt Markets: The Case of Hong Kong Corporate Credit Risk**

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First Draft: November 6, 2002

## **Abstract**

Following the rationale of the KMV model, this study builds an empirical model to price corporate credit risk for listed corporations in Hong Kong. To mitigate the bias from accounting data, the model totally relies on market-based information, such as equity value, stock market index, implied volatility of market index, riskfree rate and maturity. This fits in the reality of emerging credit markets that there is no credit mortality data, limited external credit ratings and limited data on bond yields. We find some weak evidence to support the model. Both the equity value and the stock market index have significantly negative effects on credit spreads, while the implied volatility of the market index, which measures the economic risk, shows significantly positive effect. The model explains more than 20% of the raw yield spreads. When extreme cases are removed, its explanatory power jumps to more than 50%. Observed and predicted credit spreads are slightly cointegrated. It is obvious that the model is not a complete solution but it successfully helps estimate the credit spreads and corporate credit risk of all listed corporations in Hong Kong. This solution can also be applicable to other emerging credit markets.

## **I. Introduction**

### Corporate Credit Risk Analysis outside the US

The new Basle Accord requires banks to establish internal risk ratings system to assess their credit risk and capital charges. Wholesale banks would have little problem to comply with this requirement since their credit-related assets are mostly tradable bonds or syndicated loans with external credit ratings. Even though they have non-marketable loans, these loans are usually granted to corporations with external credit ratings. Observed bond yields and external credit ratings can indicate reliably their credit risk and help estimate the total risk of a credit portfolio including these debts.

For banks specialized in corporate lending for medium-sized and small-sized corporations, the establishment of an internal ratings system will be a challenge. It is because these loans are not tradable and their issuers tend to have no external credit ratings. This challenge will be particularly severe for debts associated with non-US corporations. Currently, the US is the largest and the most efficient corporate bond market in the world. Many US corporations have their bonds traded in the market. Even less creditworthy corporations can issue high-yield bonds. As long as their debts are actively traded in the market, information about company risk, industry risk and economic risk can be efficiently reflected in their yields. This facilitates assessment and benchmarking the credit risk of individual US corporate borrowers. Relative to the US, the corporate bond markets in Europe and in Japan are smaller but still have a substantial number of corporate bonds with external credit rating. However, the number of high-yield bonds for medium-sized corporations in these markets is very limited. For other capital markets, especially those emerging markets, corporations mainly rely on bank loans for debt financing. Just look at those newly developed economies in Asia, such as Taiwan, Singapore, South Korea and Hong Kong. Very few corporations in these economies are able to issue bonds because of no external credit ratings. This phenomenon implies that banks have relatively little information to assess their credit risk

of non-US corporate borrowers and thus build their internal ratings system for credits outside the US. Under this circumstance, loan pricing tends to be inefficient. What banks usually do is either to set unreasonably high interest charges for unsecured corporate debts, to concentrate their lending on a small number of “safe” companies, or to pledge their corporate debts with real estates. These practices hinder the growth of small businesses, discourage the firms without a strong base of real estates, and interrupt the equilibrium of the real estate market.

It is obvious that non-US corporate borrowers are disadvantaged in debt financing. Meanwhile, banks granting loans to non-US borrowers are also disadvantaged in evaluating credit risk and building their internal ratings system.

### Dynamic Corporate Credit Analysis

Without observed bond yields and external credit ratings, how can banks evaluate corporate credit risk? This is what banks have done for the last century. Traditionally banks relied on accounting information to judge the profitability, financial risk and business risk of corporate clients. Furthermore, statistical analysis on actual default cases, judgments on management quality, and judgments on the characters of key executives were frequently included. The scandals of Enron and Worldcom indicate that accounting information is no longer reliable for corporate credit risk analysis. Corporations are inclined to window-dress their financial statements because of different reasons. Traditional statistical analysis, such as Altman’s (1968) discriminant analysis, is mostly static and based on historical default cases. It tends to be unable to predict default probabilities in the future and tends to provide conclusions lagging behind changes in economic conditions. For instance, Asian corporations had a sharp change in their credit risk after 1997. Statistical models on credit spreads and default probability developed before 1997 had little help after the Asian financial crisis. The remaining inputs of corporate credit analysis are subjective judgments. These judgments vary between loan officers and depend much on their professional quality and their resources on information.

In the past ten years, corporate credit analysis underwent tremendous changes. Credit analysts began to adopt dynamic models to price corporate debts. One of the most popular models is Merton's (1974) option approach to corporate debt. It argues that a firm tends to default when its asset value goes below its liabilities. Required interest rate on corporate debts can be calculated under the assumption of no arbitrage opportunity. In the early 1990s, KMV, a consulting firm in the US, modified the model and provided real-time information on credit risk and default probability with continuous estimates on asset value, liability size and asset volatility. Today many banks subscribe KMV services. In 2002, Moody's Ratings acquired KMV to supplement her credit rating business. The merit of dynamic credit models is that yield spreads and default probabilities are predictable on real-time basis with the help of on-going changes in selected time-series variables. These models will be particularly helpful when economic conditions change drastically and when accounting information is not updated frequently.

### Scope of this Study

It is well understood that the US is the largest bond market and has voluminous information about bond yields, credit ratings and default cases. Previous empirical research on corporate debts is mainly concentrated on US data. Whether these findings are applicable to markets outside the US, especially those emerging debt markets, remains a question. One realistic issue for these studies is that database for the credit market outside the US is very limited and it cannot fit into the models built by the studies. No matter how limited the database is, banks in different markets are encouraged to have their own methods to assess and price credit risk. It is due to the new Basle capital requirements. How can they manage it when credit risk data is limited?

This study attempts to build an empirical dynamic model to price corporate debts in Hong Kong. Although Hong Kong is a banking and financial center in Asia, many local corporations are unable to issue debts because of small size and unfavorable financial

performance. Some debt instruments are actively traded in the local market, such as Exchange Fund Notes of the Hong Kong Monetary Authority, sovereign debts of Asian countries, and bonds issued by quasi-governmental organizations. Only a very small number of corporations have their bonds traded in the local market, such as Bank of China (Hong Kong), HSBC, Hutchison, Sun Hung Kai Properties and so on. Some blue chips intentionally issue their bonds in the US, the UK and Japan because of illiquidity of the Hong Kong bond market. This helps reduce the liquidity premium on their cost of debt. The study follows primarily the principles of the KMV model, developing a dynamic model to price corporate credit risk continuously. The major contribution of the model is that it involves no accounting information. In Hong Kong, financial statements are made public twice a year. Accounting information thus offers little help to a model that predicts credit spreads everyday. Data involved in the dynamic model are all observable financial time series, including riskfree rate, equity value, stock index and implied volatility of the index. Unlike the KMV model, our model does not require information about asset volatility that is usually estimated from equity options. In addition, our model does not need the information of credit ratings<sup>1</sup>. This makes our model applicable to many firms without equity options traded and without external credit ratings granted. Our solution is incomplete but pragmatic. A more complete empirical model for the Hong Kong debt market would be feasible if a larger database on credit risk is available for modeling and statistical testing. However, it will take years to build the database. Before the emergence of any better empirical credit risk models on Hong Kong debts, our model has significant economic value because banks can rely on it to evaluate corporate credit risk and build their internal ratings system. Another contribution of the study is that application of the model to other debts markets is feasible as long as the markets provide the time series required.

The rest of paper will proceed as follows. Section II discusses how the model is developed. Section III describes the data. Section IV discusses the empirical findings. Section V concludes the paper.

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<sup>1</sup> Elton et. Al. (2001) find that credit ratings explain only a very small part of US credit spreads.

## II. Development of the Model

The scandals of Enron and Worldcom in 2002 reveal that accounting information is no longer reliable for measuring financial performance and credit risk. In the 1990s, the market began to shift to market-based information for credit risk analysis. KMV, a consulting firm in Chicago, is a successful story in the market, which follows Merton's option approach to price credit risk. With the help of market-based information, KMV estimates credit risk levels of a large number of listed companies in various markets. Its services receive many subscriptions from commercial banks, investment banks and central banks. According to KMV model, credit spread is a nonlinear function of financial leverage (in terms of debt-asset ratio), asset volatility, riskfree rate and maturity. This can be simply written in the following form:

$$[1] \quad Sp_t = f(A_t, D_t, \sigma_{A,t}, R_{f,t}, T_t), \text{ where}$$

$Sp_t$ : Credit spread or credit risk premium at time  $t$

$A_t$ : Asset at time  $t$

$D_t$ : Debt at time  $t$

$\sigma_{A,t}$ : Expected asset volatility at  $t$

$R_{f,t}$ : Riskfree rate at time  $t$

$T$ : Maturity left at time  $t$

In Equation [1],  $D_t$  is unobservable since not all debts are traded in the market. What KMV does is to estimate it with accounting information on both short-term and long-term debts. With creative accounting techniques, firms can easily manipulate the book value of long-term and short-term debt. In addition, the book value of debt is reported quarterly in the US and semiannually in many other markets. In most of the time,  $D_t$  is unobservable. As  $D_t$  is an unknown, this makes  $A_t$  another unknown because  $A_t$  should be

the sum of  $D_t$  and  $E_t$ , where  $E_t$  is the market value of equity. This implies that KMV is unable to accurately measure the financial leverage of a firm. Another issue is that KMV converts equity volatility to asset volatility with the information of financial leverage. As the measure of financial leverage may be biased, the asset volatility may also be biased. Unlike  $D_t$ ,  $E_t$  can be easily observed if a firm is listed on the exchange. Assume that the market cares about financial leverage in the form of  $\ln(A_t/D_t)$  instead of  $A_t/D_t$ , where  $\ln(A_t/D_t) = \ln(A_t) - \ln(D_t)$ . This means,  $\ln(A_t) - \ln(D_t)$  is nonlinearly associated with  $\ln(A_t - D_t) = \ln(E_t)$ . In this paper,  $\ln(E_t)$  is taken as an important variable for pricing credit risk. Equity value can have many effects on credit spreads. First, as mentioned above, changes in equity value can be related to changes in financial leverage. Second, changes in equity value can indicate any changes in earnings prospects and risk profile of firm. These changes have economic meaning to credit risk. Third, as a general practice, firm size affects how lenders perceive credit risk. Small firms are mostly associated with high credit risk. Fourth, as the KMV model highlights, a firm tends to default when its asset is lower than its liability. This means, default probability will be much higher if equity value is closer to zero. Therefore, we believe that the equity value will have tremendous effect on credit spreads and their association will be negative.

As mentioned above, KMV may have bias in measuring asset volatility,  $\sigma_{A,t}$ . Let us reconsider what  $\sigma_{A,t}$  means. Suppose that CAPM works well in the market. Then, we can assume an ex-ante CAPM as follows:

$$[2] \quad E(R_{A,t}) = R_{f,t} + \beta_A \{E(R_{m,t}) - R_{f,t}\} \quad \text{where}$$

$E(R_{A,t})$ : Expected asset return at time  $t$

$R_{f,t}$ : riskfree rate at time  $t$

$E(R_{m,t}) - R_{f,t}$ : Expected market risk premium at time  $t$

$\beta_A$ : beta of the asset

Equation [2] suggests that expected volatility of asset return ( $\sigma_{A,t}$ ) should be a function of ( $\beta_A \sigma_{m,t}$ ), where  $\sigma_{m,t}$  is the expected market volatility. As a general practice,  $\sigma_{m,t}$  is usually

measured by the implied volatility of market index options. Many stock index options are actively traded in many different markets. Their premiums can efficiently reflect collective expectations on market volatility. This paper will take  $\sigma_{m,t}$  as a major variable for pricing credit risk. As  $\sigma_{m,t}$  is positively associated with  $\sigma_{A,t}$ , an increase in  $\sigma_{m,t}$  will lead to higher  $\sigma_{A,t}$  and then higher credit risk.

The  $\beta_A$  in Equation [2] also have impact on  $\sigma_{A,t}$ . Higher  $\beta_A$  means high asset volatility. In the framework of CAPM,  $\beta_A$  measures the sensitivity between market portfolio return and asset return. If  $\beta_A$  is assumed to be constant, asset value of a firm ( $A_t$ ) and the market index ( $M_t$ ) tend to be cointegrated in the following form:

$$[3] \quad \ln(A_t) = \text{constant} + \beta_A \ln(M_t) + v_t$$

In reality, the  $\beta_A$  in Equation [3] may be non-stationary because of a number of reasons. For instance, from time to time, firms may have their beta changed by changing their business profiles, adjusting their financial leverage, investing in new projects, repurchasing stocks and so on. However, some studies argue the beta is time-varying but it is mean-reverting rather than random-walk. For simplicity, we assume constant  $\beta_A$ . This helps us to rewrite  $\beta_A$  in Equation [3] as a linear function of  $\ln(A_t)$  and  $\ln(M_t)$ . As  $\ln(M_t)$  is easily observable, it is included as an important variable in pricing credit spreads. A high market index means better business conditions that in turn reduce credit risk. This is same as the concept of systemic risk of credit spreads (see Elton et.al. 2001).

Although  $\ln(A_t)$  also affects credit risk, it is unobservable because of unobservable debt size. One simple solution is to include  $\ln(E_t)$  as the proxy of  $\ln(A_t)$ . It is because both the two variables should be positively associated.

Based on the above discussion, we transform the Merton's or KMV model on corporate credit risk, indicated in Equation [1], to a function as follows:

$$[4] \quad \ln[(Sp_t + R_{f,t})/R_{f,t}] = F[\ln(R_{f,t}), \ln(E_t), \ln(M_t), \ln(\sigma_{m,t}), \ln(R_{f,t}), \ln(T_t)]$$

All the variables in Equation [4] are observable. The simplest form of Equation [4] is a linear regression model:

$$[5] \quad \ln[(Sp_t + R_{f,t})/R_{f,t}] = a_0 + a_1 \ln(R_{f,t}) + a_2 \ln(E_t) + a_3 \ln(M_t) + a_4 \ln(\sigma_{m,t}) + a_5 \ln(T_t) + \varepsilon_t$$

In Equation [5], all the explanatory variables are observable in the market. Taking log on  $\sigma_{m,t}$ ,  $R_{f,t}$  and  $T$  aims to reduce their degree of skewness. The dependent variable is  $\ln(Sp_t + R_{f,t})/R_{f,t}$ . It has the following two advantages in econometrics analysis. First, as compared with  $Sp_t$ ,  $\ln(Sp_t + R_{f,t})/R_{f,t}$  tends to follow normal distribution. Second, the variable still have a valid observation for negative  $Sp_t$ , while  $\ln(Sp_t)$  cannot deal with negative values of  $Sp_t$ .

According to the above discussion,  $\ln(E_t)$  and  $\ln(M_t)$  should have negative parameters, while  $\ln(\sigma_{m,t})$  should have a positive parameter. Following the liquidity preference, we can expect a positive parameter for  $\ln(T_t)$  since long-term bonds tend to have higher yields. However, according to the Ilmanen's argument on "Convexity Bias", the yield curve for long-term bonds will go down because of convexity tradeoff. Combining these arguments, we are not quite sure what the sign of  $\ln(T_t)$  should be. The sign of the parameter of  $\ln(R_{f,t})$ ,  $a_1$ , may be either positive or negative. A positive  $a_1$  will mean that the riskfree rate has positive impact on the borrowing interest rate. It may also be possible for  $-1 < a_1 < 0$  if the impact is positive. In this case, the riskfree rate has positive impact on the  $\ln(Sp_t + R_{f,t})$  rather than on the  $\ln\{(Sp_t + R_{f,t})/R_{f,t}\}$ . If  $a_1$  is significantly less than -1, this will mean a negative impact of the riskfree rate on the borrowing interest rate. In general, it is believed that it will be  $a_1 > -1$  because higher riskfree rate should be associated with higher interest charge.

Equation [5] is obviously an incomplete model. However, it merits our attention in the following ways. First, it involves no direct measures on financial leverage and asset volatility. As mentioned above, these two measures may be biased by accounting information. Second, all the variables are easily accessible and relevant time-series data is on continuous-time basis. This means, we can renew corporate credit analysis, credit spreads and implicit default probabilities on continuous basis.

In reality, credit spreads are affected by many other factors<sup>2</sup>, such as corporate governance, management quality, financial ratios, external credit ratings and so on. This means, Equation [5] tends to oversimplify the pricing mechanism of corporate credit spreads. Yet it must be noted that all these factors are not continuous variables.<sup>2</sup> For instance, changes in financial ratios are available twice a year for Hong Kong firms. Reports on changes in credit ratings are offered to the public occasionally. In many cases, these reports lag behind price movements in the capital market. On the other hand, management quality and corporate governance are subjective measures. Even though there are recognized reports on these factors in the market, credit spreads tend to change well before the public release of the reports. Because these reports simply summarize facts rather than generating new facts. Therefore, if we need a model to determine corporate credit risk on continuous basis, Equation [5] appears to satisfy the need.

### **III. Data**

This study applies Equation [5] to bonds issued by Hong Kong corporations. Data is a great methodological issue in the study. Normally less than 30 firms in Hong Kong are qualified to issue bonds. Most Hong Kong companies are unable to be rated by Moody's or S&P Ratings. As a result, observed credit spreads are concentrated on a small number of blue chips. This may threaten the generalizability of our findings. Another issue is related to time length of data. Many Hong Kong corporations were unable to issue bonds until the early 1990s. After the Asian financial crisis in 1997, many of them had

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2. See Delianedis, Geske 2001 and Dufresne, Goldstein 2000

difficulties in issuing bonds because of undesirable financial performance. Only a small number of financially sound corporations were able to issue new bonds after 1997.

This study has challenges from limited database, unknown pricing models on corporate credit risk, measurement biases of major variables (such as financial leverage and asset volatility), and measurement errors of bond yields due to infrequent trading. These challenges are prevalent present in other debt markets outside the US. How can we price credit risk pragmatically with the above limitations? KMV and many other researchers have endeavored to solve the problem for the past 10 years, even though their models may be imperfect and predictions may involve much bias. Maybe Equation [5] can provide another incomplete but pragmatic solution. Credit spreads obtained from Equation [5] may serve as good references for analysts and lenders to set credit spreads for hundreds of corporations. Further adjustments are feasible with additional public information, private information and/or subjective judgments. As compared with the KMV model, Equation [5] looks simpler and its parameters are renewable with recent market preferences. Most importantly, predictions rely mainly on continuous time series that are all accessible in most capital markets.

To estimate the parameters in Equation [5], we searched for bond yields in both the US and the Hong Kong debt markets relevant to Hong Kong corporations. The sample covered the period from January 1996 to May 2002. Out of all Hong Kong listed companies (the All Ordinaries Index), we found only 21 companies having outstanding bonds data from the DataStream. Because of limited and discontinuous data, three bonds were excluded from the analysis. As a result, only 18 bonds and around 700 monthly yield spreads were included in the data analysis. Table 1 displays the bond issuers, the number of observations, the period involved and the equity value of the issuers. All these bond issuers tend to have larger firm size and better reputation than those having no bonds traded in the market. As shown in Table 1, several bonds have long time length, say over 60 months, while most of them have a time length between 12 months and 48 months.

Insert Table 1 around here
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Statistically it is not feasible to apply Equation [5] to individual bonds because of limited observations for individual bonds. The aim of the study is to find a model fitting all bond issuers. Therefore, to estimate the parameters, we pooled all the data together. Then we examined the patterns of residuals against a number of variables, such as issuer, firm size, year and month. Since observations of different bonds in different years were included in the regression analysis, we applied unit root tests on residuals to investigate any long-run relationship between what the model predicted and what the market behaved. This helps verify the validity of pooling data for the analysis.

### The Variables

Equation [5] involves only six variables – yield-riskfree-rate ratio  $\{ln(Sp_t + R_{f,t})/R_{f,t}\}$ , the riskfree rate  $\{ln(E_t)\}$ , the equity value of a bond issuer  $\{ln(E_t)\}$ , the market index  $\{ln(M_t)\}$ , implied volatility of index options  $\{ln(\sigma_{m,t})\}$  and maturity  $\{ln(T_t)\}$ . The credit spread  $\{Sp_t\}$  is provided by Datastream, which is simply the bond yield minus the one-year T-Bond yield. Some previous studies define credit spread is the difference between yield on coupon-paying bonds and yield on T-bond of the same maturity. Elton and et. Al. (2001) recently measured credit spread as the difference between yield on a zero-coupon corporate bond and yield of zero-coupon government bond. Because of limited data available, this paper does not make any adjustments on the  $Sp_t$  on the basis of maturity, coupon rate, liquidity and other special bond features.

The equity value is the market value of an issuer's equities. The market index is Hang Seng Index – a popular market index in Hong Kong. Implied volatility is an average implied volatility of Hang Seng Index options having strike prices around index closes. Bloomberg provides this data of implied volatility. Maturity is the number of months

before maturity. Table 2 summarizes the operational definitions of the variables in Equation [5].

Insert Table 2 around here
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## IV. Econometric Findings

### Samples and Findings

Sample 1 is the whole sample including 697 monthly bond yields from different bonds and in different periods. To check the robustness of the parameter estimates, outliers are removed by the following methods. First, we run the regression with Sample 1 and saved the residuals. Bond yields associated with the largest 10% residuals (in size) were regarded as outliers and excluded in Sample 2. Similarly, we removed the largest 25% errors and formed Sample 3.

Insert Table 3 around here
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Table 3 displays the parameter estimates of Equation [5] for the three samples. There are two models in Table 3. Model 1 is exactly Equation [5], while Model 2 is Equation [5] without the variable  $\ln(T_t)$ . From the results of Model 1, we can find that estimates of the three samples are of the same sign and similar magnitude. This suggests that the results are robust against outliers in the whole sample. Sample 1 gives an adjusted R-square at 23.6%, while Sample 3 gives 49.18%. This indicates a high explanatory power of Model 1.

The parameter of  $\ln(E_t)$  is significantly negative, ranging between -0.094 and -0.096. This means, if firm size of a firm declines, its credit spread will increase. The decline may be due to negative news about the firm or increased financial leverage of the firm. The parameter of  $\ln(M_t)$  is also negative and significant, ranging between -0.275 and -0.363. This suggests that the credit spread tends to increase in the case of poor performance of

the market index. It makes sense that the market index declines and credit risk of firms increases when economic conditions are bad. The parameter of  $\ln(\sigma_{m,t})$  is significantly positive, ranging between 0.175 and 0.359. It is logical in the sense that asset volatility affects credit risk and market portfolio volatility affects asset volatility. The KMV model has well delineated how asset volatility affects credit spreads. The section about Equation [3] in this paper has mentioned the positive link between asset volatility and market portfolio volatility.

The last variable,  $\ln(T_t)$ , gives a significantly negative parameter. Maybe it reflects the downward-sloping yield curve after the Asian financial crisis in 1997 and the global stock market crash in 2001. Another reason is that bonds with a long maturity are usually bonds of better credit ratings and lower yields. To further investigate the effect of  $\ln(T_t)$  on credit spreads, we deleted it in Model 2 and ran the regression again. When the results of Model 1 and Model 2 are compared, we can find the same signs and similar magnitudes for the parameters of  $\ln(E_t)$ ,  $\ln(M_t)$  and  $\ln(\sigma_{m,t})$ . In Model 2, the adjusted R-square does not have much decline in Samples 1 and 2. However, it jumps from 49.18% to 53.73% in Sample 3 of Model 2. All these results indicate that we can simply ignore  $\ln(T_t)$  in modeling credit spreads.

In brief, we find significant parameters for the variables  $\ln(E_t)$ ,  $\ln(M_t)$  and  $\ln(\sigma_{m,t})$ . The former two have negative relationship with credit spreads and the last one positively affect credit spreads. It appears Equation [5] is a good model since it accounts for more than 20% of the variations of the dependent variable in the whole sample. Some may suggest the inclusion of rolling historical volatility of individual stocks as an independent variable in Equation [5]. However, we found no significant improvement in explanatory power when the rolling historical volatility was included in the Equation [5]. One possible explanation is that the equity value and the implied volatility of the market index have sufficiently reflected the market risk and credit risk of the issuer.

## Residual Analysis

To further examine the validity of Equation [5] in predicting credit spreads, we examined the residuals obtained from Samples 1, 2 and 3. A good model will mean random distribution of the residuals and no additional variables can explain their distribution. The additional variables considered are all category variables and they are all observable in the debt market. They might have nonlinear effects on the yield spreads. These variables include:

- *NMV: All equity values were ranked and grouped into “Small”, “Medium” and “Large”. This tests whether some nonlinearity exists between equity value and yield spreads.*
- *NCOUPON: All coupon rates were ranked and grouped into “Low”, “Medium” and “High”. This tests whether yield spreads are sensitive to coupon rates.*
- *YEAR: This category variable include the seven calendar years (i.e. 1996-2002)*

To test their effects, we applied a 3-factor linear model to test their main and interaction effects on the residuals.

Insert Table 4 around here
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Table 4 summarizes the main and interaction effects of the three variables. Almost all the factors, except the main effect of NCOUP, have significant impacts on the residuals. The adjusted R-Squares are over 69%. Table 5 displays the marginal mean of the main effects in the 3-factor model. Across the three samples, the “Large Equity” has consistently a lower yield spread than what the model predicts. In general, the effects of NMV and NCOUP do not show a linear pattern. All these results suggest that features of individual

bonds and backgrounds of individual issuers have subtle effect on yield spreads. It is hard for us to draw a conclusion on the effects with the current database.

### Unit Root Tests on Residuals

Parameters of Equation [5] are estimated with the method of cross-sectional regression. They will be used for predicting the time-series of individual credit spreads. This violates standard approaches of econometric methods for time series, such as cointegration, vector-autoregression and error correction method. It is very likely that the explanatory variables in Equation [5] do not have any long-run effect on credit spreads and the residuals obtained are non-stationary. This study applied unit root tests to investigate the stationarity of the residuals. Only bonds with more than 30 observations in Sample 1 were selected for the analysis. Finally only 10 bonds were included in this analysis. Three ADF tests (Augmented Dicky-Fuller tests) were adopted, namely Test 1, Test 2 and Test 3. Test 1 involves lags only. Test 2 involves both lags and intercept, while Test 3 involves lags, intercept and time trend. The lag length in the above ADF tests is automatically selected by the Hannan-Quinn criterion. Table 6 summaries the ADF test results. It is obvious that the residuals are not perfectly stationary. Among the 10 bonds selected, 5 of them show some evidence of stationarity for the residuals. This means, Equation [5] works well for some bonds only and cannot help predict credit spreads for many other bonds. Non-stationary residuals can be resulted from a number of scenarios. First, the model has specification errors and does not really explain credit spreads. Second, the model is good but the parameters may be time-varying rather than being constant. Time-varying parameters may be due to time-varying liquidity premium.<sup>3</sup> Also, it may be due to mean-reverting financial leverage.<sup>4</sup> Third, the risk profile of bond issuers changes over time. For instance, changes in financial leverage, management quality, business nature and asset beta will result in permanent changes in corporate credit risk. It

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<sup>3</sup> See Annaert and De Ceuster (2000)

<sup>4</sup> See, for instance, Marsh (1982); Collin-Dufresene and Goldstein (2001).

seems that Equation [5] still has its contributions before the emergence of any more complicated models that can deal with time-varying parameters and changes in the risk profile of bond issuers.

Equation [5] is the linear form of Equation [4]. Some may argue that the relationship may be in nonlinear form. To investigate this possibility, we applied neural network approach to predict credit spreads with the variables in equation [4]. Several neural network models provided very high R-square (close to 90%) in Sample 1. However, when unit root tests were applied to the residuals, we obtained no evidence of stationary residuals. This means, from the perspective of cointegration, there is no long run relationship between the credit spreads and the predictions from the neural network models. Although Equation [5] is simple, it remains as a convincing model to predict corporate credit spreads with limited information.

#### Out-of-Sample Forecasts

To check the predictability of Equation [5], we obtained some out-of-the sample forecasts. We randomly selected a date - October 23, 2002 - as sample and searched for equity values of listed Hong Kong firms, 1-year HIBOR, Hang Seng Index and implied volatility of Hang Seng Index options. Then we predicted credit spreads with the six sets of parameters shown in Table 3 (i.e. the parameters obtained from Samples 1 to 3 and Models 1 to 2). Table 7 displays the median, the maximum and the minimum values among the six predictions. From South China Morning Post and Bloomberg, we identified the credit spreads of listed Hong Kong companies. These credit spreads came from fixed-income securities, floating-rate notes, Hong Kong Dollar debt instruments and/or US Dollar instruments. Only 14 instruments issued by Hong Kong corporations were successfully found. Two bonds gave negative spreads that might be due to infrequent trading. The table indicates that some predictions are close to observed spreads and their absolute differences are less than 80 basis points. Most of the predictions have an error between 100 and 200 basis points. With limited database and measurement errors

caused by infrequent trading, we find it hard to have meaningful statistical evaluations on the accuracy of our model. Appendix shows the predicted credit spreads of 758 listed corporations in Hong Kong. Currently very few models are able to estimate credit spreads for all listed companies in a market but our model manages to do it. All the predictions can help analysts to rate credit risk, to estimate default probabilities and default losses, and to build simulation models for corporate credit portfolios.

## **V. Conclusions**

Following the rationale of the KMV model, this study has attempted to build an empirical model to price corporate credit risk for around 700 listed corporations in Hong Kong. To mitigate the bias from accounting data, the model totally relies on market-based information, such as equity value, stock market index, implied volatility of market index, riskfree rate and maturity. This fits in the reality of emerging credit markets that there is no credit mortality data, limited external credit ratings and limited data on bond yields. We find some weak evidence to support the model. Both the equity value and the stock market index have significantly negative effects on credit spreads, while the implied volatility of the market index, which measures the economic risk, shows significantly positive effect. The model explains more than 20% of the raw yield spreads. When extreme cases are removed, its explanatory power jumps to more than 50%. Observed and predicted credit spreads are slightly cointegrated. In addition, the study finds that both coupon rate and equity value have some subtle nonlinear effects on credit spreads. This may be due to peculiar features of individual bonds and credit risk of individual issuers. It is obvious that the model is not a complete solution but it successfully helps estimate the credit spreads and corporate credit risk of all listed corporations in Hong Kong. This solution can also be applicable to other emerging credit markets.

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**Table 1 Bonds and Issuers in the Sample**

Code	Bond Name	Coupon	Maturity	Data Range	Obs	Market Value of Equity (HK\$mln)			
						Mean	Median	Minimum	Maximum
1	Cathay Pacific Finance	6.50%	06/09/01	1/96 - 9/01	61	37586	39949	16921	55095
2	China Mobile	2.25%	03/11/05	1/00 - 5/02	9	455522	448390	414900	510718
3	HSBC	6.63%	06/10/10	1/00 - 5/02	20	901555	864369	763768	1112183
4	Hutchison Whampoa	6.95%	01/08/07	8/01 - 5/02	58	302702	292574	126344	532921
5	Johnson Electric HDG	4.50%	05/11/00	1/96 - 11/01	21	11128	6747	5261	22594
6	Sino Land	5.00%	26/02/01	3/96 - 2/01	58	15499	14149	6163	27946
7	Swire Pacific Ltd	8.50%	29/09/04	1/01 - 5/02	17	40627	39955	27592	54056
8	Wharf Cap Intl	8.88%	01/11/04	6/01 - 5/02	72	46412	43300	14344	91617
9	Applied International HDG	5.25%	30/11/00	1/96 - 1/00	59	303	290	126	534
10	Beijing Enterprise Inv	0.50%	31/03/03	1/98 - 5/02	49	6283	5789	4046	10707
11	China Development	8.25%	15/05/09	1/99 - 5/02	36	169	147	48	407
12	Chinney Alliance	1.75%	31/03/02	1/96 - 3/02	69	415	325	46	1097
13	Cosco Intl	1.00%	13/03/03	1/98 - 5/02	12	926	829	548	1919
14	Great Eagle HDG	3.25%	03/04/01	6/96 - 3/02	52	6992	6641	3224	11749
15	Kerry Properties	2.00%	15/06/07	6/97 - 5/02	5	6166	6006	2689	9593
16	Road King Infrass Ltd	9.50%	15/07/07	2/01 - 5/02	16	1557	1555	1265	1885
17	Silver grant Intl	1.00%	19/08/04	9/97 - 5/02	29	877	812	518	1508
18	Stelux Holding	1.75%	31/03/01	1/96 - 3/01	54	856	435	150	1919
<b>Aggregate</b>					<b>697</b>	<b>68878</b>	<b>6666</b>	<b>46</b>	<b>1112183</b>

**Table 2 Variables of the Study**

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<b>Variable</b>	<b>Operational Definition</b>
$\log(RF_t)$	Natural log of $RF_t$ , where $RF_t$ = riskfree rate x $10^2$ and riskfree rate = US T-Bond yield (1 year)
$\log[(SP_t+RF_t)/RF_t]$	Natural log of the ratio between bond yield and riskfree rate, where bond yield = $SP_t + RF_t$ and $SP_t$ = credit spread (in %) x $10^2$
$\log(E_t)$	Natural log of $E_t$ , where $E_t$ = market value of the bond issuer's equities x $10^{-6}$
$\log(M_t)$	Natural log of $M_t$ , where $M_t$ = Hang Seng Index
$\log(IV_t)$	Natural log of $IV_t$ where $IV_t$ = Implied Volatility of Hang Seng Index options x $10^2$
$\log(T_t)$	Natural log of $T_t$ , where $T_t$ = number of month maturity

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**Table 3 Regression Analysis – Factors on Yield Spreads**

Sample	a <sub>0</sub>	a <sub>1</sub>	a <sub>2</sub>	a <sub>3</sub>	a <sub>4</sub>	a <sub>5</sub>	Adj. R-Square
<i>Model 1: <math>\log[(SP_t+RF_t)/RF_t] = a_0 + a_1 \log RF_t + a_2 \log(E_t) + a_3 \log(M_t) + a_4 \log(IV_t) + a_5 \log(T_t) + \varepsilon_t</math></i>							
Sample 1	4.630 ***	-0.431 ***	-0.098 ***	-0.275 **	0.189 ***	-0.121 ***	23.60%
Sample 2	5.210 ***	-0.297 ***	-0.094 ***	-0.363 ***	0.175 ***	-0.126 ***	34.80%
Sample 3:	4.607 ***	-0.448 ***	-0.096 ***	-0.349 ***	0.359 ***	-0.095 ***	49.18%
<i>Model 2: <math>\log[(SP_t+RF_t)/RF_t] = a_0 + a_1 \log RF_t + a_2 \log(E_t) + a_3 \log(M_t) + a_4 \log(IV_t) + \varepsilon_t</math></i>							
Sample 1	2.760 ***	-0.461 ***	-0.108 ***	-0.123	0.225 ***		21.75%
Sample 2	3.462 ***	-0.359 ***	-0.104 ***	-0.215 **	0.196 ***		32.09%
Sample 3:	2.672 ***	-0.487 ***	-0.131 ***	-0.120 *	0.308 ***		53.73%

Notes:

- Sample 1: Whole sample
- Sample 2: 10% outliers are removed from Sample 1, which are determined by the 10% largest errors in Sample 1
- Sample 3: 250% outliers are removed from Sample 1, which are determined by the 25% largest errors in Sample 1
- The difference between Model 1 and Model 2 is that  $\log(IV_t)$  is absent in Model 2.
- \*\*\*, \*\* & \*: Significant at 1%, 5% and 10% levels respectively.

**Table 4 Tests on Main and Interaction Effects of the Category Variable**

<b>Tests of Between-Subjects Effects</b>							
<b>Source</b>		<b>Type III Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>F</b>		<b>Adj. R-Square</b>
<b>Model</b>	Sample 1	40.459	44	0.920	32.661	***	72.70%
	Sample 2	39.808	44	0.905	32.544	***	72.70%
	Sample 3	36.163	44	0.822	27.256	***	68.90%
<b>YEAR</b>	Sample 1	1.112	6	0.185	6.581	***	
	Sample 2	1.227	6	0.204	7.355	***	
	Sample 3	0.942	6	0.157	5.208	***	
<b>NMV</b>	Sample 1	1.390	2	0.695	24.694	***	
	Sample 2	1.394	2	0.697	25.071	***	
	Sample 3	1.396	2	0.698	23.150	***	
<b>NCOUP</b>	Sample 1	0.078	2	0.039	1.386		
	Sample 2	0.067	2	0.033	1.198		
	Sample 3	0.174	2	0.087	2.882	*	
<b>YEAR * NMV</b>	Sample 1	3.639	11	0.331	11.752	***	
	Sample 2	3.611	11	0.328	11.808	***	
	Sample 3	3.687	11	0.335	11.115	***	
<b>YEAR * NCOUP</b>	Sample 1	3.547	11	0.322	11.453	***	
	Sample 2	3.602	11	0.327	11.779	***	
	Sample 3	3.391	11	0.308	10.224	***	
<b>NMV * NCOUP</b>	Sample 1	13.795	4	3.449	122.502	***	
	Sample 2	13.686	4	3.422	123.077	***	
	Sample 3	13.825	4	3.456	114.622	***	
<b>YEAR * NMV * NCOUP</b>	Sample 1	3.371	7	0.482	17.105	***	
	Sample 2	3.458	7	0.494	17.772	***	
	Sample 3	3.367	7	0.481	15.951	***	
<b>Error</b>	Sample 1	13.457	478	0.028			
	Sample 2	13.288	478	0.028			
	Sample 3	14.413	478	0.030			
<b>Total</b>	Sample 1	53.916	522				
	Sample 2	53.096	522				
	Sample 3	50.576	522				

\*\*\*, \*\* and \*: Significant at 1%, 5% and 10% level respectively.

**Table 5 Marginal Means of the Main Effects of the the Category Variables**

		<b>Sample 1</b>		<b>Sample 2</b>		<b>Sample 3</b>	
<b>YEAR</b>	<b>1996</b>	-0.120	***	-0.087	***	0.011	
	<b>1997</b>	-0.058	***	-0.002		-0.004	
	<b>1998</b>	0.018		0.060	***	-0.022	
	<b>1999</b>	-0.011		0.049	***	0.023	
	<b>2000</b>	-0.115	***	-0.059		-0.037	
	<b>2001</b>	-0.106	***	-0.012		-0.021	
	<b>2002</b>	-0.080		0.060		-0.002	
	<b>NMV</b>	<b>Small Equity</b>	-0.043		0.024		0.022
<b>Medium Equity</b>		0.018		0.086	***	0.068	***
<b>Large Equity</b>		-0.176	***	-0.114	***	-0.126	***
<b>NCOUP</b>	<b>Low Coupon</b>	-0.091	***	-0.013		-0.034	
	<b>Medium Coupon</b>	-0.092	***	-0.044	***	-0.021	
	<b>High Coupon</b>	-0.003		0.071	***	0.033	

\*\*\*: Significantly different from zero at 1% level

**Table 6 Unit Roots Test on the Residuals**

Bond	Residuals	Obs	ADF Test 1	ADF Test 2	ADF Test 3
1	Sample 1	61	Non-stat	Non-stat	Non-stat
1	Sample 2	59	Non-stat	Non-stat	*
1	Sample 3	41	Non-stat	Non-stat	*
4	Sample 1	58	Non-stat	**	Non-stat
4	Sample 2	58	Non-stat	**	*
4	Sample 3	58	**	**	*
6	Sample 1	58	**	Non-stat	Non-stat
6	Sample 2	55	**	Non-stat	Non-stat
6	Sample 3	50	***	**	Non-stat
8	Sample 1	72	Non-stat	Non-stat	Non-stat
8	Sample 2	72	Non-stat	Non-stat	Non-stat
8	Sample 3	72	*	Non-stat	Non-stat
9	Sample 1	59	Non-stat	Non-stat	Non-stat
9	Sample 2	57	Non-stat	**	***
9	Sample 3	45	Non-stat	Non-stat	**
10	Sample 1	49	Non-stat	Non-stat	Non-stat
10	Sample 2	43	Non-stat	Non-stat	*
10	Sample 3	39	Non-stat	Non-stat	Non-stat
11	Sample 1	36	Non-stat	Non-stat	Non-stat
11	Sample 2	32	Non-stat	Non-stat	Non-stat
11	Sample 3	22	**	Non-stat	Non-stat
13	Sample 1	69	Non-stat	Non-stat	Non-stat
13	Sample 2	64	Non-stat	Non-stat	Non-stat
13	Sample 3	42	Non-stat	Non-stat	*
15	Sample 1	52	Non-stat	Non-stat	Non-stat
15	Sample 2	52	Non-stat	Non-stat	Non-stat
15	Sample 3	50	**	*	Non-stat
18	Sample 1	29	Non-stat	Non-stat	Non-stat
18	Sample 2	29	Non-stat	Non-stat	Non-stat
18	Sample 3	27	*	Non-stat	Non-stat
19	Sample 1	54	Non-stat	Non-stat	Non-stat
19	Sample 2	24	Non-stat	Non-stat	Non-stat
19	Sample 3	8	Non-stat	Non-stat	Non-stat

## Notes

- ADF Test 1 includes lags only. ADF Test 2 includes both lags and intercept. ADF Test 3 includes lags, intercept and time trend.
- Lag length of the above ADF tests is automatically selected by the Hannan-Quinn criterion.
- "Non-stat" means the hypothesis of unit root is not rejected.
- \*\*\*, \*\* and \*: The hypothesis of unit root is rejected at 1%, 5% and 10% levels respectively.

**Table 7 Out-of-the sample Forecasts - An Example on October 23, 2002**

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Date: 10/23/2002	Predicted Credit Spread of a 3-yr Bond			Observed Spread	Absolute Error
	Median	Min	Max		
HUTCHISON WHAMP.	1.99	1.69	2.44	2.03	0.04
CHINA MOBILE (HK) LTD.	1.70	1.40	2.14	1.86	0.15
HSBC HDG.	1.44	1.08	1.85	0.78	0.66
MTR CORP.	2.74	2.34	3.17	3.52	0.78
HONG KONG ELECTRIC	2.54	2.18	2.99	1.59	0.95
CHEUNG KONG HDG.	2.22	1.91	2.69	1.00	1.22
WHARF HDG.	2.86	2.44	3.28	1.47	1.40
SWIRE PACIFIC (A+B)	2.74	2.34	3.17	1.18	1.56
BOC HONG KONG (HDG.)LTD.	2.41	2.07	2.87	0.77	1.64
SUN HUNG KAI PROPS.	2.23	1.92	2.70	0.48	1.76
CLP HOLDINGS LTD	2.47	2.12	2.93	0.58	1.89
PCCW LIMITED	3.08	2.61	3.47	6.03	2.95
HUANENG PWR.INTL. 'H'	3.80	3.22	4.14	-3.74	7.55
KERRY PROPERTIES	4.00	3.38	4.32	-5.26	9.26

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Notes:

/ . Predictions are made with the 6 set of parameters obtained from sample 1-3 and with Models 1 to 2.

/ . Equity value, Hang Seng Index and implied volatility of the index are based on the data available on Oct 23, 2002.

## Appendix

### Predicted Credit Spreads of around 700 Listed Corporations in Hong Kong

Date: 10/23/2002	Predicted Credit Spread of a 3-Yr Bond		
Company Name	Median	Min	Max
139 HOLDINGS	7.52	6.27	8.82
21 CN CYBERNET CORP.	5.46	4.58	5.87
401 HOLDINGS LTD.	6.94	5.79	7.95
ABC COMM.	7.33	6.12	8.54
AEON CREDIT	5.29	4.44	5.65
ALCO HOLDINGS	6.06	5.06	6.69
ALLAN INTL.	6.31	5.27	7.04
ALLIED GROUP	5.29	4.44	5.64
ALLIED PROPS.	5.27	4.42	5.62
ALPHA GENERAL	7.61	6.35	8.96
ALUM.CORP.OF CHINA 'H'	4.71	3.96	4.99
A-MAX HDG.LTD.	5.82	4.87	6.36
ANANDA WING ON	6.43	5.37	7.22
ANEX INTL.	8.97	7.50	11.10
ANGANG NEW STEEL 'H'	5.48	4.60	5.90
ANHUI CONCH 'H'	5.59	4.68	6.05
ANHUI EXPRESSWAY CO. 'H'	5.59	4.69	6.06
APPLIED (CHINA) LTD.	8.03	6.71	9.62
APPLIED INTL.	7.16	5.97	8.27
APT SATELLITE HDG.	5.75	4.82	6.27
ARNHOLD HDG. LTD.	7.29	6.08	8.47
ARTEL SOLUTIONS GP.	5.38	4.52	5.77
ARTFIELD GROUP	7.03	5.86	8.09
ARTS OPTICAL INTL.HLDG.	5.73	4.80	6.24
ASIA ALUMINUM HDG. LTD.	5.08	4.27	5.37
ASIA COMMERCIAL	7.61	6.35	8.96
ASIA FINANCIAL	5.31	4.45	5.67
ASIA LOGISTICS TECHS.	6.51	5.43	7.33
ASIA ORIENT	7.01	5.84	8.05
ASIA RES. HDG.LTD.	8.06	6.74	9.67
ASIA SATELLITE TELECOM	4.44	3.74	4.72
ASIA STANDARD	5.35	4.49	5.73
ASIA STD. HOTEL GP.	5.66	4.75	6.15
ASIA TELE-NET & TECH.	7.95	6.64	9.48
ASM PACIFIC TECH.	4.09	3.46	4.40
ASSD.INT.HTLS.	5.12	4.30	5.43
AUTOMATED SYSTEMS HDG.	6.12	5.11	6.78
AV CONCEPT	7.60	6.35	8.95
BALTRANS	6.12	5.11	6.78
BANK OF EAST ASIA	3.26	2.77	3.64
BEAUFORTE INVRS.	7.64	6.38	9.02

BEIJING DATANG POWER 'H'	4.42	3.72	4.70
BEIJING DEVELOPMENT	6.29	5.25	7.02
BEIJING ENTERPRISE	4.23	3.57	4.53
BEIJING NORTH STAR 'H'	5.61	4.70	6.08
BEIREN PRINTING 'H'	6.89	5.75	7.88
BEJ.CAP.INTL.AIRPORT 'H'	4.79	4.03	5.07
BENEFUN INTL.HDG.	8.36	6.99	10.14
BERJAYA HOLDINGS (HKG)	7.52	6.27	8.82
BESTWAY INTL. HDG.	7.87	6.57	9.36
BOC HONG KONG (HDG.)LTD.	2.41	2.07	2.87
BOSSINI INTERNATIONAL	6.98	5.82	8.01
BOTO INTL. HOLDINGS	7.26	6.06	8.43
BRIGHT INTL. GP.	6.02	5.03	6.64
BRILLIANCE CHINA AUTV.HLDG.	4.46	3.76	4.74
BUILDMORE INTL.	8.24	6.88	9.94
BYD CO.LTD. 'H'	4.75	4.00	5.03
C P POKPHAND	5.74	4.80	6.25
CAFE DE CORAL	4.65	3.91	4.93
CAN DO HDG.	8.17	6.83	9.83
CAPITAL STRATEGIC INV.	6.86	5.72	7.83
CARRY WEALTH HDG.	6.14	5.13	6.81
CASIL TELECOM	6.63	5.53	7.50
CATHAY PACIFIC	2.86	2.44	3.28
CATIC INTERNATIONAL HDG.	5.94	4.97	6.54
CATIC SHENZHEN 'H'	6.74	5.61	7.64
CCT TECH.HDG.LTD.	7.13	5.95	8.24
CCT TELECOM HLDG.LTD.	6.24	5.21	6.95
CEC INTL. HDG.	7.29	6.09	8.48
CEDAR BASE ELECTRONIC	8.01	6.69	9.58
CELESTIAL ASIA SECS.	6.99	5.83	8.02
CENTRAL CHINA ENTER. LTD	7.21	6.01	8.35
CENTURY CITY	7.42	6.19	8.67
CENTURY LEGEND	8.88	7.43	10.96
CHAMPION TECH.	5.71	4.78	6.21
CHEN HSONG	5.53	4.63	5.97
CHENGDU PUTIAN TELECOM-H	7.08	5.91	8.16
CHEONG MING INVS. LTD.	7.41	6.18	8.66
CHEUK NANG (HDG.) LTD.	7.75	6.47	9.17
CHEUNG KONG HDG.	2.22	1.91	2.69
CHEUNG KONG INFR.	3.00	2.55	3.41
CHEUNG TAI HONG HDG.	7.56	6.31	8.89
CHEVALIER	5.81	4.86	6.35
CHEVALIER CONSTRUCTION	9.11	7.62	11.32
CHEVALIER ITECH HDG.	6.95	5.80	7.97
CHI CHEUNG INV.	7.11	5.93	8.20
CHINA AEROSPACE	5.66	4.75	6.15

CHINA AGROTECH HDG.	6.88	5.73	7.86
CHINA ASSETS	7.50	6.26	8.80
CHINA BIO-MEDICAL GP.LTD	8.72	7.29	10.70
CHINA CITY NATURAL GAS	5.67	4.75	6.16
CHINA DEV.	8.39	7.01	10.17
CHINA EAGLE GP.CO.LTD.	5.51	4.62	5.94
CHINA EASTERN AIRL. 'H'	5.01	4.21	5.29
CHINA ELEGANCE	6.78	5.65	7.70
CHINA EVERBRIGHT	4.56	3.84	4.84
CHINA EVERBRIGHT INTL.	5.99	5.01	6.59
CHINA EVERBRIGHT TECH.	6.07	5.07	6.71
CHINA FAIR LAND HDG.	7.58	6.33	8.92
CHINA GAS HDG.LTD.	5.32	4.47	5.69
CHINA INSURANCE	4.27	3.60	4.57
CHINA INV.	6.56	5.47	7.39
CHINA INV. FUND	8.88	7.43	10.96
CHINA LAND GROUP LTD.	6.51	5.43	7.32
CHINA MERCHANTS	6.26	5.23	6.98
CHINA MOBILE (HK) LTD.	1.70	1.40	2.14
CHINA MOTION TELECOM	6.60	5.50	7.45
CHINA MOTOR BUS	4.56	3.84	4.84
CHINA MRCH.DICHAIN(ASIA)	5.43	4.56	5.84
CHINA MRCH.HOLDINGS	3.63	3.08	3.99
CHINA NAT. AVIATION	4.12	3.48	4.43
CHINA ONLINE (BER.) LTD.	6.55	5.46	7.38
CHINA OS.LAND & INV.	4.33	3.65	4.62
CHINA PHARMACEUTICAL	4.99	4.20	5.27
CHINA RARE EARTH	5.64	4.73	6.13
CHINA RES. LAND LTD.	5.11	4.29	5.41
CHINA RES. LOGIC INTL.	5.08	4.27	5.37
CHINA RES.ENTREP.	3.39	2.87	3.76
CHINA RICH HDG. LTD.	6.86	5.72	7.83
CHINA SCI-TECH HDG.	6.87	5.73	7.85
CHINA SHIPPING DEV. 'H'	4.82	4.05	5.10
CHINA SPECIALISED FIBRE	4.64	3.91	4.92
CHINA STAR ENTERTAINMENT	7.17	5.98	8.29
CHINA STHN.AIRL. 'H'	4.67	3.93	4.95
CHINA STRATEGIC HDG.	7.60	6.35	8.95
CHINA TRAVEL INTL.	4.20	3.54	4.50
CHINA TREASURE INVS.LTD.	8.32	6.95	10.07
CHINA UNICOM	2.53	2.17	2.98
CHINA UNITED	6.08	5.08	6.72
CHINA-HK.PHOTO	5.82	4.87	6.37
CHINESE ESTATES HDG.	4.85	4.08	5.13
CHING HING (HDG.) LTD.	8.61	7.20	10.53
CHINNEY ALLIANCE GP.	8.47	7.08	10.30

CHINNEY INV.	7.05	5.88	8.11
CHITALY HDG.LTD.	7.02	5.86	8.07
CHONG QING IRON&STL 'H'	6.29	5.25	7.02
CHOW SANG SANG HDG.INTL.	5.92	4.95	6.50
CHU KONG SHIP	5.97	4.99	6.57
CHUANG'S CHINA INVS.LTD.	7.06	5.89	8.13
CHUANGS CONSORT.INTL.	6.75	5.63	7.67
CHUN WO HDG.	6.86	5.72	7.82
CHUNG TAI PRINT.	6.29	5.25	7.02
CIG-WH INTL.	8.61	7.20	10.53
CIL HOLDINGS	9.65	8.07	12.20
CITIC KA WAH BANK LTD.	4.03	3.40	4.34
CITIC PACIFIC	2.88	2.45	3.29
CITY TELECOM	5.59	4.68	6.05
CLEAR MEDIA LTD.	4.81	4.05	5.09
CLIMAX INTL.	7.43	6.20	8.68
CLP HOLDINGS LTD	2.47	2.12	2.93
CNOOC LTD.	2.43	2.09	2.89
CNPC HONG KONG	4.65	3.92	4.93
CNT GROUP	7.11	5.93	8.20
COASTAL REALTY GROUP	7.14	5.96	8.25
COFCO INTL. LTD.	4.49	3.78	4.77
COMPUTER & TECHNOLOGIES	6.30	5.26	7.03
CONT.MARINER	6.15	5.14	6.83
CONTINENTAL HDG.	6.81	5.67	7.75
COSCO INTL.	5.78	4.84	6.31
COSCO PACIFIC	3.54	3.00	3.90
COSLIGHT TECH. INTL.	5.59	4.69	6.06
COSMOPOLITAN INTL.HDG.	7.97	6.66	9.52
COSMOS MACHINERY ENTS.	7.02	5.86	8.07
CR.CARD DNA SECURITY SYS	6.58	5.49	7.42
CROCODILE GARM.	7.73	6.45	9.15
CROSS HARBOUR (HDG.)	5.71	4.78	6.22
CULTURECOM HOLDINGS	5.68	4.76	6.17
DAH HWA INTL.HDG.	8.11	6.78	9.74
DAH SING FINANCE HDG.	3.77	3.19	4.12
DAIDO GROUP LTD.	7.36	6.14	8.58
DAIWA ASSOCIATE HDG.	7.80	6.51	9.25
DAN FORM HDG. CO. LTD.	6.68	5.57	7.57
DECCA HOLDINGS LTD.	6.75	5.63	7.67
DENWAY MOTORS LTD.	3.83	3.24	4.17
DESON DEV.	7.37	6.15	8.60
DICKSON CONCEPTS	6.07	5.07	6.71
DICKSON GROUP HDGS LTD	8.15	6.81	9.81
DIGITAL CHINA HOLDINGS	4.83	4.06	5.11
DIGITAL WORLD HDG.	9.08	7.60	11.29

DONG FANG ELECT.MCH. 'H'	7.12	5.94	8.21
DONG FANG GAS HDG.LTD.	6.01	5.03	6.63
DREAM INTL. LTD.	5.60	4.69	6.07
DVN (HOLDINGS) LTD.	6.37	5.32	7.13
DYNAMIC GLOBAL HDG.	7.29	6.08	8.47
DYNAMIC HDG.	6.51	5.43	7.32
E BON HOLINGS LTD.	8.07	6.74	9.67
E2-CAPITAL (HDG.) LTD.	6.68	5.56	7.56
EARNEST INVS. HDG.	10.18	8.51	13.08
EASYKNIT INTERNATIONAL	7.21	6.02	8.36
EC-FOUNDER (HDG.)	6.56	5.47	7.40
EFORCE HOLDINGS	6.30	5.26	7.02
EGANA JEWELLERY & PEARL	6.07	5.07	6.71
EGANAGOLDPFEIL (HDG.)	4.98	4.19	5.26
EHEALTHCAREASIA LTD.	6.10	5.10	6.75
E-KONG GROUP LTD.	8.11	6.77	9.73
ELEC & ELTEK INTL.HDG.	5.30	4.45	5.67
ELEGANCE INTL.	5.85	4.90	6.41
E-LIFE INTL. LTD.	5.78	4.84	6.31
EMPEROR INTL.	6.52	5.44	7.34
EMPEROR INVS.	9.14	7.65	11.38
E-NEW MEDIA CO.	6.53	5.45	7.35
ESPRIT HOLDINGS	3.43	2.90	3.80
ESUN HDG. LTD.	6.95	5.79	7.96
EVERBEST CENTURY HDG.	7.40	6.17	8.64
EVEREST INTL. INVS.	8.06	6.73	9.66
EXTRAWELL PHARMACEUTICAL	6.07	5.07	6.71
EZCOM HDG. LTD.	6.11	5.11	6.77
FAIRWOOD HDG.	7.45	6.22	8.72
FAR EAST CONSORT.INTL.	6.23	5.20	6.93
FAR EAST HTLS.& ENTM.	7.07	5.90	8.15
FAR EAST TECH. INTL.	7.92	6.62	9.45
FE PHARM. TECH.	5.58	4.67	6.03
FIRST ASIA CAPITAL	8.44	7.05	10.26
FIRST DRAGONCOM AGRO- STRATEGY HDG.	6.81	5.68	7.75
FIRST NATURAL FOODS HDG.	6.52	5.43	7.33
FIRST PACIFIC	4.74	3.99	5.02
FIRST SHANGHAI INVS.	5.90	4.94	6.47
FIRST SIGN INTL.	6.83	5.69	7.78
FIRST TRACTOR 'H'	6.69	5.58	7.58
FONG'S INDS.	5.35	4.49	5.73
FOREFRONT INTL.	5.21	4.38	5.55
FORTUNA INTL HDGS LTD	7.94	6.63	9.47
FOUNDER HDG. INTL.	5.57	4.67	6.02
FOUNTAIN SET	4.64	3.91	4.92
FOUR SEAS EFOOD	7.16	5.97	8.28

FOUR SEAS MERCANTILE	5.26	4.41	5.60
FRANKIE DOMINION	7.67	6.40	9.05
FRIEDMANN PAC.GTR. CHINA	7.71	6.44	9.11
FT HOLDINGS LTD.	7.98	6.66	9.53
FU CHEONG INTL.	7.64	6.38	9.01
FUJIKON INDUSTRIAL HDG.	6.30	5.26	7.03
FULBOND HDG. LTD.	6.41	5.35	7.19
FUSHAN HDG. LTD.	5.77	4.83	6.29
GAY GIANO INTL.	9.06	7.58	11.25
GEOMAXIMA ENERGY HDG.	5.17	4.34	5.48
GET NICE HDG.LTD.	6.76	5.63	7.68
GIORDANO INTL.	4.27	3.60	4.57
GLB. BIO-CHEM TECH. GP.	4.46	3.76	4.74
GLOBAL CHINA GP. HDG.	5.81	4.86	6.35
GLOBAL GREEN TECH GP.	5.58	4.68	6.04
GLOBAL TECH (HDG.) LTD.	5.26	4.41	5.60
GLOBAL TREND INTEL.TECH.	7.20	6.01	8.34
GLORIOUS SUN	5.07	4.26	5.36
GOLD PEAK INDS.	5.77	4.83	6.30
GOLD WO INTL.	9.02	7.54	11.18
GOLDEN DRAGON GP.HDG.LTD	7.70	6.43	9.10
GOLDEN HARVEST ENTM.	6.34	5.29	7.09
GOLDEN RES. DEV.INTL.	6.01	5.03	6.63
GOLD-FACE HOLDINGS	6.02	5.03	6.64
GOLDLION HDG.	6.22	5.19	6.91
GOLDWIZ HDG. LTD.	5.75	4.81	6.27
GOLIK HOLDINGS	7.00	5.84	8.04
GOOD FELLOW GP. LTD.	5.46	4.58	5.87
G-PROP (HDG.) LTD.	9.60	8.03	12.13
GR INV.INTL.LTD.	8.11	6.78	9.74
GRAND FIELD GP.	7.47	6.24	8.76
GRAND HOTEL HDG.'A'	5.29	4.44	5.65
GRAND HOTEL HDG.'B'	7.29	6.08	8.48
GRANDE HOLDINGS	4.61	3.88	4.88
GRANEAGLE HDG.	8.46	7.07	10.28
GREAT CHINA HDG.	7.78	6.50	9.23
GREAT EAGLE HDG.	4.50	3.79	4.78
GREAT WALL CYBERTECH	7.58	6.33	8.92
GREAT WALL TECH. 'H'	6.18	5.16	6.86
GREATER CHINA HDG.	7.90	6.60	9.41
GREENFIELD CHEMICAL HDG.	7.24	6.04	8.40
GROUP SENSE INTL.	6.60	5.50	7.45
GUANGDONG BREWERY	5.80	4.85	6.34
GUANGDONG INV.	4.44	3.74	4.72
GUANGDONG KELON 'H'	6.20	5.18	6.89
GUANGDONG TANNERY	7.02	5.86	8.08

GUANGNAN HOLDINGS	5.49	4.60	5.91
GUANGSHEN RAILWAY 'H'	4.87	4.10	5.15
GUANGZHOU INV.	4.95	4.16	5.23
GUANGZHOU PHARM. 'H'	6.14	5.13	6.80
GUANGZHOU SHIP. 'H'	7.25	6.05	8.41
GUO XIN GP.LTD.	6.26	5.22	6.97
GUOCO GROUP	3.46	2.94	3.83
GUORUN HDG.LTD.	5.08	4.27	5.36
G-VISION INTL.	8.24	6.89	9.94
GZI TRANSPORT	5.21	4.37	5.54
GZITIC HUALING HDGS	6.14	5.13	6.80
HAIER-CCT HDG. LTD.	5.14	4.32	5.45
HANG FUNG GOLD TECH.	6.03	5.04	6.66
HANG LUNG GROUP LTD.	3.76	3.18	4.10
HANG LUNG PROPERTIES LTD	3.23	2.74	3.61
HANG SENG BANK	2.09	1.79	2.55
HANISON CONSTRUCTION HDG	7.61	6.36	8.97
HANNY HDG.	6.73	5.61	7.63
HANSOM EASTERN HDG. LTD.	6.87	5.73	7.84
HANTEC INV. HDG.	6.51	5.43	7.32
HARBIN BREWERY GP.LTD.	4.96	4.17	5.23
HARBIN POWER EQUIT. 'H'	6.31	5.27	7.04
HARBOUR CENTRE DEV.	5.05	4.24	5.32
HARMONY ASSET LTD	8.30	6.94	10.04
HAYWOOD INVS. LTD.	9.47	7.92	11.91
HENDERSON CHINA	5.19	4.36	5.52
HENDERSON INV.	3.37	2.85	3.74
HENDERSON LD.DEV.	2.80	2.39	3.23
HENG FUNG HDG.	7.48	6.25	8.77
HENG TAI CONSUMABLES GP.	6.66	5.55	7.53
HENGAN INTL.GP.	4.82	4.05	5.10
HERALD	7.40	6.18	8.65
HERITAGE INTL.HDG.LTD.	6.48	5.40	7.27
HI SUN GROUP LTD.	7.03	5.86	8.08
HIGH FASHION INTL.	6.35	5.30	7.10
HK CATERING MGMT	6.90	5.75	7.89
HK CHINESE LTD.	5.62	4.71	6.10
HK PHARMACEUTICAL HDG.	5.29	4.44	5.65
HK. AIRCRAFT ENGR.	4.47	3.77	4.75
HK.& CHINA GAS	2.62	2.24	3.06
HK.& SHAI. HOTEL	4.47	3.77	4.75
HK.BLDG.& LOAN	7.31	6.10	8.50
HK.EXCHANGES & CLEARING	3.65	3.09	4.00
HKC INTL. HDG.	7.51	6.27	8.81
HKR INTL.	5.05	4.25	5.33
HON KWOK LAND INV.	6.81	5.68	7.75

HON PO GP.(LOBSTER KING)	7.73	6.45	9.14
HONG KONG CONSTRUCTION	6.55	5.47	7.38
HONG KONG ELECTRIC	2.54	2.18	2.99
HONG KONG FERRY HDG.	4.88	4.11	5.16
HONG KONG FORTUNE	5.68	4.76	6.18
HONG KONG PARKVIEW GP.	6.36	5.31	7.11
HOP HING HDG.	7.13	5.95	8.23
HOPEWELL HDG.	4.39	3.70	4.67
HOPSON DEVELOPMENT HDG.	5.16	4.33	5.47
HSBC HDG.	1.44	1.08	1.85
HSIN CHONG CON.	6.96	5.81	7.98
HUA LIEN INTL.	6.51	5.43	7.33
HUAFENG ENV.PROTC.TEX.	6.43	5.37	7.22
HUANENG PWR.INTL. 'H'	3.80	3.22	4.14
HUDSON HDG. LTD.	6.52	5.44	7.33
HUNG FUNG GROUP HDGS LTD	7.31	6.10	8.50
HUNG HING PRINT	4.61	3.88	4.88
HUTCHISON HARBOUR RING	4.49	3.78	4.77
HUTCHISON WHAMP.	1.99	1.69	2.44
HYCOMM WIRELESS LTD.	6.64	5.53	7.50
HYSAN DEV.	4.02	3.40	4.34
I100 LTD.	7.13	5.95	8.24
I-CABLE COMM.	4.00	3.38	4.32
ICBC (ASIA)	4.43	3.73	4.71
IDT INTL.	5.09	4.28	5.39
INCUTECH INVS.LTD.	7.85	6.55	9.33
ING BEIJING INV.	7.82	6.53	9.28
INNOMAXX BIOTECHNOLOGY	7.53	6.29	8.85
INTERCHINA HDG.	4.47	3.77	4.75
INTL.BANK OF ASIA	4.81	4.05	5.09
I-WOOD INTL.	6.95	5.80	7.96
JACKIN INTL.LTD.	7.84	6.55	9.32
JACKLEY HDG. LTD.	6.10	5.10	6.76
JCG HOLDINGS	4.68	3.94	4.96
JD.DYNASTY FOOD CULTURE	7.04	5.87	8.10
JIANGSU EXPRESSWAY 'H'	4.69	3.95	4.97
JIANGXI COPPER 'H'	5.46	4.58	5.88
JIAODA KUNJI HI-TECH 'H'	7.37	6.15	8.60
JILIN CHEMICAL IND. 'H'	5.77	4.83	6.30
JINGWEI TEXTILE MACH.'H'	6.63	5.52	7.49
JINHUI	7.80	6.51	9.26
JOHNSON ELECTRIC HDG.	2.98	2.53	3.38
JOYCE BOUTIQUE	6.97	5.81	7.99
JUSCO STORES	5.55	4.65	6.00
K WAH CON.MATERIALS LTD.	5.90	4.93	6.47
K WAH INTL.	5.37	4.51	5.76

K&P INTL.	8.84	7.39	10.89
KADER HDG.	7.60	6.34	8.95
KAMBOAT GROUP CO. LTD.	7.93	6.63	9.46
KANTONE HOLDINGS	7.49	6.25	8.78
KARCE INTL HDGS CO LTD	7.75	6.47	9.17
KARL THOMSON HDG.	7.66	6.40	9.04
KARRIE INTL.HLDG.LTD.	5.77	4.83	6.30
KECK SENG INV.	6.31	5.27	7.05
KEE SHING HDG.	6.81	5.68	7.75
KEL HDG.	7.63	6.37	8.99
KERRY PROPERTIES	4.00	3.38	4.32
KG NEXTVISION	7.25	6.05	8.41
KIM ENG HDGS (HKG)	6.64	5.53	7.50
KIN DON HDG. LTD.	7.55	6.30	8.87
KIN YAT HDG.	5.83	4.88	6.38
KINETANA INTL.BIOTECH	7.69	6.42	9.09
KING FOOK HDG.	7.19	6.00	8.33
KINGBOARD CHEMICALS	4.72	3.97	5.00
KINGMAKER FOOTWEAR	5.19	4.35	5.51
KITH HDG. LTD.	5.64	4.73	6.13
KIU HUNG INTL.	6.09	5.09	6.74
KOWLOON DEVELOPMENT	4.97	4.18	5.25
KOWLOON MTR.BUS HDG.	3.54	3.00	3.90
KPI COMPANY	8.01	6.69	9.58
KTP HOLDINGS	7.44	6.21	8.70
KWONG HING INTL.	6.87	5.73	7.85
KWONG SANG HONG INTL.	7.04	5.87	8.10
KWOON CHUNG BUS HLDG.	6.27	5.24	6.99
LAI FUNG HDG. LTD.	6.35	5.30	7.09
LAI SUN DEV.	6.50	5.42	7.30
LAI SUN GARM.INTL.	6.80	5.67	7.74
LAM SOON (HK.)	5.84	4.89	6.39
LE SAUNDA HDG.	6.99	5.83	8.02
LEE & MAN HANDBAG	5.93	4.96	6.52
LEE HING DEV.	5.72	4.79	6.24
LEEFUNG-ASCO PRINTERS	6.27	5.24	6.99
LEGEND GROUP LTD.	3.25	2.76	3.63
LEI SHING HONG	4.53	3.81	4.81
LERADO GROUP (HDG.)	5.50	4.61	5.93
LI & FUNG	3.15	2.68	3.54
LIFETEC GROUP LTD.	6.46	5.39	7.25
LINMARK GROUP LTD.	5.28	4.43	5.63
LIPPO	6.58	5.49	7.43
LIPPO CHINA RES.	5.99	5.01	6.60
LIU CHONG HING BANK	4.58	3.86	4.86
LIU CHONG HING INV.	5.11	4.30	5.41

LONG FAR PHARM.	6.32	5.28	7.06
LUEN TAI GP. LTD.	7.45	6.22	8.73
LUK FOOK HDG.	6.18	5.17	6.87
LUKS INDL. (GROUP) LTD.	6.43	5.37	7.21
LUNG CHEONG INTL.	6.48	5.41	7.29
LUNG KEE BER.HDG.	5.83	4.88	6.39
LUOYANG GLASS 'H'	6.81	5.67	7.75
MAANSHAN IRON & STL. 'H'	5.37	4.51	5.76
MAE HDG. LTD.	5.93	4.96	6.52
MAGICIAN INDS.HDG.	7.62	6.36	8.98
MAGNIFICENT ESTS.	7.92	6.61	9.44
MAGNUM INTL.HDG.	7.84	6.55	9.32
MAINLAND HEADWEAR HDG.	5.70	4.78	6.21
MAN SANG INTL.	7.33	6.12	8.54
MAN YUE	8.24	6.89	9.95
MANDARIN ENTERTAINMENT	6.30	5.26	7.04
MANSION HOLDINGS	7.41	6.19	8.66
MANSION HOUSE GROUP	6.57	5.48	7.41
MASCOTTE HOLDINGS	7.51	6.27	8.81
MASSIVE RES.INTL.	7.67	6.41	9.06
MATRIX HOLDINGS	6.15	5.14	6.82
MATSUNICHI COMM. HDG.	6.66	5.55	7.54
MAXX BIOSCIENCE HDG.	6.97	5.81	7.99
MEDTECH GROUP CO.	8.45	7.06	10.27
MEI AH ENTERTAINMENT	7.05	5.88	8.11
MELBOURNE ENTS.	5.74	4.81	6.26
MELCO INTL.	6.49	5.41	7.30
MIDAS INTL.HDG.LTD.	7.50	6.26	8.80
MIDLAND REALTY HOLDINGS	6.29	5.25	7.01
MILLENNIUM GP.	6.86	5.72	7.83
MILLENNIUM SENSE HDG.	8.88	7.42	10.95
MIN XIN HDG.	6.28	5.24	7.00
MING FUNG JEWELLERY	6.92	5.77	7.91
MING PAO ENTER.	6.00	5.02	6.61
MIRABELL INTL.HLDG.	6.71	5.60	7.61
MIRAMAR HTL.&INV.	4.55	3.83	4.82
MOBICON GP. LTD.	6.79	5.66	7.72
MOISELLE INTL.HDG.LTD.	6.95	5.79	7.96
MOULIN INTL.	5.35	4.49	5.72
MTR CORP.	2.74	2.34	3.17
MUI HK	6.70	5.58	7.59
MULTIFIELD INTENATIONAL	6.30	5.26	7.03
NAM FONG INTL.HLDG.	9.06	7.57	11.24
NAM HING HOLDINGS	7.79	6.51	9.24
NANJING PANDA 'H'	6.41	5.35	7.18
NANYANG HDG.	6.68	5.56	7.56

NAT.ELTN.HDG.	7.41	6.19	8.66
NATURAL BEAUTY BIO-TECH.	5.19	4.36	5.51
NEO-TECH GLOBAL LTD.	7.60	6.35	8.95
NEW ASIA REALTY	4.35	3.67	4.64
NEW CENTURY GP.HK LTD.	6.59	5.50	7.44
NEW CITY (BEIJING) DEV.	7.64	6.38	9.00
NEW ISLAND PRINT.	7.24	6.04	8.40
NEW SPRING HDG.LTD.	6.85	5.71	7.82
NEW WORLD CHINA LAND	4.83	4.06	5.10
NEW WORLD CYBERBASE LTD.	7.24	6.04	8.39
NEW WORLD DEV.	3.73	3.16	4.08
NEWOCEAN GREEN ENERGY	6.14	5.13	6.81
NEXT MEDIA LTD.	4.84	4.07	5.12
NGAI HING HONG	6.77	5.65	7.70
NGAI LIK HDG.	4.93	4.14	5.21
NORITY INTL.GROUP	7.14	5.96	8.26
NORTH EAST ELEC. 'H'	6.96	5.81	7.98
NORTHERN INTL. HDG. LTD.	8.14	6.80	9.79
OCEAN GRAND	6.14	5.13	6.81
OMNITECH GROUP	7.46	6.23	8.74
ONFEM HOLDINGS	6.51	5.43	7.32
ORIENT OS. INTL.	4.94	4.15	5.22
ORIENT POWER	7.05	5.88	8.12
ORIENT RES. GP.	7.65	6.39	9.03
ORIENTAL EXPLORER HDG.	7.78	6.49	9.22
ORIENTAL PRESS GROUP	4.67	3.93	4.95
ORIENTAL UNION HDG.	6.44	5.37	7.22
ORIENTAL WATCH HDG.	6.51	5.43	7.32
OSK ASIA CORP.	6.34	5.29	7.08
PACIFIC ANDES INTL.HDG.	6.09	5.09	6.74
PACIFIC CENTURY IN.	5.26	4.42	5.61
PACIFIC CHALLENGE HDG.	6.78	5.65	7.71
PACIFIC CONCORD HDG.	5.19	4.35	5.51
PACIFIC PLYWOOD	7.94	6.63	9.47
PACIFIC PORTS	5.26	4.42	5.61
PACMOS TECHS. HDG. LTD.	6.54	5.46	7.37
PAK FAH YEOW INTL.	6.97	5.81	7.99
PAK TAK INTL. LTD.	6.86	5.72	7.82
PALADIN	9.19	7.69	11.45
PALIBURG INTL.HOLDINGS	6.87	5.73	7.85
PCCW LIMITED	3.08	2.61	3.47
PEACE MARK	7.14	5.96	8.25
PEAKTOP INTL HDGS LTD	7.25	6.05	8.42
PEARL RIVER TYRE (HDG.)	7.56	6.31	8.89
PEGASUS INTL.HLDG.	5.79	4.85	6.33
PEKING APPAREL INTL.	8.10	6.76	9.72

PERENNIAL INTL.	8.05	6.73	9.65
PERFECTECH INTL.	6.95	5.80	7.97
PETROCHINA CO. 'H'	3.11	2.64	3.50
PICO FAR EAST HDG.	6.84	5.70	7.80
PIONEER GLOBAL GP.	6.88	5.74	7.86
PLAYMATES HDG. LTD.	6.73	5.61	7.63
POKFULAM DEV.	6.97	5.81	7.99
POLY INVESTMENT HDG.	6.76	5.63	7.68
PREMIUM LAND LTD.	5.56	4.66	6.02
PRICERITE GROUP	6.70	5.58	7.59
PRIME INVS. HDG.	9.57	8.01	12.08
PRIME SUCCESS INTL.GP.	6.98	5.82	8.01
PROSPER EVISION LTD.	6.75	5.62	7.66
PROVIEW INTL.	6.36	5.31	7.11
QINGLING MOTORS 'H'	5.37	4.50	5.75
QPL INTL.	5.43	4.55	5.83
QUALIPAK INTL. HDG.	5.43	4.55	5.83
QUALITY FOOD INTL.	6.70	5.58	7.58
QUALITY HEALTHCARE ASIA	6.33	5.29	7.07
QUAM LIMITED	8.04	6.71	9.62
RADFORD CAPITAL INV.LTD.	5.94	4.97	6.53
RAYMOND INDL.	6.58	5.49	7.42
RBI HOLDINGS	5.79	4.85	6.32
REALTY DEV.	4.80	4.04	5.08
REGAL HOTELS INTL.HDG.	6.37	5.32	7.13
RENREN HOLDINGS LTD.	9.60	8.03	12.13
RICHE MULTI-MEDIA HDG.	5.05	4.24	5.32
RISING DEV. HOLDINGS	7.29	6.09	8.48
RIVERA	5.67	4.75	6.16
RNA HOLDINGS	6.90	5.75	7.88
ROAD KING INFRASTRUCTURE	5.01	4.21	5.29
ROADSHOW HDG.	5.17	4.34	5.48
ROCKAPETTA HDG.	6.85	5.71	7.82
SAFETY GODOWN	6.01	5.03	6.63
SAINT HONORE HDG.	7.11	5.93	8.21
SAME TIME HDG.	8.06	6.73	9.66
SAMSON PAPER HDG.	6.54	5.45	7.36
SAN MIGUEL BREW.HK.	5.63	4.72	6.11
SAS DRAGON HDG.	7.25	6.05	8.41
SASA INTERNATIONAL	5.62	4.71	6.09
SC INDUSTRIAL DEV.	5.89	4.93	6.47
SCMP GROUP LTD.	4.06	3.43	4.38
SE. ASIA PROPS.&FIN.	6.60	5.50	7.45
SEA HOLDINGS	6.03	5.04	6.65
SEN HONG RES. HDGS LTD	6.27	5.24	6.99
SEWCO INTL.HDG.LTD.	6.59	5.49	7.43

SHAI.ALLIED CEMENT LTD.	5.87	4.92	6.44
SHAI.MERCHANTS HDG.	7.25	6.05	8.41
SHAI.REAL ESTATES LTD.	5.57	4.67	6.02
SHANDONG INTL.POWER 'H'	4.69	3.95	4.97
SHANDONG XINHUA PHARM 'H'	6.62	5.52	7.48
SHANG HUA HDG.LTD.	7.72	6.45	9.13
SHANGHAI CENTURY HDG.LTD	5.31	4.46	5.68
SHANGHAI INDUSTRIAL HDG.	3.61	3.06	3.97
SHANGHAI LAND HDG.	4.73	3.98	5.01
SHANGHAI MING YUAN HLDG.	6.41	5.35	7.18
SHANGRI-LA ASIA	3.71	3.14	4.06
SHANXI CENTRAL PHARM.	7.48	6.24	8.76
SHAW BROTHERS HK.	4.74	3.99	5.02
SHELL ELECTRIC MNFG.HDG.	6.13	5.13	6.80
SHENYANG PUBLIC UTL. 'H'	6.19	5.17	6.87
SHENYIN WANGUO	6.15	5.14	6.82
SHENZHEN EXPRESSWAY 'H'	5.34	4.48	5.71
SHENZHEN HIGH-TECH LTD.	5.98	5.00	6.58
SHENZHEN INTL.HDG.	4.64	3.91	4.92
SHENZHEN INV.LTD.	4.69	3.95	4.97
SHIMAO CHINA HDG. LTD.	6.25	5.22	6.96
SHOUGANG CCRD.CEN.HDG.	6.80	5.67	7.74
SHOUGANG CCRD.GRD.GP.	5.95	4.98	6.55
SHOUGANG CCRD.INTL.ENTS.	5.80	4.86	6.34
SHOUGANG CCRD.TECH.HDG.	5.97	4.99	6.57
SHUI ON CON.AND MATS.	5.19	4.35	5.51
SHUN CHEONG HDG.	8.35	6.98	10.11
SHUN HO RESOURCES	8.45	7.07	10.28
SHUN HO TECH. HDG.	8.03	6.71	9.61
SHUN TAK HOLDINGS	4.70	3.96	4.98
SICHUAN EXPRESSWAY 'H'	5.68	4.76	6.18
SILVER GRANT INTL.INDL.	5.47	4.58	5.89
SILVERNET GROUP	6.72	5.60	7.62
SIMSEN INTL. CORP. LTD.	7.98	6.67	9.54
SINCERE	7.10	5.92	8.18
SINGAMAS CONTAINER HDG.	5.75	4.81	6.27
SINGAPORE PROPERTIES	6.38	5.33	7.14
SINO GOLF HDG.	6.58	5.49	7.42
SINO HOTELS	5.34	4.48	5.72
SINO INFOTECH HDG.	6.82	5.69	7.78
SINO LAND	3.70	3.13	4.05
SINO PROSPER HDG.LTD.	6.73	5.61	7.64
SINO TECHNOLOGY INVS.	7.88	6.58	9.38
SINO-I.COM LTD.	5.99	5.01	6.61
SINOLINK WORLDWIDE	5.26	4.41	5.61
SINOPEC BEJ YANHUA 'H'	5.53	4.63	5.97

SINOPEC CORP. 'H'	3.25	2.75	3.63
SINOPEC KANTON HDG.	5.54	4.64	5.98
SINOPEC SHAL.PETROCHEM.H	4.74	3.99	5.01
SINOPEC YIZHENG CHM. 'H'	5.13	4.31	5.44
SINOPEC ZHENHAI REFN.'H'	5.24	4.40	5.58
SIS INTL.	7.46	6.23	8.74
SKY HAWK COMPUTER GP.	7.55	6.31	8.88
SKYNET (INTL GP) HDG.	8.15	6.81	9.80
SKYWORTH DIGITAL	4.87	4.10	5.15
SMARTONE TELECOM	4.25	3.58	4.55
SOFTBANK INVESTMENT	6.18	5.16	6.86
SOLARTECH INTL.HDG.	8.12	6.78	9.76
SOUNDWILL HDG.	7.44	6.21	8.70
SOUTH CHINA	5.58	4.68	6.04
SOUTH CHINA BROKERAGE	6.78	5.65	7.70
SOUTH CHINA INDS.	7.42	6.19	8.67
SOUTH EAST ASIA WOOD	4.56	3.84	4.84
SOUTH EAST GROUP LTD.	8.39	7.01	10.18
SOUTH SEA HDG. CO. LTD.	6.39	5.33	7.16
STAR EAST HDG. LTD.	7.93	6.62	9.45
STARLIGHT INTL.HDG.	7.33	6.12	8.54
STARLITE HDG.	7.11	5.93	8.20
START TECHNOLOGY CO.	6.86	5.72	7.83
STELUX HOLDINGS	6.74	5.61	7.65
STONE ELECTRONIC TECH.	5.82	4.88	6.37
STYLAND	7.34	6.12	8.55
SUGA INTL. HDG.	6.75	5.63	7.67
SUN EAST TECH. (HDG.)	6.56	5.47	7.40
SUN HING VISION GP.	5.99	5.01	6.60
SUN HUNG KAI & CO.	5.16	4.33	5.47
SUN HUNG KAI PROPS.	2.23	1.92	2.70
SUN MAN TAI HDG.	6.25	5.22	6.96
SUN MEDIA GP.HDG.	5.71	4.79	6.22
SUNCORP TECHNOLOGIES	7.57	6.32	8.90
SUNDAY COMMS.	6.36	5.31	7.11
SUNLORD CHEMICAL GP. LTD	6.24	5.22	6.95
SUNNY GLOBAL HDG.LTD.	6.60	5.50	7.45
SUNWAY INTL. HDG.	6.99	5.83	8.02
SURGE RECREATION HDG.	6.84	5.70	7.80
SUWA INTERNATIONAL HDG.	7.24	6.04	8.39
SW KINGSWAY CAPITAL	5.28	4.44	5.64
SWANK INTL. MNFG.	7.24	6.04	8.40
SWIRE PACIFIC (A+B)	2.74	2.34	3.17
SYMPHONY HDG.	6.19	5.17	6.88
TACK FAT GP.INTL.	5.84	4.89	6.39
TACK HSIN HDG.	6.13	5.12	6.79

TAI CHEUNG HDG.	5.65	4.74	6.14
TAI FOOK SECURITIES GP.	6.10	5.10	6.75
TAI PING CARPETS	6.81	5.68	7.75
TAI SANG LAND DEV.	6.03	5.04	6.66
TAK SHUN TECH.GP. LTD.	5.93	4.96	6.52
TAK SING ALLIANCE	7.02	5.85	8.06
TAKSON HOLDINGS	7.30	6.09	8.49
TANRICH FINANCIAL HDG.	7.16	5.98	8.28
TCC INTL. HDG.	5.83	4.88	6.38
TCL INTL. HOLDINGS	4.01	3.39	4.33
TEHCAP HDG. LTD.	7.99	6.67	9.55
TECHNOLOGY VENTURE HDG.	7.17	5.98	8.30
TECHTRONIC INDS.	4.42	3.72	4.70
TEEM FOUNDATION GP.	6.49	5.41	7.29
TERABIT ACCESS TECH.	7.30	6.09	8.49
TERMBRAY	5.73	4.80	6.25
TERN PROPERTIES	6.14	5.13	6.80
TEXWINCA HDG.	3.97	3.36	4.30
THE SUN'S GP.LTD.	6.29	5.25	7.02
THEME INTERNATIONAL	7.95	6.64	9.49
TIAN AN CHINA INVS.	5.45	4.57	5.86
TIAN TECK LAND	5.59	4.69	6.06
TIANJIN CAPITAL ENV. 'H'	5.91	4.95	6.49
TIANJIN DEVELOPMENT HDG.	5.21	4.37	5.54
TINGYI CYMN.ISLE.HDG.	3.59	3.04	3.95
TITAN (HDG.) LTD.	5.31	4.45	5.67
TOMORROW INTL.HOLDINGS	6.84	5.70	7.80
TOMSON GROUP LTD.	5.68	4.76	6.17
TONGDA GP. HDG.	7.00	5.84	8.04
TONIC IND HLDS	7.16	5.97	8.27
TOP FORM INTL.	6.32	5.28	7.06
TOP GLORY INTERNATIONAL	5.22	4.39	5.56
TOPSEARCH INTL.	5.83	4.88	6.38
TPV TECHNOLOGY	4.48	3.78	4.76
TRAVELSKY TECH. 'H'	5.10	4.28	5.39
TRISTATE HDG.	6.16	5.15	6.84
TRULY INTL.HDG.	5.31	4.45	5.67
TSE SUI LUEN JEWELR.INTL	8.66	7.24	10.61
TSIM SHA TSUI PROPS.	3.66	3.10	4.01
TUNGTEX HOLDINGS	5.73	4.80	6.25
TV.BROADCASTS	3.64	3.08	3.99
TYSAN HOLDINGS	7.28	6.08	8.47
UBA INVESTMENTS LTD.	7.15	5.97	8.27
U-CYBERTECHNOLOGY	6.84	5.70	7.79
UDL HOLDINGS	8.96	7.49	11.08
UNITED PACIFIC INDS.LTD.	7.11	5.93	8.20

UNITED POWER INVT.	7.09	5.91	8.17
UNITY INV. HDG.	7.90	6.60	9.41
UNIVERSAL HDG.LTD.	7.52	6.28	8.82
UNIVERSE INTL. HDG. LTD.	6.16	5.14	6.83
UPBEST GROUP	5.91	4.94	6.49
U-RIGHT INTL.	6.11	5.10	6.76
USI HOLDINGS	6.16	5.15	6.84
VAN SHUNG CHONG HDG.	6.71	5.59	7.61
VANDA SYSTEMS	6.88	5.74	7.86
VANTAGE INTL.	6.35	5.30	7.10
VARITRONIX INTL.	5.16	4.33	5.47
VEEKO INTL. HDG. LTD.	7.14	5.96	8.25
VICTORY CITY	6.34	5.29	7.09
VICTORY GROUP LTD.	9.32	7.79	11.66
VISION CENTURY CORP.	6.10	5.10	6.75
VITASOY INTL.HDG.	5.22	4.39	5.56
VST HDG.LTD.	7.60	6.34	8.95
VTECH HOLDINGS	5.06	4.25	5.34
WAH HA REALTY	7.53	6.29	8.85
WAH NAM INTERNATIONAL	7.52	6.28	8.83
WAH TAK FUNG	6.47	5.40	7.27
WAI KEE HOLDINGS	5.98	5.00	6.59
WAI YUEN TONG MEDICINE	6.03	5.04	6.65
WANG ON GROUP	7.92	6.62	9.45
WANG SING INTL.	6.38	5.33	7.14
WATER OASIS GP.LTD.	6.46	5.39	7.25
WEALTHMARK INTL.	6.88	5.74	7.86
WELLNET HOLDINGS	5.56	4.66	6.02
WHARF HDG.	2.86	2.44	3.28
WHEELOCK & CO.	3.68	3.11	4.03
WINFAIR INVESTMENT	7.68	6.42	9.08
WINFOONG INTL.	6.59	5.50	7.44
WING HANG BK.	3.91	3.30	4.24
WING LEE HDG.	7.86	6.56	9.35
WING LUNG BK.	4.02	3.40	4.34
WING ON CO.INTL.	5.27	4.43	5.63
WING SHAN INTL.	6.53	5.44	7.35
WINSAN(CHINA)INV.GROUP	7.56	6.31	8.88
WINSOR INDL.	6.03	5.04	6.66
WINSOR PROPERTIES	5.68	4.76	6.17
WINTON HDG.	6.67	5.56	7.54
WKK INTL.HDG.	6.86	5.72	7.83
WO KEE HONG HDG.	8.01	6.69	9.58
WONGS INTL.HDG.	6.00	5.02	6.61
WONSON INTL. HDG. LTD.	6.37	5.31	7.12
WORLD HOUSEWARE HDG.	6.92	5.77	7.91

WORLD TRADE BUN KEE LTD.	6.10	5.10	6.75
XINAO GAS HDG. LTD.	5.25	4.41	5.59
YANGTZEKIANG GARMENT	6.93	5.78	7.94
YANION INTL.	5.93	4.96	6.51
YANZHOU COAL MINING 'H'	4.59	3.87	4.87
YARDWAY GROUP LTD.	7.57	6.32	8.91
YAU LEE	7.36	6.15	8.59
YEEBO INTL.HDG.	6.59	5.49	7.43
YEW SANG HONG (HDG.) LTD	5.26	4.41	5.60
YGM TRADING	5.65	4.73	6.14
YIP'S CHEMICAL HDG. LTD.	6.03	5.04	6.66
YOSHIYA INTL.	8.31	6.94	10.05
YT REALTY GP.LTD.	6.47	5.39	7.26
YU MING INV.	6.19	5.17	6.88
YUE DA HDG.LTD.	7.24	6.04	8.40
YUE FUNG INTL. GROUP	8.57	7.16	10.46
YUE YUEN INDL.HDG.	3.44	2.92	3.81
YUGANG INTERNATIONAL	6.57	5.48	7.40
YUNNAN ENTER. HDG.	6.78	5.65	7.71
ZHEJIANG EXPRESSWAY 'H'	4.44	3.74	4.72
ZHEJIANG GLASS CO.LTD '	6.94	5.79	7.95
ZHONG HUA INTL. HDG.	5.90	4.93	6.47
ZHONGDA INTL.HDG.LTD.	7.51	6.27	8.82
ZHU KUAN DEVELOPMENT	6.63	5.53	7.50
ZIDA COMPUTER TECH	7.65	6.38	9.02