TRADING STRATEGIES FOR FIXED INCOME SECURITIES USING PRICING ERROR AND YIELD CURVE FACTOR ERROR

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กลยุทธ์การซื้อขายสำหรับตราสารที่ให้รายได้คงที่โดยใช้ความคลาดเคลื่อนของราคาและความคลาดเคลื่อนของปัจจัยของเส้นอัตราผลตอบแทน

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อรสิรี ตั้งสัจจธรรม : กลยุทธ์การซื้อขายสำหรับตราสารที่ให้รายได้คงที่โดยใช้ความคลาดเคลื่อนของราคาและความคลาดเคลื่อนของปัจจัยของเส้นอัตราผลตอบแทน (TRADING STRATEGIES FOR FIXED INCOME SECURITIES USING PRICING ERROR AND YIELD CURVE FACTOR ERROR) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ดร.ไทยศิริ เวทไว, 147 หน้า.

วิทยานิพนธ์ฉบับ นี้ทำการศึกษาและพัฒนากลยุทธ์การซื้อขายสำหรับตราสารที่ให้รายได้คงที่โดยอาศัยความคลาดเคลื่อนของราคาและความคลาดเคลื่อนของปัจจัยของเส้นอัตราผลตอบแทน โดยใช้แบบจำลองค่าเฉลี่ยเคลื่อนที่และแบบจำลองอนุกรมเวลาในการหาสัญญาณการซื้อขายสำหรับแต่ละกลยุทธ์ ผู้วิจัยได้ทำการศึกษาโดยอาศัย ข้อมูลของพันธบัตรรัฐบาลในประเทศเยอรมันและสหรัฐอเมริกา จากผลการวิจัยพบการวกกลับเข้าสู่ค่าเฉลี่ยของความคลาดเคลื่อนของราคาอย่างมีนัยสำคัญ และพบว่ากลยุทธ์ที่อาศัยแบบจำลองค่าเฉลี่ยเคลื่อนที่ของความคลาดเคลื่อนของราคาให้ผลตอบแทนดีกว่าอัตราผลตอบแทนของดัชนีพันธบัตรรัฐบาลในทั้งสองประเทศ และยังพบว่ากลยุทธ์ที่อาศัยความคลาดเคลื่อนของระดับของเส้นอัตราผลตอบแทนให้ผลตอบแทนดีกว่าอัตราผลตอบแทนของดัชนีพันธบัตรรัฐบาลในทั้งสองประเทศเช่นกัน แม้ว่าระดับ ของเส้นอัตราผลตอบแทนจะไม่แสดงการวกกลับเข้าสู่ค่าเฉลี่ยอย่างมีนัยสำคัญ ซึ่งเป็นการแสดงให้เห็นว่าค่าเฉลี่ยในระยะสั้นเป็นค่าพยากรณ์ที่ดีสำหรับระดับของเส้นอัตราผลตอบแทน สำหรับแบบจำลองที่ใช้ในการหาสัญญาณการซื้อขาย พบว่าสัญญาณการซื้อขายที่ได้จากแบบจำลองอนุกรมเวลาจะสร้างผลตอบแทนที่ดีกว่าสัญญาณการซื้อขายที่ได้จากแบบจำลองค่าเฉลี่ยเคลื่อนที่สำหรับกลยุทธ์ที่อาศัยความคลาดเคลื่อนของความชันและความโค้งของเส้นอัตราผลตอบแทนในทั้งสองประเทศ นอกจากนี้จากการนำแต่ละกลยุทธ์มาใช้ร่วมกันพบว่าสามารถสร้างผลตอบแทนที่ดีขึ้นได้ในประเทศเยอรมันเนื่องจากเป็นการกระจายความเสี่ยง แต่ผลของการกระจายความเสี่ยงนี้ไม่มากพอที่จะชดเชยผลตอบแทนที่ลดลงในประเทศสหรัฐอเมริกา

ภาควิชา การธนาคารและการเงิน ลายมือชื่อนิสิต .....

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This research studies and develops trading strategies for fixed income securities based on bond pricing error and yield curve factor error, which is the deviation of the yield curve factors from their historical or expected values on a particular trading day. For both pricing-error based and factor-error based strategies, the trading signals are derived by two models which are the moving average and time-series models. This empirical study is conducted for the German and U.S. government bond markets. We found the mean-reversion effects on the pricing error of the bonds in both markets and found that the pricing-error based strategy with the moving average model outperforms the benchmarks in both markets. In addition, we found that the strategy based on the deviation of the level also outperforms the benchmarks in both markets, even though the mean-reversion effects are insignificant for the level of the yield curve. This suggests that a short-term average is a good mean forecast for the level of the yield curve. Furthermore, we found that a time-series model can improve the performance of a moving average model for the strategy based on the slope and curvature of the yield curve. Combining two single strategies together, we found some improvement in the standardized returns due to diversification in the German government bond market, while the benefit of diversification is not high enough to compensate the lower return in the U.S. government bond market.

Department : Banking and Finance Student's Signature .....
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CHAPTER I

INTRODUCTION

One of the most important decisions making in investment management is the allocation of funds among asset classes. The two major asset classes are equities and fixed income securities. One major difference of these two asset classes is the risk involved in an investment. Investing in a fixed income market is usually less risky than investing in an equity market because fixed income securities are the contractual obligations to pay back the principal including the interests. In the past, fixed income securities were simple investment products. Most investors purchased these securities with the intent of holding them to their maturity dates. However, nowadays, the fixed income world has changed. The hold-to-maturity investors have been replaced by the investors who actively trade fixed income securities. Therefore, it is worthwhile to study the trading strategies on this class of assets.

Trading strategies on fixed income securities can be deployed ranging from simple arbitrage trading to complex trading based on technical or market views on the yield curve. In this research, we focus on two groups of trading strategies which are pricing-error based and factor-error based strategies. Their trading signals are derived from two models which are moving average and time-series models. The moving average model is a simple forecast method which uses a historical average as a mean forecast, while the time-series model is more complicated. For the time-series model, we need to identify the best-fit model and then use it to forecast a mean. The pricing-error based strategies are trading strategies based on pricing error of the bonds. The pricing error is defined as the market price minus the model price. The trading signals from the moving average model in this group of strategies rely on the assumption that there is a mean-reversion effect on a bond pricing error. A related paper is Jankowitsch and Nettekoven (2008). They suggested that the pricing errors of the bonds are not only the differences in liquidity and tax treatment of individual bonds or the model misspecification but these pricing errors also disclose insufficient market efficiency. Their results show that the risk-adjusted trading strategies based on bond pricing errors can provide abnormal returns compared to their benchmark in the German government bond market.

Another group of strategies, the factor-error based strategies, is a set of yield curve trading strategies. The yield curve trading strategies in our study try to take benefit from the deviations of the yield curve factors on the particular trading day relative to the historical average and forecasted values of those factors. These deviations are also called in this paper as the factor error. Following Litterman and Scheinkman (1991), we consider three factors of the yield curve, which are the level, slope and curvature. Three commonly used yield curve strategies are bullet strategy, which is a concentration at one point on the yield curve; ladder strategy, which involves in an investment across a range of maturities; and barbell strategy, which is constructed by investing in two edges of the yield curve and selling the middle point, or vice versa, see Fabozzi (1996). Essentially, bullet strategy is a bet on the level of the yields whereas ladder and barbell strategies are bets on the yield spread and curvature, respectively. We construct our portfolios for this group of strategies centering on these factors of the yield curve. The trading signals of the factor-error based strategies from the moving average model rely on the view that each yield curve factor exhibits a mean-reversion process. An empirical study on these yield curve strategies was shown in Chua, Koh, and Ramaswamy (2006). They found that some of these yield curve strategies on a risk-adjusted basis are highly profitable and outperform their benchmarks for the U.S. government bond market.

The objective of this paper is to investigate whether the strategies mentioned above outperform the benchmark in different markets. Moreover, we intend to examine the relationship between the mean-reversion effects and the performance of the single strategies which derive their trading signals from the moving average model. This paper also purposes to study whether a more complicated model such as the time-series model can improve the performance of the strategies which use the historical averages to detect their trading signals. We also study the sensitivity of the performance of our single strategy portfolios by varying the parameters which are used to derive the trading signals. According to the assumption of mean-reversion effects under the moving average model, we start our study by the test of the mean-reversion effects on pricing errors of the bonds and the yield curve factors which the previous studies omitted. We expect that if they show significant mean-reversion effects, their strategies from the moving average model will outperform the

benchmarks. In addition, other previous works have applied either pricing-error or factor-error based strategies to only one market, while our work applies both pricing-error and factor-error based strategies to the two huge bond markets in different zones which are the German and U.S. government bond markets. Furthermore, our study extends the previous studies on the pricing-error based strategies by fitting the time-series models for each type of bond instead of using AR(1) model for all bonds. We also extend the previous studies on the factor-error based strategies by deriving a trading signal based on the interval estimation instead of the point estimation. Then, like the pricing-error based strategies, we apply the time-series models to determine the trading signals for the factor-error based strategies as well. This study examines the performance of the strategies in the two government bond markets for the same time period. The benchmark portfolios are the government bond index of each market. The transaction costs are incorporated by trading at bid-price and ask-price quotations. Moreover, the two single strategies are combined together to examine whether the combined strategies can provide significant higher profit than using each strategy solely. The expectation for the combined strategy portfolios is that the combination of any two single strategies with low correlation will improve the performance over that of the individual single strategies.

CHAPTER II

LITERATURE REVIEW

In this research, we develop the trading strategies for fixed income securities based on two frameworks: bond pricing error and yield curve factor error. These two groups of strategies have been applied to the government bond market in many countries. Flavell, Meade, and Salkin (1994) applied the pricing-error based strategies to the UK government bond market for the first half of the 1990's. Their paper focuses on relative pricing error of the bonds. Their pricing error is defined as the difference between the actual clean price and the estimated price. They suggested that the pricing error should exhibit some form of mean-reversion process in order to produce some profits. Their trading signals were derived from the moving average of the recent historical pricing error for individual bonds. Their results imply that there is a mean-reversion effect on the pricing error for their data set. Then, consistently with their suggestion, the trading strategies appear to be profitable.

However, there are some papers which focus only on the direction of the pricing error. In this case, a positive (negative) pricing error is considered to be overpriced (underpriced). Nevertheless, this view might not turn out to be the optimal choice because a high liquidity bond which causes positive deviation from the model price will be considered to be overpriced even if the actual pricing error is much lower than its average level. The research of Sercu and Wu (1997) is a sample of this point of view. They applied the pricing-error based strategies to the Belgian bond market for the time period of March 1991 to December 1992. They evaluated the ability to recognize the mispriced bonds and produce trading profits of the Vasicek (1977), Cox-Ingersoll-Ross (CIR) (Cox et al., 1985), and the cubic spline model, introduced by McCulloch (1971, 1975). The model residual, which is called in our paper as the pricing error, was defined as the actual bond price minus the estimated value. A positive model residual implies that the corresponding bond is overvalued, while a negative residual implies the undervalued bond. Their paper employed a contrarian weighting scheme as one of their trading rules. This means that they bought (sold) assets which were considered to be undervalued (overvalued). Then, each trading was weighted by the size of the model residual. The larger the model residual

was, the more the position they took. The results showed that the model residual is not just a model misspecification but it is economically useful because their strategy of buying underpriced bonds or selling overpriced bonds turns out to be profitable. However, their contrarian weighting scheme is not optimal because extremely large model residuals lead to lower average profits. This implies that large model residuals are more likely to be the model misspecification than mispricing.

Then, Ioannides (2003) also applied the pricing-error based strategies to the UK government bond market for the time period of January 1995 to January 1999 by adopting the trading rules and alternative benchmarks of Sercu and Wu (1997). The trading strategy was constructed by buying (selling) undervalued (overvalued) bonds which are identified by a given term structure estimation method and weighting each transaction by the size of mispricing. In this study, Ioannides (2003) employed seven popular term structure estimation methods: Nelson and Siegel (1987), Svensson (1994), the parametric cubic spline which is introduced by McCulloch (1971, 1975), and the non-parametric splines which are developed by Adams and Van Deventer (1994), Fisher et al. (1995), Tanggaard (1995), and Waggoner (1997). This paper found that the ability to capture information in the model residuals of the two parsimonious functions, i.e. Nelson and Siegel (1987) and Svensson (1994), is better than other five spline functions because these two functions provide higher average profits. Furthermore, the results also indicate that weighting by the size of mispricing is not optimal because large size of mispricing lead to lower average returns.

Jankowitsch and Nettekoven (2008) apply the pricing-error based strategies to the German government bond market for the time period of January 1999 to May 2002. Their trading signals are derived by using the deviation of the actual pricing error from the moving average of its recent historical values, similar to the research of Flavell, Meade, and Salkin (1994). Moreover, another set of their trading signals incorporates trading on the expansion of the pricing errors by using the deviation of the actual error from its forecasted value. In this case, they use the Autoregressive model of order one, AR(1), to forecast these pricing errors. Their results show that the strategies based on bond pricing errors provide abnormal returns compared to their benchmarks on the risk-adjusted basis. Therefore, the pricing errors contain some economic information about the deviation from general market conditions of bond

prices which imply market inefficiency. These abnormal returns are continuously realized over the whole time period and also illustrate a relationship with changes in the level and the curvature of the term structure of interest rates.

For the yield curve strategies, Litterman and Scheinkman (1991) suggested that the three attributes of the yield curve, which they called level, steepness (i.e., slope) and curvature, can explain the most of the variation in returns of all fixed income securities. Alternatively, changes in the yield curve's shape are due mostly to parallel shifts, twist, and changes in the humpedness or butterfly changes. Moreover, Jones (1991) and Willner (1996) suggested that these changes in the yield curve's shape (level, slope, and curvature) are correlated with each other. Therefore, bond portfolio managers should consider all three yield curve factors as well as correlations among changes in these factors.

One of the common fixed income strategies based on the yield curve used by practitioners is riding the yield curve. This technique is constructed by purchasing bonds with the maturities longer than the planned holding period and selling them at the time when the investor had initially desired to cash out. Investors who employ this strategy hope to generate capital gains as the yields fall with the decreasing maturity of bonds. This strategy is the most profitable when the yield curve is upward sloping. Grieves and Marcus (1992) applied this yield curve strategy to the U.S. Treasuries market over the period 1949 to 1998 by using T-bills ranging in maturity from 6 to 12 months. They extended the research of Dyl and Joehnk (1981) to larger data sets for more definitive testing. The results showed that compared with the buy-and-hold strategy, 3-month rides with 6-month bills are extremely effective. On the contrary, 6-month rides with 12-month bills are not as effective due to the increasing in interest rate risk.

Pelaez (1997) also applied the riding yield curve strategy to the U.S. Treasuries market. He worked on the sample period of 1959 to 1993. This study attempted to investigate the effectiveness of longer term rides by using 2-year maturities for 1-year rides. The empirical evidences showed that compared with the buy-and-hold strategy, 1-year rides with 2-year Treasury securities generate higher average returns but do not earn the excess returns on risk-adjusted basis. Pelaez

concluded that the higher returns from longer riding the yield curve is compensated for the additional risk.

Moreover, there are other three basic yield curve strategies which are bullet, ladder, and barbell strategies. Mann and Ramanlal (1997) observed the relative performance of these three strategies under expected changes in the level of the yield curve, and the corresponding implied changes in the slope and curvature. They employed the U.S. Treasury yield curve during the period of January 1985 through December 1994. The three shape factors of the yield curve (level, slope, and curvature) are estimated by using bond prices to imply the spot rates. Then, they investigated how changes in these factors are correlated with one another and examine the relative performance of bullet and barbell strategies for various changes in the yield curves shape. This examination of the performance was accounted for correlations among the yield curve factors. They found that an upward (downward) shift in the level of the yield curve is followed by a flattening (steepening) and a decreasing (increasing) in the curvature of the yield curve. For a downward shift in the level (accompanied by the implied changes in slope and curvature), short-maturity bullet strategy outperforms short-maturity barbell strategy, and vice versa. In contrast, for longer-maturity strategies, a barbell strategy outperforms a bullet strategy when a downward shift in the level is observed, and vice versa. All of these results hold for any magnitude of the yield curves shift.

Finally, the study of Chua, Koh, and Ramaswamy (2006) examined the profitability of yield curve strategies based on the mean-reversion assumption on the yield curve. They applied the strategies to the U.S. Treasuries market for the time period of June 1964 to December 2004. This paper considered all of the three shape factors of the yield curve which are the level, slope (i.e., yield spread) and curvature, as suggested by Litterman and Scheinkman (1991). Their portfolios were constructed centering on each of the three yield curve factors. Their study showed that the yield-curve trading strategies based on the mean-reversion effect of the yield spreads (slope) are highly profitable and significantly outperformed all of their benchmarks on a risk-adjusted basis. Moreover, the trading strategies focusing on the mean-reversion of the yield spreads and curvatures are significantly outperformed a buy-and-hold strategy of the S&P index, on a risk-adjusted basis.

The researches above found some empirical evidences that both trading strategies based on bond pricing error and yield curve factor error generate excess returns compared to their benchmark portfolios in different markets. Therefore, our study adopts those strategies for fixed income securities and examines their profitability within the same market and the same restrictions. The strategies are applied to the German government bond market and the U.S. government bond market. This study aims to investigate the performance of the trading strategies on fixed income securities in different markets for the same time period. Additionally, this paper means to explore the relationship between the performance of the trading strategies which are derived from the moving average model and their mean-reversion effects. We also compare the performance of the simple moving average model with the complicated time-series model. Furthermore, we combine any two of the single strategies together and investigate the performance of the combined strategy portfolios. Our expectation on these combined strategies is that the low-correlation pair of single strategies will outperform the individual single strategy, and vice versa.

CHAPTER III

DATA AND METHODOLOGY

Data

The German government bond market is one of the largest and most liquid markets in the European Monetary Union. Therefore, the bonds of this market are usually used as input to estimate the euro-denominated term structure of riskless interest rates and are the benchmarks in EMU bond markets. In this study, we use daily data of euro-denominated German government bonds in form of market prices, ask prices, and bid prices. We use the data for the time period of January 1999 to December 2009 from Datastream. The German government bonds in this study are the series of Bubills, which is Treasury discount paper whose time to maturity is not longer than one year; Schätze, which is two-year Federal note; Bobl, which is five-year Federal note; and Bund, which is Federal bond whose time to maturity is ten years or thirty years. The time-series data for each bond maturity is constructed by replacing previous series with new series of that maturity when the new series is launched. By doing so, we get the time-series data for the specific maturity of the bonds. Moreover, we also employ daily term structure of interest rates which are estimated by Svensson (1994) model for the same time period from the website of Deutsche Bundesbank[1]. Additionally, we obtain one-month Euribor interest rate, which is the benchmark for the money and capital markets in the euro zone, from the website of Deutsche Bundesbank for the same time period. In this study, the one-month Euribor is used as a short term interest rate for borrowing and deposit in the one-month tenor.

Furthermore, the U.S. government bond market, which is one of the largest markets in the world, is also investigated in our study. We use daily data of U.S. Treasury securities in form of market prices, ask prices, and bid prices for the same time period as used for the German government bond market from Bloomberg. The US Treasury securities are Treasury bills, whose time to maturity is one year or less; Treasury notes, whose time to maturity is more than one year to ten years; and

[1] http://www.bundesbank.de

Treasury bonds, whose time to maturity is twenty years to thirty years. The time-series data for each specific bond maturity is also created in the same way as the German government bond market. Then, to make it equivalent to the German government bond market, we estimate the term structure of interest rates for the U.S. bond market by using Svensson model. This estimation by Svensson model is constructed on MATLAB. Moreover, we obtain one-month Eurodollar deposits rates from the website of the Federal Reserve[2] for the same time period and use it as a short-term interest rate for borrowing and deposit in this market.

Methodology

This paper employs two groups of trading strategies for fixed income securities which are the pricing-error based and factor-error based strategies. Therefore, the trading signals will be derived based on the deviation of the actual bond prices or yield curve factors from their estimated values. These estimated values are obtained by using historical moving-average and a time-series model. In the last section, we will also consider whether both types of errors can be combined to improve the risk-adjusted performance of the trading strategies.

Firstly, we will start with a test of the mean-reversion effect which is the underlying assumption for the historical moving-average. Due to the assumption of mean reversion on bond pricing error and yield curve factors for the moving average model, the character of pricing errors of the bonds and three factors of the yield curve are tested whether they exhibit mean reversion. Then, we examine the performance of our portfolios which are constructed from different strategies based on bond pricing error and yield curve factor error. In our paper, the yield curve factor error is the deviation of the yield curve factors from their historical average or forecasted value on a particular trading day. These portfolios are also called single strategy portfolios. After that, we use two of these single strategies together (also called combined strategy portfolios) and monitor their performance compared to the single strategy portfolios.

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[2] http://www.federalreserve.gov

1. Mean-Reversion Effects

To test for the mean reversion effects on the pricing errors of the bonds and the factors of the yield curve, we use an augmented Dickey–Fuller test (ADF), introduced by Dickey and Fuller (1979), to test for a unit root in the pricing errors of the bonds and the factors of the yield curve. If a time-series data exhibits a unit root, it means the time-series data follows a random walk process, which is a non-stationary process. In other words, there is no mean-reversion effect on that time-series data. The regression model of bonds pricing error can be written as

$$\Delta\varepsilon_{i,t} = \delta_0 \varepsilon_{i,t-1} + u_{i,t} \tag{1}$$

$$\varepsilon_{i,t} = P_{mkt_{i,t}} - P_{mdl_{i,t}} \tag{2}$$

$$P_{mdl_{i,t}} = \left(\sum_{j=1}^{nk} \frac{\left(c_{i,j}/k\right)}{\left(1 + r_{0,j}/k\right)^{j}} \right) + \left(\frac{M_i}{\left(1 + r_{0,j}/k\right)^{nk}} \right) - AI_{i,t} \tag{3}$$

Where Δ is the 1st-order difference

$\varepsilon_{i,t}$ is the pricing error for bond i on particular day t

δ is the model parameter

$u_{i,t}$ is the white noise stochastic error term for bond *i* on particular day *t*

$P_{mkt_{i,t}}$ is the market price (clean price) of bond *i* on particular day *t*

$P_{mdl_{i,t}}$ is the model price of bond *i* on particular day *t*

$c_{i,j}$ is the coupon payment per year of bond *i*

n is a total number of periods (in years)

k is a number of coupon payment per year

$r_{0,j}$ is a spot rate from the estimated term structure of interest rates

M_i is a face value of bond *i*

$AI_{i,t}$ is the accrued interest of bond *i* on particular day *t*

We conduct the ADF test by using MATLAB to examine whether the time-series data of the bonds pricing-error and the yield-curve factors are non-stationary. MATLAB will give us the test statistic for each tested time-series data. A time-series data is non-

stationary if the test statistic is larger than the critical value at the preferred significance level, which is 5% in this study. If the time-series data is non-stationary, then we conclude that there is no mean-reversion effect on that time-series data. According to the study of Litterman and Scheinkman (1991), we consider three factors of the yield curve which are the level, slope, and curvature. For the level aspect, we define the level of the yield curve as the average of all yields on the yield curve. For the slope aspects, we use the spread between the 119-month and 1-month maturities because the change in the yield spread implies the change in the slope of the yield curve. Lastly, the curvature is defined as the change in the slope of the yield curve, as shown in equation (16) below.

2. Single Strategy Portfolios

This session explains how we construct our single strategy portfolios. In this study, we use the following trading rules: the holding period of each strategy is fixed at one month to be closer to real-world investment decision where the investment horizon is certainly longer than one day. We impose the condition of cash neutrality, so any excess cash is deposited at the 1-month tenor. Similarly, the additional funding is also carried out at the 1-month tenor. The first trading day of our study is on 3 July 2006. Initial portfolios are equally weighted portfolios of the outstanding bonds. On each trading day, we observe the defined trading signals. Then, the amount of money invested in each bond *i* will be

$$inv_i = \frac{\frac{snl_i}{d_{\mathrm{mod}_i}}}{\left|\sum_j \frac{snl_j}{d_{\mathrm{mod}_j}}\right|} \cdot p \cdot Port \tag{4}$$

$$d_{\mathrm{mod}} = \frac{d_{mac}}{1+(y/k)} \tag{5}$$

$$d_{mac} = \frac{\left(\sum_{t=1}^{nk} \frac{(t/k)\cdot(c/k)}{(1+y/k)^t}\right) + \left(\frac{n\cdot M}{(1+y/k)^{nk}}\right)}{P_0} \tag{6}$$

Where inv_i is the amount of money invested in bond *i*

snl_i is the trading signal for bond *i* (1=buy, 0=hold, -1=sell)

p is the limit of trading amount in a percentage (which is set to 10%)

$Port$ is a total value of portfolio

d_{mod} is a modified duration

d_{mac} is a Macaulay duration

y is a yield to maturity

k is a number of coupon payment per year

t is a time period of the coupon payment

c is the coupon payment per year

n is a total number of periods (in years)

M is a face value of the bond

P_0 is the current bond price

We weight each trade by the modified duration of the bonds in order to equalize the interest rate sensitivity of each trade. Furthermore, we do not allow short selling of bonds. The reason is that although short selling is feasible both in the German government bond market and the US government bond market, borrowing costs may be immoderately high. In addition, we explicitly include transaction costs by selling bonds at the bid-price quotation and buying them at the ask-price quotation. According to Dimson and Hanke (2004), most of the transactions take place within the quoted bid-ask spread. Thus, for each bond, the whole bid-ask spread has to be paid and therefore completely incorporate transaction costs. The return of the trading strategy is

$$y_t^{portfolio} = \frac{portv_t}{portv_{t-1}} - 1 \tag{7}$$

$$portv_t = \sum_{i=1}^{nb_t} \left(w_{i,t-1} \cdot P_{i,t} \right) + coupon_t + cash_{t-1} \cdot \left[1 + \left(r_{t-1}^{MMY} \Big/ 12 \right) \right] \tag{8}$$

$$coupon_t = \sum_{j=1}^{nc_t} \left(c_{j,t} \cdot \left[1 + \left(r_{t-1}^{MMY} \Big/ 12 \right) \right]^{\frac{tc_j}{30}} \right) \tag{9}$$

Where $y_t^{portfolio}$ is the return of each portfolio at time *t*

$w_{i,t-1}$ is the outstanding number of bond *i* at time *t-1*

$P_{i,t}$ is a bid price of bond *i* at time *t*

nb_t is the number of bonds in the portfolio at time *t*

$cash_{t-1}$ is an excess cash from the trade (positive) or an additional cash required for the trade (negative) at time *t-1*

r_{t-1}^{MMY} is the one-month money market rate of return at time *t-1*

$c_{j,t}$ is a coupon payment of bond *j* between time *t-1* and *t*

tc_j is the number of days from the coupon payment date to time *t* of bond *j*

nc_t is the number of bonds which pay a coupon between time *t-1* to *t*

At each month, the error *e* is compared with its forecasted mean μ. If *e* is more or less than μ for at least *m* times of its forecasted standard deviation σ, then a certain action is taken according to the type of error. We will consider *e* as bond pricing error and yield curve factor errors. The values of μ and σ for each type of error will be computed from two approaches: historical moving average and time-series model. Next, we will present how the portfolios in this work are constructed.

2.1 Pricing-Error Based Strategies

The first group of the trading strategies is the pricing-error based strategies. The method for generating trading signals based on pricing error of the bonds in this thesis mainly follows Jankowitsch and Nettekoven (2008). In the first step, we employ the parameters used in estimating term structure of interest rates for the German government bond market from the website of Deutsche Bundesbank. The term structure is constructed from the estimation procedure suggested by Svensson (1994). In this model, the t-year spot rate, $r_{0,t}$, is given by

$$r_{0,t} = \beta_0 + \beta_1 \cdot \left(\frac{1-\exp\left(-t/\tau_1\right)}{\left(t/\tau_1\right)} \right) + \beta_2 \cdot \left(\frac{1-\exp\left(-t/\tau_1\right)}{\left(t/\tau_1\right)} - \exp\left(-t/\tau_1\right) \right) + \beta_3 \cdot \left(\frac{1-\exp\left(-t/\tau_2\right)}{\left(t/\tau_2\right)} - \exp\left(-t/\tau_2\right) \right) \quad (10)$$

Where β_0, β_1, β_2, β_3, τ_1, τ_2 are the model parameters. The parameters can be obtained by performing a non-linear optimization with the parameter restrictions $\beta_0 > 0$, $\tau_1 > 0$, and $\tau_2 > 0$. This procedure which is an extension of the well-known Nelson and Siegel (1987) approach is widely used by practitioners as well as financial institutions and central banks as reported in a survey of Bank for International Settlements, BIS (2005). For the U.S. government bond market, their term structure of interest rates is constructed from a quasi-cubic hermite spline model which they do not provide the model parameters. Therefore, we use Svensson model to estimate the term structure instead. This is also equivalent to the estimation of term structure in the German government bond market. In the next step, we calculate the pricing error for bond *i*, $\varepsilon_{i,t}$, which is defined as equation (2). After that, we derive our trading signals using a moving average and a time-series model. The moving average model generates trading signals based on the historical values of mispricing while the time-series model generates trading signals based on the forecasts of mean and variance.

2.1.1 Moving Average Model (PE-M)

The actual pricing error of a bond is compared to the average of its recent historical values. We use the deviation of the actual pricing error from the moving average computed over the last *k* days for each bond *i*:

$$\mu_{i,t} = \frac{1}{k} \cdot \sum_{j=t-k}^{t-1} \varepsilon_{i,j} \tag{11}$$

$$\sigma_{i,t} = \sqrt{\frac{1}{k-1} \cdot \sum_{j=t-k}^{t-1} \left(\varepsilon_{i,j} - \mu_{i,j}\right)^2} \tag{12}$$

Where $\varepsilon_{i,j}$ is the pricing error of bond *i* on day *j*.

$\mu_{i,t}$ is the sample average of the pricing error for bond *i* on particular day *t* over the last *k* days

$\sigma_{i,t}$ is the sample standard deviation of the pricing error for bond *i* on particular day *t* over the last *k* days

In this study, the number of days *k* for the calculation of the average and standard deviation above is set to 20 days.

Using the information above we define the following trading signals based on the multiplier *m*:

if $\varepsilon_{i,t} > \mu_{i,t} + \mathrm{m} \cdot \sigma_{i,t}$ then sell bond *i*

if $\varepsilon_{i,t} < \mu_{i,t} - \mathrm{m} \cdot \sigma_{i,t}$ then buy bond *i*

The multiplier *m* for the derivation of the trading signals above is set to 1 in our study.

2.1.2 Time-Series Model (PE-T)

We use time-series model to forecast the pricing errors and thus obtain trading signals. The trading signals from the time-series model are derived in the same way as the signals from the moving average model as will be shown later in this section. Firstly, we start with the selection of the appropriate time-series model by focusing on Autoregressive Integrated Moving Average model, ARIMA(p,d,q), popularized by Box and Jenkins (1970), and Generalized Autoregressive Conditional Heteroscedasticity model, GARCH(p,q), proposed by Bollerslev (1986) at the same time, also called ARIMA-GARCH. These two models include the effect of various time-series models all together. Their general forms can be written by

ARIMA(p,d,q);

$$\Delta_d \varepsilon_{i,t} = \theta + \alpha_1 \Delta_d \varepsilon_{i,t-1} + \cdots + \alpha_p \Delta_d \varepsilon_{i,t-p} + \beta_0 u_{i,t} + \beta_1 u_{i,t-1} + \cdots + \beta_q u_{i,t-q} \qquad (13)$$

Where $\varepsilon_{i,t}$ is the pricing error for bond *i* on particular day *t*

θ is a constant term

α, β are parameters of Autoregressive and Moving Average respectively

$u_{i,t}$ is the white noise stochastic error term for bond *i* on particular day *t*

Δ_d is the *d*th-order differences

p is the order of Autoregressive

d is the amount of differencing to generate the stationary time series

q is the order of Moving Average

GARCH(p,q); $$\sigma_{i,t}^2 = \omega + \varphi_1 u_{i,t-1}^2 + \cdots + \varphi_p u_{i,t-p}^2 + \gamma_1 \sigma_{i,t-1}^2 + \cdots + \gamma_q \sigma_{i,t-q}^2 \quad (14)$$

Where $\sigma_{i,t}^2$ is the variance of the white noise stochastic error term for bond *i* on particular day *t*

$u_{i,t}$ is the white noise stochastic error term for bond *i* on particular day *t*

ω is a constant term

φ is a parameter of the squared error term

γ is a parameter of the conditional variance

p is the number of lagged terms of the squared error term

q is the number of lagged terms of the conditional variances

The model selection criterion in this paper is the Bayesian information criterion (BIC) or Schwarz criterion (SBC or SBIC) which was introduced by Schwarz (1978). We apply many different lagged terms of these time-series models and choose the one which provides lowest BIC. Then, for a particular day *t* of our data set, we estimate the coefficients of the time-series models. After that, the expected pricing error and its standard deviation for the next twenty-one days, *t+21*, are calculated. The forecasted values for the next twenty-one days are used as our one-step-ahead forecasting because our holding period is one month which is assumed to be twenty-one trading days. From these results, we can obtain the respective forecasted values for the time-series of pricing errors, $\mu = \hat{\varepsilon}_{i,t+21}$ and $\sigma = \hat{\sigma}_{i,t+21}$. Then, the further setup is similar to the moving average model:

if $\varepsilon_{i,t} > \hat{\varepsilon}_{i,t+21} + \mathrm{m} \cdot \hat{\sigma}_{i,t+21}$ then sell bond *i*

if $\varepsilon_{i,t} < \hat{\varepsilon}_{i,t+21} - \mathrm{m} \cdot \hat{\sigma}_{i,t+21}$ then buy bond *i*

In our setup above, each signal is equally weighted which means that we do not concern about the size of mispricing. In other words, we will invest more in any bonds with buy signals and the cash amount invested in each of the bonds is weighted by its duration independently of the size of mispricing. Other studies which weight their investment by the size of mispricing can be seen in Sercu and Wu (1997) and Ioannides (2003).

2.2 Factor-Error Based Strategies

For another set of strategies which focus on a set of the yield curve trading strategies, we mainly follow Chua, Koh, and Ramaswamy (2006). We also consider all of the three shape factors of the yield curve which are the level, slope (i.e., yield spread) and curvature as suggested by Litterman and Scheinkman (1991). The factor error refers to the deviation of each factor of the current yield curve from its historical average or its forecasted value. The trading signals of these strategies are derived by using a moving average and a time-series model. The moving average model derives signals from the assumption of mean reversion on each yield curve factor while the time-series model concerns with the trading on the expected values of those shape factors of the yield curve. The holding period of each trade is one-month, so the relevant yield curve to compare against the historical average and the forecasted factors of the yield curve is the one-month forward yield curve which represents the expected spot rate next month based on the pure expectation hypothesis. The one-month forward interest rate at a maturity of *x* months is calculated as follows.

$$\left[1+\left(r_{1,x}/12\right)\right]^{x}=\frac{\left[1+\left(r_{0,x+1}/12\right)\right]^{x+1}}{1+\left(r_{0,1}/12\right)} \qquad (15)$$

Where $r_{0,x}$ is the spot rate at a maturity of *x* months

$r_{1,x}$ is the one-month forward interest rate at a maturity of *x* months.

Then, the one-month forward yield curve is constructed by using a set of the one-month forward interest rates over all the maturities on a particular day. For the factor-error based strategies, we consider three aspects of the yield curve strategies: level, yield spread or slope, and curvature.

2.2.1 Level Aspect

In this study, the level of the yield curve is defined as the average of all yields on the yield curve.

2.2.1.1 Moving Average Model (FE-L-M)

This strategy takes the view that the average yields (i.e., the level) of the current yield curve mean-reverts to the historical average level of the recent yield

curves. In this trade, we compare the average of all yields on the one-month forward yield curve at day *t*, $L_{f,t}$, against the moving average of the historical yield curve levels over the last 20 days, $\mu_{L,t}$. Like the PE-M strategy, we attach the multiplier *m* which is set to 1 into the standard deviation, $\sigma_{L,t}$, to determine the trading signals. If

$$L_{f,t} > \mu_{L,t} + m \cdot \sigma_{L,t}$$

then expectation is that the one-month forward yield curve would shift down. So, we will buy all the bonds with maturities longer than one month. If

$$L_{f,t} < \mu_{L,t} - m \cdot \sigma_{L,t}$$

then expectation is that the one-month forward yield curve would shift up. So, we will sell all the bonds with maturities longer than one month.

2.2.1.2 Time-Series Model (FE-L-T)

Similar to the PE-T strategy, this strategy employs ARIMA-GARCH, as defined by equation (13) and (14), to forecast the level of the yield curve and its standard deviation. In the same way as the moving average model, we compare the average of all the one-month forward yields against the forecasted yield curve level for next month, $\hat{L}_{t+21}$. The multiplier is also attached into the determination of the signals. If

$$L_{f,t} > \hat{L}_{t+21} + m \cdot \hat{\sigma}_{t+21}$$

then expectation is that one-month forward yield curve would shift down. So, we will buy all the bonds with maturities longer than one month. If

$$L_{f,t} < \hat{L}_{t+21} - m \cdot \hat{\sigma}_{t+21}$$

then expectation is that one-month forward yield curve would shift up. So, we will sell all the bonds with maturities longer than one month.

2.2.2 Slope Aspect

The yield spread of the yield curve is used because the change in the yield spread implies the change in the slope of the yield curve. We consider the spread between the 119-month and 1-month maturities on the one-month forward yield curve ($S_{f,t} = r_{1,119} - r_{1,1}$).

2.2.2.1 Moving Average Model (FE-S-M)

This strategy focuses on mean-reversion of the yield spread of the yield curve. The strategy based on the deviation of the yield spread is actually a bet on the slope of the yield curve. We compare the spread on the one-month forward yield curve, $S_{f,t}$, with the historical moving average of the corresponding yield spreads, $\mu_{S,t}$, on the recent yield curves over the last 20 days including the multiplier of the standard deviation, $\sigma_{S,t}$. If

$$S_{f,t} > \mu_{S,t} + m \cdot \sigma_{S,t}$$

then expectation is that the slope of the yield curve would flatten. So, we will buy the 120-month bond and sell the 2-month bond on the current yield curve. If

$$S_{f,t} < \mu_{S,t} - m \cdot \sigma_{S,t}$$

then expectation is that the slope of the yield curve would steepen. So, we will sell the 120-month bond and buy the 2-month bond on the current yield curve.

2.2.2.2 Time-Series Model (FE-S-T)

This strategy compares the spread between the 119-month and 1-month maturities on the one-month forward yield against the corresponding forecasted spread of the yield curve, $\hat{S}_{t+21}$, with the multiplier of its standard deviation. The forecasted yield spread is predicted by using ARIMA-GARCH model, as defined by equation (13) and (14). If

$$S_{f,t} > \hat{S}_{t+21} + m \cdot \hat{\sigma}_{t+21}$$

then expectation is that the slope of the yield curve would flatten. So, we will buy the 120-month bond and sell the 2-month bond on the current yield curve. If

$$S_{f,t} < \hat{S}_{t+21} - m \cdot \hat{\sigma}_{t+21}$$

then expectation is that the slope of the yield curve would steepen. So, we will sell the 120-month bond and buy the 2-month bond on the current yield curve.

2.2.3 Curvature Aspect

The curvature is defined as follows. Using three bonds with maturities of X, Y and Z months where X < Y < Z and corresponding one-month forward yields of $r_{1,X}$, $r_{1,Y}$ and $r_{1,Z}$, the curvature of the yield curve is:

$$c(X,Y,Z) \equiv \frac{r_{1,Y} - r_{1,X}}{Y - X} - \frac{r_{1,Z} - r_{1,Y}}{Z - Y} \quad (16)$$

In this study, we consider the maturities of 1-month, 59-month, and the 119-month bonds, on the one-month forward yield curve ($C_{f,t} = \frac{r_{1,59} - r_{1,1}}{59 - 1} - \frac{r_{1,119} - r_{1,59}}{119 - 59}$).

2.2.3.1 Moving Average Model (FE-C-M)

This strategy is based on the assumption of the mean reversion of the curvature for the whole yield curve. We compare the curvature, as measured by equation (16), on the one-month forward yield curve, $C_{f,t}$, against the historical moving average of the corresponding curvature, $\mu_{C,t}$, on the recent yield curves over the last 20 days including its standard deviation, $\sigma_{C,t}$. If

$$C_{f,t} > \mu_{C,t} + m \cdot \sigma_{C,t}$$

then expectation is that the curvature would decrease. So, we will sell the 2-month and 120-month bonds and buy the 60-month bond on the current yield curve. If

$$C_{f,t} < \mu_{C,t} - m \cdot \sigma_{C,t}$$

then expectation is that the curvature would increase. So, we will buy the 2-month and 120-month bonds and sell the 60-month bond on the current yield curve.

2.2.3.2 Time-Series Model (FE-C-T)

This strategy also considers the curvature computed using the maturities of 1 month, 59 months, and the 119 months, on the one-month forward yield curve. We compare that curvature, as calculated by equation (16), with the forecasted curvature from ARIMA-GARCH model, $\hat{C}_{t+21}$, as defined by equation (13) and (14), including its standard deviation, $\hat{\sigma}_{t+21}$. If

$$C_{f,t} > \hat{C}_{t+21} + m \cdot \hat{\sigma}_{t+21}$$

then expectation is that the curvature would decrease. So, we will sell the 2-month and 120-month bonds and buy the 60-month bond on the current yield curve. If

$$C_{f,t} < \hat{C}_{t+21} - m \cdot \hat{\sigma}_{t+21}$$

then expectation is that the curvature would increase. So, we will buy the 2-month and 120-month bonds and sell the 60-month bond on the current yield curve.

3 Combined Strategy Portfolios

After the construction of our eight single strategy portfolios, we choose two strategies from our eight single strategies and use them together. We simply combine any two single strategies which derive their trading signals from different strategies (i.e., pricing-error based and factor-error based) or different models (i.e., moving average model and time-series model). Our combined strategy portfolios are constructed by separating the initial investment into two portions equally. Each portion is invested following the selected single strategy. Then, the improvement of their performance is evaluated by comparing the standardized returns of the combined strategy portfolio against the standardized returns of each single strategy portfolio. If the standardized return of the combined strategy portfolio is higher than the standardized returns of both selected single strategy portfolios, we can conclude that they are better to use together than using them separately.

CHAPTER IV

RESULTS

Mean-Reversion Effects

The trading signals from the moving average model in this study are based on the assumption of mean-reversion effects. The signals of the pricing-error based strategies are derived from the mean-reversion effects on bonds pricing errors while the signals of the factor-error based strategies are derived from the mean-reversion effects on yield curve factors: Level, Slope (i.e., spread), and Curvature. To test for the mean-reversion effects, we test whether the data is stationary by using the augmented Dickey-Fuller test (ADF). If the data is stationary, it follows the mean reverting process.

Table 1 shows the test statistics and their logical decisions of an augmented Dickey–Fuller test (ADF) for each bond series and each factors of the yield curve for the German government bond market. The null hypothesis for this test is that there is a unit root which implies a non-stationary process. The level of significance is 5%. Hence, the corresponding critical value is -1.9416. The null hypothesis will be rejected when the test statistic is less than the critical value. The more negative the test statistic is, the stronger the rejection of the hypothesis. If the null hypothesis is rejected, the time-series data will be considered as a stationary process. In other words, there is a mean-reversion effect on the time-series data. On the other hand, we fail to reject or accept the null hypothesis when the test statistic is greater than the critical value and we will conclude that there is no mean-reversion effect. From Table 1, we found that the test statistic of the pricing error of all bond series and the curvature in Germany are less than the critical value. Thus, the pricing error of the bonds and the curvature of the yield curve exhibit the significant mean-reversion effects. For the level and slope of the yield curve, their test statistics are larger than the critical value. Thus, the null hypothesis is accepted. In other words, there are no mean-reversion effects for the level and slope of the yield curve. Therefore, we expect that our strategies based on the moving average of the pricing error of the bonds and the curvature of the yield curve will outperform the benchmark.

Furthermore, we also examine the mean-reversion effects of the pricing error of the bonds and the yield curve factors for the U.S. government bond market. Table 2, similar to the previous table, presents the test statistics and their logical decisions of an augmented Dickey–Fuller test (ADF) for each bond series and each factors of the yield curve for the U.S. government bond market. At the 5% significance level, we found that the test statistics of the pricing error of the bonds and the curvature of the yield curve are lower than the critical value. Accordingly, there are significant mean-reversion effects for the pricing error of the bonds and the curvature of the yield curve. For the level and slope of the yield curve, their test statistics are higher than the critical value. As a result, the level and slope of the yield curve do not have the significant mean-reversion effects. These results are consistent with the results for the German government bond market. Therefore, we also expect that our strategies based on the moving average of the pricing error of the bonds and the curvature of the yield curve in the U.S. government bond market outperform the benchmark.

Table 1: Test statistic and logical decision of an augmented Dickey–Fuller test (ADF) for each bond series and each factors of the yield curve in Germany

Bond series	**2 month**	**6 month**	**2 year**
Test Statistic	-14.1584	-8.8197	-7.2911
Logical Decision *	1	1	1
	5 year	**10 year**	**30 year**
Test Statistic	-5.3794	-4.9620	-3.7928
Logical Decision *	1	1	1
Yield Curve Factors	**Level**	**Slope**	**Curvature**
Test Statistic	-0.2578	-1.8244	-4.5317
Logical Decision *	0	0	1

* - The null hypothesis is that there is a unit root
- The critical value is -1.9416
- Logical decision=0 indicates acceptance of the null hypothesis
- Logical decision=1 indicates rejection of the null hypothesis

Table 2: Test statistic and logical decision of an augmented Dickey–Fuller test (ADF) for each bond series and each factors of the yield curve in United States

Bond series	**2 month**	**6 month**	**2 year**
Test Statistic	-3.8695	-4.2244	-17.0202
Logical Decision *	1	1	1
	5 year	**10 year**	**30 year**
Test Statistic	-9.5438	-23.2359	-19.9140
Logical Decision *	1	1	1
Yield Curve Factors	**Level**	**Slope**	**Curvature**
Test Statistic	-0.0288	-1.0746	-2.2336
Logical Decision *	0	0	1

* - The null hypothesis is that there is a unit root
- The critical value is -1.9416
- Logical decision=0 indicates acceptance of the null hypothesis
- Logical decision=1 indicates rejection of the null hypothesis

Single Strategy Portfolios

1 ARIMA-GARCH Model Estimation

Apart from a historical moving average model, we also employ a time-series model which is called ARIMA-GARCH model to derive the trading signals for our strategies. The appropriate lag length of the model is determined by the Bayesian information criterion (BIC). We vary the lagged terms of the time-series model to find the one which produces the lowest BIC. Table 3 shows the appropriate lag length of the ARIMA-GARCH model in both of the German and US government bond markets. The coefficients of the model are estimated by using the data for the time period of January 1999 to June 2006, as shown in Table 4 and 5. These two tables illustrate the estimated coefficients and their standard errors for each bond series and each yield curve factors in the German and U.S. government bond markets, respectively.

Table 3: Lag length of the ARIMA-GARCH model for each bond series and each yield curve factors in the German and U.S. government bond market

	Germany		**United States**	
Bond series	ARIMA	GARCH	ARIMA	GARCH
30 years	(1,0,1)	(1,1)	(4,0,5)	(1,0)
10 years	(1,0,1)	(1,2)	(5,0,5)	(1,0)
5 years	(1,0,1)	(1,1)	(4,0,3)	(1,1)
2 years	(1,0,1)	(1,2)	(5,0,3)	(1,1)
6 months	(1,0,1)	(1,1)	(3,0,4)	(2,0)
2 months	(1,0,1)	(1,2)	(2,0,1)	(1,1)
Yield curve factors				
Level	(0,1,1)	(1,1)	-	(1,1)
Slope	(2,1,4)	(1,2)	(4,1,5)	(1,2)
Curvature	(5,0,3)	(2,1)	(3,0,5)	(2,1)

Table 4: Coefficients and Standard errors of the coefficients of ARIMA-GARCH model for each bond series and each factors of the yield curve in Germany

Bond series		AR					MA				ARCH		GARCH	
	Lag length	1	2	3	4	5	1	2	3	4	1	2	1	2
30 years	Coefficient	0.9698					-0.7256				0.0912		0.8658	
	SE	0.0070					0.0201				0.0118		0.0154	
10 years	Coefficient	0.9688					-0.7206				0.1084		0.3718	0.4744
	SE	0.0038					0.0155				0.0259		0.1182	0.1043
5 years	Coefficient	0.9698					-0.7256				0.0912		0.8658	
	SE	0.0036					0.0187				0.0181		0.0284	
2 years	Coefficient	0.9870					-0.8019				0.1416		0.3256	0.4742
	SE	0.0104					0.0300				0.0302		0.2294	0.1856
6 months	Coefficient	0.9906					-0.8252				0.1590		0.6186	
	SE	0.0148					0.0271				0.0514		0.1801	
2 months	Coefficient	0.9904					-0.8214				0.1878		0.2460	0.3659
	SE	0.2196					0.3882				0.1483		0.1245	0.0347
Yield curve actors														
Level	Coefficient						-0.0766				0.0250		0.9663	
	SE						0.0243				0.0052		0.0073	
Slope	Coefficient	1.7882	-0.9064				-2.2493	1.7250	-0.3601	-0.0384	0.1560		0.7552	0.0888
	SE	0.0183	0.0177				0.0373	0.0817	0.0744	0.0294	0.0355		0.2361	0.2046
Curvature	Coefficient	-0.9789	0.5450	1.1132	0.2561	0.0503	1.7248	0.9299	-0.0397		0.1628	0.5465	0.1787	
	SE	0.1911	0.1898	0.1144	0.2210	0.0490	0.1923	0.3394	0.1924		0.0262	0.0429	0.0182	

Table 5: Coefficients and Standard errors of the coefficients of ARIMA-GARCH model for each bond series and each factors of the yield curve in United States

Bond series		AR					MA					ARCH		GARCH	
	lag length	1	2	3	4	5	1	2	3	4	5	1	2	1	2
30 years	Coefficient	1.3593	-1.3163	0.9865	-0.7717		-1.1714	1.0760	-0.8213	0.6721	0.0821	1.0000			
	SE	0.0599	0.1001	0.0938	0.0539		0.0619	0.0865	0.0737	0.0406	0.0243	0.0573			
10 years	Coefficient	1.8500	-1.9668	0.7847	0.1006	-0.4318	-1.7116	1.6031	-0.2718	-0.5069	0.5832	1.0000			
	SE	0.0495	0.1155	0.1528	0.1112	0.0464	0.0337	0.0785	0.1042	0.0761	0.0316	0.0529			
5 years	Coefficient	-0.8677	0.8507	0.4319	-0.3290		1.6339	0.3126	-0.3470			0.9997		0.0003	
	SE	0.0588	0.0671	0.0513	0.0532		0.0516	0.1024	0.0518			0.0272		0.0942	
2 years	Coefficient	1.8337	-1.0978	1.1513	-1.8392	0.9222	0.0779	0.0710	-0.9228			0.2208		0.7792	
	SE	0.0702	0.0625	0.0137	0.0677	0.0657	0.0560	0.0561	0.0559			0.0404		0.0008	
6 months	Coefficient	-0.1609	0.1195	0.9807			0.5934	0.4146	-0.4927	0.0562		0.9634	0.0366		
	SE	0.0032	0.0032	0.0024			0.0237	0.0187	0.0177	0.0213		0.0471	0.0244		
2 months	Coefficient	1.1973	-0.2006				-0.6760					0.3136		0.6864	
	SE	0.0457	0.0453				0.0295					0.0178		0.0092	
Yield curve factors															
Level	Coefficient											0.0238		0.9660	
	SE											0.0051		0.0078	
Slope	Coefficient	-0.8575	-0.6484	-0.5826	-0.7482		0.8545	0.7601	0.7207	0.8648	-0.0361	0.2309		0.4144	0.3547
	SE	0.0359	0.0467	0.0394	0.0262		0.0561	0.0554	0.0495	0.0406	0.0449	0.0224		0.1015	0.0882
Curvature	Coefficient	-0.5386	0.6194	0.8737			1.5375	0.9313	0.0758	0.1587	0.0892	0.0372	0.2382	0.7245	
	SE	0.0136	0.0090	0.0108			0.0330	0.0550	0.0594	0.0476	0.0295	0.0114	0.0286	0.0287	

2 Performance

The performance of our single strategy portfolios is measured by using the standardized excess returns. These returns are the excess returns of any portfolio over the returns of the benchmark portfolio. In this study, we use the government bond indices as our benchmarks which are the REX index for the German government bond market and the Merrill Lynch U.S. Treasury index for the U.S. government bond market.

Firstly, the moving average model is employed to derive the trading signals. Their trading signals are obtained by combining a number of 20 days (k=20) with a multiplier of 1 (m=1). Moreover, on each trading day, the total trading amount is limited at 10% of the total value of the portfolio.

Figure 1 illustrates the standardized excess returns of our four single strategy portfolios which use the moving average model to derive their trading signals for the German government bond market. According to the test of mean-reversion effects in the previous section, we expect that the strategies based on the moving average of the pricing error of the bonds, PE-M, and the moving average of the curvature of the yield curve, FE-C-M, will outperform the benchmark. From Figure 1, we found that the performance of the PE-M and the FE-C-M portfolios are consistent with our expectation. Both of them provide positive standardized excess returns. Besides, we found that the strategy based on the moving average of the slope (i.e., spread) of the yield curve, FE-S-M, underperforms the benchmark as the mean-reversion effect for the slope of the yield curve is insignificant. However, for the strategy based on the moving average of the level of the yield curve, FE-L-M, we found the largest standardized excess returns, even though the mean-reversion effect for the level of the yield curve is insignificant. This unexpected result could be occurred because our moving average model is a bit different from the mean-reversion model. The mean-reversion model assumes that there is a long-term average which the level of the yield curve will move to, while our moving average model uses a short-term average which is updated over time. This implies that an updated short-term average is a good mean forecast for the level of the yield curve. Therefore, the strategy can outperform the benchmark by using the moving average model, even though the mean-reversion effect is insignificant.

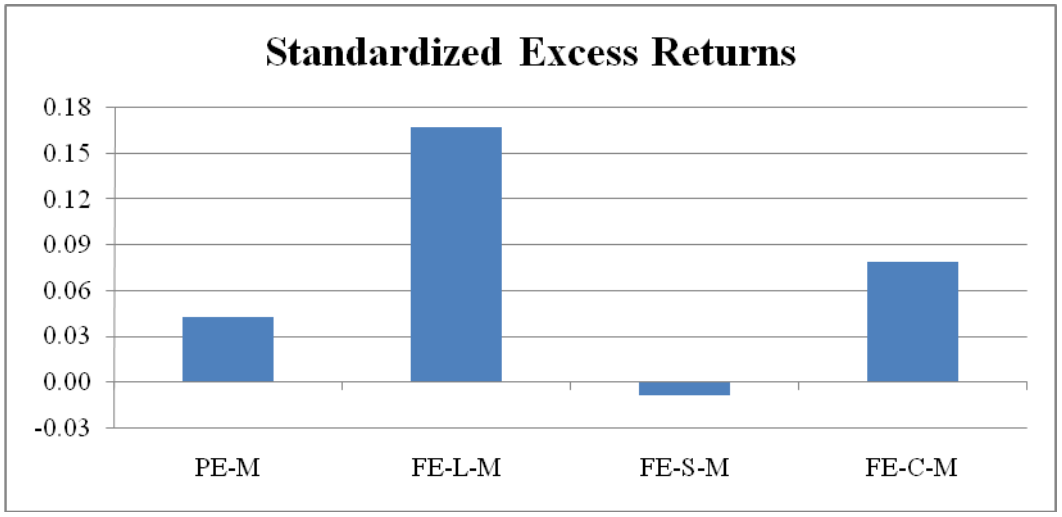

Figure 1: Standardized excess returns of portfolios using the moving average model for the German government bond market

Similar to Figure 1, Figure 2 demonstrates the standardized excess returns of our four single strategy portfolios which use the moving average model to derive their trading signals for the U.S. government bond market. In accordance with the test of mean-reversion effects for this market, we also expect that the strategies based on the moving average of the pricing error of the bonds, PE-M, and the moving average of the curvature of the yield curve, FE-C-M, will outperform the benchmark. From Figure 2, we found that the performance of the PE-M and the FE-S-M portfolios are still consistent with our expectation and also with the results for the German government bond market. The PE-M portfolio provides positive standardized excess returns, while the FE-S-M portfolio provides negative standardized excess returns. For the FE-L-M portfolio, we still found the largest standardized excess returns, even though the mean-reversion effect for the level of the yield curve is insignificant. Nevertheless, in contrast to our expectation and the results for the German government bond market, the FE-C-M portfolio provides negative standardized excess returns. This result is also inconsistent with its mean reversion behavior. The reason for this inconsistency might be its weakness of the mean-reversion effects. The curvature in the U.S. government bond market shows weaker rejection of the hypothesis that there is a unit root because its test statistic, which is used in the ADF test, is less negative than that of the German government bond market and also close to the critical value. This implies that the curvature in U.S. has a weak mean-reversion

effect. Therefore, although the curvature in the U.S. government bond market exhibits the mean-reversion process as in the German government bond market, the FE-C-M portfolio might be able to underperform the benchmark if its mean-reversion effect is relatively small compared to the effect from noises. Finally, for the moving average model, we suggest that diversification which arises from investing in a variety of maturities of the bonds is another key reason that the strategies based on the pricing error of the bonds and the level of the yield curve outperform in both markets

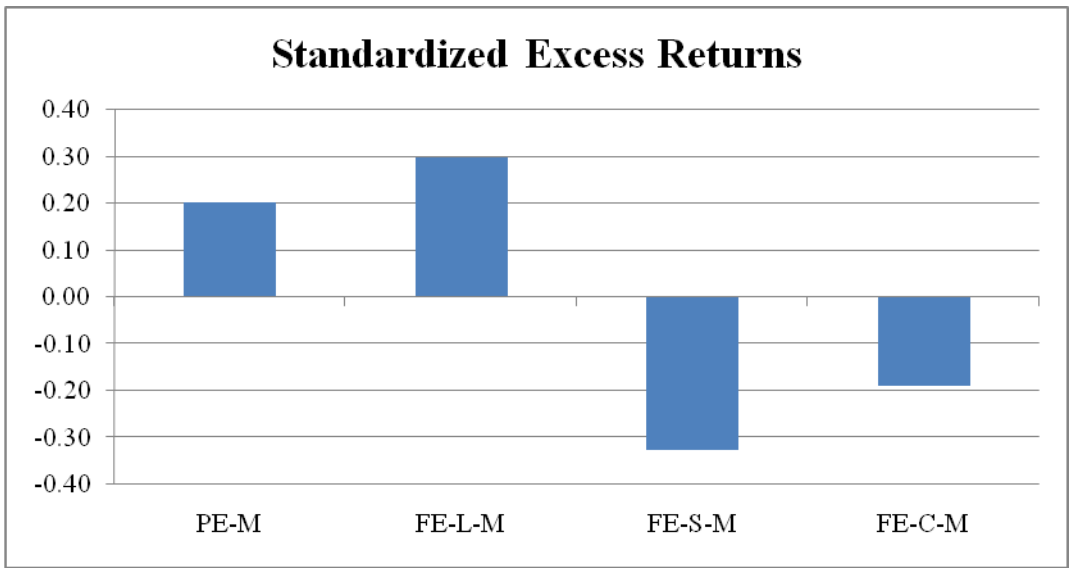

Figure 2: Standardized excess returns of portfolios using the moving average model for the U.S. government bond market

After that, we try to improve the strategies which derive their trading signals from the simple moving average model by using more complicated models. Therefore, the time-series model, i.e., ARIMA-GARCH, is also employed to derive the trading signals for the same strategies: pricing-error and factor-error. Their trading signals are obtained by using a multiplier of 1 (m=1). In addition, on each trading day, the total trading amount is limited at 10% of total value of the portfolio.

As shown in Figure 3 and Figure 4, our time-series model obviously improves the performance of the strategies based on the slope and curvature of the yield curve, FE-S and FE-C, for both markets. Table 6 and Table 7, which exhibit the excess returns before standardized, also show that although the standard deviations from the time-series models are higher, the corresponding excess returns are large enough to

compensate these higher standard deviations for FE-S and FE-C strategies. For the U.S. government bond market, even though the FE-S and the FE-C strategies produce negative standardized excess returns for our sample period, their time-series models produce less negative values than the moving average models. Moreover, we also found that the time-series model cannot improve the performance of the strategy based on the level of the yield curve, FE-L, for both markets. These results imply that the behavior of the slope and curvature of the yield curve can be captured by using the time-series model more accurately than using the moving average model. In contrast, behavior of the level of the yield curve can be captured by using the moving average model more accurately, even though the mean-reversion effect is not statistically significant. However, for the strategy based on the pricing error of the bonds, PE, the improvement by the time-series model occurs only in the U.S. government bond market. We perceive that the means and the volatilities of the historical moving average and the time-series models, which are used to derive trading signals, are calculated by using different methods. Therefore, a more complicated model like a time-series model may introduce noises and hence will not be able to improve the performance of a moving average model in some cases like what we found in the pricing error of the German bond market.

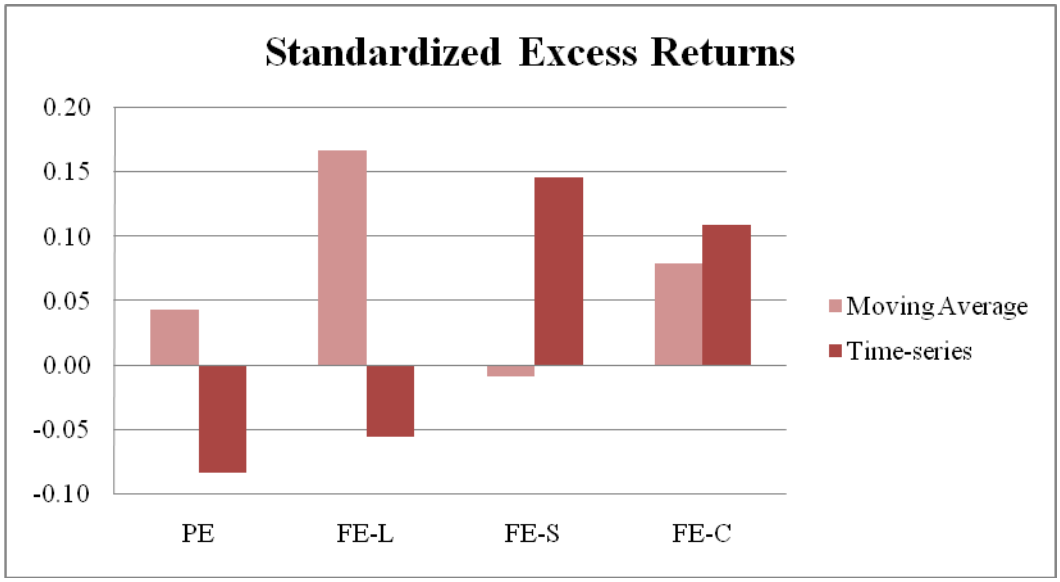

Figure 3: Standardized excess returns of portfolios using the moving average model and the time-series model for the German government bond market

Table 6: Excess returns over the benchmark and their standard deviation for the German government bond market

Historical Moving Average Models:	**PE-M**	**FE-L-M**	**FE-S-M**	**FE-C-M**
Excess Returns (over Benchmark)	0.0007	0.0027	-0.0001	0.0012
Standard Deviation	0.0153	0.0161	0.0143	0.0151
Time-Series Models:	**PE-T**	**FE-L-T**	**FE-S-T**	**FE-C-T**
Excess Returns (over Benchmark)	-0.0009	-0.0006	0.0042	0.0021
Standard Deviation	0.0108	0.0101	0.0288	0.0194

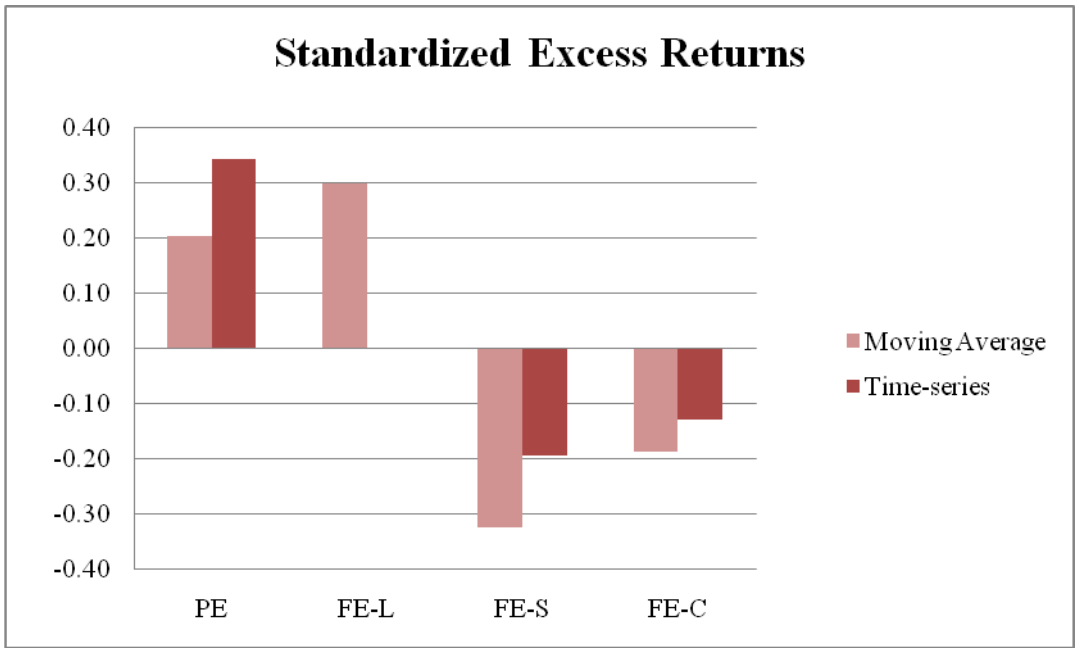

Figure 4: Standardized excess returns of portfolios using the moving average model and the time-series model for the U.S. government bond market

Table 7: Excess returns over the benchmark and their standard deviation for the U.S. government bond market

Historical Moving Average Models:	**PE-M**	**FE-L-M**	**FE-S-M**	**FE-C-M**
Excess Returns (over Benchmark)	0.0080	0.0078	-0.0055	-0.0034
Standard Deviation	0.0398	0.0263	0.0170	0.0183
Time-Series Models:	**PE-T**	**FE-L-T**	**FE-S-T**	**FE-C-T**
Excess Returns (over Benchmark)	0.0127	-0.0001	-0.0044	-0.0026
Standard Deviation	0.0372	0.0194	0.0225	0.0200

3 Robustness Test

In this section, we examine the sensitivity of the performance of our single strategy portfolios in the previous section to different values of the parameters: the number of days *k*, the multiplier *m*, and the percentage of trading *p*. Firstly, we vary the number of days *k* which is used to compute the mean and standard deviation in the moving average model. The number of days *k* is set to 5, 10, 15, 20, 30, 60, 90, 180, 360. In this case, the multiplier and the percentage of trading are fixed at 1 and 10%, respectively. We found that the strategies which outperform the benchmark at the number of 20 days keep outperforming at almost all varied values of *k*. In the mean time, the strategies which underperform the benchmark at the number of 20 days keep underperforming at almost all varied values of *k*. However, the magnitude of the standardized excess returns is quite sensitive to the values of *k*. Figure 5 and Figure 6 exhibit the standardized excess returns of the portfolios which use the strategy based on the moving average of the pricing error of the bonds, PE-M, in the German government bond market and the U.S. government bond market, respectively. These two figures illustrate that the PE-M portfolio outperforms the benchmark at almost all varied values of *k*, x-axis, in both markets with some exception in the German government bond market. Additionally, the magnitudes of the returns in the German market fluctuate more than those in the U.S. market. In other words, the performance

of the PE-M portfolio in the German government bond market is likely to increase in *k* while that in the U.S. government bond market seems to remain stable for all values of *k*. This implies that the German government bond market is more volatile than the U.S. government bond market in our sample period as it requires longer period of data to achieve better performance. Other single strategy portfolios are similar to the PE-M portfolio. The performance of all strategies in the German market is more sensitive than in the U.S. market (more details are available in Appendix B).

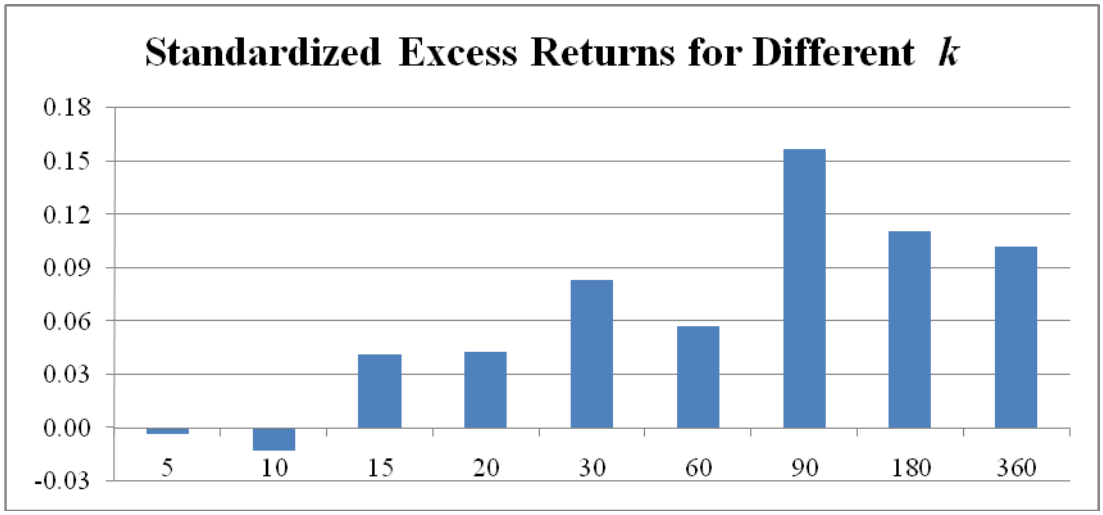

Figure 5: Standardized excess returns of the PE-M portfolio at different values of k in the German government bond market

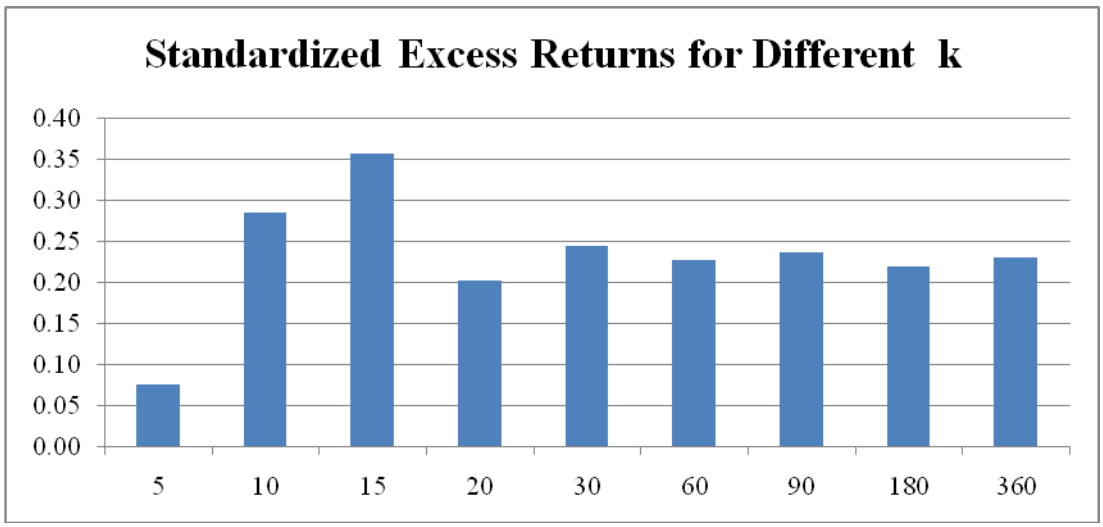

Figure 6: Standardized excess returns of the PE-M portfolio at different values of k in the U.S. government bond market

After that, we vary the multiplier *m* which is used to construct the interval in both the moving average and time-series models. The multiplier *m* is set to 0, 0.5, 1, 1.5, and 2. In this case, the number of day and the percentage of trading are fixed at 20 days and 10%, respectively. Figure 7 and Figure 8 display the standardized excess returns of the portfolios which use the strategy based on the moving average of the pricing error of the bonds, PE-M, at the different values of *m* in the German and U.S. government bond markets, respectively. Similar to the change of *k*, we found that the performance of the strategy based on the moving average of bond pricing errors in the German government bond market is more sensitive to different values of *m* than in the U.S. government bond market. Furthermore, these figures show that using *m* equal to zero provides negative standardized excess returns in both markets. This result suggests that using the multiplier of 0 which refers to the most frequently trading will take into account a noise as a trading signal for the PE-M portfolio. Besides, the figures also illustrate that the higher the value of *m*, the better the performance of the pricing-error based strategies in the Garman government bond market. On the other hand, the lower the value of *m* (except for *m*=0), the better the performance in the U.S. government bond market. These imply that the pricing errors in Germany are mostly noises rather than actual mispricing. However, this effect does not hold for other strategies. We also found that the performance of the time-series models is more sensitive to the different values of *m* than the moving average model (more details are available in Appendix C).

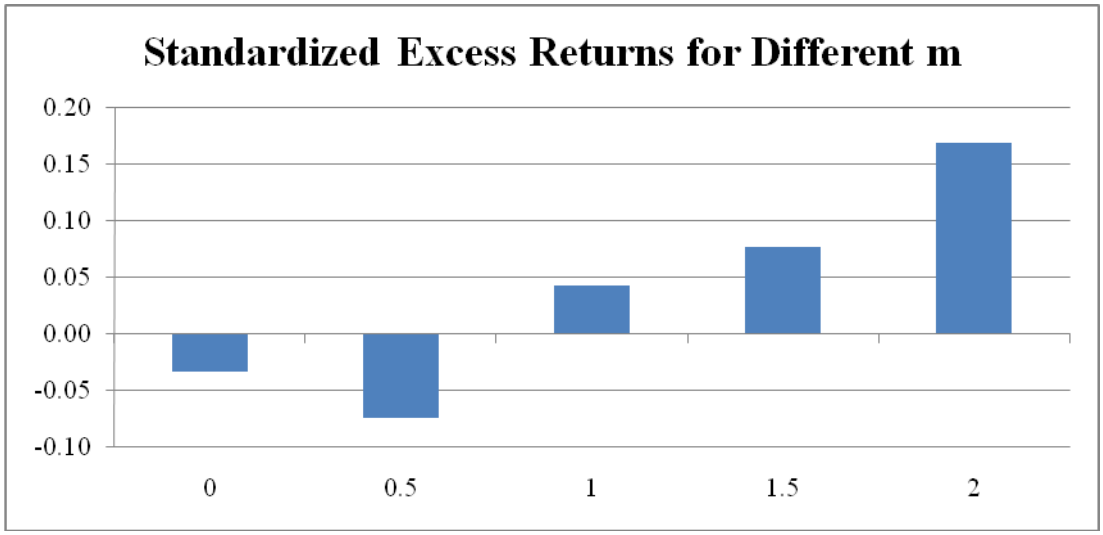

Figure 7: Standardized excess returns of the PE-M portfolio at different values of m in the German government bond market

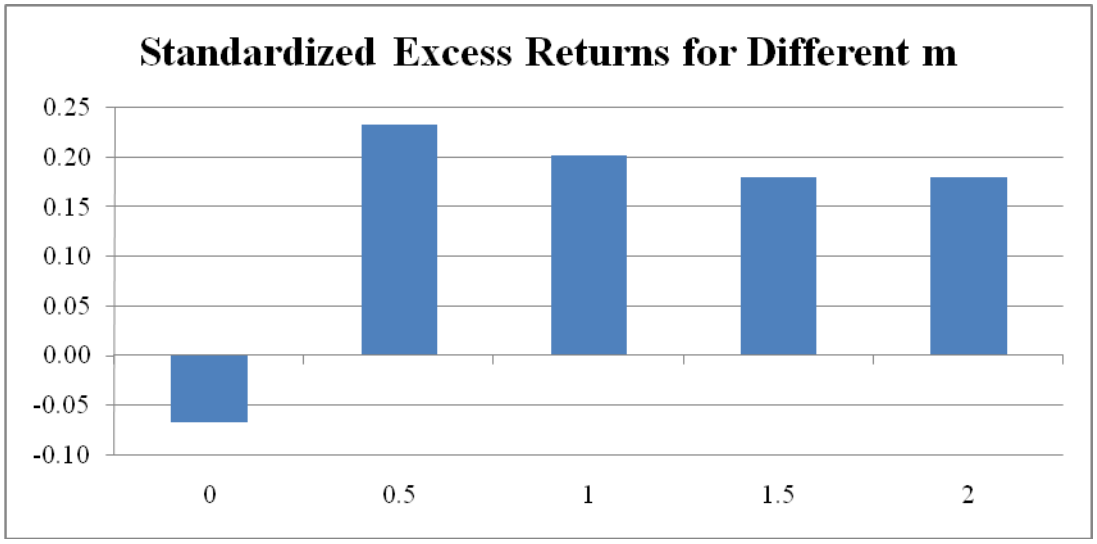

Figure 8: Standardized excess returns of the PE-M portfolio at different values of m in the U.S. government bond market

Finally, we vary the limitation of the trade, i.e., the percentage of trading *p*, while the number of day and the multiplier are fixed at 20 days and 1, respectively. The percentage of trading *p* is set to 5%, 10%, 15%. We found that, for the outperformed portfolios, the performance of portfolios is better when *p* is larger as shown in Figures 9 and 10. These two figures show the standardized excess returns of the portfolios which use the strategy based on the moving average of the pricing error

of the bonds, PE-M, at the different values of *p* in the German and U.S. government bond markets. On the contrary, the performance of our portfolios is worse when *p* is larger, for the underperformed portfolios.

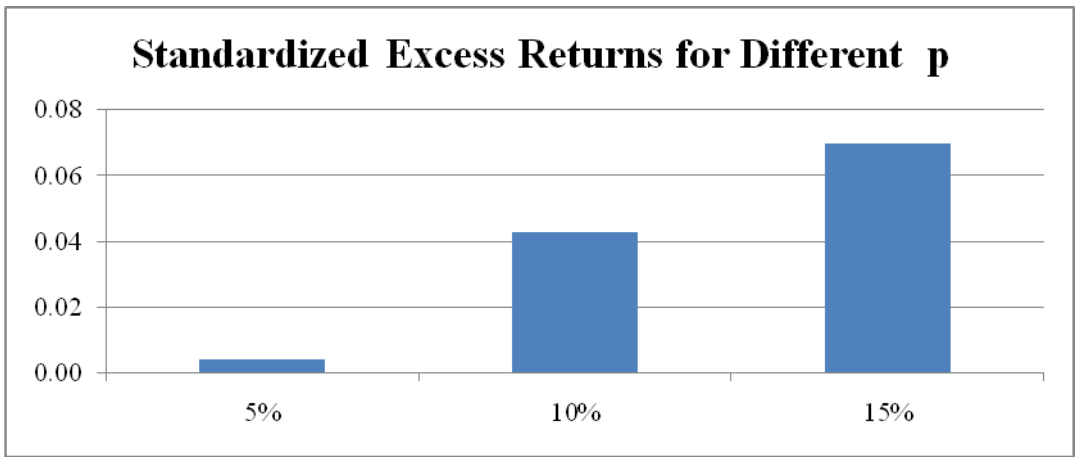

Figure 9: Standardized excess returns of the PE-M portfolio at different values of p in the German government bond market

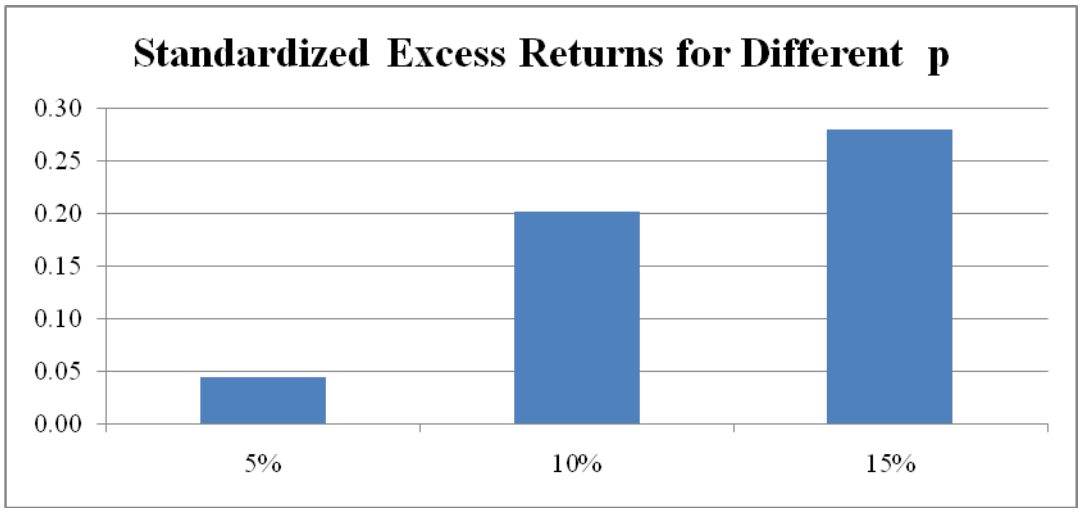

Figure 10: Standardized excess returns of the PE-M portfolio at different values of p in the U.S. government bond market

Combined Strategy Portfolios

In this section, we try to improve the trading strategies by using two single strategies together. We combine any two single strategies which use different based strategies (i.e., pricing-error based and factor-error based) or different models (i.e., moving average model and time-series model) to derive their trading signals. In this research, this combination is called the combined strategy. Table 5 presents the results of the improvement and the correlation of each combined strategy for the German government bond market. The improvement is defined by their standardized returns. We will conclude that there is an improvement if the standardized returns of the combined-strategy portfolios are higher than the standardized returns of both single-strategy portfolios. Besides, this table also shows the correlation for the monthly returns between any two single strategies which are brought to use together. We found that there is no significant improvement for the combined strategies which are highly correlated. The two single-strategy portfolios with high correlation imply that their profits or losses of the strategies often occur simultaneously. Thus, their combination cannot improve the performance from each single strategy portfolio. This implies that the improvement arises from diversification. The average returns of the combined-strategy portfolios will be in between those values of each single-strategy portfolios. Then, although the returns are smaller than the return of one of the single-strategy portfolio, the improvement will occur if the risk or the standard deviation is low enough. However, the benefit of diversification is not high enough to compensate the lower returns in the U.S. government bond market, as shown in Table 6. In conclusion, we suggest that the combined strategies from our eight single strategies can be used only when the performance of those single strategies is not too much difference and their correlations are not too high.

Table 8: The combined strategy for the German government bond market

Combined Strategy Portfolios		Standardized Returns			Improvement	Correlation
		1st Single-Strategy Portfolio	2nd Single-Strategy Portfolio	Combined-Strategy Portfolio		
Cross Model						
PE-M, PE-T		0.3365	0.3299	0.3358	No	0.9784
FE-L-M, FE-L-T		0.4458	0.3888	0.5041	Yes	0.3861
FE-S-M, FE-S-T		0.3044	0.3022	0.3640	Yes	0.2875
FE-C-M, FE-C-T		0.3753	0.3400	0.3909	Yes	0.6434
Cross Strategies						
Moving Average Model	**PE-M, FE-L-M**	0.3365	0.4458	0.4721	Yes	0.4032
	PE-M, FE-S-M	0.3365	0.3044	0.3361	No	0.8136
	PE-M, FE-C-M	0.3365	0.3753	0.3785	Yes	0.7580
Time-series Model	**PE-T, FE-L-T**	0.3299	0.3888	0.3596	No	0.9858
	PE-T, FE-S-T	0.3299	0.3022	0.3582	Yes	0.3492
	PE-T, FE-C-T	0.3299	0.3400	0.4083	Yes	0.2698

Table 9: The combined strategy for the U.S. government bond market

Combined Strategy Portfolios		Standardized Returns			Improvement	Correlation
		1st Single-Strategy Portfolio	2nd Single-Strategy Portfolio	Combined-Strategy Portfolio		
Cross Model						
PE-M, PE-T		0.3339	0.4825	0.4946	Yes	0.6291
FE-L-M, FE-L-T		0.4990	0.2685	0.4731	No	0.0986
FE-S-M, FE-S-T		-0.0160	0.0376	0.0144	No	0.8856
FE-C-M, FE-C-T		0.0994	0.1337	0.1219	No	0.7240
Cross Strategies						
Moving Average Model	**PE-M, FE-L-M**	0.3339	0.4990	0.4700	No	0.3239
	PE-M, FE-S-M	0.3339	-0.0160	0.2582	No	0.6507
	PE-M, FE-C-M	0.3339	0.0994	0.2822	No	0.5893
Time-series Model	**PE-T, FE-L-T**	0.4825	0.2685	0.4728	No	0.4250
	PE-T, FE-S-T	0.4825	0.0376	0.4150	No	0.7100
	PE-T, FE-C-T	0.4825	0.1337	0.4464	No	0.7277

CHAPTER V

CONCLUSION

This study focuses on the trading strategies for fixed income securities. We separate them into two groups of based strategies which are the pricing-error based and the factor-error based strategies. The factor-error based strategies are the strategies based on the deviation of the yield curve factors: Level, Slope (i.e., spread), and Curvature. The trading signals of each strategy are derived from the moving average and time-series models. This research is conducted for the German and U.S. government bond markets. Firstly, due to the assumption of mean-reversion effects behind our moving average model, we test for the mean-reversion effects of the pricing error of the bonds and the yield curve factors in both markets. We found that the pricing error of the bonds and the curvature of the yield curve exhibit mean reversion at the 95% confidence level. At the same time, the level and spread of the yield curve do not reveal significant mean reversion at this level of confidence. These mean-reversion effects hold in both markets.

Then, we examine the performance of our single-strategy portfolios by considering their standardized excess returns. For the moving average model, we found that the pricing-error based strategy outperforms the benchmark which is consistent with their mean-reversion effects in both markets. However, the strategy based on the deviation of the curvature outperforms the benchmark only in the German government bond market, even though we found the mean-reversion effects for the curvature in both markets. This unexpected result occurs from the weakness of the mean-reversion effects for the curvature in the U.S. market. Consequently, although the curvature in the U.S. government bond market demonstrates the mean-reversion process, the FE-C-M portfolio might be able to underperform the benchmark if its mean-reversion effect is relatively small compared to the effect from noises. Furthermore, we also found that the strategy based on the deviation of the level outperforms the benchmarks, even though the mean-reversion effects for the level of the yield curve in both markets are insignificant. This inconsistency result might occur because our moving average model relies on a short-term average, while

the mean-reversion model bases on a long-term average. Therefore, the strategy can outperform the benchmark, even though the mean-reversion effect is insignificant, if a short-term average is a good mean forecast for the level of the yield curve. Besides, our results also suggest that the diversification, which arises from investing in a variety of maturities of the bonds, is another common reason that the strategies based on the pricing error and the level outperform the benchmarks in both markets.

Moreover, we try to improve the trading strategies by applying a more complicated model which is the time-series model, ARIMA-GARCH, instead of the moving average model. We found that the time-series model obviously improves the performance for the strategies based on the spread and curvature of the yield curve in both markets. This result implies that the movement of the spread and curvature can be well defined by the time-series model. The results also suggest that the strategy based on the level is the best to use with the moving average model, even though the mean-reversion effects of the level are insignificant. For the strategy based on the pricing error of the bonds, we found that a more complicated model like a time-series model can improve the performance of a moving average model only in the U.S. government bond market. For the German bond market, a time-series model seems to introduce noises and hence cannot improve the performance of a moving average model. Therefore, the strategy based on the pricing error in the U.S. market is suitable for the time-series model, while it is suitable for the historical moving average model in the German market. We could say that although the historical moving average and time-series models are both rely on the assumption of the mean-reversion effects, their means and volatilities, used to derive trading signals, are calculated by using different methods. Therefore, these two models might be able to give different results. We also found that the performance mentioned above is sensitive to the different values of the parameters which are used to derive the trading signals.

Finally, we combine the two single strategies which derive from different model or different based strategies together. In the German government bond market, we did not find the significant improvement in the performance of the combination of the two highly correlated single strategies. The high correlation implies that the profits or losses are produced simultaneously so the combination cannot improve the performance from using them solely. Thus, we conclude that this improvement occurs

as a result of diversification. However, in the U.S. government bond market, the benefit of this diversification is not high enough to compensate the lower returns. Therefore, we suggest that the combined strategy is suitable for any two single strategies which are not highly correlated and not too much difference in their returns.

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APPENDICES

APPENDIX A

Table 10: List of German Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue date	Maturity date
1	6% Bund of 1986 (2016)	DE0001134468	6.000%	20/6/1986	20/6/2016
2	5.625% Bund of 1986 (2016)	DE0001134492	5.625%	20/9/1986	20/9/2016
3	6.25% Bund of 1993 (2024)	DE0001134922	6.250%	29/12/1993	4/1/2024
4	6.5% Bund of 1997 (2027)	DE0001135044	6.500%	3/7/1997	4/7/2027
5	5.625% Bund of 1998 (2028)	DE0001135069	5.625%	4/1/1998	4/1/2028
6	4.75% Bund of 1998 second issue (2028)	DE0001135085	4.750%	7/10/1998	4/7/2028
7	3.75% Bund of 1999 (2009)	DE0001135101	3.750%	4/1/1999	4/1/2009
8	4% Bund of 1999 (2009)	DE0001135119	4.000%	24/3/1999	4/7/2009
9	4.5% Bund of 1999 (2009)	DE0001135127	4.500%	4/7/1999	4/7/2009
10	5.375% Bund of 1999 (2010)	DE0001135135	5.375%	22/10/1999	4/1/2010
11	6.25% Bund of 2000 (2030)	DE0001135143	6.250%	4/1/2000	4/1/2030
12	5.25% Bund of 2000 first issue (2010)	DE0001135150	5.250%	5/5/2000	4/7/2010
13	5.25% Bund of 2000 second issue (2011)	DE0001135168	5.250%	29/9/2000	4/1/2011
14	5.5% Bund of 2000 (2031)	DE0001135176	5.500%	27/10/2000	4/1/2031
15	5% Bobl Series 137	DE0001141372	5.000%	16/8/2000	17/2/2006
16	4.5% Bobl Series 138	DE0001141380	4.500%	14/2/2001	18/8/2006
17	5% Bund of 2001 (2011)	DE0001135184	5.000%	23/5/2001	4/7/2011
18	4% Bobl Series 139	DE0001141398	4.000%	22/8/2001	16/2/2007
19	5% Bund of 2002 first issue (2012)	DE0001135192	5.000%	28/12/2001	4/1/2012

Table 10: List of German Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue date	Maturity date
20	4.5% Bobl Series 140	DE0001141406	4.500%	20/2/2002	17/8/2007
21	5% Bund of 2002 second issue (2012)	DE0001135200	5.000%	26/6/2002	4/7/2012
22	4.25% Bobl Series 141	DE0001141414	4.250%	14/8/2002	15/2/2008
23	4.5% Bund of 2003 (2013)	DE0001135218	4.500%	31/12/2002	4/1/2013
24	4.75% Bund of 2003 (2034)	DE0001135226	4.750%	22/1/2003	4/7/2034
25	3% Bobl Series 142	DE0001141422	3.000%	11/4/2003	11/4/2008
26	3.75% Bund of 2003 (2013)	DE0001135234	3.750%	24/6/2003	4/7/2013
27	3.5% Bobl Series 143	DE0001141430	3.500%	25/9/2003	10/10/2008
28	4.25% Bund of 2003 (2014)	DE0001135242	4.250%	21/10/2003	4/1/2014
29	3.25% Bobl Series 144	DE0001141448	3.250%	2/2/2004	17/4/2009
30	2% Schatze of 2004 (2006)	DE0001137057	2.000%	18/2/2004	10/3/2006
31	4.25% Bund of 2004 (2014)	DE0001135259	4.250%	25/4/2004	4/7/2014
32	2.75% Schatze of 2004 (2006)	DE0001137065	2.750%	26/5/2004	23/6/2006
33	3.5% Bobl Series 145	DE0001141455	3.500%	25/8/2004	9/10/2009
34	2.5% Schatze of 2004 (2006)	DE0001137073	2.500%	21/9/2004	22/9/2006
35	3.75% Bund of 2004 (2015)	DE0001135267	3.750%	27/10/2004	4/1/2015
36	2.25% Schatze of 2004 (2006)	DE0001137081	2.250%	3/11/2004	15/12/2006
37	4% Bund of 2005 (2037)	DE0001135275	4.000%	24/12/2004	4/1/2037
38	2.5% Schatze of 2005 (2007)	DE0001137099	2.500%	24/2/2005	23/3/2007
39	3.25% Bobl Series 146	DE0001141463	3.250%	24/2/2005	9/4/2010
40	3.25% Bund of 2005 (2015)	DE0001135283	3.250%	28/4/2005	4/7/2015
41	3.875% Bund of 2005 (2010)	DE0001030104	3.875%	24/5/2005	1/6/2010

Table 10: List of German Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue date	Maturity date
42	2% Schatze of 2005 (2007)	DE0001137107	2.000%	30/5/2005	15/6/2007
43	2.25% Schatze of 2005 (2007)	DE0001137115	2.250%	26/8/2005	14/9/2007
44	2.5% Bobl Series 147	DE0001141471	2.500%	26/8/2005	8/10/2010
45	3.5% Bund of 2005 (2016)	DE0001135291	3.500%	30/10/2005	4/1/2016
46	Bubills November 2005 issue	DE0001114858	0.000%	16/11/2005	17/5/2006
47	2.75% Schatze of 2005 (2007)	DE0001137123	2.750%	30/11/2005	14/12/2007
48	Bubills December 2005 issue	DE0001114866	0.000%	7/12/2005	14/6/2006
49	Bubills January 2006 issue	DE0001114874	0.000%	18/1/2006	12/7/2006
50	Bubills February 2006 issue	DE0001114882	0.000%	15/2/2006	16/8/2006
51	3.5% Bobl Series 148	DE0001141489	3.500%	26/2/2006	8/4/2011
52	3% Schatze of 2006 (2008)	DE0001137131	3.000%	8/3/2006	14/3/2008
53	Bubills March 2006 issue	DE0001114890	0.000%	15/3/2006	13/9/2006
54	Bubills April 2006 issue	DE0001114908	0.000%	12/4/2006	18/10/2006
55	4% Bund of 2006 (2016)	DE0001135309	4.000%	26/4/2006	4/7/2016
56	Bubills May 2006 issue	DE0001114916	0.000%	14/5/2006	15/11/2006
57	3.25% Schatze of 2006 (2008)	DE0001137149	3.250%	30/5/2006	13/6/2008
58	Bubills June 2006 issue	DE0001114924	0.000%	30/5/2006	13/12/2006
59	Bubills July 2006 issue	DE0001114932	0.000%	29/6/2006	17/1/2007
60	Bubills August 2006 issue	DE0001114940	0.000%	27/7/2006	14/2/2007
61	Bubills September 2006 issue	DE0001114957	0.000%	29/8/2006	14/3/2007
62	3.5% Schatze of 2006 (2008)	DE0001137156	3.500%	30/8/2006	12/9/2008
63	3.5% Bobl Series 149	DE0001141497	3.500%	30/8/2006	14/10/2011

Table 10: List of German Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue date	Maturity date
64	Bubills October 2006 issue	DE0001114965	0.000%	8/10/2006	18/4/2007
65	3.75% Bund of 2006 (2017)	DE0001135317	3.750%	31/10/2006	4/1/2017
66	Bubills November 2006 issue	DE0001114973	0.000%	31/10/2006	16/5/2007
67	3.75% Schatze of 2006 (2008)	DE0001137164	3.750%	30/11/2006	12/12/2008
68	Bubills December 2006 issue	DE0001114981	0.000%	30/11/2006	13/6/2007
69	4.25% Bund of 2007 first issue (2039)	DE0001135325	4.250%	28/12/2006	4/7/2039
70	Bubills January 2007 issue	DE0001114999	0.000%	28/12/2006	18/7/2007
71	Bubills February 2007 issue	DE0001115012	0.000%	29/1/2007	15/8/2007
72	3.75% Schatze of 2007 (2009)	DE0001137172	3.750%	28/2/2007	13/3/2009
73	4% Bobl Series 150	DE0001141505	4.000%	28/2/2007	13/4/2012
74	Bubills March 2007 issue	DE0001115020	0.000%	28/2/2007	12/9/2007
75	Bubills April 2007 issue	DE0001115038	0.000%	3/4/2007	17/10/2007
76	4.25% Bund of 2007 second issue (2017)	DE0001135333	4.250%	27/4/2007	4/7/2017
77	Bubills May 2007 issue	DE0001115046	0.000%	27/4/2007	14/11/2007
78	4.5% Schatze of 2007 (2009)	DE0001137180	4.500%	30/5/2007	12/6/2009
79	Bubills June 2007 issue	DE0001115053	0.000%	30/5/2007	12/12/2007
80	Bubills July 2007 issue	DE0001115061	0.000%	29/6/2007	16/1/2008
81	Bubills August 2007 issue	DE0001115079	0.000%	27/7/2007	13/2/2008
82	4% Schatze of 2007 (2009)	DE0001137198	4.000%	24/8/2007	11/9/2009
83	4.25% Bobl Series 151	DE0001141513	4.250%	24/8/2007	12/10/2012
84	Bubills September 2007 issue	DE0001115087	0.000%	24/8/2007	19/3/2008
85	4% Bund of 2007 (2018)	DE0001135341	4.000%	21/9/2007	4/1/2018

Table 10: List of German Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue date	Maturity date
86	4% Schatze of 2007 second issue (2009)	DE0001137206	4.000%	21/9/2007	11/12/2009
87	Bubills October 2007 issue	DE0001115095	0.000%	21/9/2007	16/4/2008
88	Bubills November 2007 issue	DE0001115103	0.000%	21/9/2007	21/5/2008
89	Bubills December 2007 issue	DE0001115111	0.000%	21/9/2007	18/6/2008
90	Bubills January 2008 issue	DE0001115129	0.000%	8/1/2008	16/7/2008
91	Bubills February 2008 issue	DE0001115137	0.000%	4/2/2008	18/8/2008
92	Bubills March 2008 issue	DE0001115145	0.000%	10/3/2008	17/9/2008
93	3% Schatze of 2008 (2010)	DE0001137214	3.000%	12/3/2008	12/3/2010
94	3.5% Bobl Series 152	DE0001141521	3.500%	28/3/2008	12/4/2013
95	Bubills April 2008 issue	DE0001115152	0.000%	7/4/2008	15/10/2008
96	Bubills May 2008 issue	DE0001115160	0.000%	12/5/2008	19/11/2008
97	4.25% Bund of 2008 (2018)	DE0001135358	4.250%	28/5/2008	4/7/2018
98	Bubills June 2008 issue	DE0001115178	0.000%	9/6/2008	10/12/2008
99	4.75% Schatze of 2008 (2010)	DE0001137222	4.750%	11/6/2008	11/6/2010
100	4.75% Bund of 2008 (2040)	DE0001135366	4.750%	4/7/2008	4/7/2040
101	Bubills July 2008 issue	DE0001115186	0.000%	7/7/2008	14/1/2009
102	Bubills August 2008 issue	DE0001115194	0.000%	4/8/2008	18/2/2009
103	Bubills September 2008 issue	DE0001115202	0.000%	22/8/2008	18/3/2009
104	4% Schatze of 2008 (2010)	DE0001137230	4.000%	10/9/2008	10/9/2010
105	4% Bobl Series 153	DE0001141539	4.000%	24/9/2008	11/10/2013
106	Bubills October 2008 issue	DE0001115210	0.000%	3/10/2008	22/4/2009
107	Bubills November 2008 issue	DE0001115228	0.000%	10/11/2008	13/5/2009

Table 10: List of German Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue date	Maturity date
108	3.75% Bund of 2008 (2019)	DE0001135374	3.750%	11/11/2008	4/1/2019
109	Bubills December 2008 issue	DE0001115236	0.000%	1/12/2008	17/6/2009
110	2.25% Schatze of 2008 (2010)	DE0001137248	2.250%	10/12/2008	10/12/2010
111	Bubills January 2009 issue / maturity 6 months	DE0001115244	0.000%	23/12/2008	15/7/2009
112	Bubills January 2009 issue / maturity 9 months	DE0001115251	0.000%	23/12/2008	28/10/2009
113	Bubills January 2009 issue / maturity 12 months	DE0001115269	0.000%	23/12/2008	27/1/2010
114	Bubills February 2009 issue / maturity 9 months	DE0001115277	0.000%	23/12/2008	25/11/2009
115	Bubills February 2009 issue / maturity 6 months	DE0001115285	0.000%	23/12/2008	12/8/2009
116	Bubills February 2009 issue / maturity 12 months	DE0001115293	0.000%	23/12/2008	24/2/2010
117	Bubills March 2009 issue / maturity 6 months	DE0001115301	0.000%	23/12/2008	16/9/2009
118	Bubills March 2009 issue / maturity 9 months	DE0001115319	0.000%	23/12/2008	16/12/2009
119	Bubills March 2009 issue / maturity 12 months	DE0001115327	0.000%	23/12/2008	31/3/2010
120	1.25% Schatze of 2009 (2011)	DE0001137255	1.250%	11/3/2009	11/3/2011
121	2.25% Bobl Series 154	DE0001141547	2.250%	25/3/2009	11/4/2014
122	Bubills April 2009 issue / maturity 3 months	DE0001115335	0.000%	30/3/2009	29/7/2009
123	Bubills April 2009 issue / maturity 6 months	DE0001115343	0.000%	14/4/2009	14/10/2009
124	Bubills April 2009 issue / maturity 12 months	DE0001115350	0.000%	20/4/2009	28/4/2010
125	Bubills May 2009 issue / maturity 6 months	DE0001115368	0.000%	1/5/2009	18/11/2009
126	Bubills May 2009 issue / maturity 3 months	DE0001115376	0.000%	11/5/2009	26/8/2009
127	3.5% Bund of 2009 (2019)	DE0001135382	3.500%	12/5/2009	4/7/2019
128	Bubills May 2009 issue / maturity 12 months	DE0001115384	0.000%	18/5/2009	19/5/2010
129	1.5% Schatze of 2009 (2011)	DE0001137263	1.500%	26/5/2009	10/6/2011

Table 10: List of German Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue date	Maturity date
130	Bubills June 2009 issue / maturity 6 months	DE0001115392	0.000%	8/6/2009	9/12/2009
131	Bubills June 2009 issue / maturity 3 months	DE0001115400	0.000%	15/6/2009	30/9/2009
132	Bubills June 2009 issue / maturity 12 months	DE0001115418	0.000%	22/6/2009	30/6/2010
133	Bubills July 2009 issue / maturity 6 months	DE0001115426	0.000%	15/7/2009	13/1/2010
134	Bubills July 2009 issue / maturity 12 months	DE0001115434	0.000%	20/7/2009	29/7/2010
135	Bubills August 2009 issue / maturity 6 months	DE0001115442	0.000%	3/8/2009	17/2/2010
136	Bubills August 2009 issue / maturity 12 months	DE0001115459	0.000%	17/8/2009	25/8/2010
137	Bubills September 2009 issue / maturity 6 months	DE0001115467	0.000%	7/9/2009	17/3/2010
138	1.25% Schatze of 2009 second issue (2011)	DE0001137271	1.250%	9/9/2009	16/9/2011
139	Bubills September 2009 issue / maturity 12 months	DE0001115475	0.000%	21/9/2009	29/9/2010
140	2.5% Bobl Series 155	DE0001141554	2.500%	23/9/2009	10/10/2014
141	Bubills October 2009 issue / maturity 6 months	DE0001115483	0.000%	5/10/2009	14/4/2010
142	Bubills October 2009 issue / maturity 12 months	DE0001115491	0.000%	19/10/2009	27/10/2010
143	Bubills November 2009 issue / maturity 6 months	DE0001115509	0.000%	9/11/2009	12/5/2010
144	3.25% Bund of 2009 (2020)	DE0001135390	3.250%	11/11/2009	4/1/2020
145	Bubills November 2009 issue / maturity 12 months	DE0001115517	0.000%	16/11/2009	24/11/2010
146	1.25% Schatze of 2009 third issue (2011)	DE0001137289	1.250%	18/11/2009	16/12/2011
147	Bubills December 2009 issue / maturity 6 months	DE0001115525	0.000%	30/11/2009	16/6/2010

Source: www.bundesbank.de

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
1	US Treasury Bond 8 1/4% 15/05/05 Early	US912810BU17	8.250%	15/5/1975	15/5/2005
2	US Treasury Bond 7 5/8% 15/02/07 S	US912810BX55	7.625%	15/2/1977	15/2/2007
3	US Treasury Bond 7 7/8% 15/11/07 Early	US912810BZ04	7.875%	15/11/1977	15/11/2007
4	US Treasury Bond 8 3/8% 15/08/08 Early	US912810CC00	8.375%	15/8/1978	15/8/2008
5	US Treasury Bond 8 3/4% 15/11/08 Early	US912810CE65	8.750%	15/11/1978	15/11/2008
6	US Treasury Bond 9 1/8% 15/05/09 Early	US912810CG14	9.125%	15/5/1979	15/5/2009
7	US Treasury Bond 10 3/8% 15/11/09 Early	US912810CK26	10.375%	5/11/1979	15/11/2009
8	US Treasury Bond 11 3/4% 15/02/10 Early	US912810CM81	11.750%	15/2/1980	15/2/2010
9	US Treasury Bond 10% 15/05/10 Early	US912810CP13	10.000%	15/5/1980	15/5/2010
10	US Treasury Bond 12 3/4% 15/11/10 Early S	US912810CS51	12.750%	15/11/1980	15/11/2010
11	US Treasury Bond 11 3/4% 15/02/01 S	US912810CT35	11.750%	12/1/1981	15/2/2001
12	US Treasury Bond 13 1/8% 15/05/01 S	US912810CU08	13.125%	2/4/1981	15/5/2001
13	US Treasury Bond 13 7/8% 15/05/11 Early	US912810CV80	13.875%	15/5/1981	15/5/2011
14	US Treasury Bond 13 3/8% 15/08/01 S	US912810CW63	13.375%	2/7/1981	15/8/2001
15	US Treasury Bond 15 3/4% 15/11/01 S	US912810CX47	15.750%	7/10/1981	15/11/2001
16	US Treasury Bond 14% 15/11/11 Early	US912810CY20	14.000%	15/11/1981	15/11/2011
17	US Treasury Bond 14 1/4% 15/02/02 S	US912810CZ94	14.250%	6/1/1982	15/2/2002
18	US Treasury Bond 11 5/8% 15/11/02 S	US912810DA35	11.625%	29/9/1982	15/11/2002
19	US Treasury Bond 10 3/8% 15/11/12 Early	US912810DB18	10.375%	15/11/1982	15/11/2012
20	US Treasury Bond 10 3/4% 15/02/03 S	US912810DC90	10.750%	26/12/1982	15/2/2003
21	US Treasury Bond 10 3/4% 15/05/03 S	US912810DD73	10.750%	4/4/1983	15/5/2003
22	US Treasury Bond 11 1/8% 15/08/03 S	US912810DE56	11.125%	5/7/1983	15/8/2003

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
23	US Treasury Bond 12% 15/08/13 Early	US912810DF22	12.000%	15/8/1983	15/8/2013
24	US Treasury Bond 11 7/8% 15/11/03 S	US912810DG05	11.875%	5/10/1983	15/11/2003
25	US Treasury Bond 12 3/8% 15/05/04 S	US912810DH87	12.375%	5/4/1984	15/5/2004
26	US Treasury Bond 13 1/4% 15/05/14 Early	US912810DJ44	13.250%	2/5/1984	15/5/2014
27	US Treasury Bond 13 3/4% 15/08/04 S	US912810DK17	13.750%	10/7/1984	15/8/2004
28	US Treasury Bond 12 1/2% 15/08/14 Early	US912810DL99	12.500%	1/8/1984	15/8/2014
29	US Treasury Bond 11 5/8% 15/11/04 S	US912810DM72	11.625%	30/10/1984	15/11/2004
30	US Treasury Bond 11 3/4% 15/11/14 Early	US912810DN55	11.750%	31/10/1984	15/11/2014
31	US Treasury 1985 11 1/4% 15/02/15 2015	US912810DP04	11.250%	15/2/1985	15/2/2015
32	US Treasury Bond 12% 15/05/05 S	US912810DQ86	12.000%	29/3/1985	15/5/2005
33	US Treasury Bond 10 3/4% 15/08/05 S	US912810DR69	10.750%	2/7/1985	15/8/2005
34	US Treasury 1985 10 5/8% 15/08/15 2015	US912810DS43	10.625%	15/8/1985	15/8/2015
35	US Treasury 1985 9 7/8% 15/11/15 2015	US912810DT26	9.875%	29/11/1985	15/11/2015
36	US Treasury Bond 9 3/8% 15/02/06 S	US912810DU98	9.375%	15/1/1986	15/2/2006
37	US Treasury 1986 9 1/4% 15/02/16 2016	US912810DV71	9.250%	18/2/1986	15/2/2016
38	US Treasury 1986 7 1/4% 15/05/16 2016	US912810DW54	7.250%	15/5/1986	15/5/2016
39	US Treasury 1986 7 1/2% 15/11/16 2016	US912810DX38	7.500%	17/11/1986	15/11/2016
40	US Treasury 1987 8 3/4% 15/05/17 2017	US912810DY11	8.750%	15/5/1987	15/5/2017
41	US Treasury 1987 8 7/8% 15/08/17 2017	US912810DZ85	8.875%	17/8/1987	15/8/2017
42	US Treasury 1988 9 1/8% 15/05/18 2018	US912810EA26	9.125%	16/5/1988	15/5/2018
43	US Treasury 1988 9% 15/11/18 2018	US912810EB09	9.000%	22/11/1988	15/11/2018
44	US Treasury 1989 8 7/8% 15/02/19 2019	US912810EC81	8.875%	15/2/1989	15/2/2019

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
45	US Treasury Note 8 7/8% 15/02/99 S	US912827XE79	8.875%	15/2/1989	15/2/1999
46	US Treasury Note 9 1/8% 15/05/99 S	US912827XN78	9.125%	15/5/1989	15/5/1999
47	US Treasury 1989 8 1/8% 15/08/19 2019	US912810ED64	8.125%	15/8/1989	15/8/2019
48	US Treasury Note 8% 15/08/99 S	US912827XW77	8.000%	15/8/1989	15/8/1999
49	US Treasury Note 7 7/8% 15/11/99 S	US912827YE60	7.875%	15/11/1989	15/11/1999
50	US Treasury 1990 8 1/2% 15/02/20 2020	US912810EE48	8.500%	15/2/1990	15/2/2020
51	US Treasury Note 8 1/2% 15/02/00 S	US912827YN69	8.500%	15/2/1990	15/2/2000
52	US Treasury 1990 8 3/4% 15/05/20 2020	US912810EF13	8.750%	15/5/1990	15/5/2020
53	US Treasury Note 8 7/8% 15/05/00 S	US912827YW68	8.875%	15/5/1990	15/5/2000
54	US Treasury 1990 8 3/4% 15/08/20 2020	US912810EG95	8.750%	15/8/1990	15/8/2020
55	US Treasury Note 8 3/4% 15/08/00 S	US912827ZE51	8.750%	15/8/1990	15/8/2000
56	US Treasury Note 8 1/2% 15/11/00 S	US912827ZN50	8.500%	15/11/1990	15/11/2000
57	US Treasury 1991 7 7/8% 15/02/21 2021	US912810EH78	7.875%	15/2/1991	15/2/2021
58	US Treasury Note 7 3/4% 15/02/01 S	US912827ZX33	7.750%	15/2/1991	15/2/2001
59	US Treasury 1991 8 1/8% 15/05/21 2021	US912810EJ35	8.125%	15/5/1991	15/5/2021
60	US Treasury Note 8% 15/05/01 S	US912827A851	8.000%	15/5/1991	15/5/2001
61	US Treasury Note 7 7/8% 15/08/01 S	US912827B925	7.875%	7/8/1991	15/8/2001
62	US Treasury 1991 8 1/8% 15/08/21 2021	US912810EK08	8.125%	15/8/1991	15/8/2021
63	US Treasury Note 7 1/2% 15/11/01 S	US912827D251	7.500%	6/11/1991	15/11/2001
64	US Treasury 1991 8% 15/11/21 2021	US912810EL80	8.000%	15/11/1991	15/11/2021
65	US Treasury Note 6 3/8% 15/01/99 S	US912827D749	6.375%	8/1/1992	15/1/1999
66	US Treasury Note 7% 15/04/99 S	US912827E812	7.000%	8/4/1992	15/4/1999

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
67	US Treasury Note 7 1/2% 15/05/02 S	US912827F496	7.500%	6/5/1992	15/5/2002
68	US Treasury Note 6 3/8% 15/07/99 S	US912827F983	6.375%	8/7/1992	15/7/1999
69	US Treasury Note 6 3/8% 15/08/02 S	US912827G551	6.375%	12/8/1992	15/8/2002
70	US Treasury 1992 7 1/4% 15/08/22 2022	US912810EM63	7.250%	17/8/1992	15/8/2022
71	US Treasury Note 6% 15/10/99 S	US912827H211	6.000%	7/10/1992	15/10/1999
72	US Treasury 1992 7 5/8% 15/11/22 2022	US912810EN47	7.625%	16/11/1992	15/11/2022
73	US Treasury Note 6 3/8% 15/01/00 S	US912827J373	6.375%	13/1/1993	15/1/2000
74	US Treasury Note 6 1/4% 15/02/03 S	US912827J787	6.250%	12/2/1993	15/2/2003
75	US Treasury 1993 7 1/8% 15/02/23 2023	US912810EP94	7.125%	16/2/1993	15/2/2023
76	US Treasury Note 5 1/2% 15/04/00 S	US912827K439	5.500%	13/4/1993	15/4/2000
77	US Treasury Note 5 3/4% 15/08/03 S	US912827L833	5.750%	11/8/1993	15/8/2003
78	US Treasury 1993 6 1/4% 15/08/23 2023	US912810EQ77	6.250%	16/8/1993	15/8/2023
79	US Treasury Note 5% 31/01/99 S	US912827N656	5.000%	26/1/1994	31/1/1999
80	US Treasury Note 5 7/8% 15/02/04 S	US912827N813	5.875%	9/2/1994	15/2/2004
81	US Treasury Note 5 1/2% 28/02/99 S	US912827P222	5.500%	24/2/1994	28/2/1999
82	US Treasury Note 5 7/8% 31/03/99 S	US912827P487	5.875%	23/3/1994	31/3/1999
83	US Treasury Note 6 1/2% 30/04/99 S	US912827P636	6.500%	28/4/1994	30/4/1999
84	US Treasury Note 7 1/4% 15/05/04 S	US912827P891	7.250%	11/5/1994	15/5/2004
85	US Treasury Note 6 3/4% 31/05/99 S	US912827Q212	6.750%	25/5/1994	31/5/1999
86	US Treasury Note 6 3/4% 30/06/99 S	US912827Q477	6.750%	22/6/1994	30/6/1999
87	US Treasury Note 6 7/8% 31/07/99 S	US912827Q626	6.875%	27/7/1994	31/7/1999
88	US Treasury Note 7 1/4% 15/08/04 S	US912827Q881	7.250%	10/8/1994	15/8/2004

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
89	US Treasury 1994 7 1/2% 15/11/24 2024	US912810ES34	7.500%	15/8/1994	15/11/2024
90	US Treasury Note 6 7/8% 31/08/99 S	US912827R202	6.875%	24/8/1994	31/8/1999
91	US Treasury Note 7 1/8% 30/09/99 S	US912827R467	7.125%	28/9/1994	30/9/1999
92	US Treasury Note 7 1/2% 31/10/99 S	US912827R616	7.500%	26/10/1994	31/10/1999
93	US Treasury Note 7 7/8% 15/11/04 S	US912827R871	7.875%	9/11/1994	15/11/2004
94	US Treasury Note 7 3/4% 31/12/99 S	US912827S457	7.750%	22/12/1994	31/12/1999
95	US Treasury Note 7 3/4% 31/01/00 S	US912827S606	7.750%	25/1/1995	31/1/2000
96	US Treasury Note 7 1/2% 15/02/05 S	US912827S861	7.500%	8/2/1995	15/2/2005
97	US Treasury 1995 7 5/8% 15/02/25 2025	US912810ET17	7.625%	15/2/1995	15/2/2025
98	US Treasury Note 7 1/8% 29/02/00 S	US912827T281	7.125%	23/2/1995	29/2/2000
99	US Treasury Note 6 7/8% 31/03/00 S	US912827T448	6.875%	29/3/1995	31/3/2000
100	US Treasury Note 6 3/4% 30/04/00 S	US912827T695	6.750%	26/4/1995	30/4/2000
101	US Treasury Note 6 1/2% 15/05/05 S	US912827T851	6.500%	10/5/1995	15/5/2005
102	US Treasury Note 6 1/4% 31/05/00 S	US912827U263	6.250%	31/5/1995	31/5/2000
103	US Treasury Note 5 7/8% 30/06/00 S	US912827U420	5.875%	28/6/1995	30/6/2000
104	US Treasury Note 6 1/8% 31/07/00 S	US912827U677	6.125%	26/7/1995	31/7/2000
105	US Treasury Note 6 1/2% 15/08/05 S	US912827U834	6.500%	9/8/1995	15/8/2005
106	US Treasury 1995 6 7/8% 15/08/25 2025	US912810EV62	6.875%	15/8/1995	15/8/2025
107	US Treasury Note 6 1/4% 31/08/00 S	US912827V253	6.250%	23/8/1995	31/8/2000
108	US Treasury Note 6 1/8% 30/09/00 S	US912827V410	6.125%	27/9/1995	30/9/2000
109	US Treasury Note 5 3/4% 31/10/00 S	US912827V667	5.750%	25/10/1995	31/10/2000
110	US Treasury Note 5 7/8% 15/11/05 S	US912827V824	5.875%	15/11/1995	15/11/2005

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
111	US Treasury Note 5 5/8% 30/11/00 S	US912827W244	5.625%	29/11/1995	30/11/2000
112	US Treasury Note 5 1/2% 31/12/00 S	US912827W400	5.500%	21/12/1995	31/12/2000
113	US Treasury Note 5 1/4% 31/01/01 S	US912827W657	5.250%	24/1/1996	31/1/2001
114	US Treasury Note 5% 15/02/99 S	US912827W731	5.000%	6/2/1996	15/2/1999
115	US Treasury Note 5 5/8% 15/02/06 S	US912827W814	5.625%	7/2/1996	15/2/2006
116	US Treasury 1996 6% 15/02/26 2026	US912810EW46	6.000%	15/2/1996	15/2/2026
117	US Treasury Note 5 5/8% 28/02/01 S	US912827X234	5.625%	28/2/1996	28/2/2001
118	US Treasury Note 6 3/8% 31/03/01 S	US912827X499	6.375%	9/4/1996	31/3/2001
119	US Treasury Note 6 1/4% 30/04/01 S	US912827X648	6.250%	24/4/1996	30/4/2001
120	US Treasury Note 6 3/8% 15/05/99 S	US912827X721	6.375%	7/5/1996	15/5/1999
121	US Treasury Note 6 7/8% 15/05/06 S	US912827X804	6.875%	8/5/1996	15/5/2006
122	US Treasury Note 6 1/2% 31/05/01 S	US912827Y224	6.500%	30/5/1996	31/5/2001
123	US Treasury Note 6 5/8% 30/06/01 S	US912827Y489	6.625%	26/6/1996	30/6/2001
124	US Treasury Note 7% 15/07/06 S	US912827Y554	7.000%	9/7/1996	15/7/2006
125	US Treasury Note 6 5/8% 31/07/01 S	US912827Y711	6.625%	26/7/1996	31/7/2001
126	US Treasury 1996 6 3/4% 15/08/26 2026	US912810EX29	6.750%	15/8/1996	15/8/2026
127	US Treasury Note 6% 15/08/99 S	US912827Y893	6.000%	15/8/1996	15/8/1999
128	US Treasury Note 6 1/2% 31/08/01 S	US912827Z395	6.500%	29/8/1996	31/8/2001
129	US Treasury Note 6 3/8% 30/09/01 S	US912827Z544	6.375%	30/9/1996	30/9/2001
130	US Treasury Note 6 1/2% 15/10/06 S	US912827Z627	6.500%	10/10/1996	15/10/2006
131	US Treasury Note 6 1/4% 31/10/01 S	US912827Z882	6.250%	26/10/1996	31/10/2001
132	US Treasury Note 5 7/8% 15/11/99 S	US912827Z965	5.875%	1/11/1996	15/11/1999

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
133	US Treasury 1996 6 1/2% 15/11/26 S	US912810EY02	6.500%	15/11/1996	15/11/2026
134	US Treasury Note 5 7/8 30/11/01 S	US9128272C54	5.875%	15/11/1996	30/11/2001
135	US Treasury Note 6 1/8% 31/12/01 S	US9128272E11	6.125%	23/12/1996	31/12/2001
136	US Treasury Note 5 7/8% 31/01/99 S	US9128272F85	5.875%	15/1/1997	31/1/1999
137	US Treasury Note 6 1/4% 31/01/02 S	US9128272G68	6.250%	24/1/1997	31/1/2002
138	US Treasury Note 5 7/8% 15/02/00 S	US9128272H42	5.875%	14/2/1997	15/2/2000
139	US Treasury Note 6 1/4% 15/02/07 S	US9128272J08	6.250%	14/2/1997	15/2/2007
140	US Treasury 1997 6 5/8% 15/02/27 S	US912810EZ76	6.625%	18/2/1997	15/2/2027
141	US Treasury Note 5 7/8% 28/02/99 S	US9128272K70	5.875%	27/2/1997	28/2/1999
142	US Treasury Note 6 1/4% 28/02/02 S	US9128272L53	6.250%	28/2/1997	28/2/2002
143	US Treasury Note 6 1/4% 31/03/99 S	US9128272N10	6.250%	27/3/1997	31/3/1999
144	US Treasury Note 6 5/8% 31/03/02 S	US9128272P67	6.625%	27/3/1997	31/3/2002
145	US Treasury Note 6 3/8% 30/04/99 S	US9128272R24	6.375%	30/4/1997	30/4/1999
146	US Treasury Note 6 5/8% 30/04/02 S	US9128272S07	6.625%	30/4/1997	30/4/2002
147	US Treasury Note 6 3/8% 15/05/00 S	US9128272T89	6.375%	6/5/1997	15/5/2000
148	US Treasury Note 6 5/8% 15/05/07 S	US9128272U52	6.625%	7/5/1997	15/5/2007
149	US Treasury Note 6 1/4% 31/05/99 S	US9128272V36	6.250%	28/5/1997	31/5/1999
150	US Treasury Note 6 1/2% 31/05/02 S	US9128272W19	6.500%	29/5/1997	31/5/2002
151	US Treasury Note 6 1/4% 30/06/02 S	US9128272Y74	6.250%	18/6/1997	30/6/2002
152	US Treasury Note 6% 30/06/99 S	US9128272X91	6.000%	18/6/1997	30/6/1999
153	US Treasury Index Linked Note 3 5/8% 15/07/02 S	US9128273A89	4.070%	10/7/1997	15/7/2002
154	US Treasury Note 5 7/8% 31/07/99 S	US9128273B62	5.875%	22/7/1997	31/7/1999

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
155	US Treasury Note 6% 31/07/02 S	US9128273C46	6.000%	31/7/1997	31/7/2002
156	US Treasury Note 6 1/8% 15/08/07 S	US9128273E02	6.125%	12/8/1997	15/8/2007
157	US Treasury Note 6% 15/08/00 S	US9128273D29	6.000%	12/8/1997	15/8/2000
158	US Treasury 1997 6 3/8% 15/08/27 S	US912810FA17	6.375%	15/8/1997	15/8/2027
159	US Treasury Note 5 7/8% 31/08/99 S	US9128273F76	5.875%	26/8/1997	31/8/1999
160	US Treasury Note 6 1/4% 31/08/02 S	US9128273G59	6.250%	27/8/1997	31/8/2002
161	US Treasury Note 5 3/4% 30/09/99 S	US9128273H33	5.750%	23/9/1997	30/9/1999
162	US Treasury Note 5 7/8% 30/09/02 S	US9128273J98	5.875%	24/9/1997	30/9/2002
163	US Treasury Note 5 5/8% 31/10/99 S	US9128273K61	5.625%	28/10/1997	31/10/1999
164	US Treasury Note 5 3/4% 31/10/02 S	US9128273L45	5.750%	29/10/1997	31/10/2002
165	US Treasury 1997 6 1/8% 15/11/27 20-2027	US912810FB99	6.125%	17/11/1997	15/11/2027
166	US Treasury Note 5 3/4% 15/11/00 S	US9128273M28	5.750%	17/11/1997	15/11/2000
167	US Treasury Note 5 5/8% 30/11/99 S	US9128273P58	5.625%	24/11/1997	30/11/1999
168	US Treasury Note 5 3/4% 30/11/02 S	US9128273Q32	5.750%	25/11/1997	30/11/2002
169	US Treasury Note 5 5/8% 31/12/99 S	US9128273R15	5.625%	22/12/1997	31/12/1999
170	US Treasury Note 5 5/8% 31/12/02 S	US9128273S97	5.625%	23/12/1997	31/12/2002
171	US Treasury Bill 1998 Zero 04/02/99	US912795BT76	0.000%	29/1/1998	4/2/1999
172	US Treasury Note 5 1/2% 31/01/03 S	US9128273V27	5.500%	30/1/1998	31/1/2003
173	US Treasury Note 5 3/8% 31/01/00 S	US9128273U44	5.375%	30/1/1998	31/1/2000
174	US Treasury Note 5 3/8% 15/02/01 S	US9128273W00	5.375%	10/2/1998	15/2/2001
175	US Treasury Note 5 1/2% 15/02/08 S	US9128273X82	5.500%	11/2/1998	15/2/2008
176	US Treasury Note 5 1/2 29/02/00 S	US9128273Y65	5.500%	24/2/1998	29/2/2000

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
177	US Treasury Note 5 1/2% 28/02/03 S	US9128273Z31	5.500%	25/2/1998	28/2/2003
178	US Treasury Bill 1998 Zero 04/03/99	US912795BU40	0.000%	26/2/1998	4/3/1999
179	US Treasury Note 5 1/2% 31/03/00 S	US9128274A70	5.500%	24/3/1998	31/3/2000
180	US Treasury Note 5 1/2% 31/03/03 S	US9128274B53	5.500%	25/3/1998	31/3/2003
181	US Treasury Bill 1998 Zero 01/04/99	US912795BV23	0.000%	26/3/1998	1/4/1999
182	US Treasury Bill 1998 Zero 29/04/99	US912795BW06	0.000%	23/4/1998	29/4/1999
183	US Treasury Note 5 5/8% 30/04/00 S	US9128274C37	5.625%	28/4/1998	30/4/2000
184	US Treasury Note 5 3/4% 30/04/03 S	US9128274D10	5.750%	29/4/1998	30/4/2003
185	US Treasury Note 5 5/8% 15/05/01 S	US9128274E92	5.625%	12/5/1998	15/5/2001
186	US Treasury Note 5 5/8% 15/05/08 S	US9128274F67	5.625%	13/5/1998	15/5/2008
187	US Treasury Bill 1998 Zero 27/05/99	US912795BX88	0.000%	21/5/1998	27/5/1999
188	US Treasury Note 5 1/2% 31/05/00 S	US9128274G41	5.500%	27/5/1998	31/5/2000
189	US Treasury Bill 1998 Zero 25/02/99	US912795BC42	0.000%	28/5/1998	25/2/1999
190	US Treasury Note 5 1/2% 31/05/03 S	US9128274H24	5.500%	28/5/1998	31/5/2003
191	US Treasury Bill 1998 Zero 24/06/99	US912795BY61	0.000%	18/6/1998	24/6/1999
192	US Treasury Note 5 3/8% 30/06/00 S	US9128274J89	5.375%	23/6/1998	30/6/2000
193	US Treasury Note 5 3/8% 30/06/03 S	US9128274K52	5.375%	24/6/1998	30/6/2003
194	US Treasury Bill 1998 Zero 22/07/99	US912795BZ37	0.000%	16/7/1998	22/7/1999
195	US Treasury Bill 1998 Zero 21/01/99	US912795AY70	0.000%	20/7/1998	21/1/1999
196	US Treasury Bill 1998 Zero 28/01/99	US912795AZ46	0.000%	27/7/1998	28/1/1999
197	US Treasury Note 5 3/8% 31/07/00 S	US9128274M19	5.375%	28/7/1998	31/7/2000
198	US Treasury Note 5 1/4% 15/08/03 S	US9128274N91	5.250%	1/8/1998	15/8/2003

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
199	US Treasury Bill 1998 Zero 11/02/99	US912795BA85	0.000%	10/8/1998	11/2/1999
200	US Treasury 1998 5 1/2% 15/08/28 Bonds O	US912810FE39	5.500%	17/8/1998	15/8/2028
201	US Treasury Bill 1998 Zero 18/02/99	US912795BB68	0.000%	17/8/1998	18/2/1999
202	US Treasury Bill 1998 Zero 19/08/99	US912795CA76	0.000%	20/8/1998	19/8/1999
203	US Treasury Note 5 1/8% 31/08/00 S	US9128274Q23	5.125%	26/8/1998	31/8/2000
204	US Treasury Bill 1998 Zero 11/03/99	US912795BD25	0.000%	8/9/1998	11/3/1999
205	US Treasury Bill 1998 Zero 18/03/99	US912795BE08	0.000%	14/9/1998	18/3/1999
206	US Treasury Bill 1998 Zero 16/09/99	US912795CB59	0.000%	15/9/1998	16/9/1999
207	US Treasury Bill 1998 Zero 25/03/99	US912795BF72	0.000%	21/9/1998	25/3/1999
208	US Treasury Note 4 1/2% 30/09/00 S	US9128274R06	4.500%	23/9/1998	30/9/2000
209	US Treasury Bill 1998 Zero 08/04/99	US912795BG55	0.000%	5/10/1998	8/4/1999
210	US Treasury Bill 1998 Zero 15/04/99	US912795BH39	0.000%	13/10/1998	15/4/1999
211	US Treasury Bill 1998 Zero 22/04/99	US912795BJ94	0.000%	19/10/1998	22/4/1999
212	US Treasury Note 4% 31/10/00 S	US9128274T61	4.000%	28/10/1998	31/10/2000
213	US Treasury Bill 1998 Zero 06/05/99	US912795BK67	0.000%	2/11/1998	6/5/1999
214	US Treasury Note 4 1/4% 15/11/03 S	US9128274U35	4.250%	3/11/1998	15/11/2003
215	US Treasury Bill 1998 Zero 12/11/99	US912795CD16	0.000%	9/11/1998	12/11/1999
216	US Treasury Bill 1998 Zero 13/05/99	US912795BL41	0.000%	9/11/1998	13/5/1999
217	US Treasury 1998 5 1/4% 15/11/28 Bonds O	US912810FF04	5.250%	16/11/1998	15/11/2028
218	US Treasury Bill 1998 Zero 20/05/99	US912795BM24	0.000%	16/11/1998	20/5/1999
219	US Treasury Note 4 5/8% 30/11/00 S	US9128274W90	4.625%	24/11/1998	30/11/2000
220	US Treasury Bill 1998 Zero 03/06/99	US912795BN07	0.000%	3/12/1998	3/6/1999

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
221	US Treasury Bill 1998 Zero 10/06/99	US912795BP54	0.000%	7/12/1998	10/6/1999
222	US Treasury Bill 1998 Zero 17/06/99	US912795BQ38	0.000%	14/12/1998	17/6/1999
223	US Treasury Bill 1998 Zero 01/07/99	US912795BR11	0.000%	28/12/1998	1/7/1999
224	US Treasury Note 4 5/8% 31/12/00 S	US9128274X73	4.625%	29/12/1998	31/12/2000
225	US Treasury Bill 1999 Zero 08/07/99	US912795CF63	0.000%	4/1/1999	8/7/1999
226	US Treasury Bill 1999 Zero 06/01/00	US912795DB41	0.000%	5/1/1999	6/1/2000
227	US Treasury Bill 1999 Zero 29/07/99	US912795CH20	0.000%	25/1/1999	29/7/1999
228	US Treasury Note 4 1/2% 31/01/01 S	US9128274Z22	4.500%	27/1/1999	31/1/2001
229	US Treasury Bill 1999 Zero 03/02/00	US912795DF54	0.000%	2/2/1999	3/2/2000
230	US Treasury Bill 1999 Zero 05/08/99	US912795CJ85	0.000%	2/2/1999	5/8/1999
231	US Treasury Bill 1999 Zero 12/08/99	US912795CK58	0.000%	8/2/1999	12/8/1999
232	US Treasury Note 4 3/4% 15/02/04 S	US9128275A61	4.750%	9/2/1999	15/2/2004
233	US Treasury 1999 5 1/4% 15/02/29 2029	US912810FG86	5.250%	16/2/1999	15/2/2029
234	US Treasury Note 4 3/4% 15/11/08 S	US9128274V18	4.750%	16/2/1999	15/11/2008
235	US Treasury Bill 1999 Zero 26/08/99	US912795CL32	0.000%	22/2/1999	26/8/1999
236	US Treasury Note 5% 28/02/01 S	US9128275C28	5.000%	24/2/1999	28/2/2001
237	US Treasury Bill 1999 Zero 02/09/99	US912795CM15	0.000%	1/3/1999	2/9/1999
238	US Treasury Bill 1999 Zero 02/03/00	US912795DK40	0.000%	2/3/1999	2/3/2000
239	US Treasury Bill 1999 Zero 23/09/99	US912795CP46	0.000%	22/3/1999	23/9/1999
240	US Treasury Note 4 7/8% 31/03/01 S	US9128275D01	4.875%	24/3/1999	31/3/2001
241	US Treasury Bill 1999 Zero 30/09/99	US912795CQ29	0.000%	29/3/1999	30/9/1999
242	US Treasury Bill 1999 Zero 30/03/00	US912795DP37	0.000%	30/3/1999	30/3/2000

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
243	US Treasury Bill 1999 Zero 07/10/99	US912795CR02	0.000%	5/4/1999	7/10/1999
244	US Treasury Bill 1999 Zero 14/10/99	US912795CC33	0.000%	12/4/1999	14/10/1999
245	US Treasury Bill 1999 Zero 15/07/99	US912795CG47	0.000%	12/4/1999	15/7/1999
246	US Treasury Bill 1999 Zero 21/10/99	US912795CS84	0.000%	19/4/1999	21/10/1999
247	US Treasury Bill 1999 Zero 28/10/99	US912795CT67	0.000%	26/4/1999	28/10/1999
248	US Treasury Bill 1999 Zero 27/04/00	US912795DT58	0.000%	27/4/1999	27/4/2000
249	US Treasury Note 5% 30/04/01 S	US9128275E83	5.000%	28/4/1999	30/4/2001
250	US Treasury Bill 1999 Zero 04/11/99	US912795CU31	0.000%	3/5/1999	4/11/1999
251	US Treasury Note 5 1/4% 15/05/04 S	US9128275F58	5.250%	11/5/1999	15/5/2004
252	US Treasury Bill 1999 Zero 18/11/99	US912795CV14	0.000%	17/5/1999	18/11/1999
253	US Treasury Note 5 1/2% 15/05/09 S	US9128275G32	5.500%	17/5/1999	15/5/2009
254	US Treasury Bill 1999 Zero 26/11/99	US912795CW96	0.000%	24/5/1999	26/11/1999
255	US Treasury Bill 1999 Zero 25/05/00	US912795DX60	0.000%	25/5/1999	25/5/2000
256	US Treasury Note 5 1/4% 31/05/01 S	US9128275H15	5.250%	26/5/1999	31/5/2001
257	US Treasury Bill 1999 Zero 02/12/99	US912795CX79	0.000%	1/6/1999	2/12/1999
258	US Treasury Bill 1999 Zero 09/09/99	US912795CN97	0.000%	9/6/1999	9/9/1999
259	US Treasury Bill 1998 Zero 09/12/99	US912795CE98	0.000%	10/6/1999	9/12/1999
260	US Treasury Bill 1999 Zero 16/12/99	US912795CY52	0.000%	14/6/1999	16/12/1999
261	US Treasury Bill 1999 Zero 23/12/99	US912795CZ28	0.000%	21/6/1999	23/12/1999
262	US Treasury Bill 1999 Zero 22/06/00	US912795EB32	0.000%	22/6/1999	22/6/2000
263	US Treasury Note 5 3/4% 30/06/01 S	US9128275J70	5.750%	23/6/1999	30/6/2001
264	US Treasury Bill 1999 Zero 30/12/99	US912795DA67	0.000%	28/6/1999	30/12/1999

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
265	US Treasury Bill 1999 Zero 13/01/00	US912795DC24	0.000%	12/7/1999	13/1/2000
266	US Treasury Bill 1999 Zero 20/01/00	US912795DD07	0.000%	19/7/1999	20/1/2000
267	US Treasury Bill 1999 Zero 20/07/00	US912795ED97	0.000%	20/7/1999	20/7/2000
268	US Treasury Bill 1999 Zero 27/01/00	US912795DE89	0.000%	26/7/1999	27/1/2000
269	US Treasury Note 5 1/2% 31/07/01 S	US9128275L27	5.500%	28/7/1999	31/7/2001
270	US Treasury Bill 1999 Zero 10/02/00	US912795DG38	0.000%	9/8/1999	10/2/2000
271	US Treasury Note 6% 15/08/04 S	US9128275M00	6.000%	10/8/1999	15/8/2004
272	US Treasury 1999 6 1/8% 15/08/29 August	US912810FJ26	6.125%	16/8/1999	15/8/2029
273	US Treasury Bill 1999 Zero 17/02/00	US912795DH11	0.000%	16/8/1999	17/2/2000
274	US Treasury Note 6% 15/08/09 S	US9128275N82	6.000%	16/8/1999	15/8/2009
275	US Treasury Bill 1999 Zero 17/08/00	US912795EE70	0.000%	17/8/1999	17/8/2000
276	US Treasury Bill 1999 Zero 24/02/00	US912795DJ76	0.000%	23/8/1999	24/2/2000
277	US Treasury Note 5 1/2% 31/08/01 S	US9128275P31	5.500%	25/8/1999	31/8/2001
278	US Treasury Bill 1999 Zero 09/03/00	US912795DL23	0.000%	7/9/1999	9/3/2000
279	US Treasury Bill 1999 Zero 16/03/00	US912795DM06	0.000%	13/9/1999	16/3/2000
280	US Treasury Bill 1999 Zero 14/09/00	US912795EF46	0.000%	14/9/1999	14/9/2000
281	US Treasury Bill 1999 Zero 23/03/00	US912795DN88	0.000%	23/9/1999	23/3/2000
282	US Treasury Note 5 5/8% 30/09/01 S	US9128275Q14	5.625%	29/9/1999	30/9/2001
283	US Treasury Bill 1999 Zero 13/04/00	US912795DR92	0.000%	12/10/1999	13/4/2000
284	US Treasury Bill 1999 Zero 12/10/00	US912795EG29	0.000%	13/10/1999	12/10/2000
285	US Treasury Bill 1999 Zero 20/04/00	US912795DS75	0.000%	18/10/1999	20/4/2000
286	US Treasury Note 5 7/8% 31/10/01 S	US9128275R96	5.875%	27/10/1999	31/10/2001

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
287	US Treasury Bill 1999 Zero 04/05/00	US912795DU22	0.000%	1/11/1999	4/5/2000
288	US Treasury Bill 1999 Zero 09/11/00	US912795EH02	0.000%	9/11/1999	9/11/2000
289	US Treasury Bill 1999 Zero 18/05/00	US912795DW87	0.000%	15/11/1999	18/5/2000
290	US Treasury Note 5 7/8% 15/11/04 S	US9128275S79	5.875%	15/11/1999	15/11/2004
291	US Treasury Bill 1999 Zero 01/06/00	US912795DY44	0.000%	29/11/1999	1/6/2000
292	US Treasury Bill 1999 Zero 08/06/00	US912795DZ19	0.000%	6/12/1999	8/6/2000
293	US Treasury Bill 1999 Zero 07/12/00	US912795EJ67	0.000%	7/12/1999	7/12/2000
294	US Treasury Bill 1999 Zero 15/06/00	US912795EA58	0.000%	14/12/1999	15/6/2000
295	US Treasury Bill 1999 Zero 29/06/00	US912795EC15	0.000%	30/12/1999	29/6/2000
296	US Treasury Bill 2000 Zero 06/07/00	US912795ER83	0.000%	3/1/2000	6/7/2000
297	US Treasury Bill 2000 Zero 04/01/01	US912795ES66	0.000%	4/1/2000	4/1/2001
298	US Treasury Bill 2000 Zero 06/04/00	US912795DQ10	0.000%	6/1/2000	6/4/2000
299	US Treasury Bill 2000 Zero 13/07/00	US912795ET40	0.000%	10/1/2000	13/7/2000
300	US Treasury Bill 2000 Zero 27/07/00	US912795EU13	0.000%	24/1/2000	27/7/2000
301	US Treasury Note 6 3/8% 31/01/02 S	US9128275X64	6.375%	26/1/2000	31/1/2002
302	US Treasury Bill 2000 Zero 03/08/00	US912795EV95	0.000%	31/1/2000	3/8/2000
303	US Treasury Bill 2000 Zero 01/02/01	US912795FR74	0.000%	1/2/2000	1/2/2001
304	US Treasury Note 6 1/2% 15/02/10 S	US9128275Z13	6.500%	2/2/2000	15/2/2010
305	US Treasury Bill 2000 Zero 10/08/00	US912795EW78	0.000%	7/2/2000	10/8/2000
306	US Treasury Bill 2000 Zero 11/05/00	US912795DV05	0.000%	7/2/2000	11/5/2000
307	US Treasury 2000 6 1/4% 15/05/30 May 2030	US912810FM54	6.250%	15/2/2000	15/5/2030
308	US Treasury Bill 2000 Zero 24/08/00	US912795EX51	0.000%	22/2/2000	24/8/2000

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
309	US Treasury Note 6 1/2% 28/02/02 S	US9128276A52	6.500%	23/2/2000	28/2/2002
310	US Treasury Bill 2000 Zero 31/08/00	US912795EY35	0.000%	28/2/2000	31/8/2000
311	US Treasury Bill 2000 Zero 01/03/01	US912795FV86	0.000%	29/2/2000	1/3/2001
312	US Treasury Bill 2000 Zero 07/09/00	US912795EZ00	0.000%	6/3/2000	7/8/2000
313	US Treasury Bill 2000 Zero 21/09/00	US912795FA40	0.000%	20/3/2000	21/9/2000
314	US Treasury Bill 2000 Zero 28/09/00	US912795FB23	0.000%	27/3/2000	28/9/2000
315	US Treasury Bill 2000 Zero 18/04/00	US912795GX34	0.000%	29/3/2000	18/4/2000
316	US Treasury Note 6 1/2% 31/03/02 S	US9128276B36	6.500%	29/3/2000	31/3/2002
317	US Treasury Bill 2000 Zero 05/10/00	US912795FC06	0.000%	3/4/2000	5/10/2000
318	US Treasury Bill 2000 Zero 19/10/00	US912795FD88	0.000%	17/4/2000	19/10/2000
319	US Treasury Note 6 3/8% 30/04/02 S	US9128276C19	6.375%	22/4/2000	30/4/2002
320	US Treasury Bill 2000 Zero 26/10/00	US912795FE61	0.000%	24/4/2000	26/10/2000
321	US Treasury Bill 2000 Zero 02/11/00	US912795FF37	0.000%	1/5/2000	2/11/2000
322	US Treasury Note 6 3/4% 15/05/05 S	US9128276D91	6.750%	9/5/2000	15/5/2005
323	US Treasury Bill 2000 Zero 16/11/00	US912795FG10	0.000%	15/5/2000	16/11/2000
324	US Treasury Bill 2000 Zero 24/11/00	US912795FH92	0.000%	22/5/2000	24/11/2000
325	US Treasury Note 6 5/8% 31/05/02 S	US9128276E74	6.625%	24/5/2000	31/5/2002
326	US Treasury Bill 2000 Zero 30/11/00	US912795FJ58	0.000%	30/5/2000	30/11/2000
327	US Treasury Bill 2000 Zero 31/05/01	US912795GJ40	0.000%	31/5/2000	31/5/2001
328	US Treasury Bill 2000 Zero 14/12/00	US912795FK22	0.000%	12/6/2000	14/12/2000
329	US Treasury Bill 2000 Zero 21/12/00	US912795FL05	0.000%	19/6/2000	21/12/2000
330	US Treasury Bill 2000 Zero 28/12/00	US912795FM87	0.000%	26/6/2000	28/12/2000

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
331	US Treasury Note 6 3/8% 30/06/02 S	US9128276F40	6.375%	28/6/2000	30/6/2002
332	US Treasury Bill 2000 Zero 11/01/01	US912795FN60	0.000%	7/7/2000	11/1/2001
333	US Treasury Bill 2000 Zero 18/01/01	US912795FP19	0.000%	14/7/2000	18/1/2001
334	US Treasury Note 6 1/4% 31/07/02 S	US9128276H06	6.250%	20/7/2000	31/7/2002
335	US Treasury Bill 2000 Zero 25/01/01	US912795FQ91	0.000%	21/7/2000	25/1/2001
336	US Treasury Bill 2000 Zero 08/02/01	US912795FS57	0.000%	7/8/2000	8/2/2001
337	US Treasury Bill 2000 Zero 15/02/01	US912795FT31	0.000%	11/8/2000	15/2/2001
338	US Treasury Note 5 3/4% 15/08/10 S	US9128276J61	5.750%	15/8/2000	15/8/2010
339	US Treasury Note 6 1/8% 31/08/02 S	US9128276K35	6.125%	17/8/2000	31/8/2002
340	US Treasury Bill 2000 Zero 22/02/01	US912795FU04	0.000%	18/8/2000	22/2/2001
341	US Treasury Bill 2000 Zero 30/08/01	US912795HL86	0.000%	25/8/2000	30/8/2001
342	US Treasury Bill 2000 Zero 15/09/00	US912795GZ81	0.000%	30/8/2000	15/9/2000
343	US Treasury Bill 2000 Zero 08/03/01	US912795FW69	0.000%	1/9/2000	8/3/2001
344	US Treasury Bill 2000 Zero 15/03/01	US912795FX43	0.000%	8/9/2000	15/3/2001
345	US Treasury Bill 2000 Zero 22/03/01	US912795FY26	0.000%	15/9/2000	22/3/2001
346	US Treasury Bill 2000 Zero 29/03/01	US912795FZ90	0.000%	22/9/2000	29/3/2001
347	US Treasury Note 6% 30/09/02 S	US9128276L18	6.000%	28/9/2000	30/9/2002
348	US Treasury Bill 2000 Zero 05/04/01	US912795GA31	0.000%	29/9/2000	5/4/2001
349	US Treasury Bill 2000 Zero 12/04/01	US912795GB14	0.000%	6/10/2000	12/4/2001
350	US Treasury Bill 2000 Zero 19/04/01	US912795GC96	0.000%	13/10/2000	19/4/2001
351	US Treasury Bill 2000 Zero 26/04/01	US912795GD79	0.000%	20/10/2000	26/4/2001
352	US Treasury Bill 2000 Zero 03/05/01	US912795GE52	0.000%	27/10/2000	3/5/2001

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
353	US Treasury Bill 2000 Zero 10/05/01	US912795GF28	0.000%	3/11/2000	10/5/2001
354	US Treasury Note 5 3/4% 15/11/05 S	US9128276N73	5.750%	3/11/2000	15/11/2005
355	US Treasury Bill 2000 Zero 17/05/01	US912795GG01	0.000%	10/11/2000	17/5/2001
356	US Treasury Bill 2000 Zero 24/05/01	US912795GH83	0.000%	17/11/2000	24/5/2001
357	US Treasury Bill 2000 Zero 29/11/01	US912795HM69	0.000%	23/11/2000	29/11/2001
358	US Treasury Note 5 5/8% 30/11/02 S	US9128276P22	5.625%	23/11/2000	30/11/2002
359	US Treasury Bill 2000 Zero 15/12/00	US912795KE07	0.000%	29/11/2000	15/12/2000
360	US Treasury Bill 2000 Zero 07/06/01	US912795GK13	0.000%	2/12/2000	7/6/2001
361	US Treasury Bill 2000 Zero 14/06/01	US912795GL95	0.000%	8/12/2000	14/6/2001
362	US Treasury Bill 2000 Zero 21/06/01	US912795GM78	0.000%	15/12/2000	21/6/2001
363	US Treasury Note 5 1/8% 31/12/02 S	US9128276Q05	5.125%	21/12/2000	31/12/2002
364	US Treasury Bill 2000 Zero 28/06/01	US912795GN51	0.000%	26/12/2000	28/6/2001
365	US Treasury Bill 2000 Zero 05/07/01	US912795HA22	0.000%	29/12/2000	5/7/2001
366	US Treasury Bill Zero 16/01/01	US912795KF71	0.000%	29/12/2000	16/1/2001
367	US Treasury Bill 2001 Zero 12/07/01	US912795HC87	0.000%	8/1/2001	12/7/2001
368	US Treasury Bill 2001 Zero 19/07/01	US912795GP00	0.000%	12/1/2001	19/7/2001
369	US Treasury Note 4 3/4% 31/01/03 S	US9128276S60	4.750%	18/1/2001	31/1/2003
370	US Treasury Bill 2001 Zero 26/07/01	US912795HD60	0.000%	19/1/2001	26/7/2001
371	US Treasury Bill 2001 Zero 02/08/01	US912795HE44	0.000%	26/1/2001	2/8/2001
372	US Treasury Bill 2001 Zero 09/08/01	US912795HG91	0.000%	2/2/2001	9/8/2001
373	US Treasury Bill 2001 Zero 16/08/01	US912795GQ82	0.000%	9/2/2001	16/8/2001
374	US Treasury 2001 5 3/8% 15/02/31 February	US912810FP85	5.375%	15/2/2001	15/2/2031

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
375	US Treasury 2001 5% 15/02/11 B-2011	US9128276T44	5.000%	15/2/2001	15/2/2011
376	US Treasury Bill 2001 Zero 23/08/01	US912795HH74	0.000%	16/2/2001	23/8/2001
377	US Treasury Note 4 5/8% 28/02/03 S	US9128276U17	4.625%	16/2/2001	28/2/2003
378	US Treasury Bill 2001 Zero 28/02/02	US912795HJ31	0.000%	23/2/2001	28/2/2002
379	US Treasury Bill 2001 Zero 06/09/01	US912795HN43	0.000%	2/3/2001	6/9/2001
380	US Treasury Bill 2001 Zero 13/09/01	US912795GR65	0.000%	9/3/2001	13/9/2001
381	US Treasury Bill 2001 Zero 20/09/01	US912795HP90	0.000%	16/3/2001	20/9/2001
382	US Treasury Note 4 1/4% 31/03/03 S	US9128276V99	4.250%	22/3/2001	31/3/2003
383	US Treasury Bill 2001 Zero 27/09/01	US912795HQ73	0.000%	23/3/2001	27/9/2001
384	US Treasury Bill 2001 Zero 04/10/01	US912795HR56	0.000%	30/3/2001	4/10/2001
385	US Treasury Bill 2001 Zero 16/04/01	US912795KG54	0.000%	30/3/2001	16/4/2001
386	US Treasury Bill 2001 Zero 11/10/01	US912795GS49	0.000%	6/4/2001	11/10/2001
387	US Treasury Bill 2001 Zero 18/10/01	US912795HS30	0.000%	13/4/2001	18/10/2001
388	US Treasury Note 4% 30/04/03 S	US9128276W72	4.000%	19/4/2001	30/4/2003
389	US Treasury Bill 2001 Zero 25/10/01	US912795HT13	0.000%	20/4/2001	25/10/2001
390	US Treasury Bill 2001 Zero 01/11/01	US912795HU85	0.000%	27/4/2001	1/11/2001
391	US Treasury Note 4 5/8% 15/05/06 S	US9128276X55	4.625%	3/5/2001	15/5/2006
392	US Treasury Bill 2001 Zero 08/11/01	US912795GT22	0.000%	4/5/2001	8/11/2001
393	US Treasury Bill 2001 Zero 15/11/01	US912795HV68	0.000%	11/5/2001	15/11/2001
394	US Treasury Bill 2001 Zero 23/11/01	US912795HW42	0.000%	18/5/2001	23/11/2001
395	US Treasury Note 4 1/4% 31/05/03 S	US9128276Y39	4.250%	24/5/2001	31/5/2003
396	US Treasury Bill 2001 Zero 15/06/01	US912795KJ93	0.000%	25/5/2001	15/6/2001

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
397	US Treasury Bill 2001 Zero 13/12/01	US912795HX25	0.000%	9/6/2001	13/12/2001
398	US Treasury Bill 2001 Zero 20/12/01	US912795HY08	0.000%	15/6/2001	20/12/2001
399	US Treasury Note 3 7/8% 30/06/03 S	US9128276Z04	3.875%	21/6/2001	30/6/2003
400	US Treasury Bill 2001 Zero 27/12/01	US912795HZ72	0.000%	22/6/2001	27/12/2001
401	US Treasury Bill 2001 Zero 03/01/02	US912795JA04	0.000%	30/6/2001	3/1/2002
402	US Treasury Bill 2001 Zero 10/01/02	US912795JB86	0.000%	6/7/2001	10/1/2002
403	US Treasury Bill 2001 Zero 17/01/02	US912795JC69	0.000%	13/7/2001	17/1/2002
404	US Treasury Note 3 7/8% 31/07/03 S	US9128277A44	3.875%	19/7/2001	31/7/2003
405	US Treasury Bill 2001 Zero 24/01/02	US912795JD43	0.000%	20/7/2001	24/1/2002
406	US Treasury Bill 2001 Zero 31/01/02	US912795JE26	0.000%	27/7/2001	31/1/2002
407	US Treasury Bill 2001 Zero 07/02/02	US912795JF90	0.000%	3/8/2001	7/2/2002
408	US Treasury Bill 2001 Zero 14/02/02	US912795JG73	0.000%	10/8/2001	14/2/2002
409	US Treasury 2001 5% 15/08/11 C-2011	US9128277B27	5.000%	15/8/2001	15/8/2011
410	US Treasury Bill 2001 Zero 21/02/02	US912795JH56	0.000%	17/8/2001	21/2/2002
411	US Treasury Note 3 5/8 31/08/03 S	US9128277C00	3.625%	23/8/2001	31/8/2003
412	US Treasury Bill 2001 Zero 07/03/02	US912795JJ13	0.000%	31/8/2001	7/3/2002
413	US Treasury Bill 2001 Zero 14/03/02	US912795JK85	0.000%	7/9/2001	14/3/2002
414	US Treasury Bill 2001 Zero 20/09/01	US912795JL68	0.000%	14/9/2001	20/9/2001
415	US Treasury Note 2 3/4% 30/09/03	US9128277D82	2.750%	19/9/2001	30/9/2003
416	US Treasury Bill 2001 Zero 28/03/02	US912795JM42	0.000%	21/9/2001	28/3/2002
417	US Treasury Bill 2001 Zero 04/04/02	US912795JN25	0.000%	28/9/2001	4/4/2002
418	US Treasury Bill 2001 Zero 11/04/02	US912795JP72	0.000%	5/10/2001	11/4/2002

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
419	US Treasury Bill 2001 Zero 18/04/02	US912795JQ55	0.000%	12/10/2001	18/4/2002
420	US Treasury Note 2 3/4% 31/10/03 S	US9128277E65	2.750%	18/10/2001	31/10/2003
421	US Treasury Bill 2001 Zero 25/04/02	US912795JR39	0.000%	19/10/2001	25/4/2002
422	US Treasury Bill 2001 Zero 02/05/02	US912795JS12	0.000%	26/10/2001	2/5/2002
423	US Treasury Bill 2001 Zero 09/05/02	US912795JT94	0.000%	2/11/2001	9/5/2002
424	US Treasury Note 3 1/2 15/11/06 S	US9128277F31	3.500%	2/11/2001	15/11/2006
425	US Treasury Bill 2001 Zero 16/05/02	US912795JU67	0.000%	9/11/2001	16/5/2002
426	US Treasury Bill 2001 Zero 23/05/02	US912795JV41	0.000%	16/11/2001	23/5/2002
427	US Treasury Bill 2001 Zero 30/05/02	US912795JW24	0.000%	22/11/2001	30/5/2002
428	US Treasury Note 3% 30/11/03 S	US9128277G14	3.000%	22/11/2001	30/11/2003
429	US Treasury Note Zero 06/06/02	US912795JX07	0.000%	3/12/2001	6/6/2002
430	US Treasury Bill 2001 Zero 13/06/02	US912795JY89	0.000%	7/12/2001	13/6/2002
431	US Treasury Note Zero 20/06/02	US912795JZ54	0.000%	14/12/2001	20/6/2002
432	US Treasury Note 3 1/4% 31/12/03 S	US9128277H96	3.250%	20/12/2001	31/12/2003
433	US Treasury Note Zero 27/06/02	US912795KA84	0.000%	21/12/2001	27/6/2002
434	US Treasury Note Zero 05/07/02	US912795KQ37	0.000%	28/12/2001	5/7/2002
435	US Treasury Note Zero 11/07/02	US912795KR10	0.000%	4/1/2002	11/7/2002
436	US Treasury Bill 2002 Zero 18/07/02	US912795KS92	0.000%	11/1/2002	18/7/2002
437	US Treasury Note 3% 31/01/04 S	US9128277K26	3.000%	17/1/2002	31/1/2004
438	US Treasury Note Zero 25/07/02	US912795KT75	0.000%	18/1/2002	25/7/2002
439	US Treasury Note Zero 01/08/02	US912795KU49	0.000%	25/1/2002	1/8/2002
440	US Treasury Note Zero 08/08/02	US912795KV22	0.000%	1/2/2002	8/8/2002

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
441	US Treasury Note Zero 15/08/02	US912795KW05	0.000%	8/2/2002	15/8/2002
442	US Treasury 2002 4 7/8% 15/02/12 B-2012	US9128277L09	4.875%	15/2/2002	15/2/2012
443	US Treasury Bill 2002 Zero 22/08/02	US912795KX87	0.000%	15/2/2002	22/8/2002
444	US Treasury Note 3% 29/02/04 S	US9128277M81	3.000%	21/2/2002	29/2/2004
445	US Treasury Note Zero 29/08/02	US912795KY60	0.000%	22/2/2002	29/8/2002
446	US Treasury Note Zero 05/09/02	US912795KZ36	0.000%	1/3/2002	5/9/2002
447	US Treasury Note Zero 12/09/02	US912795LA75	0.000%	8/3/2002	12/9/2002
448	US Treasury Note Zero 19/09/02	US912795LB58	0.000%	15/3/2002	19/9/2002
449	US Treasury Note 3 5/8% 31/03/04 S	US912828AA87	3.625%	21/3/2002	31/3/2004
450	US Treasury Bill 2002 Zero 26/09/02	US912795LC32	0.000%	22/3/2002	26/9/2002
451	US Treasury Bill 2002 Zero 03/10/02	US912795LD15	0.000%	29/3/2002	3/10/2002
452	US Treasury Bill 2002 Zero 22/04/02	US912795KK66	0.000%	2/4/2002	22/4/2002
453	US Treasury Bill 2002 Zero 16/04/02	US912795KL40	0.000%	3/4/2002	16/4/2002
454	US Treasury Bill 2002 Zero 10/10/02	US912795LE97	0.000%	5/4/2002	10/10/2002
455	US Treasury Bill 2002 Zero 17/10/02	US912795LF62	0.000%	12/4/2002	17/10/2002
456	US Treasury Note 3 3/8% 30/04/04 S	US912828AB60	3.375%	18/4/2002	30/4/2004
457	US Treasury Note Zero 24/10/02	US912795LG46	0.000%	19/4/2002	24/10/2002
458	US Treasury Note Zero 31/10/02	US912795LH29	0.000%	29/4/2002	31/10/2002
459	US Treasury Note 4 3/8% 15/05/07 S	US912828AC44	4.375%	2/5/2002	15/5/2007
460	US Treasury Note 2002 Zero 07/11/02	US912795LJ84	0.000%	3/5/2002	7/11/2002
461	US Treasury Note Zero 17/05/02	US912795KN06	0.000%	9/5/2002	17/5/2002
462	US Treasury Note Zero 14/11/02	US912795LK57	0.000%	10/5/2002	14/11/2002

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
463	US Treasury Note Zero 21/11/02	US912795LL31	0.000%	18/5/2002	21/11/2002
464	US Treasury Note 3 1/4% 31/05/04 S	US912828AD27	3.250%	24/5/2002	31/5/2004
465	US Treasury Note Zero 29/11/02	US912795LM14	0.000%	24/5/2002	29/11/2002
466	US Treasury Note Zero 05/12/02	US912795LN96	0.000%	31/5/2002	5/12/2002
467	US Treasury Note Zero 12/06/02	US912795KP53	0.000%	3/6/2002	12/6/2002
468	US Treasury Note Zero 12/12/02	US912795LP45	0.000%	7/6/2002	12/12/2002
469	US Treasury Note Zero 18/06/02	US912795MU21	0.000%	11/6/2002	18/6/2002
470	US Treasury Note Zero 19/12/02	US912795LQ28	0.000%	14/6/2002	19/12/2002
471	US Treasury Note Zero 26/12/02	US912795LR01	0.000%	21/6/2002	26/12/2002
472	US Treasury Note 2 7/8% 30/06/04 S	US912828AE00	2.875%	28/6/2002	30/6/2004
473	US Treasury Note Zero 02/01/03	US912795LS83	0.000%	1/7/2002	2/1/2003
474	US Treasury Note Zero 09/01/03	US912795LT66	0.000%	4/7/2002	9/1/2003
475	US Treasury Bill Zero 16/01/03	US912795LU30	0.000%	12/7/2002	16/1/2003
476	US Treasury Note 2 1/4% 31/07/04 S	US912828AG57	2.250%	18/7/2002	31/7/2004
477	US Treasury Bill Zero 23/01/03	US912795LV13	0.000%	19/7/2002	23/1/2003
478	US Treasury Bill Zero 30/01/03	US912795LW95	0.000%	26/7/2002	30/1/2003
479	US Treasury Note 3 1/4% 15/08/07 S	US912828AH31	3.250%	1/8/2002	15/8/2007
480	US Treasury Bill Zero 06/02/03	US912795LX78	0.000%	2/8/2002	6/2/2003
481	US Treasury Bill Zero 13/02/03	US912795LY51	0.000%	9/8/2002	13/2/2003
482	US Treasury 2002 4 3/8% 15/08/12 D-2012	US912828AJ96	4.375%	15/8/2002	15/8/2012
483	US Treasury Bill Zero 20/02/03	US912795LZ27	0.000%	16/8/2002	20/2/2003
484	US Treasury Bill Zero 27/02/03	US912795MA66	0.000%	23/8/2002	27/2/2003

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
485	US Treasury Note 2 1/8% 31/08/04 S	US912828AK69	2.125%	27/8/2002	31/8/2004
486	US Treasury Bill Zero 06/03/03	US912795MB40	0.000%	30/8/2002	6/3/2003
487	US Treasury Bill Zero 13/03/03	US912795MC23	0.000%	6/9/2002	13/3/2003
488	US Treasury Bill Zero 20/03/03	US912795MD06	0.000%	16/9/2002	20/3/2003
489	US Treasury Bill Zero 27/03/03	US912795ME88	0.000%	20/9/2002	27/3/2003
490	US Treasury Note 1 7/8% 30/09/04 S	US912828AL43	1.875%	24/9/2002	30/9/2004
491	US Treasury Bill Zero 03/04/03	US912795MF53	0.000%	27/9/2002	3/4/2003
492	US Treasury Bill Zero 10/04/03	US912795MG37	0.000%	7/10/2002	10/4/2003
493	US Treasury Bill Zero 17/04/03	US912795MH10	0.000%	12/10/2002	17/4/2003
494	US Treasury Bill Zero 24/04/03	US912795MJ75	0.000%	19/10/2002	24/4/2003
495	US Treasury Note 2 1/8% 31/10/04 S	US912828AM26	2.125%	22/10/2002	31/10/2004
496	US Treasury Bill Zero 01/05/03	US912795MK49	0.000%	25/10/2002	1/5/2003
497	US Treasury Note 3% 15/11/07 S	US912828AN09	3.000%	31/10/2002	15/11/2007
498	US Treasury Bill Zero 08/05/03	US912795ML22	0.000%	1/11/2002	8/5/2003
499	US Treasury 2002 4% 15/11/12 E-2012	US912828AP56	4.000%	15/11/2002	15/11/2012
500	US Treasury Bill Zero 22/05/03	US912795MN87	0.000%	15/11/2002	22/5/2003
501	US Treasury Bill Zero 29/05/03	US912795MP36	0.000%	22/11/2002	29/5/2003
502	US Treasury Note 2% 30/11/04 S	US912828AQ30	2.000%	26/11/2002	30/11/2004
503	US Treasury Bill Zero 05/06/03	US912795MQ19	0.000%	28/11/2002	5/6/2003
504	US Treasury Bill Zero 12/06/03	US912795MR91	0.000%	6/12/2002	12/6/2003
505	US Treasury Bill Zero 19/06/03	US912795MS74	0.000%	13/12/2002	19/6/2003
506	US Treasury Bill Zero 26/06/03	US912795MT57	0.000%	20/12/2002	26/6/2003

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
507	US Treasury Note 1 3/4% 31/12/04 S	US912828AR13	1.750%	20/12/2002	31/12/2004
508	US Treasury Bill Zero 10/07/03	US912795NC14	0.000%	3/1/2003	10/7/2003
509	US Treasury Bill Zero 17/07/03	US912795ND96	0.000%	10/1/2003	17/7/2003
510	US Treasury Bill Zero 24/07/03	US912795NE79	0.000%	17/1/2003	24/7/2003
511	US Treasury Bill Zero 31/07/03	US912795NF45	0.000%	24/1/2003	31/7/2003
512	US Treasury Note 1 5/8% 31/01/05 S	US912828AS95	1.625%	28/1/2003	31/1/2005
513	US Treasury Bill Zero 07/08/03	US912795NG28	0.000%	31/1/2003	7/8/2003
514	US Treasury Note 3% 15/02/08 S	US912828AT78	3.000%	6/2/2003	15/2/2008
515	US Treasury Bill Zero 14/08/03	US912795NH01	0.000%	7/2/2003	14/8/2003
516	US Treasury Bill Zero 21/08/03	US912795NJ66	0.000%	14/2/2003	21/8/2003
517	US Treasury 2003 3 7/8% 15/02/13 A-2013	US912828AU42	3.875%	18/2/2003	15/2/2013
518	US Treasury Bill Zero 28/08/03	US912795NK30	0.000%	21/2/2003	28/8/2003
519	US Treasury Note 1 1/2% 28/02/05 S	US912828AV25	1.500%	25/2/2003	28/2/2005
520	US Treasury Bill Zero 17/03/03	US912795MX69	0.000%	26/2/2003	17/3/2003
521	US Treasury Bill Zero 04/09/03	US912795NL13	0.000%	28/2/2003	4/9/2003
522	US Treasury Bill Zero 11/09/03	US912795NM95	0.000%	7/3/2003	11/9/2003
523	US Treasury Bill Zero 18/09/03	US912795NN78	0.000%	14/3/2003	18/9/2003
524	US Treasury Bill Zero 25/09/03	US912795NP27	0.000%	21/3/2003	25/9/2003
525	US Treasury Note 1 5/8% 31/03/05 S	US912828AW08	1.625%	25/3/2003	31/3/2005
526	US Treasury Bill Zero 02/10/03	US912795NQ00	0.000%	3/4/2003	2/10/2003
527	US Treasury Bill Zero 03/07/03	US912795NB31	0.000%	3/4/2003	3/7/2003
528	US Treasury Bill Zero 15/04/03	US912795MY43	0.000%	3/4/2003	15/4/2003

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
529	US Treasury Bill Zero 09/10/03	US912795NR82	0.000%	4/4/2003	9/10/2003
530	US Treasury Bill Zero 16/10/03	US912795NS65	0.000%	11/4/2003	16/10/2003
531	US Treasury Bill Zero 15/05/03	US912795MM05	0.000%	17/4/2003	15/5/2003
532	US Treasury Bill Zero 23/10/03	US912795NT49	0.000%	18/4/2003	23/10/2003
533	US Treasury Note 1 5/8% 30/04/05 S	US912828AX80	1.625%	22/4/2003	30/4/2005
534	US Treasury Bill Zero 30/10/03	US912795NU12	0.000%	25/4/2003	30/10/2003
535	US Treasury Note 2 5/8% 15/05/08 S	US912828AZ39	2.625%	1/5/2003	15/5/2008
536	US Treasury Note 2% 15/05/06 S	US912828AY63	2.000%	1/5/2003	15/5/2006
537	US Treasury Bill Zero 06/11/03	US912795NV94	0.000%	2/5/2003	6/11/2003
538	US Treasury Bill Zero 13/11/03	US912795NW77	0.000%	9/5/2003	13/11/2003
539	US Treasury 2003 3 5/8% 15/05/13 B-2013	US912828BA78	3.625%	15/5/2003	15/5/2013
540	US Treasury Bill Zero 20/11/03	US912795NX50	0.000%	20/5/2003	20/11/2003
541	US Treasury Bill Zero 13/06/03	US912795QF18	0.000%	27/5/2003	13/6/2003
542	US Treasury Bill Zero 28/11/03	US912795NY34	0.000%	28/5/2003	28/11/2003
543	US Treasury Note 1 1/4% 31/05/05 S	US912828BB51	1.250%	29/5/2003	31/5/2005
544	US Treasury Bill Zero 04/12/03	US912795NZ09	0.000%	30/5/2003	4/12/2003
545	US Treasury Bill Zero 11/12/03	US912795PA30	0.000%	6/6/2003	11/12/2003
546	US Treasury Bill Zero 18/12/03	US912795PB13	0.000%	16/6/2003	18/12/2003
547	US Treasury Bill Zero 26/12/03	US912795PC95	0.000%	20/6/2003	26/12/2003
548	US Treasury Note 1 1/8% 30/06/05 S	US912828BC35	1.125%	24/6/2003	30/6/2005
549	US Treasury Bill Zero 02/01/04	US912795PD78	0.000%	27/6/2003	2/1/2004
550	US Treasury Bill Zero 08/01/04	US912795PE51	0.000%	4/7/2003	8/1/2004

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
551	US Treasury Bill Zero 15/01/04	US912795PF27	0.000%	11/7/2003	15/1/2004
552	US Treasury Bill Zero 22/01/04	US912795PG00	0.000%	18/7/2003	22/1/2004
553	US Treasury Note 1 1/2% 31/07/05 S	US912828BE90	1.500%	22/7/2003	31/7/2005
554	US Treasury Bill Zero 29/01/04	US912795PH82	0.000%	25/7/2003	29/1/2004
555	US Treasury Note 2 3/8% 15/08/06 S	US912828BF65	2.375%	31/7/2003	15/8/2006
556	US Treasury Bill Zero 05/02/04	US912795PJ49	0.000%	1/8/2003	5/2/2004
557	US Treasury Bill Zero 12/02/04	US912795PK12	0.000%	8/8/2003	12/2/2004
558	US Treasury 2003 4 1/4% 15/08/13 D-2013	US912828BH22	4.250%	15/8/2003	15/8/2013
559	US Treasury Bill Zero 19/02/04	US912795PL94	0.000%	15/8/2003	19/2/2004
560	US Treasury Note 3 1/4% 15/08/08 S	US912828BG49	3.250%	15/8/2003	15/8/2008
561	US Treasury Bill Zero 26/02/04	US912795PM77	0.000%	22/8/2003	26/2/2004
562	US Treasury Note 2% 31/08/05 S	US912828BJ87	2.000%	26/8/2003	31/8/2005
563	US Treasury Bill Zero 04/03/04	US912795PN50	0.000%	29/8/2003	4/3/2004
564	US Treasury Bill Zero 11/03/04	US912795PP09	0.000%	5/9/2003	11/3/2004
565	US Treasury Note 3 1/8% 15/09/08 S	US912828BK50	3.125%	10/9/2003	15/9/2008
566	US Treasury Bill Zero 18/03/04	US912795PQ81	0.000%	12/9/2003	18/3/2004
567	US Treasury Bill Zero 25/03/04	US912795PR64	0.000%	20/9/2003	25/3/2004
568	US Treasury Note 1 5/8% 30/09/05 S	US912828BL34	1.625%	23/9/2003	30/9/2005
569	US Treasury Bill Zero 01/04/04	US912795PS48	0.000%	29/9/2003	1/4/2004
570	US Treasury Bill Zero 15/10/03	US912795QH73	0.000%	2/10/2003	15/10/2003
571	US Treasury Bill Zero 08/04/04	US912795PT21	0.000%	3/10/2003	8/4/2004
572	US Treasury Bill Zero 15/04/04	US912795PU93	0.000%	10/10/2003	15/4/2004

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
573	US Treasury Note 3 1/8% 15/10/08 S	US912828BM17	3.125%	15/10/2003	15/10/2008
574	US Treasury Bill Zero 22/04/04	US912795PV76	0.000%	16/10/2003	22/4/2004
575	US Treasury Bill Zero 29/04/04	US912795PW59	0.000%	24/10/2003	29/4/2004
576	US Treasury Note 1 5/8% 31/10/05 S	US912828BN99	1.625%	28/10/2003	31/10/2005
577	US Treasury Bill Zero 06/05/04	US912795PX33	0.000%	31/10/2003	6/5/2004
578	US Treasury Note 2 5/8% 15/11/06 S	US912828BP48	2.625%	6/11/2003	15/11/2006
579	US Treasury Bill Zero 13/05/04	US912795PY16	0.000%	7/11/2003	13/5/2004
580	US Treasury Bill Zero 20/05/04	US912795PZ80	0.000%	14/11/2003	20/5/2004
581	US Treasury 2003 4 1/4% 15/11/13 E-2013	US912828BR04	4.250%	17/11/2003	15/11/2013
582	US Treasury Note 3 3/8% 15/11/08 S	US912828BQ21	3.375%	17/11/2003	15/11/2008
583	US Treasury Bill Zero 27/05/04	US912795QA21	0.000%	21/11/2003	27/5/2004
584	US Treasury Note 1 7/8% 30/11/05 S	US912828BS86	1.875%	25/11/2003	30/11/2005
585	US Treasury Bill Zero 03/06/04	US912795QB04	0.000%	27/11/2003	3/6/2004
586	US Treasury Bill Zero 10/06/04	US912795QC86	0.000%	5/12/2003	10/6/2004
587	US Treasury Bill Zero 17/06/04	US912795QD69	0.000%	12/12/2003	17/6/2004
588	US Treasury Note 3 3/8% 15/12/08 S	US912828BT69	3.375%	15/12/2003	15/12/2008
589	US Treasury Bill Zero 24/06/04	US912795QE43	0.000%	19/12/2003	24/6/2004
590	US Treasury Note 1 7/8% 31/12/05 S	US912828BU33	1.875%	19/12/2003	31/12/2005
591	US Treasury Bill Zero 01/07/04	US912795QR55	0.000%	29/12/2003	1/7/2004
592	US Treasury Bill Zero 08/07/04	US912795QS39	0.000%	1/1/2004	8/7/2004
593	US Treasury Bill Zero 15/07/04	US912795QT12	0.000%	9/1/2004	15/7/2004
594	US Treasury Note 3 1/4% 15/01/09 S	US912828BV16	3.250%	15/1/2004	15/1/2009

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No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
595	US Treasury Bill Zero 22/07/04	US912795QU84	0.000%	16/1/2004	22/7/2004
596	US Treasury Bill Zero 29/07/04	US912795QV67	0.000%	23/1/2004	29/7/2004
597	US Treasury Note 1 7/8% 31/01/06 S	US912828BX71	1.875%	29/1/2004	31/1/2006
598	US Treasury Bill Zero 05/08/04	US912795QW41	0.000%	30/1/2004	5/8/2004
599	US Treasury Note 2 1/4% 15/02/07 S	US912828BY54	2.250%	5/2/2004	15/2/2007
600	US Treasury Bill Zero 12/08/04	US912795QX24	0.000%	9/2/2004	12/8/2004
601	US Treasury Bill Zero 19/08/04	US912795QY07	0.000%	13/2/2004	19/8/2004
602	US Treasury 2004 4% 15/02/14 B-2014	US912828CA69	4.000%	17/2/2004	15/2/2014
603	US Treasury Note 3% 15/02/09 S	US912828BZ20	3.000%	17/2/2004	15/2/2009
604	US Treasury Bill Zero 26/08/04	US912795QZ71	0.000%	20/2/2004	26/8/2004
605	US Treasury Note 1 5/8% 28/02/06 S	US912828CB43	1.625%	24/2/2004	28/2/2006
606	US Treasury Bill Zero 02/09/04	US912795RA12	0.000%	27/2/2004	2/9/2004
607	US Treasury Bill Zero 15/03/04	US912795QK03	0.000%	2/3/2004	15/3/2004
608	US Treasury Bill Zero 09/09/04	US912795RB94	0.000%	5/3/2004	9/9/2004
609	US Treasury Bill Zero 16/09/04	US912795RC77	0.000%	12/3/2004	16/9/2004
610	US Treasury Note 2 5/8% 15/03/09 S	US912828CC26	2.625%	15/3/2004	15/3/2009
611	US Treasury Bill Zero 23/09/04	US912795RD50	0.000%	19/3/2004	23/9/2004
612	US Treasury Note 1 1/2% 31/03/06 S	US912828CD09	1.500%	23/3/2004	31/3/2006
613	US Treasury Bill Zero 30/09/04	US912795RE34	0.000%	26/3/2004	30/9/2004
614	US Treasury Bill Zero 07/10/04	US912795RF09	0.000%	2/4/2004	7/10/2004
615	US Treasury Bill Zero 20/04/04	US912795QL85	0.000%	5/4/2004	20/4/2004
616	US Treasury Bill Zero 14/10/04	US912795RG81	0.000%	9/4/2004	14/10/2004

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No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
617	US Treasury Note 3 1/8% 15/04/09 S	US912828CE81	3.125%	15/4/2004	15/4/2009
618	US Treasury Bill Zero 21/10/04	US912795RH64	0.000%	19/4/2004	21/10/2004
619	US Treasury Bill Zero 28/10/04	US912795RJ21	0.000%	26/4/2004	28/10/2004
620	US Treasury Note 2 1/4% 30/04/06 S	US912828CF56	2.250%	27/4/2004	30/4/2006
621	US Treasury Bill Zero 04/11/04	US912795RK93	0.000%	3/5/2004	4/11/2004
622	US Treasury Note 3 1/8% 15/05/07 S	US912828CG30	3.125%	6/5/2004	15/5/2007
623	US Treasury Bill Zero 12/11/04	US912795RL76	0.000%	7/5/2004	12/11/2004
624	US Treasury Bill Zero 18/11/04	US912795RM59	0.000%	14/5/2004	18/11/2004
625	US Treasury Note 3 7/8% 15/05/10 S	US912828DU15	3.875%	16/5/2004	15/5/2010
626	US Treasury 2004 4 3/4% 15/05/14 C-2014	US912828CJ78	4.750%	17/5/2004	15/5/2014
627	US Treasury Note 3 7/8% 15/05/09 S	US912828CH13	3.875%	17/5/2004	15/5/2009
628	US Treasury Bill Zero 26/11/04	US912795RN33	0.000%	21/5/2004	26/11/2004
629	US Treasury Note 2 1/2% 31/05/06 S	US912828CK42	2.500%	25/5/2004	31/5/2006
630	US Treasury Bill Zero 14/06/04	US912795QN42	0.000%	26/5/2004	14/6/2004
631	US Treasury Bill Zero 02/12/04	US912795RP80	0.000%	28/5/2004	2/12/2004
632	US Treasury Bill Zero 15/06/04	US912795QP99	0.000%	28/5/2004	15/6/2004
633	US Treasury Bill Zero 09/12/04	US912795RQ63	0.000%	4/6/2004	9/12/2004
634	US Treasury Bill Zero 16/12/04	US912795RR47	0.000%	11/6/2004	16/12/2004
635	US Treasury Note 4% 15/06/09 S	US912828CL25	4.000%	15/6/2004	15/6/2009
636	US Treasury Bill Zero 23/12/04	US912795RS20	0.000%	18/6/2004	23/12/2004
637	US Treasury Note 2 3/4% 30/06/06 S	US912828CM08	2.750%	22/6/2004	30/6/2006
638	US Treasury Bill Zero 30/12/04	US912795RT03	0.000%	25/6/2004	30/12/2004

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
639	US Treasury Bill Zero 06/01/05	US912795RU75	0.000%	2/7/2004	6/1/2005
640	US Treasury Bill Zero 13/01/05	US912795RV58	0.000%	9/7/2004	13/1/2005
641	US Treasury Note 3 5/8% 15/07/09 S	US912828CN80	3.625%	15/7/2004	15/7/2009
642	US Treasury Bill Zero 20/01/05	US912795RW32	0.000%	16/7/2004	20/1/2005
643	US Treasury Bill Zero 27/01/05	US912795RX15	0.000%	23/7/2004	27/1/2005
644	US Treasury Note 2 3/4% 31/07/06 S	US912828CQ12	2.750%	27/7/2004	31/7/2006
645	US Treasury Bill Zero 03/02/05	US912795RY97	0.000%	30/7/2004	3/2/2005
646	US Treasury Bill Zero 10/02/05	US912795RZ62	0.000%	6/8/2004	10/2/2005
647	US Treasury Note 2 3/4% 15/08/07 S	US912828CR94	2.750%	6/8/2004	15/8/2007
648	US Treasury Bill Zero 17/02/05	US912795SA03	0.000%	13/8/2004	17/2/2005
649	US Treasury 2004 4 1/4% 15/08/14 E-2014	US912828CT50	4.250%	16/8/2004	15/8/2014
650	US Treasury Note 3 1/2% 15/08/09 S	US912828CS77	3.500%	16/8/2004	15/8/2009
651	US Treasury Bill Zero 24/02/05	US912795SB85	0.000%	20/8/2004	24/2/2005
652	US Treasury Note 2 3/8% 31/08/06 S	US912828CU24	2.375%	24/8/2004	31/8/2006
653	US Treasury Bill Zero 03/03/05	US912795SC68	0.000%	27/8/2004	3/3/2005
654	US Treasury Bill Zero 15/09/04	US912795TC59	0.000%	30/8/2004	15/9/2004
655	US Treasury Bill Zero 10/03/05	US912795SD42	0.000%	3/9/2004	10/3/2005
656	US Treasury Bill Zero 17/03/05	US912795SE25	0.000%	10/9/2004	17/3/2005
657	US Treasury Note 3 3/8% 15/09/09 S	US912828CV07	3.375%	15/9/2004	15/9/2009
658	US Treasury Bill Zero 24/03/05	US912795SF99	0.000%	17/9/2004	24/3/2005
659	US Treasury Bill Zero 31/03/05	US912795SG72	0.000%	27/9/2004	31/3/2005
660	US Treasury Note 2 1/2% 30/09/06 S	US912828CW89	2.500%	28/9/2004	30/9/2006

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
661	US Treasury Bill Zero 15/10/04	US912795TD33	0.000%	29/9/2004	15/10/2004
662	US Treasury Bill Zero 07/04/05	US912795SH55	0.000%	1/10/2004	7/4/2005
663	US Treasury Bill Zero 14/04/05	US912795SJ12	0.000%	8/10/2004	14/4/2005
664	US Treasury Bill Zero 21/04/05	US912795SK84	0.000%	15/10/2004	21/4/2005
665	US Treasury Note 3 3/8% 15/10/09 S	US912828CX62	3.375%	15/10/2004	15/10/2009
666	US Treasury Bill Zero 28/04/05	US912795SL67	0.000%	25/10/2004	28/4/2005
667	US Treasury Note 2 1/2% 31/10/06 S	US912828CY46	2.500%	27/10/2004	31/10/2006
668	US Treasury Bill Zero 05/05/05	US912795SM41	0.000%	29/10/2004	5/5/2005
669	US Treasury Bill Zero 12/05/05	US912795SN24	0.000%	5/11/2004	12/5/2005
670	US Treasury Bill Zero 19/05/05	US912795SP71	0.000%	11/11/2004	19/5/2005
671	US Treasury 2004 4 1/4% 15/11/14 F-2014	US912828DC17	4.250%	15/11/2004	15/11/2014
672	US Treasury Note 3 1/2% 15/11/09 S	US912828DB34	3.500%	15/11/2004	15/11/2009
673	US Treasury Bill Zero 26/05/05	US912795SQ54	0.000%	22/11/2004	26/5/2005
674	US Treasury Note 2 7/8% 30/11/06 S	US912828DD99	2.875%	22/11/2004	30/11/2006
675	US Treasury Bill Zero 02/06/05	US912795SR38	0.000%	29/11/2004	2/6/2005
676	US Treasury Bill Zero 15/12/04	US912795TF80	0.000%	30/11/2004	15/12/2004
677	US Treasury Bill Zero 09/06/05	US912795SS11	0.000%	3/12/2004	9/6/2005
678	US Treasury Bill Zero 16/06/05	US912795ST93	0.000%	10/12/2004	16/6/2005
679	US Treasury Note 3 1/2% 15/12/09 S	US912828DE72	3.500%	15/12/2004	15/12/2009
680	US Treasury Bill Zero 23/06/05	US912795SU66	0.000%	17/12/2004	23/6/2005
681	US Treasury Bill Zero 30/06/05	US912795SV40	0.000%	24/12/2004	30/6/2005
682	US Treasury Note 3% 31/12/06 S	US912828DF48	3.000%	28/12/2004	31/12/2006

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
683	US Treasury Bill Zero 18/01/05	US912795TG63	0.000%	29/12/2004	18/1/2005
684	US Treasury Bill Zero 07/07/05	US912795VF52	0.000%	31/12/2004	7/7/2005
685	US Treasury Bill Zero 14/07/05	US912795VG36	0.000%	7/1/2005	14/7/2005
686	US Treasury Bill Zero 21/07/05	US912795VH19	0.000%	14/1/2005	21/7/2005
687	US Treasury Note 3 5/8% 15/01/10 S	US912828DG21	3.625%	18/1/2005	15/1/2010
688	US Treasury Bill Zero 28/07/05	US912795VJ74	0.000%	21/1/2005	28/7/2005
689	US Treasury Note 3 1/8% 31/01/07 S	US912828DJ69	3.125%	25/1/2005	31/1/2007
690	US Treasury Bill Zero 04/08/05	US912795VK48	0.000%	31/1/2005	4/8/2005
691	US Treasury Note 3 3/8% 15/02/08 S	US912828DK33	3.375%	3/2/2005	15/2/2008
692	US Treasury Bill Zero 11/08/05	US912795VL21	0.000%	7/2/2005	11/8/2005
693	US Treasury Bill Zero 18/08/05	US912795VM04	0.000%	14/2/2005	18/8/2005
694	US Treasury 2005 4% 15/02/15 B-2015	US912828DM98	4.000%	15/2/2005	15/2/2015
695	US Treasury Note 3 1/2% 15/02/10 S	US912828DL16	3.500%	15/2/2005	15/2/2010
696	US Treasury Bill Zero 25/08/05	US912795VN86	0.000%	18/2/2005	25/8/2005
697	US Treasury Note 3 3/8% 28/02/07 S	US912828DN71	3.375%	23/2/2005	28/2/2007
698	US Treasury Bill Zero 01/09/05	US912795VP35	0.000%	25/2/2005	1/9/2005
699	US Treasury Bill Zero 15/03/05	US912795TJ03	0.000%	1/3/2005	15/3/2005
700	US Treasury Bill Zero 08/09/05	US912795VQ18	0.000%	7/3/2005	8/9/2005
701	US Treasury Bill Zero 15/09/05	US912795VR90	0.000%	11/3/2005	15/9/2005
702	US Treasury Note 4% 15/03/10 S	US912828DP20	4.000%	15/3/2005	15/3/2010
703	US Treasury Bill Zero 22/09/05	US912795VS73	0.000%	18/3/2005	22/9/2005
704	US Treasury Bill Zero 29/09/05	US912795VT56	0.000%	28/3/2005	29/9/2005

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
705	US Treasury Bill Zero 15/04/05	US912795TK75	0.000%	29/3/2005	15/4/2005
706	US Treasury Note 3 3/4% 31/03/07 S	US912828DQ03	3.750%	29/3/2005	31/3/2007
707	US Treasury Bill Zero 06/10/05	US912795VU20	0.000%	4/4/2005	6/10/2005
708	US Treasury Bill Zero 13/10/05	US912795VV03	0.000%	8/4/2005	13/10/2005
709	US Treasury Bill Zero 20/10/05	US912795VW85	0.000%	15/4/2005	20/10/2005
710	US Treasury Note 4% 15/04/10 S	US912828DR85	4.000%	15/4/2005	15/4/2010
711	US Treasury Bill Zero 27/10/05	US912795VX68	0.000%	22/4/2005	27/10/2005
712	US Treasury Note 3 5/8% 30/04/07 S	US912828DS68	3.625%	26/4/2005	30/4/2007
713	US Treasury Bill Zero 03/11/05	US912795VY42	0.000%	2/5/2005	3/11/2005
714	US Treasury Note 3 3/4% 15/05/08 S	US912828DT42	3.750%	5/5/2005	15/5/2008
715	US Treasury Bill Zero 10/11/05	US912795VZ17	0.000%	6/5/2005	10/11/2005
716	US Treasury Bill Zero 17/11/05	US912795WA56	0.000%	13/5/2005	17/11/2005
717	US Treasury 2005 4 1/8% 15/05/15 C-2015	US912828DV97	4.125%	16/5/2005	15/5/2015
718	US Treasury Bill Zero 25/11/05	US912795WB30	0.000%	23/5/2005	25/11/2005
719	US Treasury Note 3 1/2% 31/05/07 S	US912828DW70	3.500%	24/5/2005	31/5/2007
720	US Treasury Bill Zero 01/12/05	US912795WC13	0.000%	27/5/2005	1/12/2005
721	US Treasury Bill Zero 15/06/05	US912795TM32	0.000%	27/5/2005	15/6/2005
722	US Treasury Bill Zero 08/12/05	US912795WD95	0.000%	3/6/2005	8/12/2005
723	US Treasury Bill Zero 15/12/05	US912795WE78	0.000%	10/6/2005	15/12/2005
724	US Treasury Note 3 5/8% 15/06/10 S	US912828DX53	3.625%	15/6/2005	15/6/2010
725	US Treasury Bill Zero 22/12/05	US912795WF44	0.000%	20/6/2005	22/12/2005
726	US Treasury Bill Zero 29/12/05	US912795WG27	0.000%	27/6/2005	29/12/2005

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
727	US Treasury Bill Zero 15/07/05	US912795TN15	0.000%	28/6/2005	15/7/2005
728	US Treasury Note 3 5/8% 30/06/07 S	US912828DY37	3.625%	28/6/2005	30/6/2007
729	US Treasury Bill Zero 05/01/06	US912795WH00	0.000%	1/7/2005	5/1/2006
730	US Treasury Bill Zero 12/01/06	US912795WJ65	0.000%	8/7/2005	12/1/2006
731	US Treasury Bill Zero 19/01/06	US912795WK39	0.000%	15/7/2005	19/1/2006
732	US Treasury Note 3 7/8% 15/07/10 S	US912828DZ02	3.875%	15/7/2005	15/7/2010
733	US Treasury Bill Zero 26/01/06	US912795WL12	0.000%	22/7/2005	26/1/2006
734	US Treasury Note 3 7/8% 31/07/07 S	US912828EB25	3.875%	27/7/2005	31/7/2007
735	US Treasury Bill Zero 02/02/06	US912795WM94	0.000%	1/8/2005	2/2/2006
736	US Treasury Bill Zero 09/02/06	US912795WN77	0.000%	8/8/2005	9/2/2006
737	US Treasury Bill Zero 16/02/06	US912795WP26	0.000%	12/8/2005	16/2/2006
738	US Treasury 2005 4 1/4% 15/08/15 E-2015	US912828EE63	4.250%	15/8/2005	15/8/2015
739	US Treasury Note 4 1/8% 15/08/08 S	US912828EC08	4.125%	15/8/2005	15/8/2008
740	US Treasury Note 4 1/8% 15/08/10 S	US912828ED80	4.125%	15/8/2005	15/8/2010
741	US Treasury Bill Zero 23/02/06	US912795WQ09	0.000%	22/8/2005	23/2/2006
742	US Treasury Note 4% 31/08/07 S	US912828EF39	4.000%	23/8/2005	31/8/2007
743	US Treasury Bill Zero 02/03/06	US912795WR81	0.000%	29/8/2005	2/3/2006
744	US Treasury Bill Zero 09/03/06	US912795WS64	0.000%	2/9/2005	9/3/2006
745	US Treasury Bill Zero 16/03/06	US912795WT48	0.000%	9/9/2005	16/3/2006
746	US Treasury 2005 3 7/8% 15/09/10 N-2010	US912828EG12	3.875%	15/9/2005	15/9/2010
747	US Treasury Bill Zero 23/03/06	US912795WU11	0.000%	16/9/2005	23/3/2006
748	US Treasury Bill Zero 30/03/06	US912795WV93	0.000%	26/9/2005	30/3/2006

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
749	US Treasury Note 4% 30/09/07 S	US912828EH94	4.000%	27/9/2005	30/9/2007
750	US Treasury Bill Zero 06/04/06	US912795WW76	0.000%	30/9/2005	6/4/2006
751	US Treasury Bill Zero 17/10/05	US912795TQ46	0.000%	4/10/2005	17/10/2005
752	US Treasury Bill Zero 13/04/06	US912795WX59	0.000%	10/10/2005	13/4/2006
753	US Treasury Bill Zero 20/04/06	US912795WY33	0.000%	14/10/2005	20/4/2006
754	US Treasury 2005 4 1/4% 15/10/10	US912828EJ50	4.250%	17/10/2005	15/10/2010
755	US Treasury Bill Zero 27/04/06	US912795WZ08	0.000%	21/10/2005	27/4/2006
756	US Treasury Note 4 1/4% 31/10/07 S	US912828EK24	4.250%	25/10/2005	31/10/2007
757	US Treasury Bill Zero 04/05/06	US912795XA48	0.000%	28/10/2005	4/5/2006
758	US Treasury Bill Zero 11/05/06	US912795XB21	0.000%	4/11/2005	11/5/2006
759	US Treasury Bill Zero 18/05/06	US912795XC04	0.000%	11/11/2005	18/5/2006
760	US Treasury 2005 4 1/2% 15/11/15 F-2015	US912828EN62	4.500%	15/11/2005	15/11/2015
761	US Treasury 2005 4 1/2% 15/11/10 Q-2010	US912828EM89	4.500%	15/11/2005	15/11/2010
762	US Treasury Note 4 3/8% 15/11/08 S	US912828EL07	4.375%	15/11/2005	15/11/2008
763	US Treasury Bill Zero 25/05/06	US912795XD86	0.000%	18/11/2005	25/5/2006
764	US Treasury Note 4 1/4% 30/11/07 S	US912828EP11	4.250%	22/11/2005	30/11/2007
765	US Treasury Bill Zero 01/06/06	US912795XE69	0.000%	24/11/2005	1/6/2006
766	US Treasury Bill Zero 08/06/06	US912795XF35	0.000%	5/12/2005	8/6/2006
767	US Treasury Bill Zero 15/06/06	US912795XG18	0.000%	12/12/2005	15/6/2006
768	US Treasury 2005 4 3/8% 15/12/10 R-2010	US912828EQ93	4.375%	15/12/2005	15/12/2010
769	US Treasury Bill Zero 22/06/06	US912795XH90	0.000%	19/12/2005	22/6/2006
770	US Treasury Bill Zero 29/06/06	US912795XJ56	0.000%	23/12/2005	29/6/2006

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
771	US Treasury Bill Zero 17/01/06	US912795TR29	0.000%	28/12/2005	17/1/2006
772	US Treasury Note 4 3/8% 31/12/07 S	US912828ER76	4.375%	28/12/2005	31/12/2007
773	US Treasury Bill Zero 06/07/06	US912795XK20	0.000%	30/12/2005	6/7/2006
774	US Treasury Bill Zero 13/07/06	US912795XL03	0.000%	9/1/2006	13/7/2006
775	US Treasury Bill Zero 20/07/06	US912795XM85	0.000%	13/1/2006	20/7/2006
776	US Treasury 2006 4 1/4% 15/01/11 D-2011	US912828ES59	4.250%	17/1/2006	15/1/2011
777	US Treasury Bill Zero 27/07/06	US912795XN68	0.000%	23/1/2006	27/7/2006
778	US Treasury Note 4 3/8% 31/01/08 S	US912828EU06	4.375%	25/1/2006	31/1/2008
779	US Treasury Bill Zero 03/08/06	US912795XP17	0.000%	30/1/2006	3/8/2006
780	US Treasury Bill Zero 10/08/06	US912795XQ99	0.000%	3/2/2006	10/8/2006
781	US Treasury Bill Zero 17/08/06	US912795XR72	0.000%	13/2/2006	17/8/2006
782	US Treasury 2006 4 1/2% 15/02/16 B-2016	US912828EW61	4.500%	15/2/2006	15/2/2016
783	US Treasury 2006 4 1/2% 15/02/36 February	US912810FT08	4.500%	15/2/2006	15/2/2036
784	US Treasury Note 4 1/2% 15/02/09 S	US912828EV88	4.500%	15/2/2006	15/2/2009
785	US Treasury Bill Zero 24/08/06	US912795XS55	0.000%	17/2/2006	24/8/2006
786	US Treasury Note 4 5/8% 29/02/08 S	US912828EY28	4.625%	17/2/2006	29/2/2008
787	US Treasury Bill Zero 31/08/06	US912795XT39	0.000%	24/2/2006	31/8/2006
788	US Treasury 2006 4 1/2% 28/02/11 E-2011	US912828EX45	4.500%	28/2/2006	28/2/2011
789	US Treasury Bill Zero 15/03/06	US912795TS02	0.000%	1/3/2006	15/3/2006
790	US Treasury Bill Zero 07/09/06	US912795XU02	0.000%	6/3/2006	7/9/2006
791	US Treasury Bill Zero 14/09/06	US912795XV84	0.000%	13/3/2006	14/9/2006
792	US Treasury Bill Zero 21/09/06	US912795XW67	0.000%	20/3/2006	21/9/2006

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
793	US Treasury Bill Zero 28/09/06	US912795XX41	0.000%	27/3/2006	28/9/2006
794	US Treasury Note 4 5/8% 31/03/08 S	US912828EZ92	4.625%	27/3/2006	31/3/2008
795	US Treasury Bill Zero 17/04/06	US912795TU57	0.000%	30/3/2006	17/4/2006
796	US Treasury 2006 4 3/4% 31/03/11 F-2011	US912828FA33	4.750%	31/3/2006	31/3/2011
797	US Treasury Bill Zero 05/10/06	US912795XY24	0.000%	3/4/2006	5/10/2006
798	US Treasury Bill Zero 12/10/06	US912795XZ98	0.000%	10/4/2006	12/10/2006
799	US Treasury Bill Zero 19/10/06	US912795YA39	0.000%	17/4/2006	19/10/2006
800	US Treasury Bill Zero 26/10/06	US912795YB12	0.000%	24/4/2006	26/10/2006
801	US Treasury Note 4 7/8% 30/04/08 S	US912828FC98	4.875%	26/4/2006	30/4/2008
802	US Treasury 2006 4 7/8% 30/04/11 H-2011	US912828FD71	4.875%	1/5/2006	30/4/2011
803	US Treasury Bill Zero 02/11/06	US912795YC94	0.000%	1/5/2006	2/11/2006
804	US Treasury Bill Zero 09/11/06	US912795YD77	0.000%	8/5/2006	9/11/2006
805	US Treasury 2006 5 1/8% 15/05/16 C-2016	US912828FF20	5.125%	15/5/2006	15/5/2016
806	US Treasury Bill Zero 16/11/06	US912795YE50	0.000%	15/5/2006	16/11/2006
807	US Treasury Note 4 7/8% 15/05/09 S	US912828FE54	4.875%	15/5/2006	15/5/2009
808	US Treasury Bill Zero 24/11/06	US912795YF26	0.000%	22/5/2006	24/11/2006
809	US Treasury Note 4 7/8% 31/05/08 S	US912828FG03	4.875%	24/5/2006	31/5/2008
810	US Treasury Bill Zero 30/11/06	US912795YG09	0.000%	30/5/2006	30/11/2006
811	US Treasury 2006 4 7/8% 31/05/11 J-2011	US912828FH85	4.875%	31/5/2006	31/5/2011
812	US Treasury Bill Zero 07/12/06	US912795YH81	0.000%	5/6/2006	7/12/2006
813	US Treasury Bill Zero 14/12/06	US912795YJ48	0.000%	9/6/2006	14/12/2006
814	US Treasury Bill Zero 21/12/06	US912795YK11	0.000%	16/6/2006	21/12/2006

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
815	US Treasury Bill Zero 28/12/06	US912795YL93	0.000%	23/6/2006	28/12/2006
816	US Treasury Note 5 1/8% 30/06/08 S	US912828FJ42	5.125%	23/6/2006	30/6/2008
817	US Treasury 2006 5 1/8% 30/06/11 K-2011	US912828FK15	5.125%	30/6/2006	30/6/2011
818	US Treasury 2006 5 1/8% 30/06/11 K-2011	US912828FK15	5.125%	30/6/2006	30/6/2011
819	US Treasury Bill Zero 04/01/07	US912795YM76	0.000%	3/7/2006	4/1/2007
820	US Treasury Bill Zero 11/01/07	US912795YN59	0.000%	10/7/2006	11/1/2007
821	US Treasury Bill Zero 18/01/07	US912795YP08	0.000%	17/7/2006	18/1/2007
822	US Treasury Bill Zero 25/01/07	US912795YQ80	0.000%	24/7/2006	25/1/2007
823	US Treasury Note 5% 31/07/08 S	US912828FM70	5.000%	25/7/2006	31/7/2008
824	US Treasury 2006 4 7/8% 31/07/11 L-2011	US912828FN53	4.875%	31/7/2006	31/7/2011
825	US Treasury Bill Zero 01/02/07	US912795YR63	0.000%	31/7/2006	1/2/2007
826	US Treasury Bill Zero 08/02/07	US912795YS47	0.000%	4/8/2006	8/2/2007
827	US Treasury Bill Zero 15/02/07	US912795YT20	0.000%	11/8/2006	15/2/2007
828	US Treasury 2006 4 7/8% 15/08/16 E-2016	US912828FQ84	4.875%	15/8/2006	15/8/2016
829	US Treasury Note 4 7/8% 15/08/09 S	US912828FP02	4.875%	15/8/2006	15/8/2009
830	US Treasury Bill Zero 22/02/07	US912795YU92	0.000%	21/8/2006	22/2/2007
831	US Treasury Bill Zero 01/03/07	US912795YV75	0.000%	28/8/2006	1/3/2007
832	US Treasury Bill Zero 15/09/06	US912795TV31	0.000%	29/8/2006	15/9/2006
833	US Treasury 2006 4 5/8% 31/08/11 M-2011	US912828FS41	4.625%	31/8/2006	31/8/2011
834	US Treasury Note 4 7/8% 31/08/08 S	US912828FR67	4.875%	31/8/2006	31/8/2008
835	US Treasury Bill Zero 08/03/07	US912795YW58	0.000%	5/9/2006	8/3/2007
836	US Treasury Bill Zero 15/03/07	US912795YX32	0.000%	8/9/2006	15/3/2007

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
837	US Treasury Bill Zero 22/03/07	US912795YY15	0.000%	15/9/2006	22/3/2007
838	US Treasury Bill Zero 29/03/07	US912795YZ89	0.000%	22/9/2006	29/3/2007
839	US Treasury Bill Zero 05/04/07	US912795ZA20	0.000%	29/9/2006	5/4/2007
840	US Treasury 2006 4 1/2% 30/09/11 N-2011	US912828FU96	4.500%	2/10/2006	30/9/2011
841	US Treasury Note 4 5/8% 30/09/08 S	US912828FT24	4.625%	2/10/2006	30/9/2008
842	US Treasury Bill Zero 12/04/07	US912795ZB03	0.000%	6/10/2006	12/4/2007
843	US Treasury Bill Zero 19/04/07	US912795ZC85	0.000%	13/10/2006	19/4/2007
844	US Treasury Bill Zero 26/04/07	US912795ZD68	0.000%	20/10/2006	26/4/2007
845	US Treasury Note 4 7/8% 31/10/08 S	US912828FV79	4.875%	24/10/2006	31/10/2008
846	US Treasury Bill Zero 03/05/07	US912795ZE42	0.000%	27/10/2006	3/5/2007
847	US Treasury 2006 4 5/8% 31/10/11	US912828FW52	4.625%	31/10/2006	31/10/2011
848	US Treasury Bill Zero 10/05/07	US912795ZF17	0.000%	6/11/2006	10/5/2007
849	US Treasury Bill Zero 17/05/07	US912795ZG99	0.000%	13/11/2006	17/5/2007
850	US Treasury 2006 4 5/8% 15/11/16 F-2016	US912828FY19	4.625%	15/11/2006	15/11/2016
851	US Treasury Note 4 5/8% 15/11/09 S	US912828FX36	4.625%	15/11/2006	15/11/2009
852	US Treasury Bill Zero 24/05/07	US912795ZH72	0.000%	17/11/2006	24/5/2007
853	US Treasury Bill Zero 31/05/07	US912795ZJ39	0.000%	23/11/2006	31/5/2007
854	US Treasury Bill Zero 15/12/06	US912795TW14	0.000%	29/11/2006	15/12/2006
855	US Treasury 2006 4 1/2% 30/11/11 Q-2011	US912828GA24	4.500%	30/11/2006	30/11/2011
856	US Treasury Note 4 5/8% 30/11/08 S	US912828FZ83	4.625%	30/11/2006	30/11/2008
857	US Treasury Bill Zero 07/06/07	US912795ZK02	0.000%	1/12/2006	7/6/2007
858	US Treasury Bill Zero 14/06/07	US912795ZL84	0.000%	11/12/2006	14/6/2007

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
859	US Treasury Bill Zero 21/06/07	US912795ZM67	0.000%	14/12/2006	21/6/2007
860	US Treasury Bill Zero 28/06/07	US912795ZN41	0.000%	22/12/2006	28/6/2007
861	US Treasury Bill Zero 05/07/07	US912795ZP98	0.000%	28/12/2006	5/7/2007
862	US Treasury 2007 4 5/8% 31/12/11 R-2011	US912828GC89	4.625%	2/1/2007	31/12/2011
863	US Treasury Note 4 3/4% 31/12/08 S	US912828GB07	4.750%	2/1/2007	31/12/2008
864	US Treasury Bill Zero 12/07/07	US912795ZQ71	0.000%	5/1/2007	12/7/2007
865	US Treasury Bill Zero 19/07/07	US912795ZR54	0.000%	12/1/2007	19/7/2007
866	US Treasury Bill Zero 26/07/07	US912795ZS38	0.000%	22/1/2007	26/7/2007
867	US Treasury Bill Zero 02/08/07	US912795ZT11	0.000%	26/1/2007	2/8/2007
868	US Treasury 2007 4 3/4% 31/01/12 F-2012	US912828GF11	4.750%	31/1/2007	31/1/2012
869	US Treasury Note 4 7/8% 31/01/09 S	US912828GE46	4.875%	31/1/2007	31/1/2009
870	US Treasury Bill Zero 09/08/07	US912795ZU83	0.000%	1/2/2007	9/8/2007
871	US Treasury Bill Zero 16/08/07	US912795ZV66	0.000%	8/2/2007	16/8/2007
872	US Treasury 2007 4 3/4% 15/02/37 Februar	US912810PT97	4.750%	15/2/2007	15/2/2037
873	US Treasury 2007 4 5/8% 15/02/17 B-2017	US912828GH76	4.625%	15/2/2007	15/2/2017
874	US Treasury Note 4 3/4% 15/02/10 S	US912828GG93	4.750%	15/2/2007	15/2/2010
875	US Treasury Bill Zero 23/08/07	US912795ZW40	0.000%	20/2/2007	23/8/2007
876	US Treasury Bill Zero 30/08/07	US912795ZX23	0.000%	23/2/2007	30/8/2007
877	US Treasury 2007 4 5/8% 29/02/12 G-2012	US912828GK06	4.625%	28/2/2007	29/2/2012
878	US Treasury Note 4 3/4% 28/02/09 S	US912828GJ33	4.750%	28/2/2007	28/2/2009
879	US Treasury Bill Zero 06/09/07	US912795ZY06	0.000%	1/3/2007	6/9/2007
880	US Treasury Bill Zero 13/09/07	US912795ZZ70	0.000%	9/3/2007	13/9/2007

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
881	US Treasury Bill Zero 20/09/07	US912795A272	0.000%	15/3/2007	20/9/2007
882	US Treasury Bill Zero 27/09/07	US912795A355	0.000%	22/3/2007	27/9/2007
883	US Treasury Bill Zero 16/04/07	US912795TX96	0.000%	27/3/2007	16/4/2007
884	US Treasury Bill Zero 04/10/07	US912795A439	0.000%	30/3/2007	4/10/2007
885	US Treasury 2007 4 1/2% 31/03/12 H-2012	US912828GM61	4.500%	2/4/2007	31/3/2012
886	US Treasury Note 4 1/2% 31/03/09 S	US912828GL88	4.500%	2/4/2007	31/3/2009
887	US Treasury Bill Zero 17/04/07	US912795TY79	0.000%	3/4/2007	17/4/2007
888	US Treasury Bill Zero 11/10/07	US912795A504	0.000%	6/4/2007	11/10/2007
889	US Treasury Bill Zero 18/04/07	US912795TZ45	0.000%	12/4/2007	18/4/2007
890	US Treasury Bill Zero 18/10/07	US912795A686	0.000%	13/4/2007	18/10/2007
891	US Treasury Bill Zero 25/10/07	US912795A769	0.000%	20/4/2007	25/10/2007
892	US Treasury Bill Zero 01/11/07	US912795A843	0.000%	27/4/2007	1/11/2007
893	US Treasury 2007 4 1/2% 30/04/12 K-2012	US912828GQ75	4.500%	30/4/2007	30/4/2012
894	US Treasury Note 4 1/2% 30/04/09 S	US912828GP92	4.500%	30/4/2007	30/4/2009
895	US Treasury Bill Zero 08/11/07	US912795A926	0.000%	4/5/2007	8/11/2007
896	US Treasury Note 4 1/2% 15/05/10 S	US912828GR58	4.500%	7/5/2007	15/5/2010
897	US Treasury Bill Zero 15/11/07	US912795B262	0.000%	11/5/2007	15/11/2007
898	US Treasury 2007 4 1/2% 15/05/17 C-2017	US912828GS32	4.500%	15/5/2007	15/5/2017
899	US Treasury Bill Zero 23/11/07	US912795B346	0.000%	21/5/2007	23/11/2007
900	US Treasury Bill Zero 29/11/07	US912795B429	0.000%	25/5/2007	29/11/2007
901	US Treasury Bill Zero 15/06/07	US912795UA74	0.000%	30/5/2007	15/6/2007
902	US Treasury 2007 4 3/4% 31/05/12 L-2012	US912828GU87	4.750%	31/5/2007	31/5/2012

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
903	US Treasury Note 4 7/8% 31/05/09 S	US912828GT15	4.875%	31/5/2007	31/5/2009
904	US Treasury Bill Zero 06/12/07	US912795B593	0.000%	4/6/2007	6/12/2007
905	US Treasury Bill Zero 13/12/07	US912795B676	0.000%	11/6/2007	13/12/2007
906	US Treasury Bill Zero 20/12/07	US912795B759	0.000%	15/6/2007	20/12/2007
907	US Treasury Bill Zero 27/12/07	US912795B833	0.000%	22/6/2007	27/12/2007
908	US Treasury Bill Zero 03/01/08	US912795B916	0.000%	29/6/2007	3/1/2008
909	US Treasury Note 4 7/8% 30/06/09 S	US912828GV60	4.875%	30/6/2007	30/6/2009
910	US Treasury 2007 4 7/8% 30/06/12 M-2012	US912828GW44	4.875%	2/7/2007	30/6/2012
911	US Treasury Bill Zero 10/01/08	US912795C252	0.000%	6/7/2007	10/1/2008
912	US Treasury Bill Zero 17/01/08	US912795C336	0.000%	13/7/2007	17/1/2008
913	US Treasury Bill Zero 24/01/08	US912795C419	0.000%	20/7/2007	24/1/2008
914	US Treasury Bill Zero 31/01/08	US912795C583	0.000%	27/7/2007	31/1/2008
915	US Treasury 2007 4 5/8% 31/07/12 N-2012	US912828GZ74	4.625%	31/7/2007	31/7/2012
916	US Treasury Note 4 5/8% 31/07/09 S	US912828GY00	4.625%	31/7/2007	31/7/2009
917	US Treasury Bill Zero 07/02/08	US912795C666	0.000%	3/8/2007	7/2/2008
918	US Treasury Bill Zero 14/02/08	US912795C740	0.000%	10/8/2007	14/2/2008
919	US Treasury 2007 4 3/4% 15/08/17 E-2017	US912828HA15	4.750%	15/8/2007	15/8/2017
920	US Treasury 2007 5% 15/05/37 Bonds O	US912810PU60	5.000%	15/8/2007	15/5/2037
921	US Treasury Bill Zero 21/02/08	US912795C823	0.000%	17/8/2007	21/2/2008
922	US Treasury Bill Zero 28/02/08	US912795C906	0.000%	24/8/2007	28/2/2008
923	US Treasury Bill Zero 17/09/07	US912795UB57	0.000%	28/8/2007	17/9/2007
924	US Treasury 2007 4 1/8% 31/08/12		4.125%	31/8/2007	31/8/2012

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
925	US Treasury Bill Zero 06/03/08	US912795D243	0.000%	31/8/2007	6/3/2008
926	US Treasury Note 4% 31/08/09 S	US912828HB97	4.000%	31/8/2007	31/8/2009
927	US Treasury Bill Zero 13/03/08	US912795D326	0.000%	7/9/2007	13/3/2008
928	US Treasury Bill Zero 20/03/08	US912795D409	0.000%	14/9/2007	20/3/2008
929	US Treasury Bill Zero 27/03/08	US912795D573	0.000%	21/9/2007	27/3/2008
930	US Treasury Bill Zero 03/04/08	US912795D656	0.000%	28/9/2007	3/4/2008
931	US Treasury 2007 4 1/4% 30/09/12 Q-2012	US912828HE37	4.250%	1/10/2007	30/9/2012
932	US Treasury Note 4% 30/09/09 S	US912828HD53	4.000%	1/10/2007	30/9/2009
933	US Treasury Bill Zero 10/04/08	US912795D730	0.000%	5/10/2007	10/4/2008
934	US Treasury Bill Zero 17/04/08	US912795D813	0.000%	15/10/2007	17/4/2008
935	US Treasury Bill Zero 24/04/08	US912795D995	0.000%	22/10/2007	24/4/2008
936	US Treasury Bill Zero 01/05/08	US912795E233	0.000%	26/10/2007	1/5/2008
937	US Treasury 2007 3 7/8% 31/10/12 R-2012	US912828HG84	3.875%	31/10/2007	31/10/2012
938	US Treasury Note 3 5/8% 31/10/09 S	US912828HF02	3.625%	31/10/2007	31/10/2009
939	US Treasury Bill Zero 08/05/08	US912795E316	0.000%	1/11/2007	8/5/2008
940	US Treasury Bill Zero 15/05/08	US912795E498	0.000%	9/11/2007	15/5/2008
941	US Treasury 2007 4 1/4% 15/11/17 F-2017	US912828HH67	4.250%	15/11/2007	15/11/2017
942	US Treasury Bill Zero 22/05/08	US912795E563	0.000%	16/11/2007	22/5/2008
943	US Treasury Bill Zero 29/05/08	US912795E647	0.000%	26/11/2007	29/5/2008
944	US Treasury Bill Zero 17/12/07	US912795UC31	0.000%	29/11/2007	17/12/2007
945	US Treasury 2007 3 3/8% 30/11/12 S-2012	US912828HK96	3.375%	30/11/2007	30/11/2012
946	US Treasury Note 3 1/8% 30/11/09 S	US912828HJ24	3.125%	30/11/2007	30/11/2009

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
947	US Treasury Bill Zero 05/06/08	US912795E720	0.000%	5/12/2007	5/6/2008
948	US Treasury Bill Zero 12/06/08	US912795E803	0.000%	12/12/2007	12/6/2008
949	US Treasury Bill Zero 19/06/08	US912795E985	0.000%	14/12/2007	19/6/2008
950	US Treasury Bill Zero 26/06/08	US912795F222	0.000%	24/12/2007	26/6/2008
951	US Treasury Bill Zero 03/07/08	US912795F305	0.000%	28/12/2007	3/7/2008
952	US Treasury 2007 3 5/8% 31/12/12 T-2012	US912828HM52	3.625%	31/12/2007	31/12/2012
953	US Treasury Note 3 1/4% 31/12/09 S	US912828HL79	3.250%	31/12/2007	31/12/2009
954	US Treasury Bill Zero 10/07/08	US912795F487	0.000%	7/1/2008	10/7/2008
955	US Treasury Bill Zero 17/07/08	US912795F552	0.000%	14/1/2008	17/7/2008
956	US Treasury Bill Zero 24/07/08	US912795F636	0.000%	18/1/2008	24/7/2008
957	US Treasury Bill Zero 31/07/08	US912795F719	0.000%	28/1/2008	31/7/2008
958	US Treasury 2008 2 7/8% 31/01/13 F-2013	US912828HQ66	2.875%	31/1/2008	31/1/2013
959	US Treasury Note 2 1/8% 31/01/10 S	US912828HP83	2.125%	31/1/2008	31/1/2010
960	US Treasury Bill Zero 07/08/08	US912795F891	0.000%	4/2/2008	7/8/2008
961	US Treasury Bill Zero 14/08/08	US912795F974	0.000%	11/2/2008	14/8/2008
962	US Treasury Bill Zero 15/04/08	US912795UD14	0.000%	12/2/2008	15/4/2008
963	US Treasury 2008 3 1/2% 15/02/18 B-2018	US912828HR40	3.500%	15/2/2008	15/2/2018
964	US Treasury 2008 4 3/8% 15/02/38 Bonds O	US912810PW27	4.375%	15/2/2008	15/2/2038
965	US Treasury Bill Zero 21/08/08	US912795G212	0.000%	15/2/2008	21/8/2008
966	US Treasury Bill Zero 28/08/08	US912795G394	0.000%	22/2/2008	28/8/2008
967	US Treasury Bill Zero 17/03/08	US912795UE96	0.000%	26/2/2008	17/3/2008
968	US Treasury Bill Zero 04/09/08	US912795G477	0.000%	28/2/2008	4/9/2008

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
969	US Treasury 2008 2 3/4% 28/02/13 G-2013	US912828HT06	2.750%	29/2/2008	28/2/2013
970	US Treasury Note 2% 28/02/10 S	US912828HS23	2.000%	29/2/2008	28/2/2010
971	US Treasury Bill Zero 11/09/08	US912795G543	0.000%	7/3/2008	11/9/2008
972	US Treasury Bill Zero 21/04/08	US912795UF61	0.000%	25/3/2008	21/4/2008
973	US Treasury Bill Zero 16/04/08	US912795UG45	0.000%	27/3/2008	16/4/2008
974	US Treasury 2008 2 1/2% 31/03/13 H-2013	US912828HV51	2.500%	31/3/2008	31/3/2013
975	US Treasury Note 1 3/4% 31/03/10 S	US912828HU78	1.750%	31/3/2008	31/3/2010
976	US Treasury Bill Zero 23/10/08	US912795H384	0.000%	21/4/2008	23/10/2008
977	US Treasury Bill Zero 30/10/08	US912795H467	0.000%	28/4/2008	30/10/2008
978	US Treasury 2008 3 1/8% 30/04/13 K-2013	US912828HY90	3.125%	30/4/2008	30/4/2013
979	US Treasury Note 2 1/8% 30/04/10 S	US912828HX18	2.125%	30/4/2008	30/4/2010
980	US Treasury Bill Zero 06/11/08	US912795H533	0.000%	5/5/2008	6/11/2008
981	US Treasury Bill Zero 13/11/08	US912795H616	0.000%	12/5/2008	13/11/2008
982	US Treasury 2008 3 7/8% 15/05/18 C-2018	US912828HZ65	3.875%	15/5/2008	15/5/2018
983	US Treasury Bill Zero 20/11/08	US912795H798	0.000%	19/5/2008	20/11/2008
984	US Treasury Bill Zero 28/11/08	US912795H871	0.000%	27/5/2008	28/11/2008
985	US Treasury Bill Zero 16/06/08	US912795R292	0.000%	28/5/2008	16/6/2008
986	US Treasury 2008 3 1/2% 31/05/13 L-2013	US912828JB79	3.500%	2/6/2008	31/5/2013
987	US Treasury Bill Zero 04/12/08	US912795H954	0.000%	2/6/2008	4/12/2008
988	US Treasury Note 2 5/8% 31/05/10 S	US912828JA96	2.625%	2/6/2008	31/5/2010
989	US Treasury Bill Zero 04/06/09	US912795Q799	0.000%	3/6/2008	4/6/2009
990	US Treasury Bill Zero 11/12/08	US912795J281	0.000%	9/6/2008	11/12/2008

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
991	US Treasury Bill Zero 26/12/08	US912795J448	0.000%	23/6/2008	26/12/2008
992	US Treasury 2008 3 3/8% 30/06/13 M-2013	US912828JD36	3.375%	30/6/2008	30/6/2013
993	US Treasury Bill Zero 02/01/09	US912795J513	0.000%	30/6/2008	2/1/2009
994	US Treasury Note 2 7/8% 30/06/10 S	US912828JC52	2.875%	30/6/2008	30/6/2010
995	US Treasury Bill Zero 02/07/09	US912795Q872	0.000%	1/7/2008	2/7/2009
996	US Treasury Bill Zero 08/01/09	US912795J695	0.000%	7/7/2008	8/1/2009
997	US Treasury Bill Zero 15/01/09	US912795J778	0.000%	14/7/2008	15/1/2009
998	US Treasury Bill Zero 22/01/09	US912795J851	0.000%	21/7/2008	22/1/2009
999	US Treasury Bill Zero 29/01/09	US912795J935	0.000%	28/7/2008	29/1/2009
1000	US Treasury Bill Zero 30/07/09	US912795Q955	0.000%	29/7/2008	30/7/2009
1001	US Treasury 2008 3 3/8% 31/07/13 N-2013	US912828JG66	3.375%	31/7/2008	31/7/2013
1002	US Treasury Note 2 3/4% 31/07/10 S	US912828JF83	2.750%	31/7/2008	31/7/2010
1003	US Treasury Bill Zero 05/02/09	US912795K263	0.000%	4/8/2008	5/2/2009
1004	US Treasury Bill Zero 12/02/09	US912795K347	0.000%	11/8/2008	12/2/2009
1005	US Treasury Bill Zero 15/09/08	US912795S936	0.000%	14/8/2008	15/9/2008
1006	US Treasury 2008 4 1/2% 15/05/38 Bonds O	US912810PX00	4.500%	15/8/2008	15/5/2038
1007	US Treasury 2008 4% 15/08/18 E-2018	US912828JH40	4.000%	15/8/2008	15/8/2018
1008	US Treasury Bill Zero 19/02/09	US912795K420	0.000%	18/8/2008	19/2/2009
1009	US Treasury Bill Zero 18/09/08	US912795G626	0.000%	21/8/2008	18/9/2008
1010	US Treasury Bill Zero 26/02/09	US912795K594	0.000%	25/8/2008	26/2/2009
1011	US Treasury Bill Zero 25/09/08	US912795G709	0.000%	26/8/2008	25/9/2008
1012	US Treasury Bill Zero 27/08/09	US912795S282	0.000%	26/8/2008	27/8/2009

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
1013	US Treasury 2008 3 1/8% 31/08/13	US912828JK78	3.125%	2/9/2008	31/8/2013
1014	US Treasury 2008 2 3/8% 31/08/10 AB-2010	US912828JJ06	2.375%	2/9/2008	31/8/2010
1015	US Treasury Bill Zero 05/03/09	US912795K677	0.000%	2/9/2008	5/3/2009
1016	US Treasury Bill Zero 12/03/09	US912795K750	0.000%	8/9/2008	12/3/2009
1017	US Treasury Bill Zero 19/03/09	US912795K834	0.000%	15/9/2008	19/3/2009
1018	US Treasury Bill Zero 16/10/08	US912795H202	0.000%	18/9/2008	16/10/2008
1019	US Treasury Bill Zero 18/12/08	US912795J364	0.000%	18/9/2008	18/12/2008
1020	US Treasury Bill Zero 09/10/08	US912795G964	0.000%	19/9/2008	9/10/2008
1021	US Treasury Bill Zero 26/03/09	US912795K917	0.000%	22/9/2008	26/3/2009
1022	US Treasury Bill Zero 24/09/09	US912795S365	0.000%	23/9/2008	24/9/2009
1023	US Treasury Bill Zero 02/10/08	US912795G881	0.000%	25/9/2008	2/10/2008
1024	US Treasury Bill Zero 02/04/09	US912795L253	0.000%	29/9/2008	2/4/2009
1025	US Treasury 2008 3 1/8% 30/09/13 Q-2013	US912828JM35	3.125%	30/9/2008	30/9/2013
1026	US Treasury 2008 2% 30/09/10 AC-2010	US912828JL51	2.000%	30/9/2008	30/9/2010
1027	US Treasury Bill Zero 09/04/09	US912795L337	0.000%	6/10/2008	9/4/2009
1028	US Treasury Bill Zero 16/04/09	US912795L410	0.000%	14/10/2008	16/4/2009
1029	US Treasury Bill Zero 24/06/09	US912795U254	0.000%	16/10/2008	24/6/2009
1030	US Treasury Bill Zero 29/04/09	US912795T926	0.000%	16/10/2008	29/4/2009
1031	US Treasury Bill Zero 23/04/09	US912795L584	0.000%	20/10/2008	23/4/2009
1032	US Treasury Bill Zero 22/10/09	US912795S449	0.000%	21/10/2008	22/10/2009
1033	US Treasury Bill Zero 30/04/09	US912795L667	0.000%	27/10/2008	30/4/2009
1034	US Treasury 2008 2 3/4% 31/10/13 R-2013	US912828JQ49	2.750%	31/10/2008	31/10/2013

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
1035	US Treasury 2008 1 1/2% 31/10/10 AD-2010	US912828JP65	1.500%	31/10/2008	31/10/2010
1036	US Treasury Bill Zero 07/05/09	US912795L741	0.000%	3/11/2008	7/5/2009
1037	US Treasury Bill Zero 14/05/09	US912795L824	0.000%	10/11/2008	14/5/2009
1038	US Treasury Bill Zero 15/05/09	US912795V328	0.000%	13/11/2008	15/5/2009
1039	US Treasury 2008 1 3/4% 15/11/11 S-2011	US912828JU50	1.750%	17/11/2008	15/11/2011
1040	US Treasury 2008 3 3/4% 15/11/18 F-2018	US912828JR22	3.750%	17/11/2008	15/11/2018
1041	US Treasury Bill Zero 21/05/09	US912795L907	0.000%	17/11/2008	21/5/2009
1042	US Treasury Bill Zero 19/11/09	US912795S514	0.000%	18/11/2008	19/11/2009
1043	US Treasury Bill Zero 28/05/09	US912795M244	0.000%	24/11/2008	28/5/2009
1044	US Treasury 2008 2% 30/11/13 S-2013	US912828JT87	2.000%	1/12/2008	30/11/2013
1045	US Treasury 2008 1 1/4% 30/11/10 AE-2010	US912828JS05	1.250%	1/12/2008	30/11/2010
1046	US Treasury Bill Zero 11/06/09	US912795M400	0.000%	8/12/2008	11/6/2009
1047	US Treasury Bill Zero 15/09/09	US912795V815	0.000%	10/12/2008	15/9/2009
1048	US Treasury 2008 1 1/8% 15/12/11 T-2011	US912828KA77	1.125%	15/12/2008	15/12/2011
1049	US Treasury Bill Zero 18/06/09	US912795M574	0.000%	15/12/2008	18/6/2009
1050	US Treasury Bill Zero 17/12/09	US912795S696	0.000%	16/12/2008	17/12/2009
1051	US Treasury Bill Zero 25/06/09	US912795M657	0.000%	22/12/2008	25/6/2009
1052	US Treasury 2008 1 1/2% 31/12/13 T-2013	US912828JW17	1.500%	31/12/2008	31/12/2013
1053	US Treasury 2008 7/8% 31/12/10 AF-2010	US912828JV34	0.875%	31/12/2008	31/12/2010
1054	US Treasury Bill Zero 09/07/09	US912795M996	0.000%	5/1/2009	9/7/2009
1055	US Treasury Bill Zero 16/07/09	US912795N234	0.000%	12/1/2009	16/7/2009
1056	US Treasury Bill Zero 14/01/10	US912795R862	0.000%	13/1/2009	14/1/2010

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
1057	US Treasury 2009 1 1/8% 15/01/12 U-2012	US912828KB50	1.125%	15/1/2009	15/1/2012
1058	US Treasury Bill Zero 23/07/09	US912795N317	0.000%	20/1/2009	23/7/2009
1059	US Treasury 2009 1 3/4% 31/01/14 G-2014	US912828JZ48	1.750%	2/2/2009	31/1/2014
1060	US Treasury 2009 7/8% 31/01/11 U-2011	US912828JY72	0.875%	2/2/2009	31/1/2011
1061	US Treasury Bill Zero 06/08/09	US912795N564	0.000%	2/2/2009	6/8/2009
1062	US Treasury Bill Zero 13/08/09	US912795N648	0.000%	9/2/2009	13/8/2009
1063	US Treasury Bill Zero 11/02/10	US912795T272	0.000%	10/2/2009	11/2/2010
1064	US Treasury 2009 1 3/8% 15/02/12 V-2012	US912828KC34	1.375%	17/2/2009	15/2/2012
1065	US Treasury 2009 2 3/4% 15/02/19 B-2019	US912828KD17	2.750%	17/2/2009	15/2/2019
1066	US Treasury 2009 3 1/2% 15/02/39 Bonds O	US912810QA97	3.500%	17/2/2009	15/2/2039
1067	US Treasury Bill Zero 20/08/09	US912795N721	0.000%	17/2/2009	20/8/2009
1068	US Treasury 2009 1 7/8% 28/02/14 H-2014	US912828KF64	1.875%	2/3/2009	28/2/2014
1069	US Treasury 2009 2 5/8% 29/02/16 G-2016	US912828KS85	2.625%	2/3/2009	29/2/2016
1070	US Treasury 2009 7/8% 28/02/11 S	US912828KE99	0.875%	2/3/2009	28/2/2011
1071	US Treasury Bill Zero 03/09/09	US912795N986	0.000%	2/3/2009	3/9/2009
1072	US Treasury Bill Zero 10/09/09	US912795P213	0.000%	9/3/2009	10/9/2009
1073	US Treasury Bill Zero 11/03/10	US912795T686	0.000%	10/3/2009	11/3/2010
1074	US Treasury 2009 1 3/8% 15/03/12 W-2012	US912828KG48	1.375%	16/3/2009	15/3/2012
1075	US Treasury Bill Zero 17/09/09	US912795P395	0.000%	16/3/2009	17/9/2009
1076	US Treasury Bill Zero 01/10/09	US912795P544	0.000%	30/3/2009	1/10/2009
1077	US Treasury 2009 1 3/4% 31/03/14 J-2014	US912828KJ86	1.750%	31/3/2009	31/3/2014
1078	US Treasury 2009 2 3/8% 31/03/16 H-2016	US912828KT68	2.375%	31/3/2009	31/3/2016

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
1079	US Treasury 2009 7/8% 31/03/11 W-2011	US912828KH21	0.875%	31/3/2009	31/3/2011
1080	US Treasury Bill Zero 08/10/09	US912795P627	0.000%	6/4/2009	8/10/2009
1081	US Treasury Bill Zero 08/04/10	US912795U338	0.000%	7/4/2009	8/4/2010
1082	US Treasury Bill Zero 15/10/09	US912795P700	0.000%	13/4/2009	15/10/2009
1083	US Treasury 2009 1 3/8% 15/04/12 X-2012	US912828KK59	1.375%	15/4/2009	15/4/2012
1084	US Treasury Bill Zero 29/10/09	US912795P965	0.000%	27/4/2009	29/10/2009
1085	US Treasury 2009 1 7/8% 30/04/14 L-2014	US912828KN98	1.875%	30/4/2009	30/4/2014
1086	US Treasury 2009 2 5/8% 30/04/16 J-2016	US912828KR03	2.625%	30/4/2009	30/4/2016
1087	US Treasury 2009 7/8% 30/04/11 X-2011	US912828KL33	0.875%	30/4/2009	30/4/2011
1088	US Treasury Bill Zero 05/11/09	US912795Q203	0.000%	4/5/2009	5/11/2009
1089	US Treasury Bill Zero 06/05/10	US912795U411	0.000%	5/5/2009	6/5/2010
1090	US Treasury Bill Zero 12/11/09	US912795Q385	0.000%	11/5/2009	12/11/2009
1091	US Treasury Bill Zero 01/04/10	US912795UL30	0.000%	12/5/2009	1/4/2010
1092	US Treasury 2009 1 3/8% 15/05/12 Y-2012	US912828KP47	1.375%	15/5/2009	15/5/2012
1093	US Treasury 2009 3 1/8% 15/05/19 C-2019	US912828KQ20	3.125%	15/5/2009	15/5/2019
1094	US Treasury 2009 4 1/4% 15/05/39 Bonds O	US912810QB70	4.250%	15/5/2009	15/5/2039
1095	US Treasury Bill Zero 27/11/09	US912795Q534	0.000%	26/5/2009	27/11/2009
1096	US Treasury 2009 2 1/4% 31/05/14 M-2014	US912828KV15	2.250%	1/6/2009	31/5/2014
1097	US Treasury 2009 3 1/4% 31/05/16 K-2016	US912828KW97	3.250%	1/6/2009	31/5/2016
1098	US Treasury 2009 7/8% 31/05/11 Y-2011	US912828KU32	0.875%	1/6/2009	31/5/2011
1099	US Treasury Bill Zero 03/12/09	US912795Q617	0.000%	1/6/2009	3/12/2009
1100	US Treasury Bill Zero 03/06/10	US912795U585	0.000%	2/6/2009	3/6/2010

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
1101	US Treasury Bill Zero 15/06/09	US9127952E02	0.000%	3/6/2009	15/6/2009
1102	US Treasury Bill Zero 10/12/09	US912795R375	0.000%	8/6/2009	10/12/2009
1103	US Treasury 2009 1 7/8% 15/06/12 S	US912828KX70	1.875%	15/6/2009	15/6/2012
1104	US Treasury Bill Zero 24/12/09	US912795R524	0.000%	22/6/2009	24/12/2009
1105	US Treasury Bill Zero 31/12/09	US912795R607	0.000%	26/6/2009	31/12/2009
1106	US Treasury 2009 1 1/8% 30/06/11 Z-2011	US912828LF55	1.125%	30/6/2009	30/6/2011
1107	US Treasury 2009 2 5/8% 30/06/14 N-2014	US912828KY53	2.625%	30/6/2009	30/6/2014
1108	US Treasury 2009 3 1/4% 30/06/16 L-2016	US912828KZ29	3.250%	30/6/2009	30/6/2016
1109	US Treasury 2009 1 1/8% 30/06/11 Z-2011	US912828LF55	1.125%	30/6/2009	30/6/2011
1110	US Treasury Bill Zero 01/07/10	US912795U668	0.000%	30/6/2009	1/7/2010
1111	US Treasury Bill Zero 10/06/10	US912795UT65	0.000%	1/7/2009	10/6/2010
1112	US Treasury Bill Zero 07/01/10	US912795R789	0.000%	9/7/2009	7/1/2010
1113	US Treasury 2009 1 1/2% 15/07/12 AA-2012	US912828LB42	1.500%	15/7/2009	15/7/2012
1114	US Treasury Bill Zero 21/01/10	US912795R946	0.000%	23/7/2009	21/1/2010
1115	US Treasury Bill Zero 29/07/10	US912795U742	0.000%	28/7/2009	29/7/2010
1116	US Treasury Bill Zero 28/01/10	US912795S779	0.000%	30/7/2009	28/1/2010
1117	US Treasury 2009 1% 31/07/11 S	US912828LG39	1.000%	31/7/2009	31/7/2011
1118	US Treasury 2009 2 5/8% 31/07/14	US912828LC25	2.625%	31/7/2009	31/7/2014
1119	US Treasury 2009 3 1/4% 31/07/16 M-2016	US912828LD08	3.250%	31/7/2009	31/7/2016
1120	US Treasury Bill Zero 04/02/10	US912795S852	0.000%	3/8/2009	4/2/2010
1121	US Treasury 2009 1 3/4% 15/08/12 AB-2012	US912828LH12	1.750%	17/8/2009	15/8/2012
1122	US Treasury 2009 3 5/8% 15/08/19 E-2019	US912828LJ77	3.625%	17/8/2009	15/8/2019

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
1123	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912810QC53	4.500%	17/8/2009	15/8/2039
1124	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795T355	5.500%	17/8/2009	15/8/2039
1125	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UU39	6.500%	17/8/2009	15/8/2039
1126	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795T439	7.500%	17/8/2009	15/8/2039
1127	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795U825	8.500%	17/8/2009	15/8/2039
1128	US Treasury 2009 1% 31/08/11 AB-2011	US912828LV06	1.000%	31/8/2009	31/8/2011
1129	US Treasury 2009 2 3/8% 31/08/14 Q-2014	US912828LK41	2.375%	31/8/2009	31/8/2014
1130	US Treasury 2009 3% 31/08/16 N-2016	US912828LL24	3.000%	31/8/2009	31/8/2016
1131	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795T504	8.500%	17/8/2009	15/8/2039
1132	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UY50	8.500%	17/8/2009	15/8/2039
1133	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795T769	8.500%	17/8/2009	15/8/2039
1134	US Treasury 2009 1 3/8% 15/09/12 AC-2012	US912828LM07	1.375%	15/9/2009	15/9/2012
1135	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795T843	8.500%	17/8/2009	15/8/2039
1136	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795U908	8.500%	17/8/2009	15/8/2039
1137	US Treasury 2009 1% 30/09/11 AC-2011	US912828LW88	1.000%	30/9/2009	30/9/2011
1138	US Treasury 2009 2 3/8% 30/09/14 R-2014	US912828LQ11	2.375%	30/9/2009	30/9/2014
1139	US Treasury 2009 3% 30/09/16	US912828LP38	3.000%	30/9/2009	30/9/2016
1140	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UM13	8.500%	17/8/2009	15/8/2039
1141	US Treasury 2009 1 3/8% 15/10/12 AD-2012	US912828LR93	1.375%	15/10/2009	15/10/2012
1142	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UN95	8.500%	17/8/2009	15/8/2039
1143	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UH28	8.500%	17/8/2009	15/8/2039
1144	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UP44	8.500%	17/8/2009	15/8/2039

Table 11: List of United States Government Bonds during 1999-2009

No.	Designation	ISIN	Coupon	Issue Date	Maturity Date
1145	US Treasury 2009 1% 31/10/11 AD-2011	US912828LT59	1.000%	2/11/2009	31/10/2011
1146	US Treasury 2009 2 3/8% 31/10/14 S-2014	US912828LS76	2.375%	2/11/2009	31/10/2014
1147	US Treasury 2009 3 1/8% 31/10/16 Q-2016	US912828LU23	3.125%	2/11/2009	31/10/2016
1148	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UQ27	8.500%	17/8/2009	15/8/2039
1149	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UR00	8.500%	17/8/2009	15/8/2039
1150	US Treasury 2009 1 3/8% 15/11/12 AE-2012	US912828LX61	1.375%	16/11/2009	15/11/2012
1151	US Treasury 2009 3 3/8% 15/11/19 F-2019	US912828LY45	3.375%	16/11/2009	15/11/2019
1152	US Treasury 2009 4 3/8% 15/11/39 Bonds O	US912810QD37	4.375%	16/11/2009	15/11/2039
1153	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UJ83	8.500%	17/8/2009	15/8/2039
1154	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795US82	8.500%	17/8/2009	15/8/2039
1155	US Treasury 2009 2 1/8% 30/11/14 T-2014	US912828LZ10	2.125%	30/11/2009	30/11/2014
1156	US Treasury 2009 2 3/4% 30/11/16 R-2016	US912828MA59	2.750%	30/11/2009	30/11/2016
1157	US Treasury 2009 3/4% 30/11/11 AE-2011	US912828MM97	0.750%	30/11/2009	30/11/2011
1158	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795Y470	8.500%	17/8/2009	15/8/2039
1159	US Treasury 2009 1 1/8% 15/12/12 AF-2012	US912828MB33	1.125%	15/12/2009	15/12/2012
1160	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UK56	8.500%	17/8/2009	15/8/2039
1161	US Treasury 2009 4 1/2% 15/08/39 Bonds O	US912795UV12	8.500%	17/8/2009	15/8/2039
1162	US Treasury 2009 1% 31/12/11 AF-2011	US912828ML15	1.000%	31/12/2009	31/12/2011
1163	US Treasury 2009 2 5/8% 31/12/14 U-2014	US912828ME71	2.625%	31/12/2009	31/12/2014
1164	US Treasury 2009 3 1/4% 31/12/16 S-2016	US912828MD98	3.250%	31/12/2009	31/12/2016

Source: Datastream

APPENDIX B

Table 12: Standardized excess returns for different values of k in Germany (m=1, p=10%)

k	PE-M	FE-L-M	FE-S-M	FE-C-M
5	-0.0035	0.2217	-0.0351	0.1574
10	-0.0130	0.1696	-0.1192	0.0339
15	0.0414	0.1671	-0.0263	0.0020
20	0.0427	0.1672	-0.0086	0.0785
30	0.0835	0.1690	-0.0630	0.0024
60	0.0574	0.0637	0.0108	0.0752
90	0.1567	0.0653	-0.0154	0.0162
180	0.1108	-0.0568	-0.1187	0.0303
360	0.1018	-0.0658	-0.0780	-0.1070

Table 13: Standardized excess returns for different values of k in United States (m=1, p=10%)

k	PE-M	FE-L-M	FE-S-M	FE-C-M
5	0.0747	-0.0027	-0.2642	-0.2551
10	0.2849	0.1007	-0.2207	-0.1413
15	0.3566	0.2204	-0.2652	-0.1968
20	0.2016	0.2984	-0.3258	-0.1878
30	0.2433	0.3202	-0.2855	-0.1908
60	0.2272	0.1719	-0.3031	-0.1359
90	0.2352	0.5420	-0.2627	-0.1410
180	0.2180	0.5021	-0.1615	-0.1336
360	0.2290	0.5381	-0.0741	-0.1930

APPENDIX C

Table 14: Standardized excess returns for different values of m in Germany (k=20, p=10%)

m	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
0	-0.0332	-0.0815	0.1692	0.3300	-0.1096	-0.1037	0.1088	0.0820
0.5	-0.0735	-0.0835	0.1792	0.1604	-0.0202	-0.0478	0.0028	0.0200
1	0.0427	-0.0839	0.1672	-0.0558	-0.0086	0.1464	0.0785	0.1089
1.5	0.0770	0.1812	0.0592	-0.0572	-0.0400	-0.2267	0.0323	0.0883
2	0.1698	0.1721	-0.0579	-0.0569	-0.1814	-0.2063	-0.0243	-0.0722

Table 15: Standardized excess returns for different values of m in United States (k=20, p=10%)

m	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
0	-0.0673	-0.0345	0.0751	-0.0028	-0.1240	-0.1797	-0.0781	-0.1068
0.5	0.2338	0.5656	0.3849	-0.0019	-0.2178	-0.1333	-0.1187	-0.0475
1	0.2016	0.3409	0.2984	-0.0030	-0.3258	-0.1962	-0.1878	-0.1293
1.5	0.1797	-0.0546	0.0844	-0.0066	-0.3134	-0.3177	-0.1707	-0.2590
2	0.1804	-0.0869	-0.0031	-0.0033	-0.2362	-0.3319	-0.1241	-0.1902

APPENDIX D

Table 16: Standardized excess returns for different values of p in Germany (k=20, m=1)

p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
5%	0.0038	-0.0705	-0.0555	-0.0557	-0.0086	-0.2029	0.0714	-0.0590
10%	0.0427	-0.0839	0.1672	-0.0558	-0.0086	0.1464	0.0785	0.1089
15%	0.0698	-0.0957	0.2413	0.0657	0.1188	0.1745	0.0849	0.1232

Table 17: Standardized excess returns for different values of p in United States (k=20, m=1)

p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
5%	0.0440	0.1548	0.1054	-0.0027	-0.2764	-0.1949	-0.1474	-0.1056
10%	0.2016	0.3409	0.2984	-0.0030	-0.3258	-0.1962	-0.1878	-0.1293
15%	0.2803	0.4212	0.3642	-0.0033	-0.3659	-0.1895	-0.2204	-0.1457

APPENDIX E

Table 18: Standardized excess returns for different values of all three parameters in Germany

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
5	0	5%	-0.0761	-0.0694	-0.0561	0.1521	-0.0964	-0.1035	-0.0566	0.0245
		10%	-0.0970	-0.0815	0.1570	0.3300	-0.0669	-0.1037	0.1666	0.0820
		15%	-0.1180	-0.0920	0.2308	0.3951	0.1668	-0.1040	0.2164	0.1236
	0.5	5%	-0.0717	-0.0704	-0.0011	-0.0558	-0.1290	-0.2028	0.0454	-0.1597
		10%	-0.0872	-0.0835	0.2199	0.1604	0.1524	-0.0478	0.1818	0.0200
		15%	-0.1021	-0.0948	0.2830	0.2339	0.1779	0.0947	0.2096	0.0896
	1	5%	-0.0245	-0.0705	0.0005	-0.0557	-0.2281	-0.2029	0.0400	-0.0590
		10%	-0.0035	-0.0839	0.2217	-0.0558	-0.0351	0.1464	0.1574	0.1089
		15%	0.0116	-0.0957	0.2848	0.0657	0.0948	0.1745	0.1406	0.1232
	1.5	5%	-0.0134	0.1162	-0.0556	-0.0564	-0.1388	-0.2319	0.0896	-0.0506
		10%	0.0133	0.1812	0.1615	-0.0572	-0.1428	-0.2267	0.0876	0.0883
		15%	0.0683	0.2131	0.2300	-0.0580	0.0082	-0.0368	0.1774	0.1096
	2	5%	-0.0196	0.1240	-0.0554	-0.0562	-0.1515	-0.2137	0.0480	-0.0867
		10%	0.0038	0.1721	-0.0553	-0.0569	-0.0127	-0.2063	0.1059	-0.0722
		15%	0.1110	0.1931	0.0656	-0.0575	-0.0211	-0.0322	0.2032	0.0952
10	0	5%	-0.0703	-0.0694	0.0027	0.1521	-0.0990	-0.1035	-0.0573	0.0245
		10%	-0.0357	-0.0815	0.2511	0.3300	-0.0951	-0.1037	0.0499	0.0820
		15%	0.0840	-0.0920	0.3073	0.3951	0.0837	-0.1040	0.1171	0.1236

Table 18: Standardized excess returns for different values of all three parameters in Germany

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
10	0.5	5%	-0.0330	-0.0704	-0.0548	-0.0558	-0.0127	-0.2028	-0.0663	-0.1597
		10%	0.0240	-0.0835	0.1689	0.1604	0.1109	-0.0478	0.0683	0.0200
		15%	0.1495	-0.0948	0.2365	0.2339	0.1901	0.0947	0.0826	0.0896
	1	5%	-0.0406	-0.0705	-0.0544	-0.0557	-0.1197	-0.2029	-0.0488	-0.0590
		10%	-0.0130	-0.0839	0.1696	-0.0558	-0.1192	0.1464	0.0339	0.1089
		15%	0.0924	-0.0957	0.2371	0.0657	0.0720	0.1745	0.0753	0.1232
	1.5	5%	0.0010	0.1162	-0.0561	-0.0564	-0.1787	-0.2319	0.0144	-0.0506
		10%	0.0358	0.1812	-0.0567	-0.0572	-0.0242	-0.2267	0.1011	0.0883
		15%	0.0592	0.2131	0.0639	-0.0580	0.1032	-0.0368	0.1076	0.1096
	2	5%	-0.0247	0.1240	-0.0568	-0.0562	-0.1788	-0.2137	0.0155	-0.0867
		10%	0.1121	0.1721	-0.0581	-0.0569	-0.1795	-0.2063	0.1598	-0.0722
		15%	0.1946	0.1931	0.0620	-0.0575	-0.0244	-0.0322	0.1968	0.0952
15	0	5%	-0.0663	-0.0694	0.0057	0.1521	-0.1032	-0.1035	-0.0649	0.0245
		10%	-0.0282	-0.0815	0.2546	0.3300	-0.0398	-0.1037	-0.0658	0.0820
		15%	0.0895	-0.0920	0.3299	0.3951	0.1047	-0.1040	0.1233	0.1236
	0.5	5%	-0.0559	-0.0704	-0.0547	-0.0558	-0.0477	-0.2028	-0.0416	-0.1597
		10%	-0.0556	-0.0835	0.1757	0.1604	-0.0446	-0.0478	0.0686	0.0200
		15%	-0.0546	-0.0948	0.2508	0.2339	-0.0416	0.0947	0.0832	0.0896
	1	5%	-0.0360	-0.0705	-0.0561	-0.0557	-0.0268	-0.2029	0.0045	-0.0590
		10%	0.0414	-0.0839	0.1671	-0.0558	-0.0263	0.1464	0.0020	0.1089
		15%	0.1463	-0.0957	0.2348	0.0657	-0.0258	0.1745	0.1221	0.1232

Table 18: Standardized excess returns for different values of all three parameters in Germany

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
15	1.5	5%	-0.0065	0.1162	-0.0572	-0.0564	-0.0658	-0.2319	-0.0262	-0.0506
		10%	0.0241	0.1812	-0.0588	-0.0572	-0.0679	-0.2267	-0.0320	0.0883
		15%	0.0854	0.2131	0.0598	-0.0580	0.0878	-0.0368	0.1029	0.1096
	2	5%	-0.0150	0.1240	-0.0553	-0.0562	-0.1866	-0.2137	0.0081	-0.0867
		10%	0.1418	0.1721	-0.0551	-0.0569	-0.1941	-0.2063	0.0777	-0.0722
		15%	0.2444	0.1931	0.0666	-0.0575	0.1047	-0.0322	0.0901	0.0952
20	0	5%	-0.0690	-0.0694	-0.0543	0.1521	-0.1064	-0.1035	-0.0633	0.0245
		10%	-0.0332	-0.0815	0.1692	0.3300	-0.1096	-0.1037	0.1088	0.0820
		15%	0.0860	-0.0920	0.2431	0.3951	-0.1129	-0.1040	0.1536	0.1236
	0.5	5%	-0.0650	-0.0704	-0.0537	-0.0558	-0.0271	-0.2028	-0.1009	-0.1597
		10%	-0.0735	-0.0835	0.1792	0.1604	-0.0202	-0.0478	0.0028	0.0200
		15%	-0.0809	-0.0948	0.2520	0.2339	-0.0143	0.0947	0.0533	0.0896
	1	5%	0.0038	-0.0705	-0.0555	-0.0557	-0.0086	-0.2029	0.0714	-0.0590
		10%	0.0427	-0.0839	0.1672	-0.0558	-0.0086	0.1464	0.0785	0.1089
		15%	0.0698	-0.0957	0.2413	0.0657	0.1188	0.1745	0.0849	0.1232
	1.5	5%	0.0002	0.1162	-0.0574	-0.0564	-0.0465	-0.2319	-0.0491	-0.0506
		10%	0.0770	0.1812	0.0592	-0.0572	-0.0400	-0.2267	0.0323	0.0883
		15%	0.1757	0.2131	0.1681	-0.0580	0.0950	-0.0368	0.0828	0.1096
	2	5%	0.0051	0.1240	-0.0568	-0.0562	-0.1785	-0.2137	-0.0212	-0.0867
		10%	0.1698	0.1721	-0.0579	-0.0569	-0.1814	-0.2063	-0.0243	-0.0722
		15%	0.2477	0.1931	-0.0591	-0.0575	-0.1840	-0.0322	0.1108	0.0952

Table 18: Standardized excess returns for different values of all three parameters in Germany

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
30	0	5%	-0.0683	-0.0694	-0.0538	0.1521	-0.0997	-0.1035	0.0349	0.0245
		10%	-0.0606	-0.0815	0.1698	0.3300	-0.1101	-0.1037	0.0447	0.0820
		15%	0.0755	-0.0920	0.2437	0.3951	0.0781	-0.1040	0.0863	0.1236
	0.5	5%	-0.0562	-0.0704	-0.0540	-0.0558	-0.0876	-0.2028	-0.0378	-0.1597
		10%	-0.0560	-0.0835	0.1696	0.1604	-0.0882	-0.0478	-0.0387	0.0200
		15%	-0.0225	-0.0948	0.2435	0.2339	-0.0882	0.0947	-0.0393	0.0896
	1	5%	-0.0010	-0.0705	-0.0545	-0.0557	-0.0626	-0.2029	-0.0004	-0.0590
		10%	0.0835	-0.0839	0.1690	-0.0558	-0.0630	0.1464	0.0024	0.1089
		15%	0.2044	-0.0957	0.2429	0.0657	-0.0631	0.1745	0.0050	0.1232
	1.5	5%	-0.0139	0.1162	-0.0580	-0.0564	-0.0556	-0.2319	-0.0608	-0.0506
		10%	0.0121	0.1812	0.0644	-0.0572	-0.0500	-0.2267	-0.0602	0.0883
		15%	0.0685	0.2131	0.1572	-0.0580	-0.0447	-0.0368	-0.0596	0.1096
	2	5%	-0.0496	0.1240	-0.0582	-0.0562	-0.1212	-0.2137	-0.0714	-0.0867
		10%	0.0702	0.1721	-0.0608	-0.0569	-0.1189	-0.2063	-0.0721	-0.0722
		15%	0.1403	0.1931	-0.0633	-0.0575	-0.1166	-0.0322	-0.0727	0.0952
60	0	5%	-0.0650	-0.0694	-0.0543	0.1521	-0.1036	-0.1035	0.0392	0.0245
		10%	-0.0746	-0.0815	0.1688	0.3300	-0.1040	-0.1037	0.0691	0.0820
		15%	0.0415	-0.0920	0.2428	0.3951	0.0996	-0.1040	0.1241	0.1236
	0.5	5%	-0.0579	-0.0704	-0.0536	-0.0558	-0.0902	-0.2028	-0.0202	-0.1597
		10%	0.0169	-0.0835	0.1692	0.1604	-0.0876	-0.0478	0.0700	0.0200
		15%	0.1038	-0.0948	0.2433	0.2339	-0.0849	0.0947	0.1012	0.0896

Table 18: Standardized excess returns for different values of all three parameters in Germany

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
60	1	5%	0.0195	-0.0705	-0.0546	-0.0557	0.0044	-0.2029	0.1217	-0.0590
		10%	0.0574	-0.0839	0.0637	-0.0558	0.0108	0.1464	0.0752	0.1089
		15%	0.0803	-0.0957	0.1726	0.0657	0.0159	0.1745	0.0756	0.1232
	1.5	5%	-0.0162	0.1162	-0.0564	-0.0564	-0.0700	-0.2319	-0.0738	-0.0506
		10%	0.0517	0.1812	0.0602	-0.0572	-0.0679	-0.2267	-0.0847	0.0883
		15%	0.1148	0.2131	0.1694	-0.0580	-0.0658	-0.0368	0.0822	0.1096
	2	5%	-0.0136	0.1240	-0.0577	-0.0562	-0.1059	-0.2137	-0.0945	-0.0867
		10%	0.0147	0.1721	-0.0597	-0.0569	-0.1042	-0.2063	-0.0928	-0.0722
		15%	0.0352	0.1931	-0.0617	-0.0575	-0.1016	-0.0322	-0.0906	0.0952
90	0	5%	-0.0411	-0.0694	-0.0544	0.1521	-0.1141	-0.1035	-0.0712	0.0245
		10%	0.0744	-0.0815	0.1679	0.3300	-0.1251	-0.1037	-0.1307	0.0820
		15%	0.2405	-0.0920	0.2420	0.3951	-0.1363	-0.1040	-0.1260	0.1236
	0.5	5%	-0.0699	-0.0704	-0.0547	-0.0558	-0.1385	-0.2028	-0.0165	-0.1597
		10%	0.0919	-0.0835	0.0633	0.1604	-0.0678	-0.0478	-0.0362	0.0200
		15%	0.2150	-0.0948	0.1721	0.2339	0.0546	0.0947	-0.0423	0.0896
	1	5%	-0.0504	-0.0705	-0.0537	-0.0557	-0.0164	-0.2029	0.0179	-0.0590
		10%	0.1567	-0.0839	0.0653	-0.0558	-0.0154	0.1464	0.0162	0.1089
		15%	0.3484	-0.0957	0.1740	0.0657	0.1148	0.1745	-0.0192	0.1232
	1.5	5%	-0.0063	0.1162	-0.0546	-0.0564	-0.0865	-0.2319	0.0287	-0.0506
		10%	0.1566	0.1812	0.0545	-0.0572	-0.0859	-0.2267	0.0228	0.0883
		15%	0.2362	0.2131	0.1580	-0.0580	-0.0849	-0.0368	0.0174	0.1096

Table 18: Standardized excess returns for different values of all three parameters in Germany

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
90	2	5%	-0.0538	0.1240	-0.0571	-0.0562	-0.2136	-0.2137	-0.0798	-0.0867
		10%	-0.0517	0.1721	-0.0587	-0.0569	-0.2154	-0.2063	-0.0824	-0.0722
		15%	-0.0495	0.1931	-0.0602	-0.0575	-0.2168	-0.0322	-0.0849	0.0952
180	0	5%	-0.0408	-0.0694	-0.0581	0.1521	-0.1211	-0.1035	0.0524	0.0245
		10%	0.1561	-0.0815	-0.0604	0.3300	-0.1394	-0.1037	-0.1333	0.0820
		15%	0.2885	-0.0920	-0.0626	0.3951	-0.1578	-0.1040	-0.1291	0.1236
	0.5	5%	-0.0493	-0.0704	-0.0562	-0.0558	-0.0187	-0.2028	-0.0601	-0.1597
		10%	0.1004	-0.0835	-0.0568	0.1604	-0.0056	-0.0478	-0.1044	0.0200
		15%	0.1950	-0.0948	-0.0574	0.2339	0.0040	0.0947	-0.1366	0.0896
	1	5%	-0.0643	-0.0705	-0.0562	-0.0557	-0.1099	-0.2029	0.0506	-0.0590
		10%	0.1108	-0.0839	-0.0568	-0.0558	-0.1187	0.1464	0.0303	0.1089
		15%	0.2244	-0.0957	-0.0574	0.0657	-0.1251	0.1745	0.0137	0.1232
	1.5	5%	0.0624	0.1162	-0.0574	-0.0564	-0.0690	-0.2319	-0.0300	-0.0506
		10%	0.2523	0.1812	-0.0591	-0.0572	-0.0710	-0.2267	-0.0417	0.0883
		15%	0.3390	0.2131	-0.0609	-0.0580	-0.0720	-0.0368	-0.0513	0.1096
	2	5%	-0.0251	0.1240	-0.0567	-0.0562	-0.1484	-0.2137	-0.0367	-0.0867
		10%	-0.0018	0.1721	-0.0577	-0.0569	-0.1488	-0.2063	-0.0346	-0.0722
		15%	0.0937	0.1931	-0.0588	-0.0575	-0.1488	-0.0322	-0.0325	0.0952
360	0	5%	-0.0049	-0.0694	-0.0649	0.1521	-0.1299	-0.1035	-0.0787	0.0245
		10%	0.0724	-0.0815	-0.0733	0.3300	-0.1571	-0.1037	0.0358	0.0820
		15%	0.1520	-0.0920	-0.0809	0.3951	-0.1844	-0.1040	0.1629	0.1236

Table 18: Standardized excess returns for different values of all three parameters in Germany

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
360	0.5	5%	0.0584	-0.0704	-0.0634	-0.0558	-0.0188	-0.2028	-0.1054	-0.1597
		10%	0.1936	-0.0835	-0.0706	0.1604	0.0030	-0.0478	-0.0962	0.0200
		15%	0.2604	-0.0948	-0.0771	0.2339	0.0185	0.0947	-0.0723	0.0896
	1	5%	-0.0200	-0.0705	-0.0608	-0.0557	-0.0796	-0.2029	-0.1128	-0.0590
		10%	0.1018	-0.0839	-0.0658	-0.0558	-0.0780	0.1464	-0.1070	0.1089
		15%	0.1927	-0.0957	-0.0704	0.0657	-0.0764	0.1745	-0.1003	0.1232
	1.5	5%	0.0127	0.1162	-0.0578	-0.0564	-0.1311	-0.2319	-0.0569	-0.0506
		10%	0.1998	0.1812	-0.0599	-0.0572	-0.1312	-0.2267	-0.0657	0.0883
		15%	0.2658	0.2131	-0.0619	-0.0580	-0.1291	-0.0368	-0.0727	0.1096
	2	5%	-0.0270	0.1240	-0.0572	-0.0562	-0.1394	-0.2137	-0.0967	-0.0867
		10%	0.1644	0.1721	-0.0588	-0.0569	-0.1377	-0.2063	-0.1041	-0.0722
		15%	0.2236	0.1931	-0.0603	-0.0575	-0.1353	-0.0322	-0.1097	0.0952

Table 19: Standardized excess returns for different values of all three parameters in United States

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
5	0	5%	-0.0040	-0.0186	0.0013	-0.0026	-0.1230	-0.1429	-0.0533	-0.0752
		10%	-0.0054	-0.0345	0.1541	-0.0028	-0.1399	-0.1797	-0.0629	-0.1068
		15%	-0.0069	-0.0501	0.2354	0.0770	-0.1568	-0.2163	-0.0724	-0.1384
	0.5	5%	0.0015	0.3610	0.0441	-0.0022	-0.2148	-0.1267	-0.1528	-0.0424
		10%	0.0052	0.5656	0.2123	-0.0019	-0.2333	-0.1333	-0.1770	-0.0475
		15%	0.0810	0.6532	0.2854	0.0794	-0.2425	-0.1313	-0.1983	-0.0508
	1	5%	0.0359	0.1548	-0.0026	-0.0027	-0.2351	-0.1949	-0.2210	-0.1056
		10%	0.0747	0.3409	-0.0027	-0.0030	-0.2642	-0.1962	-0.2551	-0.1293
		15%	0.2030	0.4212	0.0684	-0.0033	-0.2812	-0.1895	-0.2809	-0.1457
	1.5	5%	0.1395	-0.0570	-0.0040	-0.0045	-0.2336	-0.3170	-0.1653	-0.2184
		10%	0.3067	-0.0546	-0.0054	-0.0066	-0.2601	-0.3177	-0.2099	-0.2590
		15%	0.3810	-0.0521	-0.0069	-0.0086	-0.2776	-0.3116	-0.2439	-0.2885
	2	5%	0.0556	-0.0869	-0.0023	-0.0029	-0.1924	-0.3261	-0.1851	-0.1738
		10%	0.1875	-0.0869	-0.0022	-0.0033	-0.2018	-0.3319	-0.2282	-0.1902
		15%	0.2818	-0.0869	-0.0021	-0.0037	-0.2043	-0.3329	-0.2615	-0.2031
10	0	5%	-0.0216	-0.0186	0.0898	-0.0026	-0.1289	-0.1429	-0.0626	-0.0752
		10%	-0.0403	-0.0345	0.2570	-0.0028	-0.1515	-0.1797	-0.0814	-0.1068
		15%	-0.0586	-0.0501	0.3261	0.0770	-0.1741	-0.2163	-0.1002	-0.1384
	0.5	5%	-0.0130	0.3610	0.1075	-0.0022	-0.1675	-0.1267	-0.1328	-0.0424
		10%	-0.0230	0.5656	0.2805	-0.0019	-0.2174	-0.1333	-0.1688	-0.0475
		15%	-0.0326	0.6532	0.3522	0.0794	-0.2608	-0.1313	-0.2012	-0.0508

Table 19: Standardized excess returns for different values of all three parameters in United States

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
10	1	5%	0.0619	0.1548	-0.0001	-0.0027	-0.2001	-0.1949	-0.1158	-0.1056
		10%	0.2849	0.3409	0.1007	-0.0030	-0.2207	-0.1962	-0.1413	-0.1293
		15%	0.4399	0.4212	0.1960	-0.0033	-0.2368	-0.1895	-0.1642	-0.1457
	1.5	5%	0.0586	-0.0570	-0.0031	-0.0045	-0.2123	-0.3170	-0.1897	-0.2184
		10%	0.2757	-0.0546	-0.0038	-0.0066	-0.2329	-0.3177	-0.2326	-0.2590
		15%	0.3542	-0.0521	-0.0045	-0.0086	-0.2465	-0.3116	-0.2654	-0.2885
	2	5%	0.0285	-0.0869	-0.0035	-0.0029	-0.2074	-0.3261	-0.1768	-0.1738
		10%	0.0962	-0.0869	-0.0046	-0.0033	-0.2229	-0.3319	-0.2153	-0.1902
		15%	0.1672	-0.0869	-0.0057	-0.0037	-0.2350	-0.3329	-0.2473	-0.2031
15	0	5%	-0.0365	-0.0186	0.1801	-0.0026	-0.1183	-0.1429	-0.0620	-0.0752
		10%	-0.0696	-0.0345	0.3634	-0.0028	-0.1303	-0.1797	-0.0802	-0.1068
		15%	-0.1014	-0.0501	0.4263	0.0770	-0.1424	-0.2163	-0.0985	-0.1384
	0.5	5%	0.1186	0.3610	0.0983	-0.0022	-0.1695	-0.1267	-0.0978	-0.0424
		10%	0.2749	0.5656	0.2810	-0.0019	-0.2073	-0.1333	-0.1340	-0.0475
		15%	0.3331	0.6532	0.3457	0.0794	-0.2385	-0.1313	-0.1635	-0.0508
	1	5%	0.1501	0.1548	0.0515	-0.0027	-0.2268	-0.1949	-0.1561	-0.1056
		10%	0.3566	0.3409	0.2204	-0.0030	-0.2652	-0.1962	-0.1968	-0.1293
		15%	0.4320	0.4212	0.2993	-0.0033	-0.2989	-0.1895	-0.2301	-0.1457
	1.5	5%	0.0470	-0.0570	-0.0004	-0.0045	-0.3049	-0.3170	-0.1944	-0.2184
		10%	0.2538	-0.0546	0.0964	-0.0066	-0.3287	-0.3177	-0.2469	-0.2590
		15%	0.3407	-0.0521	0.1912	-0.0086	-0.3429	-0.3116	-0.2885	-0.2885

Table 19: Standardized excess returns for different values of all three parameters in United States

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
15	2	5%	0.0496	-0.0869	-0.0049	-0.0029	-0.3141	-0.3261	-0.1586	-0.1738
		10%	0.1541	-0.0869	-0.0072	-0.0033	-0.3226	-0.3319	-0.1794	-0.1902
		15%	0.2661	-0.0869	-0.0096	-0.0037	-0.3237	-0.3329	-0.1993	-0.2031
20	0	5%	-0.0355	-0.0186	-0.0020	-0.0026	-0.1152	-0.1429	-0.0610	-0.0752
		10%	-0.0673	-0.0345	0.0751	-0.0028	-0.1240	-0.1797	-0.0781	-0.1068
		15%	-0.0976	-0.0501	0.1591	0.0770	-0.1329	-0.2163	-0.0954	-0.1384
	0.5	5%	0.0404	0.3610	0.1934	-0.0022	-0.1922	-0.1267	-0.0890	-0.0424
		10%	0.2338	0.5656	0.3849	-0.0019	-0.2178	-0.1333	-0.1187	-0.0475
		15%	0.3405	0.6532	0.4423	0.0794	-0.2399	-0.1313	-0.1450	-0.0508
	1	5%	0.0440	0.1548	0.1054	-0.0027	-0.2764	-0.1949	-0.1474	-0.1056
		10%	0.2016	0.3409	0.2984	-0.0030	-0.3258	-0.1962	-0.1878	-0.1293
		15%	0.2803	0.4212	0.3642	-0.0033	-0.3659	-0.1895	-0.2204	-0.1457
	1.5	5%	0.0395	-0.0570	-0.0003	-0.0045	-0.2883	-0.3170	-0.1187	-0.2184
		10%	0.1797	-0.0546	0.0844	-0.0066	-0.3134	-0.3177	-0.1707	-0.2590
		15%	0.2512	-0.0521	0.1640	-0.0086	-0.3289	-0.3116	-0.2153	-0.2885
	2	5%	0.0291	-0.0869	-0.0028	-0.0029	-0.2353	-0.3261	-0.1091	-0.1738
		10%	0.1804	-0.0869	-0.0031	-0.0033	-0.2362	-0.3319	-0.1241	-0.1902
		15%	0.2545	-0.0869	-0.0035	-0.0037	-0.2338	-0.3329	-0.1388	-0.2031
30	0	5%	-0.0317	-0.0186	0.0979	-0.0026	-0.1208	-0.1429	-0.0546	-0.0752
		10%	-0.0594	-0.0345	0.2924	-0.0028	-0.1354	-0.1797	-0.0654	-0.1068
		15%	-0.0856	-0.0501	0.3568	0.0770	-0.1499	-0.2163	-0.0762	-0.1384

Table 19: Standardized excess returns for different values of all three parameters in United States

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
30	0.5	5%	0.0043	0.3610	0.0038	-0.0022	-0.2489	-0.1267	-0.0826	-0.0424
		10%	0.1367	0.5656	0.1688	-0.0019	-0.2738	-0.1333	-0.1092	-0.0475
		15%	0.2237	0.6532	0.2483	0.0794	-0.2957	-0.1313	-0.1335	-0.0508
	1	5%	0.0369	0.1548	0.1435	-0.0027	-0.2742	-0.1949	-0.1540	-0.1056
		10%	0.2433	0.3409	0.3202	-0.0030	-0.2855	-0.1962	-0.1908	-0.1293
		15%	0.3478	0.4212	0.3844	-0.0033	-0.2942	-0.1895	-0.2197	-0.1457
	1.5	5%	0.0402	-0.0570	0.0955	-0.0045	-0.2962	-0.3170	-0.1448	-0.2184
		10%	0.2344	-0.0546	0.2706	-0.0066	-0.3201	-0.3177	-0.1667	-0.2590
		15%	0.3469	-0.0521	0.3386	-0.0086	-0.3405	-0.3116	-0.1843	-0.2885
	2	5%	0.0568	-0.0869	-0.0015	-0.0029	-0.3138	-0.3261	-0.1131	-0.1738
		10%	0.2837	-0.0869	-0.0005	-0.0033	-0.3213	-0.3319	-0.1194	-0.1902
		15%	0.3530	-0.0869	0.0715	-0.0037	-0.3276	-0.3329	-0.1256	-0.2031
60	0	5%	-0.0323	-0.0186	0.3083	-0.0026	-0.1142	-0.1429	-0.0601	-0.0752
		10%	-0.0611	-0.0345	0.5018	-0.0028	-0.1220	-0.1797	-0.0764	-0.1068
		15%	-0.0885	-0.0501	0.5381	0.0770	-0.1299	-0.2163	-0.0927	-0.1384
	0.5	5%	0.0799	0.3610	0.4348	-0.0022	-0.2850	-0.1267	-0.1226	-0.0424
		10%	0.3447	0.5656	0.6184	-0.0019	-0.3019	-0.1333	-0.1623	-0.0475
		15%	0.4927	0.6532	0.6467	0.0794	-0.3185	-0.1313	-0.1967	-0.0508
	1	5%	0.0936	0.1548	0.0030	-0.0027	-0.2910	-0.1949	-0.1065	-0.1056
		10%	0.2272	0.3409	0.1719	-0.0030	-0.3031	-0.1962	-0.1359	-0.1293
		15%	0.3019	0.4212	0.2491	-0.0033	-0.3146	-0.1895	-0.1625	-0.1457

Table 19: Standardized excess returns for different values of all three parameters in United States

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
60	1.5	5%	0.0912	-0.0570	0.0500	-0.0045	-0.3317	-0.3170	-0.0989	-0.2184
		10%	0.2649	-0.0546	0.2353	-0.0066	-0.3449	-0.3177	-0.1171	-0.2590
		15%	0.3375	-0.0521	0.3046	-0.0086	-0.3568	-0.3116	-0.1342	-0.2885
	2	5%	0.0277	-0.0869	-0.0004	-0.0029	-0.3352	-0.3261	-0.1067	-0.1738
		10%	0.0778	-0.0869	0.0990	-0.0033	-0.3473	-0.3319	-0.1158	-0.1902
		15%	0.1381	-0.0869	0.1927	-0.0037	-0.3587	-0.3329	-0.1248	-0.2031
90	0	5%	-0.0312	-0.0186	0.2692	-0.0026	-0.1193	-0.1429	-0.0718	-0.0752
		10%	-0.0586	-0.0345	0.4667	-0.0028	-0.1324	-0.1797	-0.1000	-0.1068
		15%	-0.0844	-0.0501	0.5065	0.0770	-0.1455	-0.2163	-0.1281	-0.1384
	0.5	5%	0.1427	0.3610	0.3506	-0.0022	-0.1387	-0.1267	-0.1303	-0.0424
		10%	0.3256	0.5656	0.5418	-0.0019	-0.1494	-0.1333	-0.1455	-0.0475
		15%	0.4533	0.6532	0.5707	0.0794	-0.1604	-0.1313	-0.1588	-0.0508
	1	5%	0.0902	0.1548	0.3519	-0.0027	-0.2596	-0.1949	-0.1179	-0.1056
		10%	0.2352	0.3409	0.5420	-0.0030	-0.2627	-0.1962	-0.1410	-0.1293
		15%	0.3112	0.4212	0.5718	-0.0033	-0.2662	-0.1895	-0.1621	-0.1457
	1.5	5%	0.0394	-0.0570	0.0043	-0.0045	-0.2774	-0.3170	-0.0961	-0.2184
		10%	0.1776	-0.0546	0.1762	-0.0066	-0.2809	-0.3177	-0.1069	-0.2590
		15%	0.2495	-0.0521	0.2601	-0.0086	-0.2836	-0.3116	-0.1174	-0.2885
	2	5%	0.0206	-0.0869	0.0059	-0.0029	-0.3154	-0.3261	-0.1425	-0.1738
		10%	0.0773	-0.0869	0.1702	-0.0033	-0.3251	-0.3319	-0.1483	-0.1902
		15%	0.1479	-0.0869	0.2562	-0.0037	-0.3346	-0.3329	-0.1540	-0.2031

Table 19: Standardized excess returns for different values of all three parameters in United States

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
180	0	5%	-0.0307	-0.0186	0.5106	-0.0026	-0.0728	-0.1429	-0.0542	-0.0752
		10%	-0.0574	-0.0345	0.7181	-0.0028	0.1214	-0.1797	-0.0645	-0.1068
		15%	-0.0824	-0.0501	0.7681	0.0770	0.2059	-0.2163	-0.0749	-0.1384
	0.5	5%	0.1152	0.3610	0.4600	-0.0022	-0.1997	-0.1267	-0.0326	-0.0424
		10%	0.2861	0.5656	0.6751	-0.0019	-0.0861	-0.1333	-0.0386	-0.0475
		15%	0.4066	0.6532	0.7270	0.0794	-0.0978	-0.1313	-0.0445	-0.0508
	1	5%	0.0942	0.1548	0.3171	-0.0027	-0.1645	-0.1949	-0.1156	-0.1056
		10%	0.2180	0.3409	0.5021	-0.0030	-0.1615	-0.1962	-0.1336	-0.1293
		15%	0.2830	0.4212	0.5411	-0.0033	-0.0370	-0.1895	-0.1505	-0.1457
	1.5	5%	0.0498	-0.0570	0.0646	-0.0045	-0.2136	-0.3170	-0.1768	-0.2184
		10%	0.1449	-0.0546	0.2597	-0.0066	-0.2237	-0.3177	-0.1986	-0.2590
		15%	0.1971	-0.0521	0.3226	-0.0086	-0.2334	-0.3116	-0.2187	-0.2885
	2	5%	0.0418	-0.0869	-0.0009	-0.0029	-0.2898	-0.3261	-0.1630	-0.1738
		10%	0.1062	-0.0869	0.0140	-0.0033	-0.2965	-0.3319	-0.1741	-0.1902
		15%	0.1654	-0.0869	0.1057	-0.0037	-0.3032	-0.3329	-0.1846	-0.2031
360	0	5%	-0.0276	-0.0186	0.3919	-0.0026	0.0171	-0.1429	0.0032	-0.0752
		10%	-0.0511	-0.0345	0.6045	-0.0028	-0.0994	-0.1797	-0.0150	-0.1068
		15%	-0.0732	-0.0501	0.6420	0.0770	0.0362	-0.2163	0.0556	-0.1384
	0.5	5%	0.0211	0.3610	0.5120	-0.0022	-0.0512	-0.1267	-0.1532	-0.0424
		10%	0.1810	0.5656	0.7309	-0.0019	-0.1560	-0.1333	-0.0760	-0.0475
		15%	0.3013	0.6532	0.7769	0.0794	-0.0272	-0.1313	-0.0752	-0.0508

Table 19: Standardized excess returns for different values of all three parameters in United States

k	m	p	PE-M	PE-T	FE-L-M	FE-L-T	FE-S-M	FE-S-T	FE-C-M	FE-C-T
360	1	5%	0.0854	0.1548	0.3165	-0.0027	-0.1904	-0.1949	-0.1804	-0.1056
		10%	0.2290	0.3409	0.5381	-0.0030	-0.0741	-0.1962	-0.1930	-0.1293
		15%	0.3297	0.4212	0.5612	-0.0033	-0.0739	-0.1895	-0.2032	-0.1457
	1.5	5%	0.0463	-0.0570	0.1778	-0.0045	-0.2364	-0.3170	-0.1668	-0.2184
		10%	0.1424	-0.0546	0.3779	-0.0066	-0.2460	-0.3177	-0.1885	-0.2590
		15%	0.1949	-0.0521	0.4219	-0.0086	-0.2553	-0.3116	-0.2052	-0.2885
	2	5%	0.0399	-0.0869	0.1778	-0.0029	-0.2307	-0.3261	-0.1679	-0.1738
		10%	0.0904	-0.0869	0.3779	-0.0033	-0.2248	-0.3319	-0.1850	-0.1902
		15%	0.1450	-0.0869	0.4219	-0.0037	-0.0574	-0.3329	-0.1997	-0.2031

APPENDIX F

MATLAB code

A. Macaulay Duration at Time t+1

```
function [dmac]=dmac(paramd,cfs,ActualD,Settle)

[sdate]=size(Settle);
[adate col]=size(cfs);
price=zeros(sdate(1),col);
wPV=zeros(size(price));
dmac=zeros(size(price));

for i=1:col;
    for j=1:sdate(1);
        TTM=zeros(adate,1);
        forw=zeros(size(TTM));
        dcfs=zeros(adate,1);
        weight_dcfs=zeros(size(dcfs));
        ind=find(cfs(:,i));
        [inddate]=size(ind);
        for k=1:inddate(1);

            TTM(ind(k,1),1)=((days360(Settle(j,1),
            ActualD(ind(k,1),1)))-30)/30;

            if TTM(ind(k,1),1)<=0
               dcfs(ind(k,1),1)=0;
            else
               param=paramd(j,:);
               forw(ind(k,1),1)=fwd(param,TTM(ind(k,1),1));

               dcfs(ind(k,1),1)=(cfs(ind(k,1),i))/((1+
              ((forw(ind(k,1),1))/1200))^(TTM(ind(k,1),1)));

                weight_dcfs(ind(k,1),1)=TTM(ind(k,1),1)*
                dcfs(ind(k,1),1);

            end
        end
        price(j,i)=sum(dcfs);
        wPV(j,i)=sum(weight_dcfs);
        if price(j,i)==0
           dmac(j,i)=NaN;
        else
           dmac(j,i)=(wPV(j,i)/price(j,i));
        end
    end
end
```

B. Modified Duration at Time t+1

```
function f=myfunc(y,p,cf,t,row)

dcf=zeros(size(cf));
for i=1:row;
    dcf(i,1)=cf(i,1)/((1+(y/100))^(t(i,1)));
end
mp=sum(dcf);
f=p-mp;


function [dmod]=dmod(paramd,cfs,ActualD,Settle,ybond)

[sdate]=size(Settle);
[adate col]=size(cfs);
dmod=zeros(sdate(1),col);
yield=zeros(sdate(1),col);
price=zeros(sdate(1),col);

for i=1:col;
    macdur=dmac(paramd,cfs(:,i),ActualD,Settle);
    for j=1:sdate(1);
        TTM=zeros(adate,1);
        forw=zeros(size(TTM));
        dcfs=zeros(size(TTM));
        ind=find(cfs(:,i));
        [inddate]=size(ind);
        cf=zeros(inddate(1),1);
        t=zeros(inddate(1),1);
        for k=1:inddate(1);

            TTM(ind(k,1),1)=((days360(Settle(j,1),
            ActualD(ind(k,1),1)))-30)/30;

            if TTM(ind(k,1),1)<=0
               dcfs(ind(k,1),1)=0;
               cf(k,1)=0;
               t(k,1)=0;
            else
               param=paramd(j,:);
               forw(ind(k,1),1)=fwd(param,TTM(ind(k,1),1));

              dcfs(ind(k,1),1)=(cfs(ind(k,1),i))/((1+
              (forw(ind(k,1),1)/1200))^(TTM(ind(k,1),1)));

               cf(k,1)=cfs(ind(k,1),i);
               t(k,1)=TTM(ind(k,1),1);
            end
        end
        if isnan(ybond(j,i))
           dmod(j,i)=NaN;
        else
```

```
            price(j,i)=sum(dcfs);
            [row]=size(cf);
            p=price(j,i);
            a=ybond(j,i);
            y=fzero(@(y) myfunc(y,p,cf,t,row(1)),a);
            yield(j,i)=y;
            dmod(j,i)=macdur(j,1)/(1+(yield(j,i)/100));
        end
    end
end
```

C. The Signals for PE-M Portfolio

```
function [sgn]=signal(indm,pe,TTM_d,k,m)

[row col]=size(indm);
inid=1876;% 3 Jul 2006, our first trading day
n=39;
d=22;
for i=0:n;
    t=inid+(i*d);
    for j=1:col;
        if TTM_d(t,indm(t,j))>30
           if pe(t,j)>(mean(pe(t-k:t-1,j))+
             (m*std(pe(t-k:t-1,j))));

              sgn(i+1,j)=-1;
           elseif pe(t,j)<(mean(pe(t-k:t-1,j))-
             (m*std(pe(t-k:t-1,j))));

              sgn(i+1,j)=1;
           else
              sgn(i+1,j)=0;
           end
        end
    end
end
```

D. The Signals for PE-T Portfolio

```
function [sgn]=signal(pe,meanf,sigmaf,m)
% meanf and sigmaf are the forecasted values

[row col]=size(pe);
inid=1876; 3 Jul 2006, our first trading day
n=39;
d=22;
for i=0:n;
    t=inid+(i*d);
    for j=1:col;
        if isnan(meanf(d,j,i+1))
           sgn(i+1,j)=NaN;
        elseif pe(t,j)>(meanf(d,j,i+1)+(m*sigmaf(d,j,i+1)));
           sgn(i+1,j)=-1;
        elseif pe(t,j)<(meanf(d,j,i+1)-(m*sigmaf(d,j,i+1)));
           sgn(i+1,j)=1;
        else
           sgn(i+1,j)=0;
        end
    end
end
```

E. The Returns for PE-M and PE-T Portfolios

```
function
[mtm,cash,portvalue,rmth,rmthbf,rinv,rinvbf,rmax,rmin,rmean,
rsd]=trade(cfs,pe,TTM_d,ask_adj,bid_adj,indm,dmod,Settle,Act
ualD,LIBOR,k,m,p)

sgn=signal(indm,pe,TTM_d,k,m);
inid=1876;% 3 Jul 2006, our first trading day
iniv=100000000;%initial investment
n=39;
d=22;
[numd numb]=size(indm);
portvalue=zeros(n+1,1);
amt=zeros(n+1,1);
sumtrcost=zeros(size(amt));
bfportvalue=zeros(size(amt));
cash=zeros(n+1,2);
trade=zeros(n+1,numb);
nbond=zeros(size(trade));
outsbond=zeros(size(trade));
mtm=zeros(size(trade));
coupon=zeros(size(trade));
tc=zeros(size(trade));
rc=zeros(size(trade));
wdur=zeros(size(trade));
trcost=zeros(size(trade));
sale=zeros(size(trade));

cash(1,1)=0;
portvalue(1,1)=iniv;
bfportvalue(1,1)=iniv;
for a=0:n;
    t=inid+(a*d);
    sdates=Settle(t-d,1);
    sdatee=Settle(t,1);
    inddates=find(ActualD(:,1)==sdates);
    inddatee=find(ActualD(:,1)==sdatee);

    if a~=0
       for b=1:numb;
           mtm(a+1,b)=outsbond(a,b).*bid_adj(t,indm(t-d,b));
           coupon(a+1,b)=sum(cfs(inddates:inddatee,
          indm(t-d,b))).*outsbond(a,b);

           if coupon(a+1,b)~=0
              indtca=(cfs(inddates:inddatee,indm(t-d,b))>0);

              tc(a+1,b)=(days360(ActualD(indtca),
              ActualD(inddatee)))/30;

              rc(a+1,b)=coupon(a+1,b).*((1+
             (LIBOR(t-d,1)/1200)).^tc(a+1,b));

           end
       end
       cash(a+1,1)=sum(rc(a+1,:))+(sum(cash(a,:))*(1+
       (LIBOR(t-d,1)/1200)));
```

```
   portvalue(a+1,1)=sum(mtm(a+1,:))+cash(a+1,1);
   bfportvalue(a+1,1)=portvalue(a+1,1)+sumtrcost(a,1);
end

for b=1:numb;
    wdur(a+1,b)=sgn(a+1,b).*1/dmod(t,indm(t,b));
end
if sum(wdur(a+1,:))==0
   amt(a+1)=0;
else
   amt(a+1)=abs((p*portvalue(a+1,1))/sum(wdur(a+1,:)));
end

%trading
for b=1:numb;
    trade(a+1,b)=amt(a+1).*wdur(a+1,b);
    if trade(a+1,b)<0
       nbond(a+1,b)=trade(a+1,b)./bid_adj(t,indm(t,b));
    elseif trade(a+1,b)>0
       nbond(a+1,b)=trade(a+1,b)./ask_adj(t,indm(t,b));
    end
    if a==0
       inibond(1,b)=(iniv/numb)/bid_adj(t,indm(t,b));

       if sgn(a+1,b)==-1 &&
         (inibond(1,b)<abs(nbond(a+1,b)))

          outsbond(a+1,b)=0;

          trcost(a+1,b)=abs(((ask_adj(t,indm(t,b))-
          bid_adj(t,indm(t,b)))/2).*inibond(1,b));

       else
          outsbond(a+1,b)=inibond(1,b)+nbond(a+1,b);

          trcost(a+1,b)=abs(((ask_adj(t,indm(t,b))-
          bid_adj(t,indm(t,b)))/2).*nbond(a+1,b));

       end
    elseif a~=0

       if sgn(a+1,b)==-1 &&
         (outsbond(a,b)<abs(nbond(a+1,b)))

          outsbond(a+1,b)=0;

          trcost(a+1,b)=abs(((ask_adj(t,indm(t,b))-
          bid_adj(t,indm(t,b)))/2).*outsbond(a,b));

       else
          if indm(t,b)==indm(t-d,b)
             outsbond(a+1,b)=outsbond(a,b)+nbond(a+1,b);

             trcost(a+1,b)=abs(((ask_adj(t,indm(t,b))-
            bid_adj(t,indm(t,b)))/2).*nbond(a+1,b));
```

```
                elseif indm(t,b)~=indm(t-d,b)

                   sale(a+1,b)=outsbond(a,b).*
                   bid_adj(t,indm(t-d,b));

                   outsbond(a+1,b)=(sale(a+1,b)./ask_adj(t,indm
                   (t,b)))+nbond(a+1,b);

                   trcost(a+1,b)=abs(((ask_adj(t,indm(t-d,b))-
                   bid_adj(t,indm(t-d,b)))/2).*outsbond(a,b))+
                   abs(((ask_adj(t,indm(t,b))-
                   bid_adj(t,indm(t,b)))/2).*outsbond(a+1,b));

                end
             end
          end
          sumtrcost(a+1,1)=sum(trcost(a+1,:));
          cash(a+1,2)=-sum(trade(a+1,:));
       end
end

%returns
[rowpv]=size(portvalue);
rmth=zeros(rowpv(1),1);
rmthbf=zeros(size(rmth));
for c=2:rowpv(1);
    rmth(c,1)=log(portvalue(c,1)/portvalue(c-1,1));
    rmthbf(c,1)=log(bfportvalue(c,1)/bfportvalue(c-1,1));
end
rinv=sum(rmth);
rinvbf=sum(rmthbf);
rmax=max(rmth);
rmin=min(rmth);
rmean=mean(rmth);
rsd=std(rmth);
```

F. The Signals for FE-L-M Portfolio

```
function [sgn]=signal(lvs,lvf,k,m)

inid=1876;% 3 Jul 2006, our first trading day
n=39;
d=22;
for i=0:n;
    t=inid+(i*d);
    meanlv(i+1,1)=mean(lvs((t-k):(t-1),1));
    stdlv(i+1,1)=std(lvs((t-k):(t-1),1));
    if lvf(t,1)<(meanlv(i+1,1)-(m*stdlv(i+1,1)))
       sgn(i+1,1)=-1;
    elseif lvf(t,1)>(meanlv(i+1,1)+(m*stdlv(i+1,1)))
       sgn(i+1,1)=1;
    else
       sgn(i+1,1)=0;
    end
end
```

G. The Signals for FE-L-T Portfolio

```
function [sgn]=signal(lvf,lvp,stdp,m)
% lvp and stdp are the forecasted values

inid=1876;
n=39;
d=22;
for i=0:n;
    r=i+1;
    t=inid+(i*d);
    if lvf(t,1)<(lvp(r,1)-(m*stdp(r,1)))
       sgn(r,1)=-1;
    elseif lvf(t,1)>(lvp(r,1)+(m*stdp(r,1)))
       sgn(r,1)=1;
    else
       sgn(r,1)=0;
    end
end
```

H. The Returns for FE-L-M and FE-L-T Portfolios

```
function
[mtm,cash,portvalue,rmth,rmthbf,rinv,rinvbf,rmax,rmin,rmean,
rsd]=trade(cfs,ask_adj,bid_adj,indm,dmod,Settle,ActualD,LIBO
R,lvs,lvf,k,m,p)

sgn=signal(lvs,lvf,k,m);
inid=1876;% 3 Jul 2006
iniv=100000000;
n=39;
d=22;
[numd numb]=size(indm);

portvalue=zeros(n+1,1);
amt=zeros(n+1,1);
sumtrcost=zeros(size(amt));
bfportvalue=zeros(size(amt));
cash=zeros(n+1,2);
trade=zeros(n+1,numb);
nbond=zeros(size(trade));
outsbond=zeros(size(trade));
mtm=zeros(size(trade));
coupon=zeros(size(trade));
tc=zeros(size(trade));
rc=zeros(size(trade));
wdur=zeros(size(trade));
trcost=zeros(size(trade));
sale=zeros(size(trade));

cash(1,1)=0;
portvalue(1,1)=iniv;
bfportvalue(1,1)=iniv;
for a=0:n;
    t=inid+(a*d);
    sdates=Settle(t-d,1);
    sdatee=Settle(t,1);
    inddates=find(ActualD(:,1)==sdates);
    inddatee=find(ActualD(:,1)==sdatee);

    if a~=0
       for b=1:numb;
           mtm(a+1,b)=outsbond(a,b).*bid_adj(t,indm(t-d,b));

           coupon(a+1,b)=sum(cfs(inddates:inddatee,
           indm(t-d,b))).*outsbond(a,b);

           if coupon(a+1,b)~=0
              indtca=(cfs(inddates:inddatee,indm(t-d,b))>0);

              tc(a+1,b)=(days360(ActualD(indtca),
              ActualD(inddatee)))/30;

              rc(a+1,b)=coupon(a+1,b).*((1+
             (LIBOR(t-d,1)/1200)).^tc(a+1,b));

           end
       end
```

```
    cash(a+1,1)=sum(rc(a+1,:))+(sum(cash(a,:))*(1+
   (LIBOR(t-d,1)/1200)));

    portvalue(a+1,1)=sum(mtm(a+1,:))+cash(a+1,1);
    bfportvalue(a+1,1)=portvalue(a+1,1)+sumtrcost(a,1);
end

for b=1:numb;
    wdur(a+1,b)=1/dmod(t,indm(t,b));
end
amt(a+1)=(p*portvalue(a+1,1))/sum(wdur(a+1,:));

%trading
for b=1:numb;
    trade(a+1,b)=amt(a+1).*sgn(a+1,1).*wdur(a+1,b);
    if trade(a+1,b)<0
       nbond(a+1,b)=trade(a+1,b)./bid_adj(t,indm(t,b));
    elseif trade(a+1,b)>0
       nbond(a+1,b)=trade(a+1,b)./ask_adj(t,indm(t,b));
    end
    if a==0
       inibond(1,b)=(iniv/numb)/bid_adj(t,indm(t,b));

       if sgn(a+1,1)==-1 &&
         (inibond(1,b)<abs(nbond(a+1,b)))

          outsbond(a+1,b)=0;
          trcost(a+1,b)=abs(((ask_adj(t,indm(t,b))-
          bid_adj(t,indm(t,b)))/2).*inibond(1,b));

       else

          outsbond(a+1,b)=inibond(1,b)+nbond(a+1,b);

          trcost(a+1,b)=abs(((ask_adj(t,indm(t,b))-
          bid_adj(t,indm(t,b)))/2).*nbond(a+1,b));
       end
    elseif a~=0

       if sgn(a+1,1)==-1 &&
         (outsbond(a,b)<abs(nbond(a+1,b)))

          outsbond(a+1,b)=0;

          trcost(a+1,b)=abs(((ask_adj(t,indm(t,b))-
          bid_adj(t,indm(t,b)))/2).*outsbond(a,b));

       else
          if indm(t,b)==indm(t-d,b)
             outsbond(a+1,b)=outsbond(a,b)+nbond(a+1,b);

             trcost(a+1,b)=abs(((ask_adj(t,indm(t,b))-
            bid_adj(t,indm(t,b)))/2).*nbond(a+1,b));

          elseif indm(t,b)~=indm(t-d,b)
```

```
                    sale(a+1,b)=outsbond(a,b).*
                    bid_adj(t,indm(t-d,b));

                    outsbond(a+1,b)=(sale(a+1,b)./
                    ask_adj(t,indm(t,b)))+nbond(a+1,b);

                    trcost(a+1,b)=abs(((ask_adj(t,indm(t-d,b))-
                    bid_adj(t,indm(t-d,b)))/2).*outsbond(a,b))+
                    abs(((ask_adj(t,indm(t,b))-
                    bid_adj(t,indm(t,b)))/2).*outsbond(a+1,b));

                end
            end
        end
        sumtrcost(a+1,1)=sum(trcost(a+1,:));
        cash(a+1,2)=-sum(trade(a+1,:));
    end
end

%returns
[rowpv]=size(portvalue);
rmth=zeros(rowpv(1),1);
rmthbf=zeros(size(rmth));
for e=2:rowpv(1);
    rmth(e,1)=log(portvalue(e,1)/portvalue(e-1,1));
    rmthbf(e,1)=log(bfportvalue(e,1)/bfportvalue(e-1,1));
end
rinv=sum(rmth);
rinvbf=sum(rmthbf);
rmax=max(rmth);
rmin=min(rmth);
rmean=mean(rmth);
rsd=std(rmth);
```

I. The Signals for FE-S-M Portfolio

```
function [sgn]=signal(sps,spf,k,m)

inid=1876;% 3 Jul 2006, our first trading day
n=39;
d=22;
for i=0:n;
    t=inid+(i*d);
    meansps(i+1,1)=mean(sps((t-k):(t-1),1));
    stdsps(i+1,1)=std(sps((t-k):(t-1),1));
    if spf(t,1)>(meansps(i+1,1)+(m*stdsps(i+1,1)))
       sgn(i+1,1)=-1;
       sgn(i+1,2)=1;
    elseif spf(t,1)<(meansps(i+1,1)-(m*stdsps(i+1,1)))
       sgn(i+1,1)=1;
       sgn(i+1,2)=-1;
    else
       sgn(i+1,1)=0;
       sgn(i+1,2)=0;
    end
end
```

J. The Signals for FE-S-T Portfolio

```
function [sgn]=signal(spf,spp,stdp,m)
% spp and stdp are the forecasted values

inid=1876;
n=39;
d=22;
for i=0:n;
    r=i+1;
    t=inid+(i*d);
    if spf(t,1)>(spp(r,1)+(m*stdp(r,1)))
       sgn(r,1)=-1;
       sgn(r,2)=1;
    elseif spf(t,1)<(spp(r,1)-(m*stdp(r,1)))
       sgn(r,1)=1;
       sgn(r,2)=-1;
    else
       sgn(r,1)=0;
       sgn(r,2)=0;
    end
end
```

K. The Returns for FE-S-M and FE-S-T Portfolios

```
function
[mtm,cash,portvalue,rmth,rmthbf,rinv,rinvbf,rmax,rmin,rmean,
rsd]=trade(cfs,ask_adj,bid_adj,indm,dmod,Settle,ActualD,LIBO
R,spf,spp,stdp,m,p)

sgn=signal(spf,spp,stdp,m);
inid=1876;
iniv=100000000;
n=39;
d=22;
nb=2;

portvalue=zeros(n+1,1);
amt=zeros(n+1,1);
sumtrcost=zeros(size(amt));
bfportvalue=zeros(size(amt));
cash=zeros(n+1,2);
trade=zeros(n+1,nb);
nbond=zeros(size(trade));
outsbond=zeros(size(trade));
mtm=zeros(size(trade));
coupon=zeros(size(trade));
tc=zeros(size(trade));
rc=zeros(size(trade));
trcost=zeros(size(trade));
sale=zeros(size(trade));

cash(1,1)=0;
portvalue(1,1)=iniv;
bfportvalue(1,1)=iniv;
col=[1,5];%column of short and long-term bonds (2mth,10yr)
for b=1:nb;
    inibond(1,b)=(iniv/nb)/bid_adj(inid,indm(inid,col(b)));
end
for a=0:n;
    t=inid+(a*d);
    sdates=Settle(t-d,1);
    sdatee=Settle(t,1);
    inddates=find(ActualD(:,1)==sdates);
    inddatee=find(ActualD(:,1)==sdatee);

    if a~=0
       for b=1:nb;

           mtm(a+1,b)=outsbond(a,b).*
           bid_adj(t,indm(t-d,col(b)));

           coupon(a+1,b)=sum(cfs(inddates:inddatee,
           indm(t-d,col(b)))).*outsbond(a,b);

           if coupon(a+1,b)~=0

              indtca=(cfs(inddates:inddatee,
              indm(t-d,col(b)))>0);

              tc(a+1,b)=(days360(ActualD(indtca),
```

```
            ActualD(inddatee)))/30;
            rc(a+1,b)=coupon(a+1,b).*((1+
           (LIBOR(t-d,1)/1200)).^tc(a+1,b));

        end
    end

    cash(a+1,1)=sum(rc(a+1,:))+(sum(cash(a,:))*(1+
    (LIBOR(t-d,1)/1200)));

    portvalue(a+1,1)=sum(mtm(a+1,:))+cash(a+1,1);
    bfportvalue(a+1,1)=portvalue(a+1,1)+sumtrcost(a,1);
end

if all(sgn(a+1,:))
    indsell=find(sgn(a+1,:)==-1);
    if a~=0 && (outsbond(a,indsell)==0)
       for b=1:nb;
           outsbond(a+1,b)=outsbond(a,b);
       end
       sumtrcost(a+1,1)=0;
       cash(a+1,2)=0;
    else

       amt(a+1)=(p*portvalue(a+1,1))./abs((sgn(a+1,1).*
       (1/dmod(t,indm(t,col(1)))))+(sgn(a+1,2).*
       (1/dmod(t,indm(t,col(2))))));

       for b=1:nb;

            trade(a+1,b)=amt(a+1).*sgn(a+1,b).*
            (1/dmod(t,indm(t,col(b))));

            if trade(a+1,b)<0

               nbond(a+1,b)=trade(a+1,b)./
               bid_adj(t,indm(t,col(b)));

            elseif trade(a+1,b)>0

               nbond(a+1,b)=trade(a+1,b)./
               ask_adj(t,indm(t,col(b)));

            end
            if a==0
               outsbond(a+1,b)=inibond(1,b)+nbond(a+1,b);

               trcost(a+1,b)=abs((ask_adj(t,indm(t,col(b))-
               bid_adj(t,indm(t,col(b)))/2).*nbond(a+1,b));

            elseif a~=0 && (outsbond(a,indsell)~=0)

               if nbond(a+1,b)<0 &&
                  abs(nbond(a+1,b))>outsbond(a,b)

                  outsbond(a+1,b)=0;
```

```
                    trcost(a+1,b)=abs(((ask_adj
                    (t,indm(t-d,col(b)))-bid_adj
                    (t,indm(t-d,col(b))))/2).*outsbond(a,b));

                     else
                        if indm(t,col(b))==indm(t-d,col(b))

                           outsbond(a+1,b)=outsbond(a,b)+
                           nbond(a+1,b);

                           trcost(a+1,b)=abs(((ask_adj(
                           t,indm(t,col(b)))-bid_adj(
                           t,indm(t,col(b))))/2).*nbond(a+1,b));

                        elseif indm(t,col(b))~=indm(t-d,col(b))

                           sale(a+1,b)=outsbond(a,b).*
                           bid_adj(t,indm(t-d,col(b)));

                           outsbond(a+1,b)=(sale(a+1,b)./ask_adj(
                           t,indm(t,col(b))))+nbond(a+1,b);

                            trcost(a+1,b)=abs(((ask_adj(t,indm(
                           t-d,col(b)))-bid_adj(t,indm(
                           t-d,col(b))))/2).*outsbond(a,b))+
                           abs(((ask_adj(t,indm(t,col(b)))-
                           bid_adj(t,indm(t,col(b))))/2).*
                           outsbond(a+1,b));

                        end
                     end
                  end
               end
               sumtrcost(a+1,1)=sum(trcost(a+1,:));
               cash(a+1,2)=-sum(trade(a+1,:));
            end
         else
            for b=1:nb;
                if a==0
                   outsbond(a+1,b)=inibond(1,b);
                else
                   outsbond(a+1,b)=outsbond(a,b);
                end
            end
            sumtrcost(a+1,1)=0;
            cash(a+1,2)=0;
         end
      end
```

```
%returns
[rowpv]=size(portvalue);
rmth=zeros(rowpv(1),1);
rmthbf=zeros(size(rmth));
for c=2:rowpv(1);
    rmth(c,1)=log(portvalue(c,1)/portvalue(c-1,1));
    rmthbf(c,1)=log(bfportvalue(c,1)/bfportvalue(c-1,1));
end
rinv=sum(rmth);
rinvbf=sum(rmthbf);
rmax=max(rmth);
rmin=min(rmth);
rmean=mean(rmth);
rsd=std(rmth);
```

L. The Signals for FE-C-M Portfolio

```
function [sgn]=signal(cvs,cvf,k,m)

inid=1876;% 3 Jul 2006, our first trading day
n=39;
d=22;
for i=0:n;
    t=inid+(i*d);
    meancv(i+1,1)=mean(cvs((t-k):(t-1),1));
    stdcv(i+1,1)=std(cvs((t-k):(t-1),1));
    if cvf(t,1)>(meancv(i+1,1)+(m*stdcv(i+1,1)))
       sgn(i+1,1)=-1;
       sgn(i+1,2)=1;
       sgn(i+1,3)=-1;
    elseif cvf(t,1)<(meancv(i+1,1)-(m*stdcv(i+1,1)))
       sgn(i+1,1)=1;
       sgn(i+1,2)=-1;
       sgn(i+1,3)=1;
    else
       sgn(i+1,1)=0;
       sgn(i+1,2)=0;
       sgn(i+1,3)=0;
    end
end
```

M. The Signals for FE-C-T Portfolio

```
function [sgn]=signal(cvf,cvp,stdp,m)
% cvp and stdp are the forecasted values

inid=1876;
n=39;
d=22;
for i=0:n;
    r=i+1;
    t=inid+(i*d);
    if cvf(t,1)>(cvp(r,1)+(m*stdp(r,1)))
       sgn(r,1)=-1;
       sgn(r,2)=1;
       sgn(r,3)=-1;
    elseif cvf(t,1)<(cvp(r,1)-(m*stdp(r,1)))
       sgn(r,1)=1;
       sgn(r,2)=-1;
       sgn(r,3)=1;
    else
       sgn(r,1)=0;
       sgn(r,2)=0;
       sgn(r,3)=0;
    end
end
```

N. The Returns for FE-C-M and FE-C-T Portfolios

```
function
[mtm,cash,portvalue,rmth,rmthbf,rinv,rinvbf,rmax,rmin,rmean,
rsd]=trade(cfs,ask_adj,bid_adj,indm,dmod,Settle,ActualD,LIBO
R,cvf,cvp,stdp,m,p)

sgn=signal(cvf,cvp,stdp,m);
inid=1876;
iniv=100000000;
n=39;
d=22;
nb=3;

portvalue=zeros(n+1,1);
amt=zeros(n+1,1);
sumtrcost=zeros(size(amt));
bfportvalue=zeros(size(amt));
cash=zeros(n+1,2);
trade=zeros(n+1,nb);
nbond=zeros(size(trade));
outsbond=zeros(size(trade));
mtm=zeros(size(trade));
coupon=zeros(size(trade));
tc=zeros(size(trade));
rc=zeros(size(trade));
trcost=zeros(size(trade));
sale=zeros(size(trade));

cash(1,1)=0;
portvalue(1,1)=iniv;
bfportvalue(1,1)=iniv;
col=[1,4,5];%column of short,medium,and long-term bonds
(2mth,5yr,10yr)
for b=1:nb;
    inibond(1,b)=(iniv/nb)/bid_adj(inid,indm(inid,col(b)));
end
for a=0:n;
    t=inid+(a*d);
    sdates=Settle(t-d,1);
    sdatee=Settle(t,1);
    inddates=find(ActualD(:,1)==sdates);
    inddatee=find(ActualD(:,1)==sdatee);
    %find portvalue
    if a~=0
       for b=1:nb;

           mtm(a+1,b)=outsbond(a,b).*
           bid_adj(t,indm(t-d,col(b)));

           coupon(a+1,b)=sum(cfs(inddates:inddatee,
           indm(t-d,col(b)))).*outsbond(a,b);

           if coupon(a+1,b)~=0
              indtca=(cfs(inddates:inddatee,indm(
              t-d,col(b)))>0);

              tc(a+1,b)=(days360(ActualD(indtca),
              ActualD(inddatee)))/30;
```

```
            rc(a+1,b)=coupon(a+1,b).*((1+
           (LIBOR(t-d,1)/1200)).^tc(a+1,b));

        end
    end

   cash(a+1,1)=sum(rc(a+1,:))+(sum(cash(a,:))*(1+
  (LIBOR(t-d,1)/1200)));

   portvalue(a+1,1)=sum(mtm(a+1,:))+cash(a+1,1);
   bfportvalue(a+1,1)=portvalue(a+1,1)+sumtrcost(a,1);
end

if all(sgn(a+1,:))
   indsell=find(sgn(a+1,:)==-1);
   if a~=0 && any(outsbond(a,indsell)==0)
      for b=1:nb;
          outsbond(a+1,b)=outsbond(a,b);
      end
      sumtrcost(a+1,1)=0;
      cash(a+1,2)=0;
   else

      amt(a+1)=(p*portvalue(a+1,1))./abs((sgn(a+1,1).*
      (1/dmod(t,indm(t,col(1)))))+(2*sgn(a+1,2).*
      (1/dmod(t,indm(t,col(2)))))+(sgn(a+1,3).*
      (1/dmod(t,indm(t,col(3))))));

      for b=1:nb;
          if b==2

             trade(a+1,b)=2*amt(a+1).*sgn(a+1,b).*
            (1/dmod(t,indm(t,col(b))));

          elseif b~=2

             trade(a+1,b)=amt(a+1).*sgn(a+1,b).*
             (1/dmod(t,indm(t,col(b))));

          end
          if trade(a+1,b)<0

             nbond(a+1,b)=trade(a+1,b)./
             bid_adj(t,indm(t,col(b)));

          elseif trade(a+1,b)>0

             nbond(a+1,b)=trade(a+1,b)./
             ask_adj(t,indm(t,col(b)));

          end
          if a==0
             outsbond(a+1,b)=inibond(1,b)+nbond(a+1,b);

             trcost(a+1,b)=abs(((ask_adj(t,indm(
             t,col(b)))-bid_adj(t,indm(t,col(b))))/2).*
             nbond(a+1,b));
```

```
                elseif a~=0 && all(outsbond(a,indsell))

                   if nbond(a+1,b)<0 &&
                      abs(nbond(a+1,b))>outsbond(a,b)

                      outsbond(a+1,b)=0;

                      trcost(a+1,b)=abs(((ask_adj(t,indm(
                      t-d,col(b)))-bid_adj(t,indm(
                      t-d,col(b))))/2).*outsbond(a,b));

                   else
                      if indm(t,col(b))==indm(t-d,col(b))

                         outsbond(a+1,b)=outsbond(a,b)+
                         nbond(a+1,b);

                         trcost(a+1,b)=abs(((ask_adj(t,indm(
                         t,col(b)))-bid_adj(t,indm(t,col(b))))/
                         2).*nbond(a+1,b));

                      elseif indm(t,col(b))~=indm(t-d,col(b))

                         sale(a+1,b)=outsbond(a,b).*
                         bid_adj(t,indm(t-d,col(b)));

                         outsbond(a+1,b)=(sale(a+1,b)./
                         ask_adj(t,indm(t,col(b))))+
                         nbond(a+1,b);

                          trcost(a+1,b)=abs(((ask_adj(t,indm(
                          t-d,col(b)))-bid_adj(t,indm(
                          t-d,col(b))))/2).*outsbond(a,b))+
                          abs(((ask_adj(t,indm(t,col(b)))-
                         bid_adj(t,indm(t,col(b))))/2).*
                         outsbond(a+1,b));

                      end
                   end
                end
             end
             sumtrcost(a+1,1)=sum(trcost(a+1,:));
             cash(a+1,2)=-sum(trade(a+1,:));
          end
       else
          for b=1:nb;
              if a==0
                 outsbond(a+1,b)=inibond(1,b);
              else
                 outsbond(a+1,b)=outsbond(a,b);
              end
          end
          sumtrcost(a+1,1)=0;
          cash(a+1,2)=0;
       end
end
```

```
%returns
[rowpv]=size(portvalue);
rmth=zeros(rowpv(1),1);
rmthbf=zeros(size(rmth));
for c=2:rowpv(1);
    rmth(c,1)=log(portvalue(c,1)/portvalue(c-1,1));
    rmthbf(c,1)=log(bfportvalue(c,1)/bfportvalue(c-1,1));
end
rinv=sum(rmth);
rinvbf=sum(rmthbf);
rmax=max(rmth);
rmin=min(rmth);
rmean=mean(rmth);
rsd=std(rmth);
```

BIOGRAPHY

Ornsiree Tangsajjatham is a Master's degree student majoring in Finance at the Faculty of Commerce and Accountancy, Chulalongkorn University. She was born on 1 December 1984 in Ratchaburi, Thailand. She lives with her brothers in Bangkok, Thailand. She holds a Bachelor's degree of Industrial Engineering from Kasetsart University.