The Performance of Standard Corporate and Merchant Bank's Yield Enhanced Security

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A project report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Masters in Business Administration

Johannesburg, 2006.

Abstract

The performance of the Yield Enhanced Security (YES) and the Yield Enhanced Security Plus (Yes-Plus) offered in South Africa by Standard Corporate and Merchant Bank was modelled over a ten-year period.

Through combinations of put and call options on certain shares an investor stands to gain superior returns during periods of market consolidation. Such synthetic instruments are new to the South African market, and have yet to be the subject of extensive study.

Daily closing share prices were collected over a ten-year period. A model simulating the instrument's performance was built using Microsoft Excel.

It was found that the YES outperformed the Yes-Plus and conventional share investment, both in terms of absolute, and risk-adjusted returns.

Declaration

I, Philip Harms, declare that this project report is my own work. It is submitted in partial fulfilment of the requirements for the degree of Masters in Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

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30th day of May 2006

Acknowledgements

The author wishes to acknowledge the kind assistance of the following, without whom this report would not have been possible.

- My supervisor, Frank Durand, for experience and guidance.

- The staff, students and guest lecturers of the WBS, who combined to make the MBA a thoroughly enjoyable and enlightening experience.

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1. Introduction

Recent times have seen increased sophistication amongst investors. The print and electronic media have contributed toward investor education by covering investment issues on a regular basis. Through the internet individuals can trade in shares for themselves, monitor the performance of their investments directly, and are thus taking a more active interest in the workings of the markets.

To satisfy the increasingly complex needs of the investors, new vehicles have been, and are still being, made available to both corporate and individual investors. A wide variety of investment techniques thus exist, each offering their own risk and reward profiles.

Through the use of derivatives new instruments may be synthesised, broadening the scope for the investor, by providing tailored risk – reward characteristics. Where only long and short positions were once available to the investor, requiring market movements in order to achieve returns, it is possible now to gain in times of limited, or no, market movement.

By constructing derivatives, linked to underlying assets and combining these appropriately, a large variety of instruments can be synthesised.

The “Yield Enhanced Security” (YES) offered by Standard Corporate and Merchant Bank (SCMB) is such an instrument. The YES is designed to appeal to investors who anticipate only limited movements in the market or individual shares in the near future. Such an investor, (who believes the market will not move in the near future) was previously limited to considering either investing in Bonds or interest earning instruments, such as fixed deposits. While these are perceived as low risk, they do not necessarily offer high returns. The lure of the “YES” is to be the potentially highest returning instrument in such times.

Such synthetic instruments are relatively new to the South African market. By their nature they may vary considerably in the inherent characteristics, and have not yet been subject to extensive study.

1.1 The Purpose of the Study

This study will investigate the performance of the Yield Enhanced Security (YES) and the Yield Enhanced Security Plus (YES-Plus) instruments offered in South Africa by Standard Corporate and Merchant Bank (SCMB).

The YES was launched in March 2001, thus limiting the amount of actual data available for the research. Using the principles upon which the YES is based its performance was modelled over a ten-year period.

1.2 The Significance of the Study

No previous studies of the performance of such instruments have yet been conducted. This study will be the first to investigate instruments of this nature, as they pertain to the South African market.

2. Literature Review

2.1 The Yield Enhanced Security

"Offered by SCMB, the Yield Enhanced Security "YES" is an exiting innovation in the South African share market and will appeal to a wide range of investors.

The product gives investors the chance to earn very attractive rates of interest especially in times of consolidation in the share market.

For investors who believe that the market is unlikely to move significantly in either direction in the short term, "YES" provides an investment that may outperform cash and direct shares. Investors may also consider "YES" as a lower risk alternative to directly investing in shares." (SCMB Yes, 2002)

To achieve the increased yield (the yield over and above that which is readily available to investors), the investor enters into a contract whereby any yield achieved beyond a fixed level is forfeited. The upside potential of the investment is thus capped.

Through carefully setting an appropriate level at which the yield is capped SCMB hopes to attract investors. Naturally investors would wish to the see capped level as high as possible, while SCMB would wish to set it as low as possible The setting of this capped level is thus not a trivial exercise.

Since the upside potential of the investment is capped, the yield quoted by SCMB is the best possible outcome for the investor. If it is the investor's belief that the market is unlikely to move in the short term, the YES may provide the most attractive returns available.

An example of quoted yields, as they pertain to the individual shares they are linked to, is shown in Appendix I. It is immediately obvious that the quoted yields may vary considerably from share to share.

Investors are required to make a minimum investment of R50 000, which is used to "purchase" shares at 90% of their trading value. After a period of 84 days the investor receives the quoted interest amount. If the shares trade at or above the purchase price the R50 000 is returned. If the shares trade below the purchase price the investor receives their market value at maturity. The quoted interest amount is paid in either event.

The first series (shown in Appendix I) was made available on the 5th March 2001, maturing on the 28th May 2001. New series are made available fortnightly.

On the 11th February 2002 the YES-Plus was launched. Available in 42-day and 84-day terms, the YES-Plus offers higher interest rates than the YES.

Again the investor is required to invest not less than R50 000. At maturity the pre-published interest is paid. If the share trades in a range of between 90% and 110% of its starting price the R50 000 is returned. If the share trades outside this band a reduced payment is returned to the investor (SCMB YES-Plus, 2002). The reduced payment being the market value of the shares if trading below the 90% level, or the difference between the market value and the 110% level should the shares trade above the 110% level. Again the interest is paid regardless of the trading price of the shares, at the maturity date.

The documentation pertaining to both the YES and the YES-Plus is included in Appendix VI and includes the brochures, the application forms and the contracts.

In reality, of course, the instruments are synthetic. Shares are not actually purchased, unless specifically requested by the investor, and then only at maturity. A saving in transaction costs is thus achieved, which would not be possible in traditional methods of stock market investing.

2.1.1 The Payoff Profiles

Very little information is published both in Alexander & Oldert (2001) and SCMB-YES (2002) and SCMB-YES-Plus (2002) as to exactly how the

published interest rates and eventual outcomes are derived. To establish the mechanism used analysis of the relevant pay-off profiles is necessary.

A payoff profile plots the value of the investment as a function of movements in the underlying equity. These payoff profiles for the YES and YES-Plus are shown in figures 1 and 2 nearby.

Clearly, the returns on both the YES and the YES-Plus do not track the underlying share price, but depend instead on whether or not the shares trade within predetermined levels.

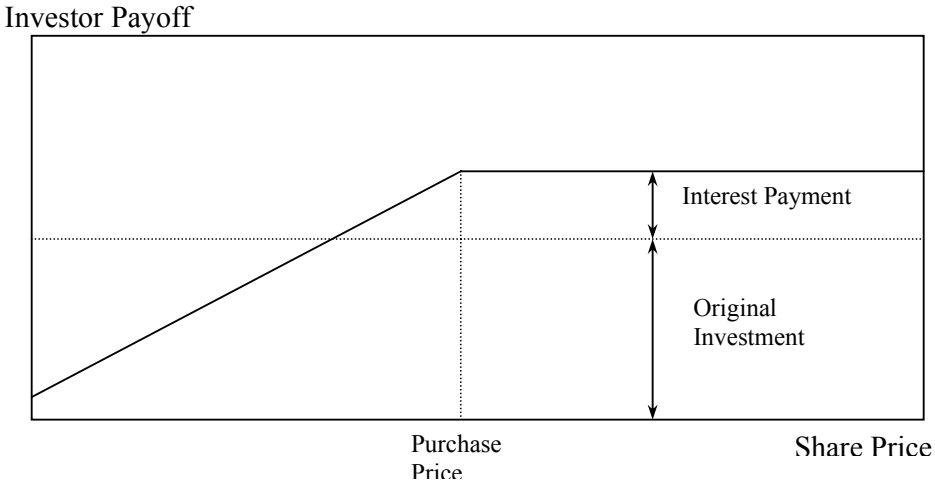


Figure 1: The YES Payoff Profile

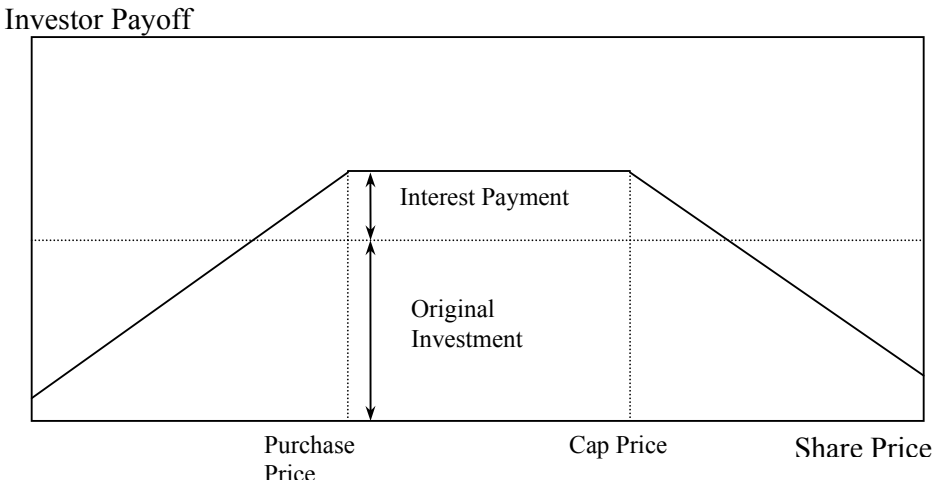


Figure2: The YES-Plus Payoff Profile

Clearly the lure to the investor is that the interest payable on the investment be higher than attainable elsewhere.

Calamos (1998:71-72) describes these types of instruments as "Equity-Linked Securities" and goes on to say: "Equity-linked securities are not a fad. The increasing sophistication of investors and their greater capacity to understand and accept complex securities means that the use of these securities should continue to expand."

He continues: "Each type of equity linked security has its own legal structure and unique risk and reward characteristics….Sometimes higher yield is achieved by capping the upside potential."

Such positions are created through the use of option contracts. These will be discussed below. It will be shown how the payoff profiles of the YES and the YES-Plus shown earlier are readily synthesised.

2.2 Option Contracts

Contrary to popular opinion derivates are not new. “Option contracts on commodities, such as wheat, have been used by merchants since the middle ages.” (Gemmill, 1993:4) Even earlier references to ancient Greek times exist, where Thales of Miletus (625-547 BC) made fortunes from trading options on olive presses (Kat, 2001). Since then, the writing and trading of option contracts has expanded, slowly at first, then with the opening of the Chicago Board Options Exchange (CBOE) in 1973 at a much faster rate. Option contracts are now traded on exchanges in many countries

2.2.1 Types of options

Figlewski, Silber & Subrahmanyam (1990:3-4) divide options into two types: calls and puts and defined each as follows:

“A *call* option is the *right* to *buy* a specified quantity of some *underlying asset* by paying a specified *exercise price*, *on or before* and *expiration date.*

A *put* option is the *right* to *sell* a specified quantity of some *underlying asset* for a specified *exercise price*, *on or before* and *expiration date*.”

It is important to note that option contracts confer the right, but not the obligation to exercise the contract.

2.2.2 Option Terminology

A wide array of terminology surrounding option contracts has evolved and will be briefly outlined below

- **Option Premium –** The fee paid to the option writer for the right to exercise the option
- **In-, at- or out-the-money -** If immediate exercise of the option would yield a positive (negative) cash flow the option is said to be in-the-money (out-the-money). If no net cash flow results from exercising, the option is said to be at-the-money. The resultant cash flow is termed the intrinsic option value.
- **Option holder -** The party having the right to decide whether or not to exercise is termed the option holder and is said to be "long" the option.
- **Option writer -** The party having to either sell or buy is termed the option writer and is said to be "short" the option
- **American options** - options which can be exercised at any time on or before the expiration date
- **European options** – options which are exercisable only on the expiration date

Over and above the standard American and European option types a number of other exotic option forms have emerged. These include Asian (average rate) option where the exercise price is determined by the average price of

the underlying asset during the option's life. In Look back options the exercise price is the highest or lowest price achieved. Barrier options only come into effect should the price of the underlying cross a predetermined level. Chooser options may be puts or calls at the option of the holder (Hudson, 1992).

2.2.3 Option Pricing

The model developed by Black & Scholes (1972), which is appropriate for pricing European style options, has gained wide acceptance by the investment community (Bodie, Kane & Marcus, 2002).

The Black-Scholes formula is given by

$$C = S*N(d_1) – X*[EXP(-rt)]*N(d_2)$$

$$P = X*[EXP(-rt)]*N(-d_2) – S*N(-d_1)$$

for calls and puts, respectively. In the above

- S is the spot price,
- X the exercise price,
- r the risk free rate,
- t the time to expiry, and
- N() the cumulative normal distribution.

The formulae for d_1 and d_2 are shown below:

$$d_1 = [\ln(S/X)+(r+\sigma^2/2)t]/\sigma\sqrt{t}$$

and

$$d_2 = d1 - \sigma\sqrt{t}$$

Where σ is the volatility (annualised standard deviation) of share returns. The returns used above are calculated as the natural logarithms of successive prices,

$$R_t = \ln(R_t/R_{t-1})$$

Gemmill (1993) lists the most important assumptions made by the Black-Scholes model.

- Share returns are log-normally distributed.
- There are no transaction costs.
- Interest rates are both known and constant.
- Options are of only of European type.
- The underlying shares pay no dividends.

Almost all variables in the Black-Scholes model are either known or readily observable. The variable, which is not easily observed, is the volatility. Methods for estimating volatility will be discussed below.

2.2.4 Volatility

The results obtained when pricing options by the Black-Scholes model are critically dependant on the estimated level of volatility (Gemmill, 1993). Moreover, there is uncertainty about exactly how the volatility should be estimated. In fact, the field of volatility estimation may well be the subject of a separate report.

Gemmill (1993) divides volatility estimation into historic and subjective methods. Historic methods analyse past data, while subjective methods focus on future events and their likely impact on market movements.

Figlewski *et al* (1990) propose, as a simple method, that daily closing share data be collected. From these logarithmic returns are calculated. The standard deviation of these returns is then computed. To use the value obtained in the Black-Scholes model it must first be annualised. Multiplying the value obtained by the square root of 250 does this. (250 being the average number of working days per year)

A further method of estimating volatility is to apply the Black-Scholes formula in reverse and solve for the volatility. This must be done iteratively, and yields the market's view of the volatility. Care must be taken to use only near-the-money options when doing this, to avoid the "volatility smile" effect (Gemmill, 1993).

2.3 Option strategies

Buying or selling of different options on the same underlying asset enables the synthesis of different pay-off profiles. Combining more than one option is termed a spread. Gemmill (1993) identifies some common types of spreads: (from the buyer's point of view).

- Straddles – buy call and put at same strike price
- Strangles – as Straddle, but put and call at different strike prices
- Butterflies – as Straddle but with limited upside potential
- Condors – as Strangle, but with limited upside potential

2.4 Construction of the YES and YES-Plus

Using the above discussion together with the YES and YES-Plus payoff profiles mentioned earlier it can be seen that the instruments are merely short option positions taken by the investor.

The payoff profile of the YES is identical to that of a writer of a European put option. The writer gains the option premium, but no more than that, and loses money in linear fashion as the share price moves below the option's strike price.

The payoff profile of the YES-Plus is identical to that of a writer of a strangle, made up of two European options, a put at a low strike price and a call at a higher strike price. Two option premiums are gained by the writer, but losses can be made should the share trade below the strike price of the put option, or above the strike price of the call option.

An investor in the YES thus stands to gain should the share price remain constant or increase, while an investor in the YES-Plus would gain only if the share price remains relatively stable. In return, the yield the investor stands to gain on the YES-Plus is higher than the yield on the YES.

Both the YES and the YES-Plus thus provide mechanisms whereby an investor profits even though the underlying asset prices have not moved. This property makes the YES and YES-Plus different from any other commercially available stock market investments. Traditional investments, both long and short, rely on share price movements to generate returns.

2.5 The Pricing of the YES and YES-Plus

Prior to the commencement of the current investment cycle the interest rates applicable to each share are published by SCMB. Examples of these are given in Appendix I. Although it is not published exactly how these are calculated, the interest paid to the investor must necessarily contain elements of the following.

- Interest on the initial investment. The bank requires the investment up front as security, but since the investor is not liable until expiry of the option SCMB is obliged to pay interest on the investment.

- The option premium is payable on signing of the option contract, and thus belongs to the investor from the start of the contract.
- Interest must thus also be paid on the option premium.

To model the interest rates quoted by SCMB it is then necessary to determine

a) The appropriate interest rate on an 84 day fixed deposit,
b) The value of the options involved
c) The yield on the initial investment and the option premium if placed in such a fixed deposit.

2.6 Risk Adjustment

No objective evaluation of investment performance can be made without consideration of the risks involved (Bodie, Kane & Marcus, 2002). Traditionally the Capital Asset Pricing Model (CAPM) provides the framework used to express risk-return relationships. Detailed discussions on the CAPM can be found in many good finance texts, and thus it will not be discussed in this report.

In a CAPM scenario security returns are symmetrical. In the case of the YES and the Yes-Plus the payoff profiles shown in Figures 1 and 2 clearly show the asymmetrical nature of the returns. In light of this Ward (2000: 35) proposes the following: "Risk is asymmetric. Investors care about losing, and this is what they mean by "risk". They are not concerned about possible upside potential – just downside loss." He suggests that in such a scenario risk is better defined as the probability of under-performing a certain benchmark. The risk free rate, R_f would be the obvious choice.

Ward (2000:37) defines risk as "..the *expected downside* return. So, for a particular investment strategy there may be a 30% probability that the return will be below R_f. If the average downside return is 3%, then the level of risk can be defined as being 7% if R_f is 10% (i.e. the distance below R_f). The

expected downside return is then 30%*7% = 2.1%." He proposes the use of the Hebrew "bet" to refer to the expected downside risk as defined above. Thus,

Bet = (probability of downside return) * (Rf - average downside return)

"Bet", as defined above, rather than the CAPM beta, will be used throughout the study for risk adjustment purposes.

3. Research Methodology

3.1 The Choice of Securities to be included

The selection of shares, to which to link the investment, offered by SCMB varies from series to series. For the purpose of this study the top 40 shares on the Johannesburg Securities Exchange (JSE) as at 31 December 2002 were selected. From these only those shares for which complete ten-year data was available from I-Net were included. Together with the All-Share Index this left a total of 28 shares. A complete list of the securities included is shown in Appendix II.

3.2 The Period of the Study

Both the YES and the Yes-Plus were modelled over a nine-year period ending 31 December 2002. In practise SCMB offers a new series fortnightly. Although it would be academically "purer" to use non-overlapping data, this would result in very few data points. A series' term is 84 days or twelve weeks, resulting in only four data points per share per year.

It was decided to model the performance in a fashion similar to how the instrument operates in practise, i.e. a new series starting fortnightly.

3.3 Model Construction

As alluded to earlier, the published yields on the Yes and Yes-Plus are a combination of option premium, interest on invested amount and interest on the option premium. The rates as quoted by SCMB are in Annual Percentage Rate, rate than Effective Annual Rate, and this convention was used throughout.

A model was constructed in Microsoft Excel to generate data points as follows:

a) The option premium was calculated using the Black-Scholes formula, at a strike price of 10% below the day's closing price for the Yes and a combination of puts and calls at strikes 10% below and 10% above the day's closing price, respectively for the Yes-Plus. Historical volatility over an identical period and the yield to maturity of the R150 long-term government bond were used as Black-Scholes input.
b) The interest on the invested amount and the option premium(s) using the yield to maturity on the R150 as the prevailing interest rate.
c) The actual outcome of the investment contract, in accordance with the relevant payoff conditions.

For simplicity the yield to maturity on the R150 was used throughout as both the risk free rate for the Black-Scholes model and the interest on the investment.

The detail of the calculations performed is shown in Appendix III.

The initial data collected was needed to calculate volatility, thus the first series modelled began 11 April 1994. For the "YES" this yielded 221 data points at 90% strike price level and another 221 at 95% strike price level. This was repeated for each share studied, and the ALSI.

For the Yes-Plus 221 data points were generated at 90% strike price level, another 221 at 95% strike price level. Since the Yes-Plus is offered in both 84 and 42-day periods, the above was conducted for both time periods. This was then repeated for each share studied and for the ALSI.

From the data so obtained the risk level of "bet" was calculated in accordance with the proposals of Ward (2000). This was done both for results in investing in the YES and Yes-Plus and for direct investment in the relevant shares. Details of this calculation are shown in Appendix IV.

3.4 Data Collection

All data collection was done from I-Net. This includes daily closing share prices, daily closing All Share Index levels and the yield to maturity of the R150. The data as collected from I-Net was assumed to be correct.

No trading occurs on public holidays, resulting in missing values, which are rejected by the model. For simplicity the values pertaining to public holidays were assigned the previous day's value.

Since each series runs for the predetermined time period, regardless of public holidays, the extra complication of including these in the model would not result in increased accuracy. The simplification is thus justified.

Data was collected from 3 January 1994 through to 31 December 2002.

4. Results

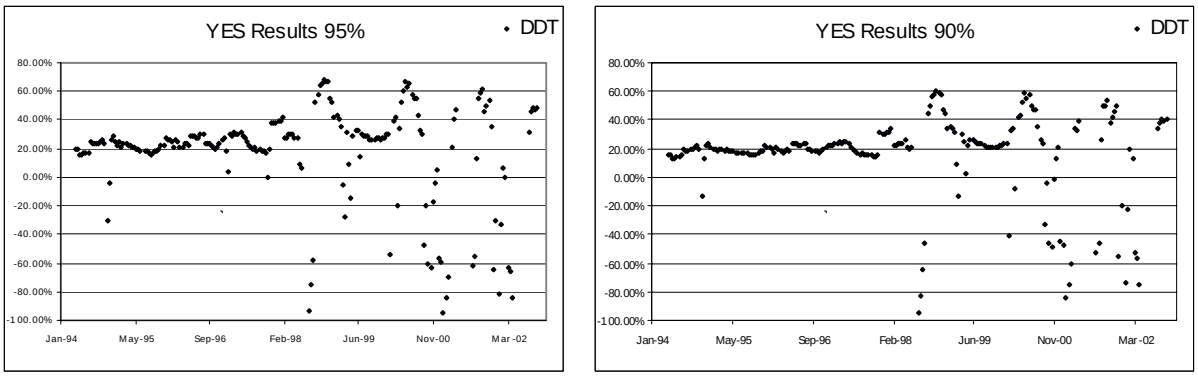
The results obtained when combining all returns, “bets”, and returns over “bets” are shown below in Table 1, below. The results were grouped firstly into 42 and 84-day terms, and were then grouped by strike price level. Average results for all shares studied are shown, in the case of 42-day terms for “Yes-Plus” at both 90% and 95% strike price level. In the case of 84-day terms results are shown for both “YES” and “Yes-Plus” at 90% and 95% levels. For comparison, the results achieved for conventional investment in the underlying shares are also shown.

It is immediately seen that when considering reward / risk ratios (or return divided by “Bet”) that the observed values for “YES” at both 90% and 95% strike price level are an order of magnitude larger than values observed for the “Yes-Plus” and conventional investment in shares, regardless of the strike price level or the term length.

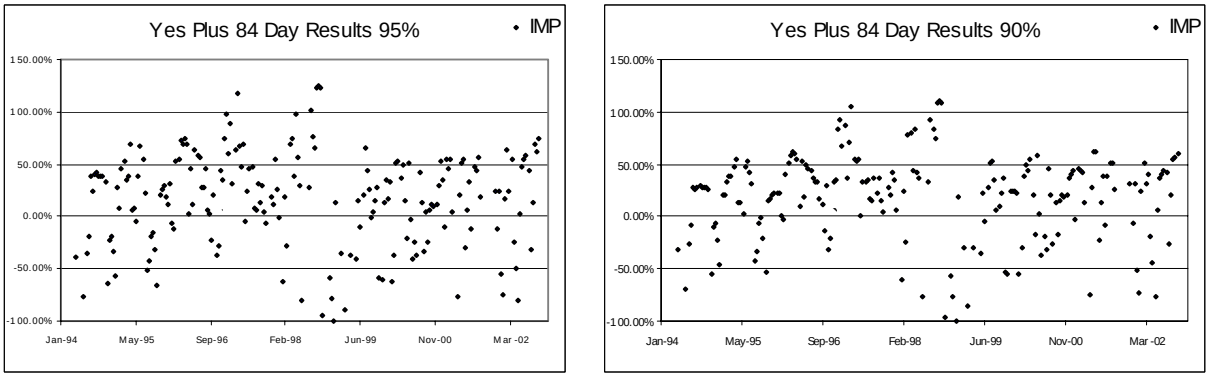
	Investment Type	Ave Return	Bet	Ret/Bet
42 day	YES-Plus 90%	4.52%	13.32%	0.34
	YES-Plus 95%	0.92%	18.14%	0.05
	Share	10.51%	36.27%	0.29
84 day	YES 90%	12.84%	4.63%	2.77
	YES 95%	12.31%	5.75%	2.14
	YES-Plus 90%	6.49%	12.40%	0.52
	YES-Plus 95%	5.52%	15.30%	0.36
	Share	9.97%	22.66%	0.44

Table 1: Results obtained for the different investment options available

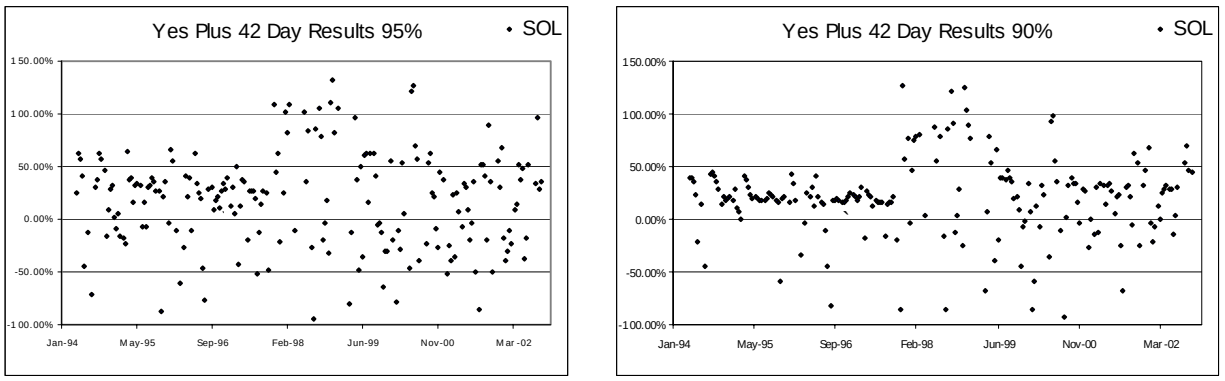
Shown below is a selection of typical results obtained for each share. Each graph shows all 221data points generated through the study period. The complete set of all 168 graphs is shown in Appendix V. They consist of results for the "YES" at both 90% and 95% levels, "Yes-Plus" at both 90% and 95% levels, first for the 84-day term, and then for the 42-day term.



Graph 1: "YES" results for Dimension Data (DDT) at 95% and 90% levels



Graph 2:"Yes-Plus" results for Impala Platinum (IMP) at 95% and 90% levels for the 84-day term



Graph 3:"Yes-Plus" results for Sasol (SOL) at 95% and 90% levels for the 42-day term

In all three above examples the two graphs for the 95% and the 90% bear a strong degree of resemblance to each other, but it is immediately noticeable that the results for the 95% show greater scatter than those for the 90%. Higher "highs" and lower "lows" are readily observable.

5. Discussion

5.1 Average Results

5.1.1 Average Returns

Table 1, previously, shows the results obtained from modelling both YES and Yes-Plus over the study period at 90% and 95% strike price level over an 84 day investment term, as well a 42 day term for the Yes-Plus. For comparison, tradition share investment is included.

The highest returns, on average around 12%, were achieved by the YES at both 90% and 95% strike price level. Traditional share investment showed returns of around 10%, while the various permutations of the Yes-Plus achieved no better than 6.5%, with the Yes-Plus (95% 42-day) achieving only 0.9%.

The YES clearly provided the superior returns during the study period, but to explain quite why this was so is not a trivial exercise. If traditional share investment is to be used as the performance benchmark in this instance, there is clear discrepancy between the performance of the YES and the Yes-Plus. The YES over performed, and the Yes-Plus under performed the benchmark. This will be discussed in greater detail later, when consideration will be given to the effects of the individual variables involved.

5.1.2 Bet

Traditional share investment showed the highest values of Bet observed during the study, almost twice as high as those observed in the Yes-Plus. The YES only showed bets of around a quarter of those seen in the traditional share investment.

Explanation of these findings is considerably simpler than explaining the returns observed. Bet, as defined by Ward (2000), is the expected downside risk. Since money is lost immediately a share loses value, even slight fluctuations in share price will increase bet values observed. Both the YES and the Yes-Plus have "cushions" built in. Thus the synthetics can exhibit a degree of movement, before any losses are incurred. Clearly, then, it is expected that the YES and the Yes-Plus should yield lower values of bet than traditional shares, which was indeed the case.

The YES can accommodate upward share movement without incurring losses for the investor, while the Yes-Plus incurs losses during both upward and downward movements in underlying asset price. Intuitively, thus, the YES should show lower bets than the Yes-Plus. The actual results obtained show that the YES bet values were around half those observed in the Yes-Plus (around 5% versus around 12-15%).

5.1.3 Returns/Bet

As Bodie, Kane & Marcus (2002) stress, evaluation of an investment's performance cannot be performed without consideration of the risks involved. To this end both returns and risks must be considered together. They list a number of such measures, e.g. Sharpe's measure, Treynor's measure, and others. Although these measures do differ from each other they contain similar fundamentals. Generally, they all measure the return achieved, divided by the risk taken. The exact detail in calculating the returns and the risks differ from measure to measure. None of these measures can be used as an absolute result, but they can be used to rank performance (Bodie, Kane & Marcus, 2002).

In this study consideration was given to the return/bet ratio. From the investor's point of view the superior investment would be the one showing the highest return/bet ratio values, be they generated from high returns, low bets, or preferably, both. It was here, that the YES stood out. Compared to the Yes-Plus and direct shares, it showed values of over 2, as opposed to values of 0.5 and lower for the Yes-Plus and direct shares. The YES had the highest returns at the lowest bet levels, and thus clearly would appear superior when returns and risks are considered together.

5.2 Effect of strike price level

Both YES and Yes-Plus are available at 90% and 95% strike price level. The effect of choosing the 95% rather then the 90% level should be to increase the returns, but also the risks. Thus higher "highs" and lower "lows" should be expected. Indeed, for each share studied, the graph of the 95% level is a "vertically stretched" version of the 90% level. But would the higher "highs" compensate for the lower "lows", and the increased risk?

As expected, values of bet were higher for the 95% level than for the 90%, both for YES and Yes-Plus, regardless of term length. Average returns, on the other hand, were lower for 95% levels, than for 90% levels, regardless of whether the YES, the Yes-Plus or the term length were considered.

This result hints at the (intriguing) existence of an "optimum" strike price level, which balances the counter effects of increased possible returns at high levels against decreased risk at lower levels. Determination of this optimum level would be a complicated modelling process, and could well be the topic of a separate study.

5.3 Effect of term length

Only the Yes-Plus was offered in 84-day and 42-day terms. The 42-day term resulted in higher bets and lower returns than the corresponding 84-day terms. On the face of it, it appeared that the 84-day term offered better performance that the 42-day term, but the data is too little to attempt any meaningful conclusions on the possible effects of term length.

As discussed earlier, though, there may exist an optimal term length, which maximises returns and, possibly, minimises risk. Again this would require a complicated modelling effort, but might be worthy of future study.

5.4 "YES" vs "Yes-Plus"

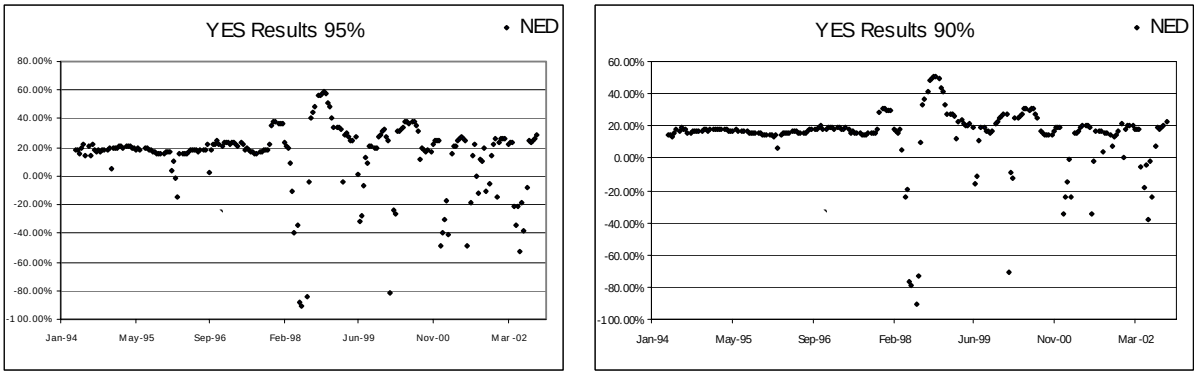
The performance of YES versus Yes-Plus could only be evaluated using data from the 84-day term, since the YES was not offered on 42-day terms.

Over the study period the YES achieved almost double the returns (12% compared to 6%) that the Yes-Plus achieved. Also, the risks observed in the YES were around half the levels of those observed in the Yes-Plus (5% compared to 12-15%). Thus the YES achieved around four times the return/risk ratio observed in the Yes-Plus (over 2 compared to around 0.5).

This result was surprising, in that it was felt at the outset that the additional upside loss exposure of the Yes-Plus would be compensated by the increased return potential, when compared to the YES. Clearly this was not the case, and some consideration must be given as to why this should be so.

As alluded to earlier, the YES and the Yes-Plus rely on relatively stagnant market conditions to achieve their best possible performance. The only difference between the YES and the Yes-Plus is that the Yes-Plus is vulnerable to a rising market, which the YES is not. It appears, thus, that the superior returns the Yes-Plus promises over the YES in times of stagnant markets are not high enough to compensate for the increased risks. Alternatively, the market did not experience enough sufficiently stagnant periods for the Yes-Plus to achieve the promised high returns.

Another explanation of the effects observed could be that they are simply due to period choice. As mentioned earlier, the choice of study period was largely arbitrary, governed by the time the data was gathered, and the limitations imposed by I-Net, limiting the available data to only ten years. Weight is added to the period effect argument by simple examination of many of the graphs. As an example, the graphs for the YES, using the Nedcor share as underlying asset, shown below, displays lengthy periods of almost uninterrupted gains, with few losses.



Graph 4: YES results for Nedcor at both 95% and 90% strike price level

A marked difference can be observed when comparing the period up to February 1998, with the period post February 1998. Prior to February 1998 steady gains were observed, with almost no losses at all. Post February 1998 the share returns experienced increased volatility. This is evidenced by the higher returns observed, nearing the 60% level, compared to around 20% pre February 1998. The increased volatility improved the YES returns, but also was the cause of some losses.

A student gathering data post 1998 would certainly produce vastly different results to one making use of earlier data.

The observations mentioned may, in part, be ascribed to the well documented South East Asian financial crises, which fell squarely in the middle of the study period. The repercussions were certainly felt in the South African financial market, affecting both investor confidence and

interest rates. To exclude times of uncertainty and volatility from a study for the sake of "neater" results would be dishonest and unscientific.

5.5 Study limitations, assumptions and criticisms

In conducting the study certain assumptions were made. Since these could materially affect another researcher's ability to reproduce the results obtained, they bear mention.

a) The data, as collected from I-Net was assumed to be correct, and no attempt to independently validate it was made.

b) Share selection was made on the basis of complete data being available for the entire ten-year period. Since the instruments run for short times only in practise, accusations of survivorship bias may be averted. Criticism of easy data bias could, though, be levelled at the study in that a ten-year period was chosen. Collecting data over longer periods would have been considerable more difficult, but may have yielded more complete results. It was felt, though, that ten-year data was more than adequate to produce meaningful results.

c) The choice of study period included a time of severe interest rate volatility in South Africa. This materially affected the average interest rate calculated over the period. The benchmark set for the calculation of "bet" was thus possibly slightly high, being found to be 13.9%. This value was applied to the YES, the Yes-Plus and

direct share investment, so comparisons are still possible, but care must be taken when attempting to draw absolute conclusions.

d) The study specifically excluded the tax situation of individuals, assuming that investors able to raise the R50 000 needed would all be paying the highest marginal tax rate applicable. Any conclusions applying to an individual's investment needs would need to include the tax situation as applicable.

e) The YES and Yes-Plus are synthetic instruments, resulting in a saving of transaction costs, when compared to direct share investment. These costs were not included in the study, but must necessarily be considered when individuals are weighing up investment options.

6. Conclusions

a) Over the study period the YES out performed the Yes-Plus and direct share investment.

b) This out performance was observed both when considering absolute returns and risk-adjusted returns.

c) Drawing absolute conclusions about the future performance of an investment instrument must be done with caution.

d) Synthetic investment instruments can, at times, deliver superior returns to conventional investing.

7. References

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Appendix I: The first YES Series, published 5th March 2001

Series Num 1 Issue Date: 5/3/01

Minimum AR 50 000 p Maturity Date 25/5/2001

R25 000 p

Listed Entity (Underlying Share)	JSE Code	Interest Rate (% p.a.)	Purchase Price %	Closing Share Price on Purchase	Purchase Price	Breakeven Price	Previous Day Close
Amplats	AMS	18.12%	90%	R335.00	R301.50	R287.53	R403.20
Billiton	BIL	19.47%	90%	R35.60	R32.04	R30.45	R43.00
BOE	BOE	14.96%	90%	R4.22	R3.80	R3.65	R4.35
Didata	DDT	25.18%	90%	R44.70	R40.23	R37.64	R40.40
Datatec	DTC	32.04%	90%	R23.35	R21.02	R19.29	R22.20
FirstRand	FSR	13.28%	90%	R8.00	R7.20	R6.96	R8.40
M-Cell	MCE	22.99%	90%	R21.20	R19.08	R17.96	R21.60
NedCor	NED	13.88%	90%	R155.60	R140.04	R135.08	R146.40
Old Mutual	OML	12.89%	90%	R18.20	R16.38	R15.84	R17.55
Richemont	RCH	12.20%	90%	R185.00	R166.50	R161.30	R205.20
Rand Merchant	RMH	14.14%	90%	R11.45	R10.31	R9.93	R11.85
Sanlam	SLM	12.91%	90%	R9.48	R8.53	R8.25	R10.00
Sasol	SOL	15.45%	90%	R59.80	R53.82	R51.70	R77.00
Venfin	VNF	18.12%	90%	R19.80	R17.82	R16.99	R20.00

Appendix II: The Securities studied

Share Name	Share Code
Anglogold	ANG
Anglo American	AGL
African Oxygen	AFX
Absa Group	ASA
Anglo Platinum	AMS
Amalgamated Beverage Industries	ABI
Avgold	AVG
Dimension Data Holdings	DDT
Durban Roodepoort Deep	DUR
FirstRand	FSR
Gold Fields	GFI
Harmony	HAR
Impala Platinum Holdings	IMP
Imperial Holdings	IPL
Nampak	NPK
Nedcor	NED
Northam Platinum	NHM
Pick ’n Pay	PIK
Pretoria Portland Cement Company	PPC
RMB Holdings	RMH
South African Breweries	SAB
Sasol	SOL
Santam	SNT
Shoprite Holdings	SHP
Standard Bank Group	SBK
Tiger Brands	TBS
Western Areas	WAR
All Share Index	ALSI

Appendix III: Details of Model Construction

1) The Model for the "YES" (Sell a put to SCMB)

(For example purposes reference is made to the series starting 11 April 1994).

Note: SCMB publish the interest rates applicable one week prior to commencement of the series, but spot and strike prices applicable are those occurring on the actual commencement and end of the series.

a) Calculation of option premium.

   The Black Scholes model was used with inputs as follows:

   Volatility: Since interest rates on a series are published one week prior to commencement of the series, the 84 days ending Friday 1 April 1994 were used to calculate volatility.

   Spot Price: The day's closing price of 11 April 1994

   Strike price: 90% (or 95%) of spot

   Time: 84 Days

   Interest rate: Closing R150 yield of 1 April 1994.

b) Cover ratio: R50 000 / Strike price

c) Option premium component: Cover ratio x Black Scholes value

d) Interest: 84 day interest on R50 000 + 84 day interest on option premium, both at R150 yield.

e) Total yield: Interest + option premium

f) Yield %: Yield / (R50 000 x 84/365) in annual percentage rate.

g) Actual return at series end:

Either: Yield if share >= strike, or

Market value x cover ratio + yield if share < strike.

h) Return %: Actual return / (R50 000 x 84/365) in annual percentage rate.

2) The Model for the "Yes-Plus " (Sell a put and a call to SCMB)

(For example purposes reference is made to the series starting 11 April 1994).

Note: SCMB publish the interest rates applicable one week prior to commencement of the series, but spot and strike prices applicable are those occurring on the actual commencement and end of the series.

The Yes-Plus is offered in both 84 and 42-day terms, so for the 42-day substitute 42 for 84 in the calculations below.

a) Calculation of option premiums for both put and call.

   The Black Scholes model was used with inputs as follows:

   Volatility: Since interest rates on a series are published one week prior to commencement of the series, the 84 days ending Friday 1 April 1994 were used to calculate volatility.

   Spot Price: The day's closing price of 11 April 1994

   Strike price for put: 90% (or 95%) of spot

   Strike price for call: 110% (or 105%) of spot

   Time: 84 days

   Interest rate: Closing R150 yield of 1 April 1994.

b) Cover ratio: R50 000 / Strike price

c) Option premium component:

(Cover ratio x Black Scholes value for put) + (Cover ratio x Black Scholes value for call)

d) Interest: 84-day interest on R50 000 + 84-day interest on option premium, both at R150 yield.

e) Total yield: Interest + option premium

f) Yield %: Yield / (R50 000 x 84/365) in annual percentage rate.

g) Actual return at series end:

Either: Yield, if (put strike) <= share => (call strike), or

Market value x cover ratio + yield, if share < put strike, or

R50 000 – [(Market value – call strike) x cover ratio] + yield,

if share > call strike

h) Return %: Actual return / (R50 000 x 84/365) in annual percentage rate.

Appendix IV: Calculation of "Bet"

The "Bet" calculation involves the selection of a benchmark against which to evaluate under performance. To obtain this the yield on the R150 was averaged over the 9-year period. The value so obtained was 13.9% and was used as R_f throughout.

a) Probability of under performing R_f:

$$P_{underperformance} = [\Sigma (< R_f)]/ \text{No of observations}$$

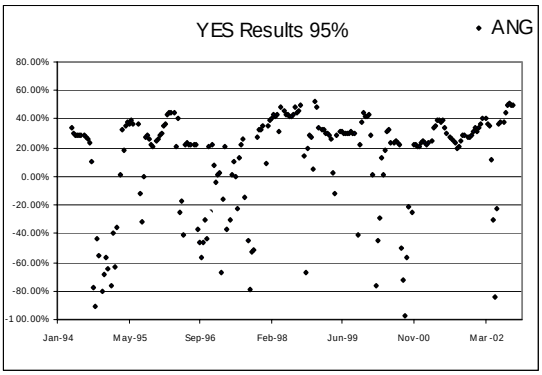
b) Risk level:

$$\text{Risk level} = R_f - [\text{Average of all observations} < R_f]$$

c) Bet:

$$\text{Bet} = P_{underperformance} \text{ x Risk level}$$

Appendix V: Detailed returns observed for each Security studied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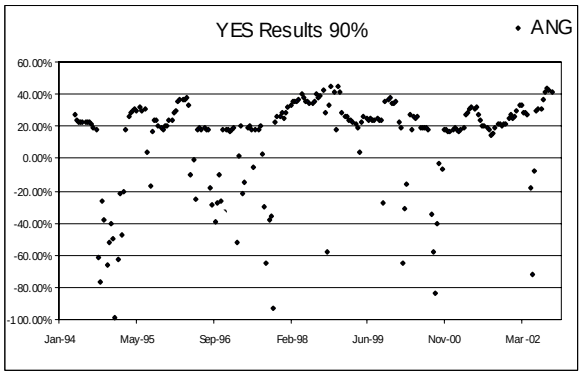
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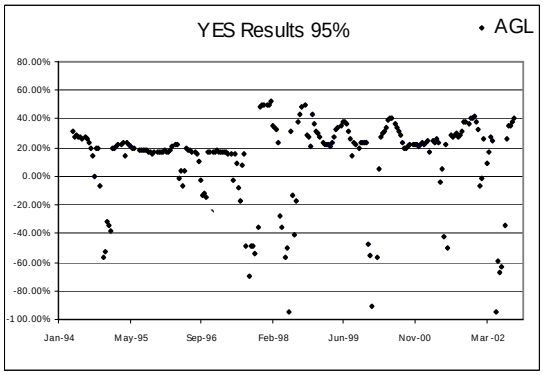
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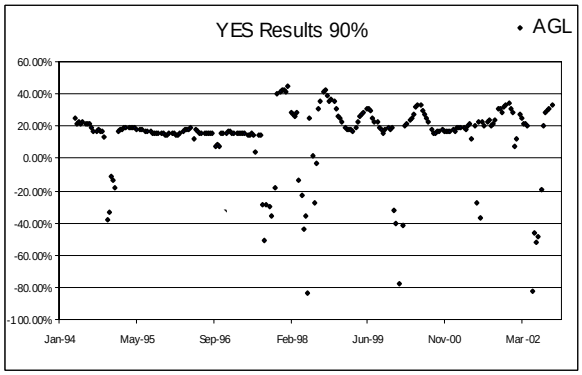
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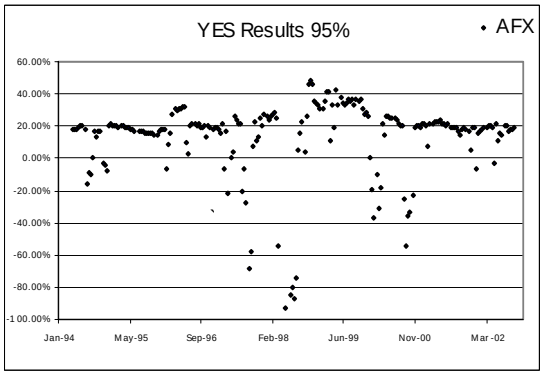
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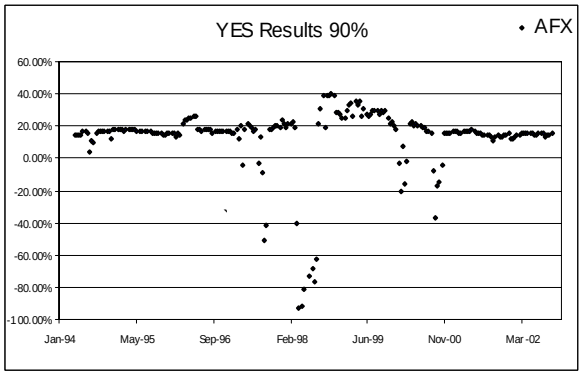
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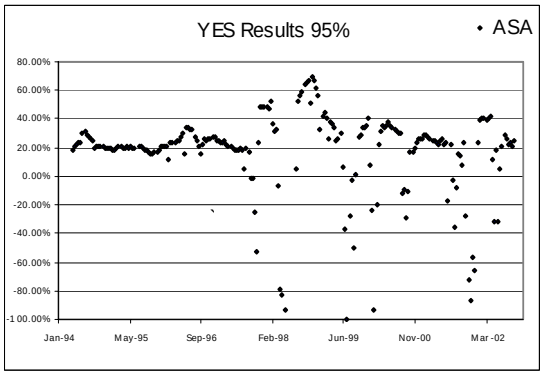
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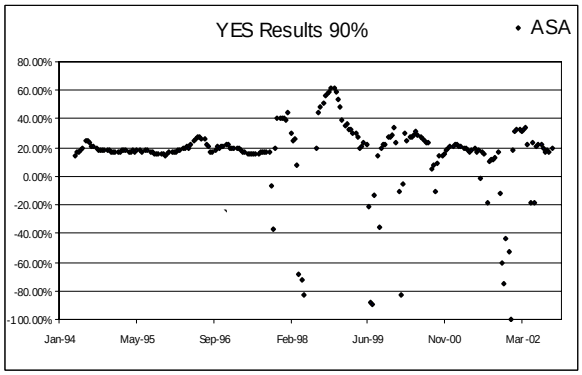
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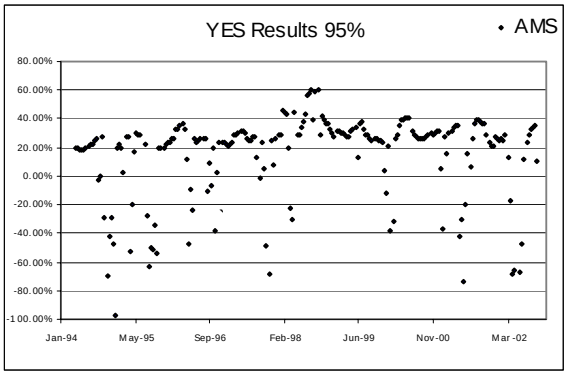
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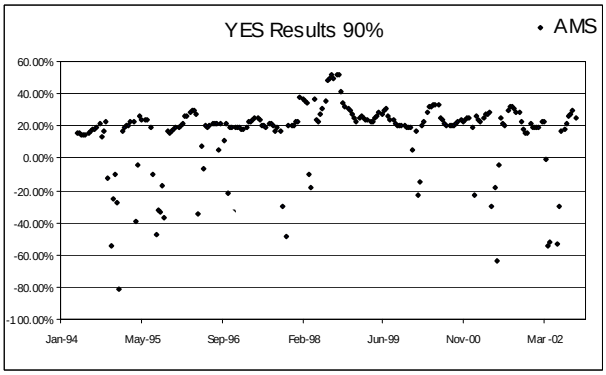
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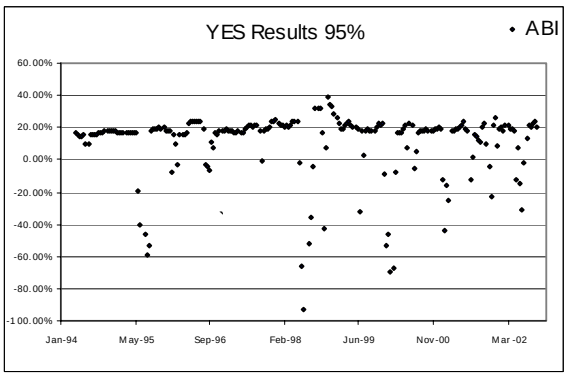
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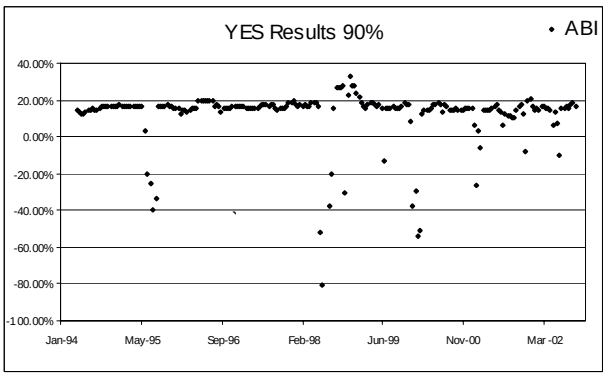
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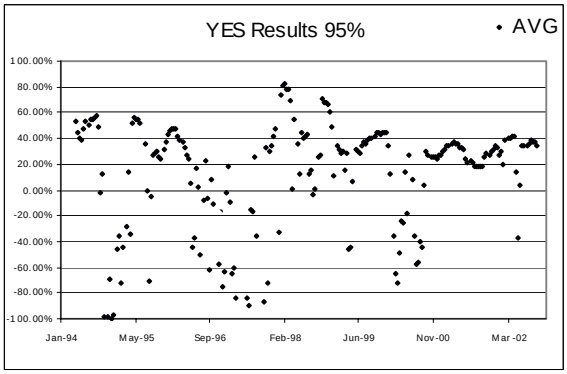
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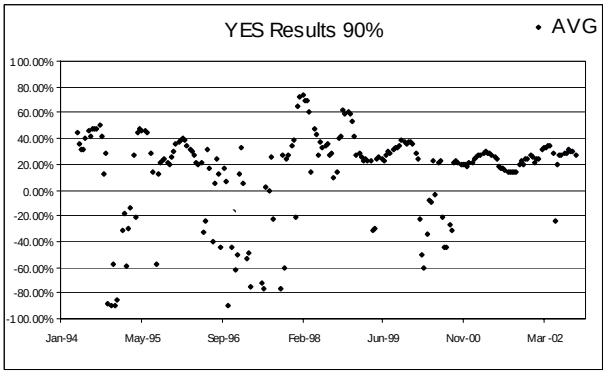
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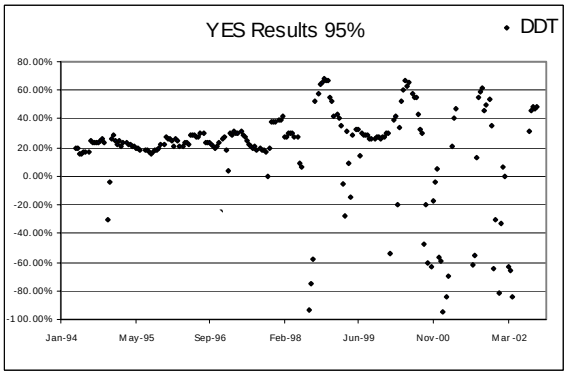
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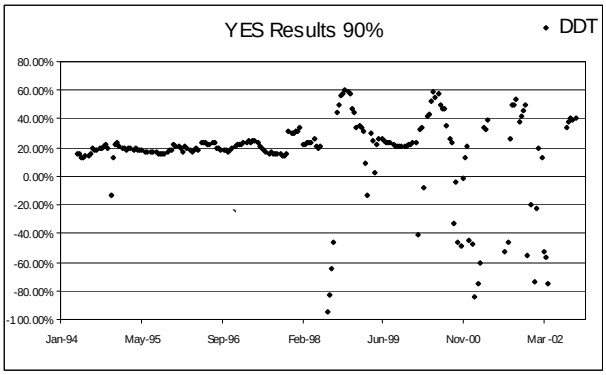
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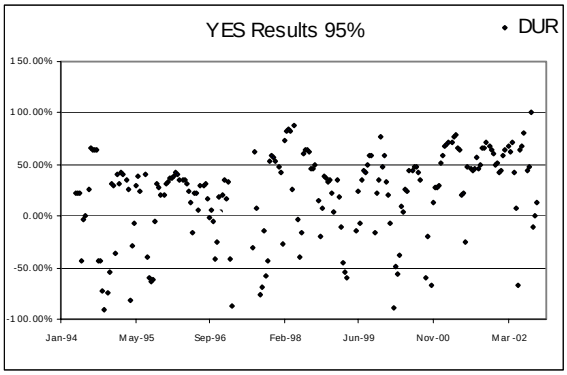
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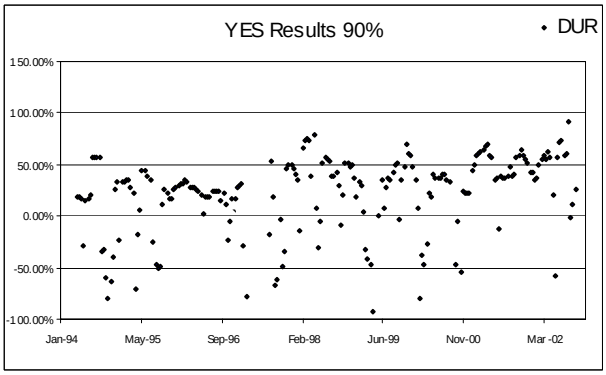
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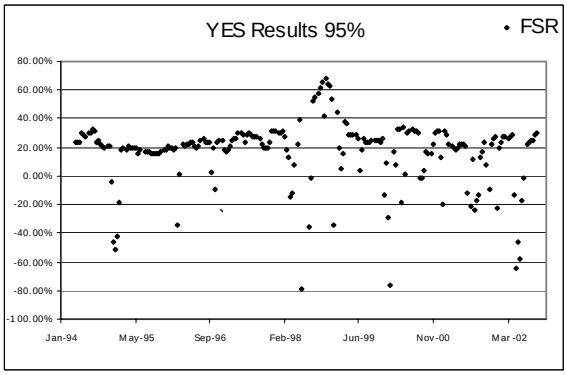
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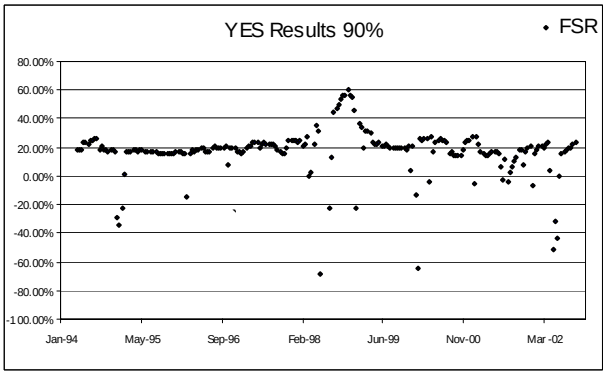
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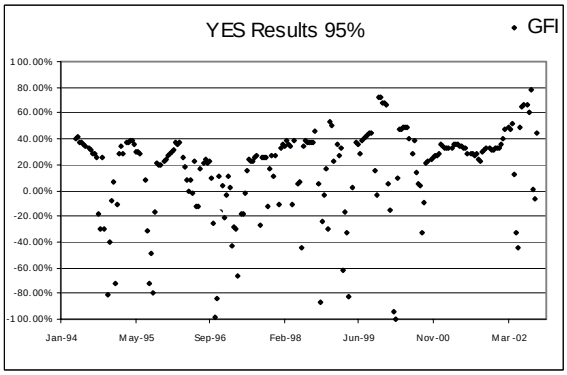
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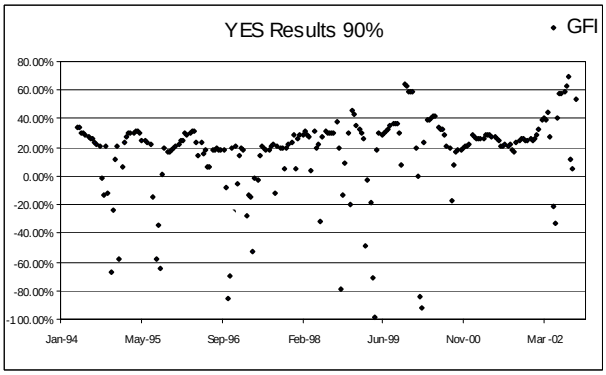
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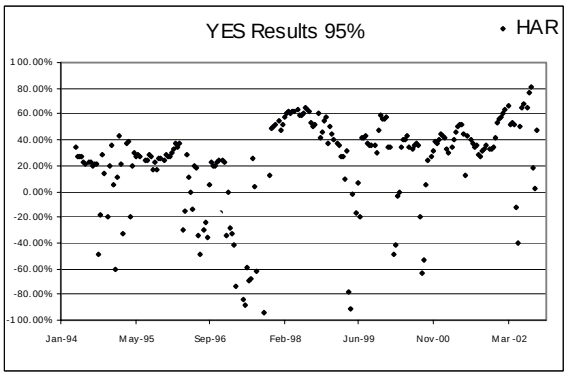
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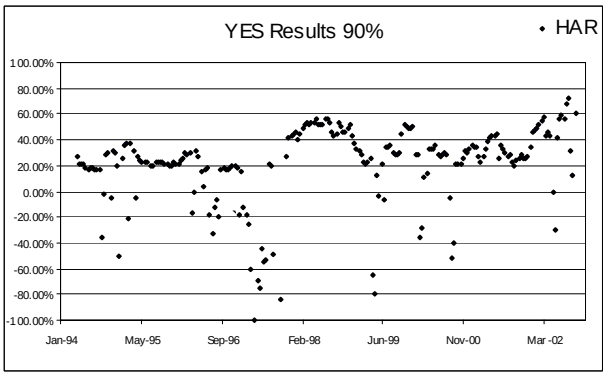
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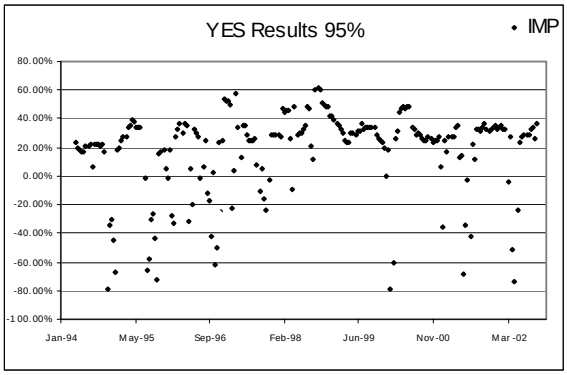
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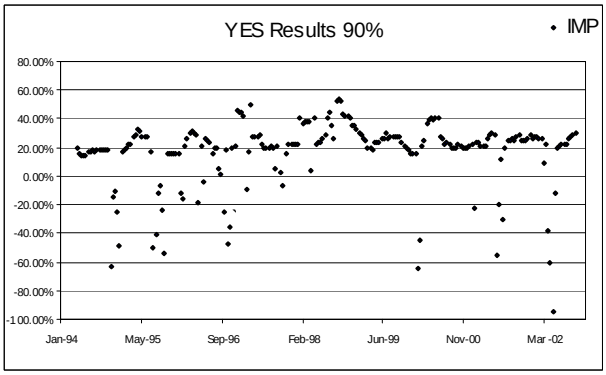
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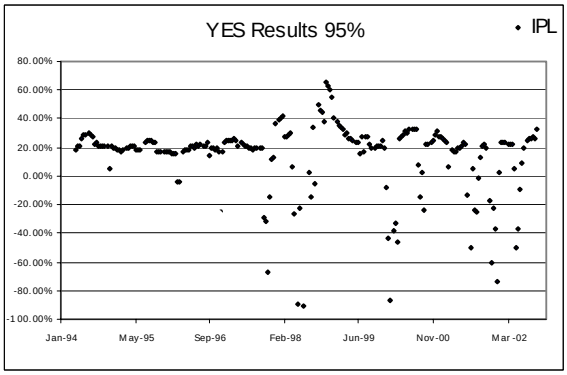
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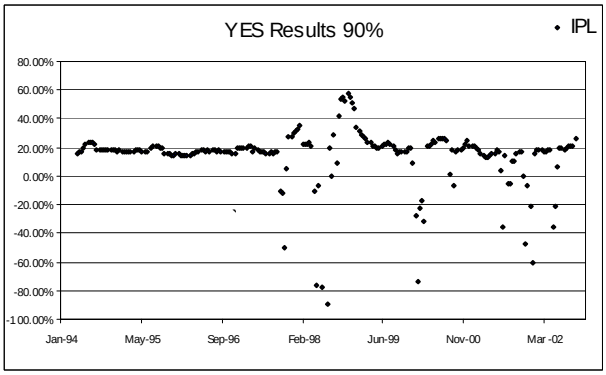
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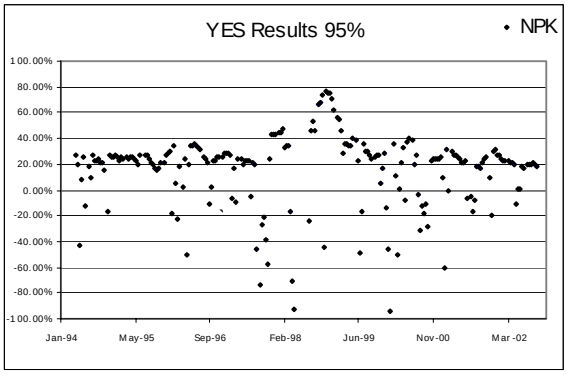
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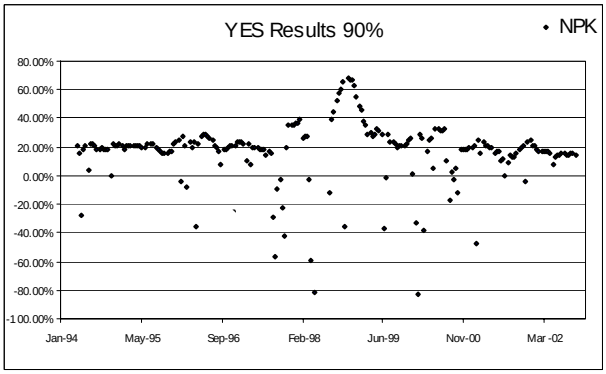
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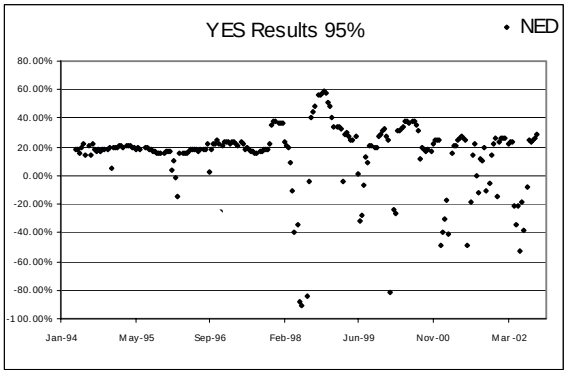
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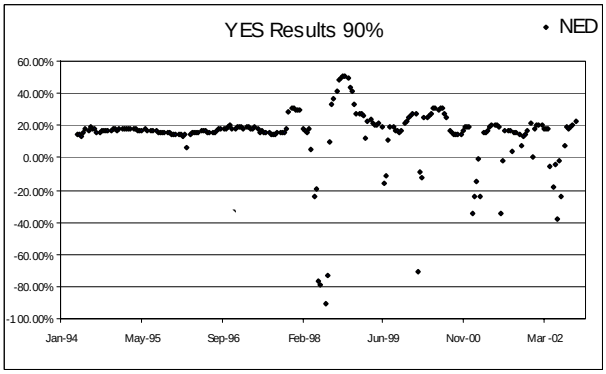
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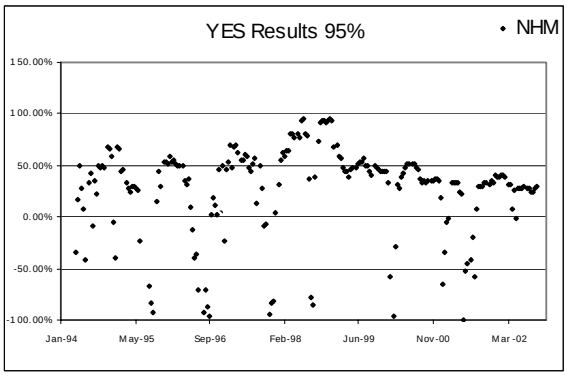
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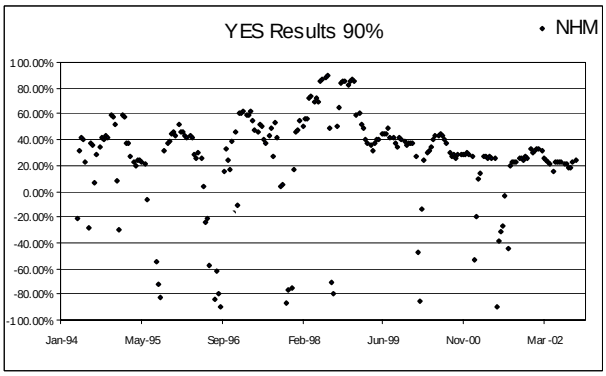
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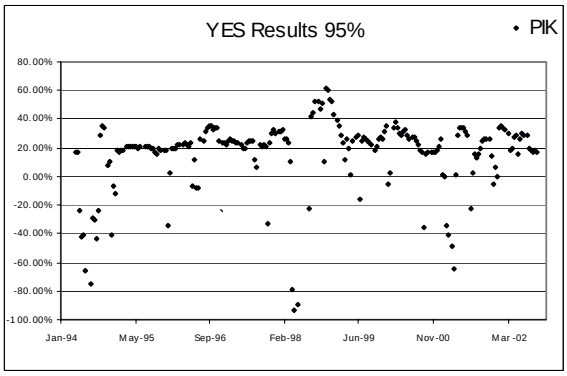
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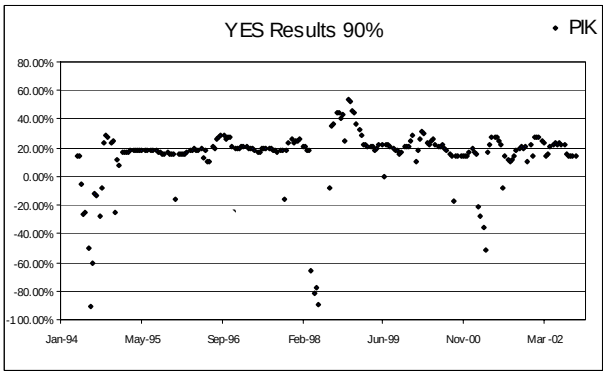
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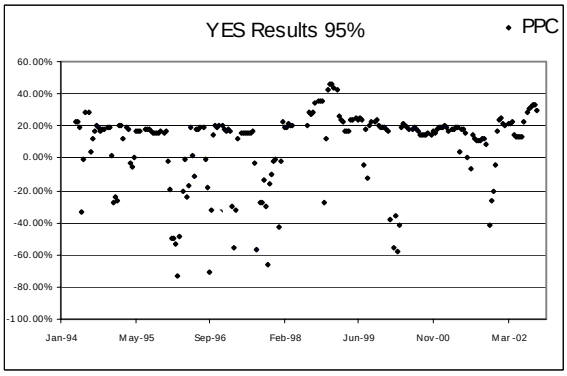
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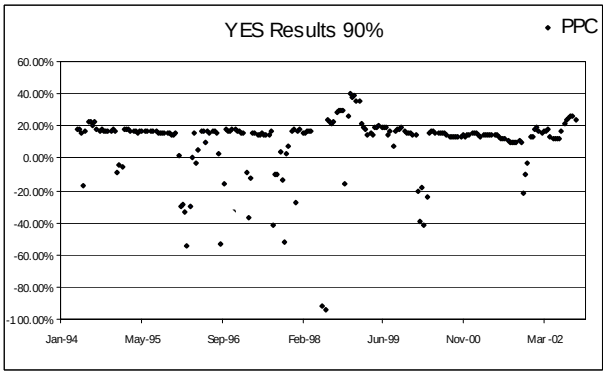
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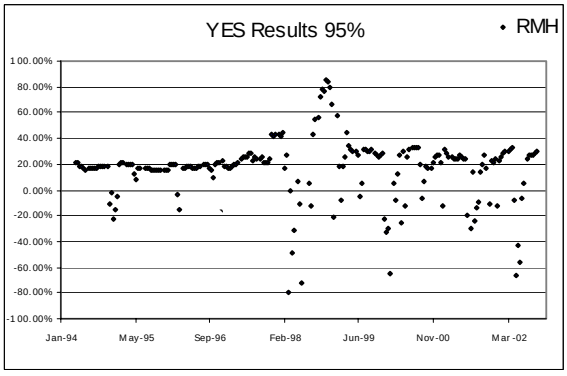
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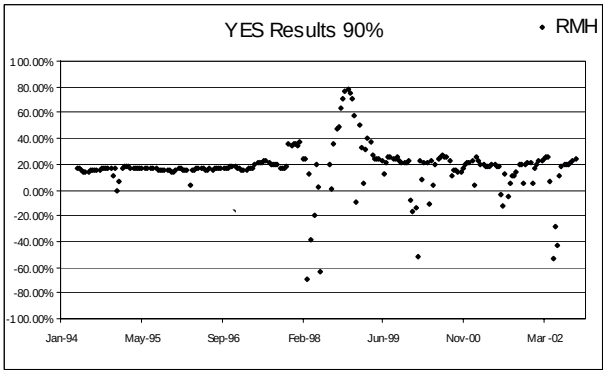
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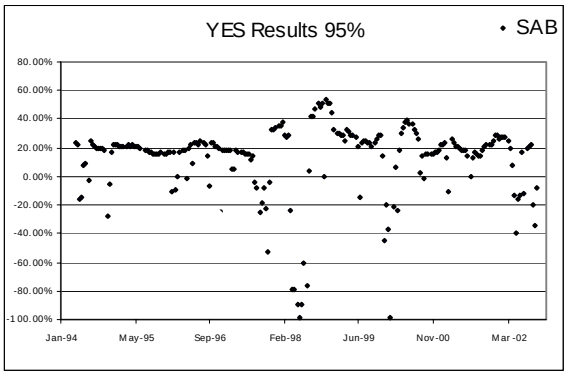
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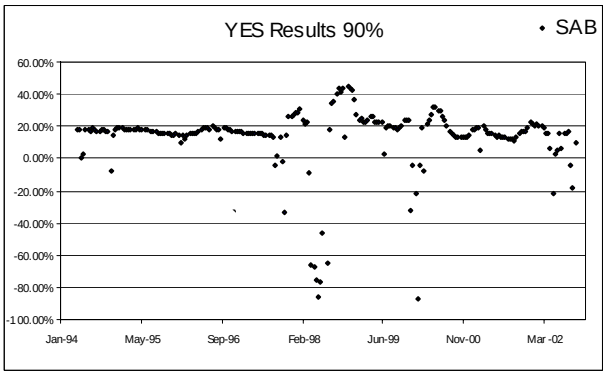
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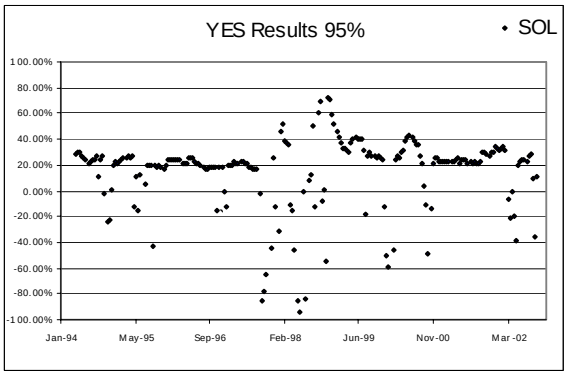
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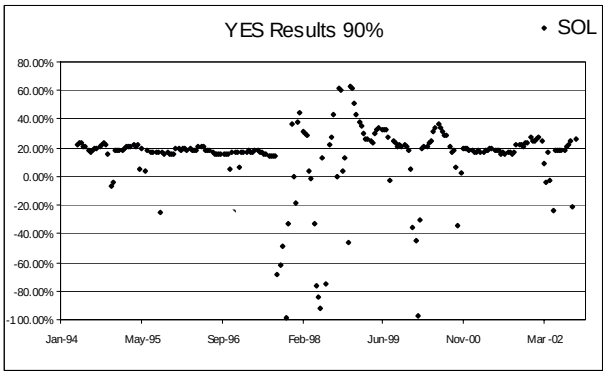
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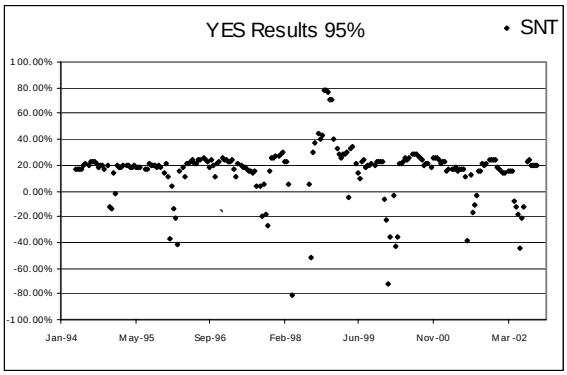
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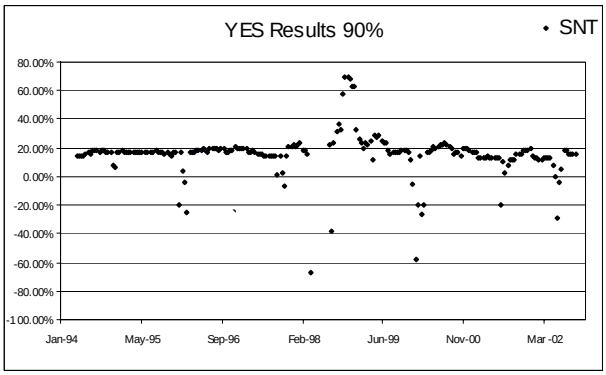
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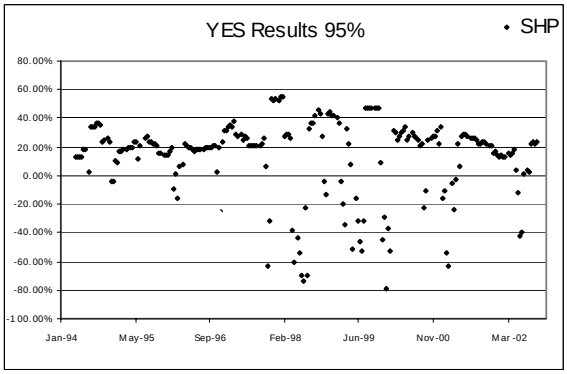
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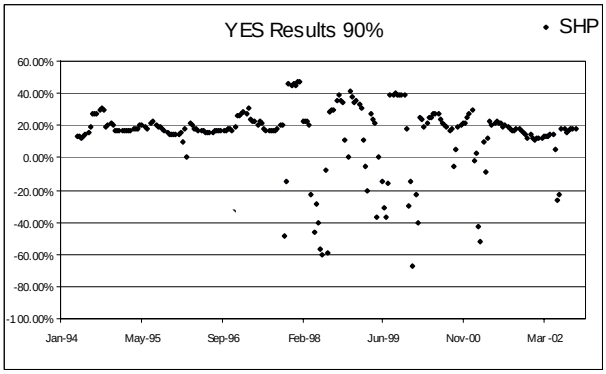
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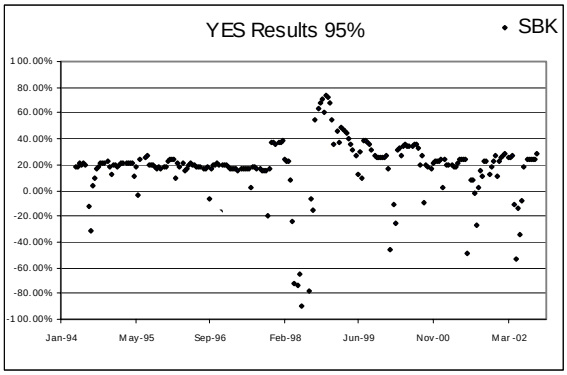
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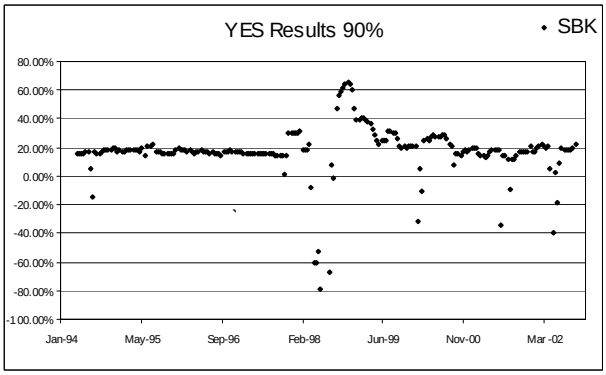
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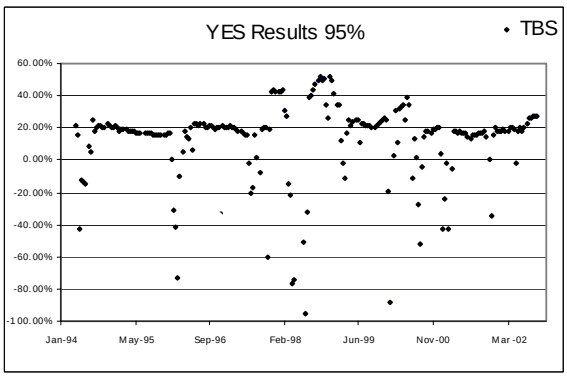
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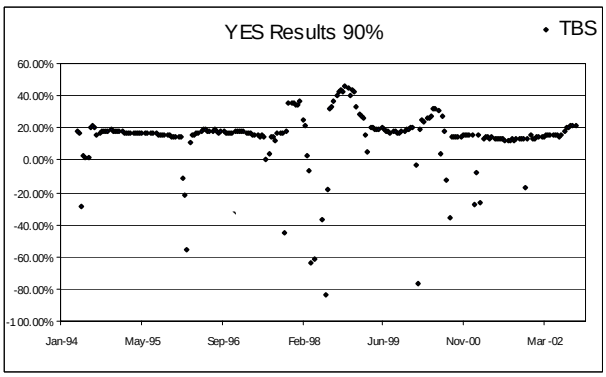
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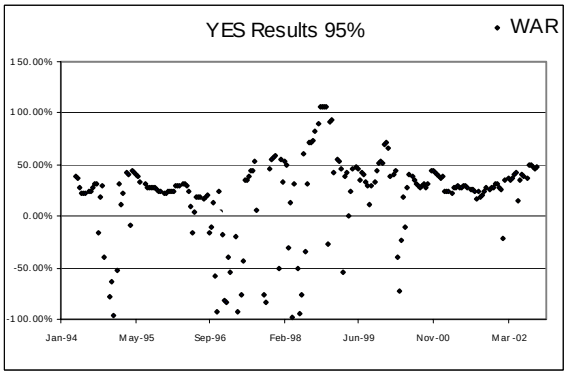
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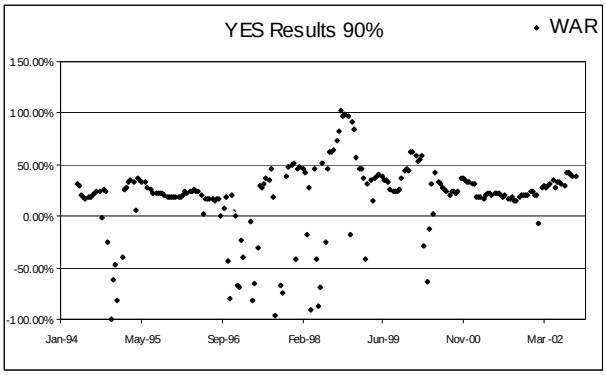
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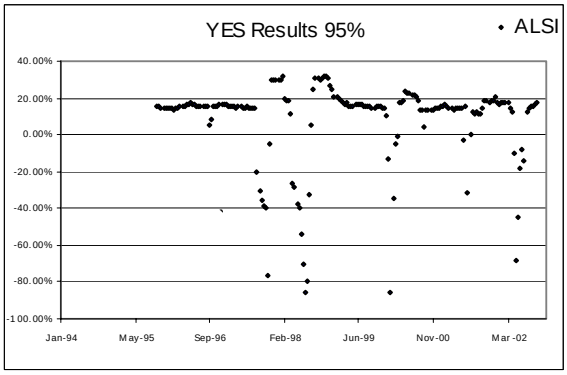
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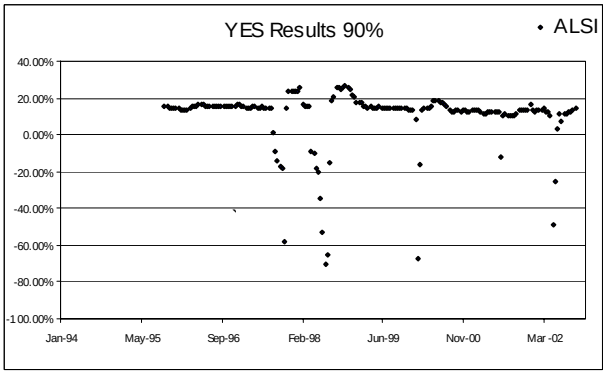
YES Results 90%
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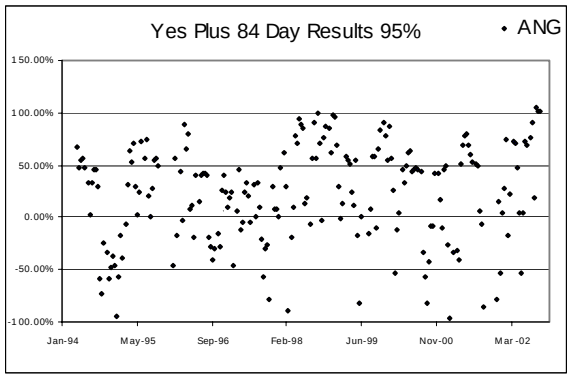
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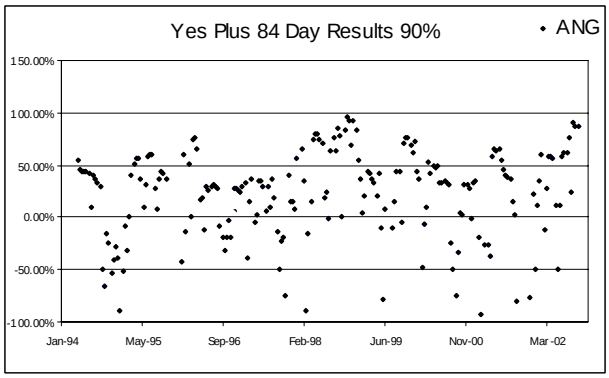
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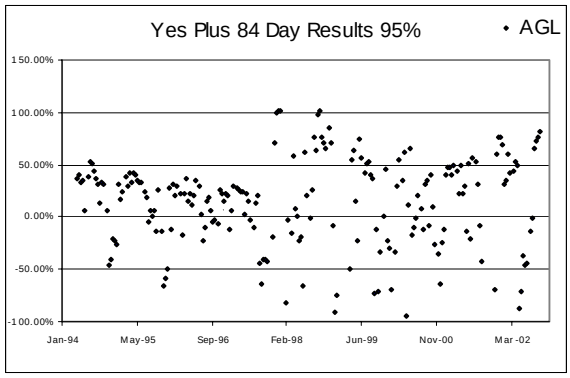
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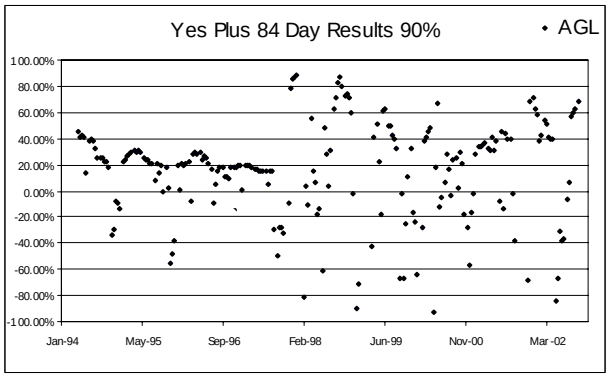
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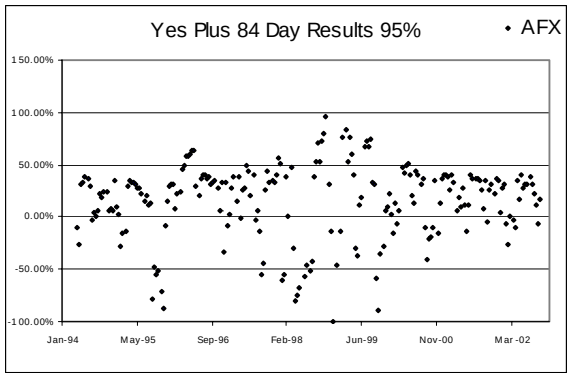
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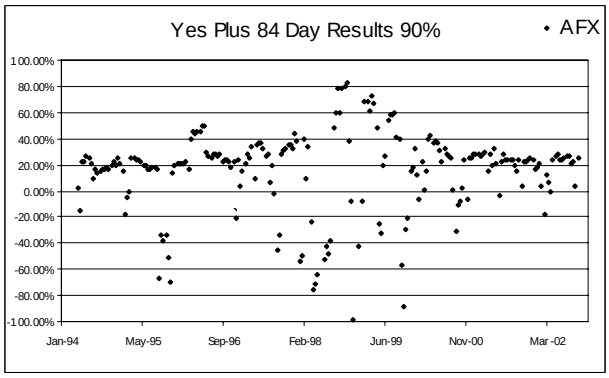
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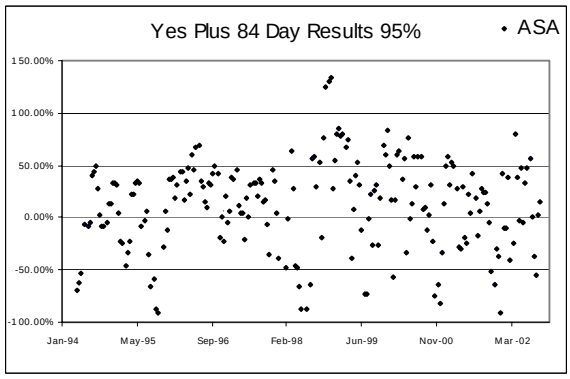
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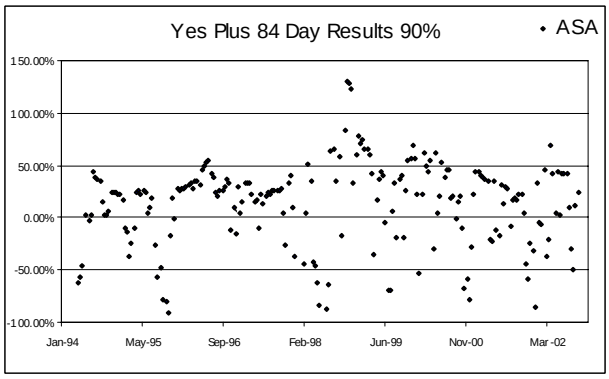
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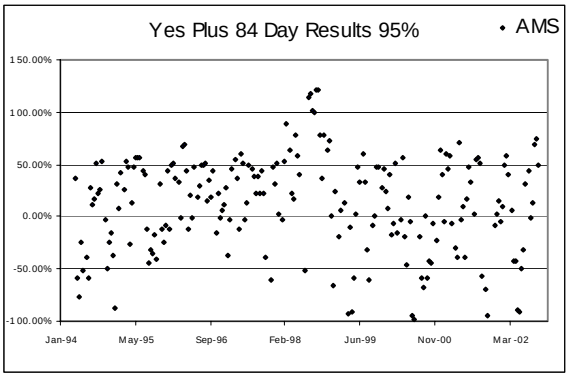
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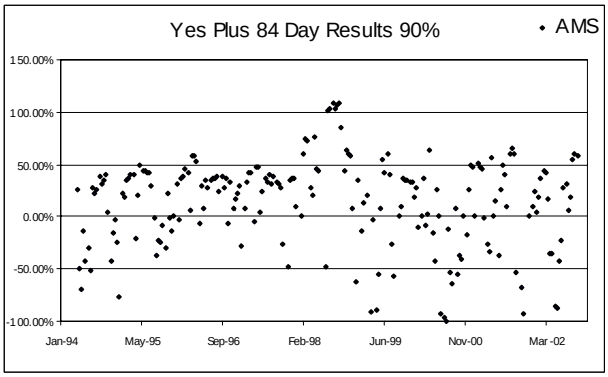
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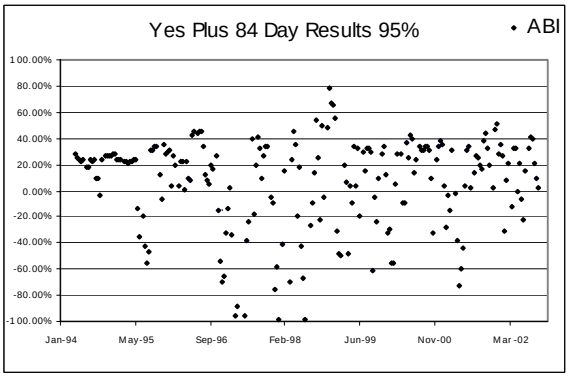
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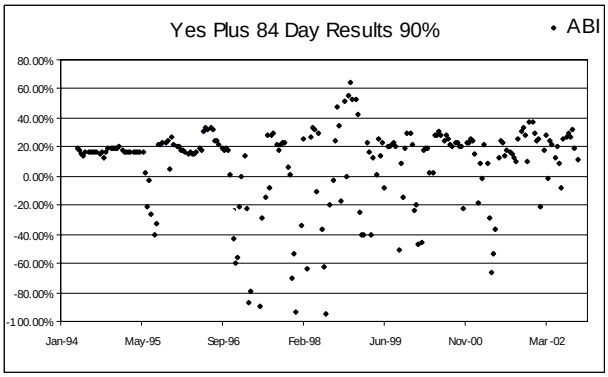
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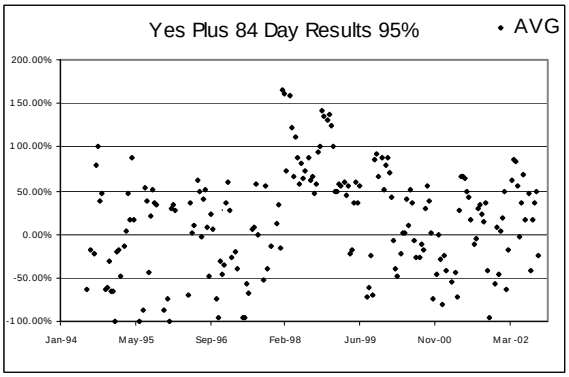
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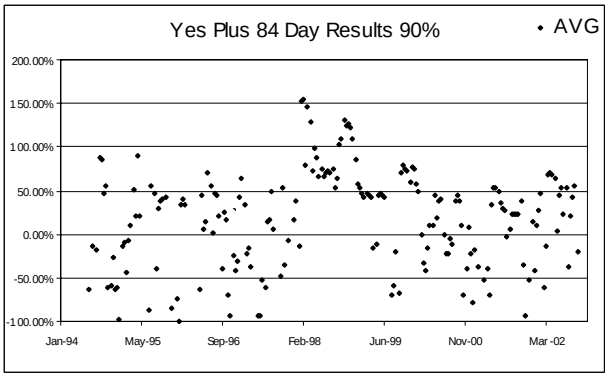
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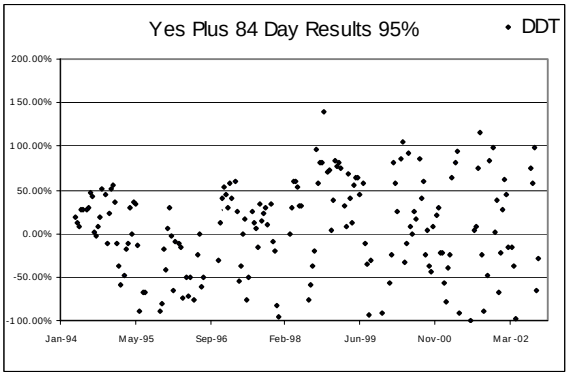
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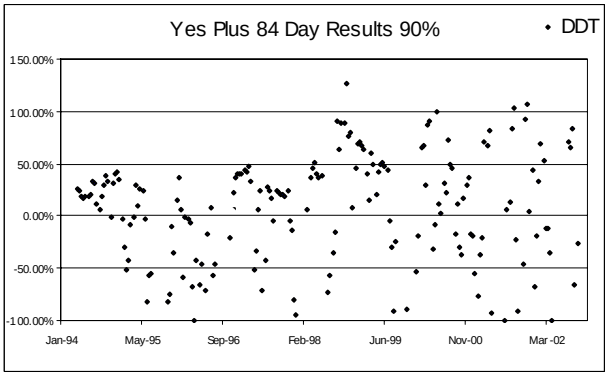
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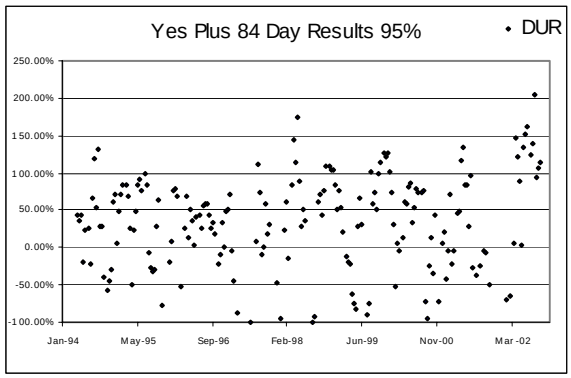
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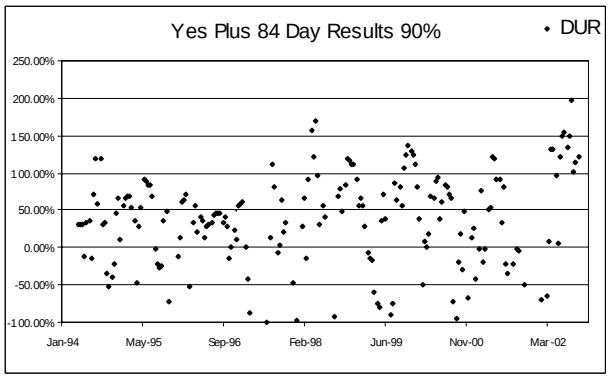
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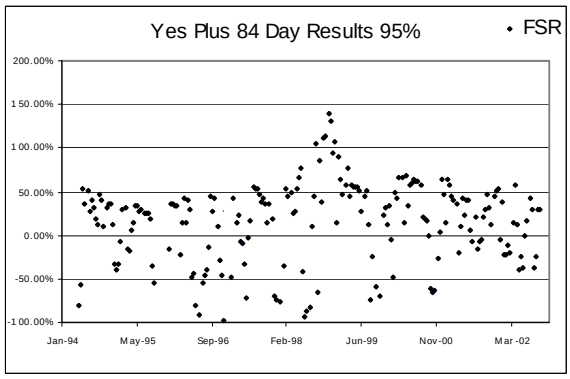
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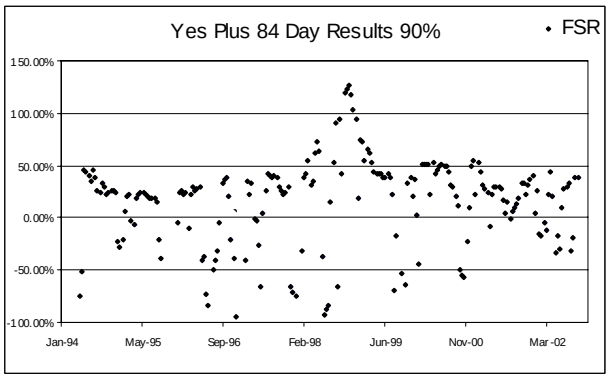
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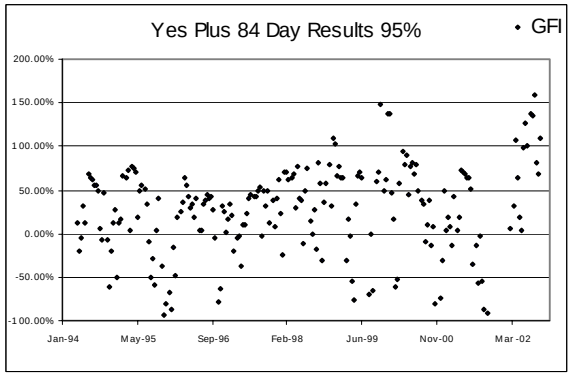
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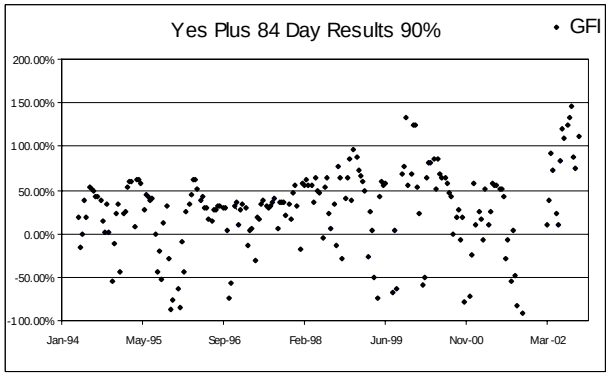
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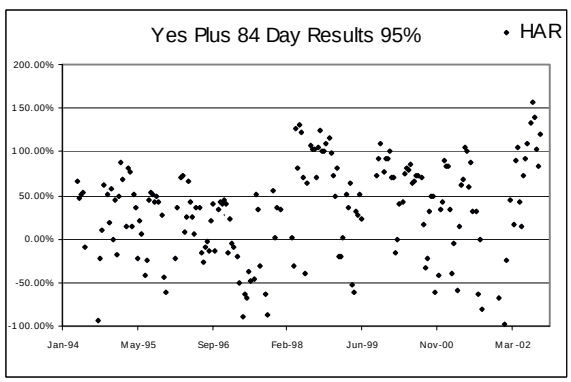
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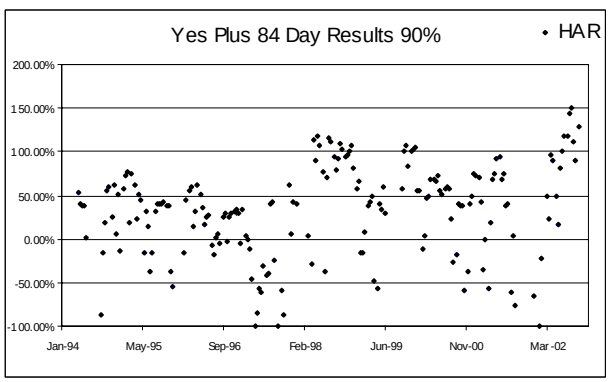
Yes Plus 84 Day Results 90%
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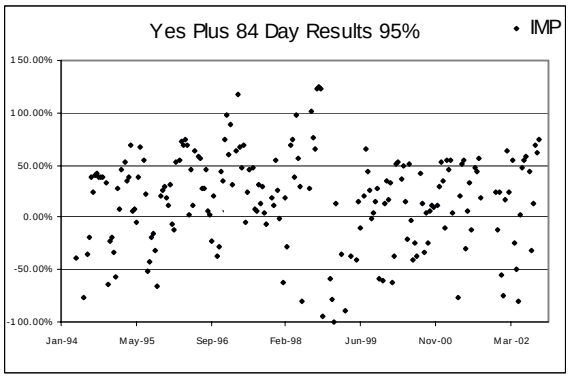
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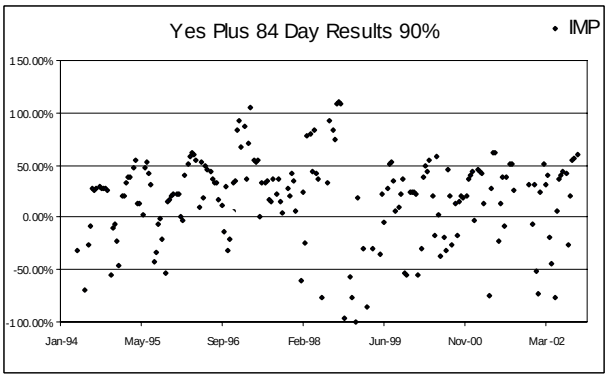
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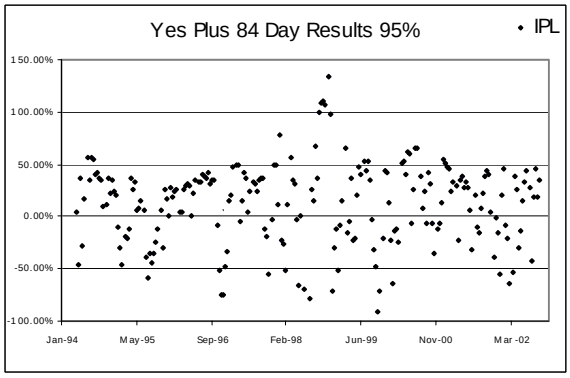
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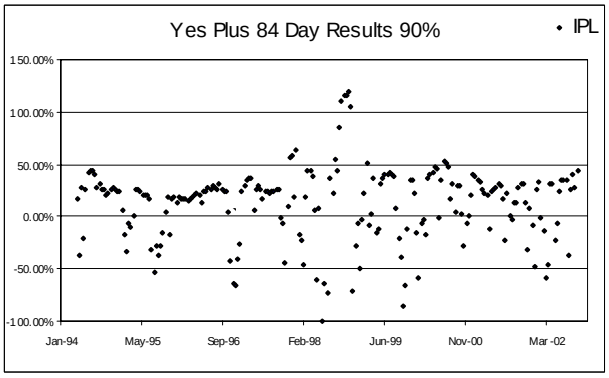
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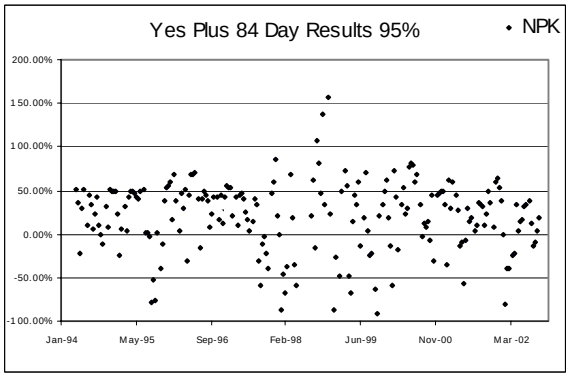
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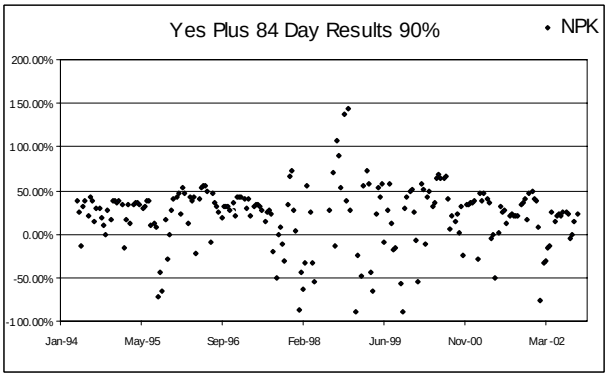
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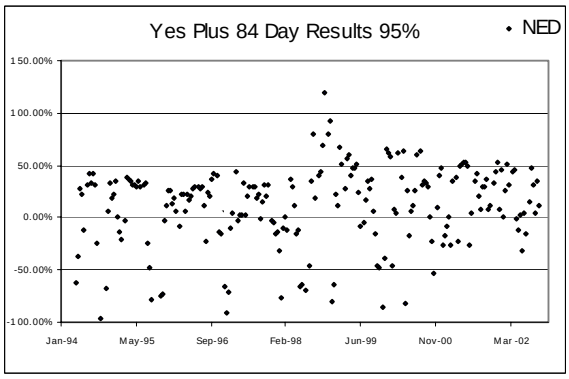
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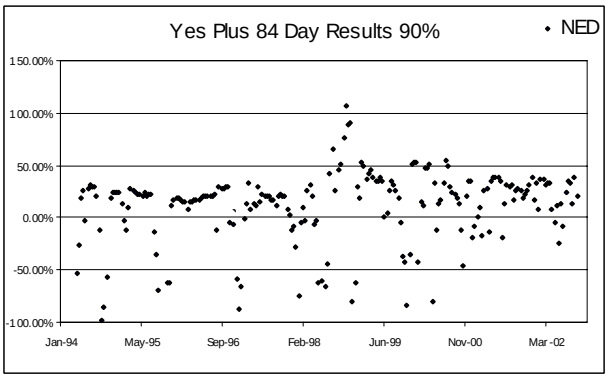
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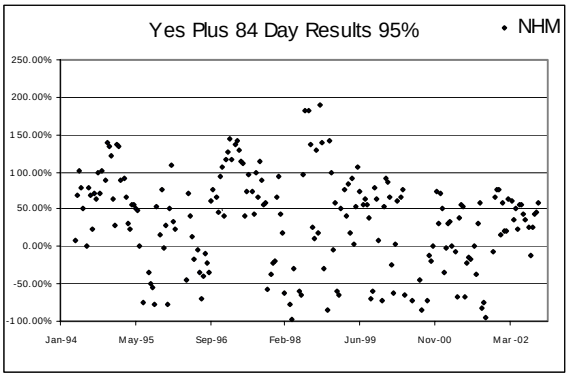
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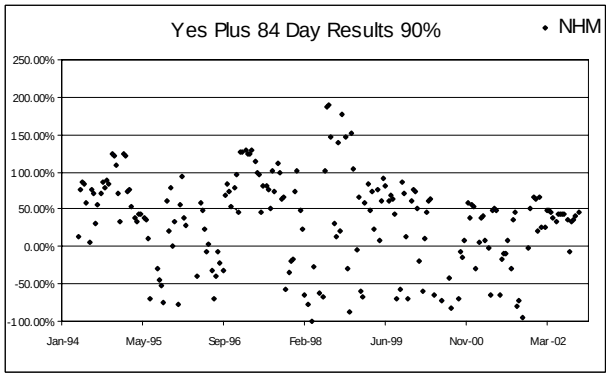
Yes Plus 84 Day Results 90%
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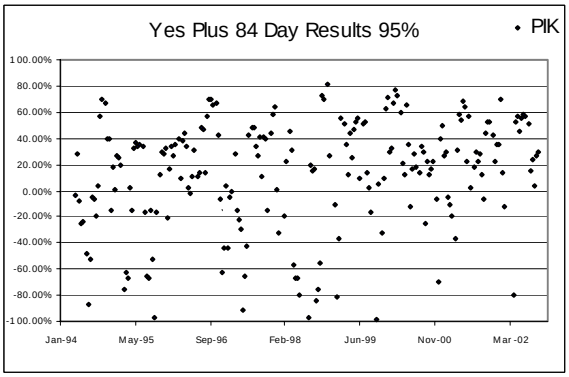
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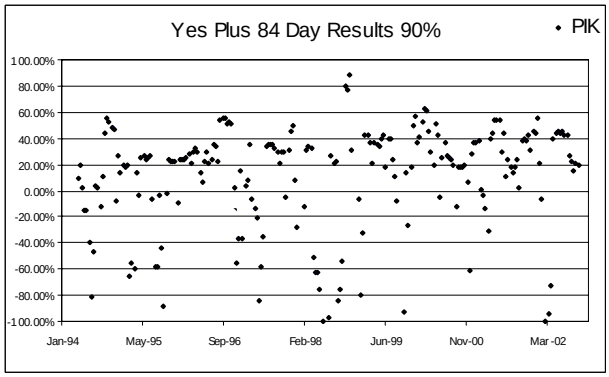
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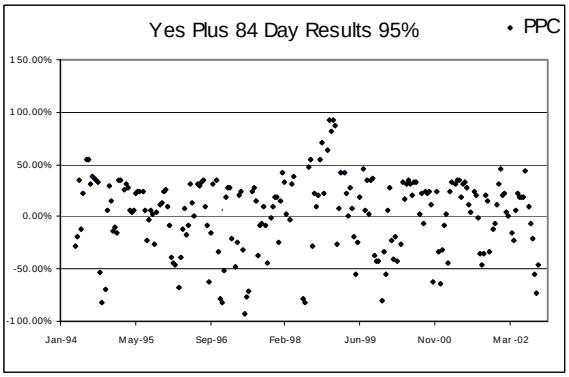
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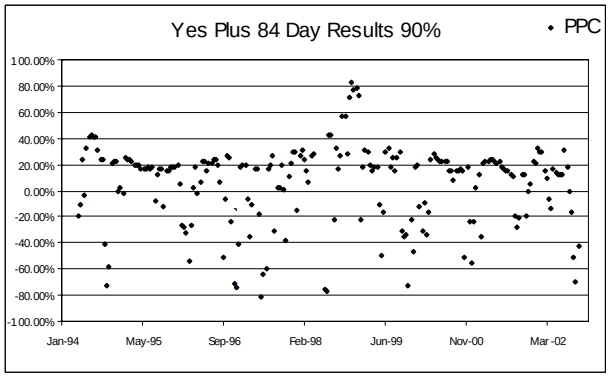
Yes Plus 84 Day Results 90%
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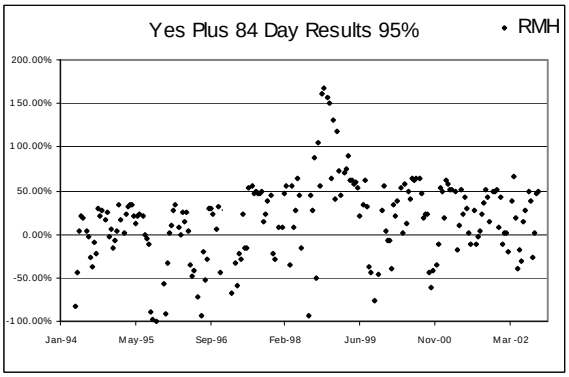
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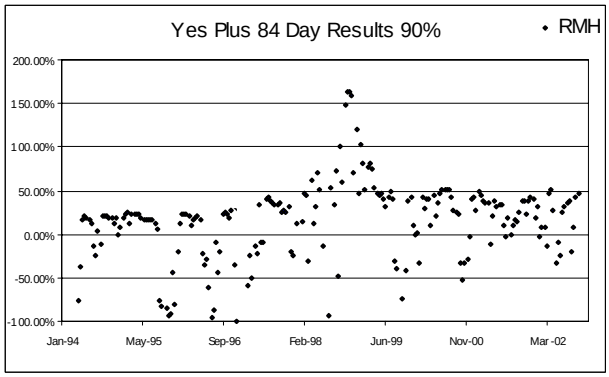
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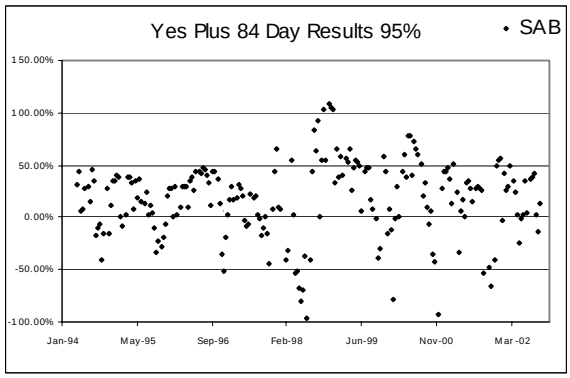
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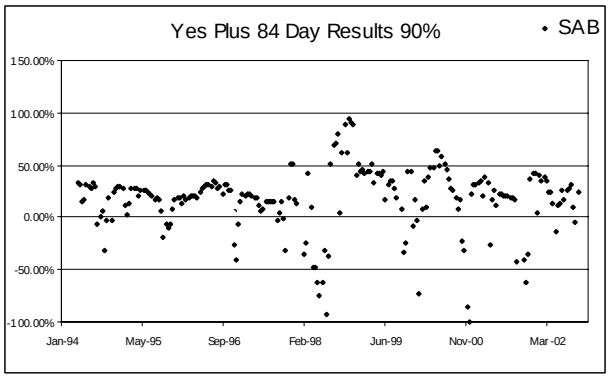
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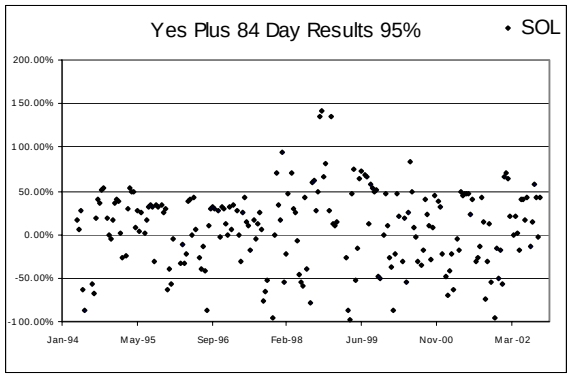
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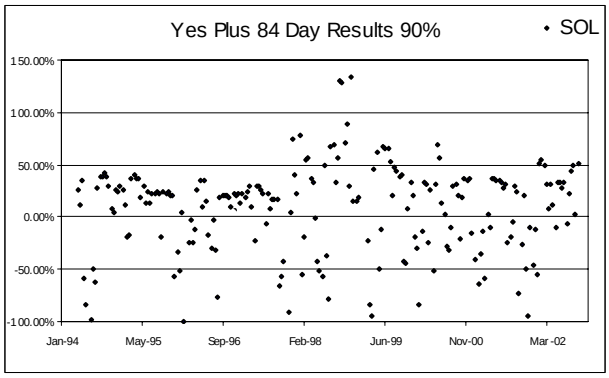
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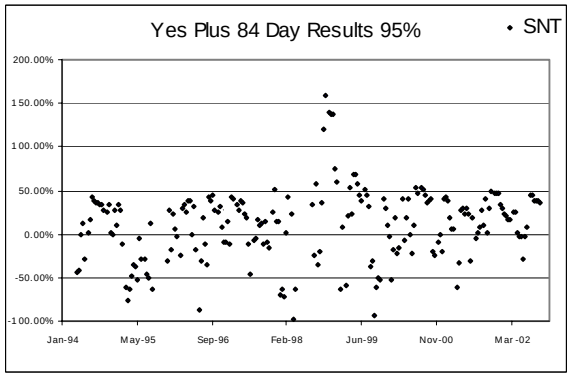
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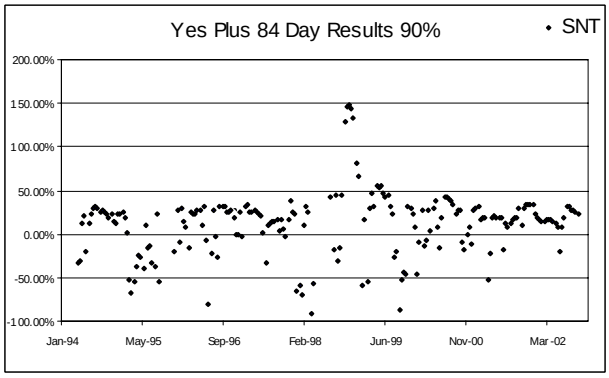
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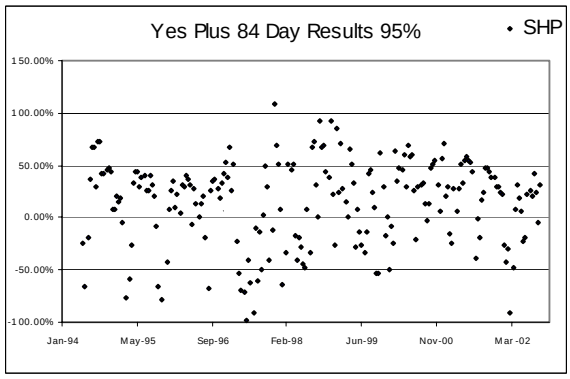
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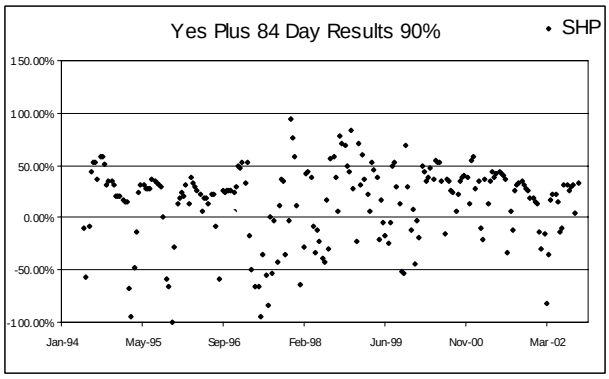
Yes Plus 84 Day Results 90%
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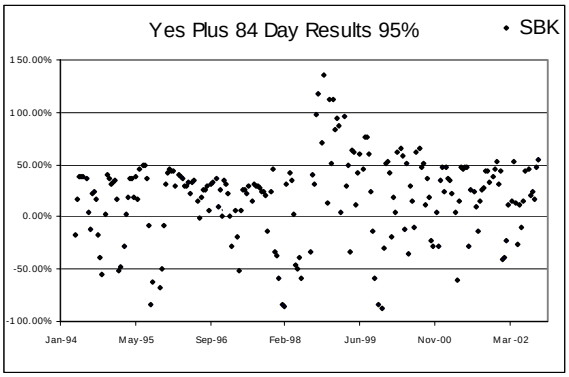
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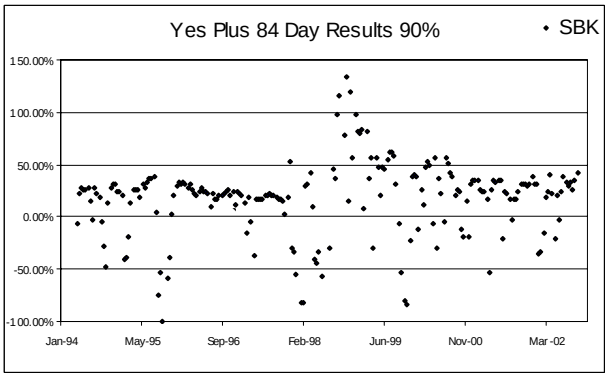
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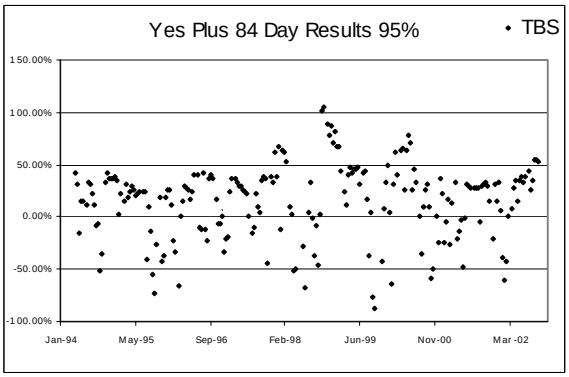
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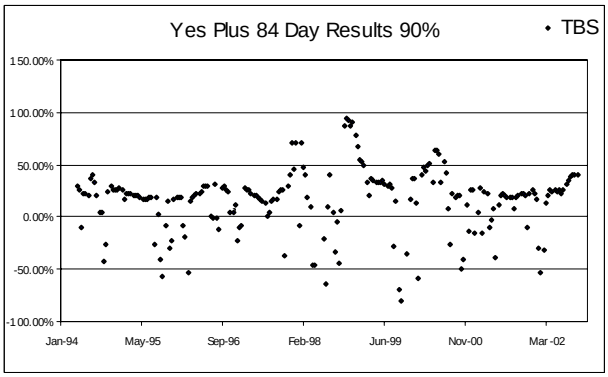
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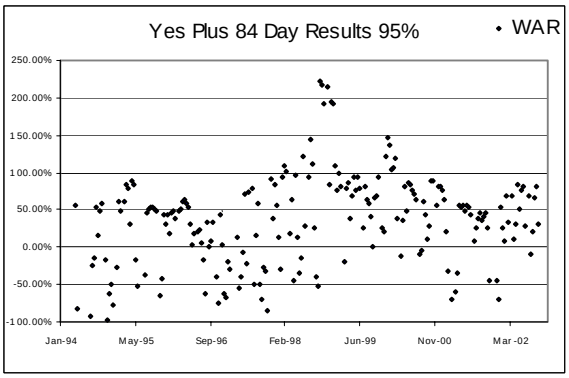
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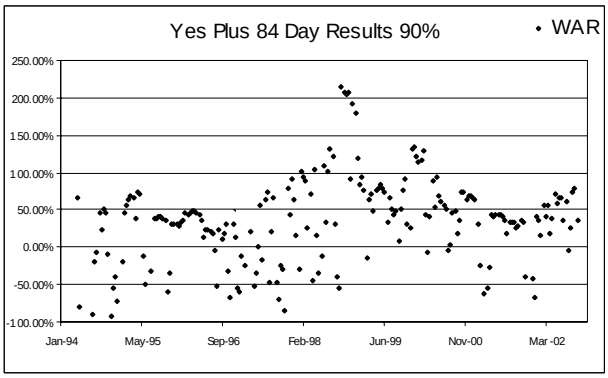
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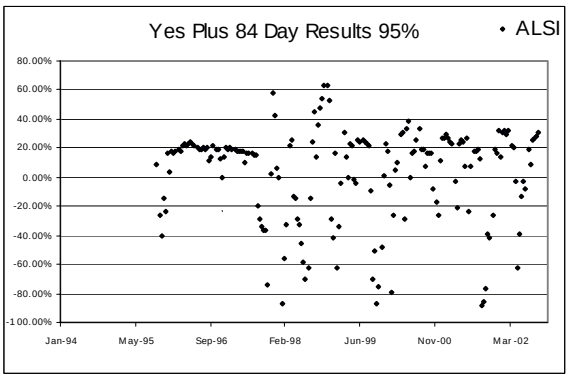
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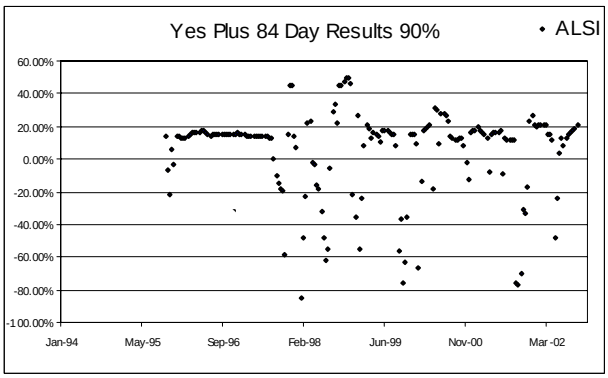
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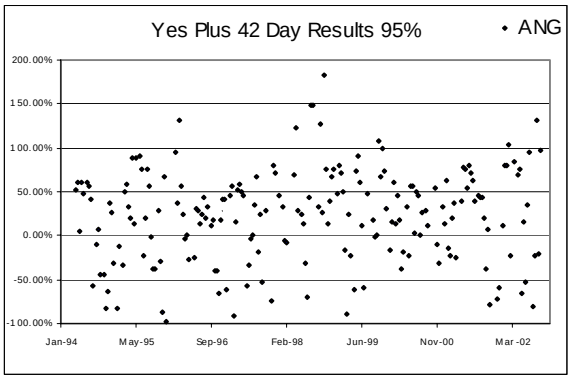
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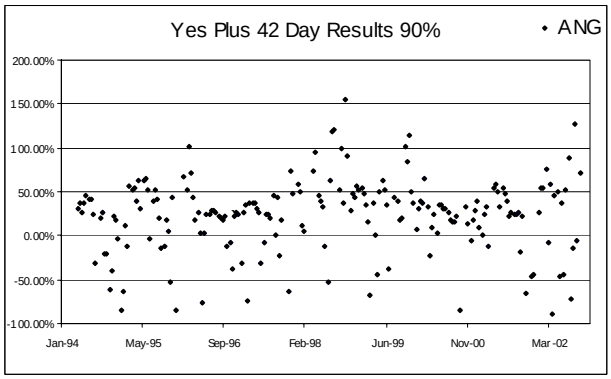
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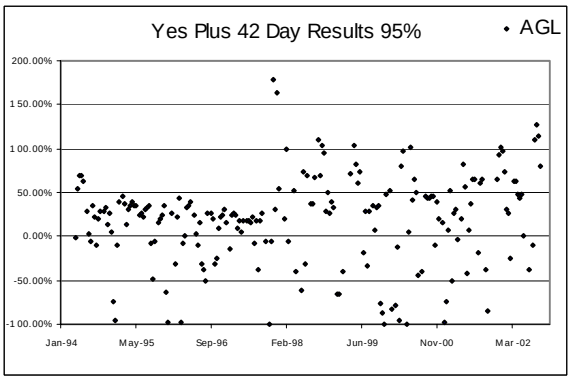
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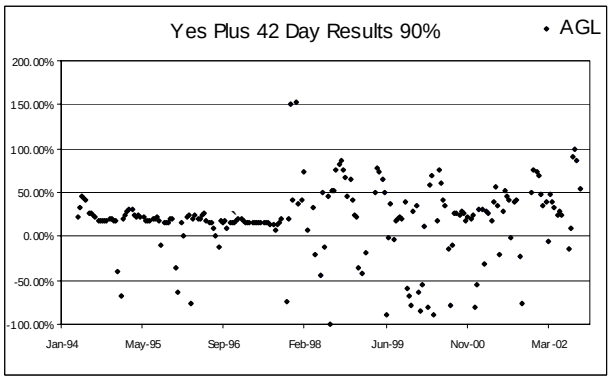
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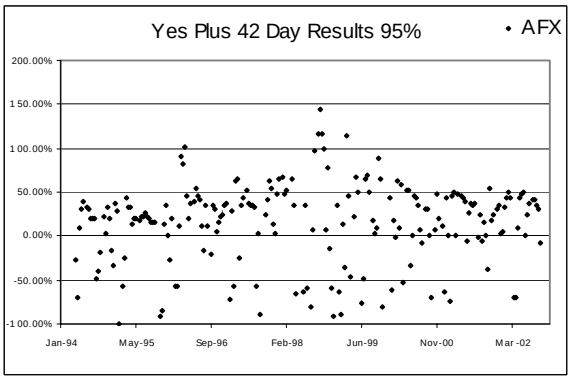
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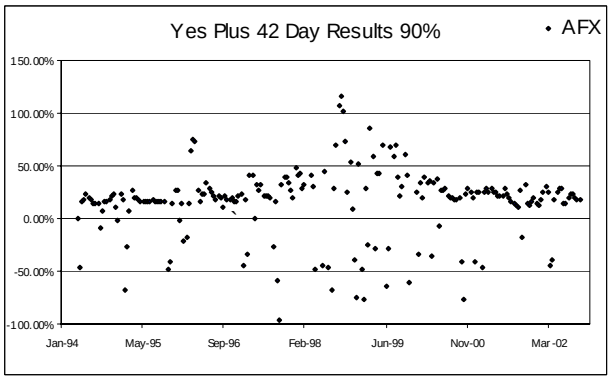
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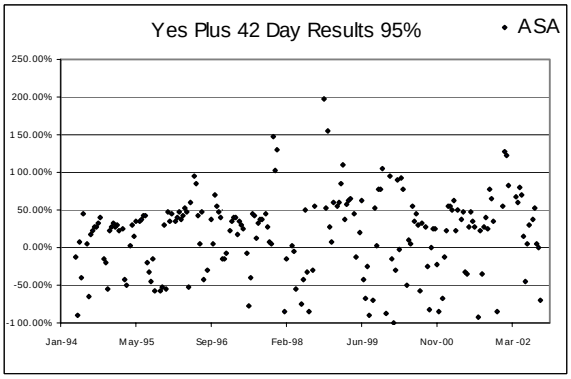
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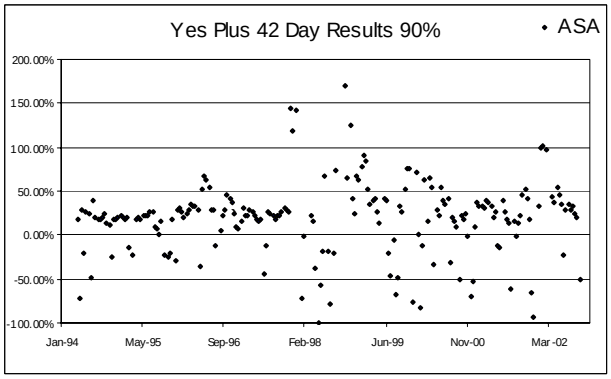
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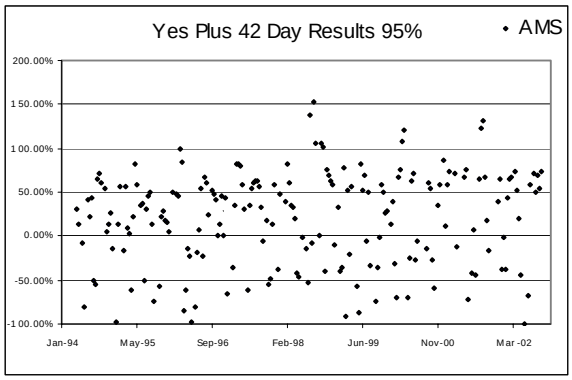
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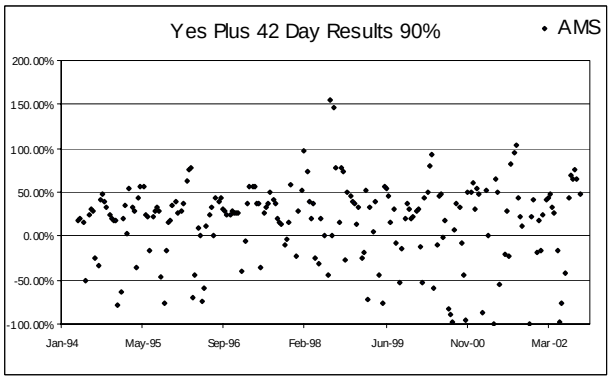
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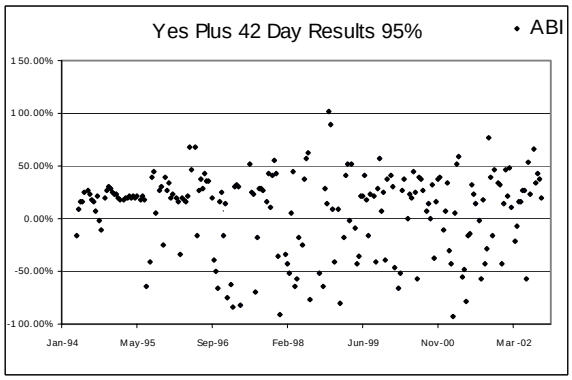
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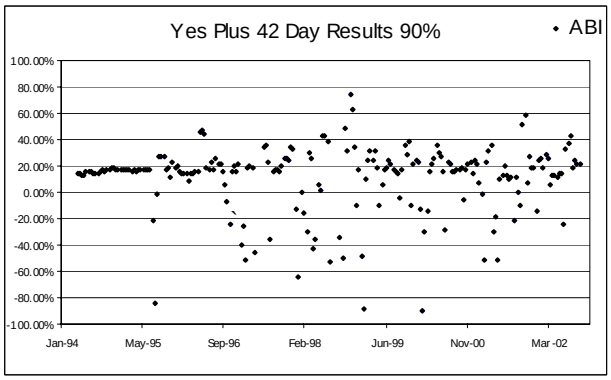
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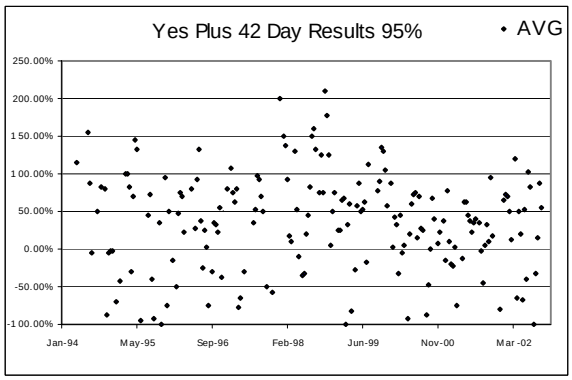
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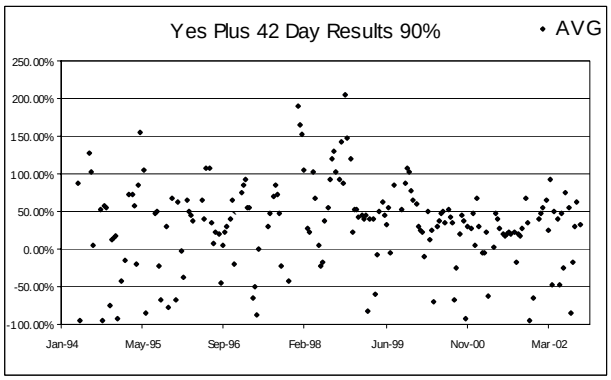
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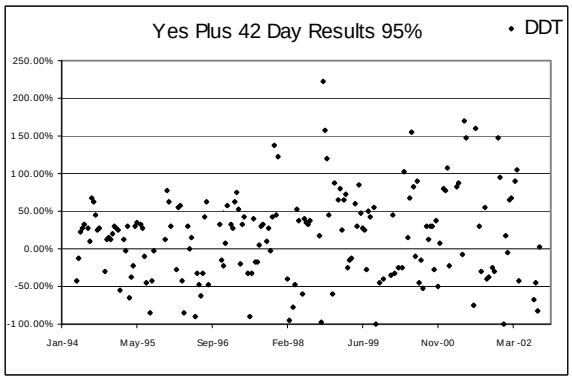
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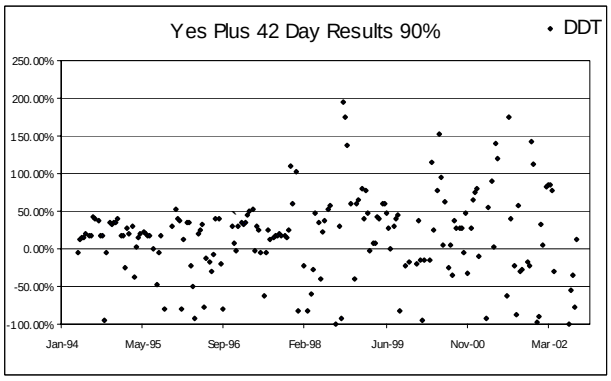
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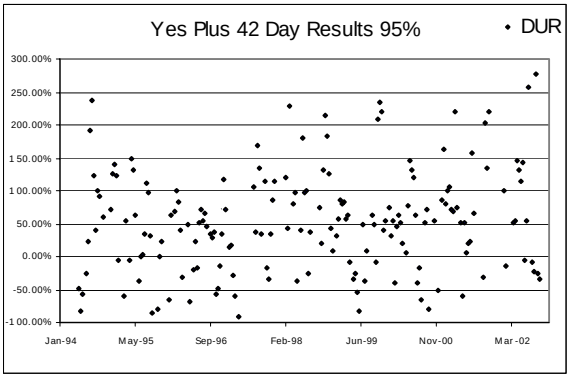
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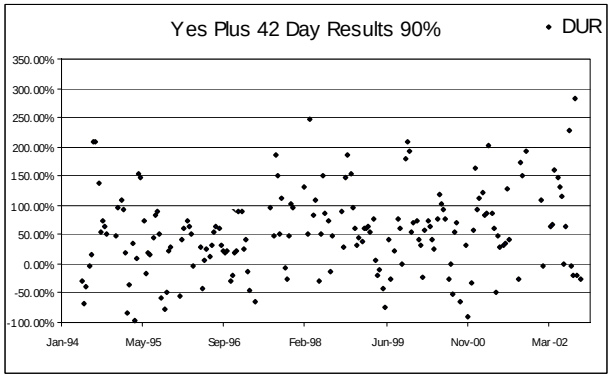
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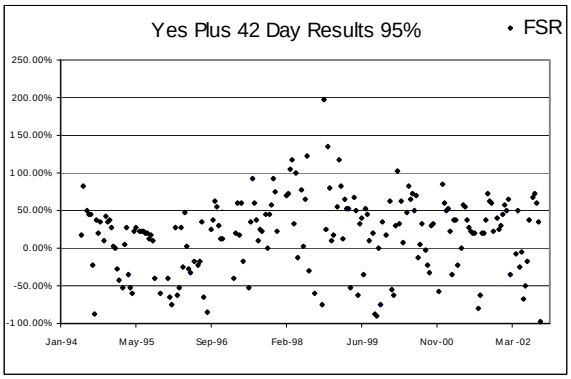
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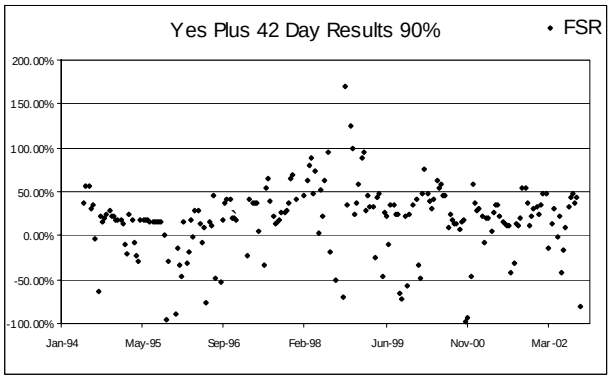
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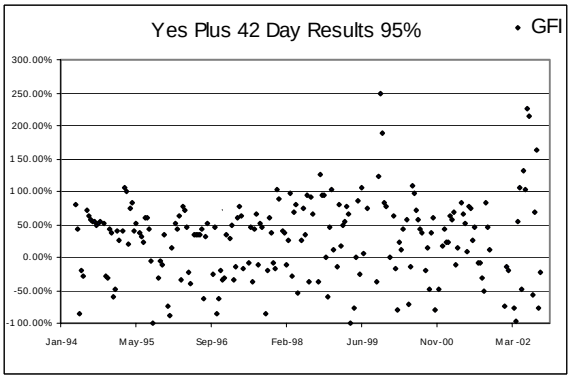
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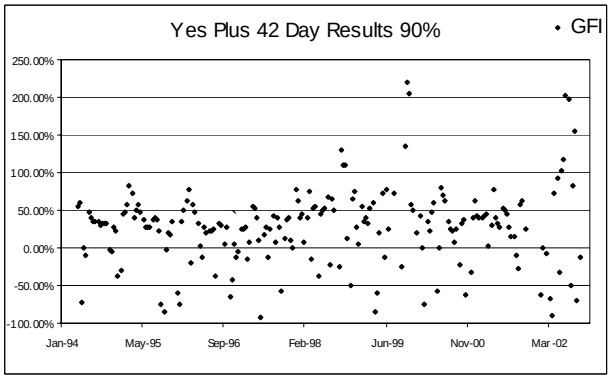
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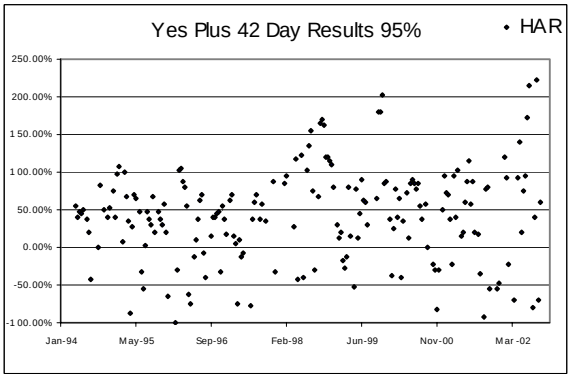
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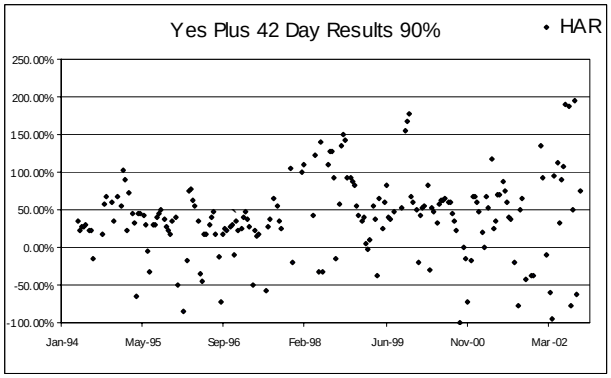
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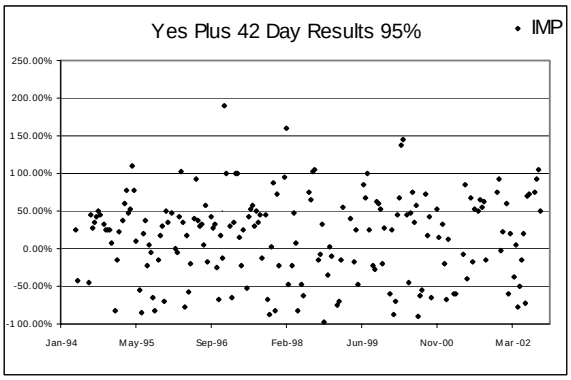
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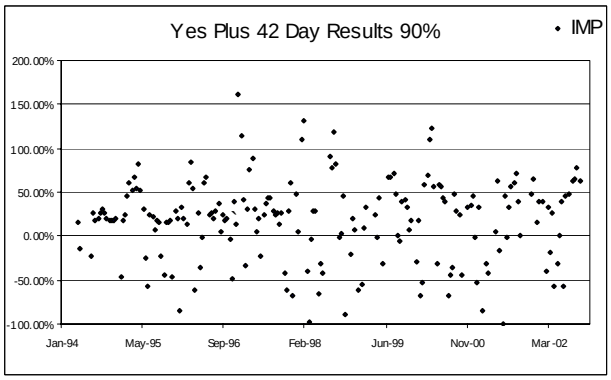
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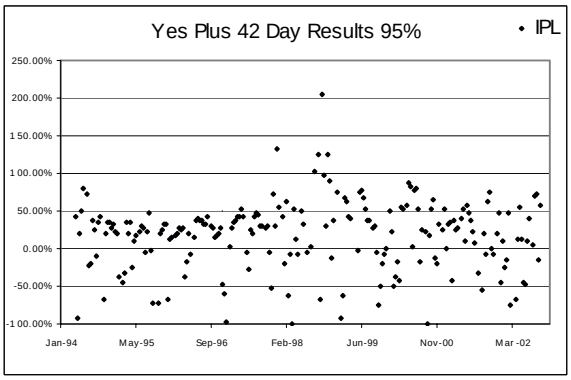
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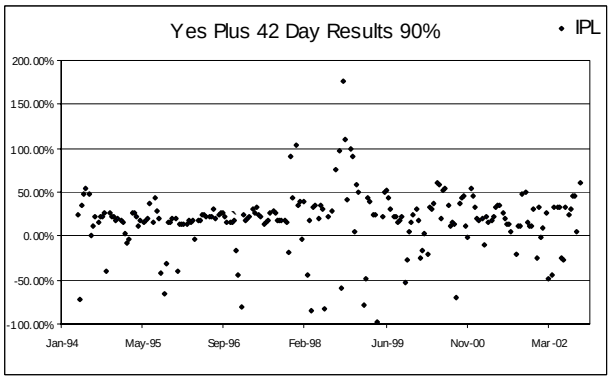
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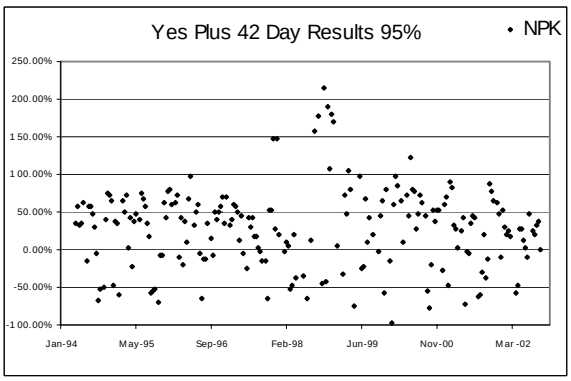
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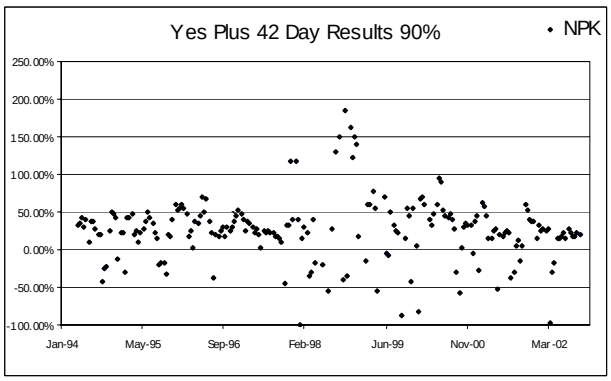
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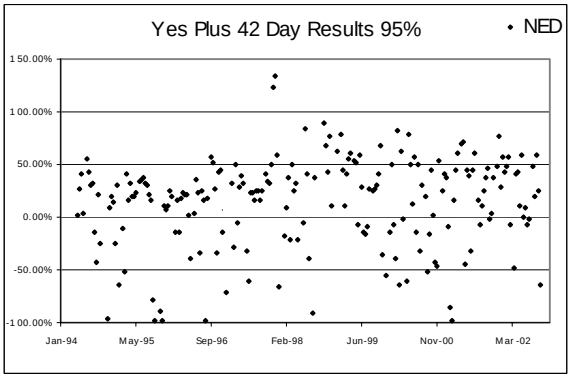
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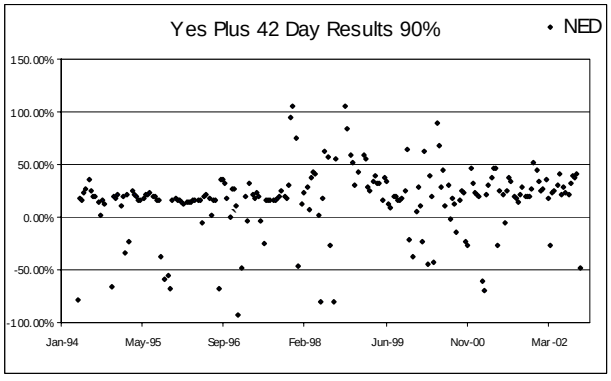
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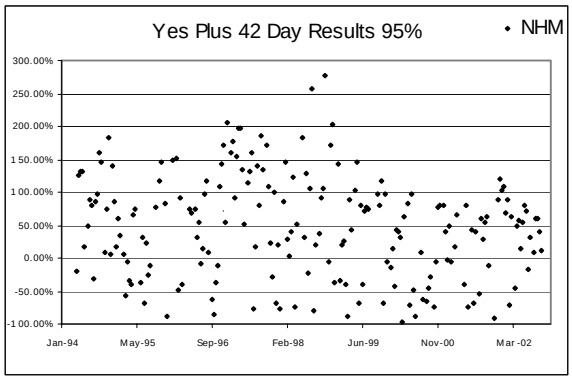
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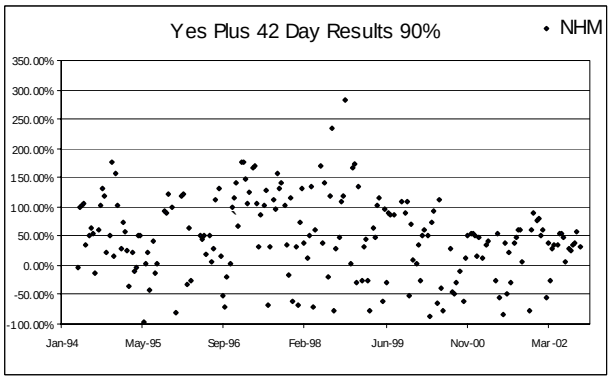
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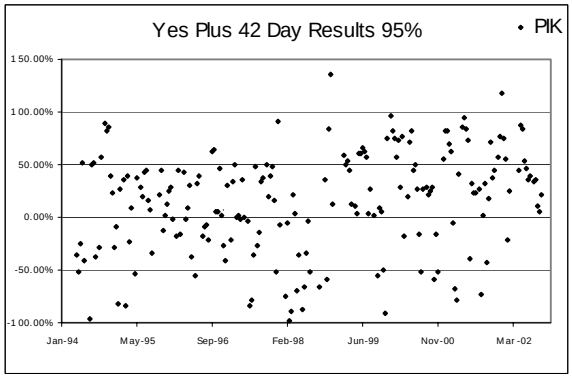
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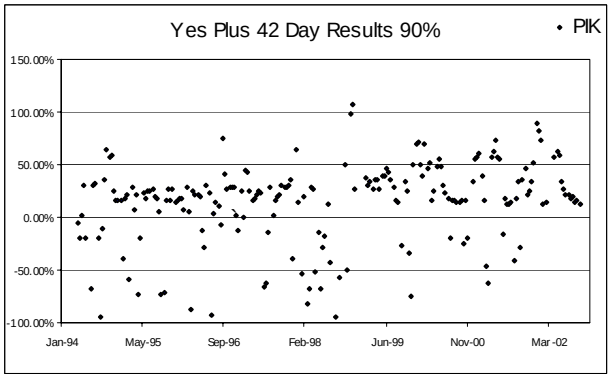
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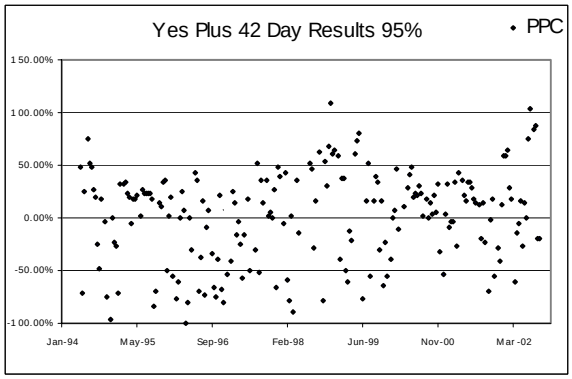
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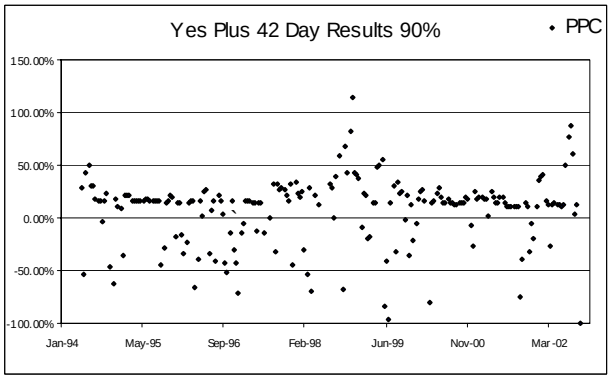
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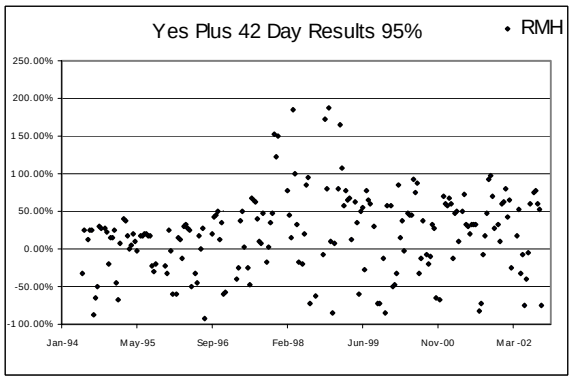
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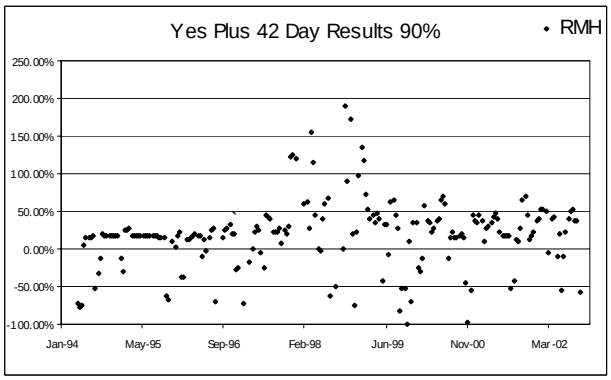
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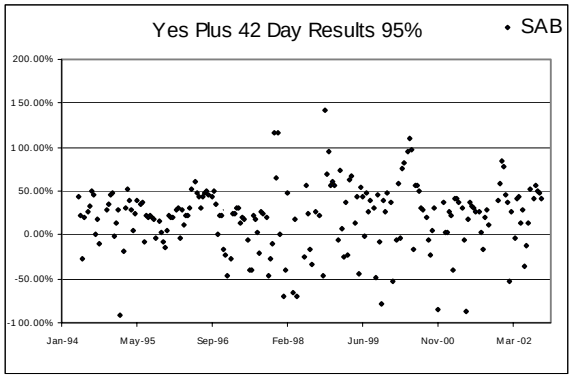
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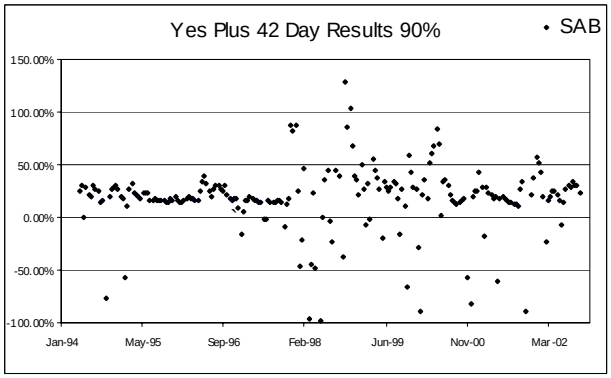
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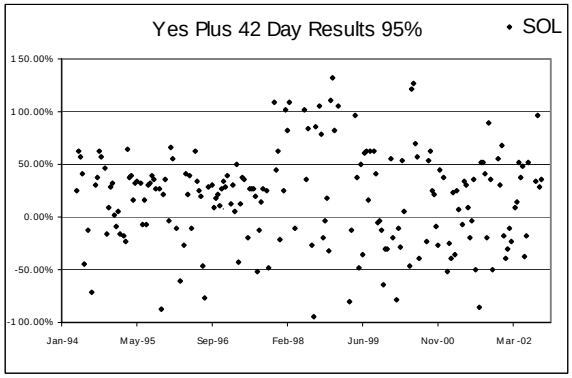
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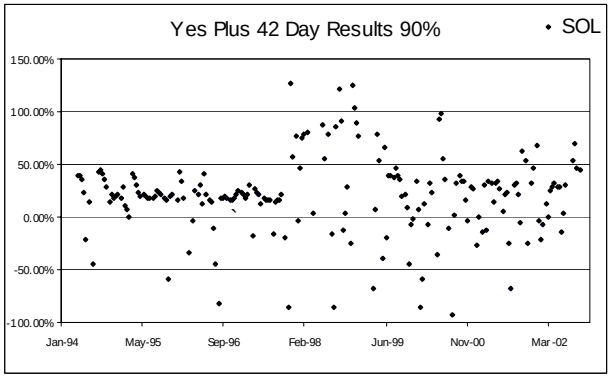
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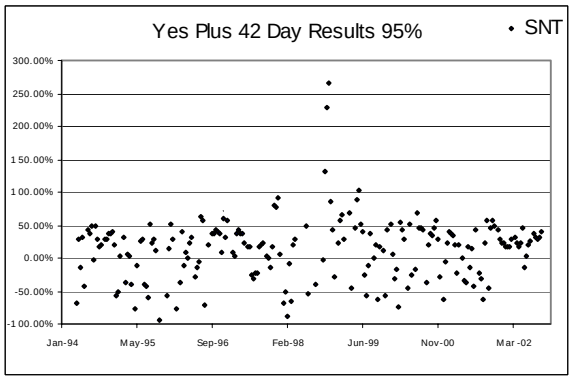
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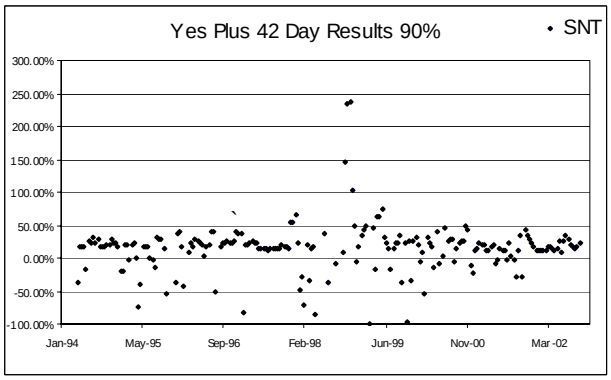
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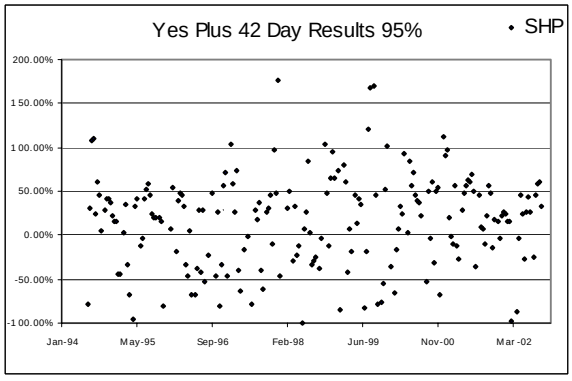
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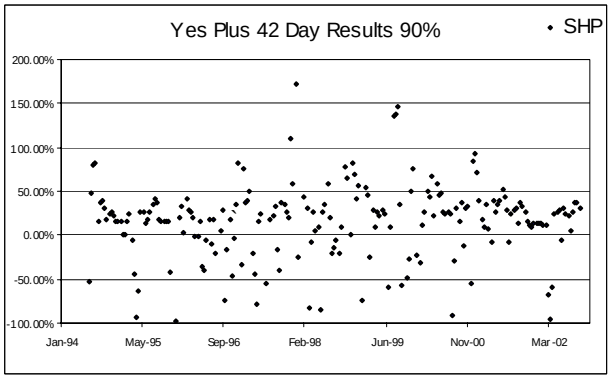
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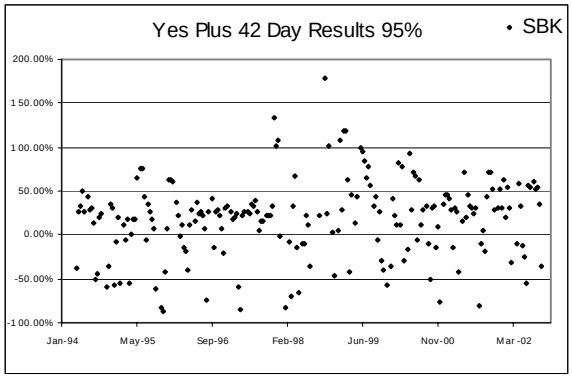
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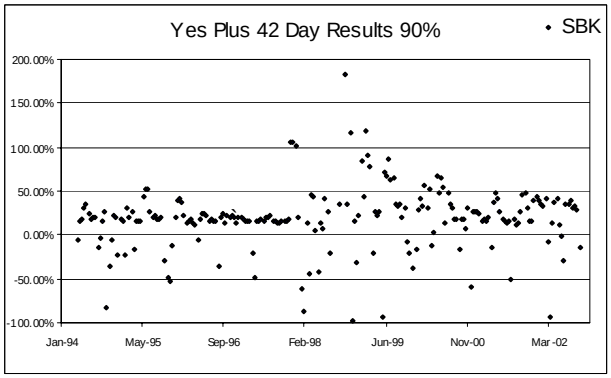
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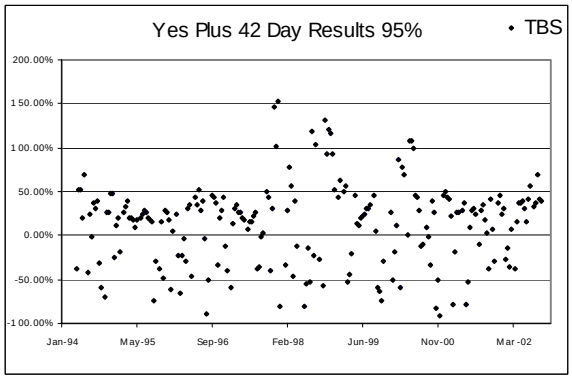
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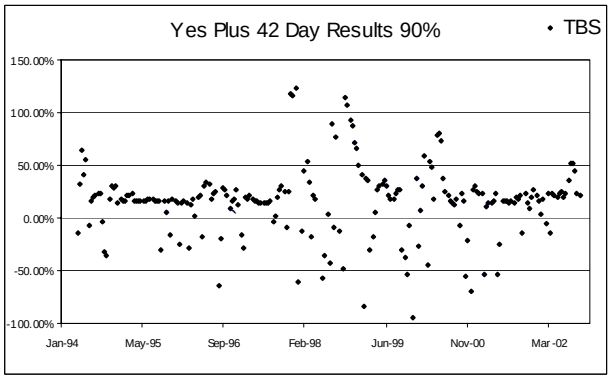
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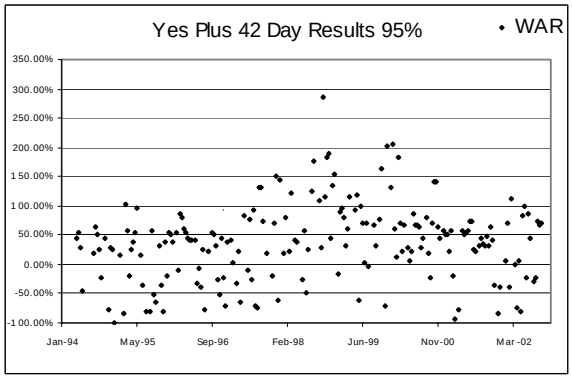
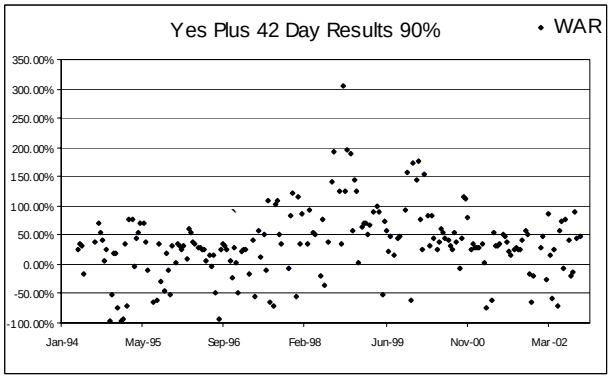
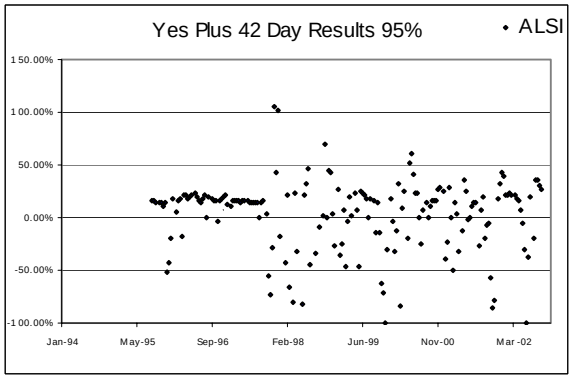
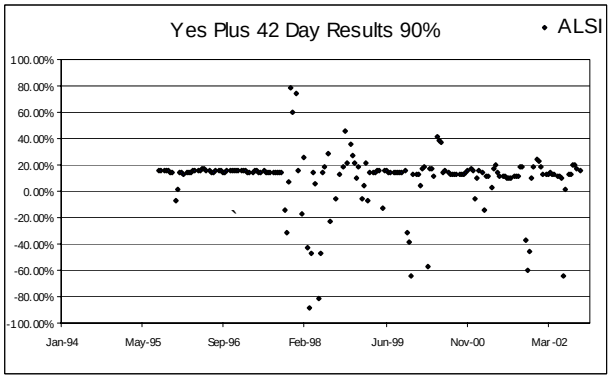

Yes Plus 42 Day Results 95%
WAR
350.00%
300.00%
250.00%
200.00%
150.00%
100.00%
50.00%
0.00%
-50.00%
-100.00%
Jan-94
May-95
Sep-96
Feb-98
Jun-99
Nov-00
Mar-02


Yes Plus 42 Day Results 90%
WAR
350.00%
300.00%
250.00%
200.00%
150.00%
100.00%
50.00%
0.00%
-50.00%
-100.00%
Jan-94
May-95
Sep-96
Feb-98
Jun-99
Nov-00
Mar-02


Yes Plus 42 Day Results 95%
ALSI
150.00%
100.00%
50.00%
0.00%
-50.00%
-100.00%
Jan-94
May-95
Sep-96
Feb-98
Jun-99
Nov-00
Mar-02


Yes Plus 42 Day Results 90%
ALSI
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
-20.00%
-40.00%
-60.00%
-80.00%
-100.00%
Jan-94
May-95
Sep-96
Feb-98
Jun-99
Nov-00
Mar-02

Appendix VI: The Documentation pertaining to the YES and Yes-Plus