

**Enrico Malverti**

Quantitative Analysis and  
Trading System Research



# Robo Advisors & Automatic Trading: Overview and Outlook

Benefits of algorithmic trading, design,  
evaluation parameters, operational  
issues, automatic execution

Supervisor: Enrico Malverti

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## ABOUT ME

## Enrico Malverti



Enrico Malverti has developed automated trading systems for institutional clients (funds, asset management firms and banks treasuries) on stocks, bonds, currencies and futures for over 15 years.

He is the author of several best-seller books about trading systems and technical analysis including "Trading systems vincenti" published by Hoepli. He has also been an appreciated speaker at several national and international seminars on automated trading for almost a decade. He's coordinator R&D at Cybertrade, a company specialized in building robotraders and roboadvisors.

Enrico has covered the role of Chief Investment Officer in an Italian Financial Consultancy Firm for four years and from 2013 to 2015 he has been Senior Quantitative Analyst for an english management company.

[www.enricomalverti.com](http://www.enricomalverti.com)

# WHAT'S ROBO-ADVISOR?

An approach to the financial markets through software that provide signals generated on the basis of studies and statistics offers several advantages:



- 1) First, you can measure the risk on the basis of historical data;
- 2) a consultant can select the most effective strategies emerged from simulations;
- 3) the signals can be standardized according to different risk profiles; the consultant can effectively follow a greater number of customers;
- 4) the robot allows you to monitor the markets 24 hours a day, facilitating the consultant's work

**When signals of a trading system also have the automatic execution is called robotrader**

**You can use either black box strategies or self made**

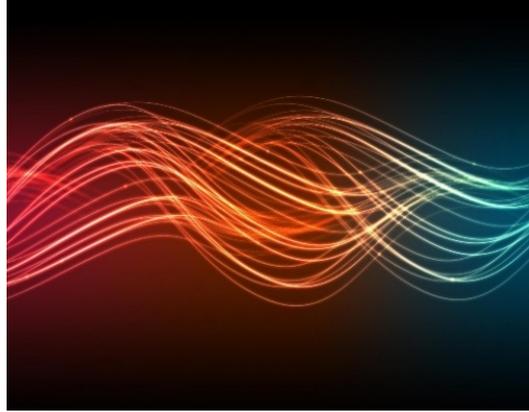
**To be successful in algorithmic trading technology architecture and quality of brokers are essential in minimizing errors, slippage**

## Design of a robotrader / roboadvisor

### Experience is required to overcome several obstacles



- the strategy may have too many parameters and result overfitted, ie too optimized retrospectively on past data;
- the strategy may well have bugs which improve the results but make no replicable results;
- the strategy could have considered market conditions unrealistic (slippage)
- the strategy may have been tested on a historic datas too short



Both the position trading and the short term trading impose a decision-making process that increase if you shrink the time frame.

Trading systems are an important aid to reduce the stress.

## The decision making process in trading and investment involves four levels:

- 1) The timing of entry
- 2) The risk management
- 3) The position sizing
- 4) The asset allocation

# Elements of a successful trading system

## Entry strategy

Entry rules

Filters

## Exit strategy (risk management)

## Position sizing

## Equity filter

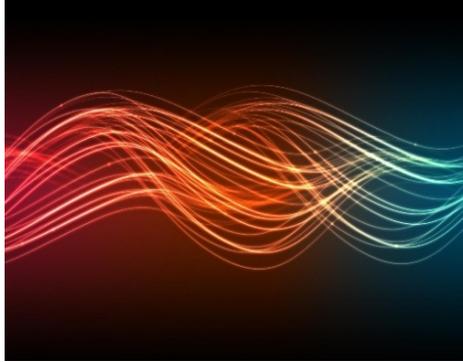
# 1) Timing of entries

You need to:

- 1) Determine the time frame based on your availability of time to devote to trading
- 2) Define the set-up (For example, what are the patterns most profitable?)

# Toolbox

- **Moving averages (simple, exponential, adaptive)**
- **Oscillators**
- **Breakout**
- **Pattern**
- **Correlations (pair trading, hedging,...)**



The success of a good entry strategy depends largely on the additional conditions that enable us to work as little as possible during lateral (operating filters)



Source: eSignal

**The strategy "Channelmov", shown in the example, is based on four inputs:**

- **Volumes**
- **Strength of the trend**
- **Volatility**
- **Price average**

## 2) Risk management

- When we take profit?
- Where we place the stop loss?

## **Stop loss**

*Stop loss in percentage*

*Stop loss in economic value*

*Stop loss based on time*

*Stop loss based on the volatility*

*Stop loss based on pattern*

*Stop loss based on barrier exit*

*Stop loss mixed*

## **Target**

### **Trailing stop**

*Trailing stop based on the volatility or the Fibonacci retracements*

*Natural trailing stop*

### **Mix exit**

*Exit at target with half position*

*Stop loss differentiated*

# MONEY MANAGEMENT = Risk management + Position sizing

The position sizing tells us how much we can risk for each position. A good money management can improve performance of a trading system as much as 30%, but the necessary condition is positive mathematical expectation

$$\textit{Expectancy} = (\textit{average win} \times \% \textit{ trades in win}) - (\textit{average loss} \times \% \textit{ trades in loss})$$

It means the average return is expected to obtain for each economic unit at risk must be positive.

## 3) Position sizing

- How much we have to invest on each individual trade?
- We reinvest profits or not?
- In futures trading when is the right time to increase the number of contracts?

**Martingale: principle used in the lotto or at the casino. If you lose, you increase the capital for the next bet. Paradoxically, when we have less capital we risk more.**

**Antimartingala: the magnitude of the "Bet" is reduced every time you lose. In the application to trading, the risk is to struggle to get out of drawdown**

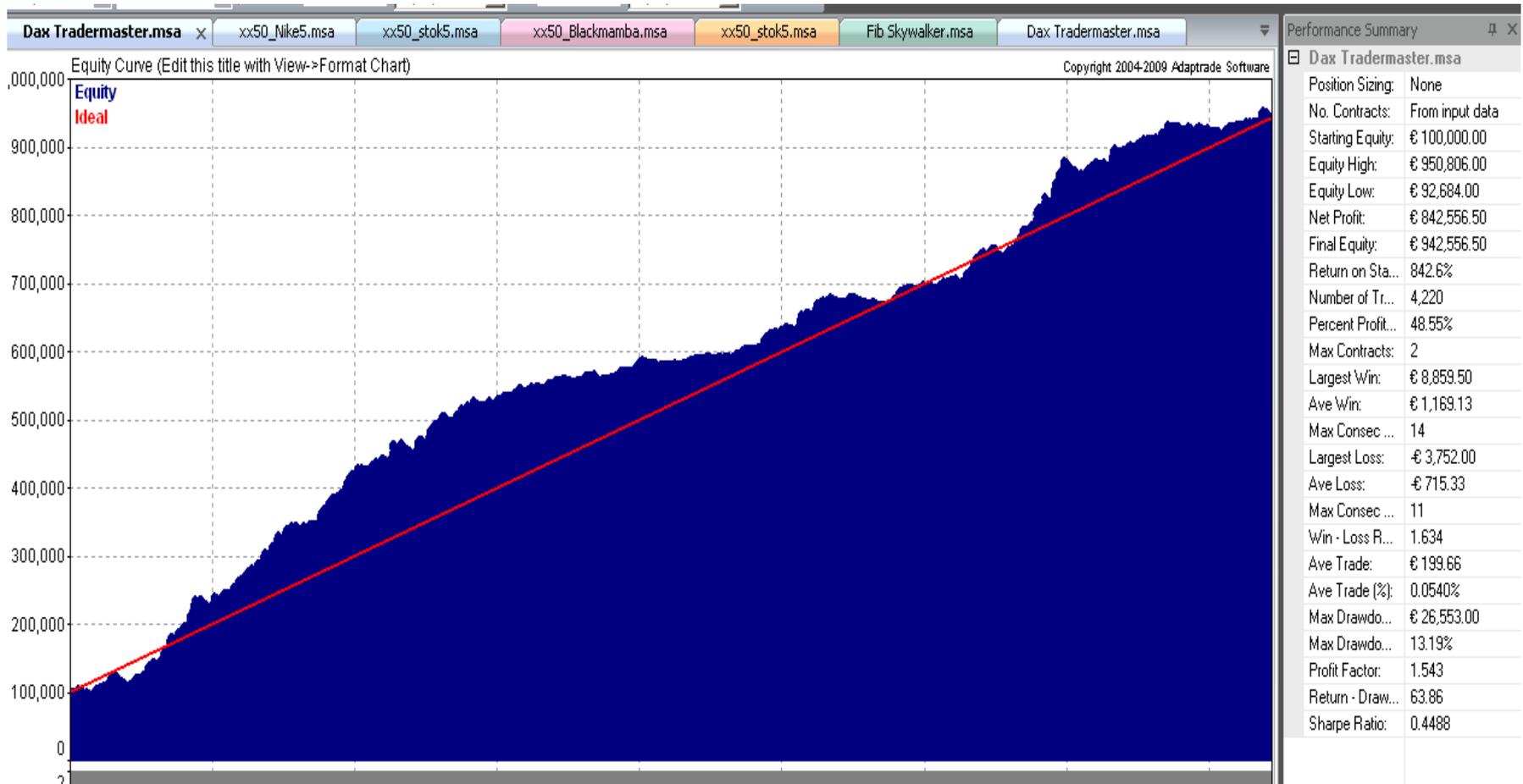
# Example:

- With a trend follower strategy is better the Kelly formula or the formula of Pruitt and Hill?

# Kelly Formula:

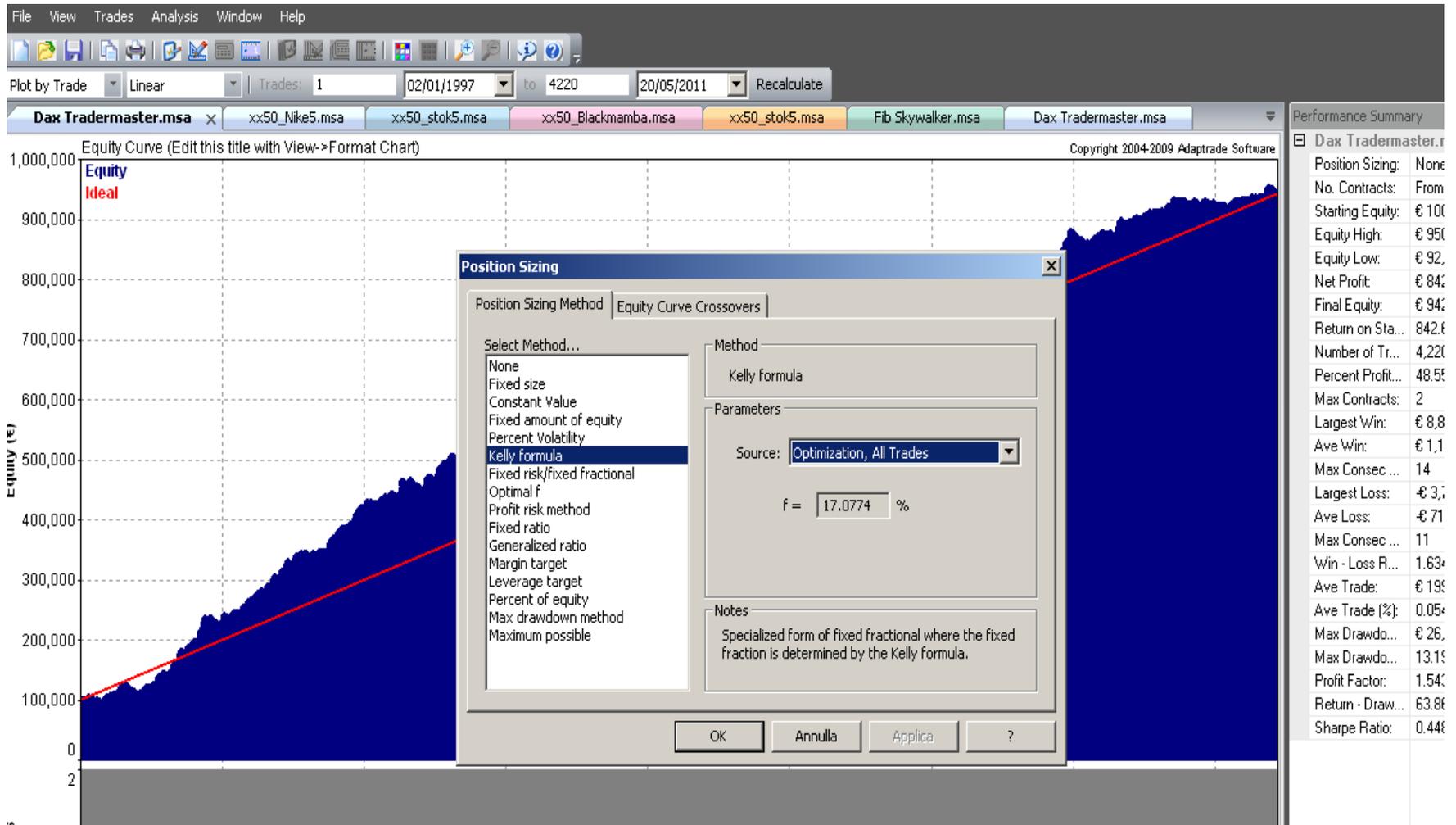
- **Kelly formula** is used to determine the optimal size of a series of bets. In most gambling scenarios, and some investing scenarios under some simplifying assumptions, the Kelly strategy will do better than any essentially different strategy in the long run. It was described by [J. L. Kelly, Jr](#) in 1956.

# We consider a trading system for the DAX30 future on 5 minutes. Results with a futures contract from 1997 to 2011



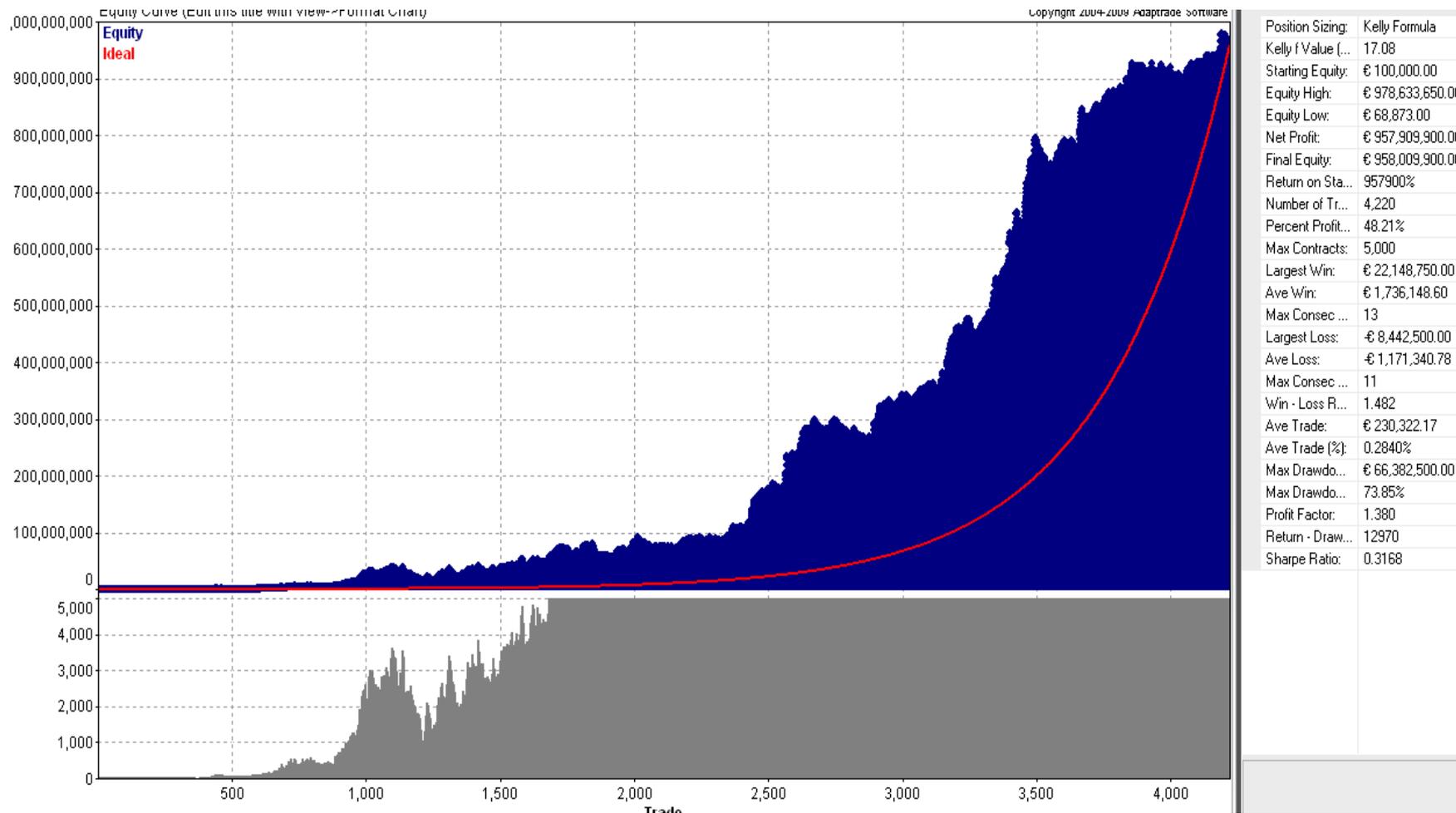
Source: Adaptrade

# Now with the software called Market System Analyzer we test the Kelly formula considering margins € 12,500 and € 100,000 as starting capital:



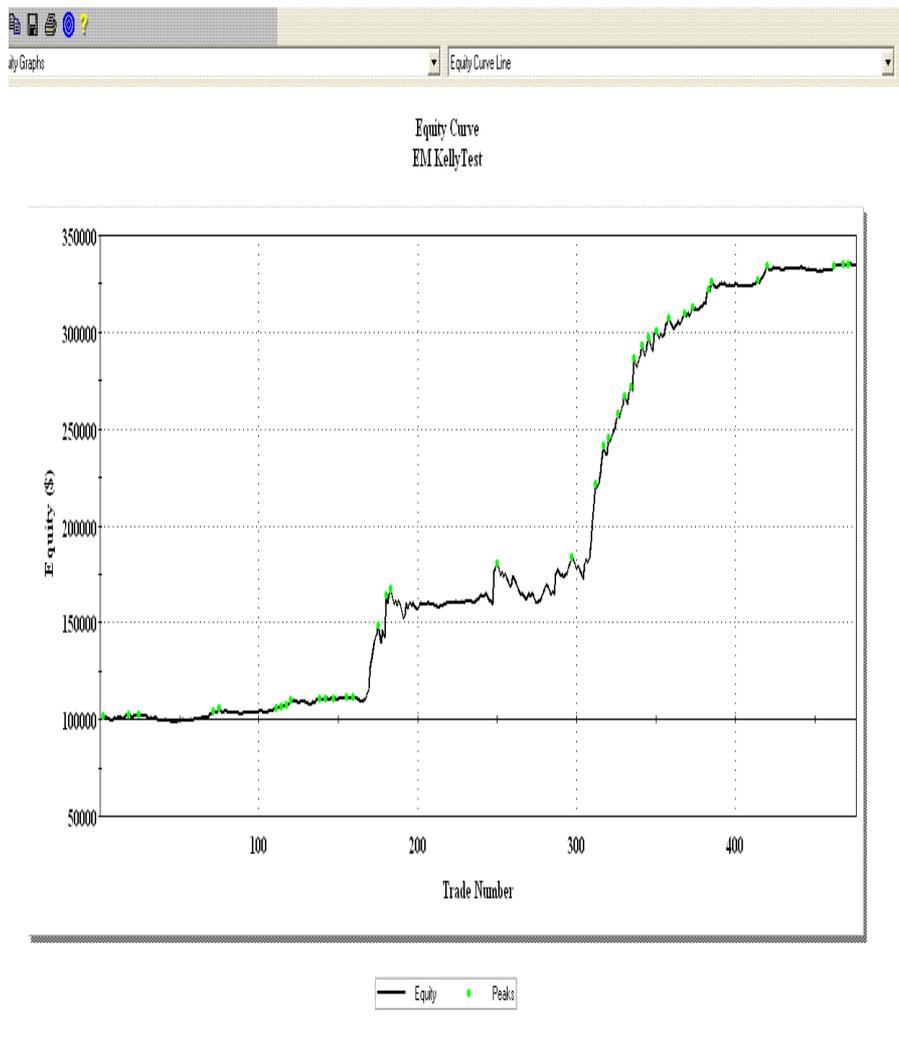
Source: Adaptrade

The result is a curve of profits with exceptional gains but very volatile. The drawdowns are potentially very high because the number of contracts varies significantly and little gradual.

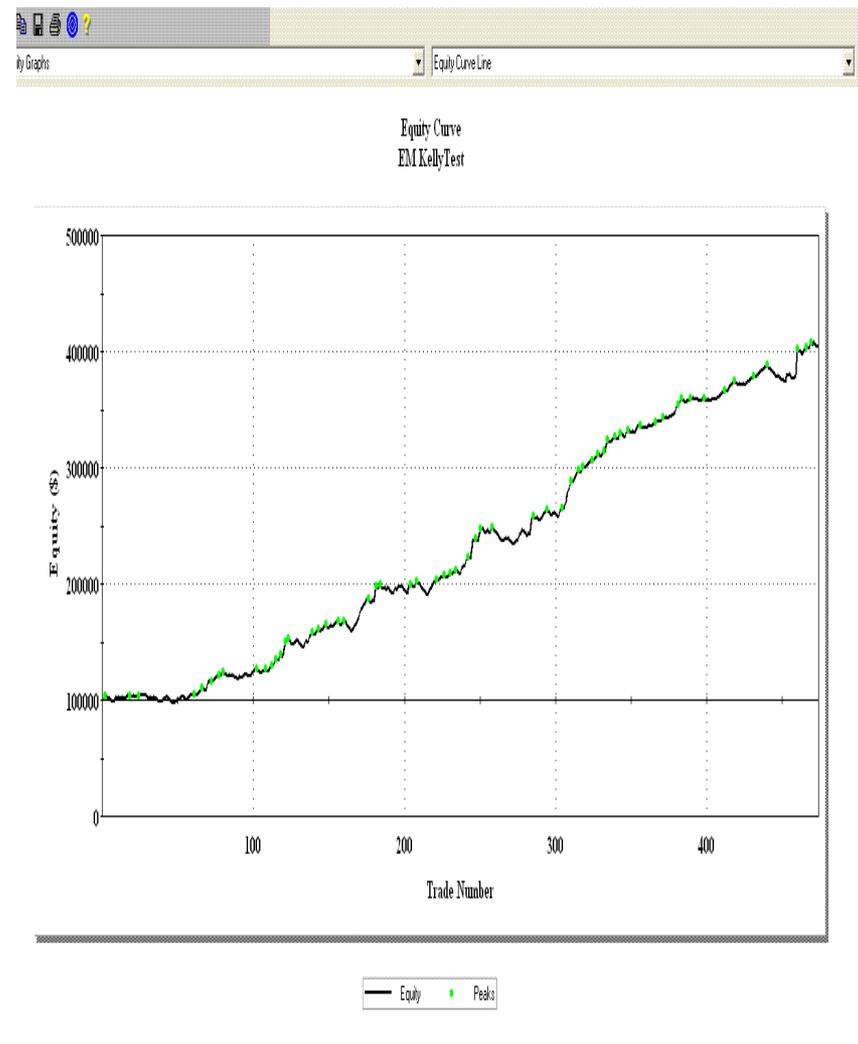


Source: Adaptrade

- In this slide we compare the Kelly formula (on the left) with the Pruitt & Hill formula kelly (on the right), the second considers the volatility for the denominator and is more regular



Created with Omega Research ProSuite 2000i © 1999



Created with Omega Research ProSuite 2000i © 1999

Source: Omega Prosuite2000i

A good trading system must be significant and robust. Note that there is a trade off between the two concepts

## 4) Asset allocation

At this level of analysis the questions are:

- 1) What percentage of the share we shall reserve to the equities trading? And to derivatives, bonds, ETF; Funds?
- 2) How many T-Bond we trade for each Nasdaq or for each S&P? (Standardisation of Number of contracts)

Building a robo-trader or a robo-advisor is the reply to all these questions.

Numbers never lie and a robotrader can measure your risk in every condition and in every time horizon.

**In a report analysis this point are very important:**

### **Profit factor**

This field calculates how many dollars a trading strategy made for every dollar it lost. This value is calculated by dividing gross profits by gross losses.

### **Ratio avg. win/avg. loss**

This field calculates, on average, how many dollars you win for every dollar you lose. This value is calculated by dividing the average winning trade by the average losing trade.

### **RINA Index**

This proprietary index combines select net profit, time in the market, and drawdown calculations into a single reward/risk ratio. The larger the number the more efficient the strategy. Look for a strategy with an index of 30 or more. 
$$\text{RINA Index} = \frac{\text{Select Net Profit}}{((\text{Average Drawdown}) \times (\text{Percent time in the market}))}$$
 profit results. A trade is considered to be an outlier when its profit is greater than three standard deviations away from the average profit.

### **Select Net Profit**

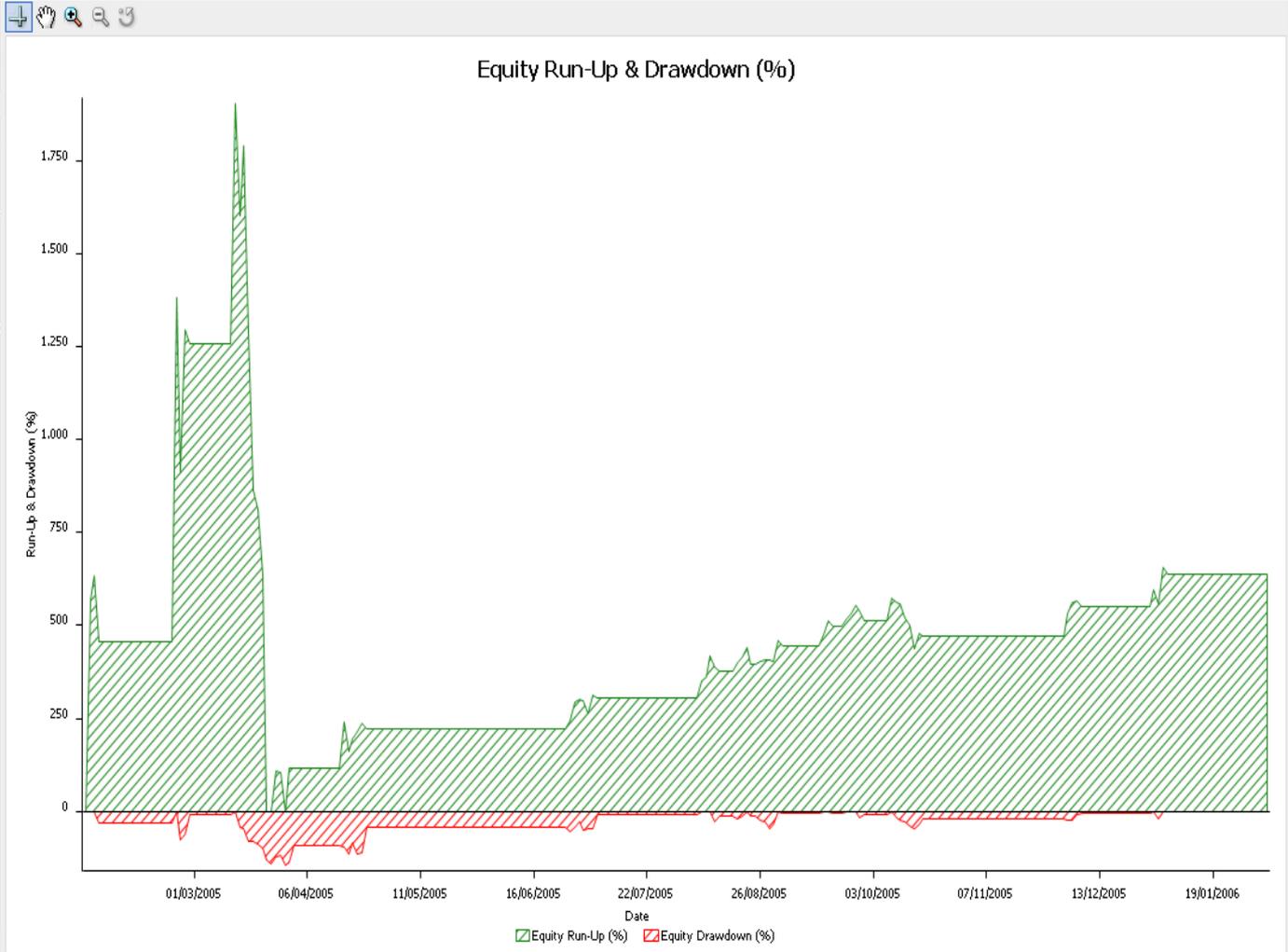
This field adjusts strategy results by removing all outlier trades, both positive and negative. The final value represents the net profit without any anomalous trades.

### **Sharpe Ratio**

Average monthly return (%) minus the risk-free rate (Interest rate setting in the Costs tab of the Format Strategy dialog box) divided by the standard deviation of monthly returns. The higher the number, the greater the return in relation to the risk. This calculation is based on the last 36 Months.



- Equity Graphs
  - Equity Curve Detailed
  - Equity Curve Detailed With Draw
  - Equity Run-Up & Drawdown
  - Equity Run-Up & Drawdown (%)
  - Equity Curve Close To Close
  - Equity Curve Close To Close With Buy & Hold Return
  - Monthly Returns & Drawdowns
  - Monthly Returns & Drawdowns (%)
  - Monthly Accumulative Net Profit
  - Value Added Monthly Index
  - Average Profit By Month
  - Annual Returns & Drawdowns
  - Annual Returns & Drawdowns (%)
  - Annual Accumulative Net Profit
- Trade Graphs



Source: eSignal

# Mini S&P500:

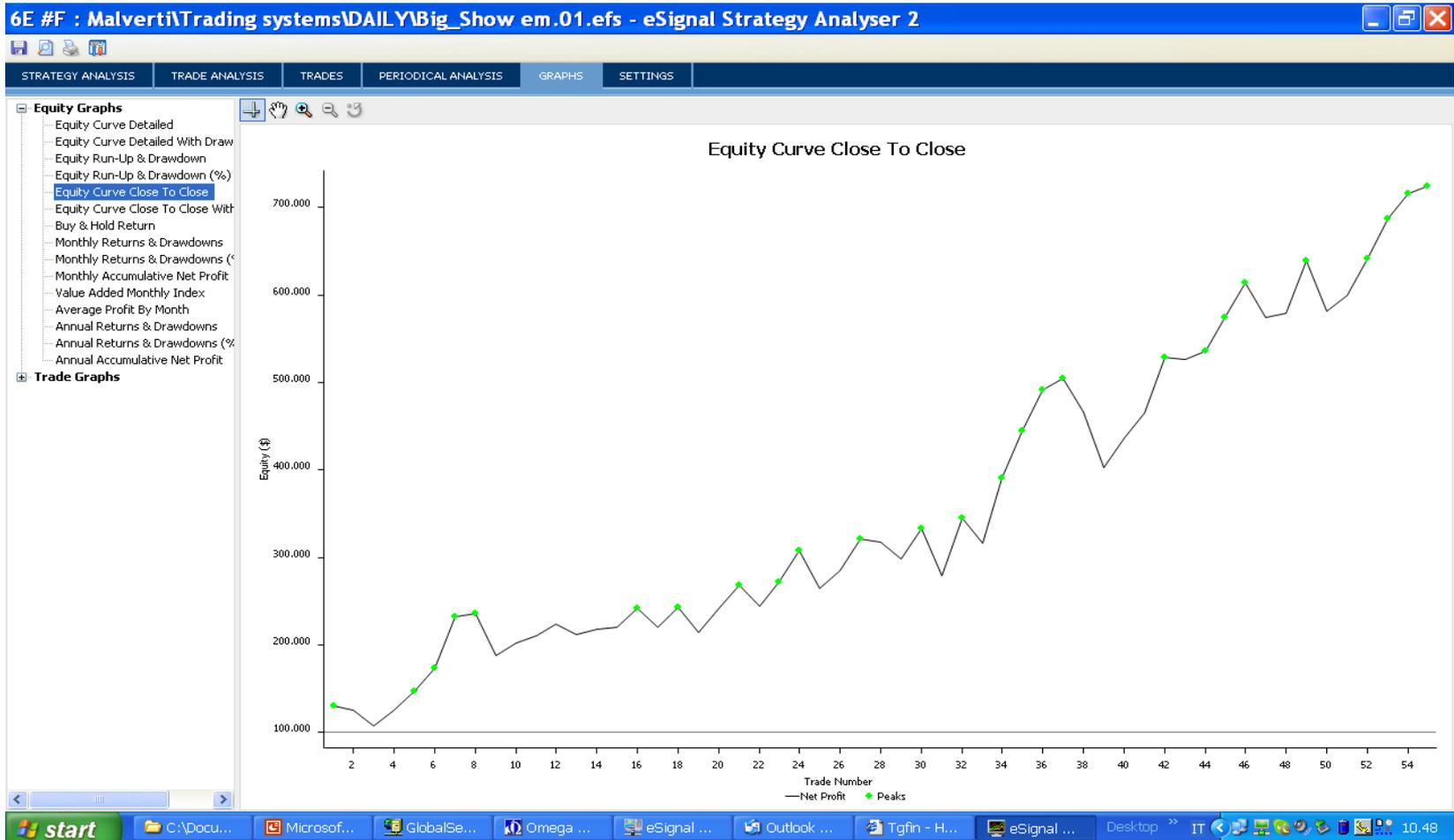
ES #F : MalvertiTrading systems\DAIlyBig\_Show em.01.efs - eSignal Strategy Analyser 2



Source: eSignal

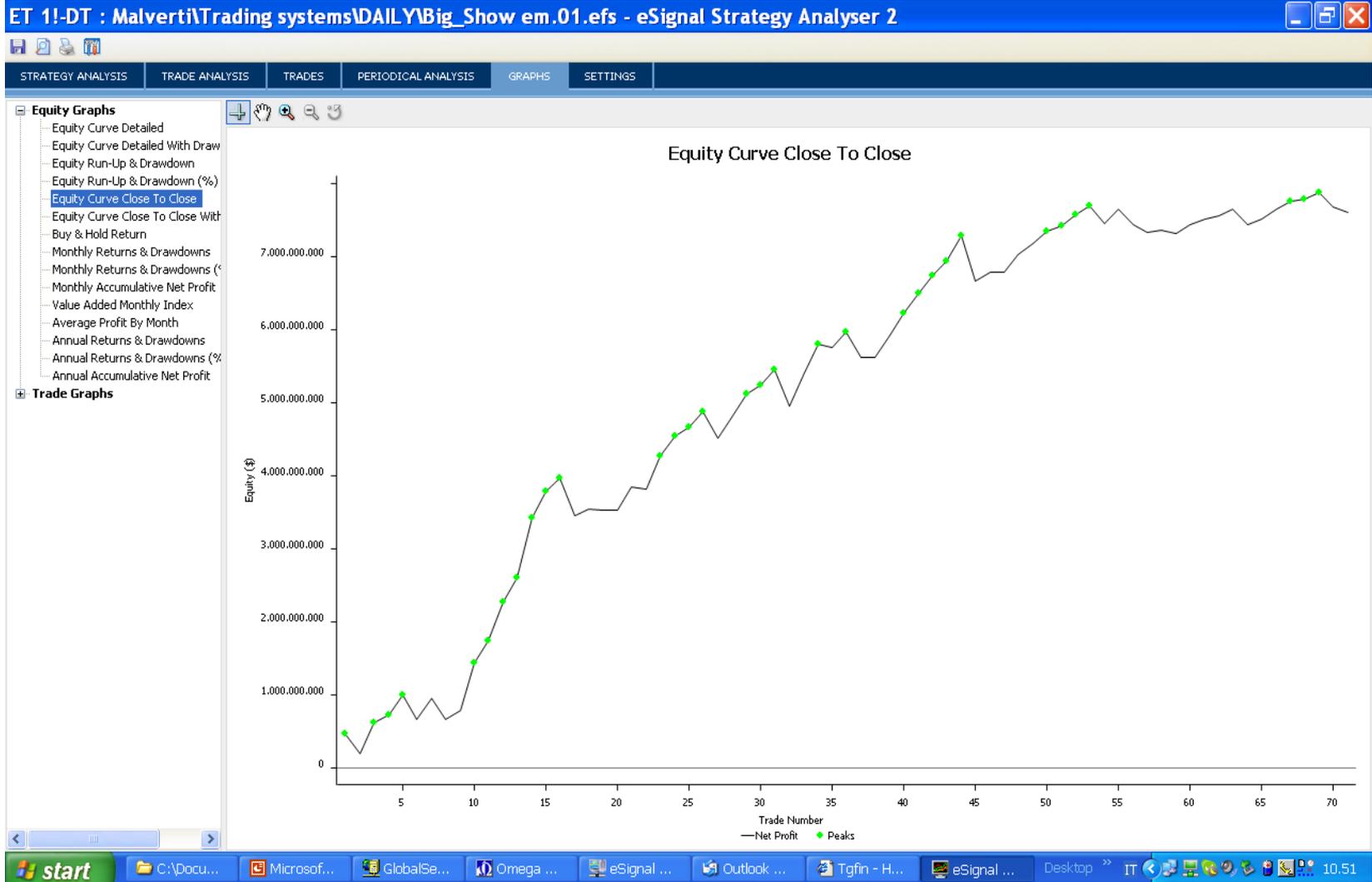
A strategy to be reliable and have a good chance to continue to perform in the future must be robust. Must operate at parameters unchanged on multiple instruments not related.

After the mini SP here is the same trading system applied to future euro-dollar:



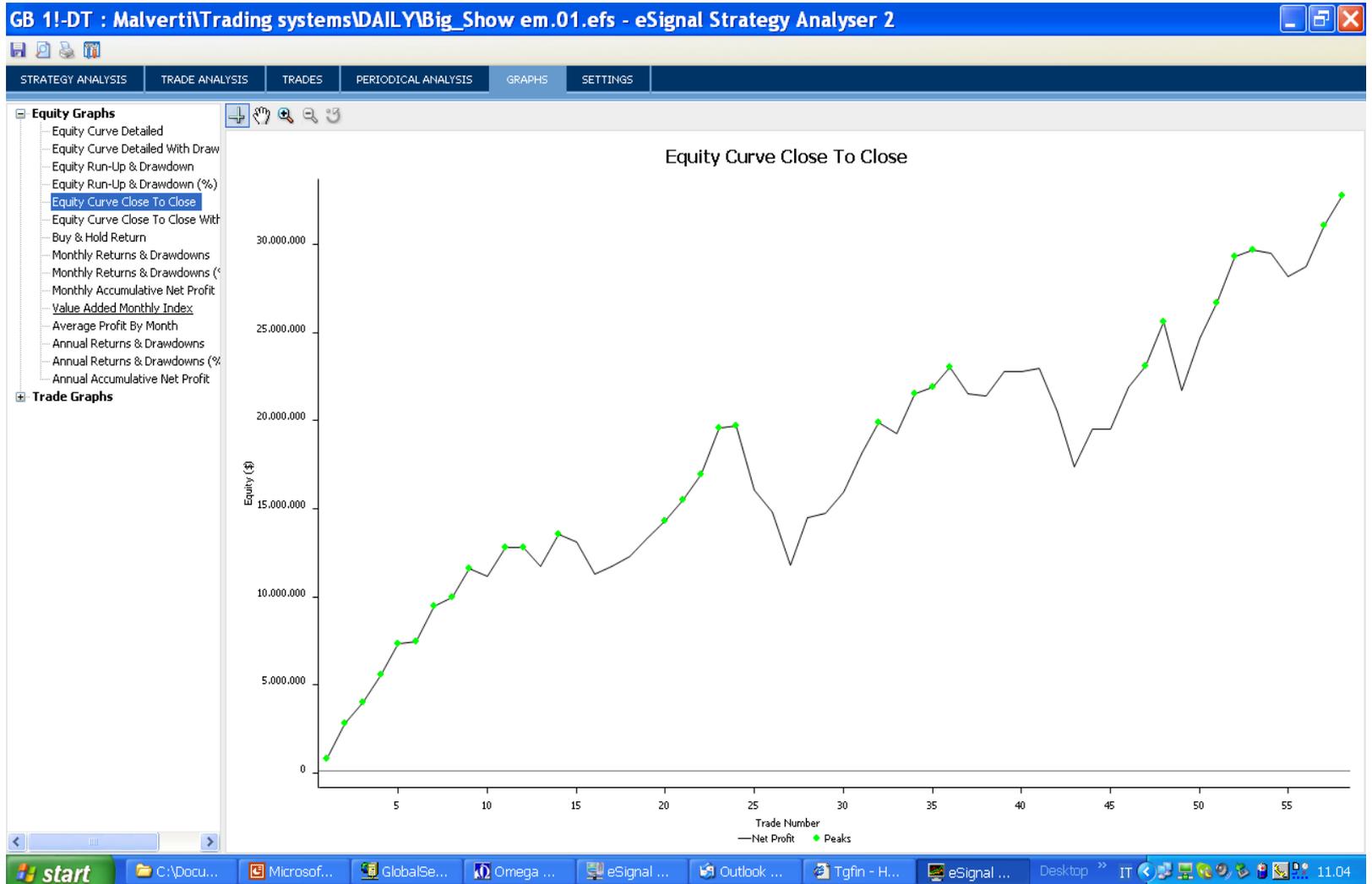
Source: eSignal

# ...Eurostoxx50 future:



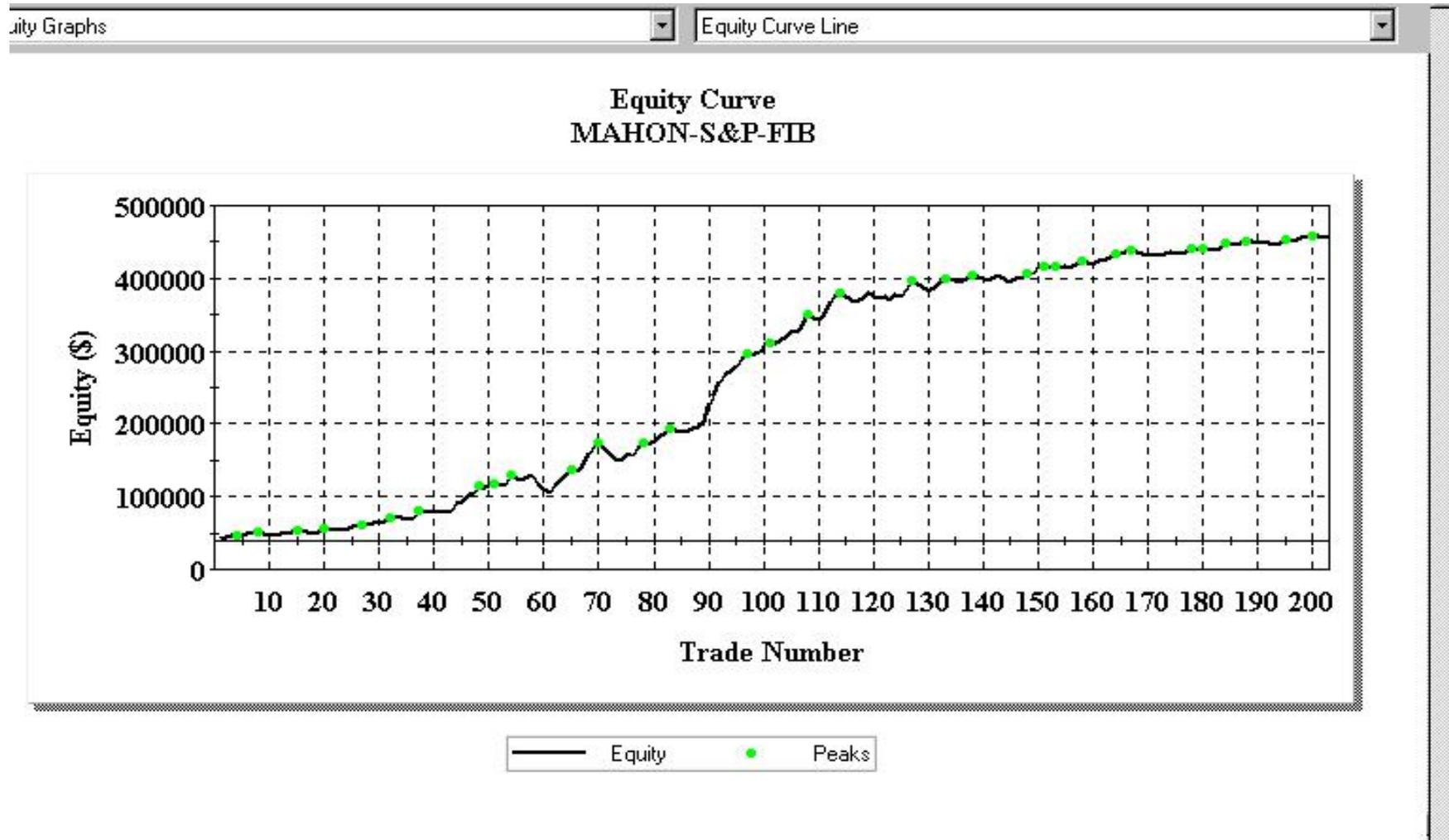
Source: eSignal

# ...and Bund future:



Source: eSignal

# Would you like following a trading system with this equity line?



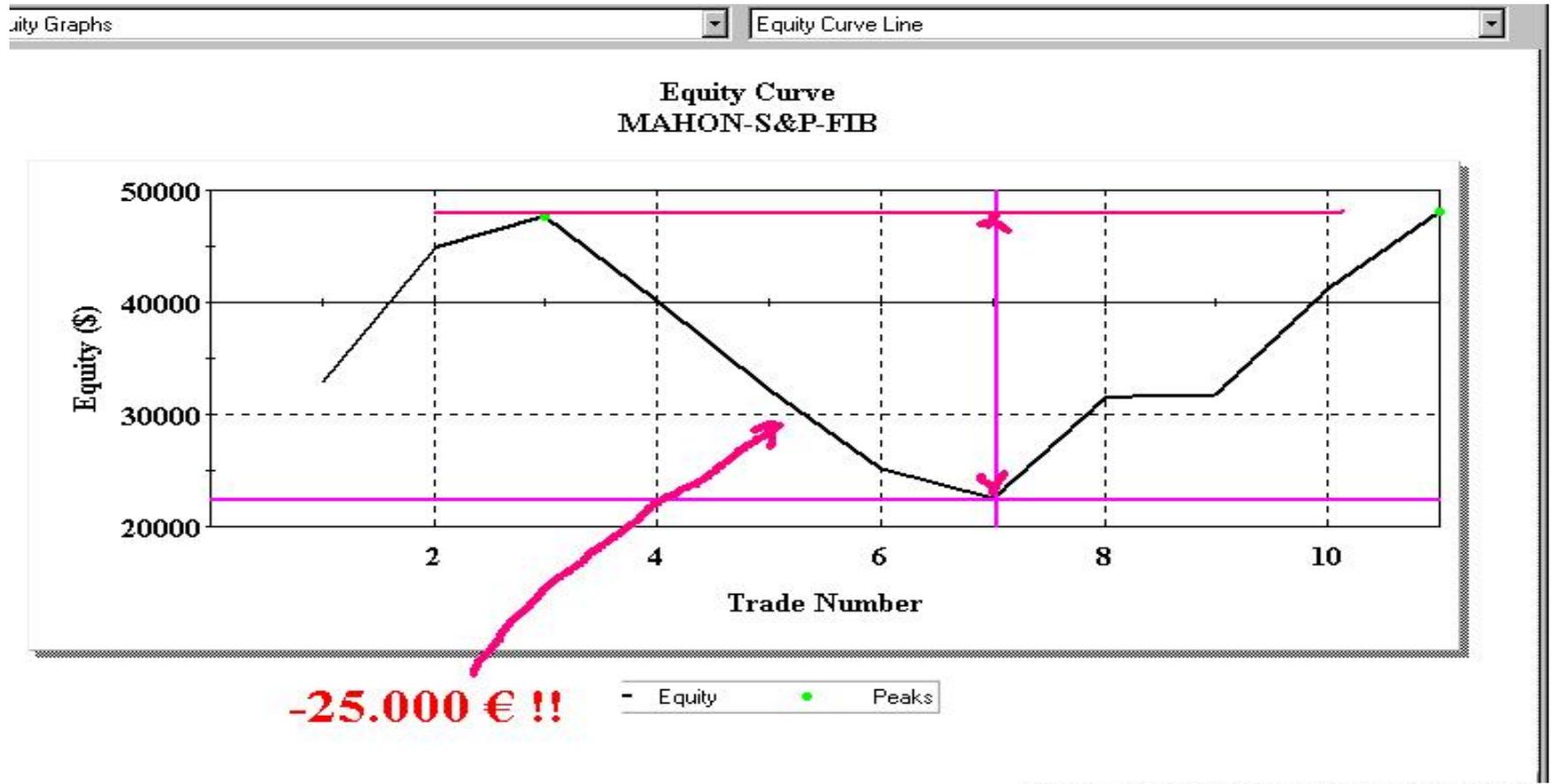
Source: Omega ProSuite2000i

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**Probably YES, but...**

**...We observe the profit curve  
in more detail**

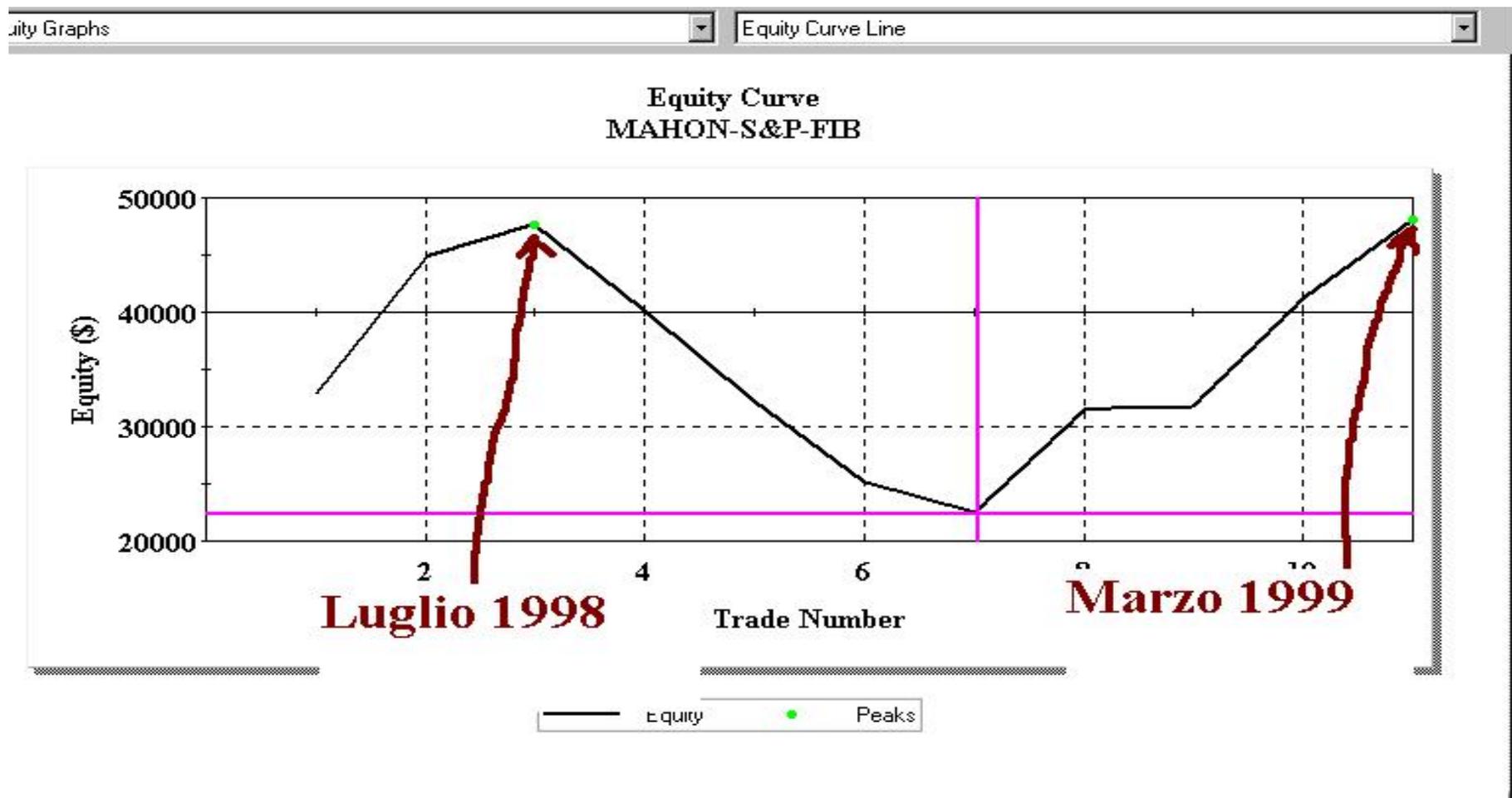
# In July-September 1998 five consecutive stop loss generated a drawdown of 25,000 €



Source: Omega Prosuite2000i

Created with Omega Research ProSuite 2000i © 1999

# In March 1999, the trading system is finally released from the drawdown



Source: Omega ProSuite2000i

Created with Omega Research ProSuite 2000i © 1999

**The question that needs a reply is: "If a similar situation occurs again I could stand up to a loss of this magnitude and / or 9 months of drawdown without leaving the system?"**

**The majority of traders is not  
sufficiently prepared or  
brought to bear the losses ...**

**... And they abandon  
prematurely a strategy just  
before that it start to gain  
again.**

**You should be sufficiently  
capitalized for:**

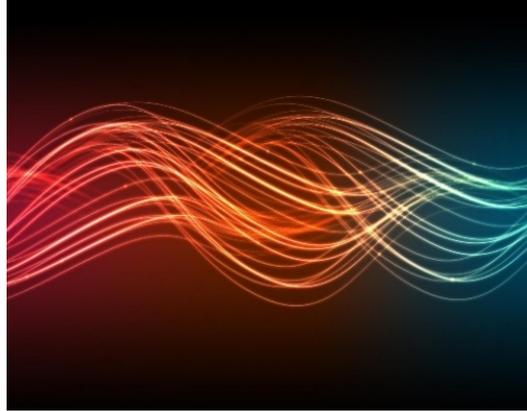
- 1) Absorb the individual drawdown**
- 2) Make a proper diversification  
multimarket multisystem**

## **The world of quantitative advisory was discovered by large institutional in the last two years**

There are also aspects not to be underestimated: the signals cannot be applied to thousands of customers without causing slippage on the prices of execution.

The buy and sell signals must be timely and replicable by customers without generating too much stress.

It still required a minimum of assistance and explanations on operations. People do not like too depersonalized approach



**To be successful in algorithmic trading technology architecture and quality of brokers are essential in minimizing errors, slippage**



**The problems can be distinguished into two parts: design and execution**

## OUR SOLUTIONS:

Wide Trader is a software developed in 2008 by Cyber Trade Srl. It was born from professional traders who make automated trading since 2000, as a software solution that avoids the inconveniences lived with other software

Since 2008 Wide Trader interfaces with Interactive Brokers

Widetrader can be used both as a platform for both robotrader and roboadvisor: it sends sms, email, skype chat, pop up and sound alarm when there is a new signal

## WIDETRADER: A SOLUTION FOR AUTOMATIC TRADING

Widetrader keeps always the right alignment between virtual positions (coming from trading systems) and real positions on your Interactive Brokers account.

It provides sophisticated alarms

The image displays two screenshots of the Wide Trader software interface. Both screenshots show a top navigation bar with a 'WT' logo, a 'Wide Trader v' title, and several menu items: 'Log and Monitor', 'Events Configuration and Log', and 'Automatic'. Below the navigation bar are tabs for 'Working Orders', 'Account Information', 'OrdersType', and 'Mex'. The main content area is titled 'Positions' and features a table with columns for 'Symb', 'Exchange\*', 'VP', 'RP', 'AP', 'ProfitLoss', 'Delta', and 'Buy'. The table is filtered by 'Views' set to 'Zipped' and 'Size' set to 'Standard'. The left screenshot shows positions for FIB, DAX, IBX3!, XX5, and BUN. The right screenshot shows positions for SI, NG, HG, and HO.

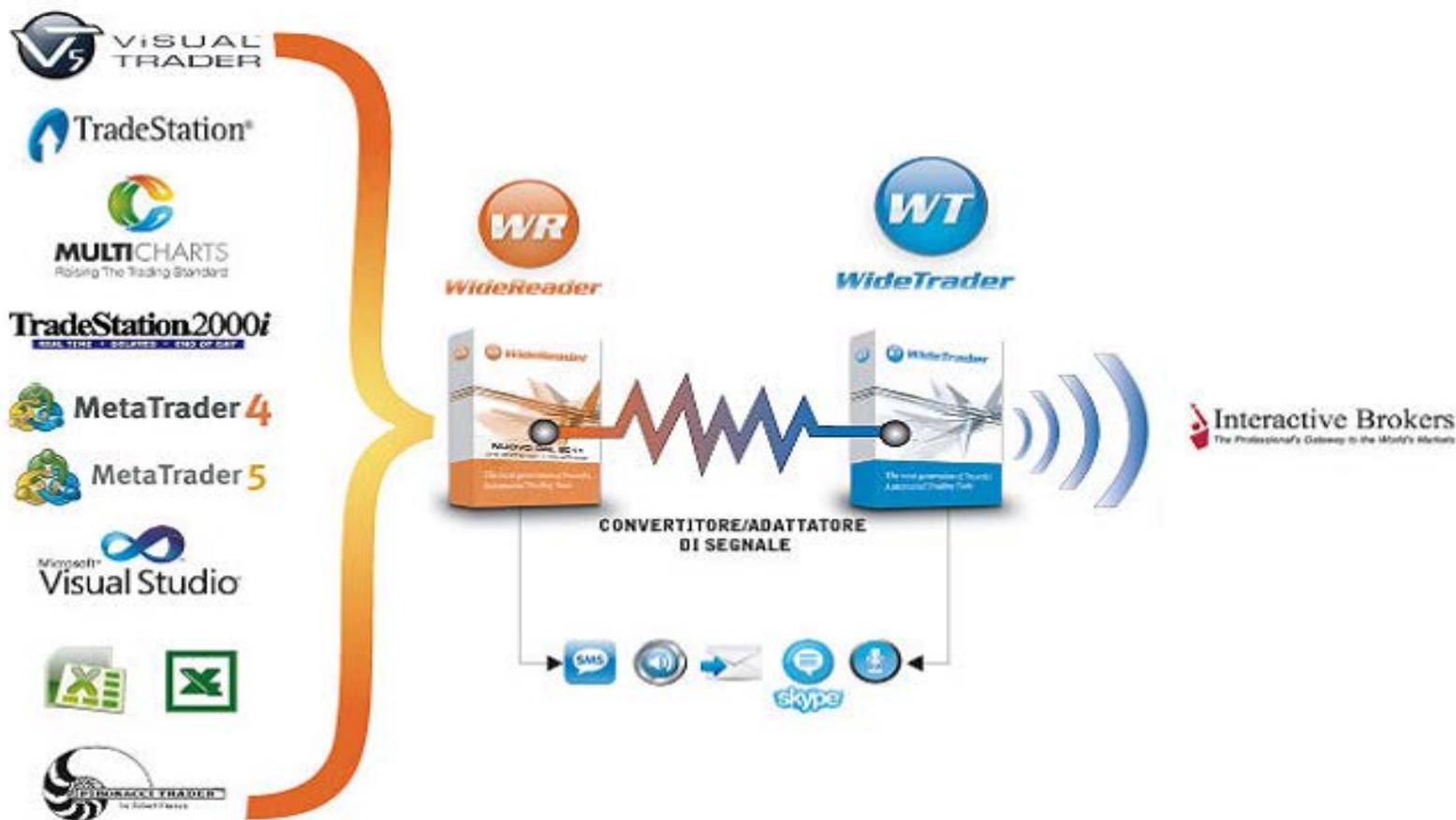
Symb	Exchange*	VP	RP	AP	ProfitLoss	Delta	Buy
FIB	IDEM	8	8	8	9.354,83	0	Buy
DAX	EUREX	4	4	4	9.369,36	0	Buy
IBX3!	MEFFRV	0	0	0	0	0	Buy
XX5	EUREX	2	2	2	797,58	0	Buy
BUN	EUREX	-1	-1	-1	73,90	0	Buy

Symbo	Exchange*	VP	RP	AP	ProfitLoss	Delta	E
SI	COMEX	4	4	4	29.540,72	0	E
NG	NYMEX	-1	-1	-1	216,57	0	E
HG	NYMEX	1	1	1	1.141,43	0	E
HO	NYMEX	1	1	1	814,58	0	E

# WIDETRADER: A SOLUTION FOR AUTOMATIC TRADING

Thanks to Widetrader you can interface the most popular platform for trading system design with Interactive Brokers



## COMING SOON:

We are developing an app for mobile devices (tablets and smartphones) that allows you to receive signals and execute them with a few clicks by opening the app from the broker's account (roboadvisor mode)

THANK YOU FOR YOUR ATTENTION!!

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[www.rob-advisor.it](http://www.rob-advisor.it)