

TRADING MICRO FUTURES 2023

USING STRATEGYQUANT



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About

This document contains a collection of educational materials related to system trading (a.k.a. algo-trading, auto-trading). This ambitious project is powered up by coensio.com, a free educational online blog, which is fully dedicated to system trading and supported by a great community of algo-traders, quants and other people interested in trading financial markets. This guide contains the essence of practical trading knowledge which was gathered during the last 10 year period. Moreover, in this guide we almost fully concentrate on system development using [StrategyQuant X](#) platform, which is mostly used by our community members.

Our Goal and our mission

Our goal:

1. **To provide the simplest, the fastest, the most straightforward the most complete A-to-Z algo-trading guide for struggling system traders.**

Our missions:

1. **To provide education that is supported by the actual trading results with real live examples and proof!**
2. **To build an educated community of successful algo-traders.**
3. **To learn and discover new trading solutions and improve our trading skills.**

Let's do this together!

Chris

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Disclaimer

Before you engage in transactions using an electronic system, you should carefully review the rules and regulations of the exchanges offering the system and/or listing the instruments you intend to trade. Online trading has inherent risk due to system response and access times that may vary due to market conditions, system performance, and other factors. You should understand these and additional risks before trading.

Leverage allows traders the ability to enter into a position worth many times the account value with a relatively small amount of money. This leverage can work with you as well as against you. Even though the Forex market offers traders the ability to use a high degree of leverage, trading with high leverage may increase the losses suffered. Please use caution when using leverage in trading or investing.

All investments involve risk, and the past performance of a security, industry, sector, market, financial product, trading strategy, or individual's trading does not guarantee future results or returns. Investors are fully responsible for any investment decisions they make. Such decisions should be based solely on an evaluation of their financial circumstances, investment objectives, risk tolerance, and liquidity needs.

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Tools

Below an overview of tools used by this guide:

Item	Platform	Tool version	Remarks
SQX	StrategyQuant X	B135	See YouTube video
Coensio scripts	Python	3.14	Command line scripts
Tradestation	Tradestation	10.0	Update 50
T.B.D			
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The theoretical part

What is algo-trading anyway?

Algo-trading, also known as system-trading (or auto-trading / quantitative trading) is a trading method which assumes that all information needed to “beat” today’s market can be found in previous/historical data. Algo-traders use sophisticated data mining tools (like [StrategyQuant X](#)) and a huge amount of statistical analysis to design, test and verify their automated trading systems. The resulting systems are fully automated and rely on fixed (mechanical) trading logic for entry and exit signals.

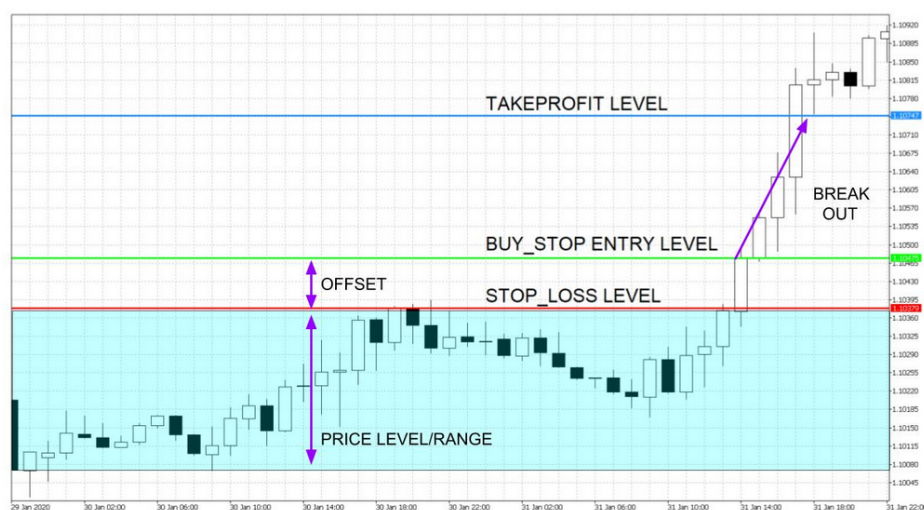
Algo-trading explained and why it works?

Algo-trading can be done in an unlimited number of ways, however since our lifetime is very limited we prefer to concentrate on one single proven method and become good at it. The selected method is: **Break-out trading**.

In automated trading, algorithmic systems are not designed in order to try to “predict” the next market move, instead the systems are mainly meant to be able to “catch” the direction of the current price move and “react” to it. That’s the main reason why it works in practice.

IN SYSTEM TRADING WE ARE NOT TRYING TO PREDICTING THE FUTURE. IT’S NOT POSSIBLE! NOBODY HAS A CRYSTAL BALL, AT LEAST NOT A WORKING ONE:)

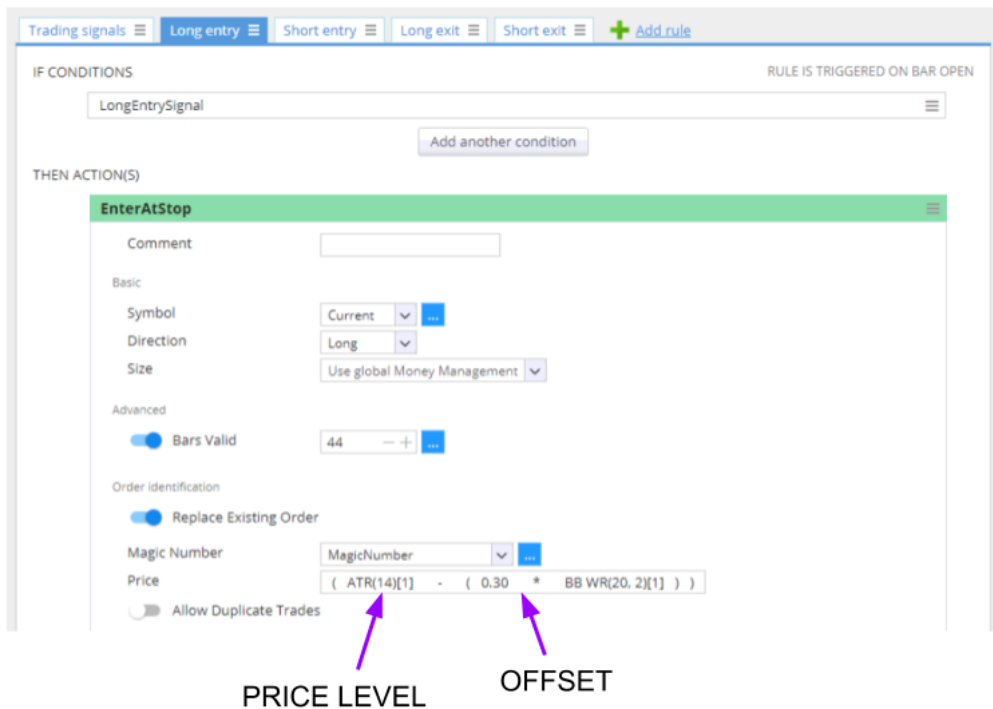
Most break-out strategies try to react to the market moves, by automatically opening, closing and managing trades. In most cases we are dealing here with “pending” trades that use: BUY_STOP and SELL_STOP market orders. Figure below shows an example of a bullish breakout trade setup.



The figure above shows a typical break-out strategy setup, but also a typical strategy logic. Break-out strategies mostly are built based on two level:

1. **PRICE RANGE or LEVEL** = representing current price dynamics and defining a 'range' in which price is expected to move
2. **OFFSET** = a level above/below a 'range' at which price action will be considered as a valid breakout.

Let's look into SQX AlgoWizard to see this structure, using a typical breakout strategy:



Most of the strategies that are generated by the SQX, have this or a very similar entry logic. Automated break-out trading method is not only proven by us and our small scale tests, but it is also used by countless number of successful retail and professional traders, including hedge fund managers, managing multiple millions of dollars! Break-out trading = a serious business when done right!

What is StrategyQuant?

StrategyQuant is a software program that allows users to create, test, and optimize trading strategies using historical market data. It uses a process called strategy generation to automatically generate a large number of potential trading strategies, which can then be tested and refined using various parameters and metrics. The ultimate goal of using StrategyQuant is to identify a profitable trading strategy that can be used in live trading. If you are new to StrategyQuant please see the short introduction video first: [Go to YouTube](#).

The pieces of successful break-out trading puzzle

If we could describe successful break-out trading it would have the following components:

1. Volatility
2. Proper market timing
3. Liquidity
4. Reliable platform and market interface
5. Proper account sizing
6. Statistical significance
7. Robustness of trading systems
8. Diversification
9. Low correlation
10. Positive expectation
11. High trading frequency
12. Portfolio building method
13. Monitoring and incubating methods
14. Patience

Note: in order to be really successful in break-out trading we need to master ALL of the above listed topics. If one of all components is missing, the whole system collapses. It's like a big puzzle, that not everyone can easily solve, and that's the most common reason why most traders will fail and will never become successful in system-trading. System trading is an extremely complex skill to learn!

In the following chapters we will describe all of the topics in more detail.

1) Volatility



Volatility means “market mobility” and is a measurement of “market movements”. If the price stays “flat” and there are no price movements, then volatility is low. If the price goes up and down and up again etc...then volatility is high. Since the break-out trading method is based on “catching” the market moves, we need to have some significant price movements and so we need to have **high volatility!**

Thus one of the most important lessons in this document is: in order to be successful in break-out trading: **we need to target only the volatile markets!** Trading using break-outs on markets that do not move much is like trying to catch a fish in a small puddle = not gonna happen!

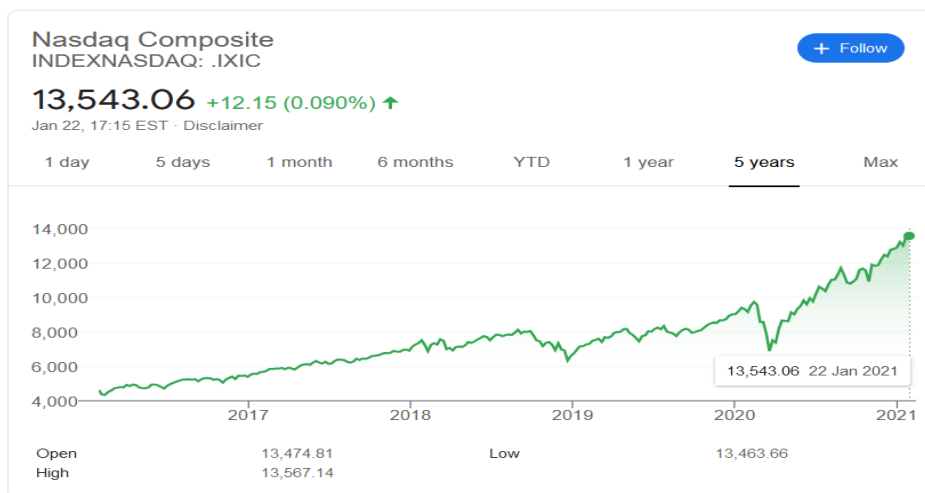
So... glad we've cleared that up. Each time I see people struggling and losing money in trading by trying break-out systems on flat markets I get depressed ;) For that and many other reasons let's forget about the Forex markets for now and let's concentrate on something that really works in practice, for example: Indices (using Futures contracts)! Yes,

indices, like stock market indices e.g.: S&P500 or NASDAQ. The biggest advantage of trading on those markets is that indices have strong break-out moves, strong long lasting price trends and the futures contract have a very good liquidity (= low slippages). Those characteristics will help us a lot in our daily trading.

2) Proper market timing: LONG vs SHORT



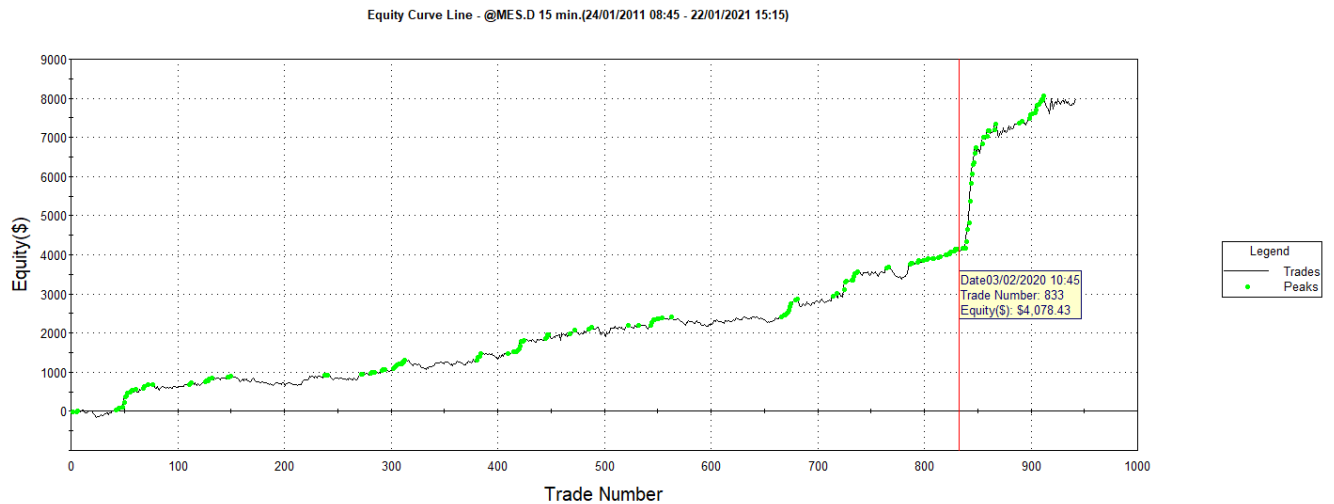
This section is easy to explain. Let's look at the following figure representing long term NASDAQ index price chart:



Looking at this long term trend, can you tell in which direction you want to trade? LONG or SHORT or both? The proper answer is LONG (most of the time), just because this market has a strong bullish bias with some bearish mid-term trends or “market crash” periods. Trading LONG only does not mean you will always win in this market, but instead it can increase your chances of winning (significantly). To exploit this long term market bias we will try to find systems with the following characteristics:

- Systems that perform extremely well during bullish periods (= high Ret/DD figures)
- Systems that do not lose or do not take trades at all during market correction or even market meltdowns, which happen very frequently (refer to: 2008, 2014, end of 2018 and recently in 2020 the coronavirus crash). The equity curve of a good/robust LONG-only system should at least stay FLAT during those problematic periods! = Very important!

Note: So far most of our LONG-only break-out systems have shown an extremely good response to market crashes during 2018 and 2020.



Does it all mean we will take LONG only trades on all markets? No of course not, but it's the easiest way to start with!

3) Liquidity

Trading in volatile markets is not enough if there is no *"liquidity"* which describes the degree to which an asset or security can be quickly bought or sold on the *market* at a price reflecting its intrinsic value. Example: if you want to BUY some instrument, but there is no one that is willing to sell it to you at the current price, then this market has a 'low liquidity'. Note that in all cases we need to make sure, we are trading only on highly liquid markets AND also, using a platform and a broker providing us a good access to this liquidity. Low liquidity or bad market access will have a very large, negative influence on our trading results, due to e.g.: order execution delays or higher slippages/spreads.

The bottom line: trading on highly liquid markets with many potential *"buyers"* and *"sellers"* is not enough, our trading results will strongly depend on the selected broker! That is why we prefer to trade high liquid futures contracts on a semi-professional broker like Tradestation. See next chapter.

4) Reliable platform and market interface

As discussed in previous sections, our trading results will strongly depend on the selected market interface. This includes our trading platform and the selected broker.

Trading platforms: From our experience (real trading) the best and most robust trading platform is TradeStation (also MultiCharts can be used). In this guide we will only concentrate on the TradeStation platform.

Why not MT4/MT5 which are so common for beginning traders? Simply because, after so many tries, we couldn't not find any honest MT4/MT5 broker that would let us win. Period.

Brokers: We like "Tradestation" broker for many different reasons, which will be explained later in the upcoming sections :)

VPS: Unlike on MT4/MT5 brokers, on Tradestation broker VPS trading is not mandatory! It's a "nice-to-have" but it's not necessary to become successful. Do not spend too much time on this topic, if you are living in a well developed country, your standard internet connection with a standard power grid stability should be enough to start with. VPS is only a costly improvement which can come later when you will get familiar with algo trading.

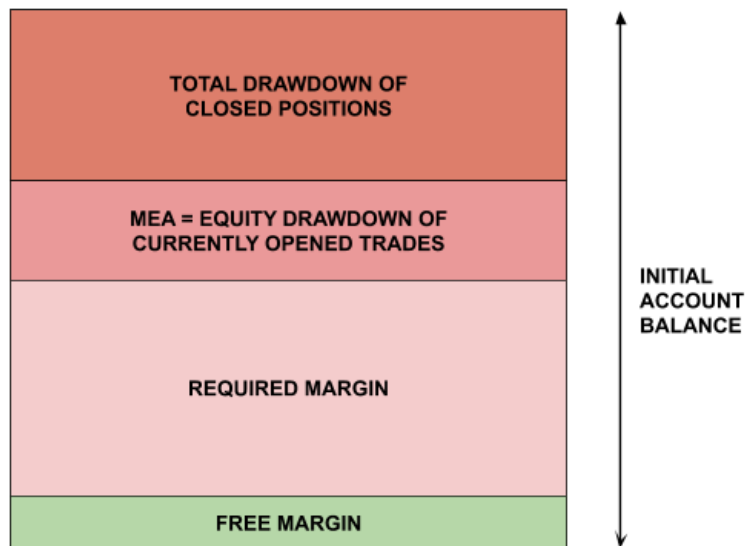


5) Proper account sizing

Account sizing, or trade sizing is very important, especially when trading futures (full/mini or micro contracts). It will determine your risk level, but also will have a large impact on diversification of your trading in general (= it will put a limit on the maximum number of strategies you can run on your account). For proper account sizing you need to take the following points into account (note that some of those topics will be discussed later in this guide):

- The maximum number of simultaneously opened trades (= number of trading systems)
- Maximum total expected drawdown (historical, or historical monte-carlo simulated drawdown)
- Maximum total expected equity drawdown of open trades (MEA = Maximum Adverse Excursion)
- Required margin per each traded instrument (= your broker's leverage) and maximum order size (contract size) per strategy.

Lucky for us all of the required information will be provided by the broker and our tools during the system design phase. So after doing our homework, we will get a clear overview of our account sizing. The figure below represents an overview of how money on our account will be divided.



The goal is to make sure our free margin level will never drop below the critical 'margin call' levels defined by our broker. Basically our account size should be always higher than the total sum of all of the red parts as presented by the figure. If your open account balance (=equity) drops below the level of the currently 'required margin', then you will get a 'margin call' notice from your broker. Basically they will start to automatically close your positions even if they are in a huge drawdown.

Figure below shows margin requirements for futures contracts on Tradestation broker:

Description	Symbol Root	Initial Margin	Maint. Margin	Day Trading Rate
Indexes				
E-MINI S&P 500	ES	\$12,100	\$11,000	25% of initial
E-MINI MIDCAP 400	EMD	\$14,850	\$13,500	NONE
E-MINI NASDAQ 100	NQ	\$17,600	\$16,000	25% of initial
MINI RUSSELL 2000 (CME)	RTY	\$7,150	\$6,500	25% of initial
MINI DOW JONES (\$5)	YM	\$9,900	\$9,000	25% of initial
MICRO ES	MES	\$1,210	\$1,100	25% of initial
MICRO NQ	MNQ	\$1,760	\$1,600	25% of initial
MICRO RUSSELL	M2K	\$715	\$650	25% of initial

Source: <https://www.tradestation.com/pricing/futures-margin-requirements/>

This is somewhat problematic, since it means that for example we need to have at least \$1760 of free available equity in our account, only to be able to open 1 contract position on micro NASDAQ futures market (MNQ). And this is not even including a possible intra-trade drawdown which can happen during every trade. So in practice we will need at least \$2500 or even more just to be able to trade 1 of our systems!

A good practice in the beginning is just to open 4 separate mini accounts (~\$3000) each and trade only one system per account! And we need to always closely monitor our draw-down and margin levels in order to not get into troubles!

6) Statistical significance



'Statistical significance' is another huge reason why most traders fail in their auto-trading. Why? Because nobody talks about it...and I really do not know why most people ignore this very important concept. So we will give this topic the attention it deserves;) Basically, statistical significance tells you one extremely important thing: **if you can 'trust' your results which you see in your backtests or forward tests** or is everything that you see just an illusion caused by noise or a random luck.

To make clear what statistical significance is, let's look at the scientific concept known as **P-Value**. I will try to explain that using two examples:

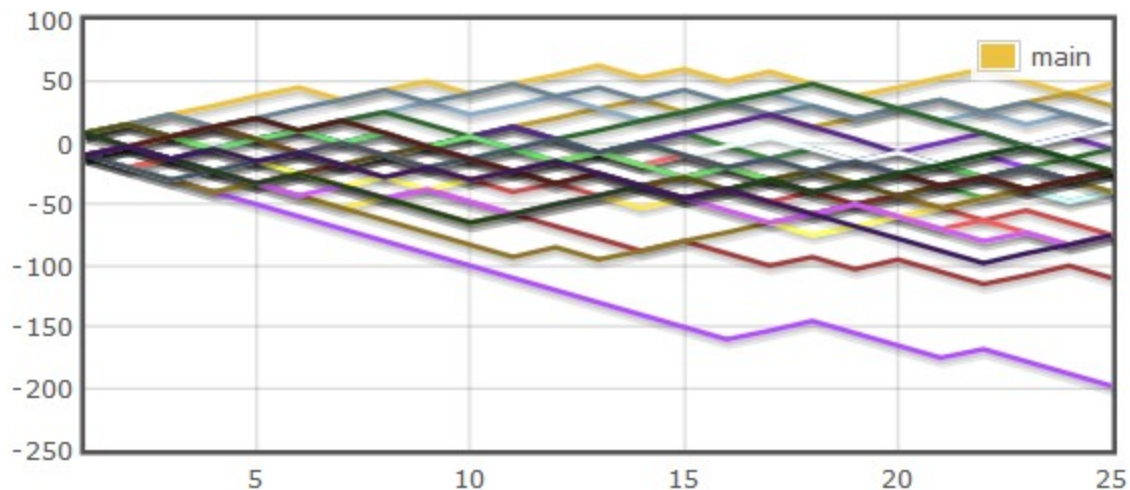
Example 1: The P-VALUE is calculated by big pharmaceutical corporations each time they are testing new drugs in order to check if a new drug is really effective or if the positive results are purely accidental (due to randomness or luck). So, for example they are running tests on 20 different test groups (each group has several hundreds of people) where only 1 group of 20 groups will get the real drug and the rest of groups will get fake drugs (candies). After some months they will compare if the results in this one group with the real drugs are really much better than all other 19 groups with fake drugs. If the results are significantly better, then it means that the calculated P-VALUE is 5% = 1 group out of 20 groups ($1/20 = 0.05 = 5\%$). This 5% is the minimal scientifically accepted level of P-VALUE, where you can assume that your results are statistically significant. Moreover, P-VALUE of 1% (1 out of 100) is much stronger than 5%. This also applies to trading and optimization, for each single optimization result you need to check what the resulting P-VALUE is and determine if this is a really profitable setting or just a random lucky shot.

Example 2: Imagine you claim to have a system or crystal ball (or a system) which is capable of predicting results from a simple coin toss sequence. Of course, I do not believe you and of course I want to test if you are telling the truth. So in order to test your claims I need to perform the following experiment: each time the coin will be thrown (heads or tail) I will write down your prediction upfront, but I will also write down all results from 19 other random prediction (for this I will use 19 different coins, which I will throw in parallel with the main coin to generate 19 random predictions). So, if your claim (or system) is right I need to see a significant difference in prediction accuracy between your predictions and my 19 randomly generated predictions, after some X-number of tosses. This is because my

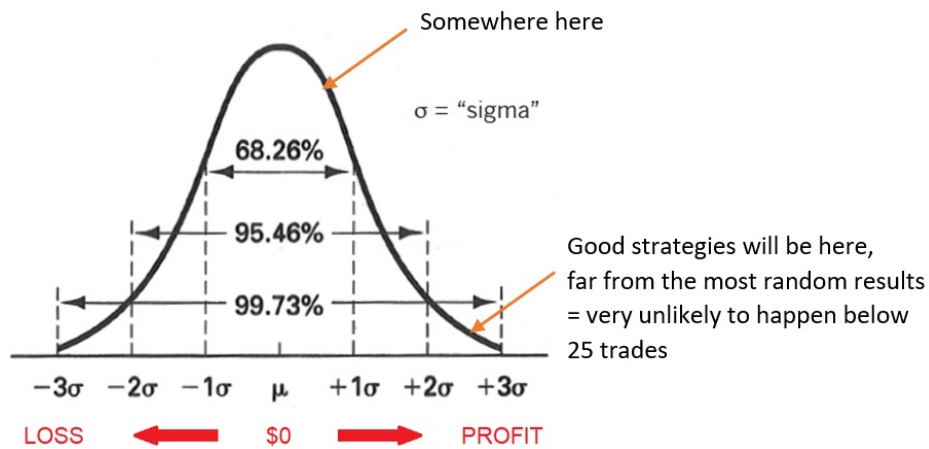
pure random predictions should always result in 50%/50% and your system (if valid) should give a much better win/loss ratio like e.g.: 60%/40%.

This simple test also gives you **the X number**. This number is the minimum required number of coin tosses (or trades), needed to be able to tell if a given system has any statistical winning edge (= statistical significance). So, for example if you see a profitable system after only 25 trades during the optimization, you need to compare this to at least 19 other random trading systems (like “random coin tosses” in example above). If one or more random results produces equal or better results than your optimized system, then it is NOT a statistically significant result. That is why it is almost impossible to optimize using short historical data or higher timeframes (like: daily/weekly basis), since each system will produce only a few trades. With only a few trades, when comparing the results to “random systems” those random systems will always produce similar or even better results! You will not know if your system is profitable or if the positive result during optimization is caused by a random/lucky shot.

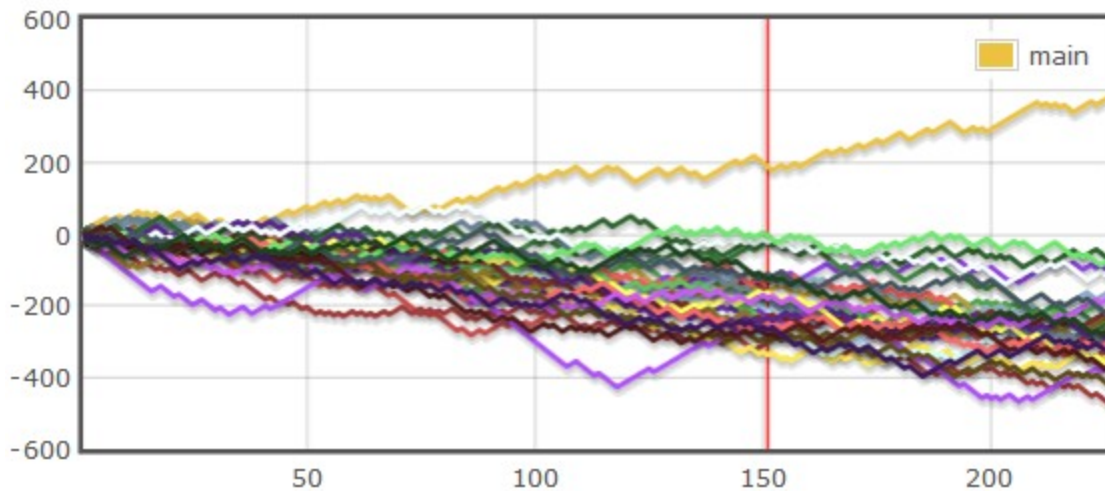
You can test it by yourself, but the minimum valid number of trades ≥ 50 . Only after 50 or more trades there will be some difference between all random systems and any other really profitable setting. 50 is the absolute minimum 150 or more is considered as stable (note: this number depends on 'degrees-of-freedom' used to generate a system...keep reading...). See the following example.



As you can see in the example above after 25 trades the result of our main strategy (gold line) is not much better than randomly distributed results (based on random entry strategy, = a random coin toss). In that case you can not say if this result is based on a good/robust strategy or just pure luck like shown by the results of random trading systems. This also means that the result is within 'first sigma' of probability distribution of all possible results, within a pure randomness, see next figure:



So, after only 25 trades it is very difficult to distinguish good strategies from random strategies. (Actually, there is one way, but I will explain it later). Thus, one way to check if the system can beat random systems is to increase the number of trades until there will be a huge difference between random strategies and the selected EA setting. See the following figure:



In this example the selected strategy (or setting) is profitable over the long term and results in a strong P-Value of 5% (since the final result beats 19 random strategies, 1 out of 20). Thus, in order to be able to say if the given setting is profitable or not we need to test it over a long(er) period of time using a high amount of trades! The optimization/backtesting results based on a (too) small amount of trades (<100) have very low STATISTICAL SIGNIFICANCE and cannot be trusted!

We like to see 600 trades or more in our 10 years backtest results! During development we will generate strategies with at least 40 trades a year!

7) Robustness of trading systems



In fact, using tools like StrategyQuant it is extremely easy to find many strategies with those beautiful equity curves that go only in the “up” direction on any selected market. But this is called ‘curve-fitting’ and this will get you nowhere near a profitable system. Lucky for us, we know how to test if a given system is ‘curve-fitted’ or not. We use: robustness testing. The idea of robustness testing is simple:

For each single good looking strategy with a beautiful equity curve we will try to disprove it! We will do anything we can to prove that this strategy is garbage, we hit it with our ‘sticks’, we will throw ‘rocks’ on it, we will put it on fire and IF and ONLY IF it will still survive all our efforts to kill it, then we can (only) ASSUME this strategy is not curve-fitted.

Of course we do not have sticks and rocks;) Instead, we will use our robustness testing procedures. Below just a few examples of standard robustness testing methods:

- Does strategy work on another timeframe?
- Does it work on a different market? Another symbol? Another pair?
- Does it work with increased slippage? How about high real-spread?
- And what will the equity curve look like, if we will shuffle the trade order?
- The same, if we will randomize our initial strategy settings?
- Can we re-optimize the initial strategy settings?
- How about using a different time window for our backtest?

Generally the robustness topic is so important, we will spend most of our time just on running several different robustness and stability tests. And we will select only a handful of strategies chosen from millions of candidates for our live trading. This will take most of our time so we need to find a way to limit the amount of tests! So, we did...! Below the most critical the most important test we do to determine the robustness level of our systems:

1. WFM and WFA test: the main core of our robustness testing is walk-forward based. Why? Because we look at what other professional traders do! They rely on this one specific characteristic of a system called: Walk-Forward efficiency! (Just read the books of the legendary trader [Robert E. Pardo](#).) Moreover there are countless publications/books and proven results that basically say the same thing: if re-optimized parameters during a walk-forward optimization run show a good healthy improvement w.r.t. the original strategy settings, then we have an increased chance of continuation of this profitable behaviour on the future out-of-sample data.
2. Monte-carlo parameter test: after millions of tests we have concluded that if this test passes then there is an increased chance that all other monte-carlo tests will also pass.

3. Additional OOS testing: hereby we will ALWAYS reserve some part of our most recent historical data in order to see how our system behaves after it comes directly out of our workflow!
4. Other markets test: a very important test that shows us if a given system has been curve-fitted to selected market/historical data or if it has a true winning edge that also works on a different un-seen out-of-sample data from a different, but correlated market. In this test we can see if our system has not been curve-fitted to some random market noise in our in-sample historical data which happens very frequently while building systems using SQX builder module.

That's it, these are the minimum required tests to ensure our systems have not been totally curve-fitted. In the end this will not give us 100% guarantee, but it will increase our chances of finding robust systems!

8) Diversification



Diversification in trading simply means: "NOT putting all of our eggs into one basket". We will spread our risk and increase our chances of winning by trading on several different (preferably uncorrelated) markets. Assuming that when one strategy is losing because of some unexpected unfavorable market conditions, then all other systems will cover for this loss: "one for all, all for one" idea. Diversification does the following to your trading results:

- It lowers the risk of being wiped out due to some black swan event.
- It lowers the total drawdown on the portfolio level.
- It increases the total return/drawdown ratio (RetDD figure).
- It increases the number of trades of your portfolio.

To achieve this we need systems with low correlation. A "correlation" is a measure of how one system is correlated (look-alike) vs another system or w.r.t. a group of trading strategies on the portfolio level. In order to stay well diversified (as discussed in the previous section) we need to keep system to system correlation as low as possible. Correlation can be automatically calculated using internal features of SQX or QA tools (it will be discussed in the practical part of this guide). Our target is to minimize our portfolio correlation number, which is calculated based on the monthly profit/loss figures.

Naturally we like all of those positive aspects of diversification, however you must remember that this topic is also linked to the 'account sizing' issue as discussed in previous sections.

Diversification is a great way to reduce the total risk, but only if it fits well into our account sizing strategy! So it is great if you can afford it by trading many different systems on a larger account! How many? It's hard to say... 6 is better than 3, but when trading more than 15 systems on 1 account, then you are probably

over-trading! There is no hard rule, sometimes only 1 very good, robust and very profitable system is enough to make you happy :)

9) Data correlation: WYSIWYG



Data correlation = a forgotten, but an extremely important topic. Data correlation is the measure of how well your back tested results correlate to your live trading results on your live account. We've spent years on this topic only to conclude that there are not many brokers where we could achieve acceptable correlation between our backtested results and live trades on a live account. That's one of the main reasons why we have abandoned MT4/MT5 FX oriented brokers:

- FX oriented brokers do not provide they historical data
- FX oriented brokers have very poor liquidity and trade execution (slippages, spreads delays, etc...)

Assume you have produced beautiful ultra robust strategies in your SQX, and then after few months of live trading on your live account you will probably see this one thing:

The results from your live account do not look as pretty as the backtested results in your SQX over the same period of time!

The main reason = lack of correlation between your historical data and tick data on your live account! Basically your strategies are developed on other/different data than tick data streamed to your trading platform by your broker!

The second reason = your strategies are developed using different order execution conditions (slippage, spread, delays) than what you get on your broker!

This all will make you very unhappy after a few months of trading when you will realize that your SQX results are still OK on most recent OOS data and your live results are far from being perfect or profitable. So, a good data correlation is THE MOST FORGOTTEN KEY to successful system trading, and it is very hard to accomplish on a Forex oriented broker (MT4/MT5). That is the number 1 reason why after so many years of trying we have switched to a semi-professional broker like Tradestation.

About Tradestation platform and broker:

- It's a semi-professional broker allowing small and professional traders as its customers
- They provide their accurate M1 historical data, you can easily import to your SQX in order to design your systems on real historical data
- They have huge liquidity and fast market access, this means very good order execution conditions, low delays, low slippages

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