**Mechanical systems: what to trade and how to choose your time frame**

Recently we had quite a productive discussion with regard to the question about the profitability of HFT algos. I have announced there that I would post some of my findings here and ask for a feedback.   
  
Here is the bottom line my findings (you can find more details and results here:[http://eliteforex101.com/files/EliteForex101Overview.pdf](http://www.linkedin.com/redirect?url=http%3A%2F%2Feliteforex101%2Ecom%2Ffiles%2FEliteForex101Overview%2Epdf&urlhash=jrSP&_t=tracking_anet" \t "blank)).  
  
I. Forex  
1) The best Forex pair to trade with mechanical momentum and trend following strategies is EUR/USD.  
2) The best and most stable EUR/USD algorithms are found within higher (>4 hour) non-standard time frames.  
3) The SL for EUR/USD should never be higher than 40 pips  
4) The TP for EUR/USD should never be higher than 60 pips  
5) Trading should occur 24 hours per day - there is no such a thing like an optimal time  
II. Dax  
1) The best time frames to trade the Dax are those under 40 minutes  
2) The SL should never be higher than 30 points  
3) The TP should not exceed 60 points  
  
Basically I use for all my mechanical trading one single algo and trade EUR/USD and the Dax future only. The only variation is the time frame and the SL/TP setting but the algo doesn't have any other input variables but adjusts itself based on the market volatility and range.   
  
This algo has been able to consistently generate profits over 16 months of live trading on EUR/USD and Dax future. Since the Yen volatility has picked up recently I also use the algo on EUR/JPY and it is profitable.  
  
When it comes to other Forex pairs I was not able to design a system which could show consistent profitability over a longer period of time (>12 months). Maybe somebody was more successful than me in this area?  
  
I would appreciate any constructive feedback. Also it would be great if other members of this forum would also share their findings and in this way we could help each other to find directions for our future research.

[**Vlad Shurupov**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=6326697) • Tzvetomir, welcome to the club! You have done a great job. EUR/USD is probably the most mathematically elegant currency pair on the planet. Its behaviour in multiple frequency ranges looks almost too good to be true. Ride it, but constantly monitor the Walk Forward Efficiency. USD/JPY was very interesting for a while, but the game changed (the quant FX traders out there know what I am referring to). Have you looked at USDCNH yet? :-)

[**Vlad Shurupov**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=6326697) • I forgot to mention that if you operate with volatility units and rather than absolute pips, your strategies will be a little more generic and have a better equity curve.

[**Tzvetomir Vassilev**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=127891550) • Vlad, thanks for the feedback! I didn't look at USDCNH yet but will do so. Thanks for the suggestion regarding volatility units. I have been thinking about this too but I need to find a really good replacement for the absolute pip values because it is not a trivial problem. As soon as I have some more time for research I will be working on a proprietary formula for calculating volatility-based stops and targets out of the current price action profile. Another area of research and tests will be the substitution of the time frame basis of the algorithm with alternative scales and compare the results. And last but not least - currently the algorithm works with a single entry and single exit but the results can be improved by adding a scaling in and scaling out algorithm: some first tests have shown an improvement of factor 2 with a minimal effect on the dd.

[**Vlad Shurupov**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=6326697) • My pleasure. My approach to EURUSD is very "polarised". I diversify across (<H1) and (>=D1) strategies. Interestingly enough, the short-term one produced very similar results to yours, but the shape of your equity curve looks more attractive. I have higher upward volatility of returns as I do not employ profit targets. My stop losses, drifts, tolerance boundaries, stop "locks" are measured in units of volatility.   
  
You might consider implementing the scaling in and out behaviour by pairing two instances of the same strategy fine-tuned to different frequency ranges and/or range expansion levels.   
  
USDCNH is a young market with a lot of potential.

[**Vasily Nekrasov**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=23263190) • Hi Tzvetomir,  
  
your results look very impressive, esp. w.r.t. such a small drawdown.  
  
However, as investor I would doubt since:  
\* Your Strategy EURUSD\_1: Profitable: 64.04%, Return on initial capital: 41.64%  
Max draw down on initial capital: 4.05%  
\* From your message above: The SL for EUR/USD should never be higher than 40 pips  
The TP for EUR/USD should never be higher than 60 pips  
  
So TP/SL = 1.5, 64.04% profitable trades and only 4.05% drawdown???  
(Additionally, if we assume the spread of 2 pips then TP/SL = 58 / 42 = 1.38)  
  
Sincerely  
Vasily

[**Tzvetomir Vassilev**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=127891550) • Hi Vasily,   
  
Thx for your feedback! Pls allow me to keep my exact SL and TP a secret :) I have only given a range as a hint for those who work on strategies for EUR/USD. One hint for you: two of the strategies have actually a TP slightly less than the SL... The profit and dd numbers are correct and even a bit adjusted to the downside: to every trade has been added a spread and slippage of total 3 pips. On a real account the spread and slippage of EUR/USD have been around 1.5 pip: so you can add this 1.5 x #trades to the results :)   
All results are out of sample and the algo behind really kicks ass. My only aim with this discussion was to share some important findings and to get some ideas from other strategy developers and traders in exchange. So if you have something pls go ahead and share.   
  
Best Regards   
Tzvetomir

[**Vasily Nekrasov**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=23263190) • Well, probably my "common sense" doubts were superficial. Actually, the pair {termWealth, maxDD} depends very much on money management. Here is an R-script which tries to validate your strategy for the plausibility. For 400 trades a pair {41.64%, 4.05%} is plausible under your TP/SL and percentage of profitable trades.   
However, it seems to be that you risk approx. 0.15% of capital pro trade. How much money should one have in order to make it realistic?! (A position size is not infinitely divisible and the brokers usually impose pretty large minimal position size).  
  
library(tseries)  
N = 1000  
trades = 400  
stakePerTrade = 0.0015  
pl = 1.38  
maxDD = array(0.0, dim=N)  
termWealth = array(0.0, dim=N)  
for(i in 1:N)  
{  
results = rbinom(trades, 1, 0.64)  
wealth = array(1.0, dim=(trades+1))  
for(k in 2:(trades+1))  
{  
if(results[k-1] == 1)  
{  
wealth[k] = wealth[k-1] \* (1 + stakePerTrade \* pl)  
} else  
{  
wealth[k] = wealth[k-1] \* (1 - stakePerTrade )  
}  
}  
  
maxDD[i] = (maxdrawdown(wealth))[[1]]  
termWealth[i] = wealth[trades]  
}  
par(mfrow=c(1,2))  
plot((density(termWealth)))  
plot((density(maxDD)))

[**Tzvetomir Vassilev**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=127891550) • I don't fully understand your question but maybe following example would make it more clear: If you trade the strategy with 1 standard lot per position and don't increase the position size based on equity growth then your net profit would be around 61000 and your maximal equity dd around 4000 USD. Apply this to a 100.000 USD account and you get a realistic scenario. Of course you could apply a higher leverage and tripple your account by allowing around 15% dd.

[**Vlad Shurupov**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=6326697) • Vasily, risking 0.15% in this style of trading is not uncommon. Fractional lots in spot FX provide you sufficient granularity at no additional cost. Nice R script!

[**Tzvetomir Vassilev**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=127891550) • I had to update the presentation due to a copy paste error (on slide 13 the dd is not 32.3% but 0.33%). You can download the updated version from the same link: [http://eliteforex101.com/files/EliteForex101Overview.pdf](http://www.linkedin.com/redirect?url=http%3A%2F%2Feliteforex101%2Ecom%2Ffiles%2FEliteForex101Overview%2Epdf&urlhash=jrSP&_t=tracking_disc)

[**Maros Fric**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=4891621) • perhaps little bit off topic, but how have you found the algo you are using in your strategies?   
Did you use some data mining or you developed it from observation?   
  
Would you give some hint what is it based on?

[**Tzvetomir Vassilev**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=127891550) • Maros, I used some knowledge in mathematics left in my brain, a pen and a piece of paper and finally EasyLanguage in order to code it... I don't use data mining because it just gives you the illusion that you have found something which is just not there...

great links - thanks! Pls check also following source for Forex tick data (it is one of the best free available tick data): [http://www.truefx.com](http://www.linkedin.com/redirect?url=http%3A%2F%2Fwww%2Etruefx%2Ecom&urlhash=oJPn&_t=tracking_disc)

[**Tzvetomir Vassilev**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=127891550) • Some of you have asked me about back tests. I also was curious and therefore I have run back tests of my EURUSD strategies for the last 12 years (01.01.2001-30.11.2012). You can find the results in the updated presentation:[http://eliteforex101.com/files/EliteForex101Overview.pdf](http://www.linkedin.com/redirect?url=http%3A%2F%2Feliteforex101%2Ecom%2Ffiles%2FEliteForex101Overview%2Epdf&urlhash=jrSP&_t=tracking_disc" \t "blank)   
Bottom line: the back tests provide the same picture like the live trading results.

[**Tzvetomir Vassilev**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=127891550) • Here is all you need for building your bridge to IB:[http://www.interactivebrokers.com/en/?f=programInterface](http://www.linkedin.com/redirect?url=http%3A%2F%2Fwww%2Einteractivebrokers%2Ecom%2Fen%2F%3Ff%3DprogramInterface&urlhash=HHBn&_t=tracking_disc" \t "blank)

[**Mark Brown mark@markbrown.com**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=56072165) • a successful model will not be time frame dependent. it will not experience any slippage on order execution. it will adapt to its environment and switch between trending and non trending methods. it will perform well with a broad range of optimized settings. it will test out on synthetic created data as well as actual data on millions of data points not just a few hundred. etc. ~m

[**Tzvetomir Vassilev**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=127891550) • Mark,   
  
many thanks for providing feedback - I will think more deeply about every point and see how I can utilize it. Here are just some brief comments:   
  
My algo remains profitable on a very broad range of time frames - this is a sort of time frame independence but I will be looking also at volatility-based units (as also suggested by Vlad) to see if the results can be further improved.   
  
The access to good liquidity and execution is the primary factor for achieving low slippage - with EURUSD the slippage has been near zero.   
  
I have tested the algo on all available data for EURUSD (since 01.01.2001). Recently I have also tested the algo on other assets with positive results and from January on I will be trading live XAUUSD and GBPUSD. Additional assets will be added.   
  
My algorithm has only one sensitivity parameter with 3 possible values but I use only one value (for all values the algorithm shows positive results). Also it is possible to set a fixed SL/TP - the results stay positive for a really broad range of settings and also if you don't use SL/TP at all. In that sense there is no optimization of settings - you can just use different instances in order to achieve slightly different behavior and capture different parts of the moves.   
  
It is important to state that I have not been using an empirical method based on data mining to arrive to the algorithm. Instead I have been using an analytic approach (theory -> model -> algorithm).   
  
Btw: Can you provide an example (back test, live trading results) of some model of yours which comes close to your criteria?   
  
Best Regards,   
Tzvetomir

[**Truong Vinh Vu**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=98854727) • Hi Tzvetomir, thanks for your nice sharing.   
May I ask what kind of strategy you are developing in terms of trending following or mean reversion? and is this on a basket of pair or just single one? Did you test it on tick-to-tick historical data or one some coalesced data?   
Thanks again in advances

[**Dwayne Paschall**](http://www.linkedin.com/groups?viewMemberFeed=&gid=62719&memberID=57125244) • We also use this:  
  
Intraday News Analytics from EOTPRO and Thomson Reuters  
  
[https://docs.google.com/open?id=0ByUhXypJM\_S3dVFPVnhqRzRhSXc](http://www.linkedin.com/redirect?url=https%3A%2F%2Fdocs%2Egoogle%2Ecom%2Fopen%3Fid%3D0ByUhXypJM_S3dVFPVnhqRzRhSXc&urlhash=tBWc&_t=tracking_disc)