Encoding Trader 'Horse-Sense':
Experiments using Historical Foreign Exchange Data

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Introduction

- **horse-sense** *colloq. (orig. U.S.)*
  "A coarse, robust, and conspicuous form of shrewdness."
- Early reference: 1870 Nation (N.Y.) 18 Aug. 105
  "The new phrase – born in the West, we believe – of 'horse-sense', which is applied to the intellectual ability of men who exceed others in practical wisdom." (OED)

Introduction

- A classical (pre-connectionist, pre-Bayesian network) artificial intelligence paradigm:
  - Logical or algorithmic encoding of heuristic procedures.
  - Incorporation into computational processes.

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Introduction

- *Trade with the trend.*
- *Cut losses short.*
- *Let gains run.*

These three trading dictums, which we characterize as "horse-sense" trading principles, are often found explicated in lay-audience treatments of trading.

Introduction

Tools and Tactics for the Master Day Trader
– Oliver L. Velez, Greg Capra

Trader Vic–Methods of a Wall Street Master
– Victor Sperandeo and T. Sullivan Brown

The Four Cardinal Principles of Trading
– Bruce Babcock

Lessons from the Greatest Stock Traders of All Time
– John Bok

How to Trade Stocks
– Jesse Livermore

Introduction

- What do they mean?
- Can they can be gainfully incorporated into computational trading?
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Spoiler

- We find some evidence that suitable encoding and application of the three dicta can result in a parameterized trading model in which historically-inferred parameter values yield returns exceeding those of the same strategy with randomized parameters; that is:
  - A strategy that chooses parameters by inspecting historical data behaves differently vs.
  - A strategy that ignores the historical data.

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Formulating "Cut Losses Short"

- What does this mean?
  - Don't allow an (unrealized) loss on a position to influence a decision to close.
  - A natural emotional reaction to an unrealized loss is to hope that it will reverse.
  - In fact, the greater the unrealized loss, the more difficult it is to close the position – converting an unrealized loss to a realized loss is painful.
  - Maintain a loss threshold, and if it is exceeded, cut the loss short and take the hit.

Formulating "Let Gains Run"

- What does this mean?
  - Don't allow an (unrealized) gain on a position to influence a decision to close.
  - A natural emotional reaction to an unrealized gain is to fear that it will vanish.
  - Maintain a gain threshold, and until it is exceeded, hold the position.
  - If the gain evaporates, so be it.

Asymmetric Trading – the Trailing Stop

Asymmetric Trading – the Trailing Stop

Sometimes very helpful:

(Note that vertical scale is log!)

Asymmetric Trading – the Trailing Stop

- Use of trailing stop could be regarded as a single mechanism that captures both sides of:
  - cut losses short
  - let gains run

  in a disciplined way.

Formulating "The Trend"

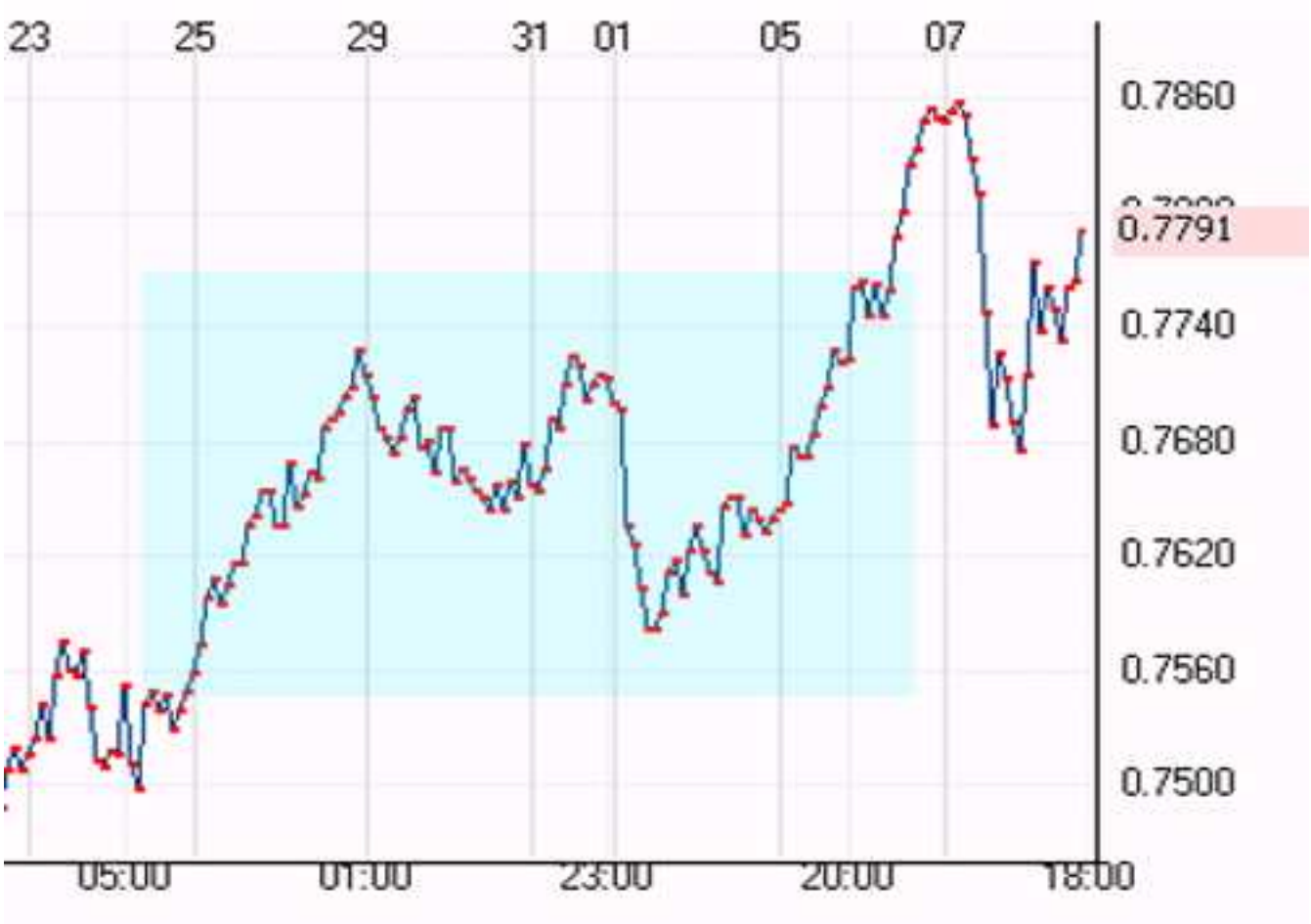
- Definition of trend here based on heuristics loosely derived from the writings of Jesse Livermore (the "World's Greatest Stock Trader"),
  - Born July 26, 1877, began "bucket shop" trading at age 15, eventually reached sufficient notoriety due to his gains that the bucket shops collaboratively blacklisted him.
  - Gained $3M by shorting in the crash of 1907.
  - Lost most of that on one bad cotton future trade by repeatedly adding to a losing position.
  - Gained $100M shorting in the crash of 1929.
  - Managed to lose most of that by 1934.
  - Went bankrupt.
  - Died ignobly on November 28, 1940.

Formulating "The Trend"

- Define an "upward trend"
  - a "peak" is detected,
  - retreated from,
  - then surpassed,

  all within a given time window.
- A "peak" is just a net downward change in price by a specified amount, within the time window.
- So, "upward trend" = a peak, a dip, then a surpassing recovery.
- "Downward trend" is the complement.

Formulating "The Trend"



"Agent"-based Approach

- Agents (software entities) watch for formation of trends, and open and close positions accordingly using trailing stops.
- Dimensions of agent parameter space:
  - window size
  - peak size
  - trailing-stop size

Agent Parameter Space

- 3-dimensional agent parameter space:
  - Sliding window length: 0.7 to 25 days, logarithmically spaced, 16 values.
  - Peak size (minimum dip): 7 to 350 pips, logarithmically spaced, 16 values.
  - Trailing stop spread: 6 to 300 pips, logarithmically spaced, 16 values.
- Each agent's behavior is governed by one triple within the parameter space.
- The entire population of agents numbers 16 x 16 x 16 = 4096.

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- Experiment: Divide the historical data in half. Call the earlier half "in sample", and the later half "out of sample".
  - Allow all 4096 agents to perform hypothetical trades on the in-sample data.
  - For each agent, record
    - the highest net gain (gain relative to initial capital),
    - the lowest net gain, and
    - the final net gain.
- Each agent gets a score given by the sum of these three figures. (Why: this (very crudely) correlates with average net gain (from initial capital) of agent during trial.)
- The ten highest-scoring agents participate in out-of-sample test.

The Arbitor

- After in-sample run, choose the agents with the ten highest scores.
- Using the out-of-sample data, begin hypothetical trading with these ten agents.
- For each agent, the *arbitor* maintains a sliding average of that agent's net gain.
- At regular intervals, the arbitor chooses the agent with the highest sliding-average net-gain currently (rotating strat.).
- The arbitor (actually) executes the (hypothetical) trades indicated by the chosen agent, for the duration of the current interval. The hypothetical trades of the other agents are computed but not used by the arbitor.

The Arbitor

- Selecting ten agents from the agent parameter-space amounts to choosing 30 parameters of a trading model.
- If in-sample price-change behavior contains no information about out-of-sample price-change behavior, then a choice of the 30 parameters based on inspection of the in-sample price data should, on average, perform as well as (i.e. not better than) 30 parameters chosen randomly from the parameter-space.
- In practice, we chose ten arbitrary agents and compared their performance with the ten highest-scoring agents from the in-sample run.

Agent Performance on Out-of-sample Data

Bse.	Ctr.	Best 10 Net Gain	Rand. 10 Net Gain			Bse.	Ctr.	Best 10 Net Gain	Rand. 10 Net Gain			Bse.	Ctr.	Best 10 Net Gain	Rand. 10 Net Gain		
AUD	JPY	568	-1822	x		2AU	JPY	-2486	-1936		x	2US	BEF	-16884	-98093	x	
AUD	USD	-1591	-1463		x	2AU	USD	-2081	-2367	x		2US	CAD	-618	-1679	x	
CAD	JPY	66	-11	x		2CH	JPY	-1132	-4266	x		2US	CHF	-2636	-2606		x
CHF	JPY	-1093	-1513	x		2DE	CHF	-577	-995	x		2US	DEM	-2705	-2834	x	
EUR	AUD	449	119	x		2DE	JPY	-1100	-4167	x		2US	DKK	-302	-519	x	
EUR	CAD	-14	-241	x		2EU	CHF	-576	-2272	x		2US	ESP	-3422	-35666	x	
EUR	CHF	-689	-513		x	2EU	GBP	-1245	-900		x	2US	FIM	-9183	-14966	x	
EUR	GBP	-910	-1371	x		2EU	JPY	-3427	-2839		x	2US	FRF	-12515	-7445		x
EUR	JPY	-733	-806	x		2EU	USD	-1852	-1885	x		2US	HUF	-9467	-32301	x	
EUR	USD	-90	-404	x		2GB	CHF	-6640	-15984	x		2US	ITL	-4540	-2185		x
GBP	CHF	-2437	-4534	x		2GB	DEM	-6057	-14504	x		2US	JPY	-961	-5185	x	
GBP	JPY	398	-1619	x		2GB	EUR	-2545	-6010	x		2US	NLG	-1757	254		x
GBP	USD	501	-1571	x		2GB	JPY	-711	-3134	x		2US	NOK	-1290	-56626	x	
USD	CAD	-366	-2011	x		2GB	USD	317	-5982	x		2US	SEK	-1790	-28980	x	
USD	CHF	-1498	-3106	x		2NZ	USD	-1007	-2022	x		2US	SGD	-2341	-872		x
USD	JPY	-1715	-1645		x	2US	ATS	-1451	-34846	x							

Performance of best ten agents and of random ten agents on out-of-sample historical data.