Market Time Data™ - Improving Technical Analysis and Trading

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Outline

- Objectives
- Market Time Data™
- Statistical results
- Trading system results
- Market State™ results
- Extensions to daily data
- Daily data results
- Summary

Objectives

- Introduce Market Time Data™ concept
- Demonstrate that Market Time Data™ improves technical analysis and trading systems
- Extend the concept to daily data
- Demonstrate the economic usefulness at the daily time frame

Market Time Data (MTD)

- Seasonalities and stylized facts effect technical indicators and trading systems
- Want to remove these artifacts
  - Uncover the "true market signal"
  - Remove noise
- MTD is a *dynamically* sampled data stream that does this
- A market time "minute" depends on what the instrument is doing - activity.
  - Mandelbrot, Stock, Clark, Olsen...

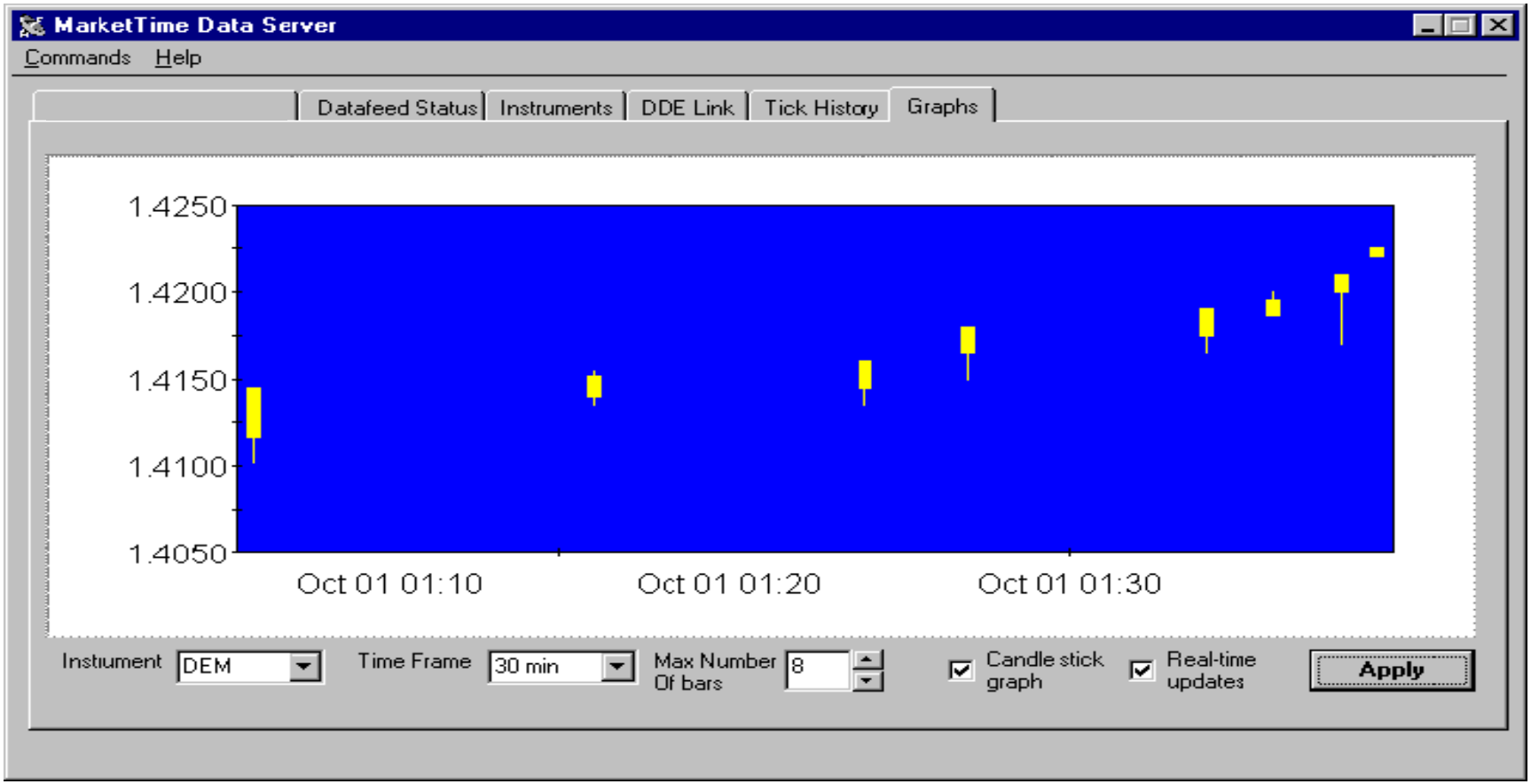
Dynamic Sampling

- Sampling is based on a measure of activity in the market
  - FX markets are indicative price based
  - Other markets use volume in addition to price
  - Do not use tick counts
- Continually updates to go with market movements and transients
- Not a static look-up table of times to sample the data
- On average normalize a week in Market Time to a week in physical time

Market Time Data Server™

- Implements MTD concepts
- Hybrid Reuters Triarch™ application
- Windows NT™ 4.0
- Consumes tick data
  - DEM=
- Publishes market time bars for further use
  - Open, high, low, close
  - Date and time
  - lDEM05M=, lDEM10M=, lDEM15M=, lDEM20M=, lDEM30M=, lDEM45M=, lDEM60M=
- Any Triarch application can now use MTD

MTDS Screen Shot



Statistical Tests

- Look at the efficiency of MTD vs. standard data
- Two statistical tests
  - Correlation coefficient: level of statistical significance
  - Directional forecasts: % correct
- Look 1 to 20 bars in the future after an event
- An event is a signal from a technical indicator
  - Moving average crossover
  - Channel breakout

Correlation Results

	DEM/USD		JPY/USD	
Bars	**MT**	**PT**	**MT**	**PT**
1	**42%**	72%	**0%**	53%
2	**11%**	70%	**0%**	21%
5	**5%**	25%	**1%**	99%
10	**16%**	40%	**4%**	67%

	GBP/USD		JPY/DEM	
Bars	**MT**	**PT**	**MT**	**PT**
1	**2%**	30%	45%	**4%**
2	**0%**	22%	23%	**4%**
5	**14%**	32%	**2%**	6%
10	**3%**	57%	**3%**	53%

Directional Forecasting Results

	DEM/ USD		JPY/ USD	
Bars	**MT**	**PT**	**MT**	**PT**
1	**50%**	36%	**45%**	44%
2	**47%**	39%	**48%**	45%
5	**46%**	41%	**48%**	47%
10	**49%**	42%	**50%**	**50%**

	GBP/ USD		JPY/ DEM	
Bars	**MT**	**PT**	**MT**	**PT**
1	**48%**	42%	**48%**	44%
2	**45%**	43%	**50%**	42%
5	**50%**	45%	**45%**	43%
10	**49%**	48%	**49%**	**49%**

Trading System Test

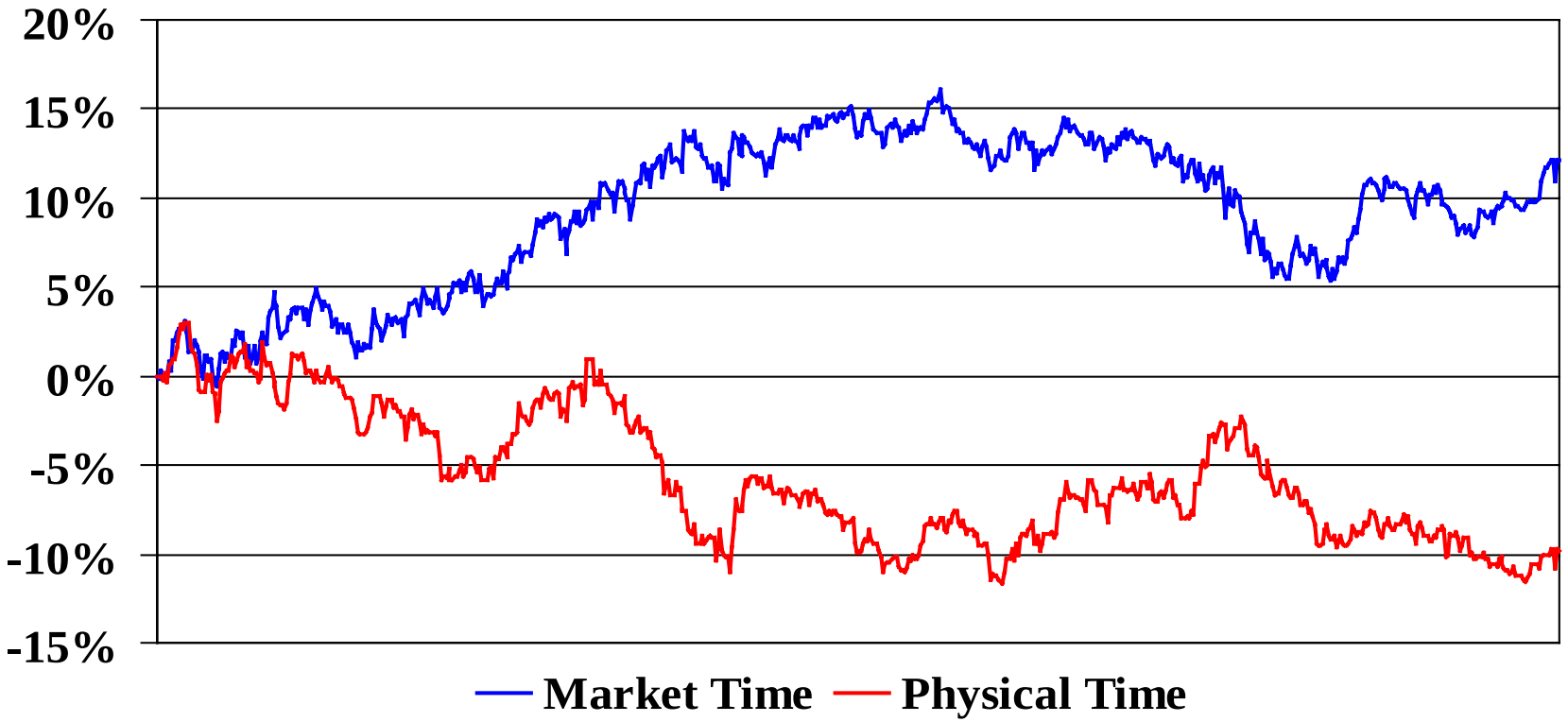
- Look at simple moving average based systems
  - Single SMA
  - SAR system
- Three time frames
  - Short: about 1 day
  - Medium: about 2-3 days
  - Long: about 1 month

Trading System Results

	DEM/ USD		JPY/ USD	
System	**MT**	**PT**	**MT**	**PT**
Short	**1.2 (11.1)**	-9.8 (12.1)	**82.6 (5.4)**	30.0 (5.0)
Medium	**6.2 (8.3)**	-10.6 (11.2)	**55.0 (5.9)**	8.9 (7.5)
Long	-6.5 (11.7)	**-6.3 (-11.7)**	**29.0 (9.2)**	4.7 (8.2)

	GBP/ USD		JPY/ DEM	
System	**MT**	**PT**	**MT**	**PT**
Short	**28.0 (7.7)**	17.3 (9.3)	**8.5 (10.5)**	5.0 (7.5)
Medium	**19.0 (7.4)**	8.2 (9.9)	**-4.1 (19.4)**	-6.7 (20.0)
Long	8.6 (16.5)	**16.4 (10.2)**	**4.2 (10.2)**	-5.6 (13.1)

DEM/USD 1993-94



Support & Resistance

- Curcio et. al. (1997) have examined support & resistance rules using intraday data (1 hour physical time)
- S&R did not hold up well before or after transaction costs
- Modified study
  - Look for breakouts above or below a local Min or Max value N-bars back (N = 50-200)
  - Hold position for 12 bars
  - Examine both physical time and Market Time data

Support & Resistance Results

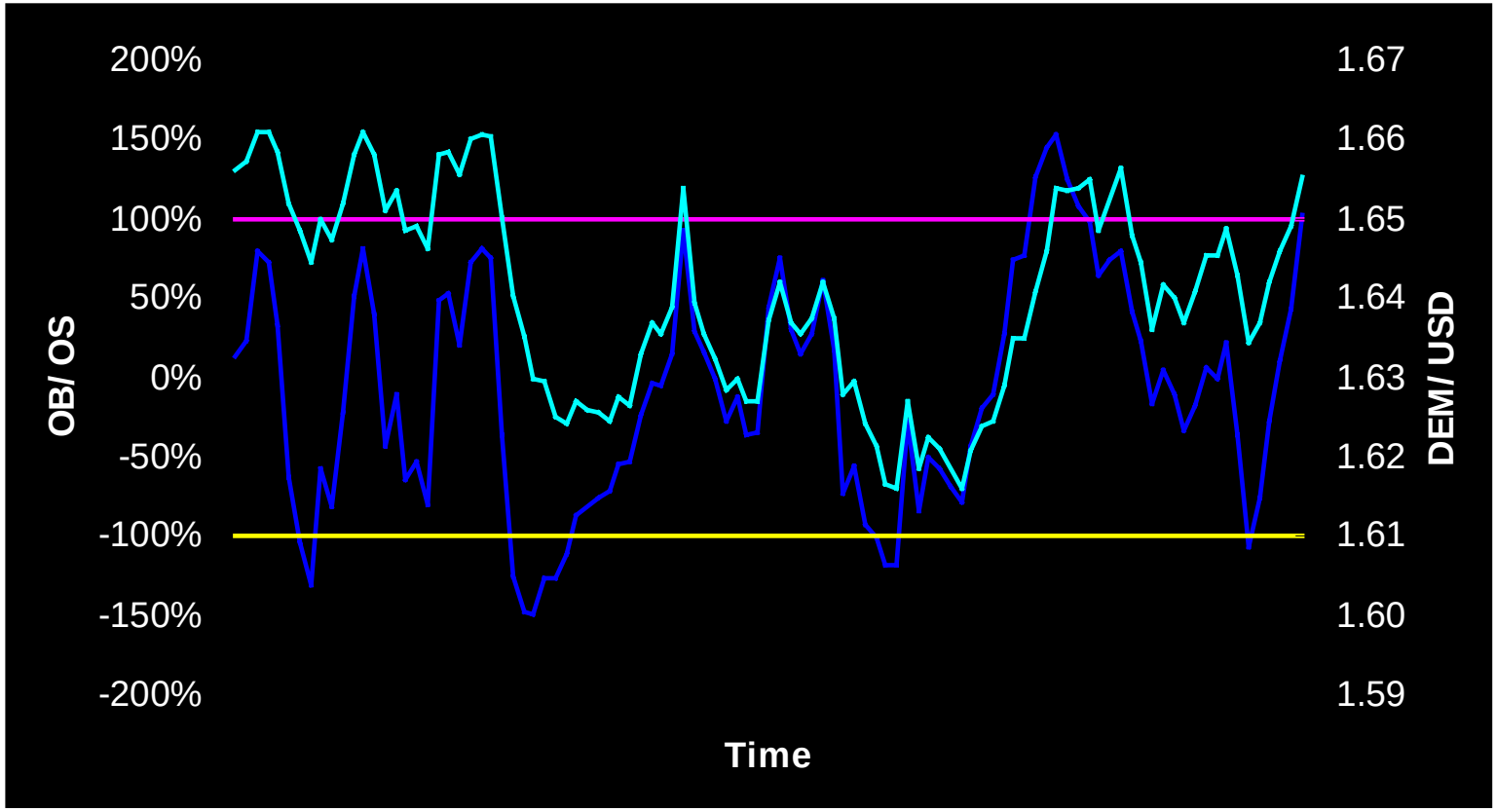
Channel Length	DEM/ USD		JPY/ USD	
	MT	PT	MT	PT
50	**6.4 (4.5)**	1.3 (8.2)	**1.0 (7.4)**	- 5.0 (11)
100	**7.4 (3.4)**	- 0.5 (8.8)	**2.3 (8.2)**	0.3 (5.0)
150	**3.4 (3.7)**	2.3 (6.6)	**2.3 (5.6)**	0.5 (5.1)
200	**1.5 (4.4)**	0.2 (5.4)	**2.0 (4.5)**	- 6.0 (8.7)

Channel Length	GBP/ USD		JPY/ DEM	
	MT	PT	MT	PT
50	**2.2 (9.9)**	- 2.3 (14)	**5.6 (9.1)**	4.0 (13.3)
100	1.2 (6.0)	**1.3 (7.5)**	**6.7 (5.3)**	- 1.5 (7.2)
150	**1.2 (5.1)**	- 4.1 (6.9)	1.8 (6.4)	**3.2 (6.1)**
200	**0.2 (5.2)**	- 7.5 (9.1)	**2.9 (4.7)**	0.4 (7.4)

Market State

- Proprietary OB/OS indicator
- Calculated with MTD in 1 hour time frame
- Can define simple trading system
  - Sell on crossover from overbought
  - Buy on the crossover from oversold
  - Close out position on zero crossing
- Return 7.2%, MaxDD 4.1%, 36 trades, in the market 25% of the time

Market State Example



Extensions to Daily Data

- Based on customer demand
  - Traders want a daily bar
  - A 24 hour Market Time bar is not compatible with their requirements
- Use a scaling principal
  - Expand or weight higher then average movements
- Use a long term and short term measure of activity on a daily data series

FxDx

- Trend following currency trading benchmark from BNP
  - 3 simple moving averages
  - 7 currency pairs
  - Weighted by Dealing 2000 volume
- High correlation to currency manager benchmarks and individual trend following traders

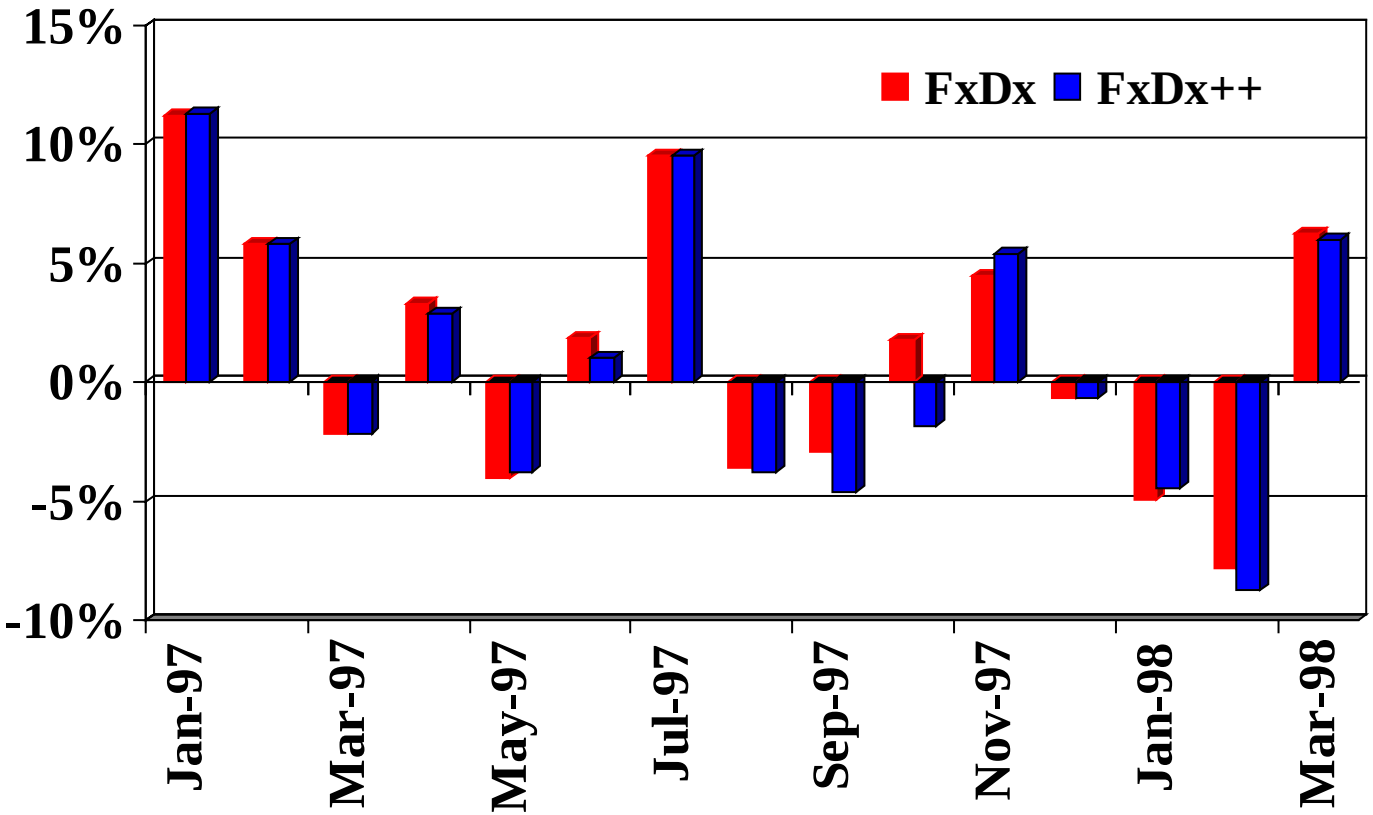
FxDx Experiment

- Compute two versions
  - FxDx standard version
  - FxDx++ use DMTD
- Compare return and risk statistics

FxDx Results 1987-1996

- Average out performance of FxDx++ is over 1% per year
- FxDx++ outperforms FxDx
  - 60% of the months
  - 7 out of 10 years
- Sharpe ratio of 0.91 vs. 0.86
- T-Test: 10% level

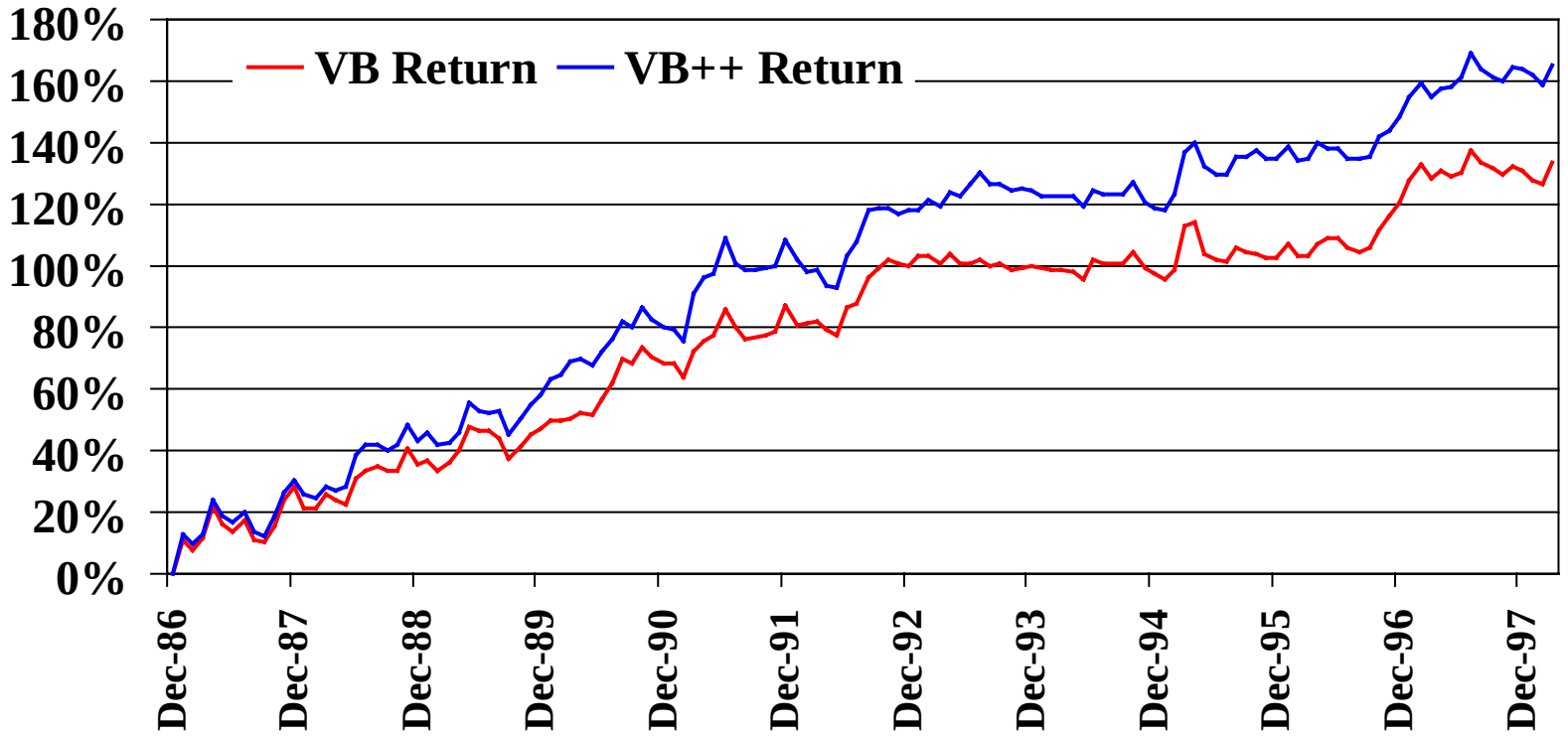
FxDx Results 1997-1998



Volatility Breakout

- Use short, medium, and long term systems
- Only trades the 4 major IMM rates
- Compare standard daily data (VB) and DMTD (VB++)
- Results
  - 2.4% out performance per year
  - outperforms in 75% of the months
  - 0.93 vs. 0.83 Sharpe Ratio
  - T-Test: 5% level

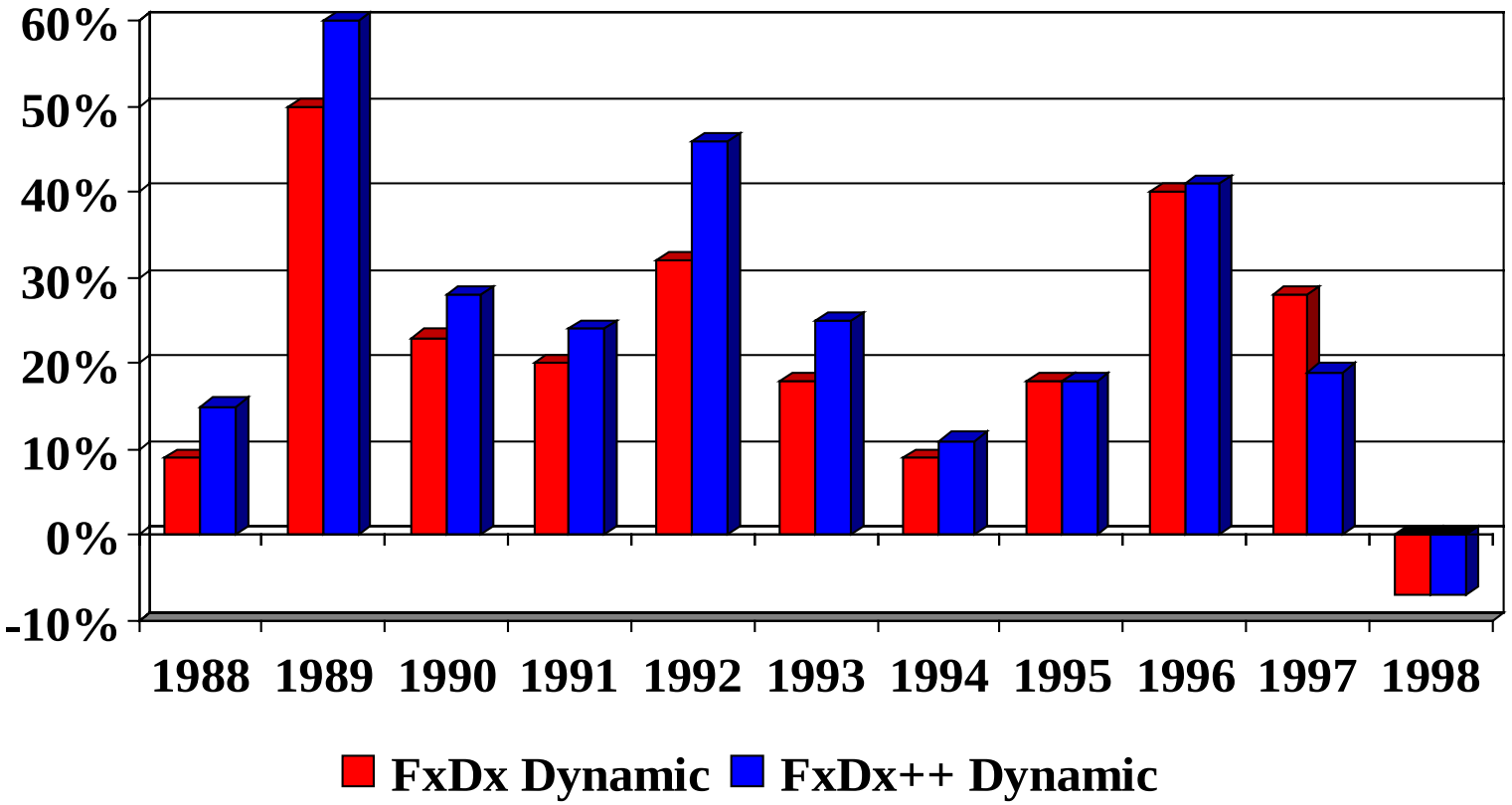
Volatility Breakout Results



Dynamic Leverage

- More realistic result that uses a trend following system (FxDx/SMA)
- Dynamic money management rules
  - currency allocation is not fixed (0%-50%)
  - overall portfolio leverage is not fixed (2x-10x)
- Precisely the same rules and parameters utilized for both versions

Dynamic Leverage Results



Dynamic Leverage Results

- DMTD out performance is ~3.7% per year
- Only one year of under performance, 1997

	DMTD	Daily Data
Sharpe	1.43	1.30
MaxRet	70%	75%
MinRet	-15%	-14%

Summary

- Market Time Data can improve technical analysis at intraday and daily frequencies
- Improvements in trading can be made by changing data alone
- Should look improving data before switching techniques

Standard Methods and New Data

vs.

New Methods and Standard Data