

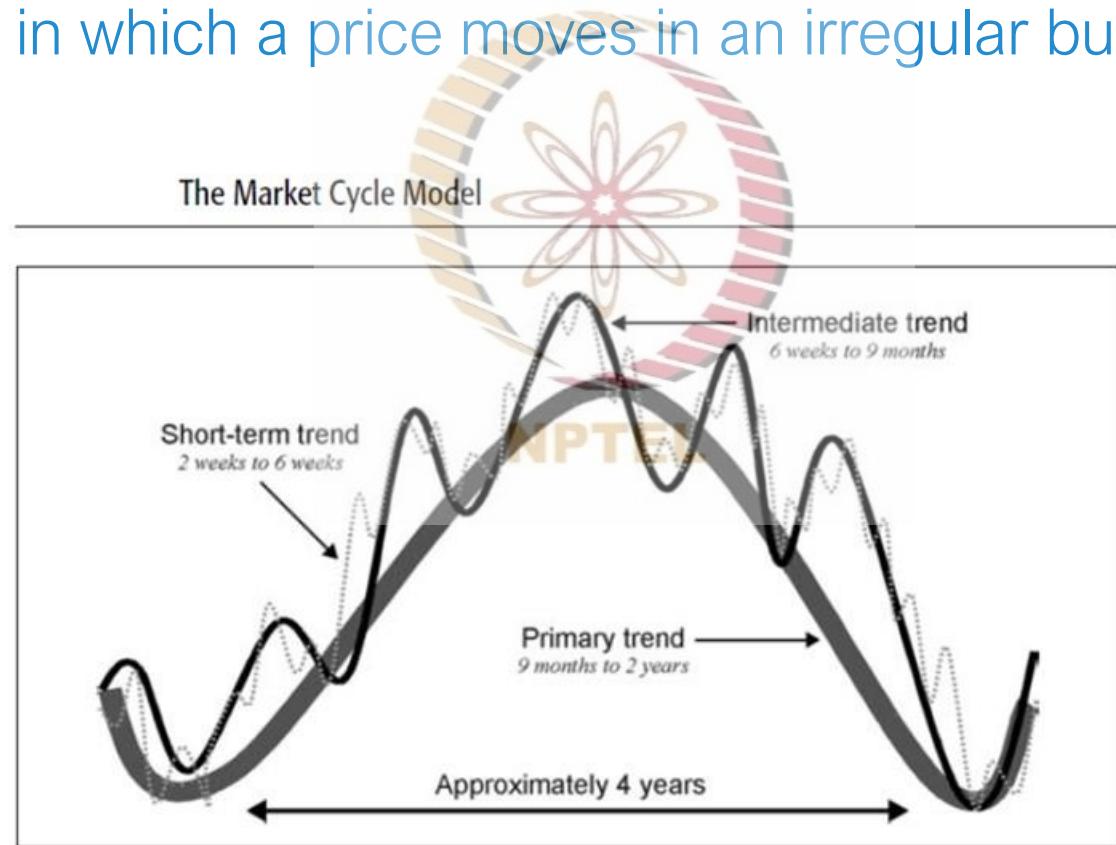
Introduction

- What is fundamental and what is technical?
- What is algo-trading?
- Supply and demand of buying and selling forces



Trend and Market Cycle

A trend is a period in which a price moves in an irregular but persistent direction



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.



Introduction

- Dow theory of Charles Down
- Major trends in financial markets
- Techniques for Identifying trend reversals
 - Intermediate cycles
 - Support and resistance zones
 - Trendlines
 - Basic characteristics and interpretation of volume
 - Classic price patterns





Dow Theory (Charles H Dow)



Dow Theory (Charles H Dow)

- Dow theory suggests that there are primary and secondary trends
- Majority of the securities are affected by these market-wise trends
- Dow constructed Dow Jones Industrial Average (DJIA) Index
- Based on the learnings of Dow, the Dow theory is proposed





Dow Theory (Charles H Dow)

Tenet (1) Averages discount everything

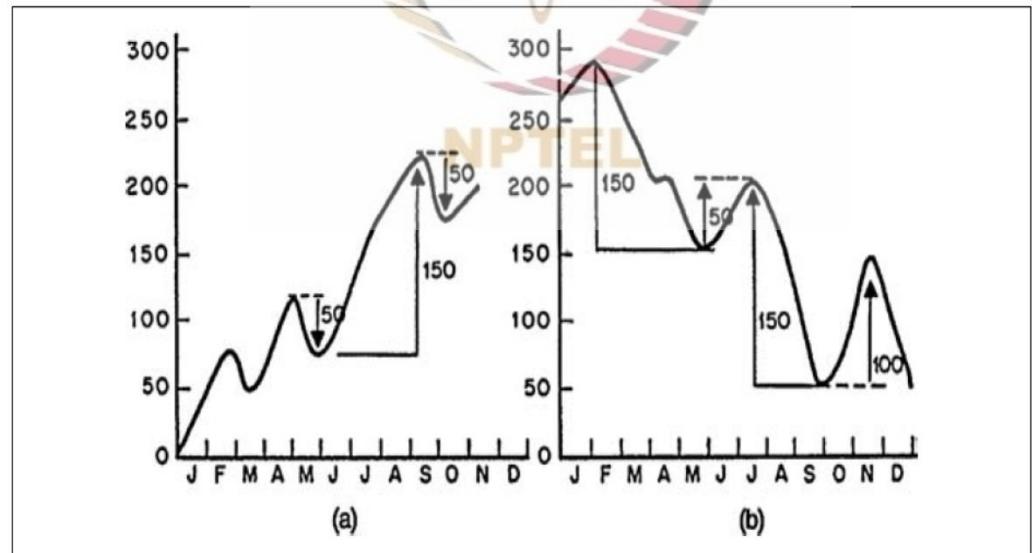
- Similar to portfolio theory
- Average movements of stocks in a market captures the wisdom of the market and, therefore, the demand-supply situation



Dow Theory (Charles H Dow)

Tenet (2) Market has three major movements

(a) Primary or major trend: this is the major market movement, generally known as a bull (rising) or bear (falling) market, lasting for one year to several years

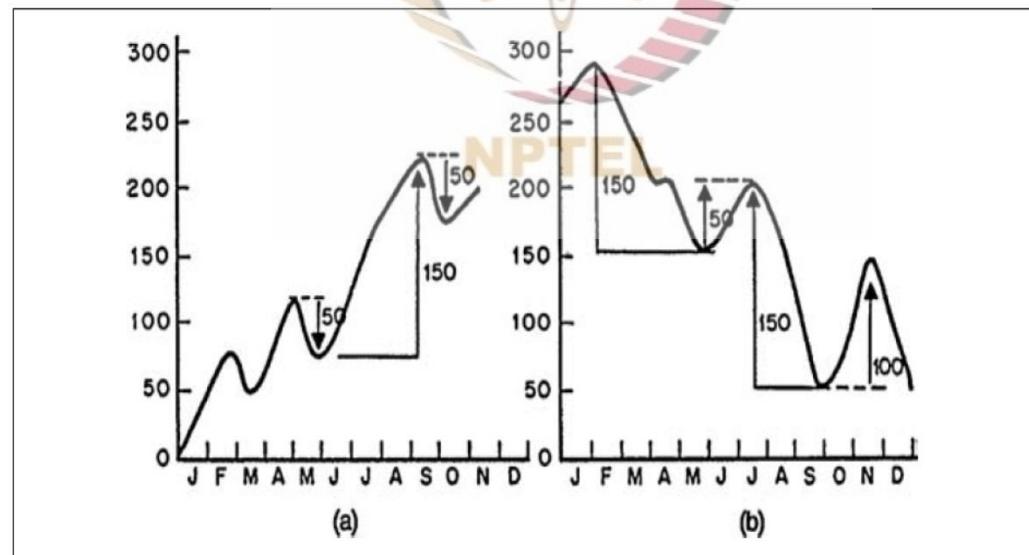


Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Dow Theory (Charles H Dow)

Tenet (2) Market has three major movements

(b) Secondary market reactions: a secondary or intermediate reaction is defined as an important decline in a bull market or advance in a bear market

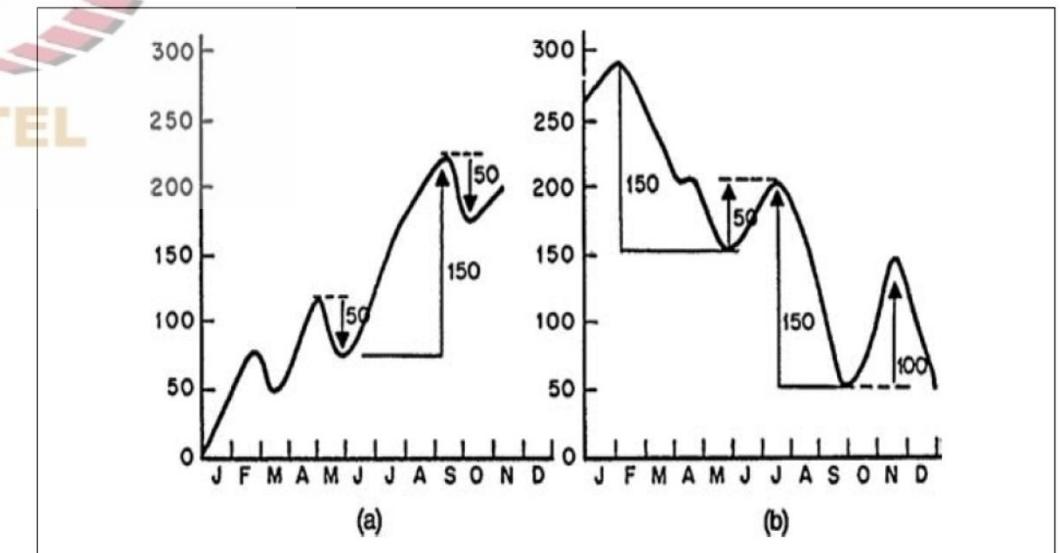


Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Dow Theory (Charles H Dow)

Tenet (2) Market has three major movements

Intermediary cycles: an intermediate cycle is a combination of one move in the direction of a prevailing trend and moves that are counter to the trend:
combination of primary and secondary



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Dow Theory (Charles H Dow)

Tenet (2) Market has three major movements

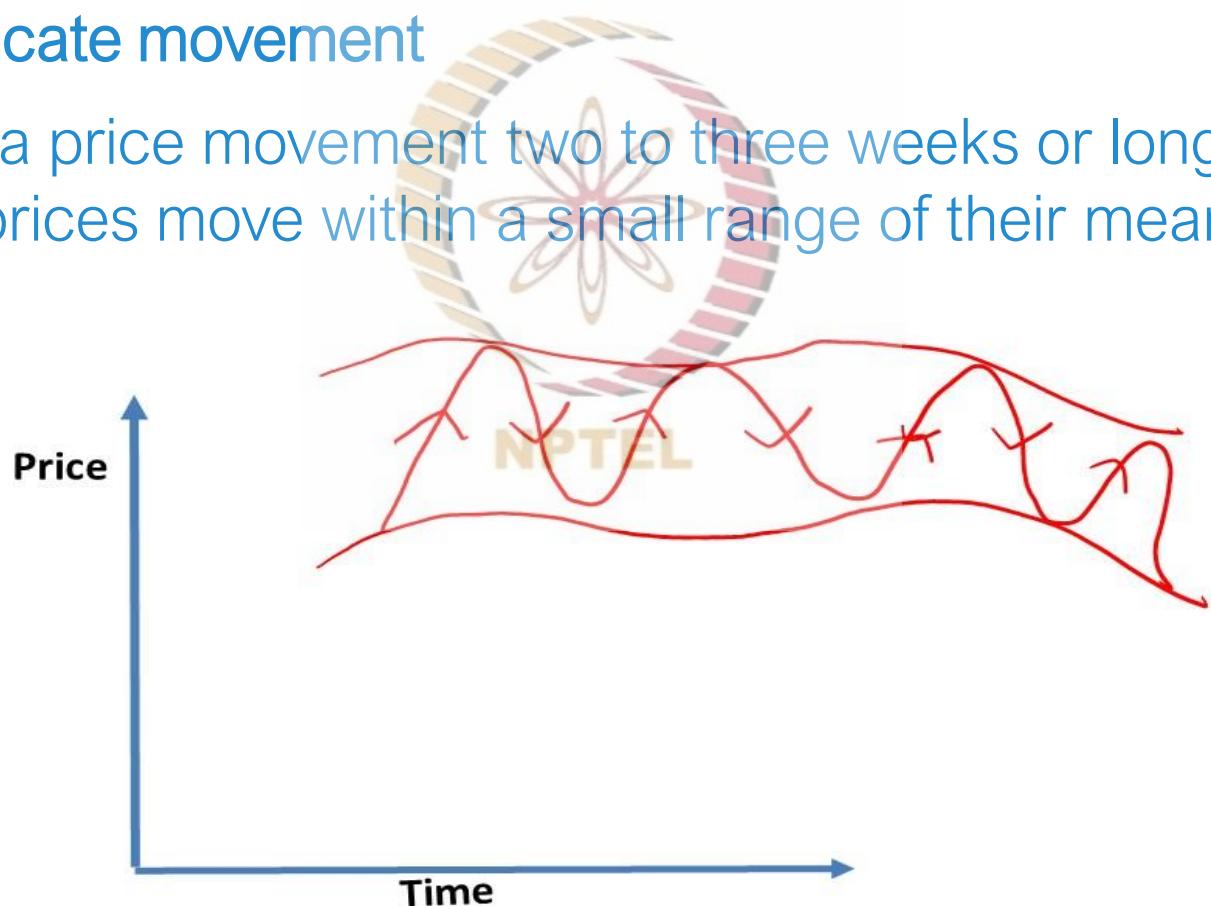
- c) Minor movements: very short-term movements can be a part of the primary or secondary move, no-value to long-term investors



Dow Theory (Charles H Dow)

Tenet (3) Lines indicate movement

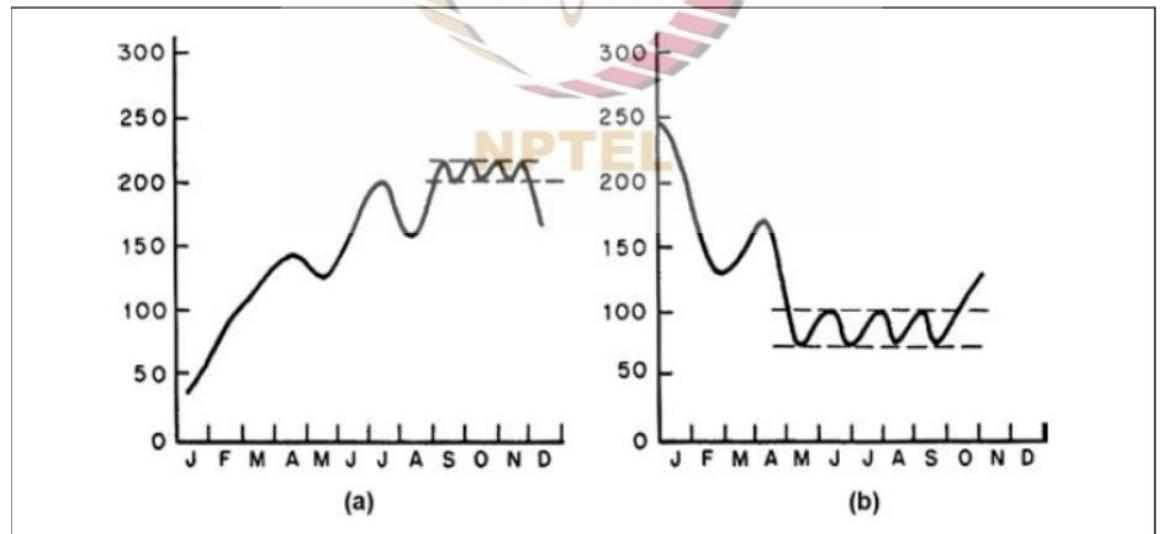
Line is defined as “a price movement two to three weeks or longer, during which period, the prices move within a small range of their mean average



Dow Theory (Charles H Dow)

Tenet (3) Lines indicate movement

Line is defined as “a price movement two to three weeks or longer, during which period, the prices move within a small range of their mean average



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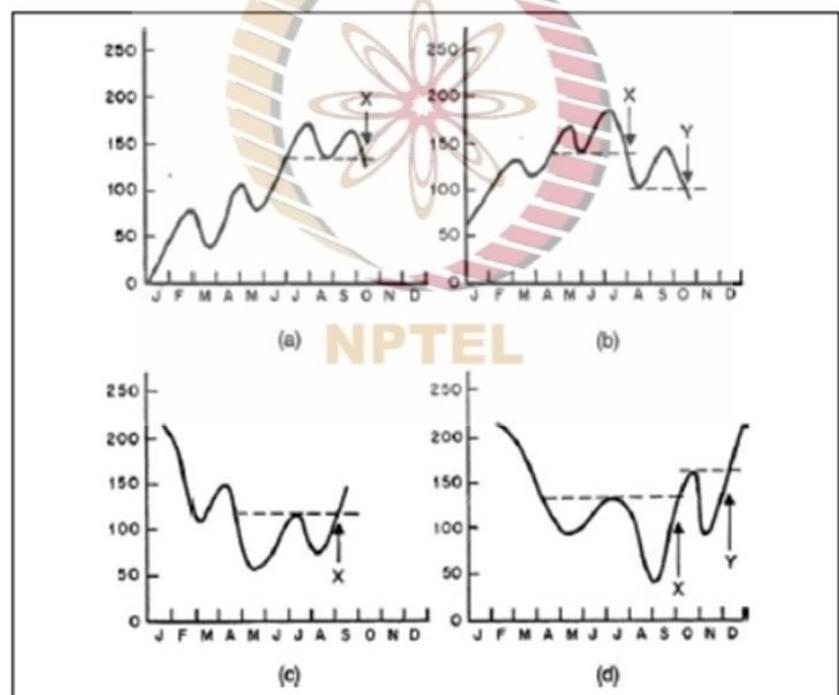
Dow Theory (Charles H Dow)

Tenet (4) Price volume relationships provide the background

- The normal relationship is for volume to expand on rallies and contract on declines
- If it becomes dull on a price advance and expands on a decline, this is a warning that the prevailing trend may soon be reversed
- This principle should be used as background information only since the conclusive evidence of trend reversals can be given only by the price action

Dow Theory (Charles H Dow)

Tenet (5) Price action determines the trend



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.



Dow Theory (Charles H Dow)

Tenet (6) The averages must confirm

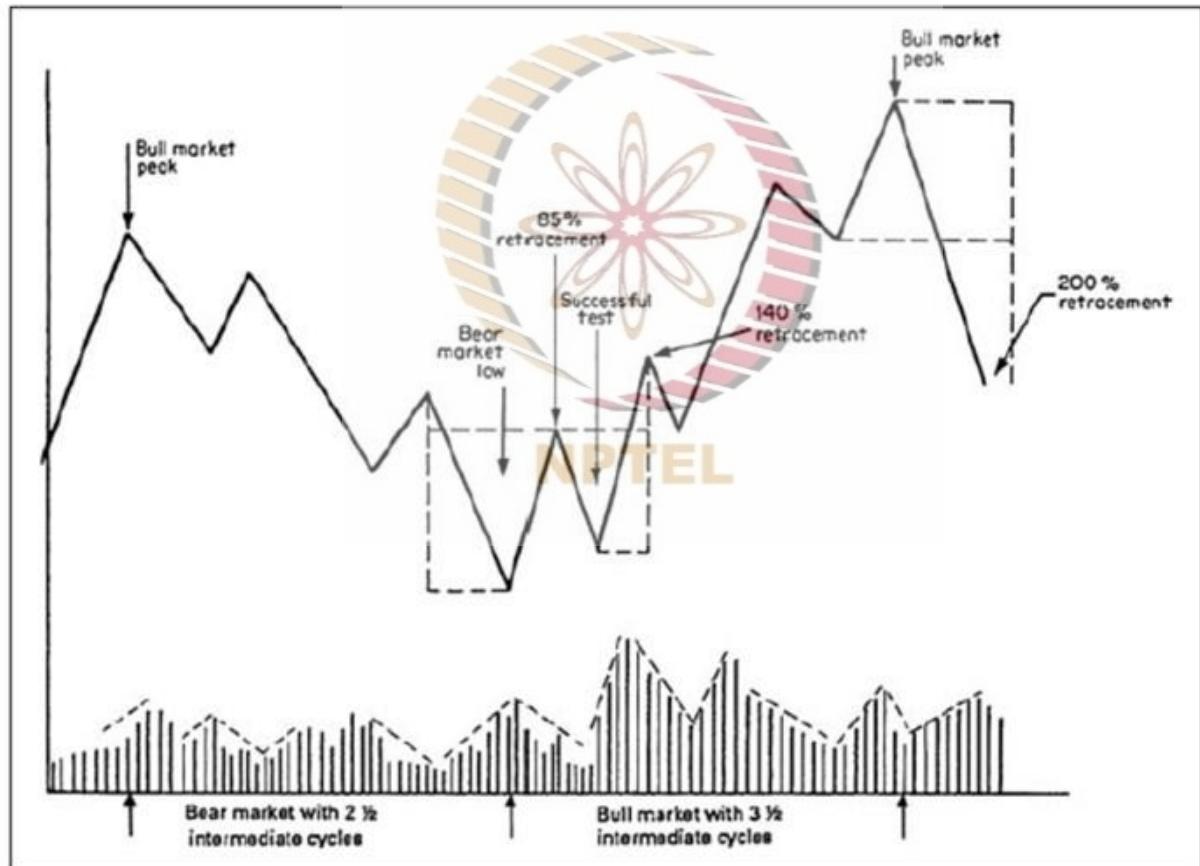
The averages (broad market-wide indices) must confirm each other. The confirmation action is a more fundamental, logical, and appropriate barometer of future business conditions





Using Intermediate Cycles to Identify Primary Reversals

Intermediate Cycles to Identify Reversals



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

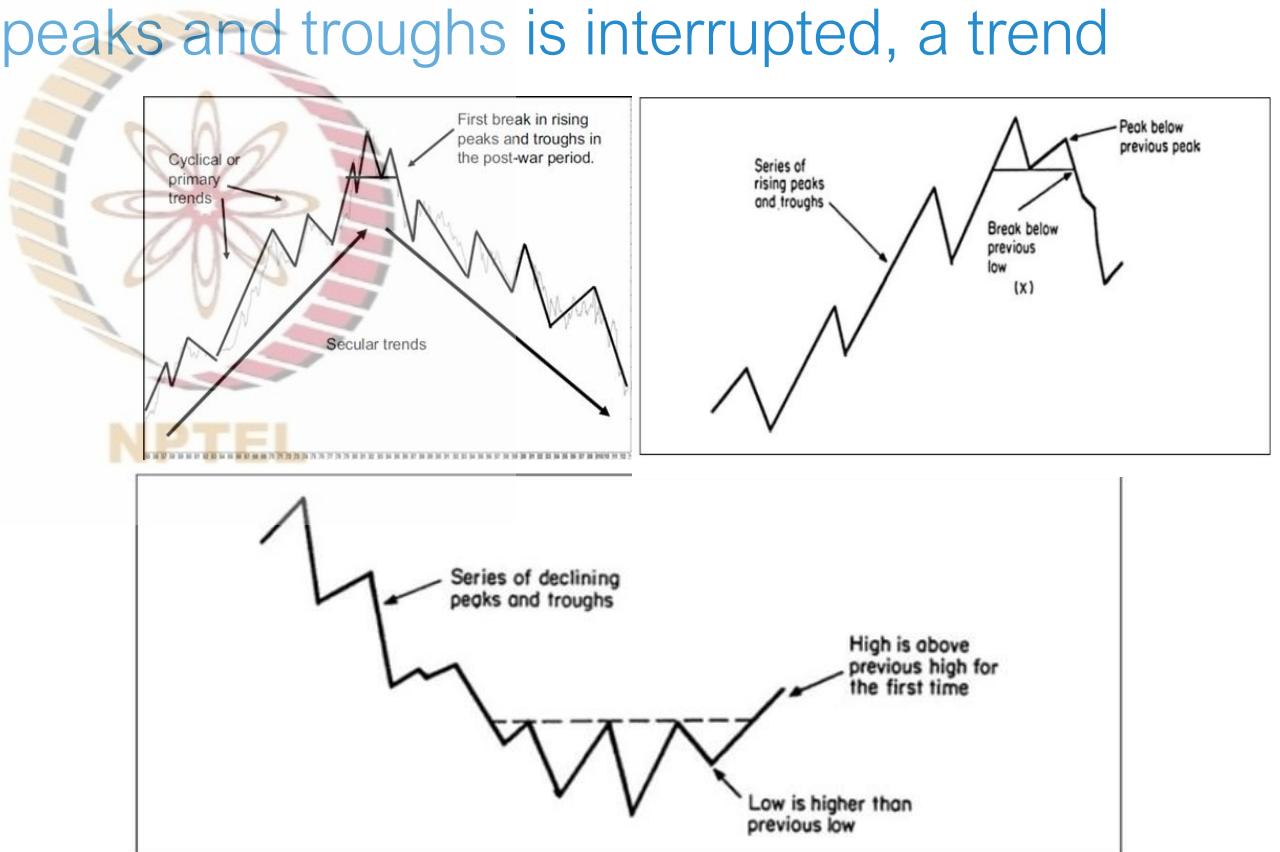
Identifying Trend Reversals

- Substantial increase in volume on secondary intermediate price movement (i.e., opposite to primary trend)
- Secondary intermediate movement (or retracement) is more than 60% of the primary, intermediate move
- Volume does not substantially increase or remains dull around primary, intermediate price move (i.e., along with the trend)
- The retracement is more than 100%
- Series of rising (falling) peaks/troughs is broken



Peak and Trough Analysis

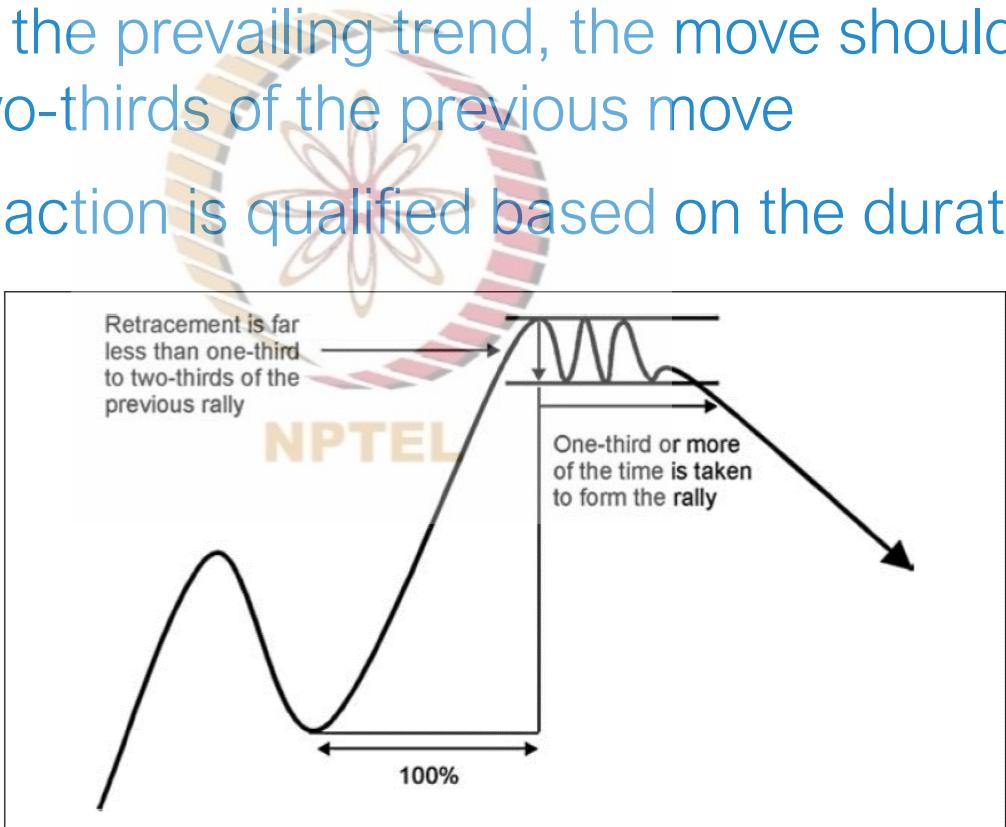
When the series of rising (falling) peaks and troughs is interrupted, a trend reversal is signaled



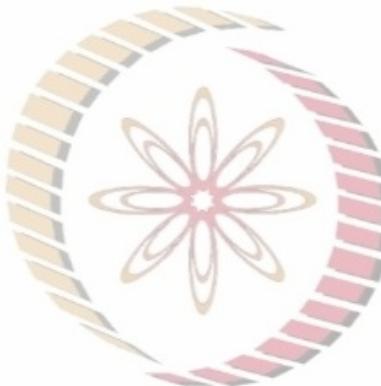
Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Identifying Peaks and Troughs

- To qualify as a reaction to the prevailing trend, the move should retrace between one-third and two-thirds of the previous move
- In the case of lines, the reaction is qualified based on the duration (instead of magnitude)



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.



Support and Resistance Zones

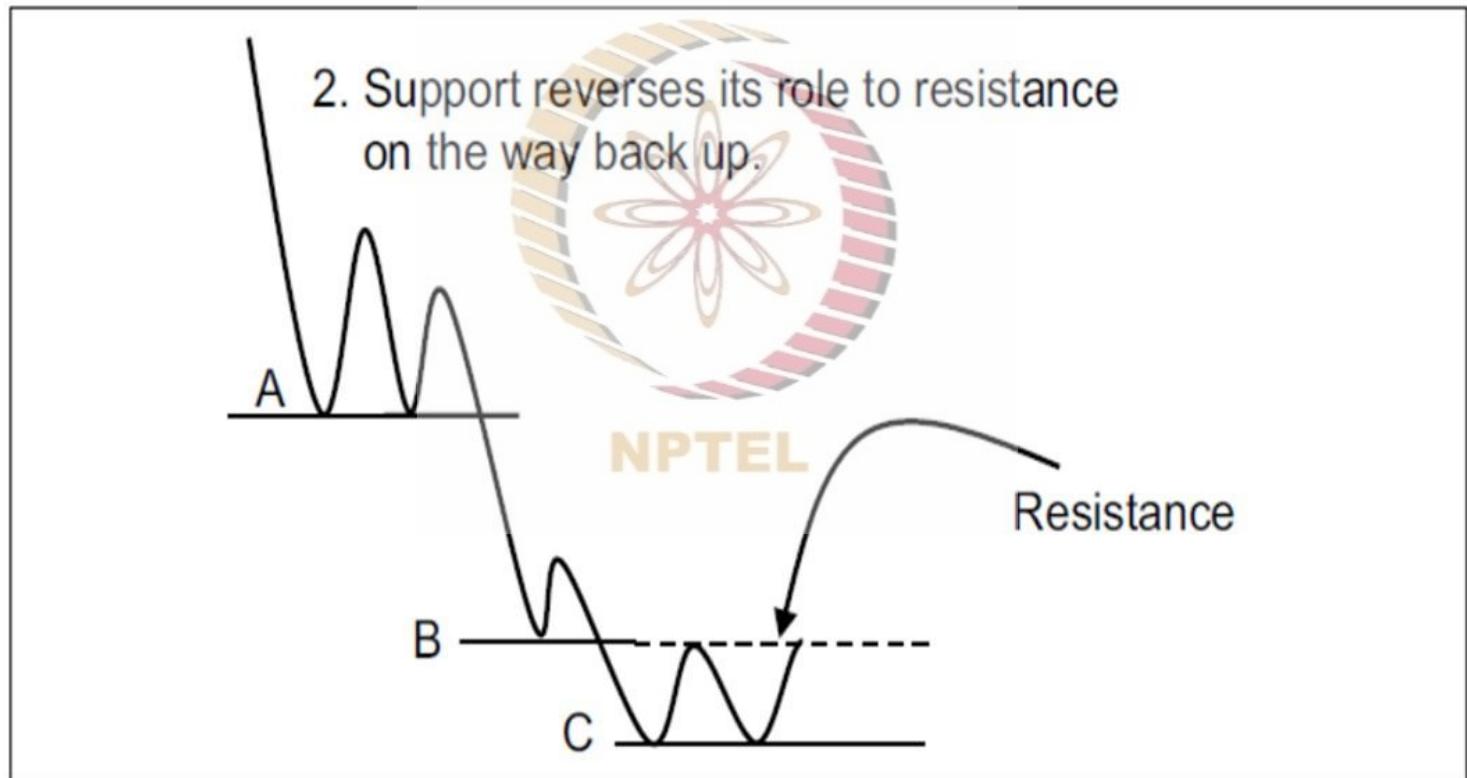
Support and Resistance Zones

Support indicates buying sufficient volumes to arrest a downtrend in prices, and resistance indicates selling sufficient volumes to stop the rise for the time



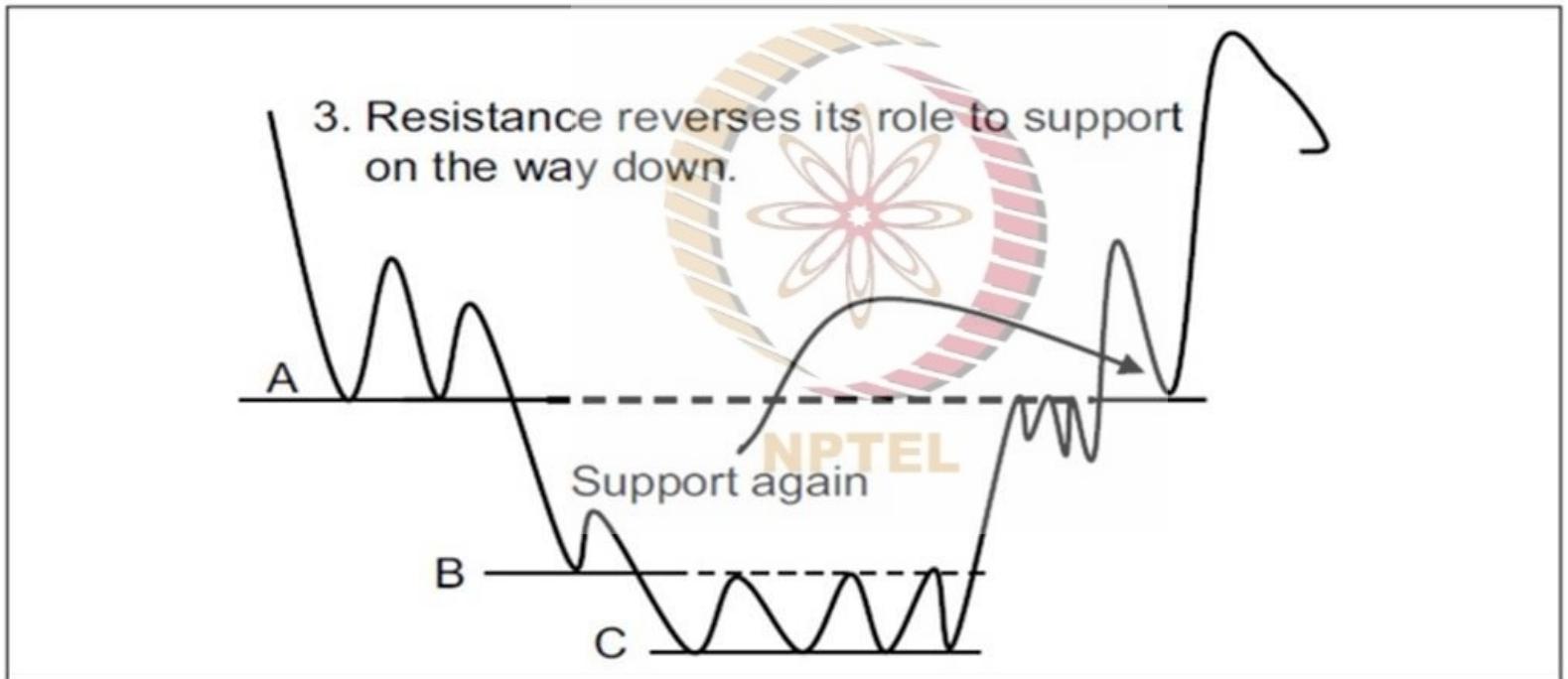
Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Support and Resistance Zones



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Support and Resistance Zones



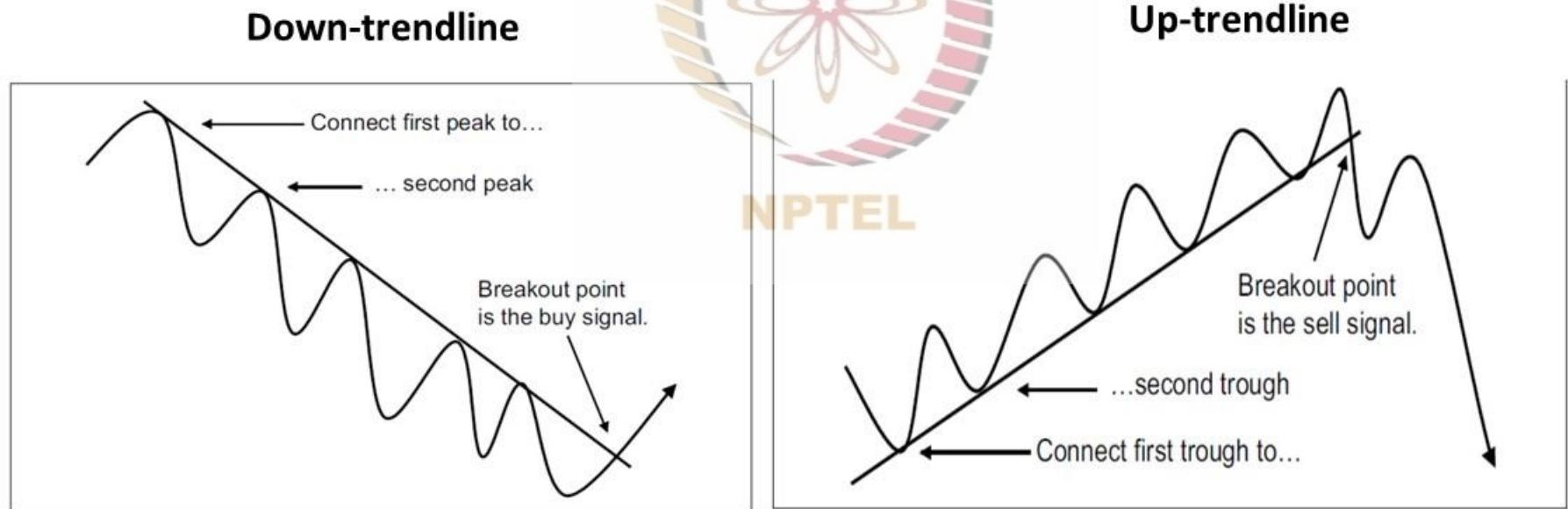
Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Trend Lines



Trend Lines

A trend line is a straight line connecting either a series of ascending bottoms in a rising market or the tops of a descending series of rally peaks



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

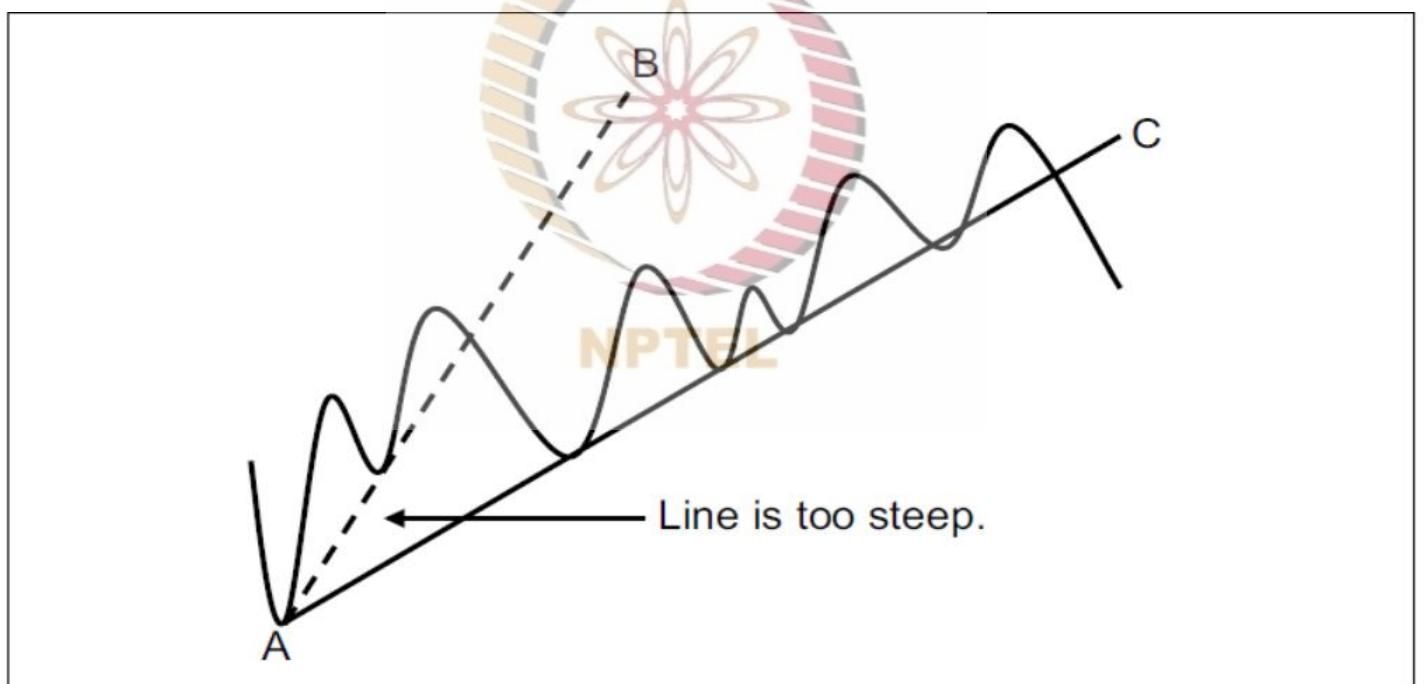
Trend Line Violation/Reversal of a Trend

- The volume associated with a trend line violation/break point is an important indicator
- The larger the length (duration) of a trend line, the higher the strength of the trend line violation/break point signal
- More number of times a trend line has been touched (i.e., acted as support/resistance), the greater its significance
- A very steep (up or down) trend line may be broken to result in continuation pattern rather than trend reversal



Trend Line Breaks

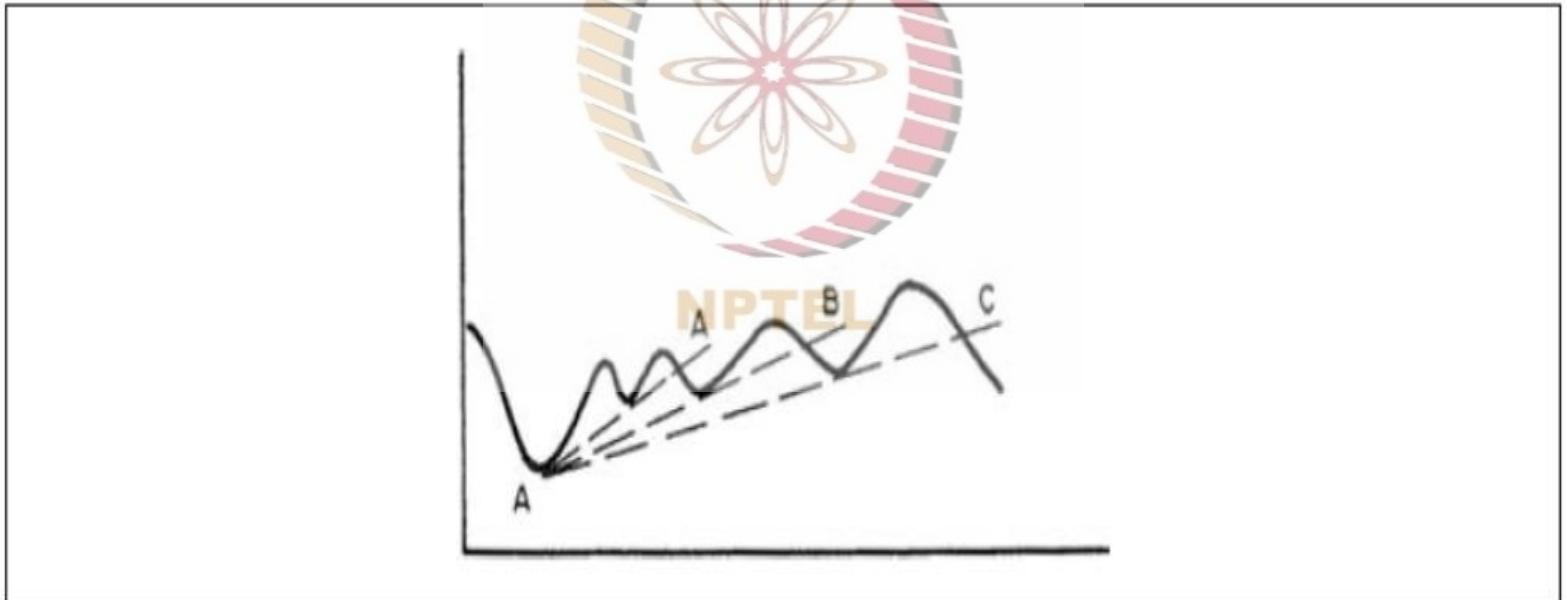
Steep angle of descent



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Trend Line Breaks

Corrective fan principal



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

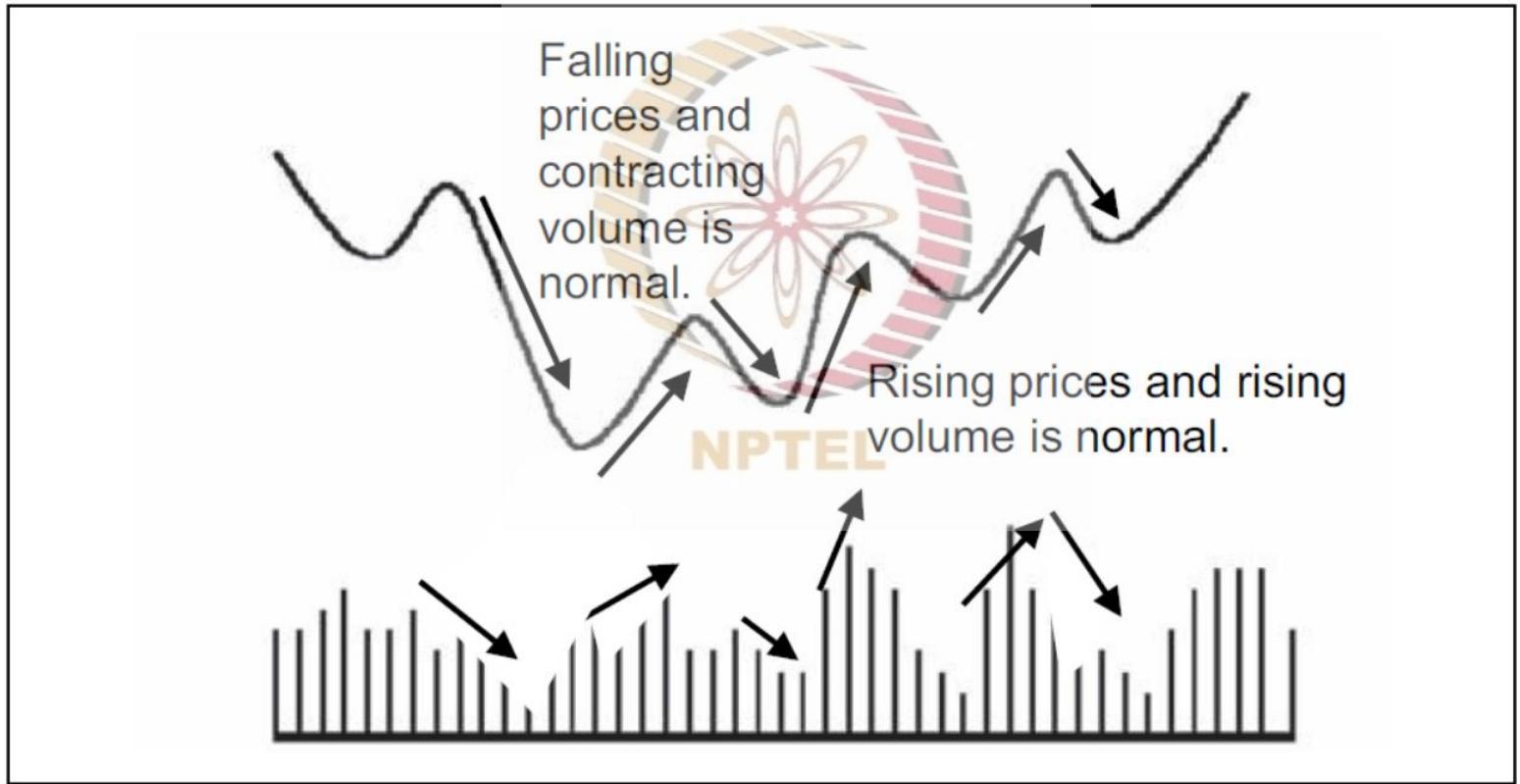


Basic Characteristics of Volume

Volume Characteristics

- Volume gives greater depth to the weight of the evidence
- Volume not only measures the enthusiasm of buyers and sellers but also is a variable that is independent of price
- When price and volume patterns are compared, it is important to see whether they are in agreement. If so, the probabilities favor an extension of the trend
- If price and volume disagree, this tells us that the underlying trend is not as strong as it looks on the surface

Volume Goes with the Trend



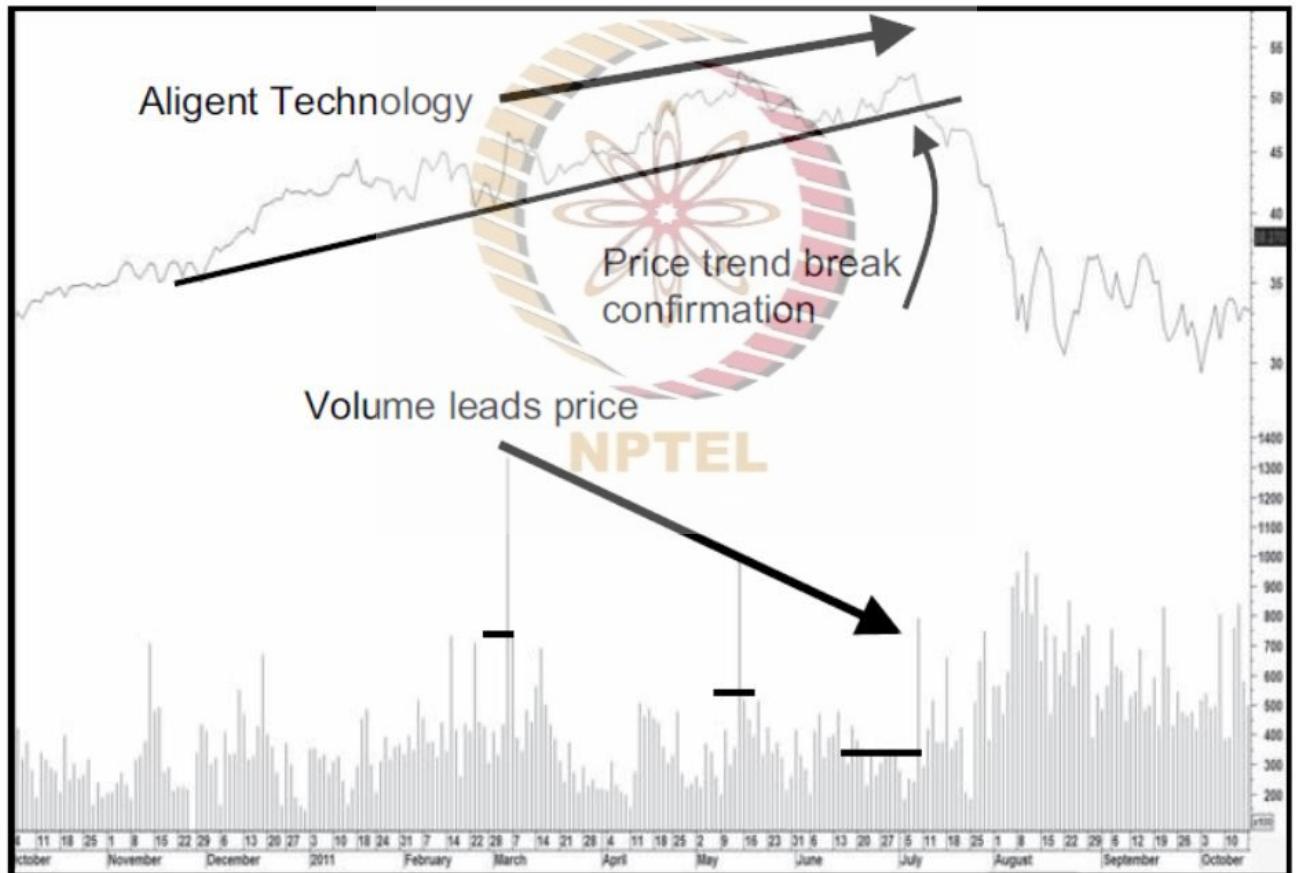
Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Volume Characteristics

- The first and most important principle is that volume typically goes with the trend. It is normal for activity to expand in a rising market and contract in a declining one
- The combination of the rising volume and rising price is normal. It indicates that things are in gear
- Volume normally leads price during a bull move. A new high in price that is not confirmed by volume should be regarded as a red flag, a warning that the prevailing trend may be about to reverse



Volume Leads Price



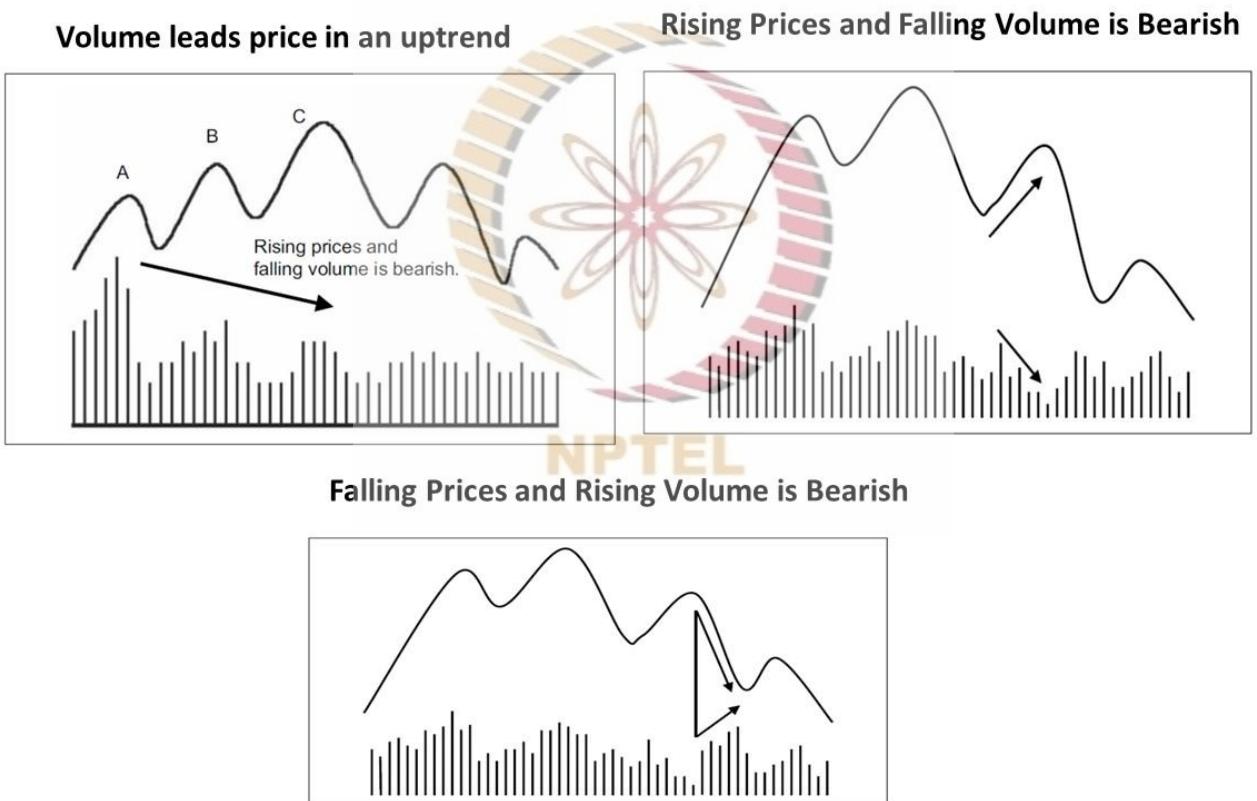
Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Volume Characteristics

- Rising prices accompanied by a trend of falling volume is an abnormal situation. It indicates a weak and suspect rally and is a bear market characteristic
- Volume measures the relative enthusiasm of buyers and sellers. When it shrinks as prices rise, the advance occurs because of a lack of selling rather than sponsorship from buyers
- Sooner or later, the trend will reach a point where sellers become more motivated. After that, prices will start to pick up on the downside
- One clue is provided when activity increases noticeably, the price starts to decline

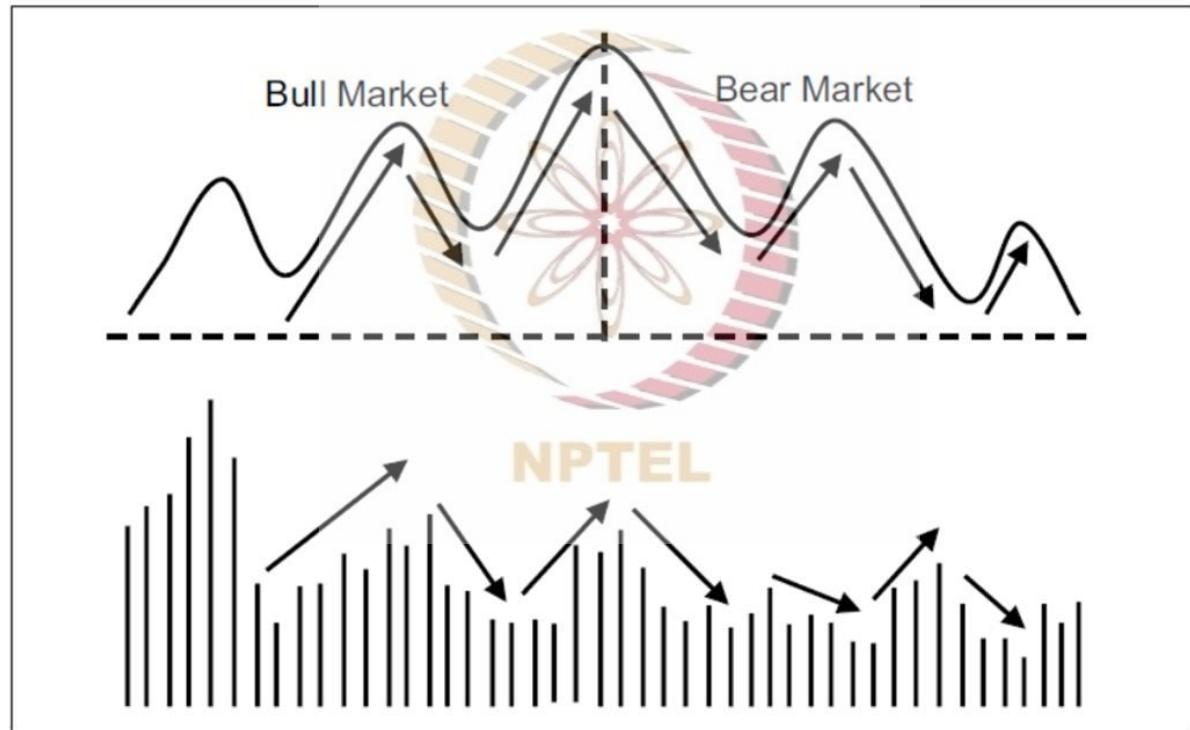


Volume Leads Price in an Uptrend



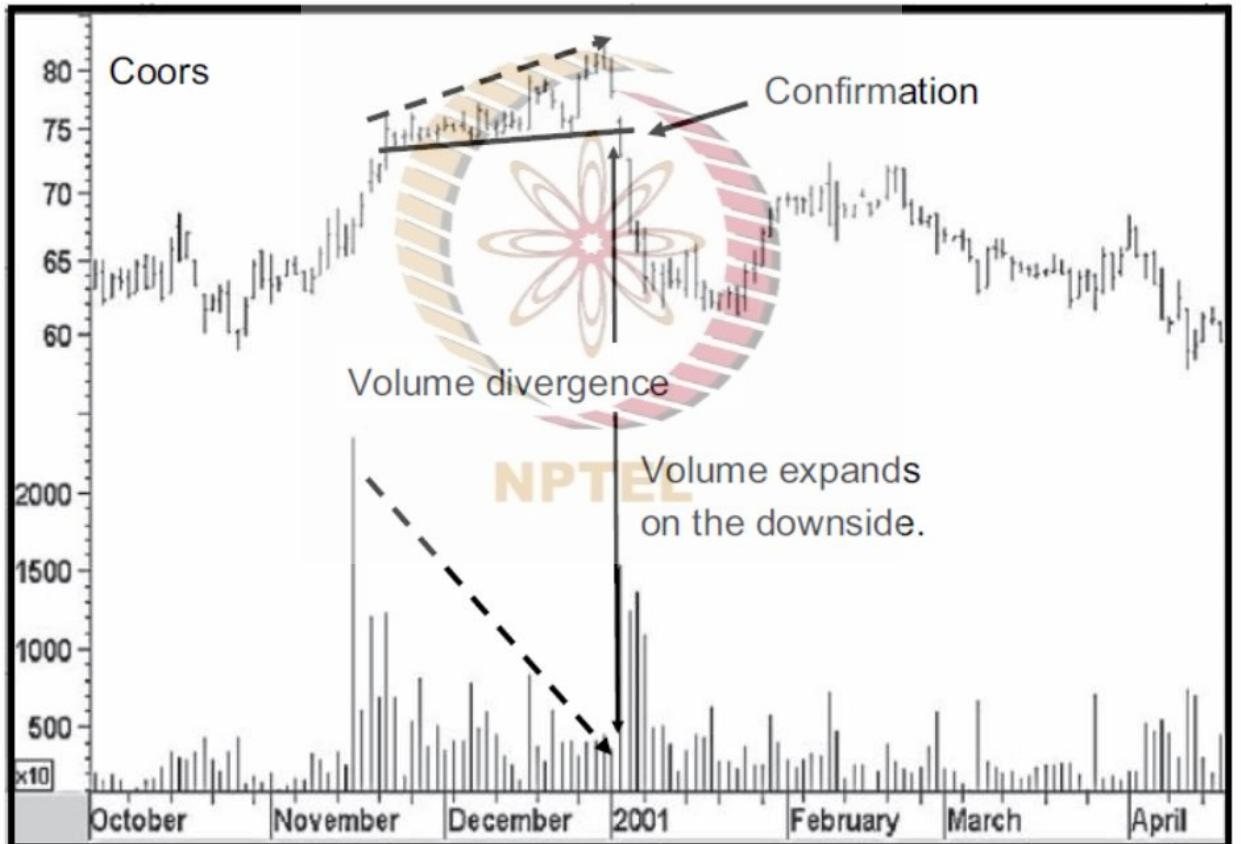
Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Volume Characteristics Change in Bull and Bear Markets



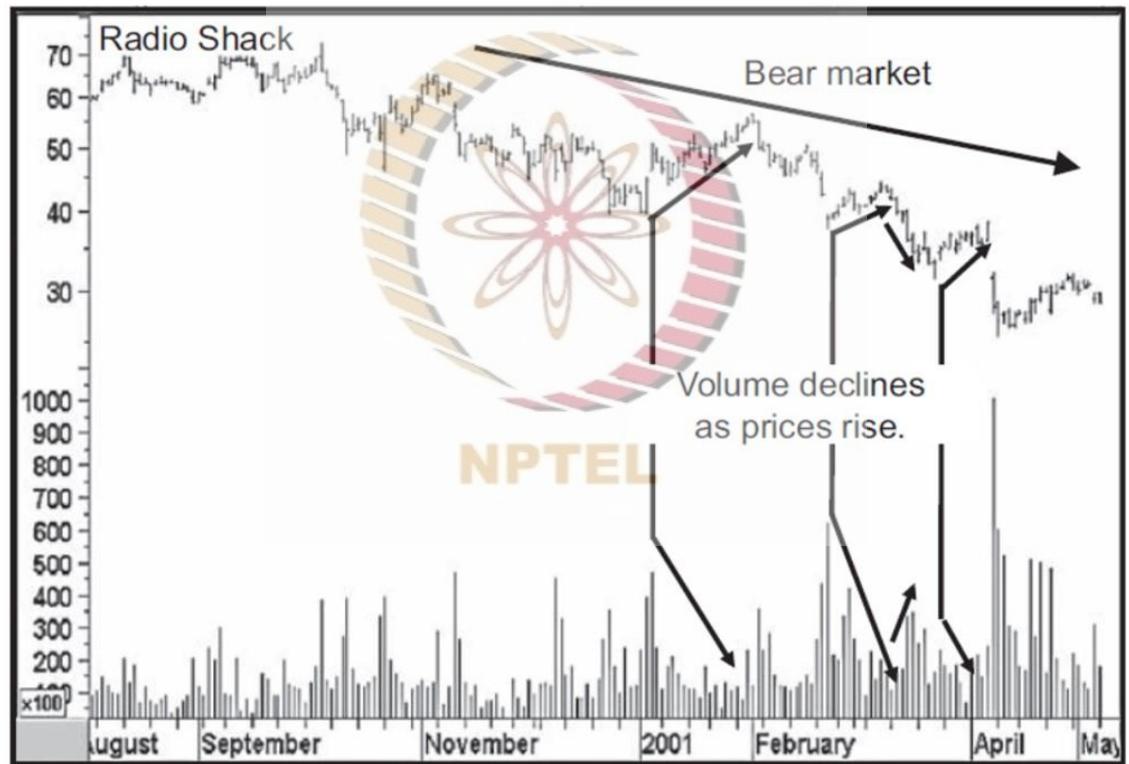
Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Price Volume Divergence



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Rising Price Declining Volume



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.



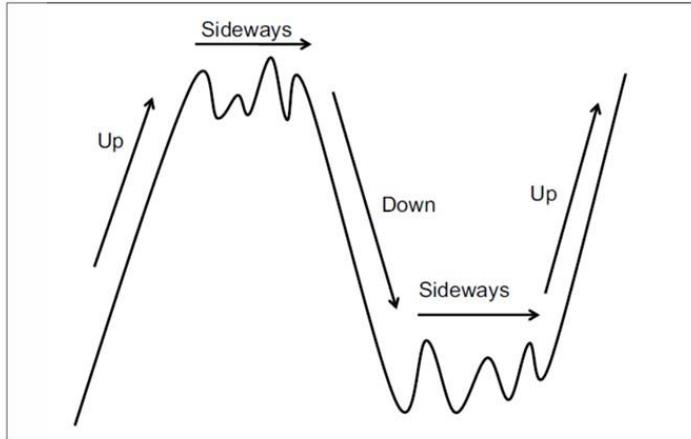
Classical Price Patterns

Classical Price Patterns

- A typical market cycle comprises three trends: up, sideways, and down
- The sideways trend indicates a transition phase between two major movements



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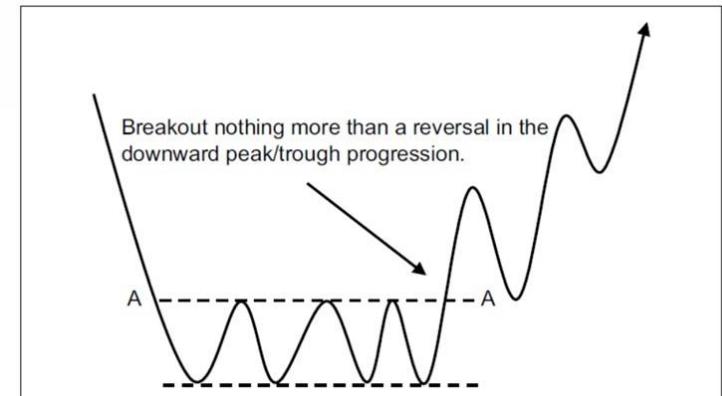
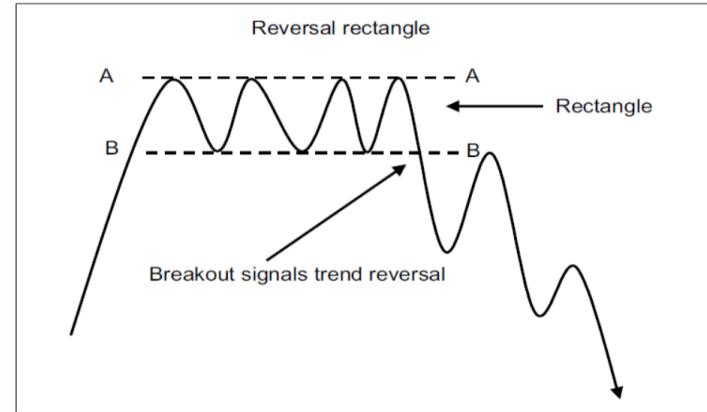


- These sideways or trading ranges are often called price patterns
- During these trading ranges, there is an even balance between buyers and sellers
- At the end of this range (completion of the price pattern), balance is shifted in favor of buyers or sellers

Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Classical Price Patterns

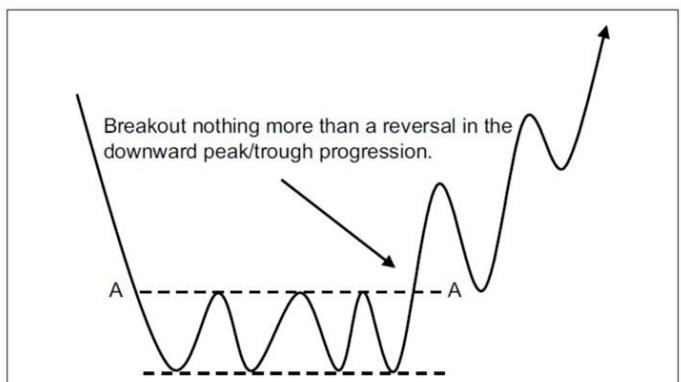
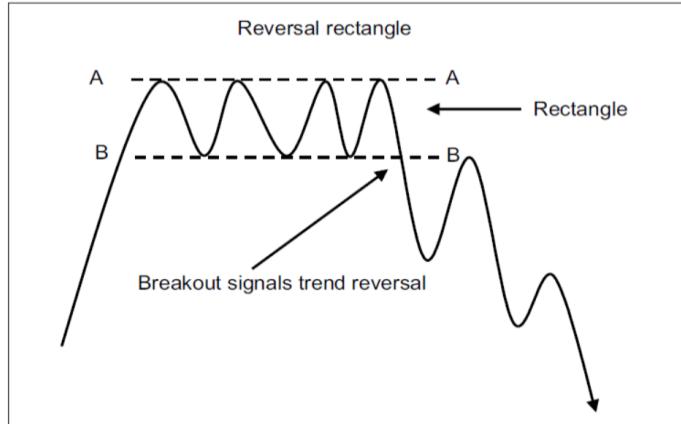
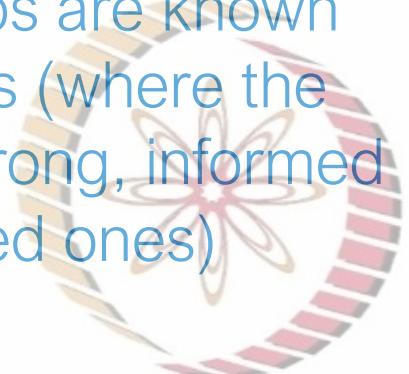
- The transition area comprises resistance and support zones
- These are the point of temporary reversals: shifting of balance between buyers and sellers
- The transitional or horizontal phase separating rising and falling price trends discussed earlier is a pattern known as a rectangle (line from DOW theory)
- Here, a reversal pattern is shown



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Classical Price Patterns

- Reversal patterns at market tops are known as distribution areas or patterns (where the security is “distributed” from strong, informed participants to weak, uninformed ones)
- Those at market bottoms are called accumulation patterns (where the security passes from weak, uninformed participants to strong, informed ones)



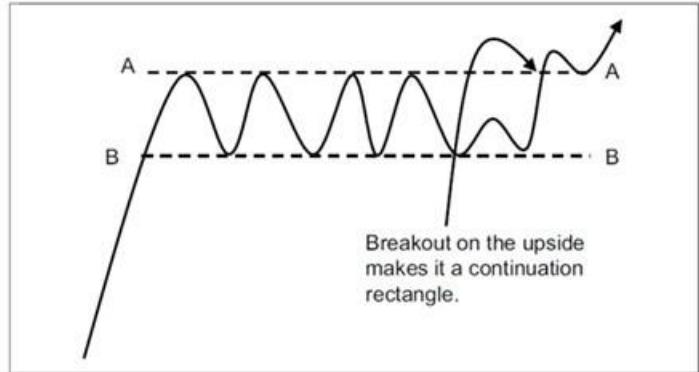
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Classical Price Patterns

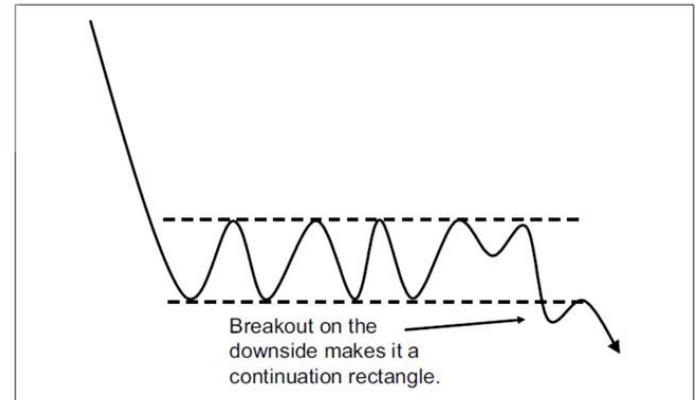
- The price breaks to the upside, reinforcing the series of rising peaks and troughs that precede the formation of the rectangle, thereby reaffirming the underlying trend: consolidation or continuation patterns
- In this case, the corrective phase associated with the formation of the rectangle would temporarily interrupt the trend



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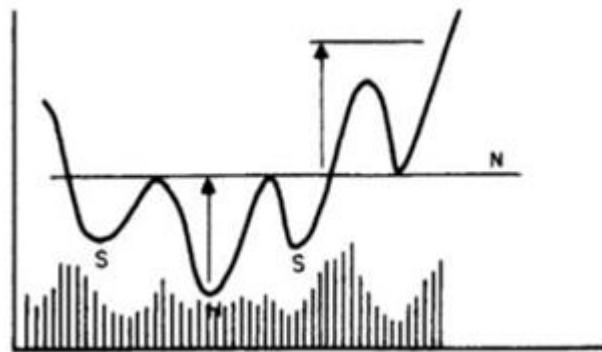
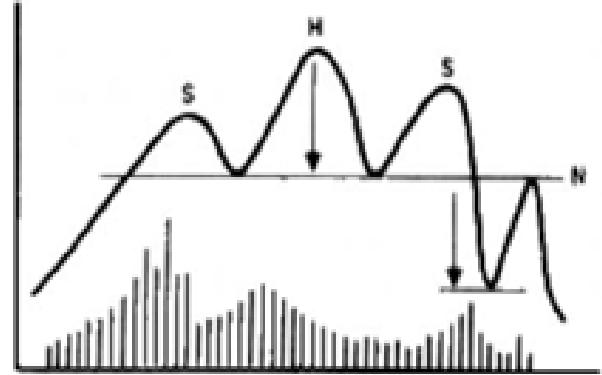
Breakout on the upside makes it a continuation rectangle.



Breakout on the downside makes it a continuation rectangle.

Classical Price Patterns

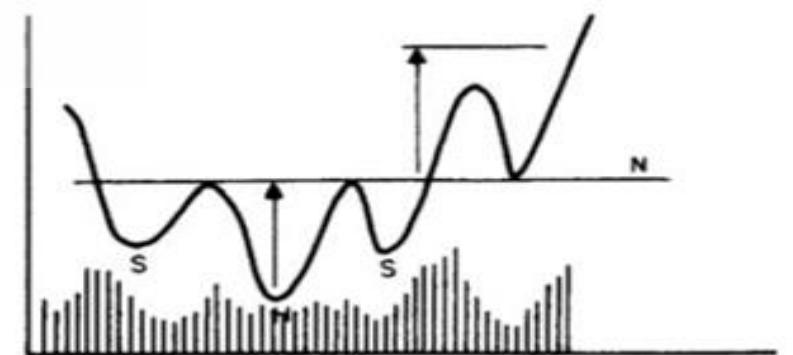
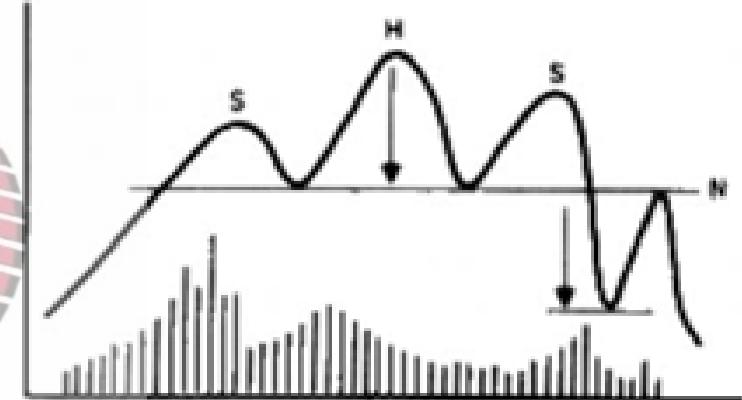
- Head and shoulders (H&S) are probably the most reliable of all chart patterns
- They occur at both market tops and market bottoms: accumulation and distribution
- It consists of a final rally (the head) separating two smaller, although not necessarily identical, rallies (the shoulders)
- Volume characteristics are of critical importance in assessing the validity of these patterns



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Classical Price Patterns

- Right shoulder peak accompanies lower volume in the direction of previous trend and expands with breakout
- The line joining the bottoms of the two shoulders is called the neckline and represents the support area
- The violation of the neckline represents a signal that the previous series of rising/falling peaks and troughs have been broken



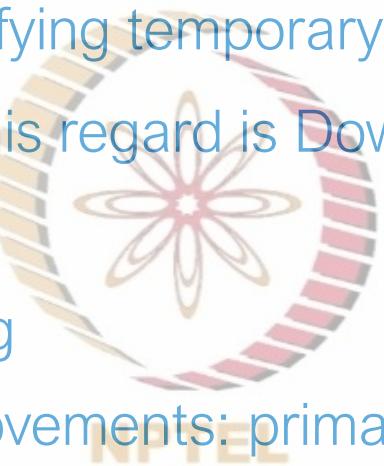
Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.



Summary and Concluding remarks

Summary and Concluding remarks

- Technical analysis deals with identifying temporary supply/demand mismatches
- A very important development in this regard is Dow theory by Charles Dow
- The theory has six postulations
 1. Averages discount everything
 2. Market has three types of movements: primary or major trend, secondary reaction, and minor movements.
 3. Lines indicate movement
 4. Price and volume relationships provide the background
 5. Price action determines the trend
 6. Averages must confirm



Summary and Concluding remarks

- An intermediary cycle comprises an up and down move in a primary bull or bear run
- These intermediary cycles are very important in identifying trends and reversals
- There are various price formations and patterns that are used to identify the strength of a trend and chances of its reversal
- These include support and resistance zones, trend line violations, and classical price patterns such as sideways, rectangles, breakouts, head & shoulder patterns



Summary and Concluding remarks

- Trendlines are lines connecting rising troughs and falling peaks
- A down cross of an up trend line and vice-versa price movement indicates chances of reversal
- Volume also offers important information in examining the strength of a trend and chances of reversal
- For example, volume movements that agree with price indicate the strength of the trend
- Volume movements that do not agree indicate weakness in the current trend
- Price volume relationship changes its nature in bull vs bear run



INDIAN INSTITUTE OF TECHNOLOGY KANPUR



Introduction

- Introduction to Moving Averages (MAs)
- Characteristics of MAs
- Signal Generation with MAs
- Application of Multiple Simple MAs
- MAs in trading ranges
- Weighted Moving Averages (WMAs)
- Exponential Moving Averages (EMAs)





Introduction to Moving Averages

Introduction to Moving Averages

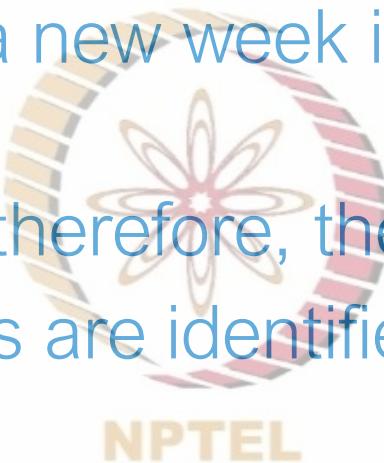
- Moving averages: prices can be volatile; moving averages attempt to reduce this volatility in prices and provide a smoothed trend and reduce the distortions to a minimum
- Three kinds of moving averages are employed: simple MA, weighted MA, and exponential MA
- MAs, like trend-lines, provide dynamic levels of support and resistance
- MA is like a simple mean, just in a rolling over format

Computation of Simple MA

Simple SMA				
Date		Index	10-Week Total	MA
Jan.	8	101		
	15	100		
	22	103		
	29	99		
Feb.	5	96		
	12	99		
	19	95		
	26	91		
Mar.	5	93		
	12	89	966	96.6
	19	90	955	95.5
	26	95	950	95
Apr.	2	103	950	95

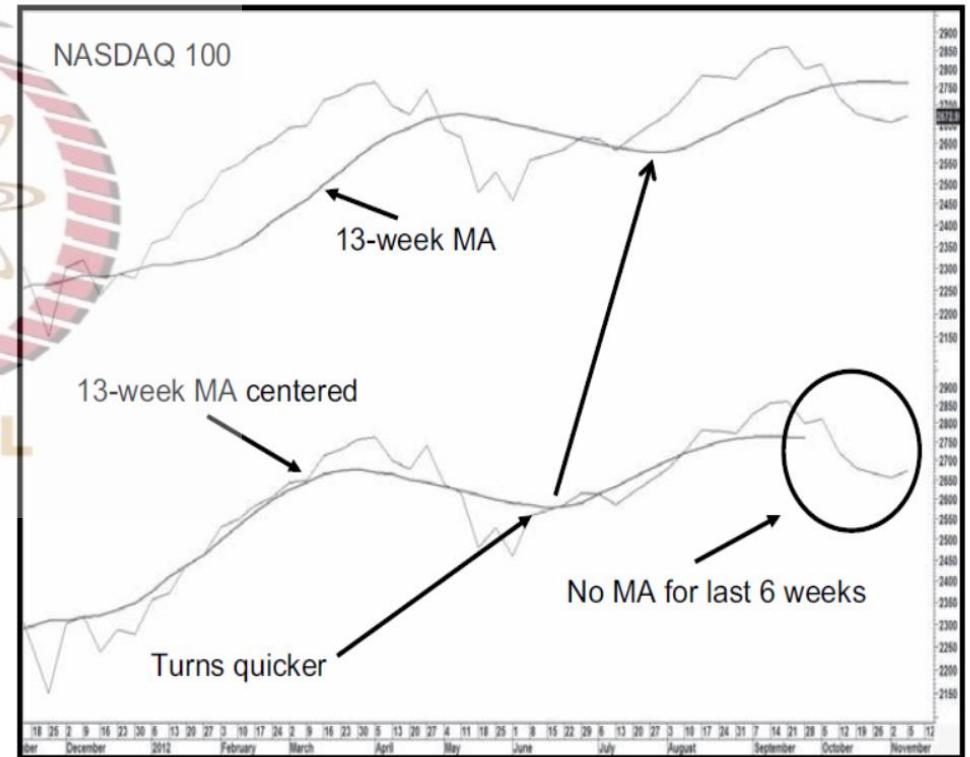
Introduction to Moving Averages

- As the window roles over, a new week is added, and old week is subtracted
- Thus, the average moves (therefore, the term moving average)
- Changes in the price trends are identified by the price crossing MA
- A change from a rising to a declining market is signaled when the price moves below its MA
- A bullish signal is triggered when the price rallies above the average



Introduction to Moving Averages

- An MA is a smoothed version of a trend, and the average itself is an area of dynamic support and resistance
- The more times an MA has been touched, i.e., acts as a support or resistance area, the greater the significance when it is violated



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.



Characteristics of MA

Characteristics of MA

- In a rising/falling market, price reactions are often reversed as they find support/resistance in the area of the MA
- If the rest of the evidence agrees, it is not a bad idea to wait for the price to reach its MA prior to making a purchase/sale
- A rally in a declining market often meets resistance at an MA and turns down
- The more times an MA has been touched, i.e., acts as a support or resistance area, the greater the significance when it is violated

Characteristics of MA

- A carefully chosen MA should reflect the underlying trend; its violation, therefore, warns that a change in trend may already have taken place
- If the MA is flat or has already changed direction, its violation is conclusive proof that the previous trend has reversed
- If the violation occurs while the MA is still proceeding in the direction of the prevailing trend, this development should be treated as a preliminary warning that a trend reversal has taken place
- Confirmation should await a flattening or a change in direction in the MA itself or should be sought from alternative technical sources

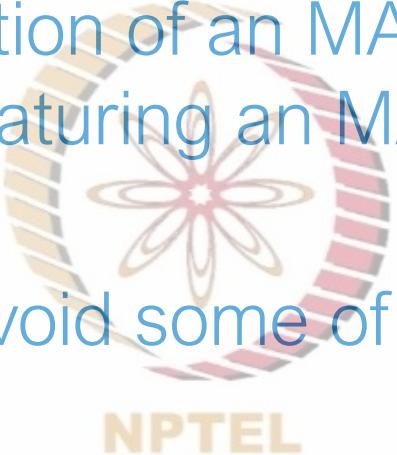
Characteristics of MA

- The longer the period covered by an MA, the greater is the significance of a crossover signal
- For instance, the violation of an 18-month MA is substantially more important than a crossover of a 30-day MA
- Reversals in the direction of an MA are usually more reliable than a crossover
- The instances in which a change in direction occurs close to a market turning point, a very powerful and reliable signal is given
- However, in most instances, an average reverses well after a new trend has begun and so is only useful as a confirmation



Problems with MA Crossover

- A crossover is any penetration of an MA. However, close observation of any chart featuring an MA will usually reveal several whipsaws or false signals
- However, it is possible to avoid some of these close calls by using filtering techniques
- The type of filter to be used depends on the period in question and is very much a matter of individual experimentation
- For example, we may decide to take action on MA crossovers for which a 3% penetration takes place and to ignore all others

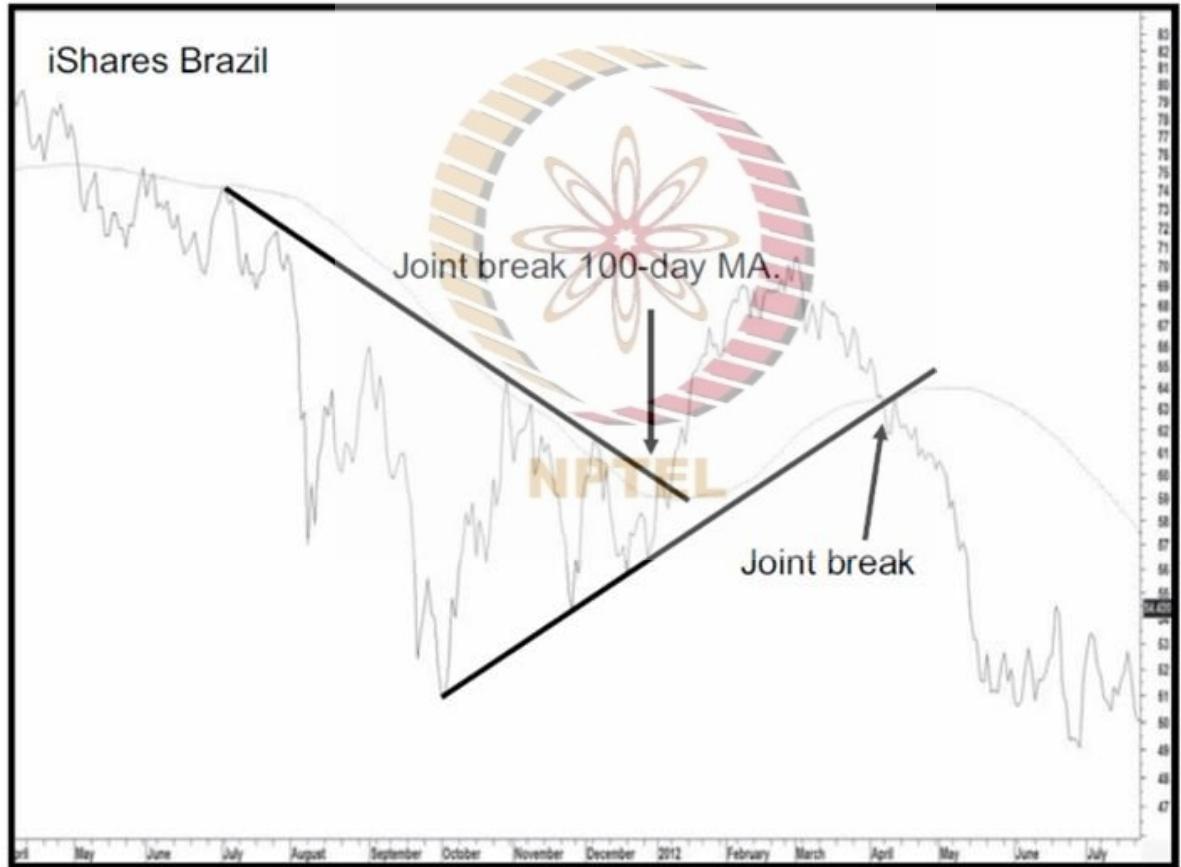


Problems with MA Crossover

- Violations of a 40-week MA might result in an average price move of 15% to 20%
- In this instance, a 3% penetration would be a reasonable filter
- On the other hand, since 3% would probably encompass the whole move signaled by a 10-hour MA crossover, this filter would be of no use whatsoever
- A useful tip is to wait for an MA crossover to take place while a trend line is violated or a price pattern is completed. Such signals strongly reinforce the trend line or price pattern signal and, therefore, needless in the form of a filter requirement



Joint Trend Line/MA Violations



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.



Signal Generation with MAs

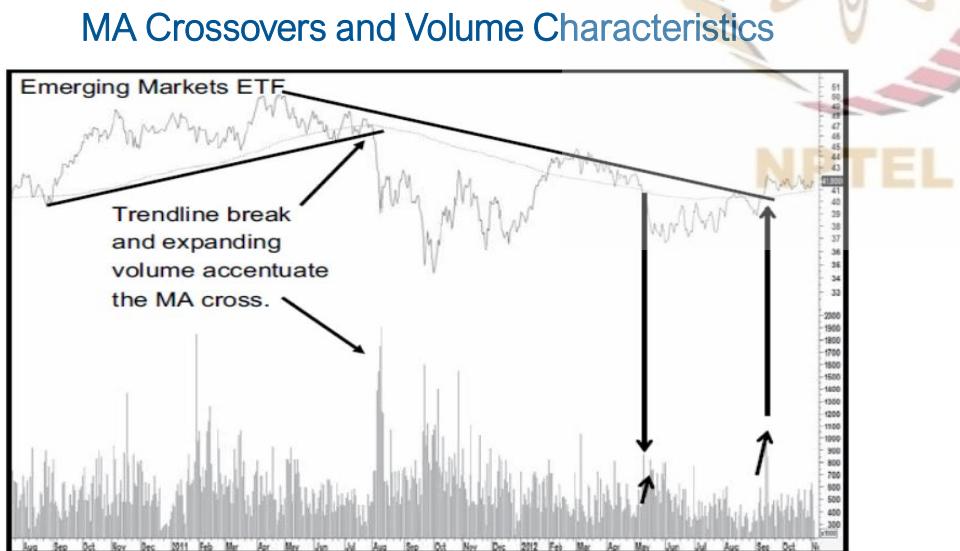
Signal Strength of a Crossover

- If an MA crossover takes place at the same time a trend line is violated or a price pattern is completed, these signals strongly reinforce each other and, therefore, needless in the form of a filter requirement
- Sometimes, it is possible to see an MA crossover accompanied by exceptionally heavy volume
- In such circumstances, you could lower your standards of what represented a decisive breakout since the expanding volume would emphasize enthusiasm by the buyers or fear by the sellers, depending on the direction of the break



Signal Strength of a Crossover

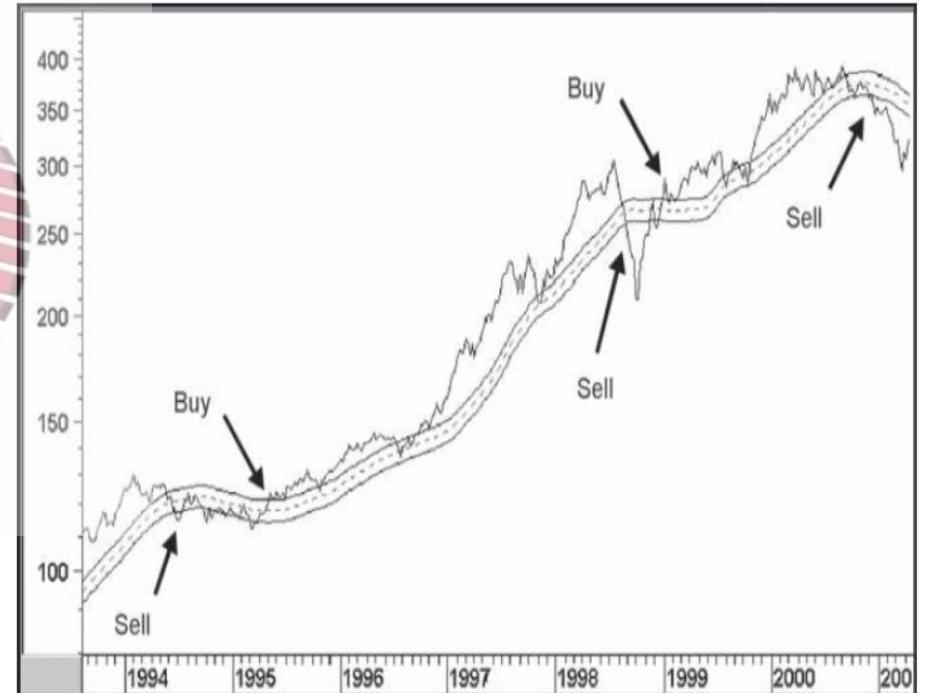
- The cross was accompanied by expanding volume and a trend line break
- Two other breaks also developed on expanding activity, one of which was an upside violation, which was also associated with a trend line break



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

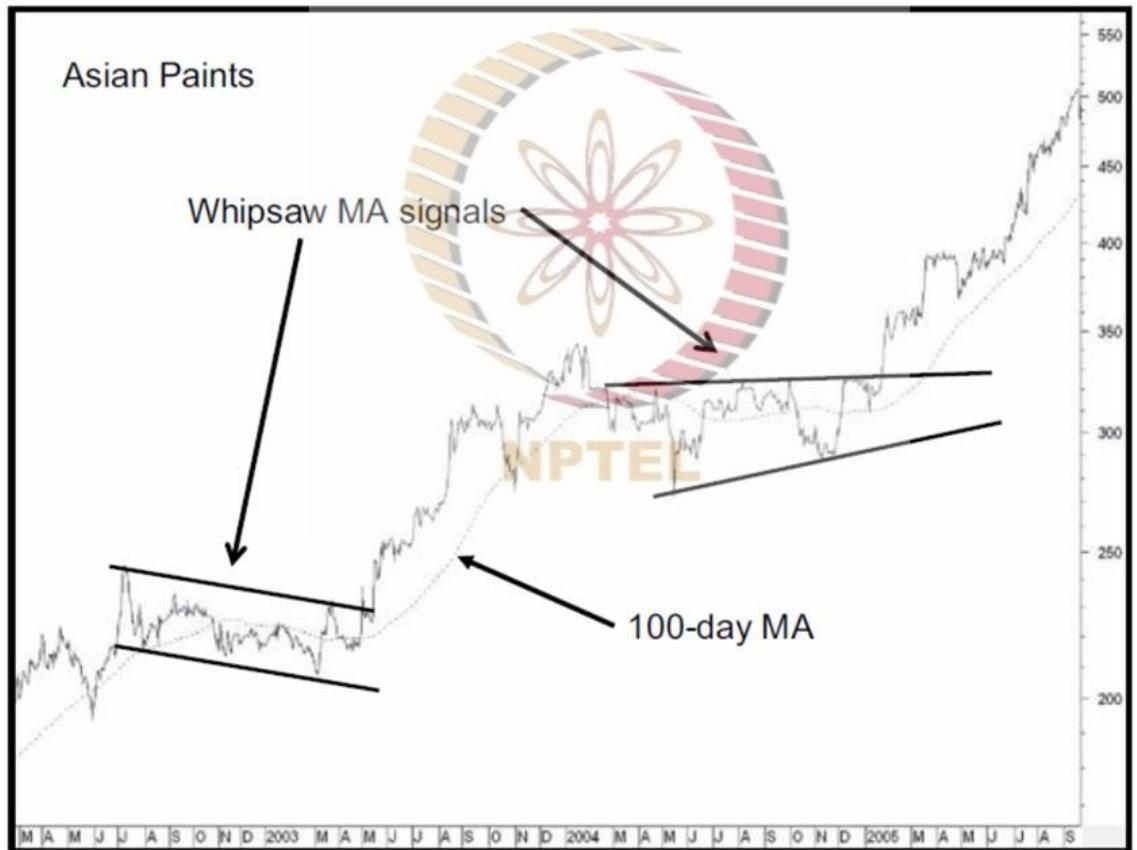
Problems with MA Crossover

- The figure features the Eurotop Index together with a 40-week MA and two bands that have been plotted 3% above and below the average itself
- Buy signals are generated when the price crosses above the upper line and sell signals when it crosses below the lower one
- This has the effect of filtering out some of the whipsaws



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

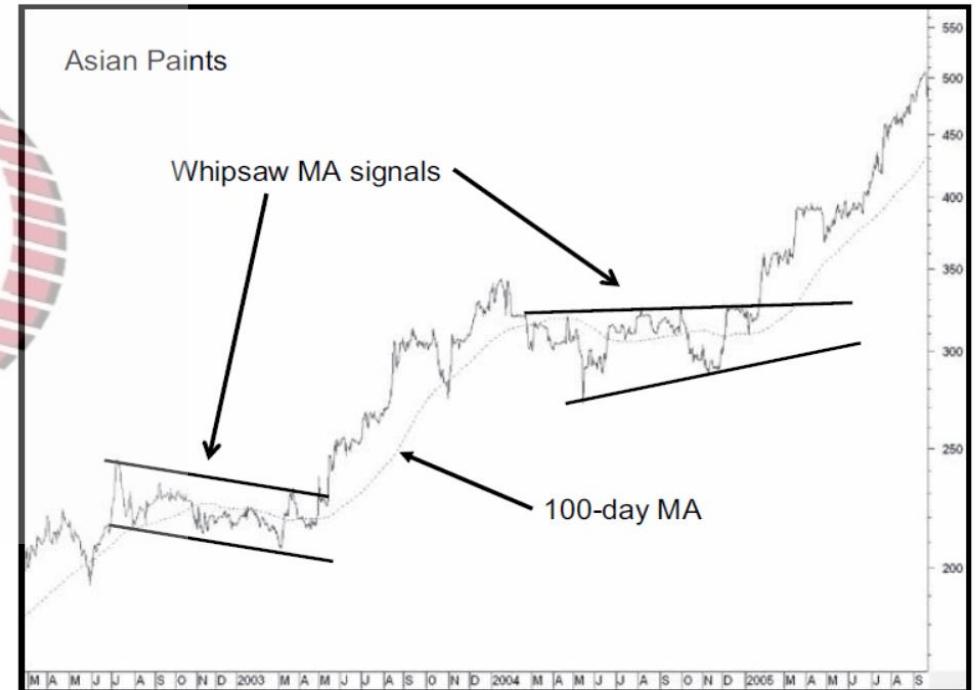
Crossovers and Trading Ranges



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Problems with Crossovers

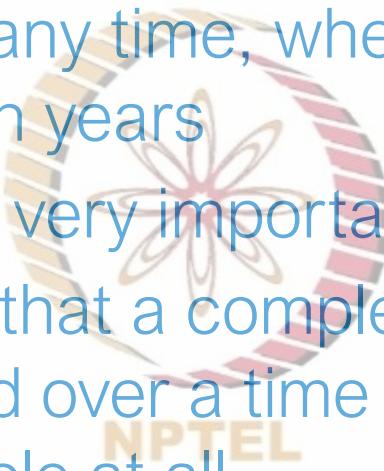
- During a trading range, MA crossovers have a strong tendency to be counterproductive
- In these situations, it is usually best to use the outer ends of the trading range for the signal rather than the MA
- That is the time when a well-constructed trend line should be substituted for an MA crossover



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Choosing a Time Span

- MAs can be constructed for any time, whether a few days, several weeks, many months, or even years
- Optimal selection of length is very important
- For example, if it is assumed that a complete bull and bear cycle lasts for 1 year, an MA constructed over a time span longer than 6-12 months will not reflect the cycle at all
- This is because it smoothens out all the fluctuations that take place during the period and will appear more or less as a straight-line crossing through the middle of the data unless there is a particularly sharp linear trend



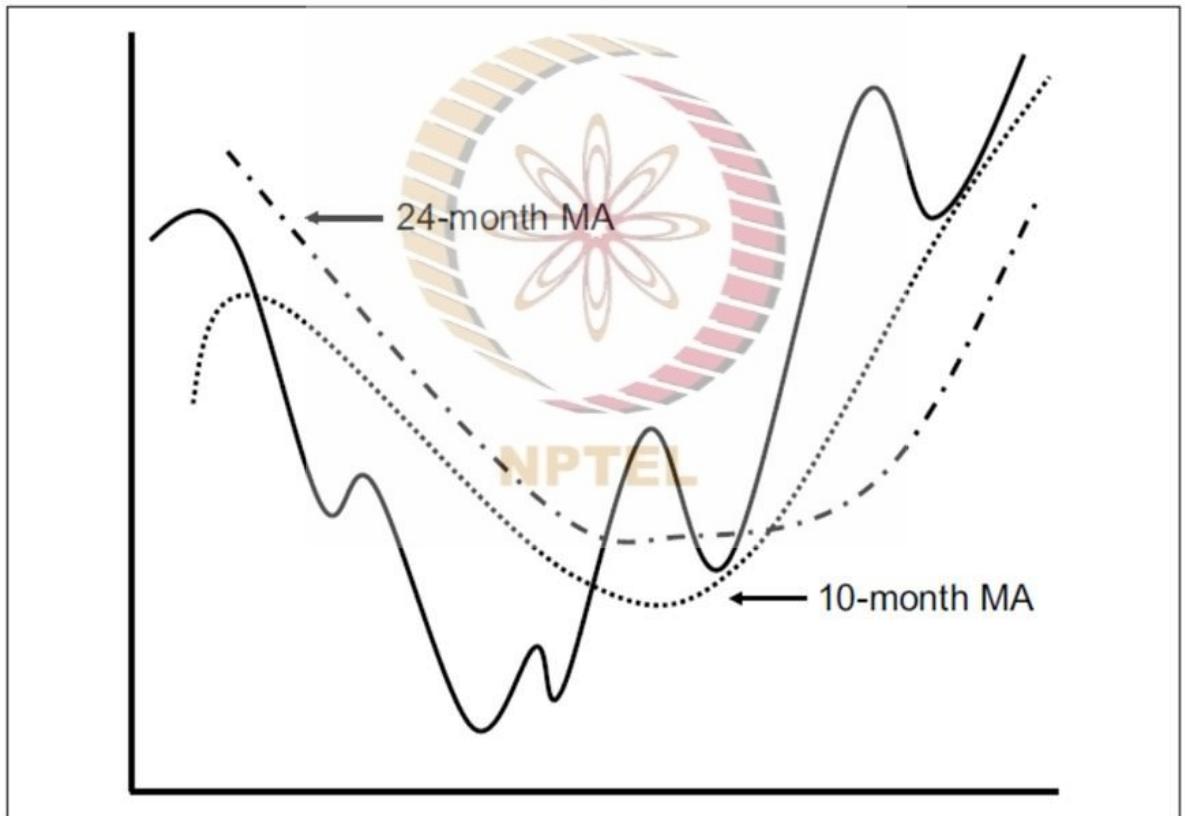
Choosing a Time Span

- On the other hand, a 5-day MA will catch every minor move in the stock cycle and will be useless for identifying the actual top and bottom of the overall cycle
- Even if the 48-month average were shortened to 24 months, using the crossover signals would still cause the 24-month average to give an agonizingly slow confirmation of a change in trend
- The 4-week average would be so sensitive that it would continually give misleading or whipsaw signals
- Only an MA that can catch the movement of the actual cycle will provide the optimum trade-off between lateness and oversensitivity



Application of Multiple Simple MAs

A Short-Term Versus a Long-Term MA



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Convergence of Averages

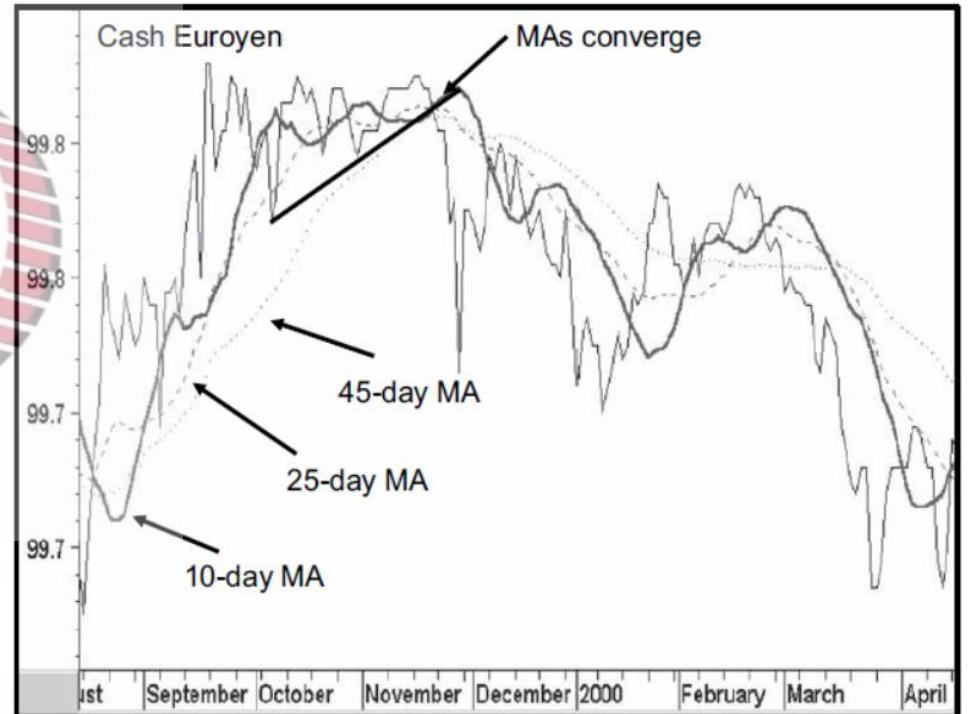
- A sharp price move is often preceded by a gradually narrowing trading range
- In effect, decreasing price fluctuations reflect a very fine balance between buyers and sellers
- When the balance is tipped one way or the other, the price is then free to embark upon a major move
- This kind of situation can often be identified by plotting several MAs and observing when they are all at approximately the same point



NIFTY

Convergence of Averages

- The figure, for example, shows the daily price for cash Euroyen
- Note how the three MAs almost converge entirely just before the price embarks on a sharp decline
- The convergence of the averages warns that a major move is likely, but the actual signal comes from the violation of the trend line.



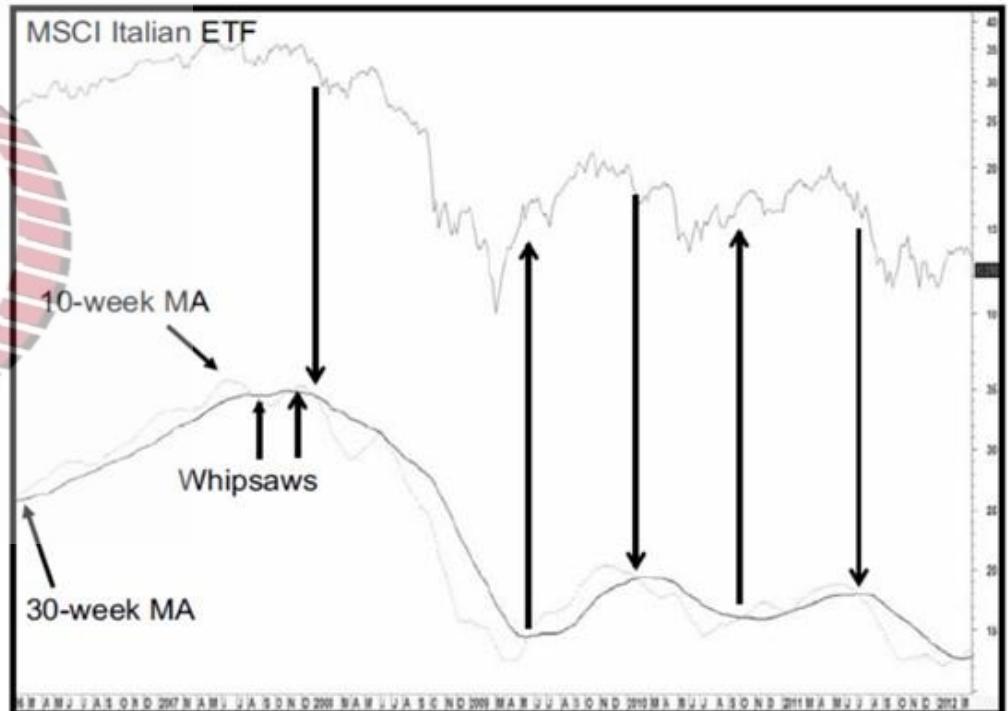
Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Application of Multiple Simple MAs

- Some techniques of trend determination involve more than one MA
- Signals are given by a short-term MA crossing above or below a longer one
- This procedure has the advantage of smoothing the data twice, which reduces the possibility of a whipsaw, yet it warns of trend changes fairly quickly after they have taken place



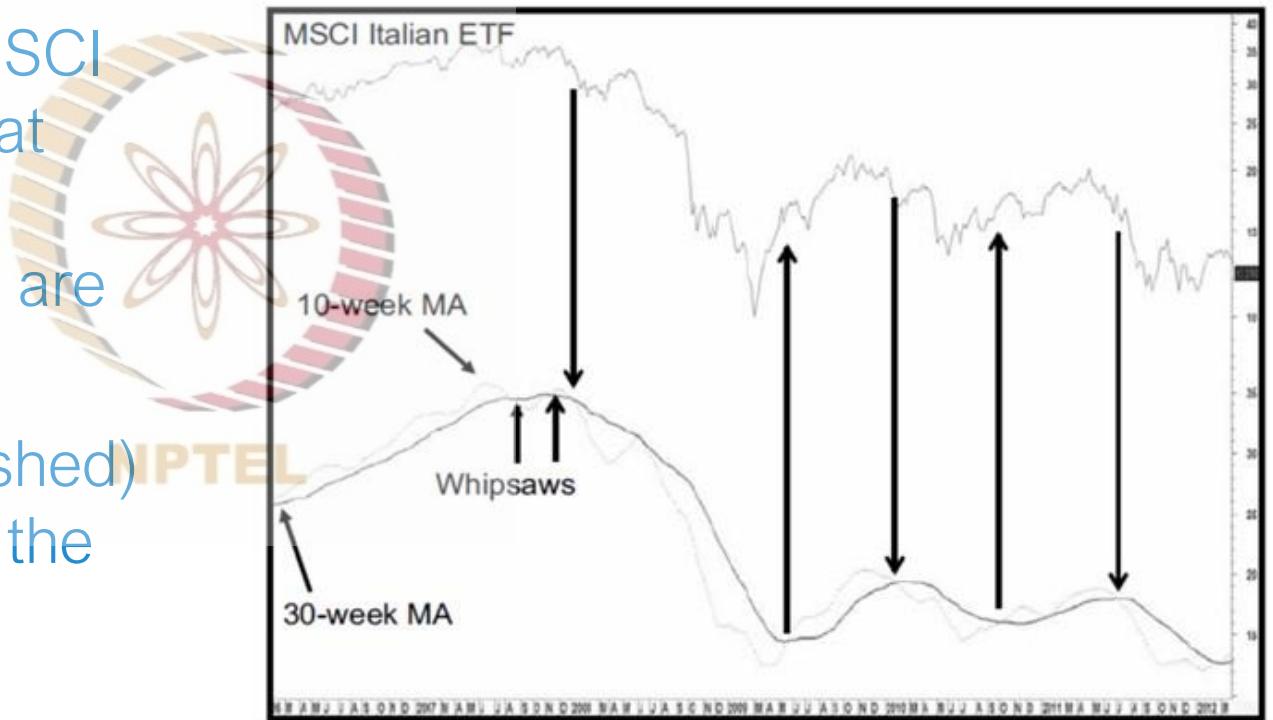
NPTEL



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Application of Multiple Simple MAs

- In the figure here, for iShares MSCI Italian ETF, the two averages that have traditionally been used for identifying primary trend moves are the 10- and 30-week spans
- Signals are given when the (dashed) 10-week average moves below the 30-week average



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Application of Multiple Simple MAs

- Some technicians prefer to wait until the 30-week series is moving in the direction of the cross so that a negative cross would require a declining 30-week MA
- Negative signals of either variety warn that the major trend is down
- Subsequently, it is not assumed to have reversed until either the 10-week MA moves higher than the 30-week MA, or it does so when both are rising simultaneously
- By definition, either methodology results in signals being triggered after the ultimate price peak or trough



Application of Multiple Simple MAs

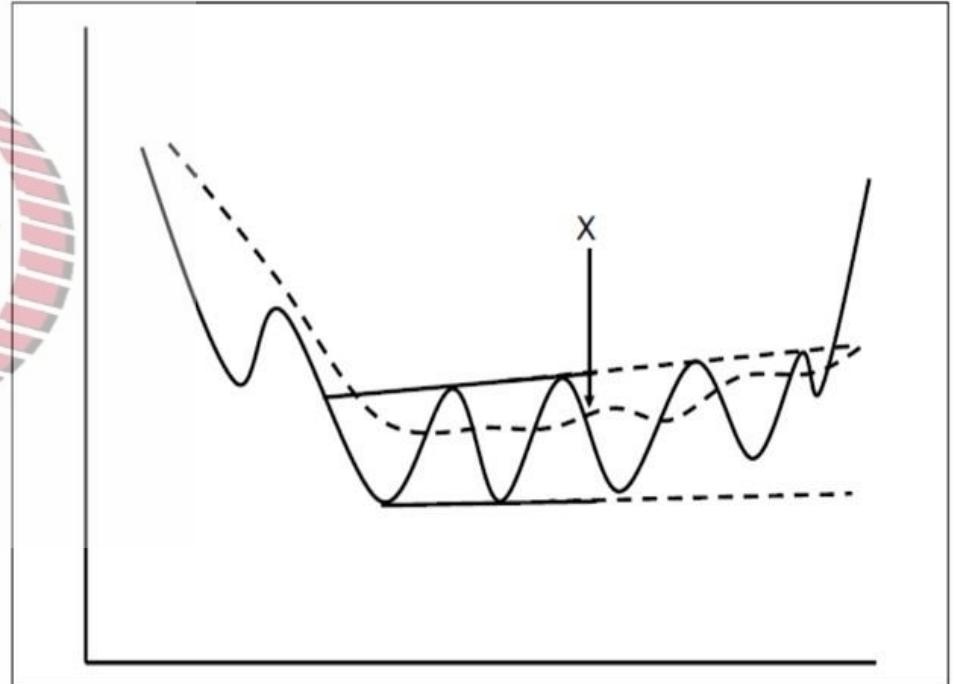
- Therefore, they serve as a confirmation of a change in trend rather than as actual juncture points in themselves
- If the signal develops close to the final turning point, it can be acted upon in a timely and practical way
- On the other hand, if it is triggered some distance from the previous peak or trough, it can merely be used as confirmation.



MA in Trading Range

MAs in Trading Range

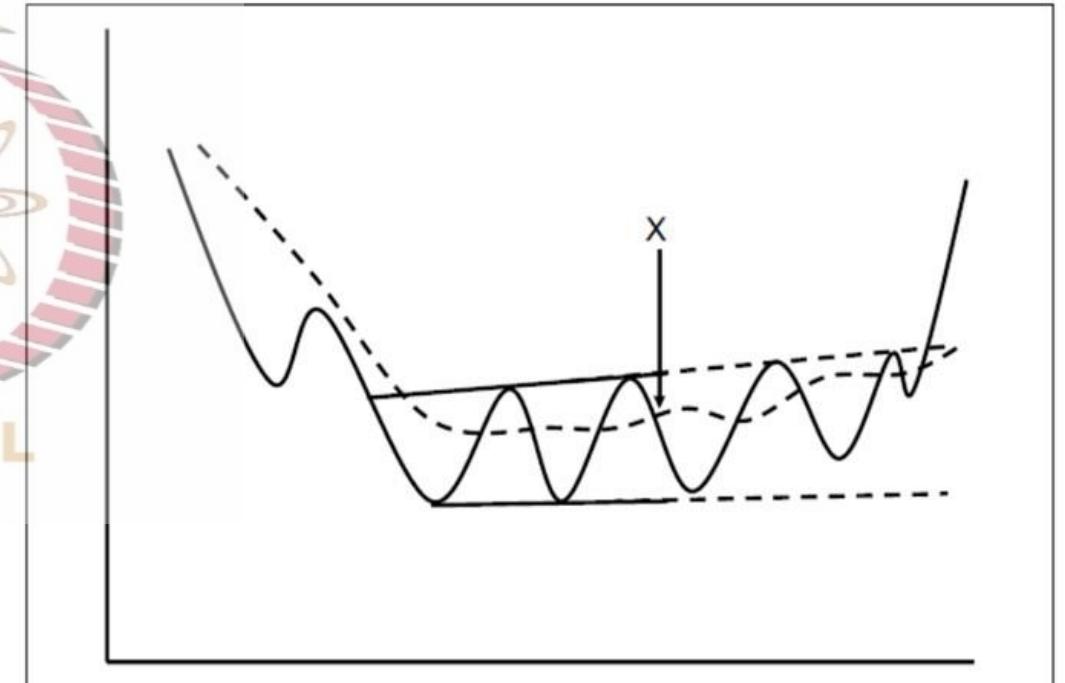
- MAs should always be used in conjunction with other indicators
- This is because prices occasionally fluctuate in a broad sideways pattern for an extended period, resulting in a series of misleading signals
- The good news is that such frustrating trading-range action is often followed by an extremely strong trend in which the losses incurred from the trendless period of whipsaw signals are more than made up for



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

MAs in Trading Range

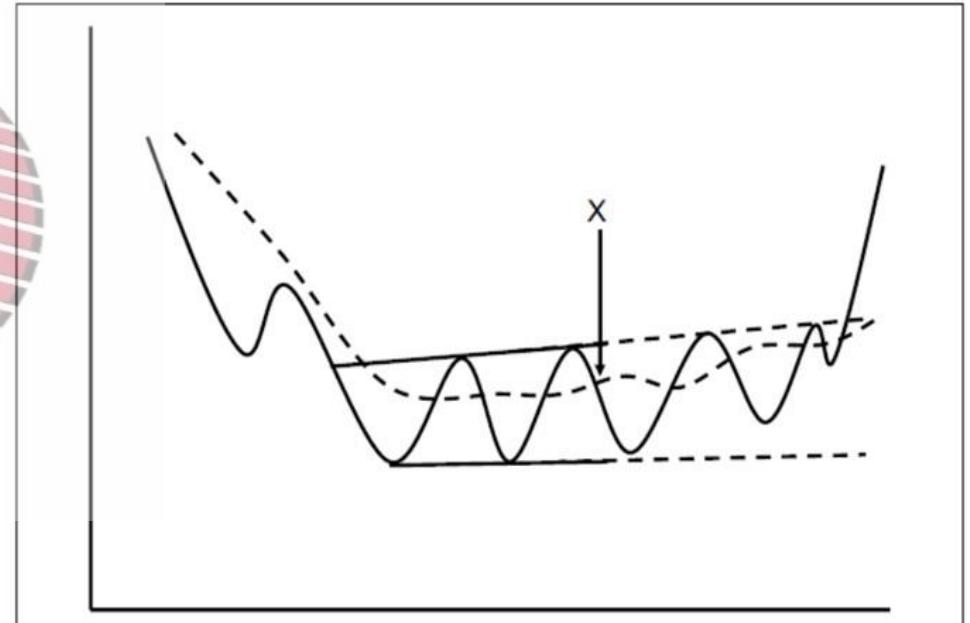
- This is because the whipsaws indicate confusion between buyers and sellers, and this implies a big battle
- When one or the other wins out, the victorious side is then able to push prices in a much stronger way
- The figure shows an example of an MA offering numerous whipsaw signals as it moves through a trading range



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

MAs in Trading Range

- At first, it is not obvious that the price action is a trading range
- However, at point X, when the price crosses below the MA again, it is possible to construct two trend lines that reflect this ranging action
- At such a time, it makes much better sense to await the verdict by acting on a trend line break rather than an MA crossover since there is no reason to suspect that the next crossover after X will not turn out to be a whipsaw



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.



Weighted Moving Averages (WMAs)

Weighted Moving Averages (WMA)

- A simple moving average (SMA) can only correctly represent a trend from a statistical point of view if it is centered but centering an average delays the signal
- One technique that attempts to overcome this problem is to weigh the data in favor of the most recent observations. An MA constructed in this manner (WMA) can “turn” or reverse direction much more quickly than a simple MA

Weighted Moving Averages: WMA

- There are countless ways in which data can be weighted, but the most widely used method is a technique whereby the first period of data is multiplied by 1, the second by 2, the third by 3, and so on until the most recent one. The calculations for each period are then totaled. The divisor for a simple MA is the number of periods, but for this form of weighted average, the divisor is the sum of the weights, i.e., $1 + 2 + 3 + 4 + 5 + 6 = 21$
- For a 10-week weighted MA, the sum of the weights would be $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55$

Weighted Moving Averages: WMA

Weighted Moving Average Calculation

			6 × col. 1	5 × col. 1	4 × col. 1	3 × col. 1	2 × col. 1	1 × col. 1	Total	Total /21
			Present	1 week ago	2 weeks ago	3 weeks ago	4 weeks ago	5 weeks ago		
Date		Index								
Jan.	8	101								
	15	100								
	22	103								
	29	99								
Feb.	5	96								
	12	99	594	480	396	309	200	101	2080	99.1
	19	95	570	495	384	297	206	100	2052	97.7
	26	91	546	475	396	288	198	103	2006	95.5
Mar.	5	93	558	455	380	297	192	99	1981	94.3
	12	89	534	465	364	285	198	96	1924	92.5

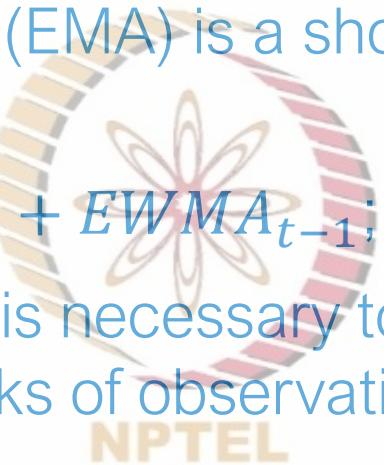




Exponential Moving Averages (EMAs)

Exponential Moving Averages (EMAs)

- An exponential moving average (EMA) is a shortcut to obtaining a form of weighted MA
- $EWMA_t = \alpha * (P_t - EWMA_{t-1}) + EWMA_{t-1}$; α = exponent
- To construct a 20-week EMA, it is necessary to calculate a simple 20-week MA first, i.e., the total of 20 weeks of observations divided by 20
- In the table, this has been done for the 20 weeks ending January 1, and the result appears as 99.00 in column 6
- The 20-week average becomes the starting point for the EMA
- It is transferred to column 2 for the following week



Exponential Moving Averages (EMAs)

Exponential Moving Average Calculation							
			EMA for previous week	Difference (1)-(2)	Exponent	(4)*(3)	(2)+(5)
		(1)	(2)	(3)	(4)	(5)	(6)
Date	Index						
Jan.	1	NPTEL	99.00
	8	100.00	99.00	1.00	0.10	0.10	99.10
	15	103.00	99.10	3.90	0.10	0.39	99.49
	22	102.00	99.49	2.51	0.10	0.25	99.74
Mar.	29	99.00	99.74	-0.74	0.10	-0.07	99.67

Exponential Moving Averages (EMAs)

- Next, the entry for the 21st week (January 8 in the earlier example) is compared with the EMA, and the difference is added or subtracted and posted in column 3, i.e., $100 - 99 = 1.00$
- This difference is then multiplied by the exponent, which for a 20-week EMA is 0.1
- This exponentially treated difference, 1.00×0.1 , is then added to the previous week's EMA, and the calculation is repeated each succeeding week
- In the example, the exponentially treated difference for January 8 is 0.1, which is added to the previous week's average, 99.00, to obtain an EMA for January 8 of 99.10. This figure in column 6 is then plotted. The exponent used varies with the time span of the MA

Exponential Factors for Various Time Frames

Number of Weeks	Exponent
5	0.4
10	0.2
15	0.13
20	0.1
40	0.05

Exponential Moving Averages

- The correct exponents for various periods are shown, where the periods have been described as weekly
- In effect, however, the exponent 0.1 can be used for any measure of 20 days, weeks, months, years, or an even longer period
- Exponents for time periods other than those shown in the table can easily be calculated by dividing 2 by the time span
- Trade-off between timeliness and sensitivity

Exponential Moving Averages

- A 5-week average will need to be twice as sensitive as a 10-week average; thus, 2 divided by 5 gives an exponent of 0.4
- On the other hand, since a 20-week average should be half as sensitive as for a 10-week period (0.2), its exponent is halved to 0.1
- If an EMA proves to be too sensitive for the trend being monitored, one solution is to extend its time period. **All forms of MAs represent a compromise between timeliness and sensitivity**



Summary



Summary

- One of the basic assumptions of technical analysis is that stocks move in trends
- Since major trends comprise many minor fluctuations in prices, an MA is constructed to help smooth out the data so that the underlying trend will be more clearly visible
- Often, MA crossovers are employed to provide warnings of a reversal in trend and using WMAs or EMAs, which are more sensitive to changes in the prevailing trend since they weigh data in favor of the most recent periods



Summary

- There is no such thing as a perfect average. The choice of time span always represents a trade-off between timeliness—catching the trend at an early stage—and sensitivity—catching the trend turn too early and causing an undue amount of whipsaws



INDIAN INSTITUTE OF TECHNOLOGY KANPUR





Introduction to Momentum Oscillators

Introduction

- Ball thrown in the air, Car rolling down the hill
- Various momentum indicators are Rate of change (ROC), the relative strength indicator (RSI), moving-average convergence divergence (MACD), and Stochastics
- The principles or characteristics of momentum interpretation are the same for all indicators, but some are specially constructed to bring out a particular characteristic



Momentum signals

- The momentum signal performs the act of supplementary “witness” in our weight-of-the-evidence approach
- Momentum and sentiment are closely aligned
- Momentum indicators have two major applications
- Momentum indicators are often useful in identifying overbought and oversold conditions, and divergences
- Also, momentum indicators can be used for identifying trend reversals: assumption here is that if momentum is reversed, prices will follow in sometime



Rate of Change (RoC) Oscillator

Rate of Change (RoC)

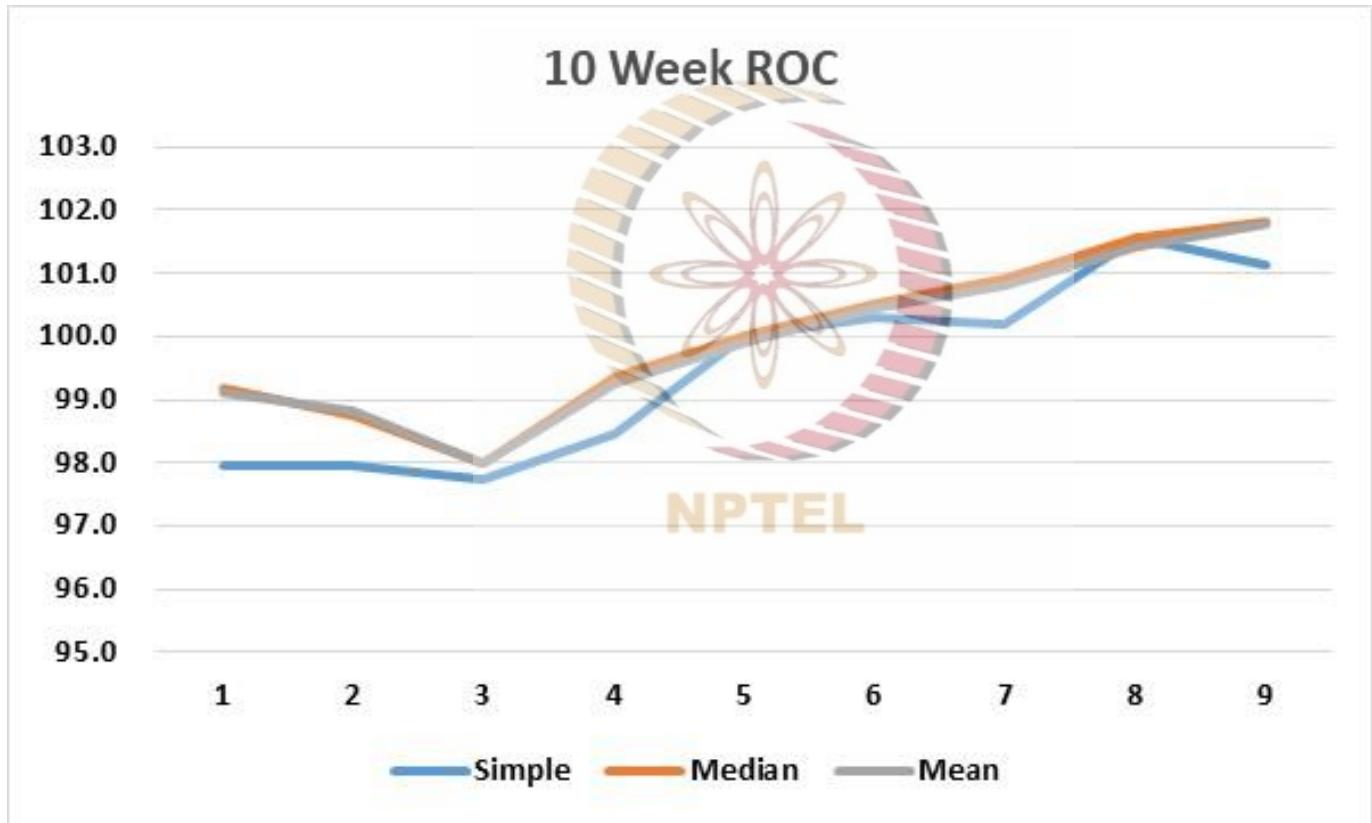
- Divide current price by the price 10-week/Day ago (or any period that is more suitable) to obtain RoC
- For example, if the current price is 100 and the price 10-week ago was 105, then $\text{RoC} = 100/105 = 95.2$
- The subsequent price will be divided by the price 10-week ago
- The resulting series will oscillate around some central point
- Instead of using exact value, we can use mean and median of the period



10 Week ROC calculation

Date	Index Price	Seq	10 Weeks Ago (2)	10 Week ROC (1) divided by (2)	10 Weak ROC (Median)	10 Weak ROC (Mean)
Jan-01	985	1				
8	980	2				
15	972	3				
22	975	4				
29	965	5				
Feb-05	967	6				
12	972	7				
19	965	8				
26	974	9				
Mar-05	980	10		NPTI Simple	Median	Mean
12	965	11	985	98.0	99.2	99.1
19	960	12	980	98.0	98.8	98.8
26	950	13	972	97.7	98.0	98.0
Apr-02	960	14	975	98.5	99.4	99.2
9	965	15	965	100.0	100.0	99.9
16	970	16	967	100.3	100.5	100.4
23	974	17	972	100.2	100.9	100.8
30	980	18	965	101.6	101.6	101.4
May-07	985	19	974	101.1	101.8	101.8

10 Week ROC calculation





RoC Characteristics

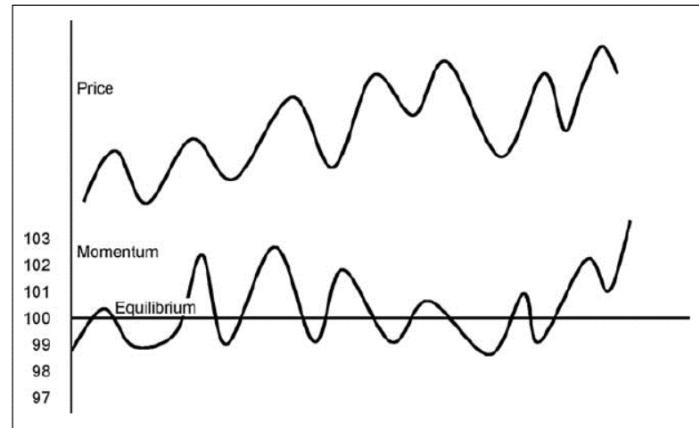
Rate of Change (RoC) Oscillator

- This horizontal equilibrium line represents the level at which the price is unchanged from its reading 10 weeks ago
- When an ROC indicator is above the reference line, the market price that it is measuring is higher than its level 10 weeks ago
- If the ROC indicator is also rising, the difference between the current reading of the price and its level 10 weeks ago is growing

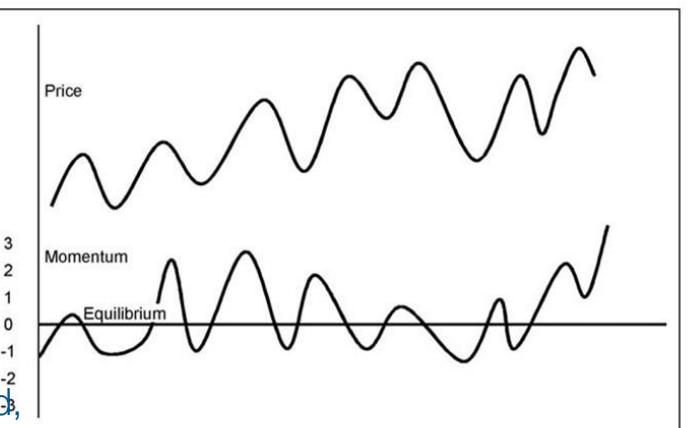


Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

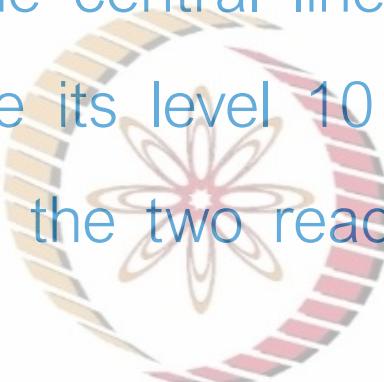
RoC with % scaling



RoC in return form



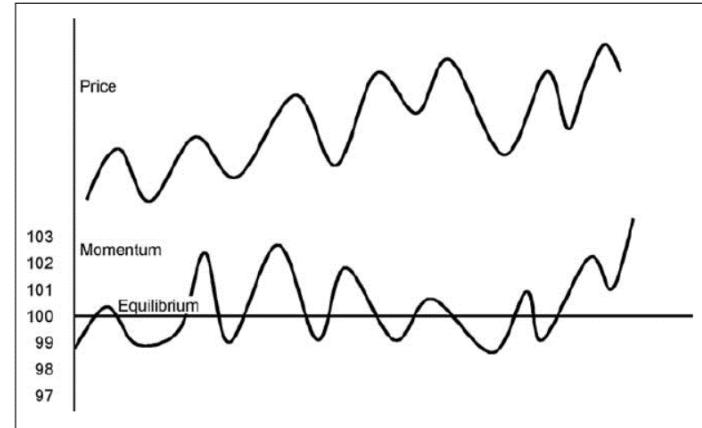
Rate of Change (RoC) Oscillator



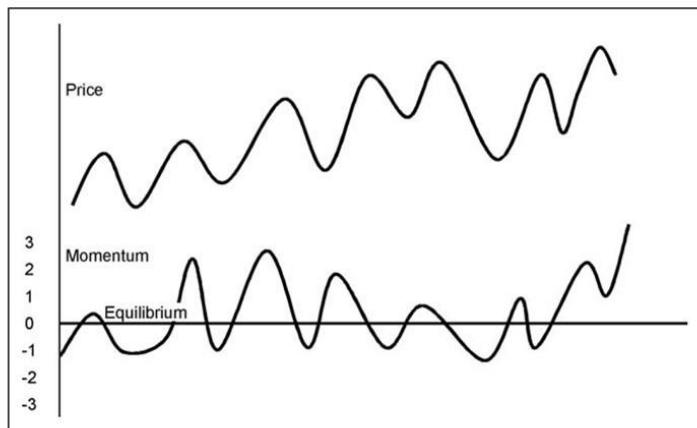
- If an ROC indicator is above the central line but is declining, the price is still above its level 10 weeks ago, but the difference between the two readings is shrinking
- When the ROC indicator is below its central line and falling, the price is below its level 10 weeks ago, and the difference between the two is growing

Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

RoC with % scaling



RoC in return form



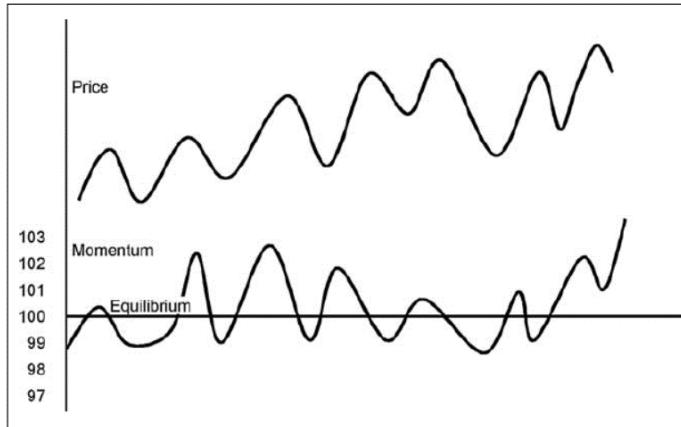
Rate of Change (RoC) Oscillator

- If the indicator is below its central line but rising, the price is still lower than its level 10 weeks ago, but its rate of decline is slowing
- In short, a rising ROC indicator implies expanding velocity, and a falling one implies a loss of momentum
- Rising momentum should be interpreted as a bullish factor, and declining momentum as a bearish one

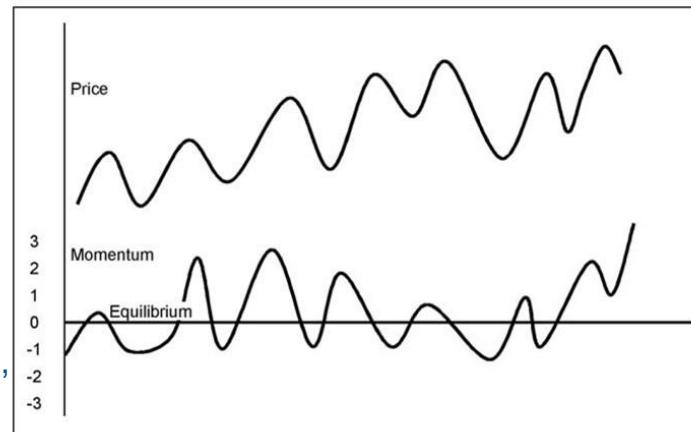


Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

RoC with % scaling

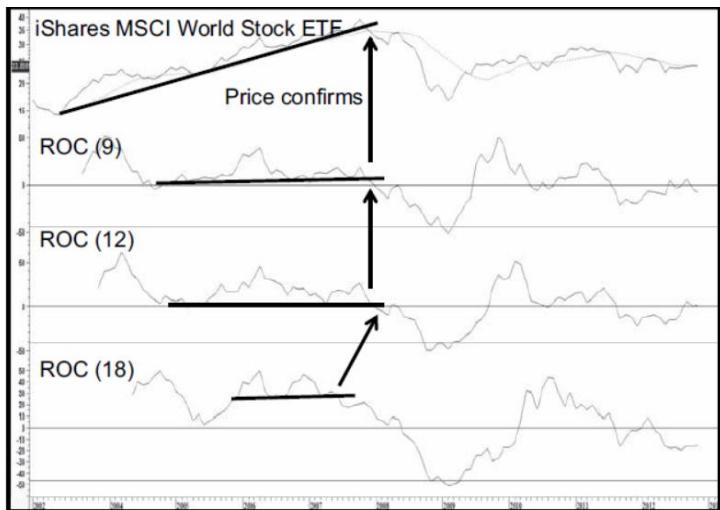


RoC in return form



RoC: Use of different time-spans

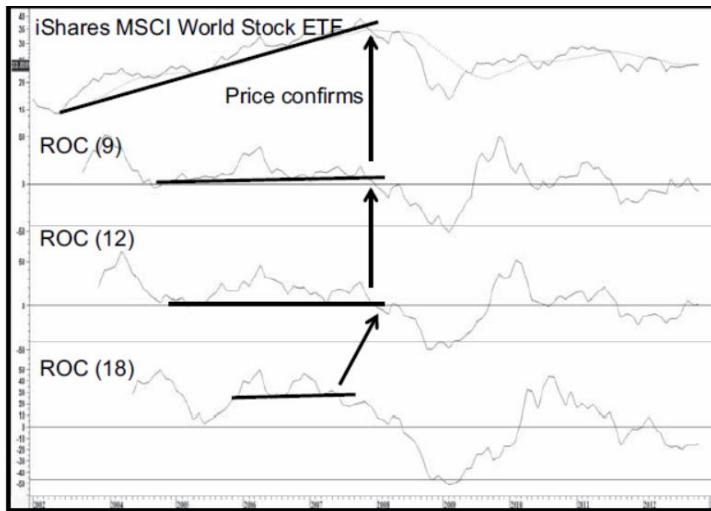
- Calculation of momentum indicators (e.g., ROC) for different time span helps
- E.g., trendlines, price patterns, or divergences, which may not be apparent in one period, are more apparent in another
- 12 month MA along with 9, 12, and 18 month ROC are provided here
- Notice the 12 month MA trend line violation



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

RoC: Use of different time-spans

- The trendline was violated with 12 month MA along with loss of momentum in all the three ROCs (9, 12, 18)
- Momentum typically reverses along with price, often with a small lead, but just because oscillators change direction, doesn't always mean that prices will too
- Normally, a reversal in the momentum trend acts as confirming evidence of a price trend reversal signal



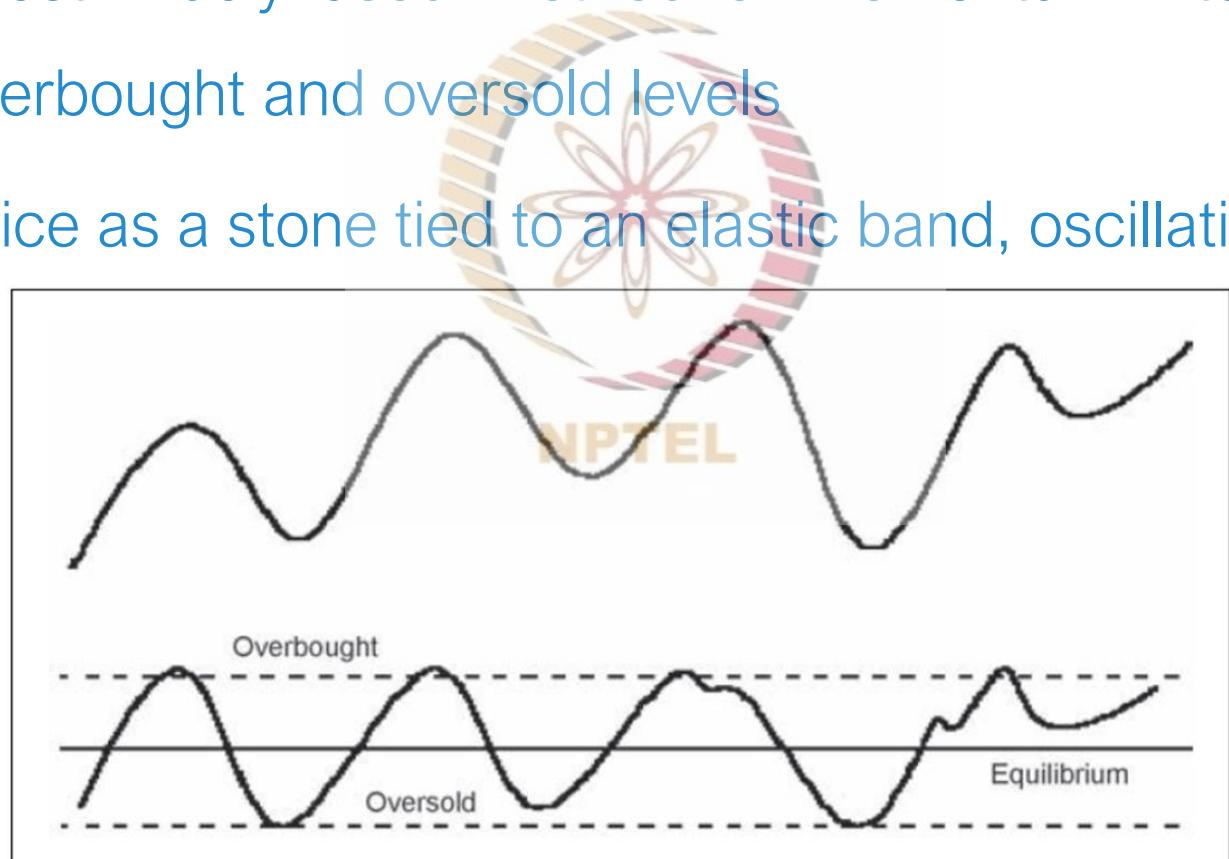
Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.



Overbought and Oversold levels

Overbought and oversold levels

- Perhaps the most widely used method of momentum interpretation is the evaluation of overbought and oversold levels
- Consider the price as a stone tied to an elastic band, oscillating up and down



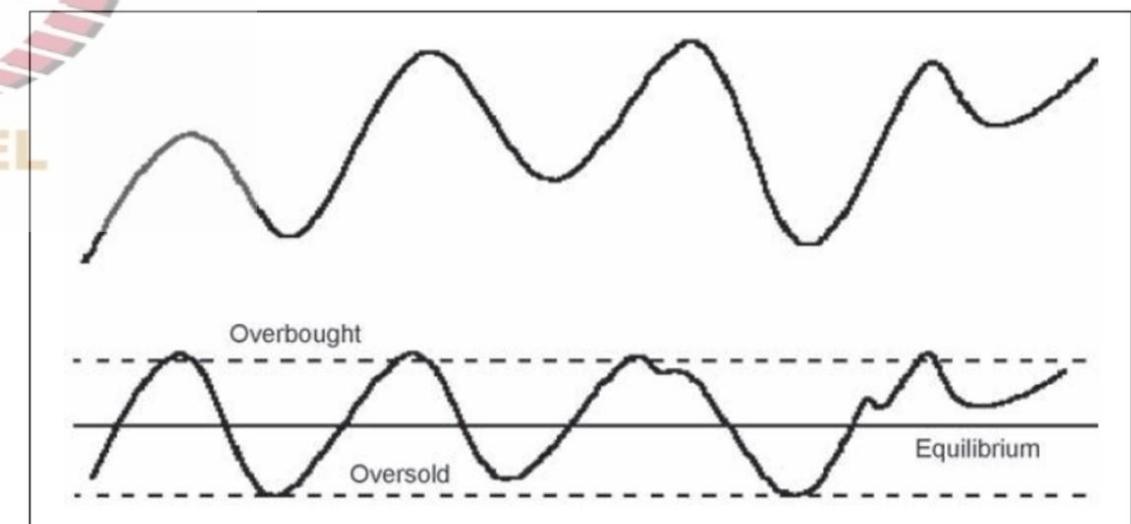
Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Overbought and oversold levels

- A particularly strong or weak price tends to extend beyond the normal limits, known as overbought and oversold levels
- These areas are drawn on a chart at some distance above and below the equilibrium level
- The actual boundaries will depend on the volatility of the price being monitored and the time period over which the momentum indicator has been constructed



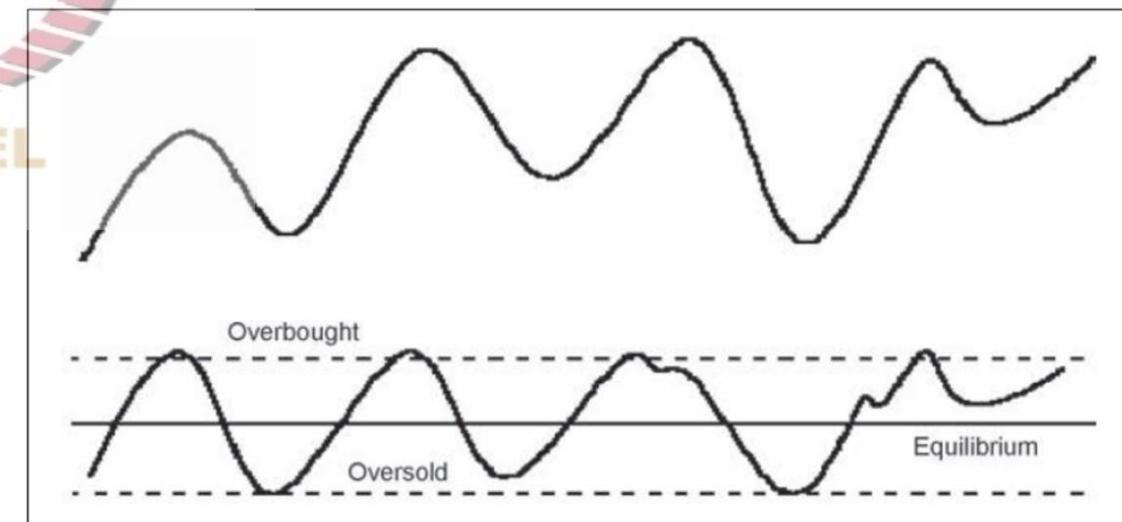
NPTEL



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Overbought and oversold levels

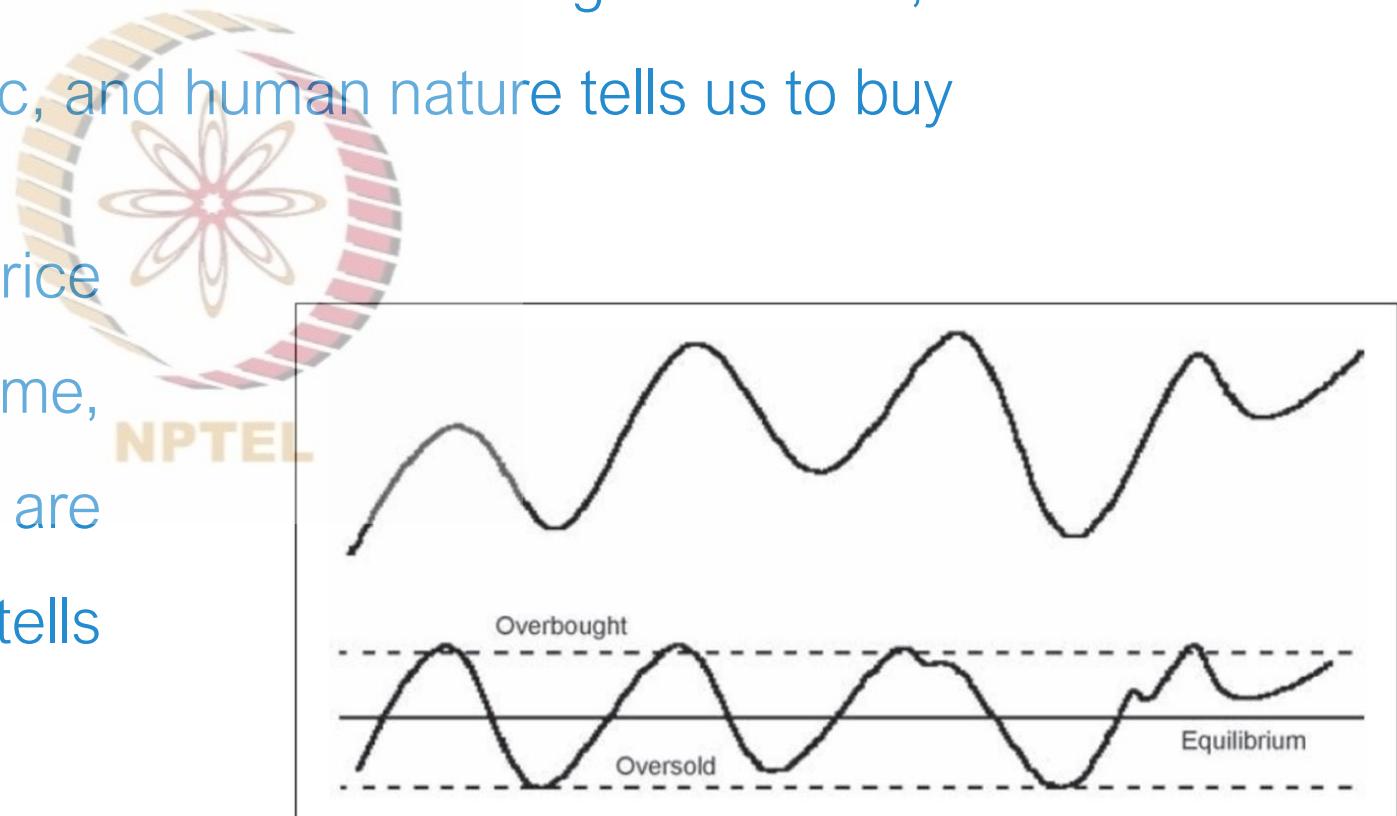
- When a price reaches an overbought or oversold extreme, the probabilities favor but, by no means guarantee, a reversal
- An overbought reading is a time to be thinking about selling, and an oversold one warns that the current technical position may warrant a purchase



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland,

Overbought and oversold levels

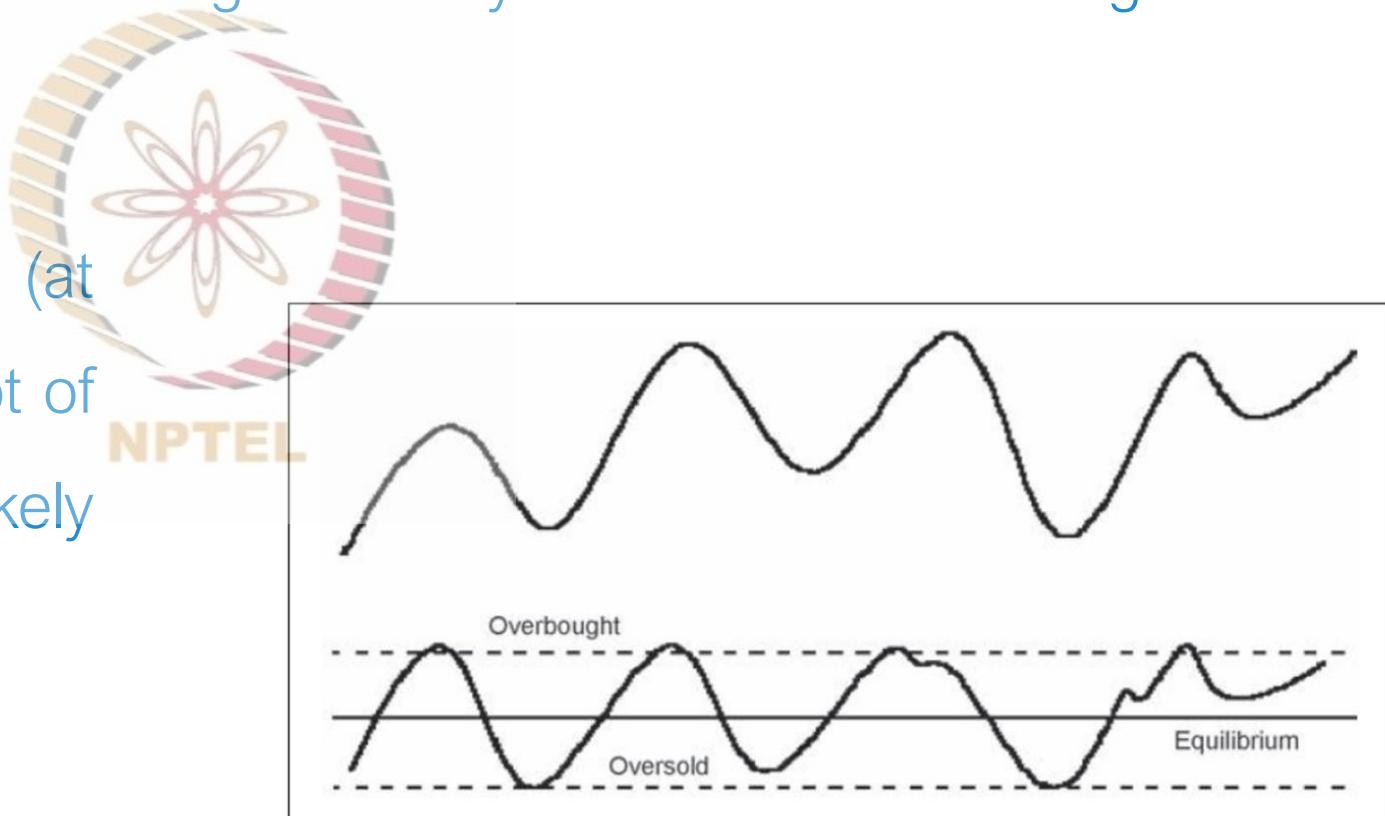
- In many cases, when a price reaches an overbought extreme, the news is good, participants are optimistic, and human nature tells us to buy
- In many cases, when a price reaches an oversold extreme, the news is good, participants are optimistic, and human nature tells us to buy



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland,

Overbought and oversold levels

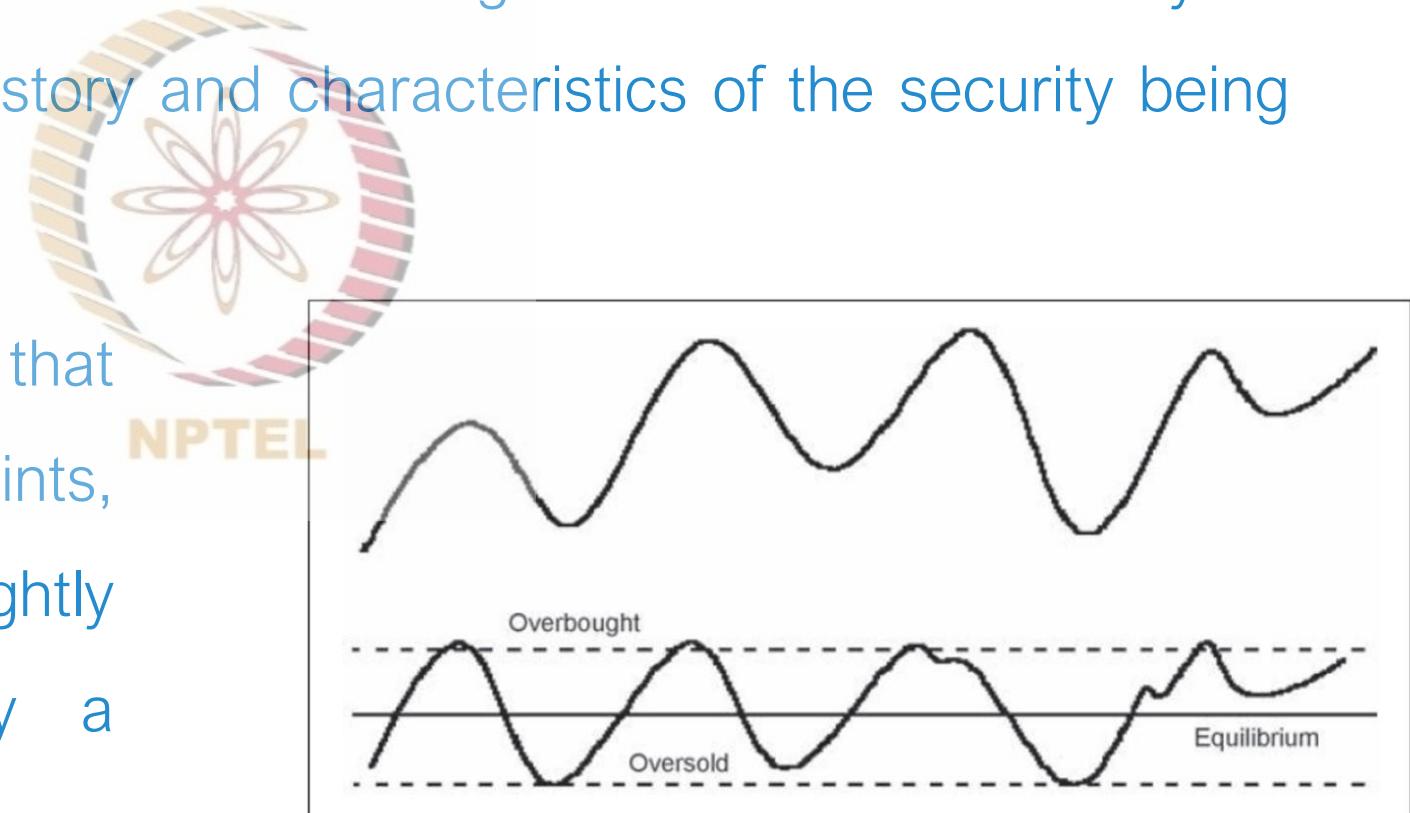
- On the other hand, an oversold reading is usually associated with a negative news background
- Most of the people are fearful (at oversold level) and it takes a lot of courage to buy but mostly likely that is the right thing to do



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland,

Overbought and oversold levels

- However, where to draw these lines of overbought and oversold can only be determined by studying the history and characteristics of the security being monitored
- They should be drawn such that they will act as pivotal points, which, when touched or slightly exceeded, are followed by a reversal in the oscillator



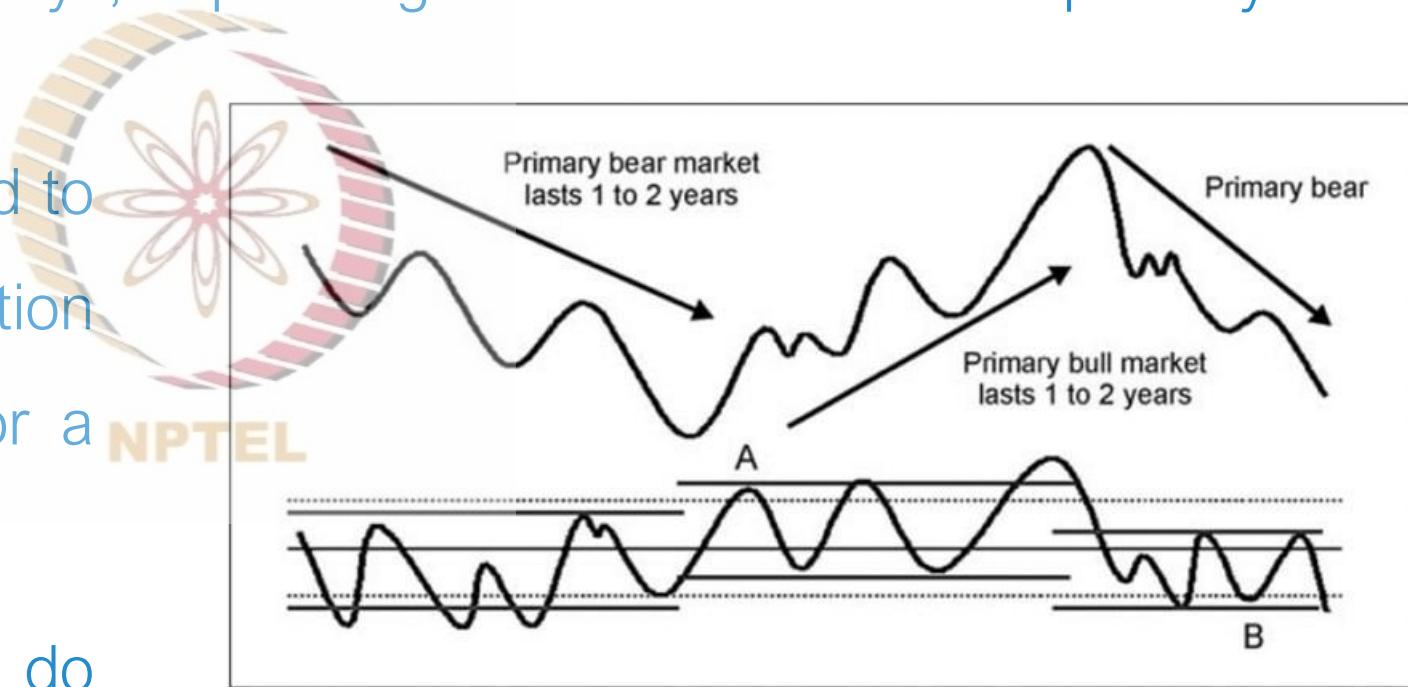
Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland,



Momentum (Oscillator) Characteristics in Primary Bull and Bear Markets

Introduction

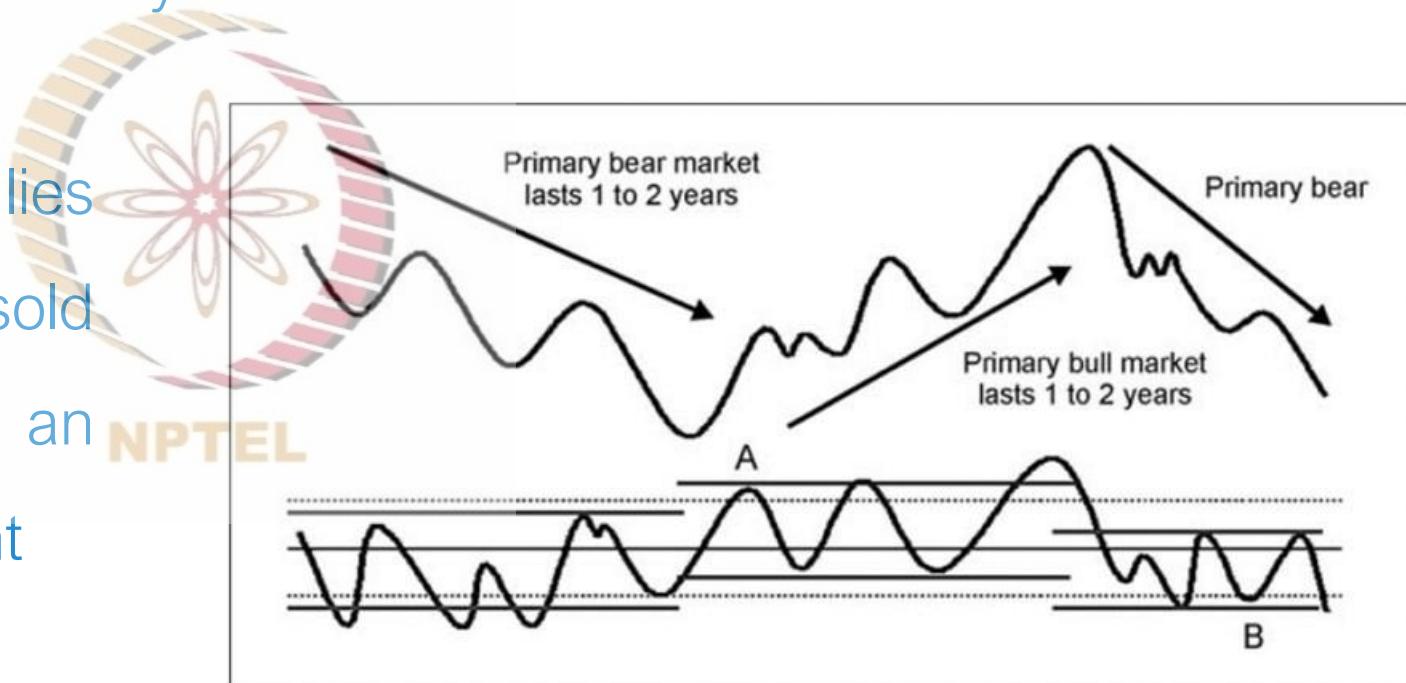
- Oscillators behave in different ways, depending on the direction of the primary trend
- In a bull market, oscillators tend to move into an overbought condition very quickly and stay there for a long time
- In a bear market, they can and do remain in an oversold condition for a long time



Source: From Martin Pring, Trading Systems Explained, Marketplace Books Columbia, Maryland, 2008.

Introduction

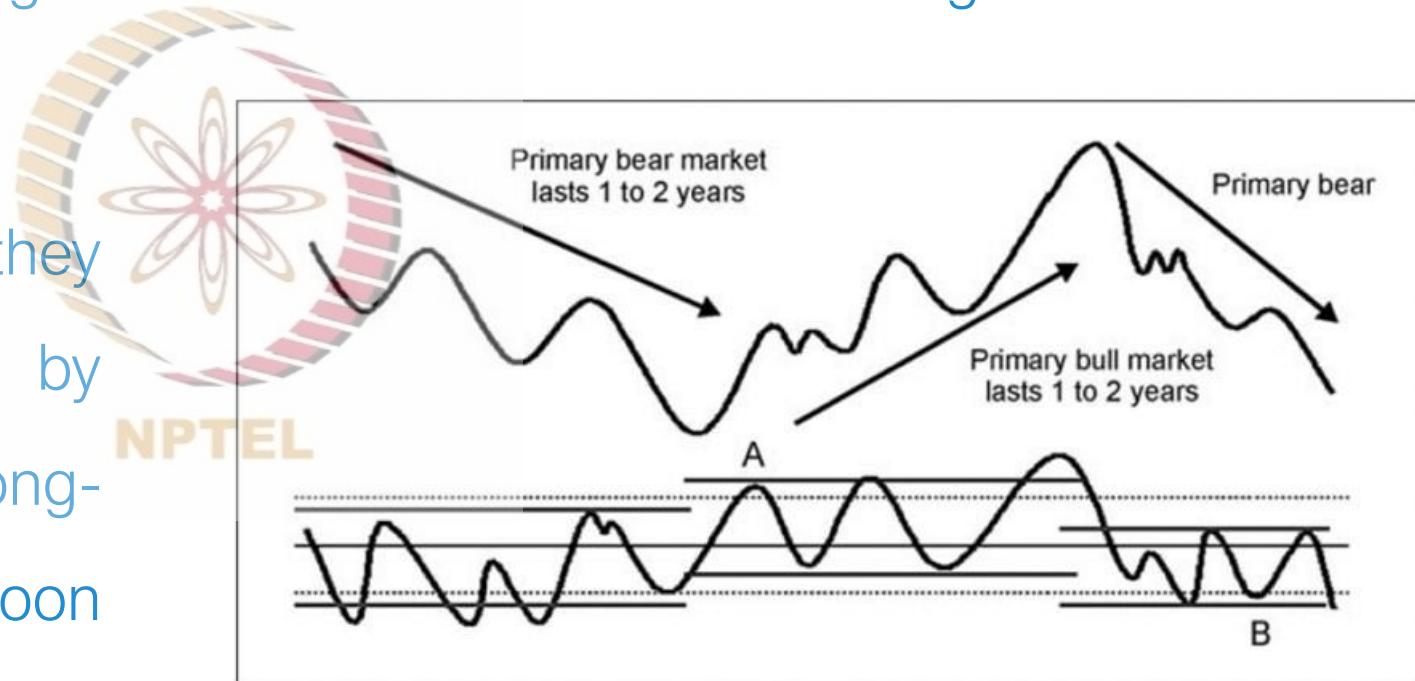
- In a bull market, the price is extremely sensitive to an oversold condition
- The reason for this sensitivity lies in the fact that the oversold reading very likely reflects an extreme in short-term sentiment



Source: From Martin Pring, Trading Systems Explained, Marketplace Books Columbia, Maryland, 2008.

Introduction

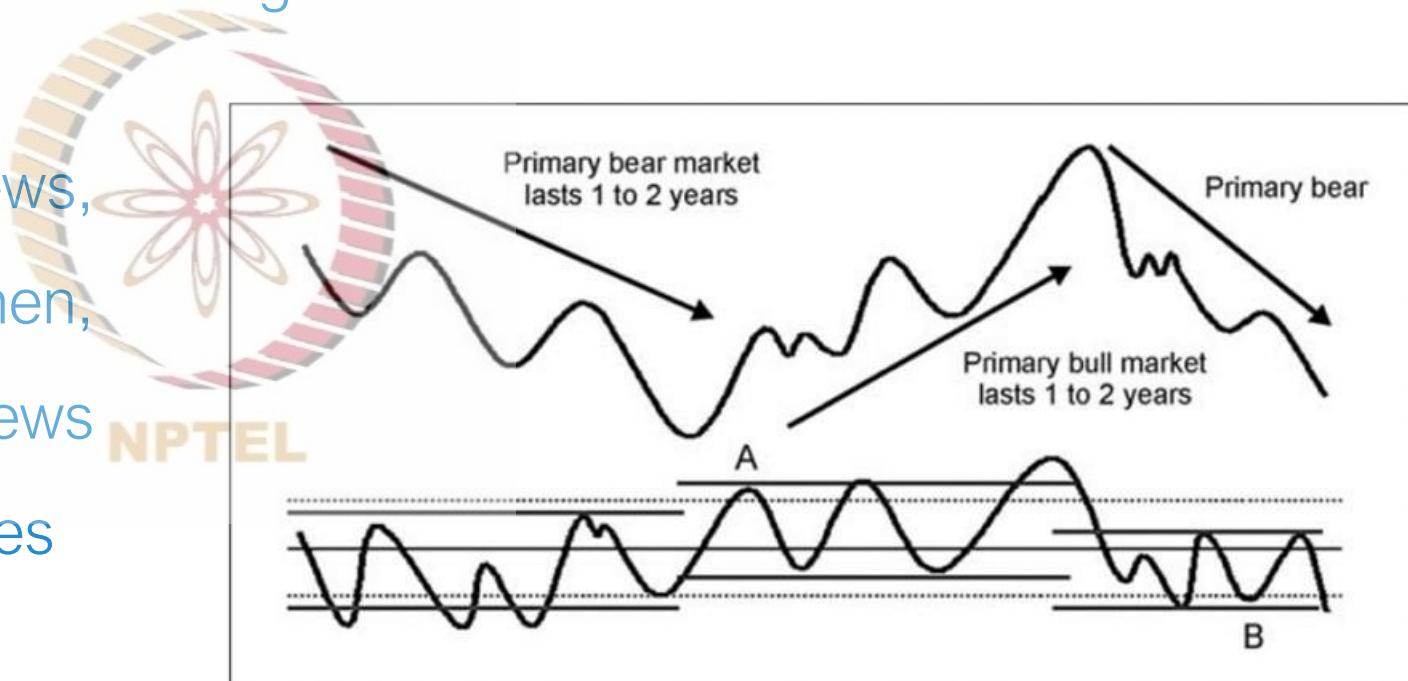
- Market participants are focusing on the latest bad news and using that as an excuse to sell
- Since this is a bull market, they would be better served by remembering the positive long-term fundamentals that will soon emerge and using this weakness as an opportunity to buy



Source: From Martin Pring, Trading Systems Explained, Marketplace Books Columbia, Maryland, 2008.

Introduction

- The same thing happens in reverse during a bear market
- Traders are focused on bad news, which sends the price down; then, some unexpectedly good news hits the wires and the price rallies



Source: From Martin Pring, Trading Systems Explained, Marketplace Books Columbia, Maryland, 2008.

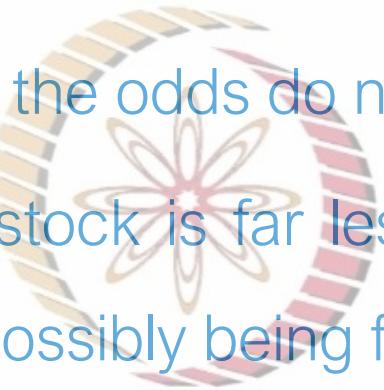
Oscillator Characteristics in Primary Bull and Bear Markets

- However, when it is fully digested, most people realize that things really haven't changed at all and the price declines again
- Thus, the overbought reading more often than not will correspond with the top of a bear market rally
- Looking at it from another perspective, during a bull market, the price will be far less sensitive to an overbought condition
- Often, it will be followed by a small decline or even a trading range



Oscillator Characteristics in Primary Bull and Bear Markets

- The rule, then, is don't count on a short-term overbought condition to trigger a big decline (in bull market) because the odds do not favor it
- In a bear market, a market or stock is far less sensitive to an oversold reading, often failing to signal a rally, or possibly being followed by a trading range
- The maturity of the trend, whether primary or intermediate, often has an effect on the limits that an oscillator might reach
- For example, when a bull market has just begun, there is a far greater tendency for it to move quickly into overbought territory and to remain at very high readings for a considerable period of time



Oscillator Characteristics in Primary Bull and Bear Markets

- In such cases, the overbought readings tend to give premature warnings of declines
- During the early phases of the bull cycle, when the market possesses strong momentum, reactions to the oversold level are much more responsive to price reversals, and such readings, therefore, offer more reliable signals
- It is only when a bull trend is maturing, or during bear phases, that overbought levels can be relied upon to signal that a rally is shortly to be aborted
- The opposite is true for a bear trend



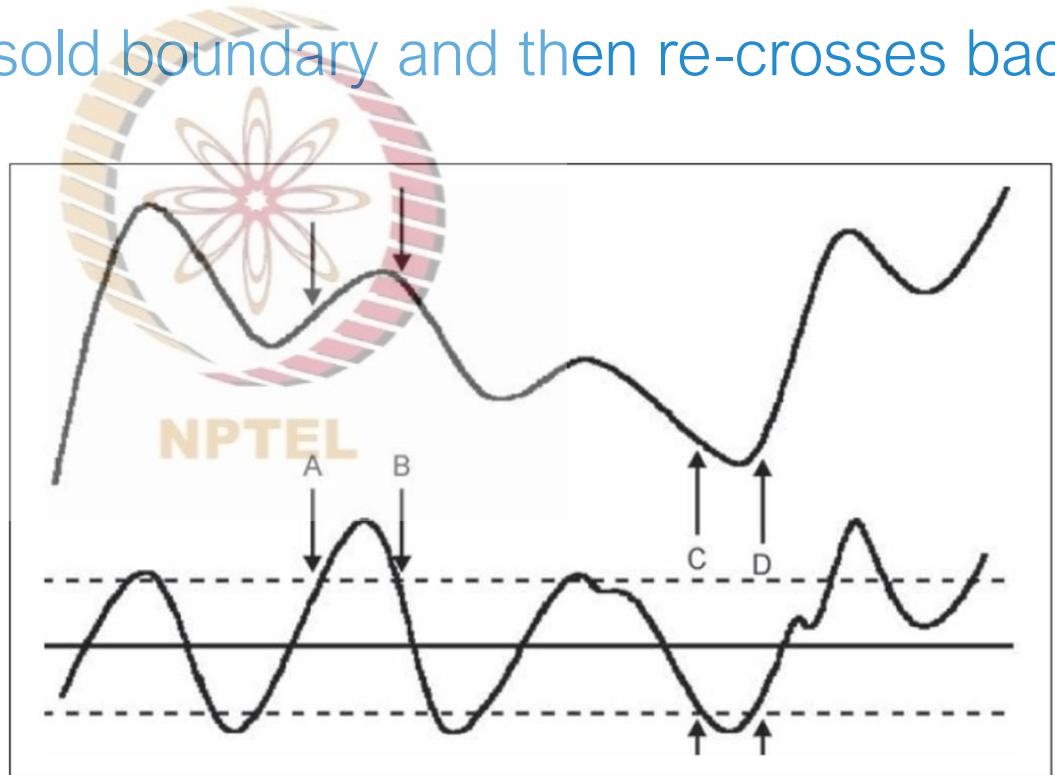
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Overbought/Oversold Re-crossovers

Overbought/Oversold Re-crossovers

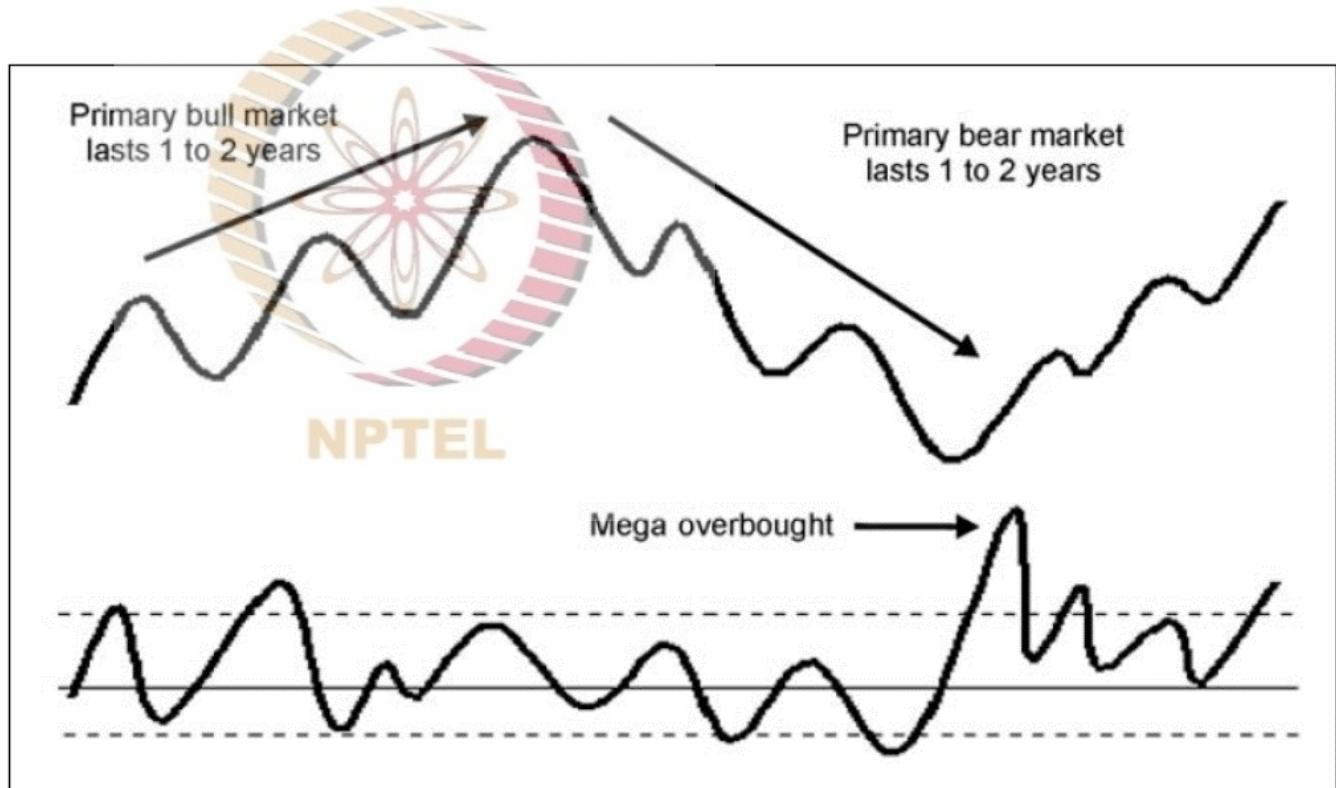
- Buy and sell alerts are generated when the momentum indicator exceeds its extended overbought or oversold boundary and then re-crosses back through the boundary on its way to zero



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Mega Overbought

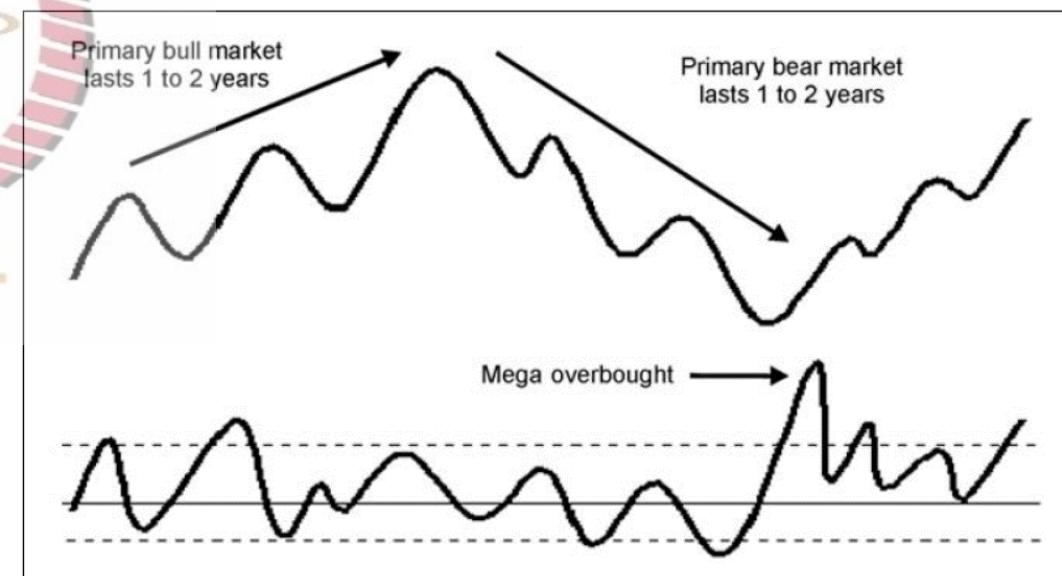
- A mega overbought is the initial thrust in a bull market following the final low



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Mega Overboughts

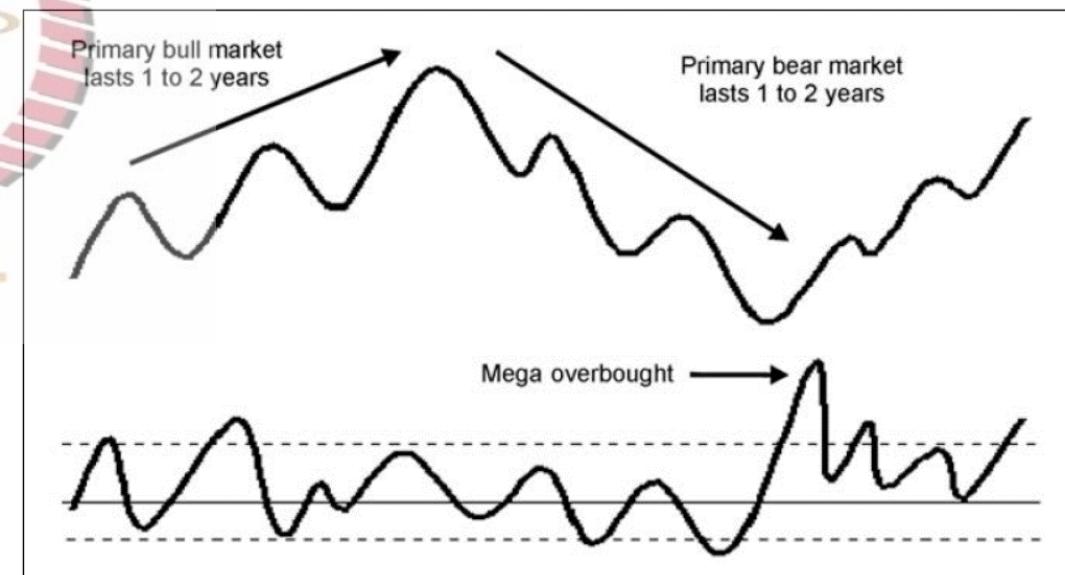
- It's a reading in the momentum indicator that takes it well beyond the normal overbought condition witnessed in either a preceding bull or bear market: a multiyear high for the oscillator concerned
- Such conditions are usually a sign of a very young and vibrant bull market



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Mega Overbought

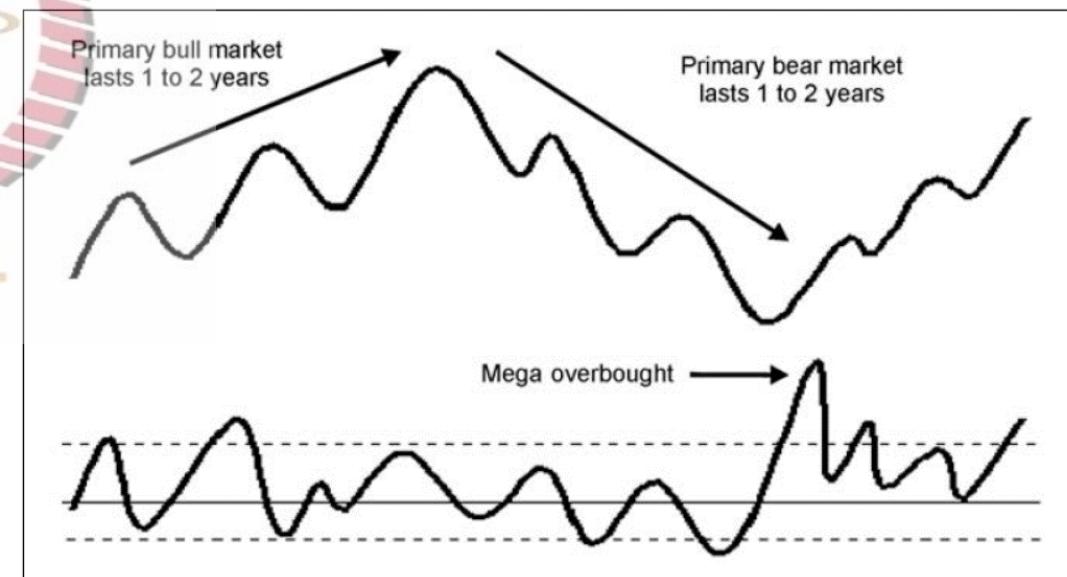
- Mega overbought the only instance when opening a long position from an overbought condition can be justified
- Whenever an oscillator experiences a mega overbought, higher prices almost always follow after a short-term setback or consolidation



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Mega Overboughts

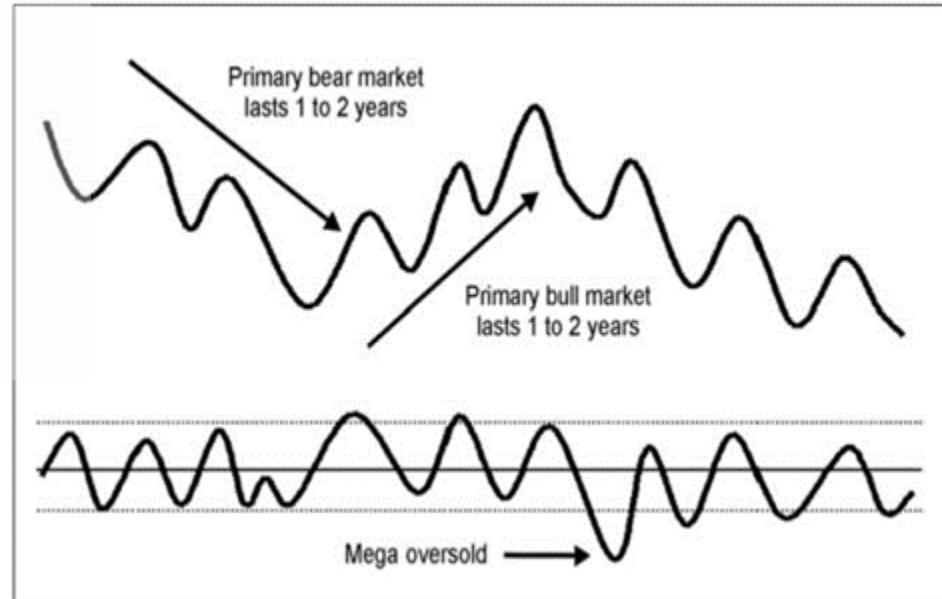
- Since a mega overbought is associated with the first rally in a bull market, it's a good idea to check and see if volume is also expanding rapidly
- If it takes the form of record volume for that particular security, the signal is far louder because record volume coming after a major decline is typically a reliable signal of a new bull market



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Mega Oversold

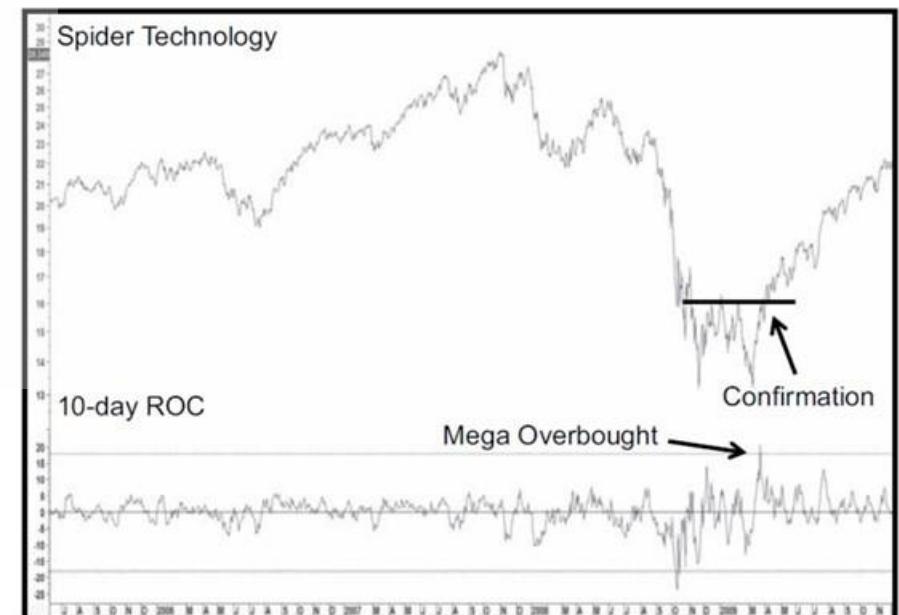
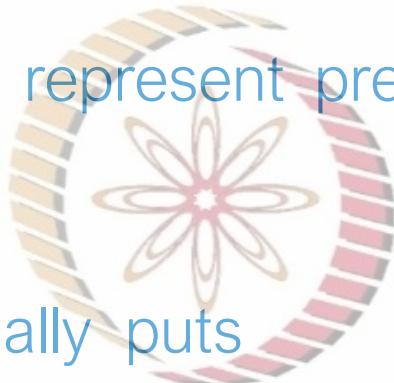
- Expanding volume is a more or less necessary condition since it is consistent with the idea that buyers now have the upper hand and that the psychology has totally reversed
- Consequently, when a price decline following a bull market high pushes a momentum indicator to a new extreme low, well beyond anything witnessed either during the previous bull market or for many years prior to that



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Mega Over- Bought/sold

- The implication is that sellers now have the upper hand
- Mega and extreme conditions represent preliminary signals of a primary trend reversal
- Confirmation by the price usually puts the issue beyond reasonable doubt



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.



Momentum and price divergence

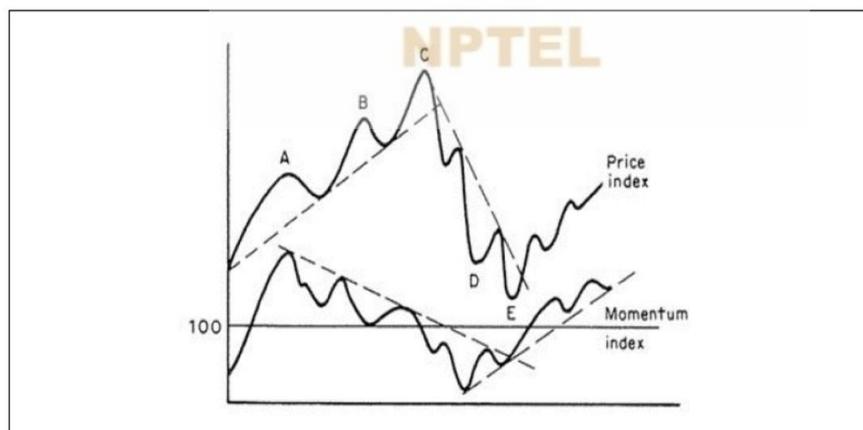
Momentum and price divergence

- Prices in financial markets usually reach their maximum level of momentum ahead of the final peak in prices
- If the price makes a new high, which is confirmed by the momentum index, no indication of technical weakness arises



Momentum and price divergence

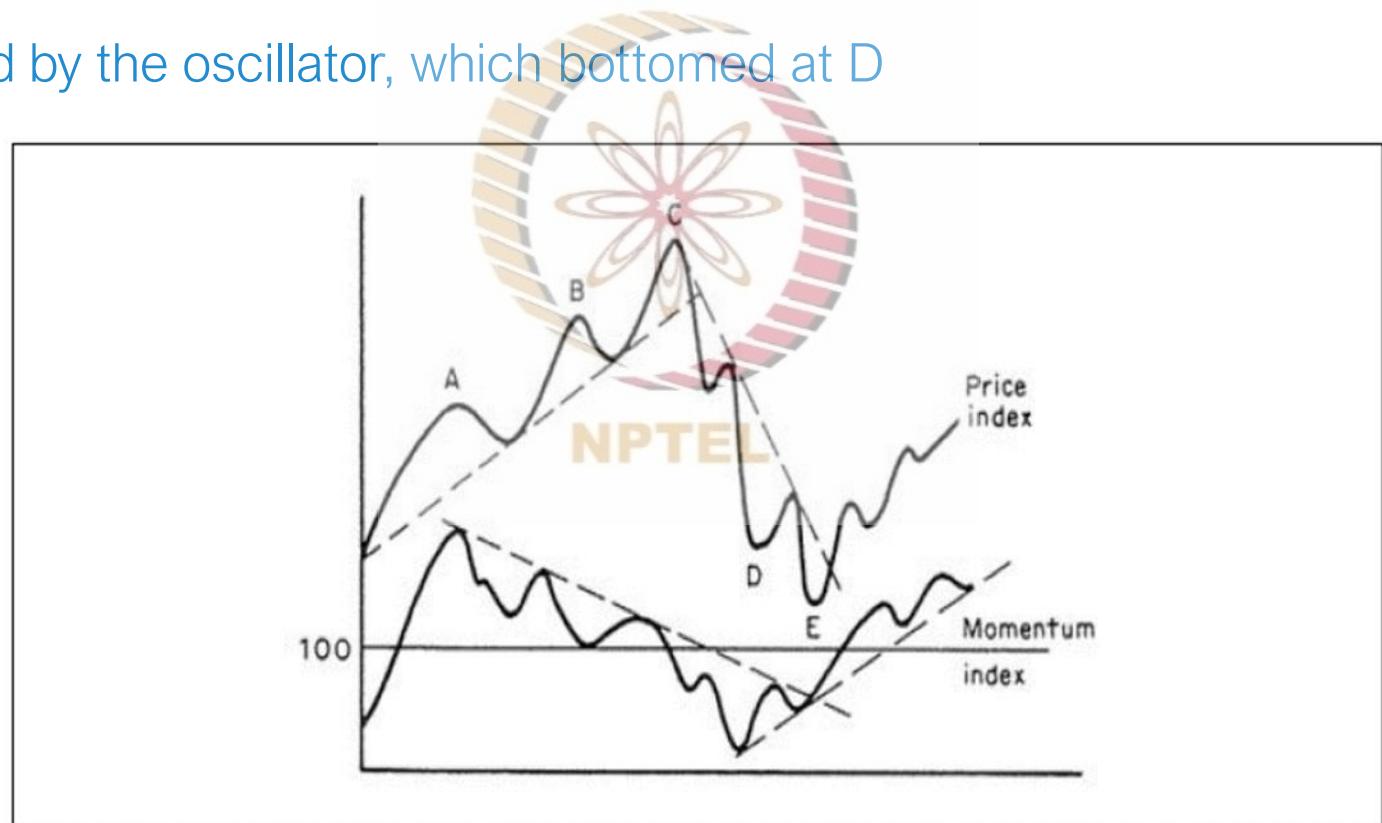
- On the other hand, if momentum fails to confirm (point B), a negative divergence is set up between the two series, and a warning of a weakening technical structure is given
- Such discrepancies normally indicate that the price will undergo a corrective process. It can take the form of either a sideways or a horizontal trading range, or (more likely) a downward one



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Momentum and price divergence

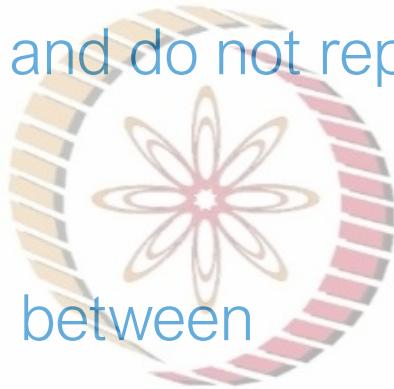
- The Fig. also shows a positive divergence. In this instance, the price makes its low at point E, but this was preceded by the oscillator, which bottomed at D



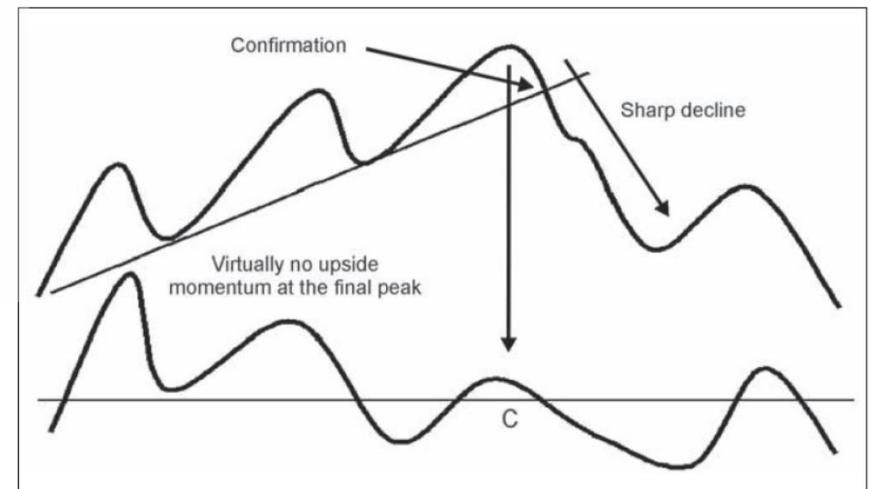
Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Momentum and price divergence

- It is extremely important to note that divergences only warn of a weakening or strengthening market condition and do not represent actual buy and sell signals
- Whenever any divergence between momentum and price occurs, it is essential to wait for a confirmation from the price itself that its trend has also been reversed



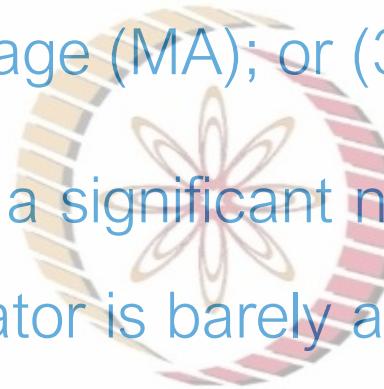
Extreme Bearish Divergence



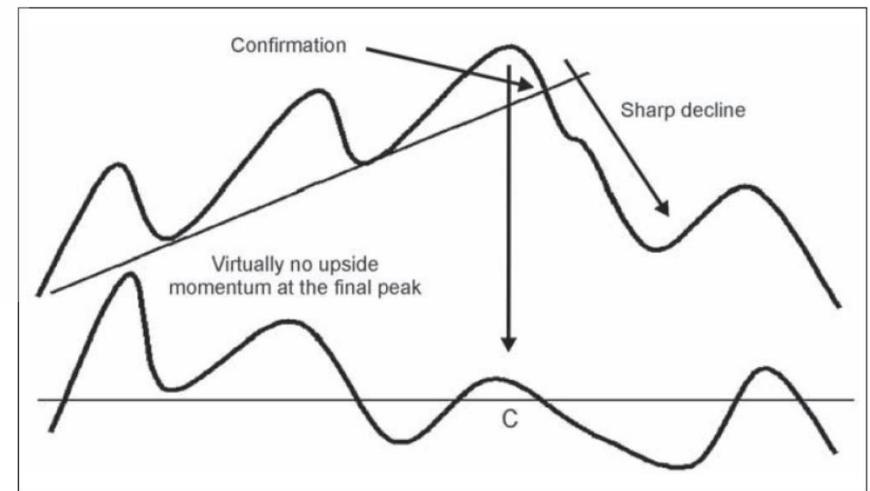
Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Momentum and price divergence

- This confirmation can be achieved by: (1) the violation of a simple trendline, (2) the crossover of a moving average (MA); or (3) the completion of a price pattern
- At point C, the price moves to a significant new high, but the momentum indicator is barely able to remain above the equilibrium line
- When accompanied by a trend break, it is usually a sign of extreme technical weakness and is often, though certainly not always, followed by a very sharp decline.



Extreme Bearish Divergence

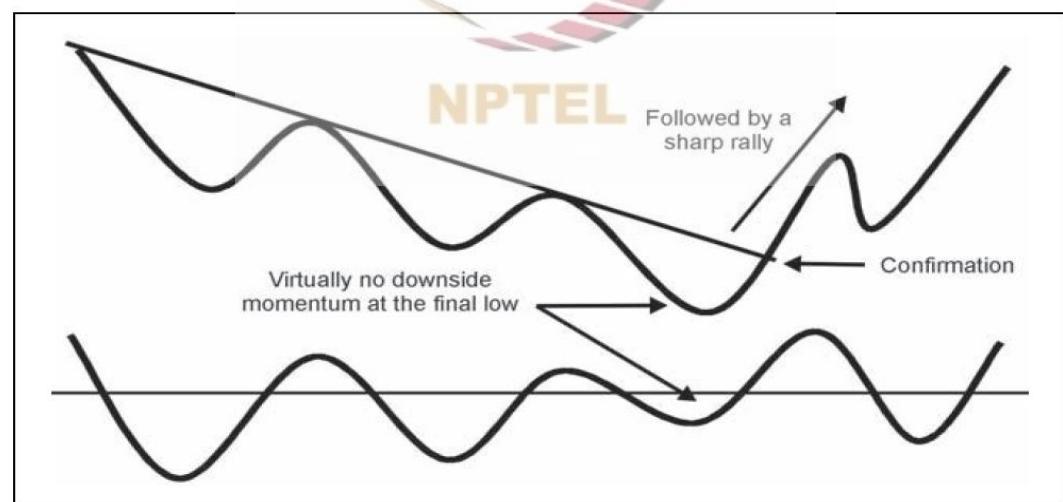


Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Momentum and price divergence

- The opposite type of situation in a bear market should be viewed as a very positive characteristic, especially if the upward trend break in price is accompanied by high volume. The more explosive the volume, the more reliable the signal is likely to be

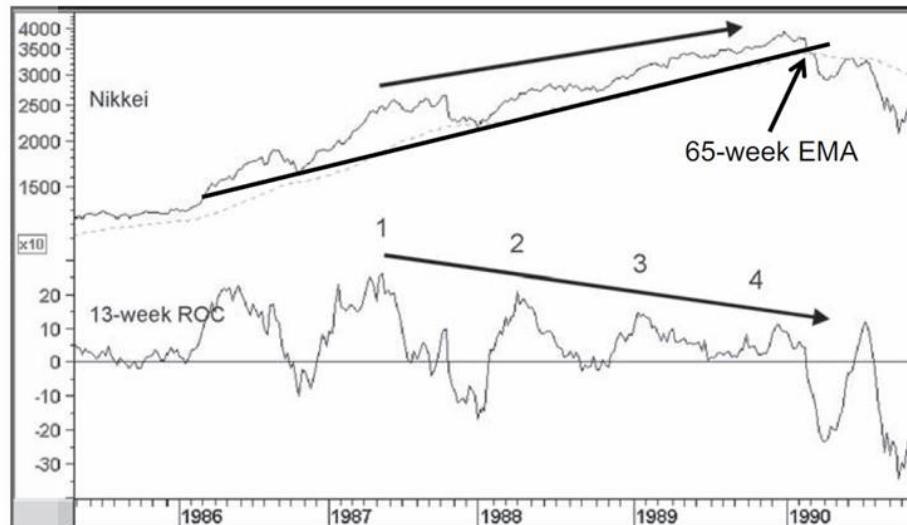
Extreme Bullish Divergence



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Momentum and price divergence

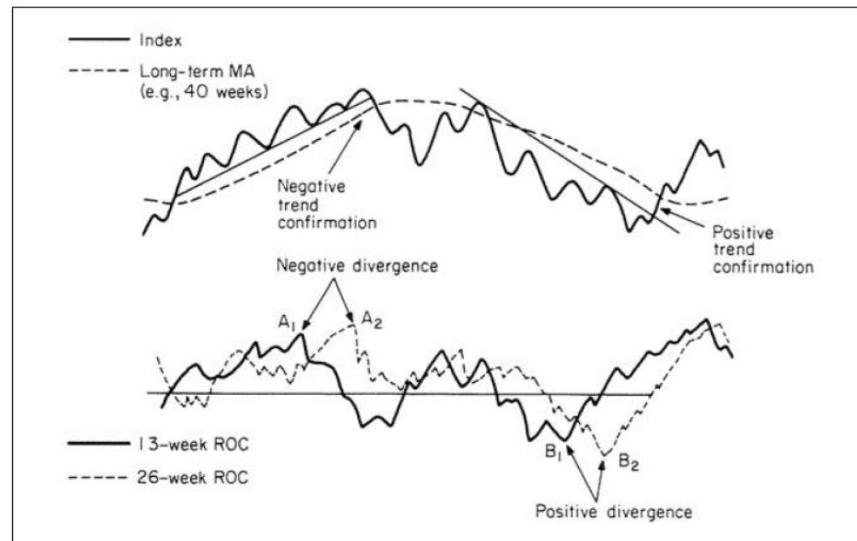
- In the Fig., Nikkei Index violating an important 3½-year secondary trendline after the 13-week ROC indicator had negatively diverged several times with the index
- A very timely signal is generated by a confirmation in the form of a trend break in the index itself through a negative 65-week EMA crossover



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Complex divergence

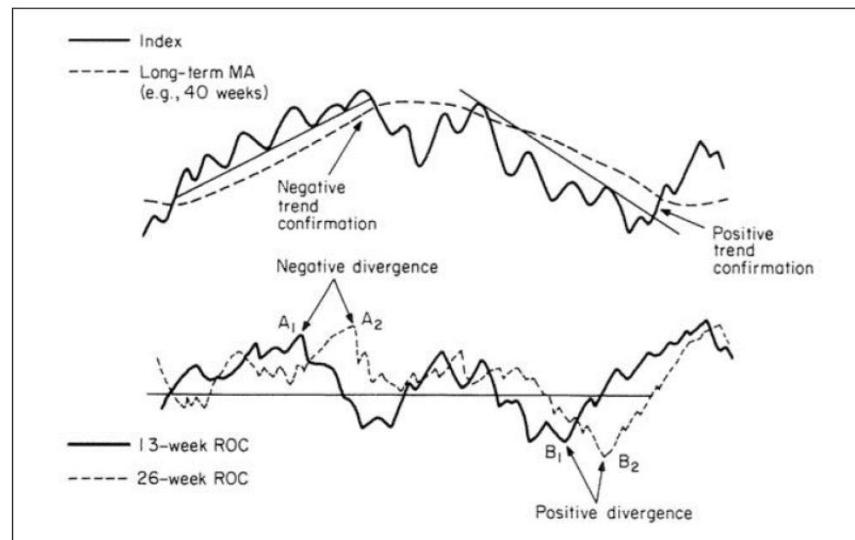
- It is always a good idea to compare several different momentum indicators based on differing time spans
- Different time-spans capture the influence of different cyclic phenomenon
- One approach is to plot two momentum indicators of differing time spans on the same chart



Source: From Martin Pring, Trading Systems Explained, Market Books, Columbia, Maryland, 2008.

Complex divergence

- When the longer-term indicator reaches a new peak and the shorter one is at or close to the equilibrium line, they are clearly in disagreement or out of gear (A2)
- It is very important to make sure that any such divergence is confirmed by a reversal in the price trend itself
- Complex divergences also occur in a positive combination, as indicated later on at point B1
- This indicates that a reversal in trend will take place, and it is usually an important one



Source: From Martin Pring, *Trading Systems Explained*, Market Books, Columbia, Maryland, 2008.



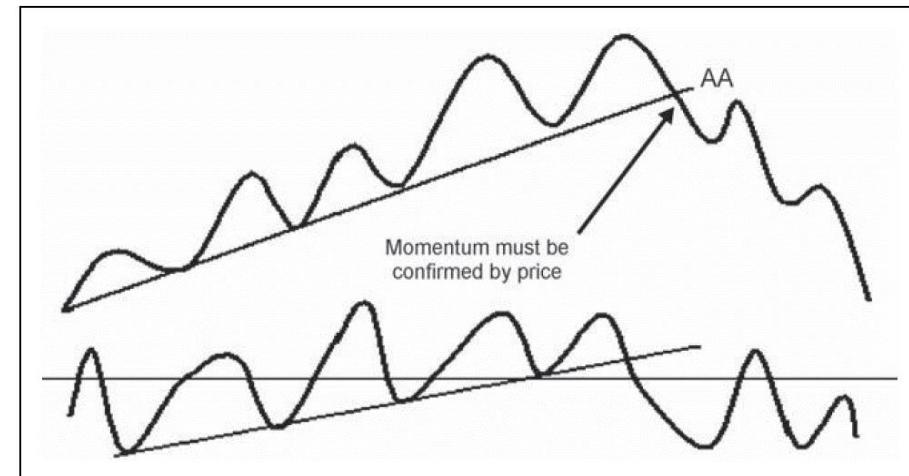
Momentum Trend Reversal Techniques

Momentum Trend Reversal Techniques

- Basic concepts such as trendline, moving average crossovers, price patterns can also be applied to momentum indicators
- Momentum indicators can be smoothed by incorporating MAs
- An example for an uptrend reversal is shown in the Figure here. When the line is violated, a trend reversal signal for the oscillator is generated



Bearish Momentum Trend Break



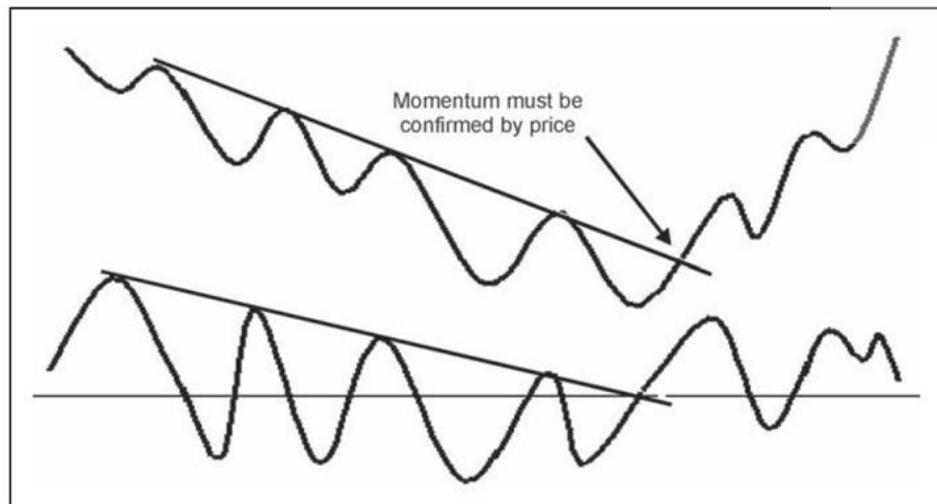
Source: From Martin Pring, Trading Systems Explained, Market Books, Columbia, Maryland, 2008.

Momentum Trend Reversal Techniques

- Warnings of trend reversal in the price would be offered by a reversal in the smoothed momentum index itself
- Or penetration of MA by a designated overbought and oversold levels



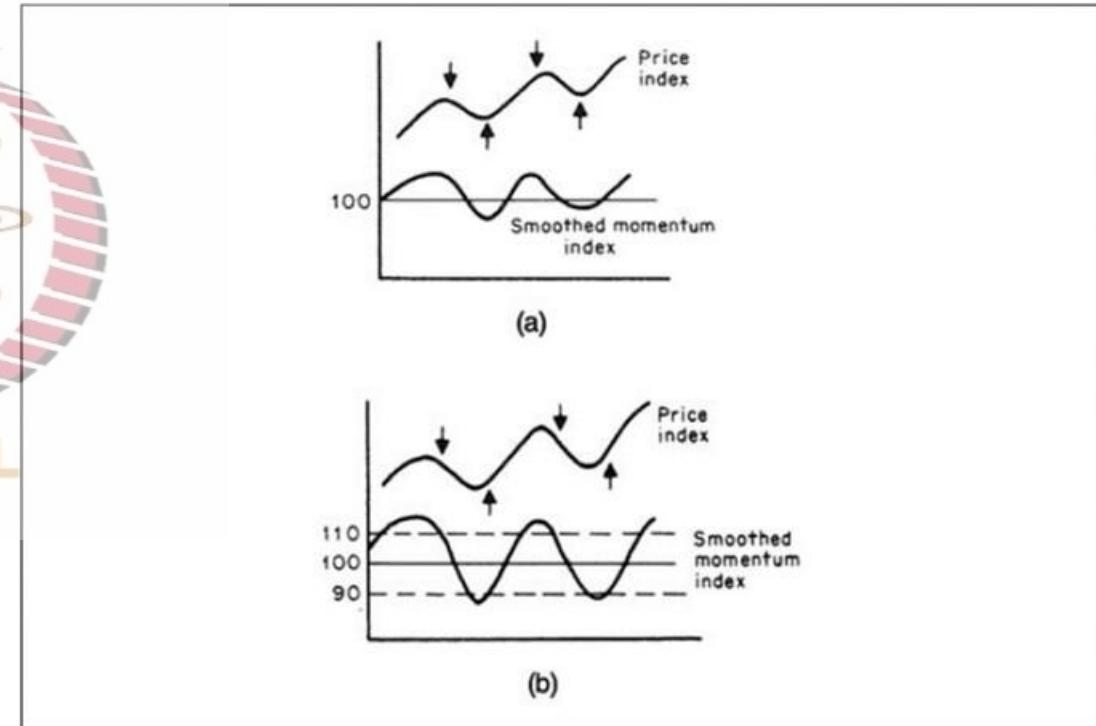
Bullish Momentum Trend Break



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

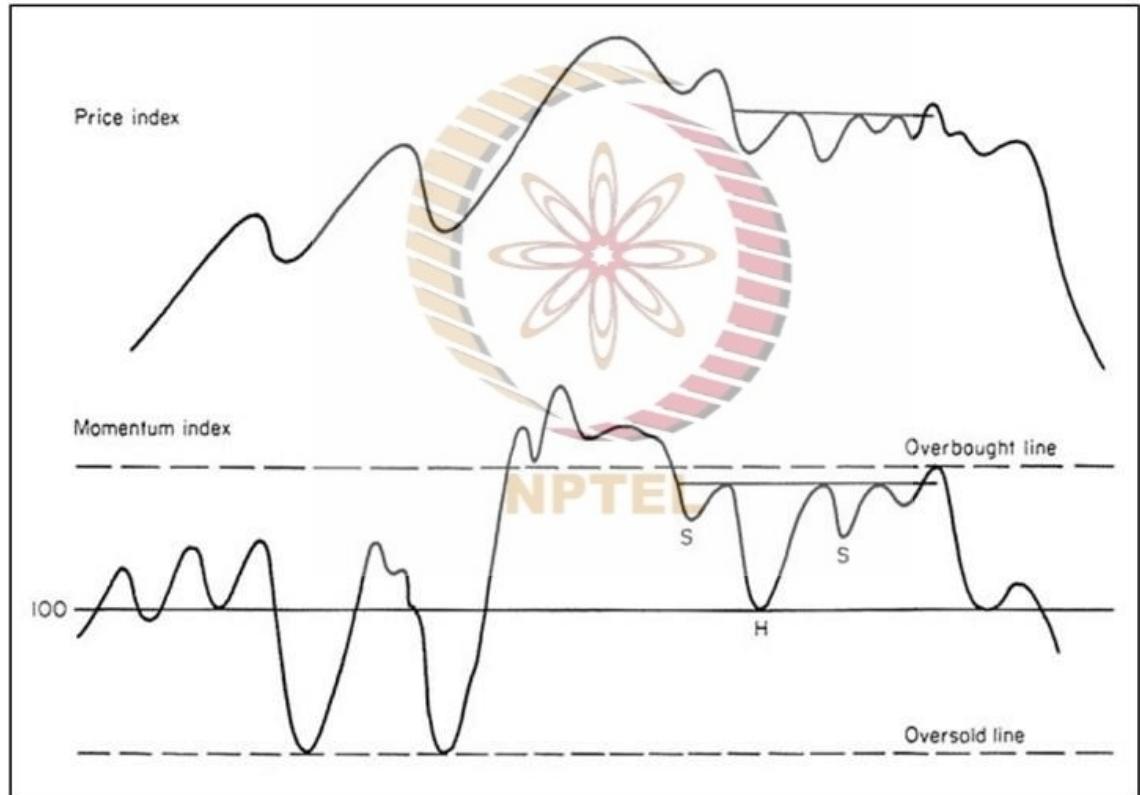
Momentum Trend Reversal Techniques

- The fig. here provides (a) Directional Changes of Smoothed Momentum MAs. (b) Overbought and oversold Re-crossovers of Smoothed Momentum MAs



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

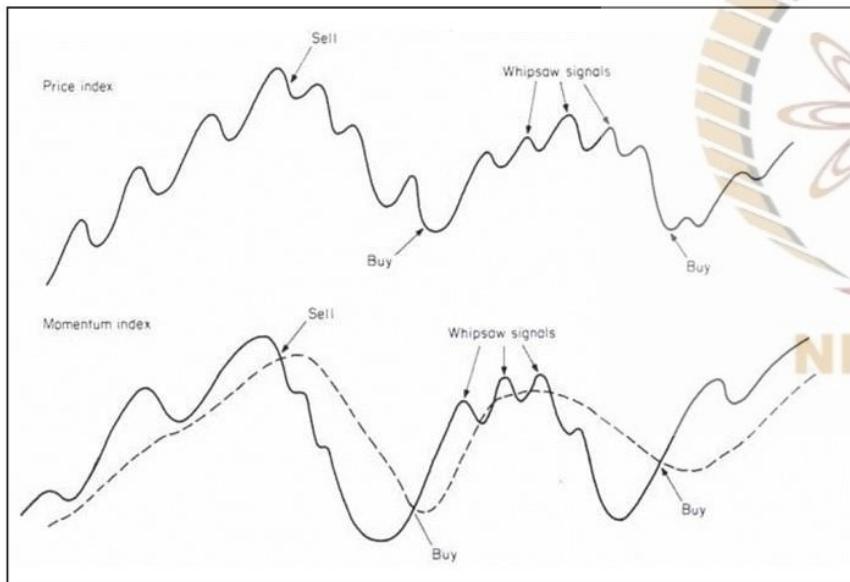
Overbought Momentum Pattern Completion



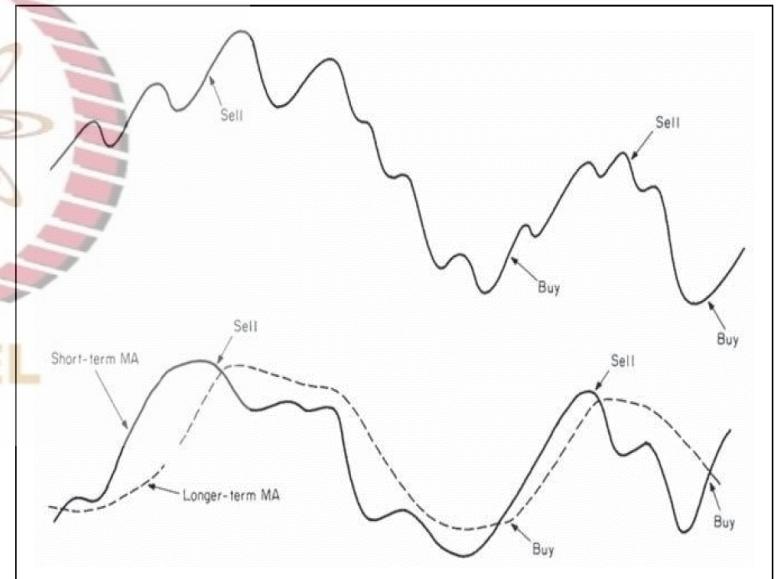
Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Momentum and Moving Averages

Momentum MA crossovers



MA crossovers smoothed



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Summary



Summary

- Momentum is a generic term embracing many different types of oscillators
- Momentum measures the rate at which prices rise or fall
- It gives useful indications of latent strengths or weakness in a price trend
- This is because prices usually rise at their fastest pace well ahead of their peak and normally decline at their greatest speed before their ultimate low
- Since markets generally spend more time in a rising than a falling phase, the lead characteristic of momentum indicators is normally greater during rallies than during reactions



Summary

- Oscillators reflect market sentiment and have different characters in primary bull and bear markets
- There are two basic methods of interpreting momentum: momentum characteristics and momentum trend reversals
- Momentum signals should always be used in conjunction with a trend reversal signal by the actual price





Relative Strength Indicator (RSI)

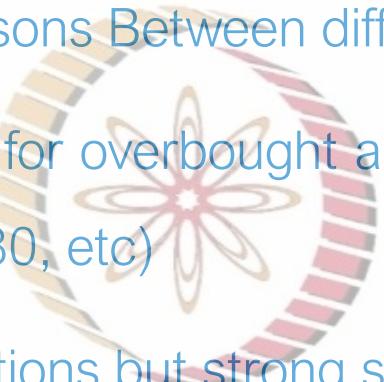
Relative Strength Indicator (RSI)

- The formula for RSI is provided below
- $$RSI = 100 - \frac{100}{1+RS}$$
- Here RS= the average of x days' up close prices divided by the average of the x days' down prices (can also compute in diff./return form)
- X here can be 28 days or any suitable period (e.g., 30 days, 45 days, 60 days) which is justified by the past price movements
- The indicator helps in the following manner:
 - Erratic price movements are smoothed; these movements would have affected RoC
 - It offers a constant trading band for comparison purposes; the indicator fluctuates within a constant band of 0 to 100



Relative Strength Indicator (RSI)

- The RSI Is Useful for Making Comparisons Between different Securities on the same chart
- Easier to establish universal standard for overbought and oversold benchmarks (e.g., 30 for oversold and 70 for overbough or 20/80, etc)
- Extreme values would mean less violations but strong signal
- Shorter time-span cause wider RSI oscillations and larger time-spans cause narrower swings: the breakout points can be appropriately adjusted



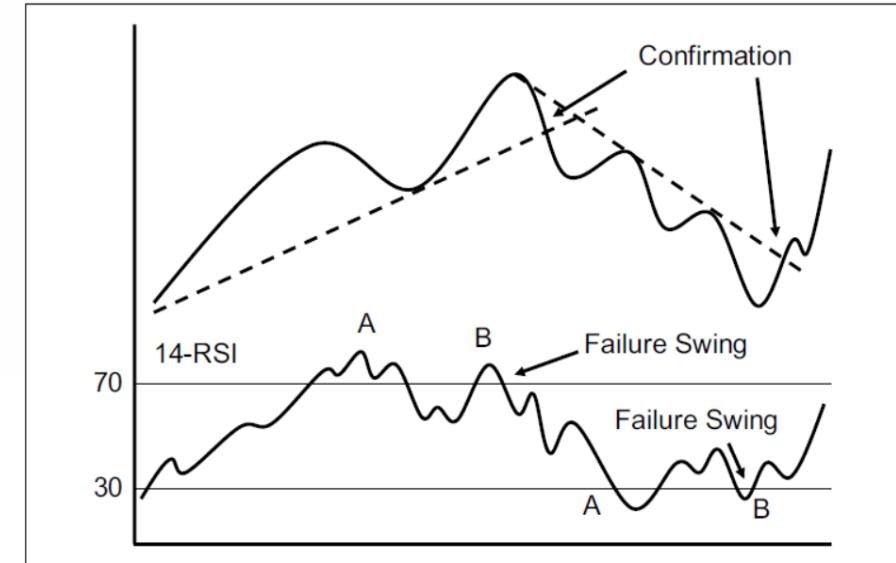
NPTEL

RSI interpretation

- Any time an RSI moves above its overbought or below its oversold zone, it indicates the security in question is ripe for a turn
- The significance depends upon the time
- The second crossover of the extreme level at points A and B usually offers good buy and sell alerts
- These divergences are often called failure swings
- The RSI can also be used in conjunction with trendline violations and pattern completions
- RSI can also be smoothed with MA techniques



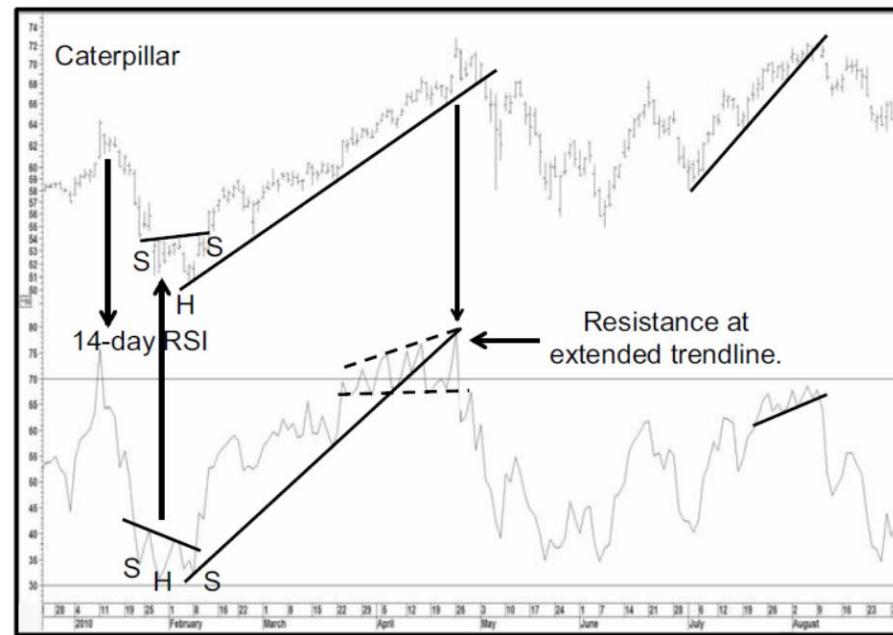
RSI Failure Swing



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

Trendline Violations and Pattern Completions

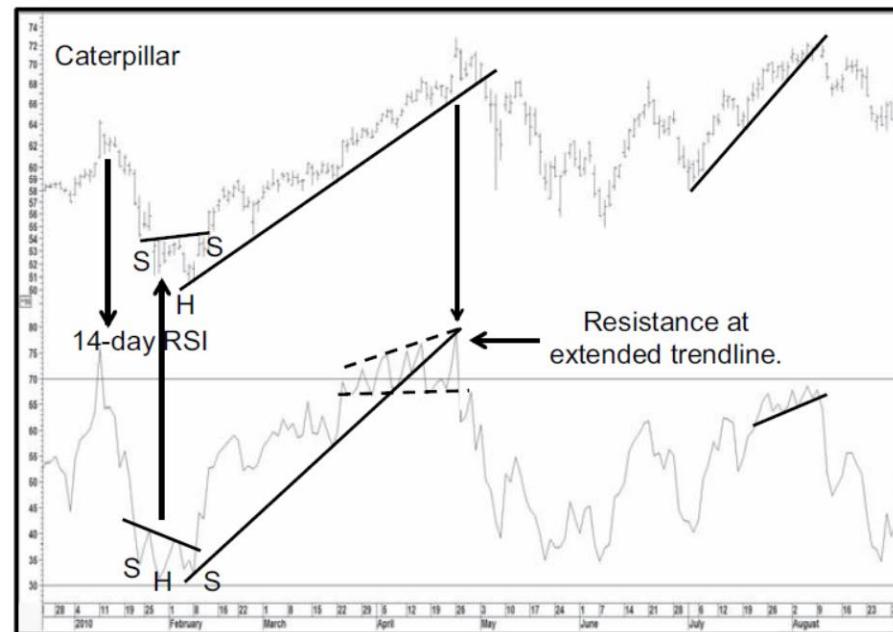
- The RSI often traces out a series of rising or falling peaks and troughs, which, when reversed, offer important buy or sell alerts
- Important signals are generated when trendlines for both price and the RSI are violated within a relatively short period
- The RSI forms a reverse head-and-shoulders pattern, which is more or less simultaneously confirmed by the price



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

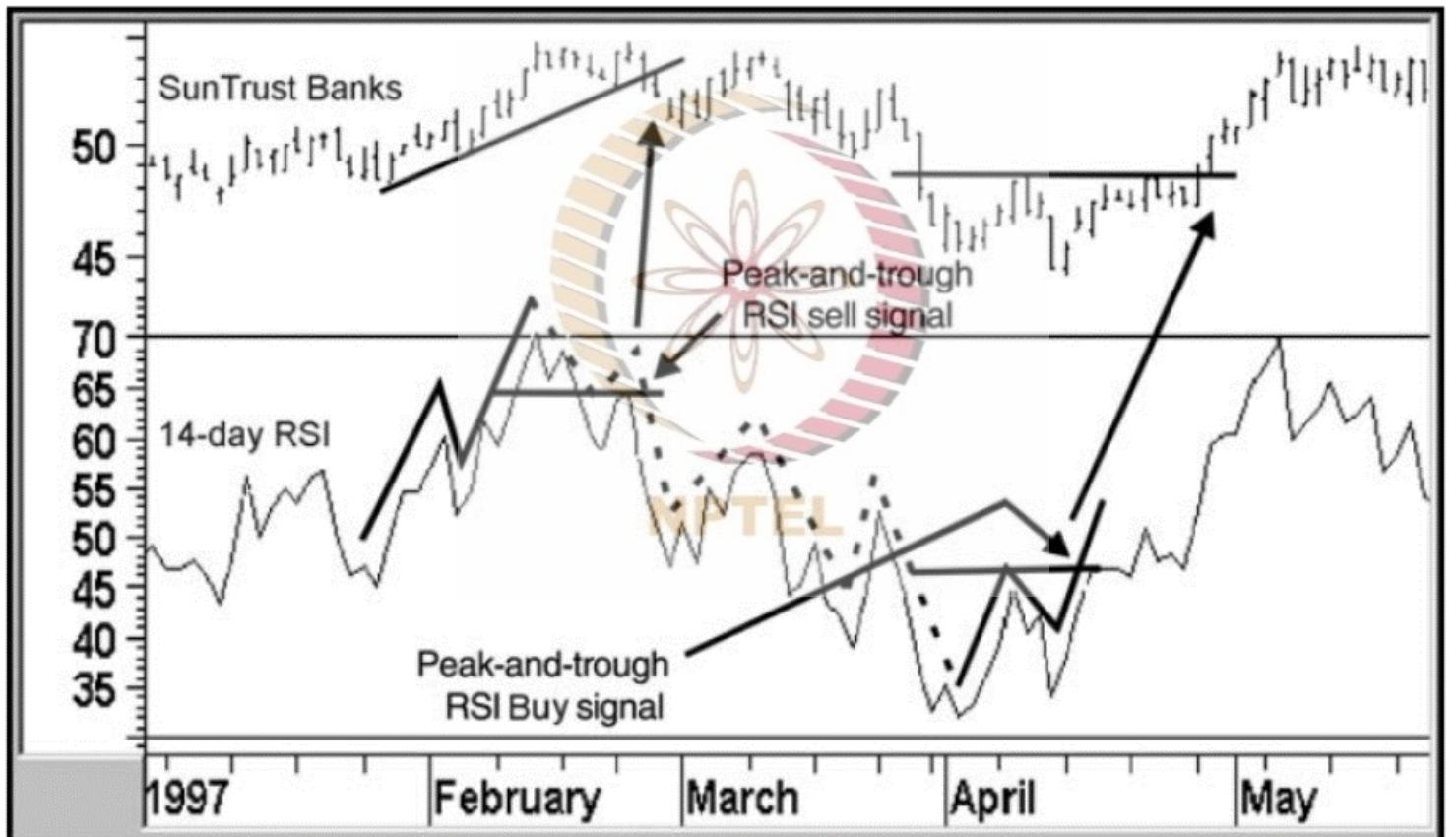
Trendline Violations and Pattern Completions

- After a good rally materializes, the RSI violates this up trendline. We can also construct a trendline for the price
- Finally, the RSI completes a broadening formation, and a downside breakout
- The next rally peak also experiences a small RSI top, which is confirmed with a trendline violation by the price



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

RSI and Peak-and-Trough Analysis



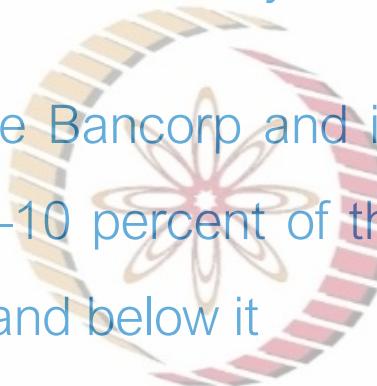
Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.



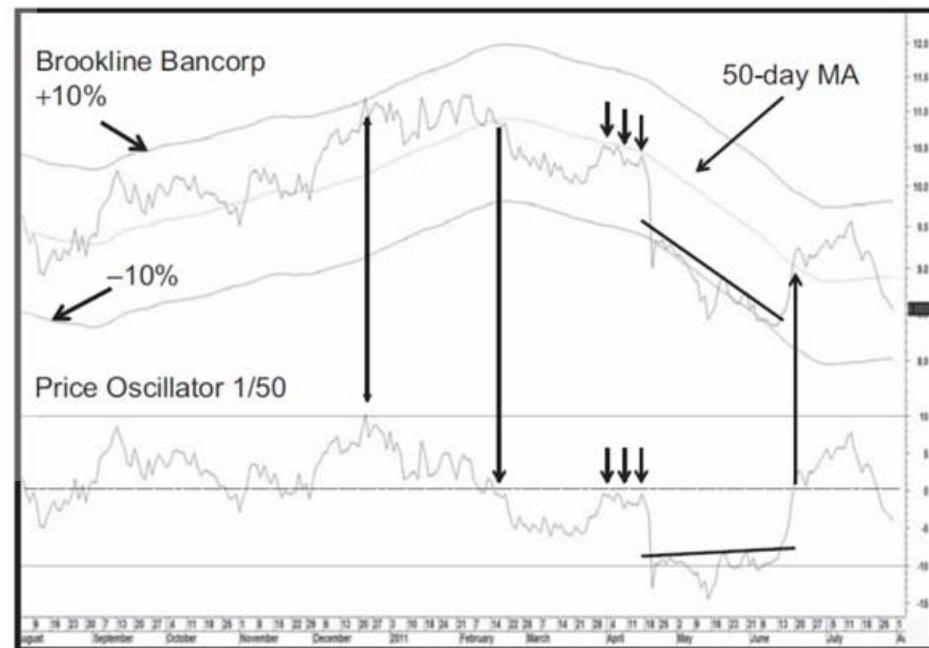
Trend deviation/Price oscillator

Trend deviation/Price oscillator

- 1/10 Price oscillator: 1day MA (close) is divided by 10-day MA
- The Fig. shows the price of Brookline Bancorp and its 50-day MA. Two bands at +10 and -10 percent of the 50-day MA have been plotted above and below it
- The bottom panel represents the same data but expressed in momentum (price oscillator) format



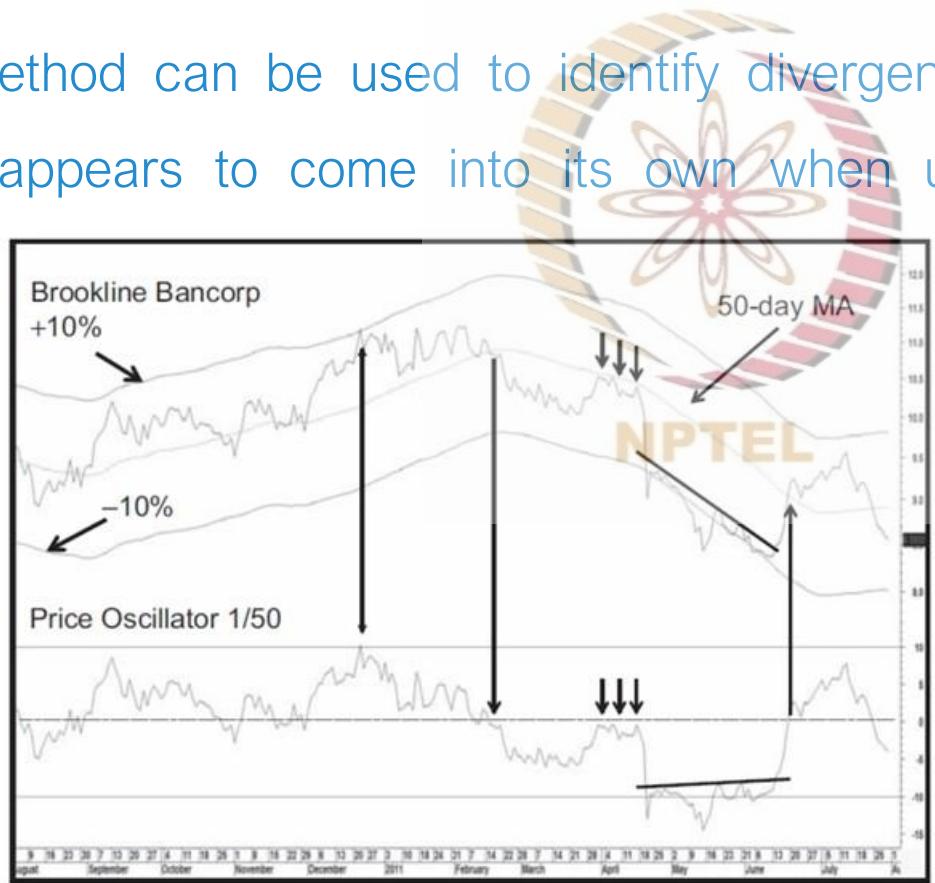
NIFTY



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

Trend deviation/Price oscillator

- The interpretation of a trend-deviation indicator is based on the same principles described earlier. This method can be used to identify divergences and overbought and oversold zones, but it appears to come into its own when used in conjunction with trendline construction al



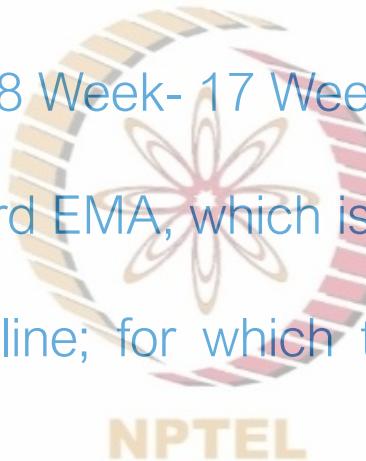
Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.



Moving-average Convergence Divergence (MACD)

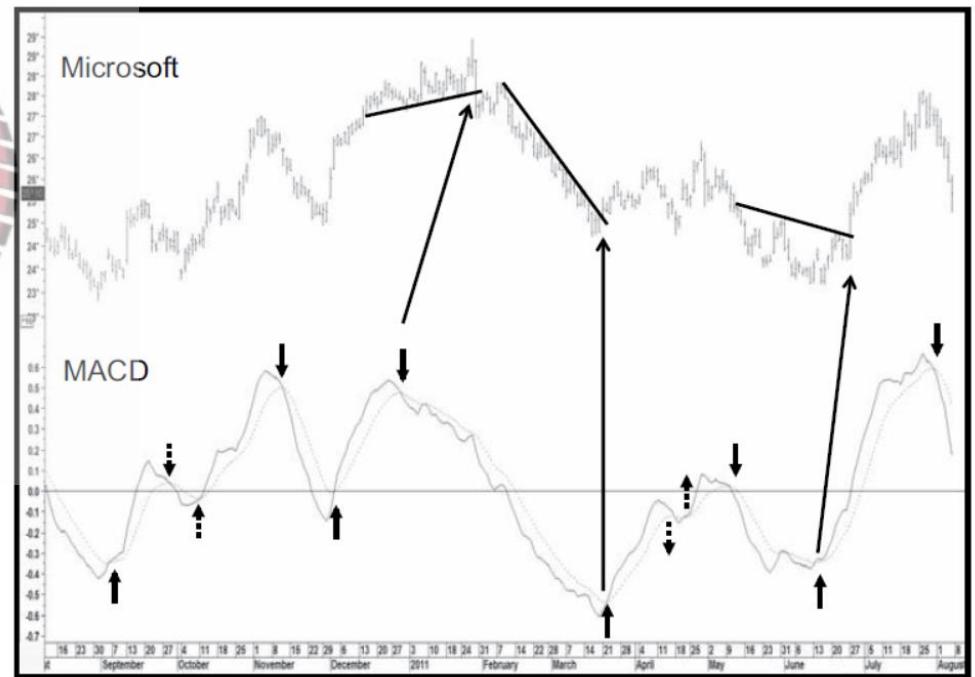
MACD Interpretation

- MACD is form of trend-deviation indicator using two exponential moving averages
- The difference between the 2 EMAs: 8 Week- 17 Week
- The MACD is then smoothed by a third EMA, which is also plotted on the chart
- This final EMA is called the signal line; for which the crossovers generate buy and sell signals
- The two EMAs continuously converge and diverge
- The configuration can be for example: 8/17/9, 12/25/9 etc.



MACD Interpretation

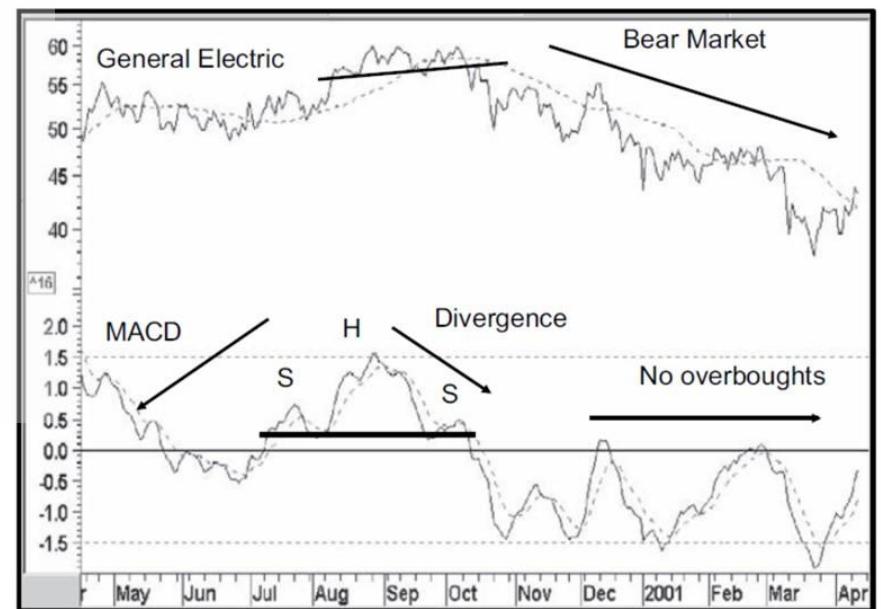
- The dotted arrows indicate whipsaw signals, and the long arrows indicate those signals that were confirmed with a trendline break of some kind
- MACDs can be employed with overbought/oversold levels, trendlines, and price patterns



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

MACD Interpretation

- Both series complete head-and-shoulders patterns. The MACD also experiences a negative divergence
- Neckline violation at second shoulder
- Note also that the indicator remained below the equilibrium point and touched its oversold level several times during



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.



Stochastic Indicator (%k-%D) indicator

Stochastic Indicator

- Theory: Prices tend to close near the upper end of a trading range during an uptrend. As the trend matures, the tendency for prices to close away from the high of the session becomes pronounced
- In a downward-moving market, the reverse conditions hold true
- The stochastic indicator, therefore, attempts to measure the points in a rising trend at which the closing prices tend to cluster around the lows for the period in question, and vice versa, since these are the conditions that signal trend reversals
- It is plotted as two lines: the %K line and the %D line
- The %D line is the one that provides the major signals and is, therefore, more important



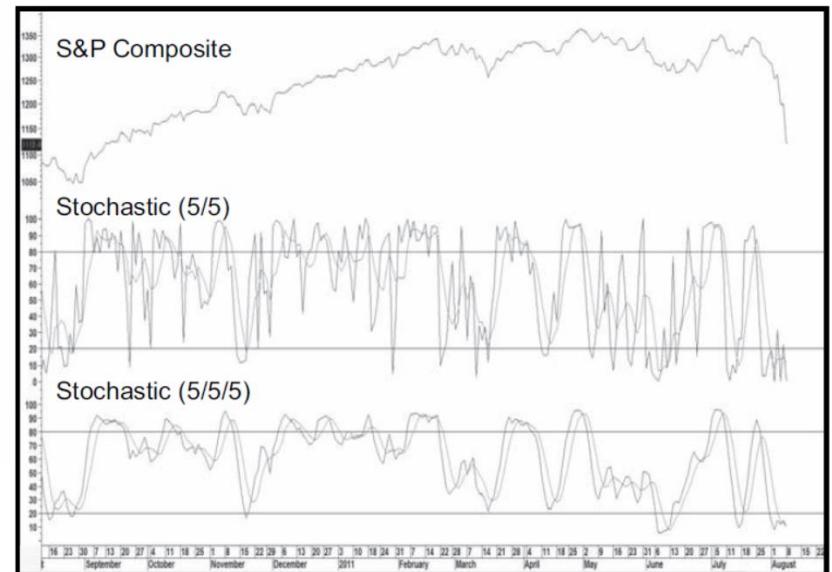
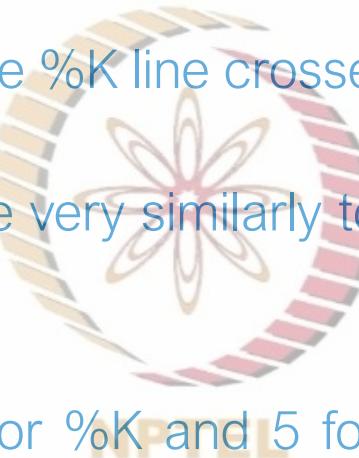
Stochastic Indicator

- $\%K = 100 \left[\frac{C - L_n}{H_n - L_n} \right]$
- Where C is the most recent close, and Ln and Hn are the lowest and highest of the low and high price for the last n traded periods (can be 5, 9, etc.)
- %D is some MA of % K (may be 3 period, 5 period etc.)
- This results in a momentum indicator with 2 lines fluctuating between 0 and 100
- Overbought and oversold levels can be plotted in 75%-85% on upside and 15%-25% on the downside



Stochastic Indicator

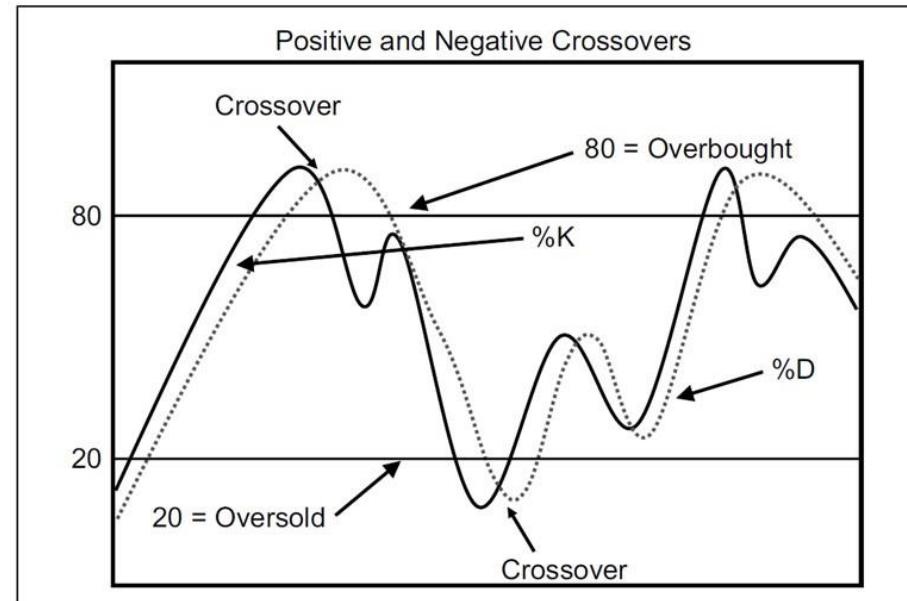
- An overbought indication is given when the %D line crosses the extreme band, but an actual sell alert is not indicated until the %K line crosses below the lower band.
- When the two lines cross, they behave very similarly to a dual MA system
- 10/5 would represent a value of 10 for %K and 5 for %D
- The stochastic can be further slowed by using %D instead of %K and further using some MA of %D as signal line (instead of %D): 5/5/5 uses a factor of 5 to slowdown %D



Source: From Martin Pring, Trading Systems Explained, Marketplace Books, Columbia, Maryland, 2008.

General Interpretation

- Crossovers:** Normally, the faster %K line changes direction sooner than the %D line. This means that the crossover will occur before the %D line has reversed direction
- Stochastic Positive and Negative Divergences:** %K fails to confirm a new high or low in the price, thereby setting up a divergence, which when confirmed, signals a change in trend



Source: From Martin Pring, *Trading Systems Explained*, Marketplace Books, Columbia, Maryland, 2008.

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