THE COMPOSITE INDEX: A DIVERGENCE ANALYSIS STUDY

A thesis submitted in fulfillment of the requirements for the certification

MASTER OF FINANCIAL ANALYSIS (MFTA)

By

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ABSTRACT

Asset managers often use normalized oscillators such as Wells Wilder's Relative Strength Index (RSI)[1] and Gerald Appel's Moving Average Convergence/Divergence Oscillator (MACD)[2] to enhance their fundamental metrics. Normalized oscillators travel in a fixed range between zero and 100. The expectation is that these normalized oscillators will display a divergence away from the developing price trend in order to warn of an approaching trend reversal. However, a common problem in Global Equity Indexes is that the RSI oscillator frequently fails to show any divergence. As a result there is no warning in long horizon trends of a major price reversal up or down.

This paper will demonstrate how imbedding a Momentum formula within the Relative Strength Index will significantly improve the trend reversal signal and timing characteristics of this oscillator. The method has benefits for shorter-horizon traders as well.

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ACKNOWLEDGEMENTS

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George Lane taught me a valuable survival lesson that applies today. He said the single greatest mistake a trader can make is buy too large a home that adds stress. The stress about consistent payments will change your trading skills to such an extent; you jeopardize your very roots. So live where you can be happy if you never make a trade for an entire year. It has been invaluable advice and made the tough years always more manageable.

Joe DiNapoli taught me the risk management skills that bought me the time needed to learn. He said there are three critical factors; experience, skill, and risk management. When you begin the only element you can hold onto for your survival is risk management. Joe introduced me to the concept of Fibonacci confluence and taught me stop placement. While my methods evolved with time and experience, it is the use of confluence targets that allowed me to enjoy a long career.

Bruce Kamich, CMT has always offered an invitation and a patient ear to listen and offer guidance whenever I was in New York. It was Bruce who signed my CMT certification when he was the President. I have always respected his skill and warm encouragement.

Bob Prechter, CMT I can still see clearly when we first met. I was attending a monthly MTA meeting in New York City in the mid-1980s. I was a "groupie". I hung around after the meeting asking tons of stupid questions when Bob asked, "Would you like to join us for dinner?" I kept pinching myself as the table began to fill with the giants I had only known through FNN.(pre-CNBC) Bob Prechter, John Murphy, Ralph Acampora, Manny Stoller, Steve Nison, Bruce Kamich and John Brooks. That single dinner ignited a passion that still carries on today.

I want to thank Rolf Wetzer, Ph.D., President of IFTA. Rolf gave me the much needed push to move forward and develop the current work behind this paper. He also clearly stated the methodology was most critical. Therefore, greater effort and focus was made to be transparent and detailed about the testing criteria. The result includes a finding that was unconsciously used for many years as a trader, but was never consciously defined until now.

I would also like to thank Tim Every and Akhil Patel, advanced professional traders, for their time to review the draft copy. One always needs knowledgeable readers to show where a clarification is needed. Readers who develop systems will want more on the divergence signal itself within Market-Analyst software. Components of that tool will be proprietary such as the filtering and sensitivity code. For this reason there is no further discussion about the code itself. Please contact Market-Analyst for questions about their software.

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INTRODUCTION

1.1 COMPOSITE INDEX OSCILLATOR

The Composite Index [3] oscillator was developed by Connie Brown under the guidance of Manny Stoller. The problem we faced several decades ago is still present today; the Relative Strength Index, as developed by Welles Wilder [2], does not develop oscillator divergences against long-horizon price data. The failure to display divergence signals against price is costly for asset managers as major trend reversals can occur without any warning from this widely relied upon indicator.

The Market Technician Association's *Journal of Technical Analysis* (Winter 1993-Spring 1994; 42: p45) published *The Derivative Oscillator: A New Approach for an Old Problem* by Connie Brown.[4] This early work introduced a triple smoothed derivative of RSI plotted as a histogram. The formula imbedded a smoothed short 3-period RSI within a standard 14-period RSI as developed by Welles Wilder. The character of the *Derivative Oscillator* was found to provide less noise and more clearly defined amplitude signals to aid the development of Elliott Wave Principle interpretations. The results found the simple histogram was free ranged and the first maximum extremes mapped with third-of-third wave positions. The divergence amplitude mapped to the fifth wave positions. This was repeatable. However, the conventional 14-period RSI did not display any divergence at similar pivot points.

From this work in 1991, Manny Stoller of Cantor Fitzgerald asked me to develop this concept further by imbedding other formulas into the oscillator in an effort to find a possible solution for the divergence problem we clearly observed within the RSI.

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The Composite Index oscillator is the solution to this RSI divergence problem for asset managers and traders. The Composite Index against the RSI is tested with the long horizon price data of the German Dax, French CAC 40 Index, China Shanghai Composite Index, Dow Jones Industrial Average, 10-Year U.S. Government Bond Yields, and the 10-Year Japanese Government Bonds.

1.2 COMPOSITE INDEX FORMULA

The Composite Index formula is as follows;

(Omega *TradeStation* format)[1]:

Plot1(RSIMO9+RSI3,"Plot1");

Plot2(average((plot1),13),"Plot2");

Plot3(average((plot1),33),"Plot3");

The function RSIMO9 is written; RSIMO9 = MOMENTUM(RSI(CLOSE,14),9)

The second function is written RSI3=AVERAGE(RSI(CLOSE,3),3)

This paper excludes the moving averages in 'Plot2' and 'Plot3' so that the Composite Index formula, with the imbedded Momentum formula, can be studied in-depth against the conventional 14-period RSI oscillator. Momentum is a simple comparison. The embedded 9-period Momentum in the Composite Index, is the comparison between the most recent 14-period RSI value to the RSI value from 9 periods earlier. By imbedding Momentum into the RSI formula it allows the RSI to have a free range travel and is not limited to the normalized range of zero to 100.

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[1] The Composite Index is now a standard tool in Market-Analyst. Bloomberg will add it by request. It is also now in the public domain for eSignal and CQG.

METHODOLOGY

2.1 DIVERGENCE ANALYSIS

	A	B	C	D	E	F	G	H	I
1									
2									
3	German DAX - 2 month Bar Chart								
4				Linear Regression	Swing	# Bars		Percent Retrace	
5	Signal Date	Price Range	Reversal Swing*	Divergence	Price	Swing H/L	Price Move	Following Signal	Divergence Signal
6		Prior Swing	Criteria Test	Signal	High/Low	Exceeded	After Signal	to prior Swing	Pass/Fail
7			(see below)	(6 Bar LR)		(> H/L3?)		(> 35.0 %?)	
8									
9	3/29/2015	6,476	active	Sell	H- 11,920	active	-2582(active)	active	open
10	6/10/2007	5,962	passed	Sell	H- 8,151	H33	-4,562	76.50	passed
11	2/14/2003	-5947	passed	Buy	L- 2,188	H74	5,962	100.26	passed
12	6/7/1998	4326	passed	Sell	H- 6,217	H8	-542	35.66	passed
13	6/9/1990	1045	passed	Sell	H- 1,976	H9	-664	63.58	passed
14	* Swing Criteria Test: Bar=4, Percent=9.0, Calculate Using: High/Low								
15	example:	If start of swing is a high; 9% is calculated by							
16		High - (High x 0.9), if prior swing length = 100 at least $9 retracement.							
17		Bar = 4 means criteria is true after 4 bar reversal minimum.							
18									

TABLE 1. German DAX – Divergence Analysis Test Criteria

Divergence is determined by applying a linear regression test. A 6-bar linear regression comparison is made between the Composite Index and RSI by the Market-Analyst[6] tool called 'Divergence (DIV)'. TABLE 1 shows how column 'A' will record the signal date when divergence is identified by Market-Analyst software. The settings have to be changed from the default comparison between the oscillator and the price data so that the comparison occurs between the Composite Index and RSI. (Figure 12)

Cell (D:7) in TABLE 1 records the number of indicator periods that are used for each linear regression test. Column D records a 'Buy' signal when the Composite Index has a positive divergence to RSI. A 'Sell' signal occurs when the Composite Index has a negative divergence to RSI.

A 6-bar linear regression setting is a minimum. The program will examine the 7th value and elongate the highlight box on the chart as long as the divergence continues.

When divergence between the Composite Index and RSI is identified, it would be undesirable if the signal should fall within a trending price swing. Price swings are drawn on the price data by using an analysis tool called the 'Percent Swing Overlay' (PCSC). Two conditions must be met before the trending swing can be reversed.

The first condition is when 'Bars= 3'. A swing reversal condition is 'True' only after a minimum 3-bar reversal. In a 2-month bar chart a swing reversal can only occur after a 6-month period that is a desirable holding period for most fund managers. Equity Indexes all required a 3-bar reversal. U.S. Treasury Note Yields and Japanese Government Bonds required "Bars" to be set at '1' as the next test was found to be more important.

The second condition for a price swing reversal to occur is the retracement percentage minimum. When 'Percent' equals 9.0, as was used in all the equity indexes tested, it means if the start of the swing is a high; 9 percent is calculated by High – (High x 0.09). If the prior swing length equals $100 then there must be at least a $9 retracement to trigger a new swing. The swing is the blue and green line drawn through the price data in all Figures connecting swing low to high or high to low. When the divergence signal between oscillators develops at a price low, Low + (Low x 0.09) is used for a 9 percent reversal. Column E will record the price high (H) or low (L) nearest the actual divergence signal. A divergence signal must occur within 2 bars of a new price swing. If the signal occurs later it is marked as a 'failed' signal.

Column "B" in Table 1 records the price range of the swing preceding the divergence signal that is used to calculate the retracement percentage.

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As it is undesirable to have a divergence signal that immediately fails when prices break through the signal price, Column F was added called: '# Bars (after pivot) Swing H/L Exceeded. Cell (F:7) in TABLE 1 shows (> H/L3?). A tool in Market-Analyst 8 called 'Pivot Labels' will count how many bars forward will develop before that specific pivot high (H) or pivot low (L) is exceeded. A divergence signal will 'fail' in this test if the buy price is exceed or the sell price is penetrated to the downside after 3 bars or less. Figure 1 is a 2-month German Dax bar chart with Pivot Labels. Within Figure 1 a horizontal line has been drawn between the pivot label showing 'H44' on March 1, 2000, and the price high on July 1, 2007. This is an example to show how the pivot price was exceeded 44 bars later. Each swing will have a pivot label. If column F shows 'active' the price pivot has not been retraced or broken by the market.

Column G in all the Tables will record the price move after the divergence signal. Column H will record the percentage retracement following the divergence signal as compared to the price range of the prior swing in Column B. Column G will be red, denoting a failure, if the percent retracement is less than 35.0%. The 35% value was consciously selected to be under the common Fibonacci retracement ratio of 38.2%. The last Column 'I' will show a 'failed' label if any of the divergence tests are found not to be true. When all the criteria has been met as described for columns C, F, and H, the label 'passed' will be found in the results column for the signal in Column I. Failed signals will also have comments on the bottom right of each table to clarify the tests that triggered a 'failed' result.

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RESULTS

These results summarize my findings of the divergence study. Each market tested will have a chart or charts to show the divergence signals extracted by Market-Analyst's linear regression formula over the dates in question. The charts are always followed by summarized supporting tables. This section only displays the results of the Composite Index study and the interpretation will be found in the next section called "Discussion".

FIGURE 1. German DAX – 2-month Bar Chart with Linear Regression Divergences, Pivot Labels, and Percent Swing Overlay. (1984 – 2015)

Signal Date	Price Range Prior Swing	Reversal Swing* Criteria Test (see below)	Linear Regression Divergence Signal (6 Bar LR)	Swing Price High/Low	# Bars Swing H/L Exceeded (> H/L3?)	Price Move After Signal	Percent Retrace Following Signal to prior Swing (> 35.0 %?)	Divergence Signal Pass/Fail
3/29/2015	6,476	active	Sell	H- 11,920	active	-2582(active)	active	open
6/10/2007	5,962	passed	Sell	H- 8,151	H33	-4,562	76.50	passed
2/14/2003	-5947	passed	Buy	L- 2,188	H74	5,962	100.26	passed
6/7/1998	4326	passed	Sell	H- 6,217	H8	-542	35.66	passed
6/9/1990	1045	passed	Sell	H- 1,976	H9	-664	63.58	passed

* Swing Criteria Test: Bar= 4, Percent= 9.0, Calculate Using: High/Low

example: If start of swing is a high; 9% is calculated by

High - (High x 0.9), if prior swing length = 100 at least $9 retracement.

Bar = 4 means criteria is true after 4 bar reversal minimum.

TABLE 1. German DAX

From 1984 to 2015 the German Dax triggered 5 divergence signals in the 2-month bar chart. Four signals were "Sell" signals and one was a "Buy" signal. One signal remains open as the signal remains active in current markets. The four closed signals all had a "passed" result.
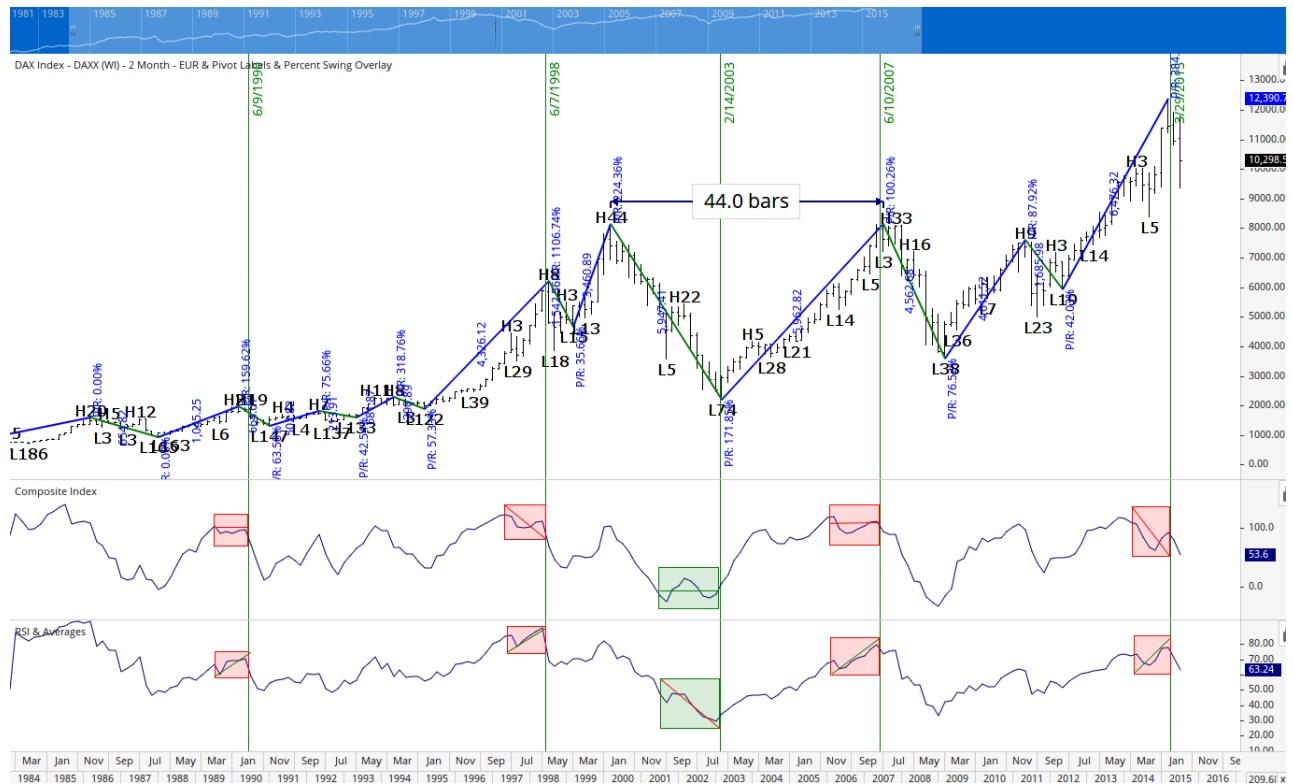

FIGURE 2. French CAC 40 Index – 2-month Bar Chart with Linear Regression Divergences, Pivot Labels, and Percent Swing Overlay. (1990 – 2015)

	Signal Date	Price Range	Reversal Swing*	Linear Regression Divergence Signal (6 Bar LR)	Swing Price High/Low	# Bars Swing H/L Exceeded (> H/L3?)	Price Move After Signal	Percent Retrace Following Signal to prior Swing (> 35.0 %?)	Divergence Signal Pass/Fail
		Prior Swing	Criteria Test (see below)						
27	5/4/2015	2,590	active	Sell	H- 5,193	active	-963(active)	active	open
28	6/25/2007	3,767	passed	Sell	H- 6,168	H49	-3,702	98.29	passed
29	2/22/2003	-4543	passed	Buy	L- 2,401	H74	3,767	82.91	passed
30	6/17/1998	4326	failed**	Sell	H- 4.404	H4	-1,523	86.6 *	failed**
31	10/31/1995	-649	passed	Buy	H-1,976	L119 (active)	5232	806.09	passed

French CAC 40 Index - 2 month Bar Chart (row 21 header)

* Swing Criteria Test: Bar= 3, Percent= 9.0, Calculate Using: High/Low   ** divergence falls in the middle of long horizon swing

example: If start of swing is a high; 9% is calculated by

High - (High x 0.9), if prior swing length = 100 at least $9 retracement.

Bar = 3 means criteria is true after 3 bar reversal minimum.

TABLE 2. French CAC 40 Index – 2-month Bar Chart Divergence Signal Analysis

From 1990 to 2015 the French CAC 40 Index triggered 5 divergence signals in a 2-month bar chart.

Three signals were 'Sell' signals and two were 'Buy' signals. One signal remains open as the signal remains active in current markets. Of the four closed signals, three passed and one failed because the divergence signal was trigger in the middle of a long horizon swing.
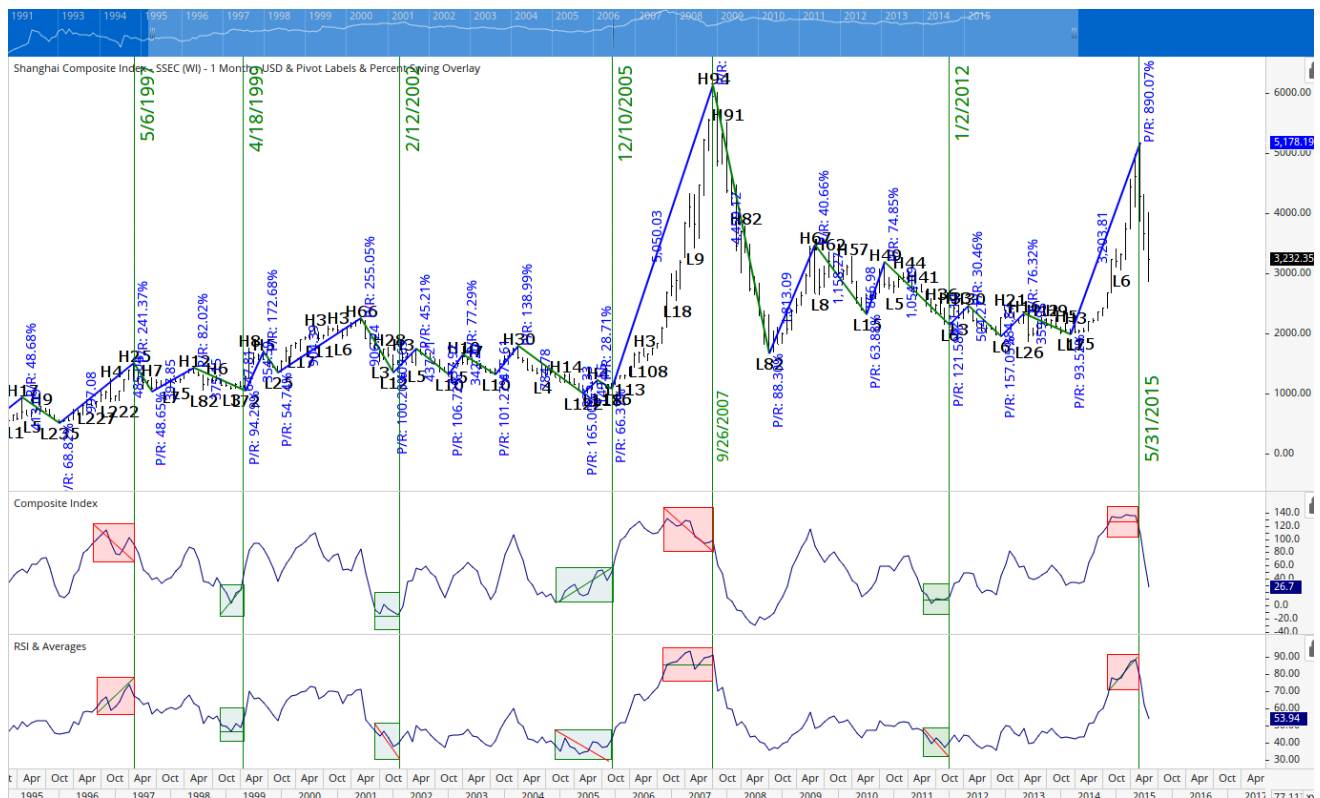

FIGURE 3. China – Shanghai Composite monthly Bar Chart with Linear Regression Divergences, Pivot Labels, and Percent Swing Overlay. (1995 - 2015)

	A	B	C	D	E	F	G	H	I
39	China Shanghai Composite - 1 month Bar Chart								
40				Linear Regression	Swing	# Bars		Percent Retrace	
41	Signal Date	Price Range	Reversal Swing*	Divergence	Price	Swing H/L	Price Move	Following Signal	Divergence Signal
42		Prior Swing	Criteria Test	Signal	High/Low	Exceeded	After Signal	to prior Swing	Pass/Fail
43			(see below)	(6 Bar LR)		(> H/L3?)		(> 35.0 %?)	
44									
45	5/31/2015	3,203	active	Sell	H-4,986	active	-2136(active)	active	open
46	1/2/2012	-1,054	passed	Buy	L- 2,132	L6	317	30.46	failed**
47	9/26/2007	5,050	passed	Sell	H- 6,005	H94 (active)	-1,213	86.99	passed
48	12/10/2005	-784	passed	Buy	L- 1,074	L86	5,050	3376.82	passed
49	2/12/2002	-906	passed	Buy	L- 1,476	L12	409	45.2	passed
50	4/18/1999	-375	passed	Buy	L- 1,047	L72	1,197	319.24	passed
51	5/6/1997	997	passed	Sell	H- 1,510	H25	-485	48.65	passed
52									
53	* Swing Criteria Test: Bar= 3, Percent= 9.0, Calculate Using: High/Low						** decline failed to exceed the 35% or greater test		
54	example:	If start of swing is a high; 9% is calculated by							
55		High - (High x 0.9), if prior swing length = 100 at least $9 retracement.							
56		Bar = 3 means criteria is true after 3 bar reversal minimum.							
57									

TABLE 3. China Shanghai Composite Index – monthly Bar Chart Divergence Signal Analysis

From 1995 to 2015 the China Shanghai Composite Index triggered seven divergence signals in a monthly bar chart. Of the seven signals four were 'Buy' signals and three were 'Sell' signals. The most recent 'Sell' signal remains open as the signal remains active. Five divergence signals passed. One failed because the percentage retracement did not met the trend retracement criteria of greater than 35%. The retracement was 30.46 percent. A monthly bar chart was used due to the limited historical data for this market.

FIGURE 4. Dow Jones Industrial Average – 2-month Bar Chart with Linear Regression Divergences, Pivot Labels, and Percent Swing Overlay. (1981 – 2015)

FIGURE 5. Dow Jones Industrial Average – 2-month Bar Chart with Linear Regression Divergences, Pivot Labels, and Percent Swing Overlay. (1951 – 1982)
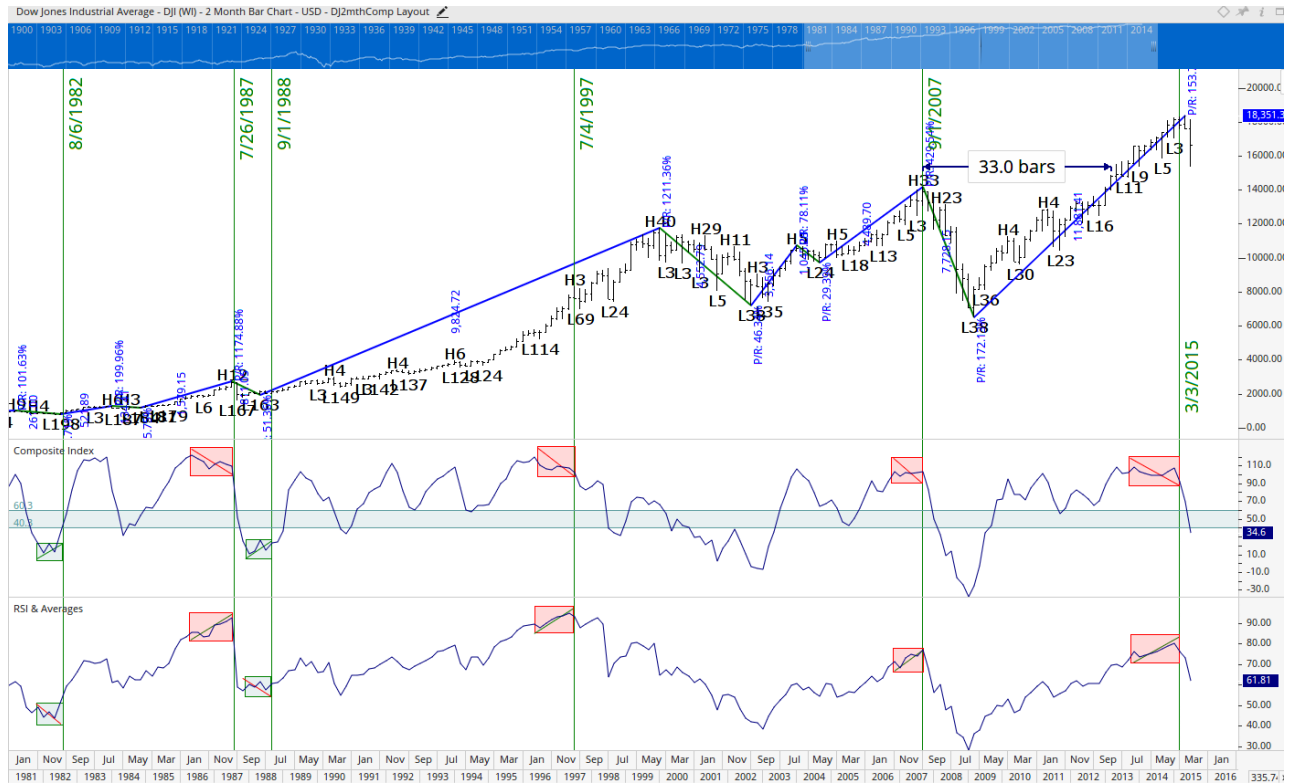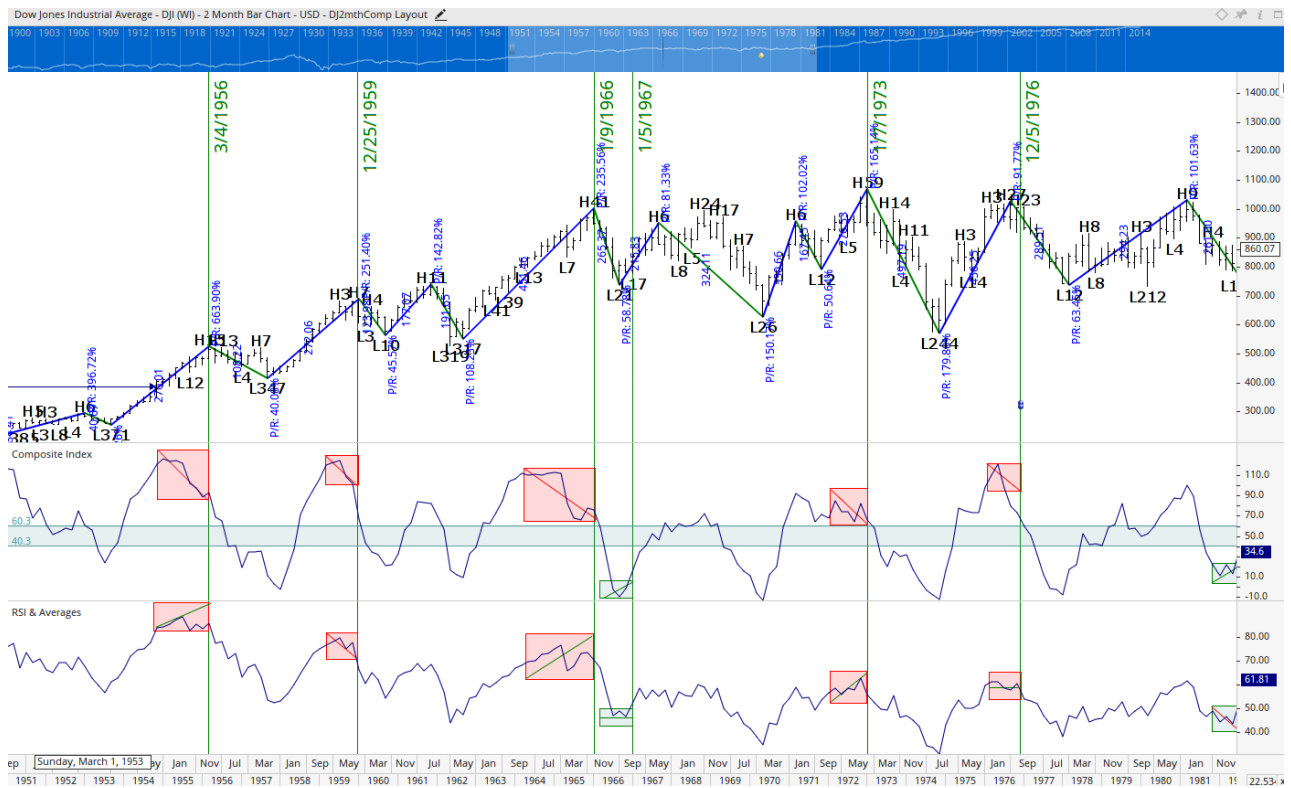
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FIGURE 6. Dow Jones Industrial Average – 2-month Bar Chart with Linear Regression Divergences, Pivot Labels, and Percent Swing Overlay. (1919 – 1951)

	A	B	C	D	E	F	G	H	I
59	**Dow Jones Industrial Avg - 2 month Bar Chart**								
60				Linear Regression	Swing	# Bars		Percent Retrace	
61	Signal Date	Price Range	Reversal Swing*	Divergence	Price	Swing H/L	Price Move	Following Signal	Divergence Signal
62		Prior Swing	Criteria Test	Signal	High/Low	Exceeded	After Signal	to prior Swing	Pass/Fail
63			(see below)	(6 Bar LR)		(> H/L3?)		(> 35.0 %?)	
64									
65	3/3/2015	11,881	active	Sell	H- 18,351	active	-2981(active)	active	open
66	9/1/2007	4,489	passed	Sell	H- 14,198	H33	-7,728	172.13	passed
67	7/4/1997	6374	failed**	Sell	H- 8,299	H3 +	-1,328	20.8	failed + **
68	9/1/1988	-811	passed	Buy	L- 1,996	L163 (active)	9,824	1211.4	passed
69	7/26/1987	1579	passed	Sell	H- 2,736	H12	-811	51.36	passed
70	8/6/1982	-761	passed	Buy	L- 888	L198(active)	521	199.9	passed
71	12/5/1976	456	passed	Sell	H- 1,006	H23	-289	63.45	passed
72	1/11/1973	276	passed	Sell	H- 1,067	H59	-497	179.8	passed
73	1/5/1967	-265	passed	Buy	L- 735	L21	87	81.33	passed
74	1/9/1966	41	passed	Sell	H- 1001	H41	142	55.68	passed
75	12/25/1959	272	passed	Sell	H- 688	H7	-123	45.6	passed
76	3/4/1956	270	passed	Sell	H- 524	H13	-108	26.41	failed
77	1/11/1948	-15	failed	Buy	L- 174	L8	29	63.65	failed 2**
78	5/13/1946	120	passed	Sell	H- 213	H23	-52	43.08	passed
79	2/10/1937	111	passed	Sell	H- 195	H52	-98	88.38	passed
80	5/31/1932	-345	passed	Buy	L- 40.6	L498 (active)	active	active	passed
81	9/1/1929	297	passed	no signal**	H- 386	H151	-	-	-
82	2/7/1923	41	passed	Sell	H- 105	H8	-27	46.99	passed
83	8/3/1921	55	passed	Buy	L- 66.8	L64	41	74.51	passed
84									
85	* Swing Criteria Test: Bar= 3, Percent= 9.0, Calculate Using: High/Low					no signal** Divergence is present between the Composite Index and RSI,			
86	example:	If start of swing is a high; 9% is calculated by				the signal was filtered out due the the width of the signal			
87		High - (High x 0.9), if prior swing length = 100 at least $9 retracement.							
88		Bar = 4 means criteria is true after 4 bar reversal minimum.				+ ** Signal falls in the middle of a swing, failed Time test (H3) and			
89						failed the retracement percentage test			
90									
91						2** Signal falls in the middle of a Swing			
92									

TABLE 4. Dow Jones Industrial Average – 2-month Bar Chart Divergence Signal Analysis

The Composite Index/Brown/2015   October 2015

From 1919 to 2015 the Dow Jones Industrial Average triggered eighteen divergence signals in a 2-month bar chart. Of the eighteen signals, six were 'Buy' signals, and twelve were 'Sell' signals. The most recent 'Sell' signal remains open as the signal remains active. Fourteen divergence signals passed. Three signals failed. One signal failed for multiple reasons. The signal on July 4, 1997 failed because it was triggered further than the 2 bar minimum after a swing reversal. It also failed because the price high was exceeded 3 bars later when the criteria was set to a 3 bar minimum. The sell signal lead to a 20.8 percent decline and did not met the 35% retracement minimum of the previous swing. The signal on 1/11/1948 followed too late after the start of the new swing, though the signal did yield a 63.65 percent retracement of the prior swing.

Because of the historic price high of September 1, 1929, this date was added to Table 4. Figure 6 shows a hand drawn divergence signal recording a divergence into this date, but a filter was established within the Composite Index of 40 to 60. This means any value in the linear regression that falls within this band is filtered out and regression starts a new count. Therefore a result of 'no signal' is in Column D for this date because the Composite falls to this filtered range. This was done to filter any signal that had an exceptionally long divergence pattern and the filter acted as a time variable within the regression test. This filter was only applied to the DJIA.
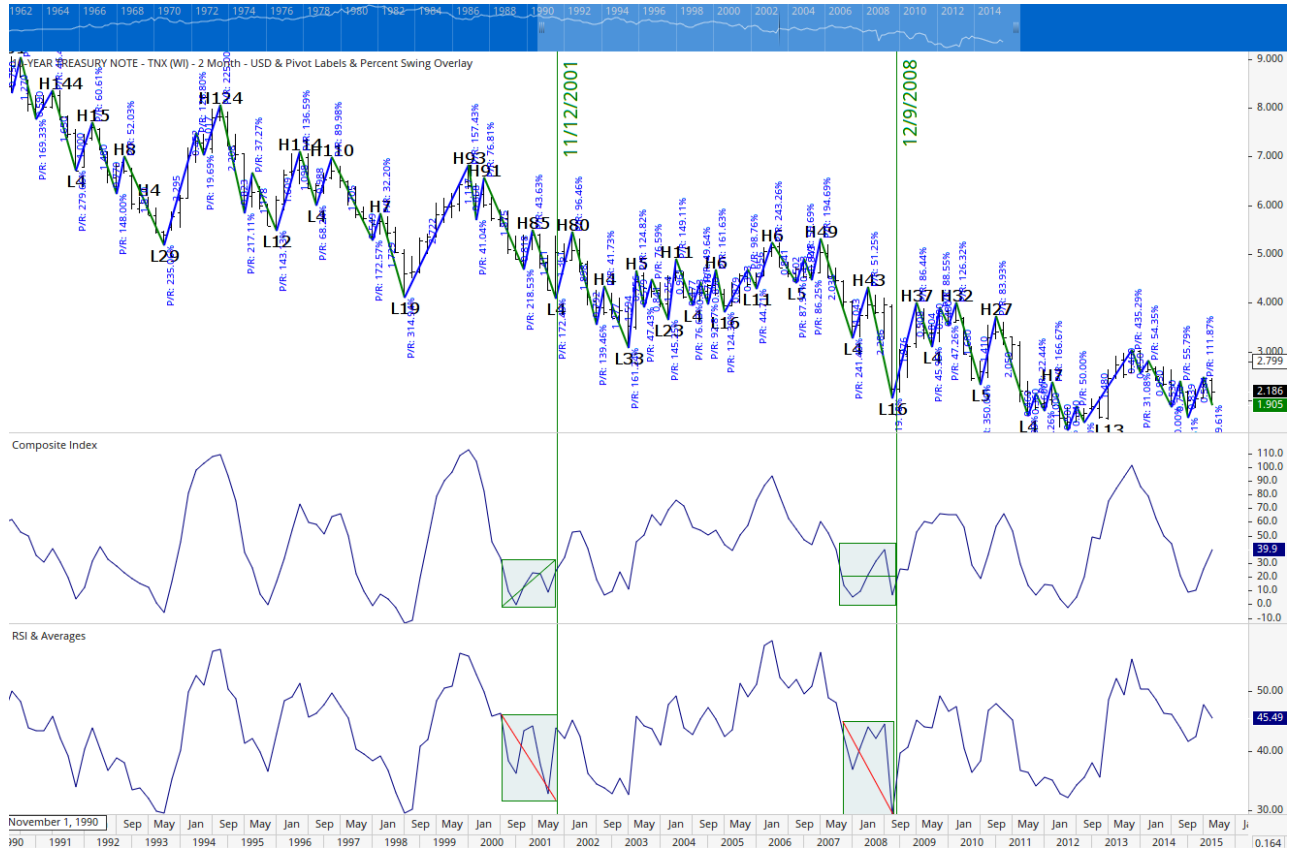
FIGURE 7. 10-Year U.S. Treasury Note Yields – 2-month Bar Chart with Linear Regression Divergences, Pivot Labels, and Percent Swing Overlay. (1990 - 2015)

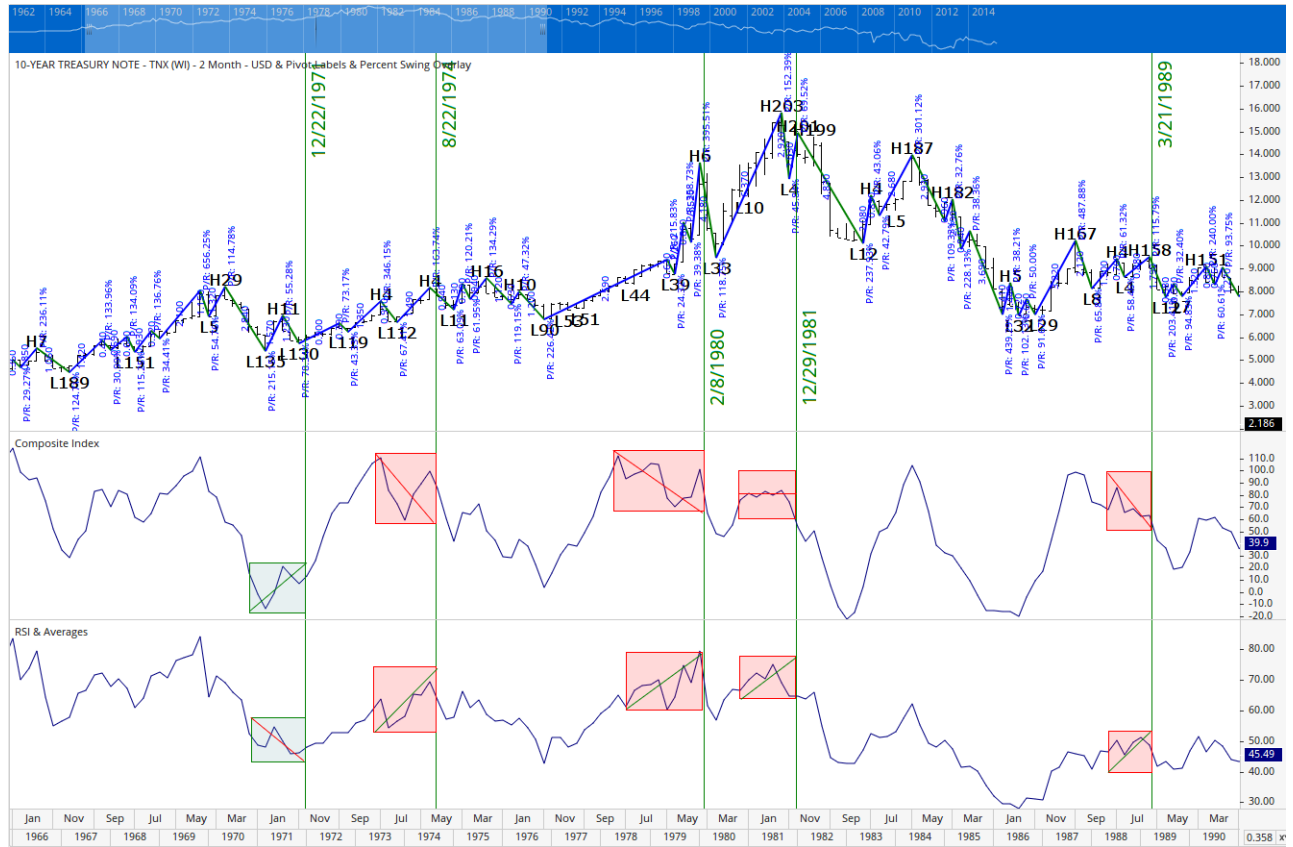The Composite Index/Brown/2015   October 2015

Figure 8. 10-Year U.S. Treasury Note Yields – 2-month Bar Chart with Linear Regression Divergences, Pivot Labels, and Percent Swing Overlay. (1966 - 1990)

	A	B	C	D	E	F	G	H	I
93									
94	**10-Year U.S. Treasury Note Yields - 2 month Bar Chart**								
95				Linear Regression	Swing	# Bars		Percent Retrace	
96	Signal Date	Range	Reversal Swing*	Divergence	Price	Swing H/L	Move	Following Signal	Divergence Signal
97		Prior Swing	Criteria Test	Signal	High/Low	Exceeded	After Signal	to prior Swing	Pass/Fail
98			(see below)	(6 Bar LR)		(>=H/L3?)		(> 35.0 %?)	
99									
100	12/9/2008	-2.286	passed	Buy	L- 2.038	L16	1.976	86.44	passed
101	11/12/2001	-1.411	passed	Buy	L- 4.096	L4	1.361	96.46	passed
102	3/21/1989	0.880	passed	Sell	H- 9.41	H158 (active)	-1.790	203.41	passed
103	12/29/1981	2.030	passed	Sell	H- 14.95	L199 (active)	-4.830	237.93	passed
104	2/8/1980	3.520	passed	Sell	H- 13.17	H6	-4.180	118.75	passed
105	8/22/1974	1.490	passed	Sell	H- 6.16	H4	-0.940	63.09	passed
106	12/22/1971	-1.230	passed	Buy	L- 5.85	L130	0.500	73.17	passed
107									
108									
109	* Swing Criteria Test: Bar= 1, Percent= 5.0, Calculate Using: High/Low								
110	example:	If start of swing is a high; 5% is calculated by							
111		High - (High x 0.5), if prior swing length = 100 at least $5 retracement.							
112		Bar = 1 means criteria is true with each new bar. However, the 5% reversal must be 'true' to create/terminate a new swing.							
113									

TABLE 5. 10-Year U.S. Treasury Note Yields – 2-month Bar Chart Divergence Signal Analysis

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From 1966 to 2015 there were seven divergence signals in a 2-month 10-Year U.S. Treasury Note Yields bar chart. Three signals were 'Sell' signals and four were 'Buy' signals. All seven signals produced percentage retracements greater than 35% relative to the prior swing preceding the divergence signal.
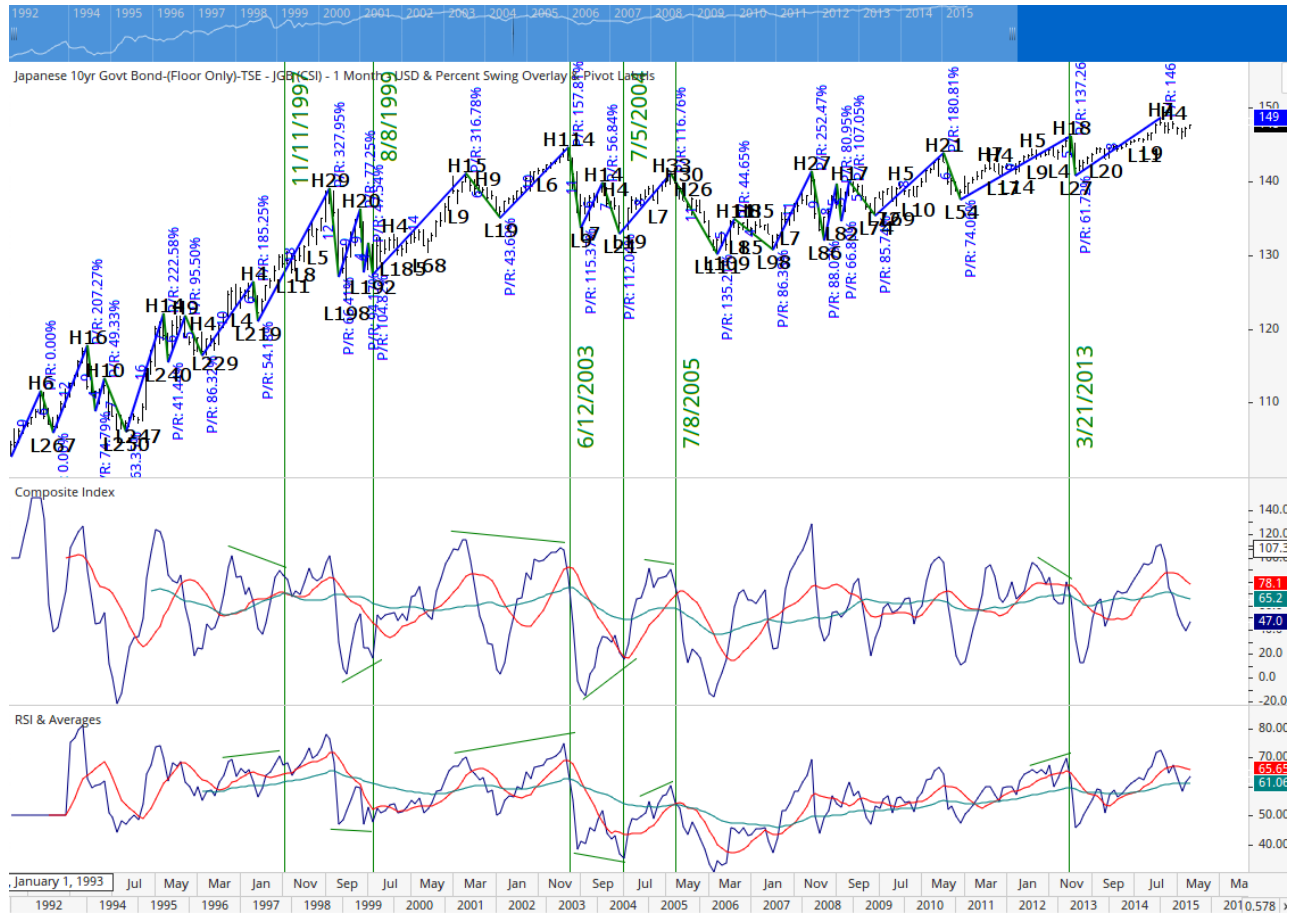

FIGURE 9. 10-Year Japanese Gov't Bond (Floor Only) TSE - monthly Bar Chart and Percent Swing Overlay. (1992 - 2015) (Divergences visually determined.)

		10-Year Japanese Govt Bond (Floor Only) -TSE - 1 month Bar Chart							
			Linear Regression	Swing	# Bars		Percent Retrace	
Signal Date	Price Range	Reversal Swing*	Divergence	Price	Swing H/L	Price Move	Following Signal	Divergence Signal
	Prior Swing	Criteria Test	Signal	High/Low	Exceeded	After Signal	to prior Swing	Pass/Fail
		(see below)	(6 Bar LR)		(>H/L3?)		(> 35.0 %?)	
3/21/2013	8.7	passed	Sell	H-146	H18	-4.0	61.72	passed
7/8/2005	8.2	passed	Sell	H-141	H33	-11.0	135.21	passed
7/5/2004	-7.0	passed	Buy	L- 133	L19	8.2	116.76	passed
6/12/2003	9.5	passed	Sell	H- 145	H114	-10.9	114.73	passed
8/8/1999	-4.3	passed	Buy	L- 128	L192 (active)	13.8	320.93	passed
11/11/1997	-3.0	failed 2**	Sell	H-131	L2	2.0	-	failed 2**
					2** Signal falls in the middle of a Swing			
* Swing Criteria Test: Bar= 1, Percent= 3.0, Calculate Using: High/Low								
example:	If start of swing is a high; 3% is calculated by							
	High - (High x 0.3), if prior swing length = 100 at least $3 retracement.							
	Bar = 1 means criteria is true with each new bar. However, the 3% reversal must be 'true' to create/terminate a new swing.							

TABLE 6. 10-Year Japanese Gov't Bond (Floor Only) TSE – monthly Bar Chart Divergence Signal Analysis

During the writing of this paper numerous observations were made during the Beta testing period of the software that led to changes. When the monthly Japanese Government Bond (JGB) market was tested the Divergence tool was not the same as the markets tested in Figures 1 through 8. Therefore these results are added for information purposes only and will not be considered in the discussion or conclusion sections. The divergence signals were determined visually by comparing where the Composite Index diverged from the RSI. However the signal still had to be near a swing pivot and exceed a 35% retracement of the prior swing.

From 1992 to 2015 there were six divergence signals. Four were 'Sell' signals and two were 'Buy' signals in the JGB monthly bar chart. Only one divergence signal failed as it developed within a trending price swing and the price was exceeded two bars later.

DISCUSSION

While the results are very favorable for the Composite Index compared to the RSI, this study is going to immediately raise a question for the reader who is in a trading environment. 'Does the Composite Index provide divergence signals when the RSI does not in other markets and in other time frames? The author is a global Equity Index specialist. It has only been used in financial markets and specifically with financial futures contracts for trading. Experience has shown that the Composite Index can be used within long horizon and short horizon time frames. However, charts displaying long horizon Government Treasury market data will find that the Composite Index will have more frequent and timely divergences if the oscillator is applied to yields. Though traders will find it of value in treasury futures markets in shorter horizon charts of weekly and shorter intervals because the trends are more distinctive in these shorter time periods.

Intraday signals of divergence have been observed for nearly 30 years on S&P500 futures. In this market the Composite Index has had extensive real-time use.

Consider Figure 10 showing the EURUSD in a 2-day bar chart. The divergence signals between the Composite Index and RSI have been marked in Figure 10. The favored time period is a 2 or 3-day bar chart because this interval is favored by Gann analysts. The 2 or 3-day bar chart will help develop Elliott wave interpretations. But always pair the signal with a longer period chart, such as a 2-day against a weekly chart, or a weekly against a monthly chart. The time ratio of 1:4 is used for intraday comparisons. As example a 240-minute chart against a 60-minute chart. When both charts show divergence signals there is a very high probability of a near trend reversal.

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The Composite Index can be used alone under price data as that is the same divergence pattern. It does not have to be a comparison between the RSI and Composite Index to generate the divergence signal.
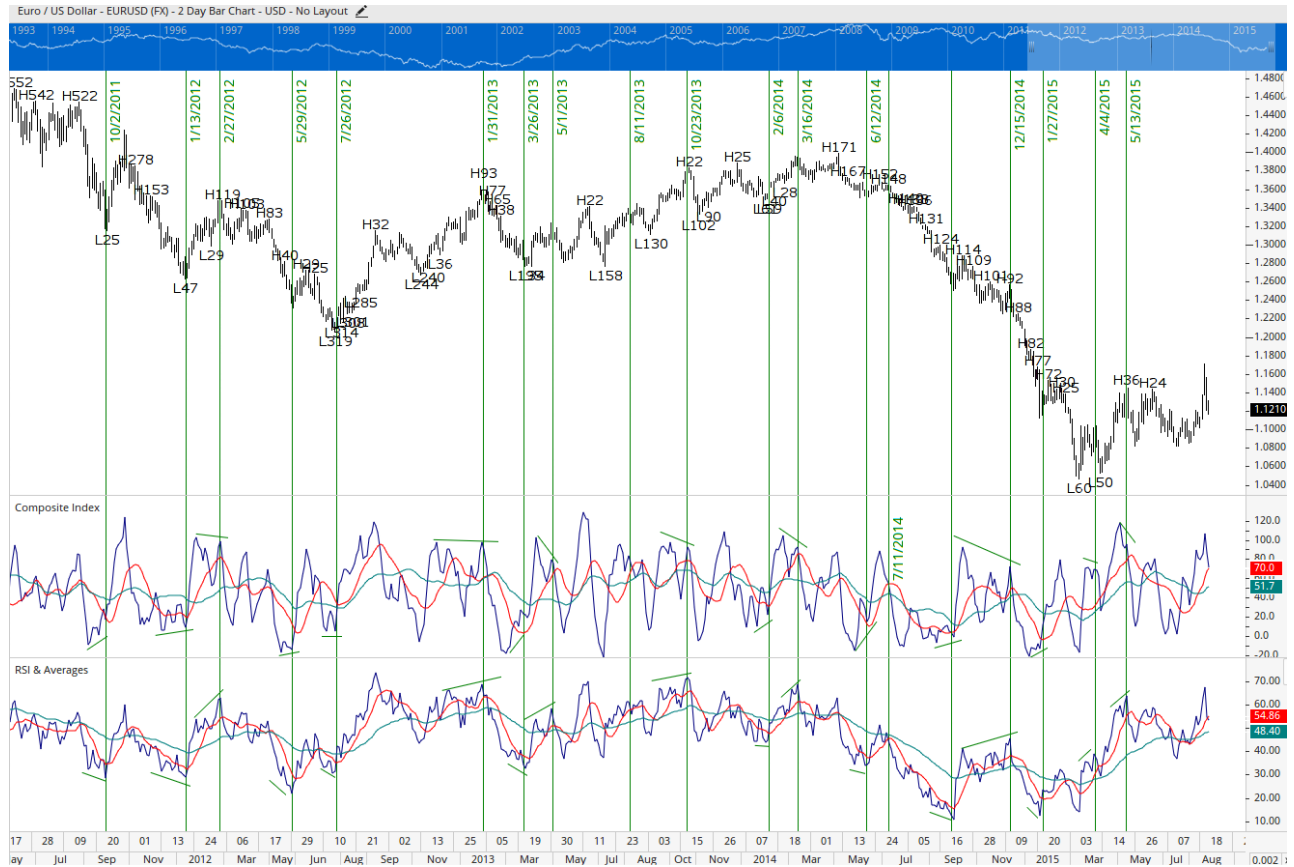

FIGURE 10. EURUSD – 2-day Bar Chart with Pivot Labels and Divergence Signals between Composite Index and RSI. (including simple moving average on the oscillators)

Because the Composite Index can oscillate freely to an unrestricted amplitude high or low, it is important to draw horizontal lines on the oscillator when these extremes have occurred. Historic extremes in the DJIA, such as the start of World War I, World War II, 2008, move the Composite Index to new extreme lows, but then the DJIA used these prior panic extremes as meaningful support levels before launching new rallies.

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The Composite Index can be used for developing Elliott Wave Principle[5] patterns. The Composite Index will form the maximum displacement at a third-of-third Elliott wave. The divergence comes with the fifth of a third wave. A second divergence with the third oscillator peak at the final fifth wave. This has been a major help for the author for many years.

Many investors and traders couple RSI with MACD. The purpose and expectation for this is to use the faster oscillating RSI against the longer MACD to improve timing. However, the failure of RSI to develop divergence signals at critical junctions is a problem for them.
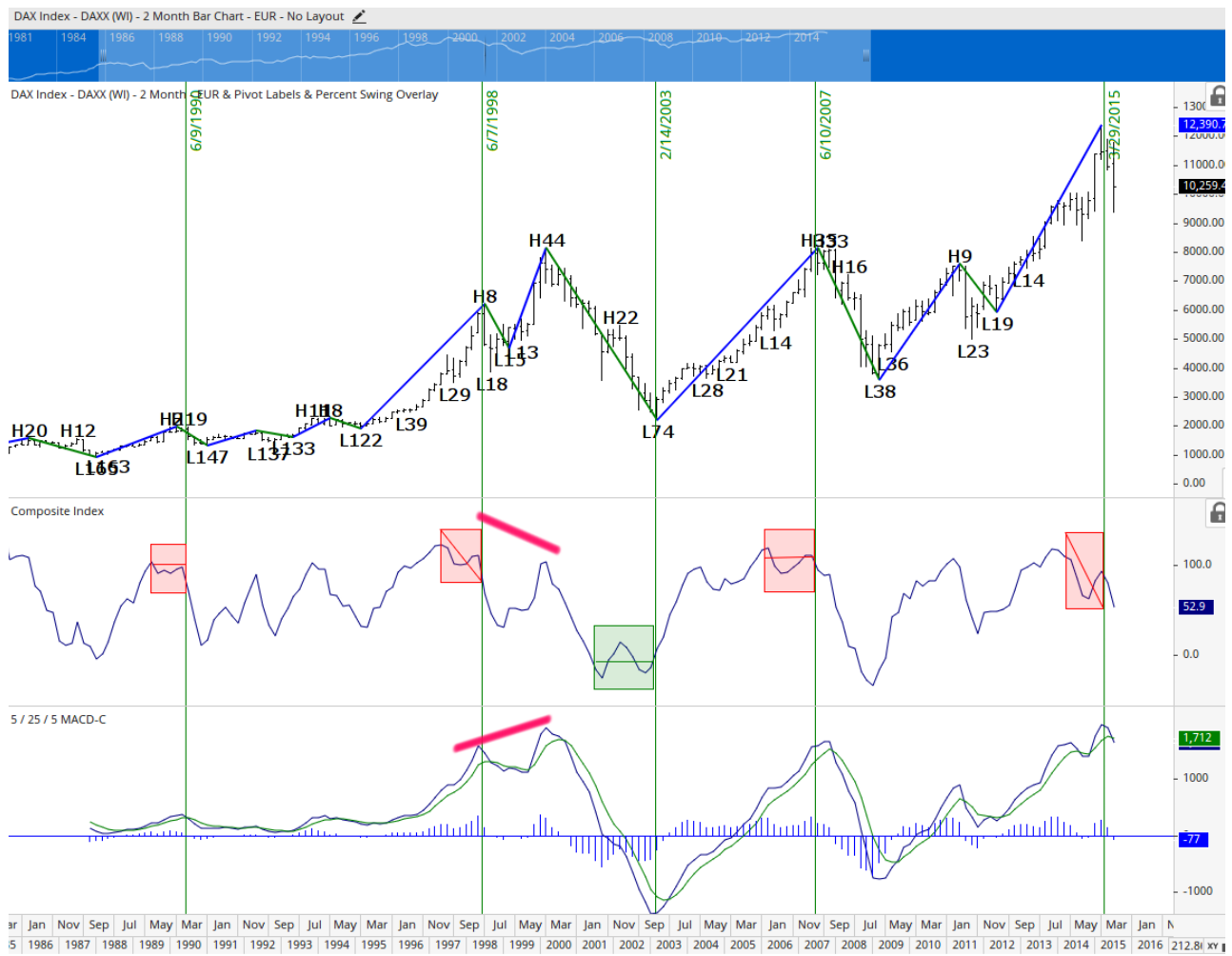

FIGURE 11. German Dax 2-mth Bar Chart with Composite Index and 5/25/5 MACD

Consider the German DAX 2-month bar chart in Figure 11. The Composite Index has

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replaced the RSI that is normally plotted over the MACD. In Figure 11 a 5/25/5 period MACD is being used.

The Composite Index may offer a stronger pairing with MACD due to the ability of the oscillator to form divergence signals where the RSI consistently showed a problem exists.

FIGURE 12. 2-month German Dax (left) and 2-month DJIA (right) displaying the final Divergence tool in Market-Analyst.

Figure 12 shows a long-horizon 2-month bar chart again for the German DAX and DJIA. One of the lessons learned from this study was divergence does not always have to be a comparison between diverging oscillator peaks. Consider the sharp price drop in the DJIA in 2008. Market-Analyst in this final version of the Divergence tool is able to define divergences when a sharp 'V' pattern develops. In hindsight, the author has always recognized this to be a form of divergence, but never had the tools to present the pattern in a provable way. Sharp 'V' bottoms or tops in the Composite Index versus the conventional 'W's and 'M's in the RSI should be read as divergence between these oscillators because the RSI is lagging.

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CONCLUSION

The conclusion that should first be made is that the Relative Strength Index displayed a serious problem across six markets in long-horizon charts by failing to develop a divergence signal forty-two times (excluding the six additional JGB's signals). In most cases the failure to provide a warning signal in this study was followed by a major price trend reversal that would have been extremely costly for asset managers.

The Composite Index triggered 17 'Buy' signals and '25' Sell signals for a total 42 divergences against the RSI. It can be suggested that anyone currently using RSI would benefit from adding the Composite Index to their screen. Four signals remained open today because the market has neither triggered a pass or fail result, though the current markets after these signals have experienced corrections. Thirty-three signals passed while only 5 failed. The Composite Index showed an exceptional performance in the long-term horizon of monthly or 2-month bar charts.

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