The GML System for Market Timing and Asset Allocation Using Combined Candlestick and Renko Charting Formats

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Humphrey E. D. Lloyd, MD

alfredo@stx.rr.com 2/26/2013

ABSTRACT

The GML System is presented as a timing model upon which accurate allocation of assets under management may be made. The system is named for Genevieve Mary Lloyd who is a Doctor of Pharmacy working in California. In November 2011, she asked me to design a reliable timing system for managing her retirement account using a single daily check on market action.

My search focused on the Renko format introduced to U.S. traders in 1994 by Nison⁹, as this format reduces the degree of volatility recorded. The name 'Renko' is derived from the Japanese word renga, a brick. A Renko, RKO, chart responds only to movement in the underlying security and will record only those changes which persist into the close of the time period selected. These values are recorded as 'bricks' without tops or tails, the brick size being selected by the trader. RKO charts are similar to Point and Figure, P&F, charts which also only record price movement without a fixed time element, but with the important difference that on a RKO chart each column consists only of a single brick with each brick being one brick higher or lower than its predecessor.

In traditional P&F charting a standard box size of one point is used. This box will represent a finite percentage difference between the high and low values with the percentage decreasing as the values of the underlying security increase and vice versa. This problem was solved by percentage-based charting such that every box represents the same percentage and by logarithmic conversion retains the same size throughout the range of values displayed on the 'Y' axis. Presently no such program exists for RKO charts. There is an additional problem with RKO charts as the brick size is chosen by the trader and therefore subject to variation. A column of rising white bricks will form a Zig high, defined by a three red brick reversal. Similarly a Zag low of falling red bricks will be defined by a three white brick reversal. Two previous versions of the GML System were rejected when the necessity to recalculate a new brick size after the formation of each higher Zig high or lower Zag low was recognized as the most dependable way presently of deriving brick size. To provide consistency and facilitate back-testing the corresponding real-time closing values shown on a Line chart were used in the calculations. Extensive trial-and-error showed that multiplying the difference between the Zig and Zag values by 3.23% provided a satisfactory brick size for prospective analysis to be used both in real-time and when running a back-test thus avoiding the inaccuracy present when pre-determined brick sizes are used. This is the look-forward bias noted by Aronson.¹

Because Renko charts do not record all the significant changes occurring in the underlying security and are not fixed on any time frame, the possibility of combining them with Candlestick, CSK, charts was examined and with the help of Bollinger bands and the Zone concept, the GML System was developed. Bollinger bands² as described originally were plotted at a +/- 2 standard deviations, SDs, above a 20 period simple moving average, SMA. In the GML System weekly CSK charts with 13 and 7 period SMAs are used at the same SDs. These averages divide the chart into four Zones. Zone 1 is above both averages and bullish, Zone 2 is between 7 SMA above and 13 below, a cautionary area, Zone 3 is below both averages and bearish, while Zone 4 is between SMA 13 above and 7 below indicating that a possible change in trend may be underway. There were two important observations 1. On occasions the action on a regular CSK chart would hit the upper band, tagging it before running upwards with it sometimes for a significant distance. 2. RKO charts record less volatility than CSK charts so the bands on them are tighter to the action.

In the GML System, Buy signals occur biphasically with the setup on a CSK chart as Step 1, when a white candlestick moves up though SMA 13 into Zone 1 and the signal brick as Step 2 on a RKO chart, which can only be taken when Step 1 is in place. Step 2 is activated when a rising white brick meets the upper Bollinger band, tagging it, to be followed in a successful trade, by further white bricks. The basic Sell signal is at the low of the third red brick to form below the weekly white brick high.

Appreciation is sought on both sides of the market, with exchange-traded funds, ETFs, mutual funds and individual stock positions being traded on the long side, then sold before seeking short side profits via inverse ETFs or put options. Back-tests were run for the years 2010 through 2012 with an allocation of \$20,000 to each position as follows. 1. SSO, at x 2 leverage to the underlying S&P. Details of the trades are presented in Table 1. 2. SPY, the original ETF based on the S&P. 3. ULPIX, the x 2 leveraged mutual fund also based on the S&P. 4. RXL the x 2 leveraged ETF based on the DJ Healthcare Index and 5. McDonald's Corp. MCD. Put options were traded on the short side for positions 1, 2, 4, and 5. The overall appreciation on the long positions was \$54,067 on the total \$100,000 for an annualized return of 15.5%. All put option positions were profitable overall with a win/loss ratio of 19.5/1 calculated on the percentage decline in the security on which the trades were based.

The GML System

A good timing model on which to base sound management decisions is one of the requirements, although by no means the only important one, for achieving success as an active investment manager. The GML System utilizes an unusual biphasic timing model to assign and manage asset positions. It is named for one of my daughters, Genevieve Mary Lloyd who is a Doctor of Pharmacy in charge of a busy pharmacy department in California. In November 2011 she asked me if I could design a trading system that would enable her to manage her retirement account effectively while paying little attention to it during the regular trading day. She agreed that a single evaluation of the action during the last half hour of trading would fit into her work schedule. She wished to trade individual stocks and exchange-traded funds, ETFs.

This request stimulated me to review my own timing model which had not been performing well due, I believed, to the greatly increased speed of communication with world-wide distribution of important events capable of market impact, but I could not discount a degree of system deterioration. My hope for Genevieve was that I could find a system which would stay with the trend ignoring market 'noise' without sacrificing the ability to react expeditiously to trend changes. My quest in many ways paralleled my own experiences with the market. I began trading in the middle sixties with poor results after a single sparkling initial success. I was living north of Boston with its well-known mutual fund and investment management companies. One of my close friends was the manager of a well-known mutual fund. He told me that his investment The GML SYSTEM decisions were predominantly based on technical analysis, TA. At that time, TA was not well accepted by many senior financial professionals, so he avoided mentioning this approach in any discussion about position selection. His influence and my search of the literature were responsible for my decision to use TA in my quest for a reliable manner in which to trade. Hurst's book in particular, *The Profit Magic of Stock Transaction Timing*⁴ influenced my thinking greatly.

My training in medicine and pathology had instilled in me the importance of making accurate initial observations before trying to form any conclusions or to make any diagnoses. I used the work of other technical analysts and my own research to develop a trading system of my own. Such a personal approach is of importance to me. By 1974 I had developed the Moving Balance Indicator, MBI, describing it in a book published in 1976⁵ This was followed by a system based on several indicators, including the MBI, published in 1991⁶, *The RSL Market Timing System*. This <u>Relative Strength Locator</u> System, served me well such that I was able to record a string of 15 winning trades from 10/8/82 to 4/3/84 with an annualized return of 29.6 %. I have not been able to duplicate this level of performance since that time.

These results were achieved by trading mutual funds from the long side only as no inverse mutual funds were available then to trade the short side of the market. Movement into cash would follow a sell signal. Waiting until the next buy demonstrated the importance of avoiding premature entry and of not forcing the trade. I fully recognized that an essential ingredient for success was to decide on stop values for exit, both to protect profit or to avoid further loss and never to second-guess the decisions once they had been made. Stops are not permitted when trading mutual funds but a definite value at which to exit must be identified and honored.

When a market decline is underway there are basically two ways in which to react.

1) By using strategies which will preserve any gains already made, either by moving into cash or by hedging the position. 2) By using active strategies designed to increase the overall return by moving out of the original position entirely on a sell signal, while holding the decision to reinstate it at the next buy signal, but in the interim to profit from the use of inverse EFT's positions or put options as primary methods of accumulating short-side profit. In recent years inverse ETFs have become available, indeed some offering a x 2 or even x 3 performance leverage in both direct and inverse formats. Inverse ETFs enable a position which is the equivalent of a short sale position to be taken. Their inverse nature means that they are bought in expectation of a market decline. Such a position does not require margin as the security has been purchased and accordingly will be eligible for inclusion in a retirement account. Selling short and selling naked calls are not permitted in these accounts, but put purchases, as well as their sale against settled cash, are permissible. Inactivity is NOT an option for those wishing to preserve capital and preservation of capital is a vitally important ingredient for long term success.

Life involves change. The markets will react to underlying conditions and perceptions as they are traded by many groups of disparate individuals whose expectations fluctuate. The GML SYSTEM 3 Stokes¹¹ presented some interesting data on his blog. He demonstrated that the trending tendency which had been present up until the turn of the century, namely for an up day in the market to be followed by another up day, i.e. to be in trend mode, changed between 2002 and 2005 to a mean-reverting mode, signifying that a strongly up day was likely to be followed by one that was down. Indeed it became well-known that if Monday was significantly 'up' or 'down', it was likely to be followed by a 'turnaround Tuesday', with movement in the opposite direction.

By 2009, I had begun to recognize that Renko charts, introduced to this country by Nison⁹ in 1994, will reduce market noise considerably, but I did not begin any research into using them until Genevieve's request. That sentence contains some faulty thinking and illustrates a trap into which it is all too easy to fall when discussing market action. Renko charts as they are constructed do not, because they cannot, change or diminish the market's gyrations. All they can provide is a method of recording such behavior with diminished volatility. This is achieved by ignoring any moves which do not persist into the close of the period under observation. There is however no way of determining from the data presented if what has been excluded is of significance. Renko charts should therefore not be used on their own.

The name Renko is derived from the Japanese word *renga*, a brick. This is an accurate description of the way the recorded values appear on a Renko, RKO, chart as the 'bricks' are all of equal size without tops or tails. RKO charts record movement in the underlying security without reference to the precise time at which such movement The GML SYSTEM

occurs. In addition there is the important feature that only bricks present at the close of the time frame being studied will be preserved on the chart. A weekly chart will make a record of the position at the end of the week, revealing none of the action which may have happened during the week unless such action persists into the close. In this respect RKO charts are similar to but are less well-known than Point and Figure, P&F, charts, which are also time independent, recording only the actual movement in the underlying security on a closing basis, a daily format usually being selected.

However there is a significant difference between P&F and RKO charting techniques as in RKO charting each new brick moves over to a new column immediately to the right of the old brick, such that each column consists only of one brick, with each brick being placed one brick higher or lower than its predecessor. This splaying out for the action bestows some immediate and substantial advantages on RKO charts when compared to the P&F format, as moving averages and Bollinger bands as well as indicators of all types may routinely be applied to RKO charts. Traders using P&F charts will require access to more sophisticated software to make these additions. I regard a RKO chart as a P&F chart spread out in an unusual manner. This process causes the characteristic Zig- Zag look to RKO charts as the angles of ascent and descent are inversely identical.

The diminished volatility furnished by RKO charts is a useful feature as the underlying structure of the data being studied will become more apparent in this format, but there is a definite price to be paid for this convenience as unlike a P&F chart where a specific box size is selected and used thereafter, a RKO brick can be of any size, to The GML SYSTEM

be determined by the trader. Selecting the correct RKO brick size presents difficulties as it is clear that a brick size which is effective over one given price range cannot be expected to provide satisfactory results over a markedly different price range. A brick of a certain size will represent a finite percentage difference between the high and low values of the brick at its present value. In an uptrend as values increase, the percentage difference represented within a single brick will become smaller with the opposite change in a downtrend. A similar although less intrusive problem in P&F charting was solved by using bricks sized to a fixed percentage and plotted logarithmically to record the values on the 'Y' axis in a manner which assured that each box remained at a constant size and at a constant percentage difference. No such program is presently available for RKO charting. It should be noted that simply plotting RKO charts on a logarithmic 'Y' scale will not accomplish anything positive as the bricks will become progressively smaller in an uptrend, or larger in a downtrend, while the percentage differences will remain variable. It should also be noted that determining brick size by using the average true range option available on the StockCharts platform did not perform well with weekly charts.

There were many false starts and the rejection of two previous versions prior to the one presented here as the timing model for the GML System. The prototype of the system was assembled rapidly on order to provide Genevieve with familiarity with the RKO concept and to assess if the basic system appealed to her. Care was taken to select only those trades permitted in a retirement account. In the original version brick size The GML SYSTEM was calculated by using half the distance between the values on the 'Y' axis. This was not satisfactory as a rally or decline of sufficient size would alter the distance between the 'Y' axis values abruptly as the program adapted to the change. The second version was more detailed and while based on significantly more research, was inaccurate as I realized, quite by chance one evening, when I was checking to see if RKO charts were mentioned in Aronson's text¹. I recognized with dismay that the method I had used for running a back-test was invalid as brick sizes had been selected based on yearly or halfyearly periods. I had inadvertently been guilty of using the look-ahead bias, also known as the 'leakage of future information'.¹

This lead me to recognize a truly important aspect of RKO charting. When a change in brick size becomes necessary, it should be calculated from the difference between the most recent Zig high and the lowest Zag low occurring within a twelve month time frame. This recalculation will affect all the values on the chart including those used in the recalculation process rendering the chart inaccurate if used for retrospective analysis. Furthermore the values of the upper and lower Bollinger bands which play a key role in the second stage of the GML timing model will also change, although only slightly. The net effect is that a RKO chart will be accurate only for the period immediately following recalculation of brick size until the next recalculation, i.e. prospectively. This is a complicating and challenging feature.

In discussing this problem by e-mail with Jeremy du Plessis, author of *The Definitive Guide to Point And Figure*³ he made the following statement which is used with his The GML SYSTEM 7 permission. There is no doubt in my mind that percentage size bricks is the way to go, so each brick represents a percentage interval. I believe that when such a method becomes available it would provide an absolutely accurate way to size RKO bricks, and further that RKO charts will come to rival other popular and well-accepted charting methods as they provide dramatic visualization of underlying market structure.

Presently Renko is a difficult medium to work with as there are no absolute values. On any RKO chart the closing values will vary with the brick size selected. Mathematically these values can never be higher than the true closing values displayed by traditional charting formats such as Open-High-Low-Close, Candlestick or Line charts, but may and usually will be somewhat lower than the true values. This situation is mirrored on the downside when the RKO chart will display closing values which are usually slightly higher than the true closing values but never lower. Without percentage-based RKO brick sizing, PB-RKO, it is impossible to develop a method of brick sizing that will be self-correcting and finitely accurate. The method I use presently is the most dependable that I have found. It is derived in hybrid fashion in this manner.

I take note of reversal highs and lows comparing weekly candlestick, CSK, and RKO charts to identify RKO Zig highs and Zag lows. The CSK chart is now easily converted to a <u>Line</u> chart using the 'Chart Attributes' section in StockCharts. The Line chart will identify the significant <u>closing</u> values. The RKO brick sizes are calculated from these closing values on the Line chart. This method provides stability as the real-time weekly closing values are used to calculate the brick sizes which will be transferred to

the corresponding RKO chart. Other traders will certainly be able to reproduce these values, and checking on the action during any particular previous period on a RKO chart will provide reproducible results. This statement cannot be made with assurance when a RKO chart is used on its own without the tethering effect of using true values, as the procedure becomes more complicated and errors are likely to occur which will be carried forward into the calculation of future brick sizes. When recalculating brick size based on true closing weekly values identified on a Line chart, I multiply the difference found between the selected high and selected low closing values by 3.23%. This figure was determined by extensive trial and error. The favorable result is that RKO charts derived in this manner will provide dependable values upon which to base real-time trading decisions and will also provide accurate back-test results. Recalculation will still be necessary and will change all previous RKO values, but the process of recalculation of a new brick size to be used prospectively soon becomes routine.

The real-time identification of new RKO Zig highs or Zag lows is made when there have been at least three reactive bricks of different color persisting into the weekly close. The brick size is never changed during an unbroken series of white, Zig or red, Zag, bricks. On occasions there will be a significant change in brick size after a long move. This problem will be solved when percentage-based brick charting become a reality. The newly calculated brick size becomes valid immediately following the closure of the third reactive brick and the chart with this new value is the one to use for making put purchases when these options are being traded to profit from downside market action. This method of calculating brick size is as accurate in back-testing as it is in real-time trading as it follows the same processes.

The present version of the GML System corrects the bias present in the previous unpublished versions. Percentage based sizing, if it becomes available, will solve the brick size problem while preserving the dramatic pictorial presentation of market action offered by the RKO format which reveals the scaffolding under the market. In their present format RKO charts, for the reasons discussed, are unsuitable on their own for trading. Since I wished to preserve the visual advantages they provide, I experimented with combining them with Candlestick, CSK charts. In the ideal system a buy signal would stay with the dominant weekly trend and would exit only when a change in trend became identified. In the GML System, the two charting methods are combined in an unusual manner, with setup buy signals being identified using CSK time and price charts, to be followed by action signals identified on RKO charts which respond only to price movement. Weekly charts provide the best combination signals. Here are the important components of the system.

Candlestick charts. I was introduced to CSK charts in 1990, when I was presented with Shimizu's book, *The Japanese Chart of Charts*¹⁰. I recognized almost immediately the importance of these strange looking charts which had been used by Japanese rice traders dating back to the mid 1700s and perhaps even earlier than this. Then Nison's book⁸ on candlesticks appeared in 1991, with further important details of CSK chart behavior.

 The Zone concept and Bollinger bands. Some 10 years ago I invented an indicator

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which I called the Security Assignment Indicator, SAI, recording the parameters in an e-book published in 2006⁷. This indicator was based on CSK charts and divided market action into 'stages' using 13 and 7 period simple moving averages, the same ones used in the Zone concept. However the emphasis on the Zone concept evolved as the direct result of searching for a method to trade Renko charts and was not described in this manner in the e-book. When I began the quest for the GML System, I realized that the SAI which divided the market action into 'stages' could be upgraded to become the important Zone concept which in conjunction with action involving the Bollinger bands helped greatly in the design of the GML System.

Bollinger bands were introduced to traders in 1998. Bollinger's definitive book was published in 2002². They are volatility bands derived from a complicated formula, the important point being that as volatility increases the bands widen. They will then contract significantly when volatility settles down. The original bands were derived from a 20 period simple moving average, SMA 20, and were plotted at 2 standard deviations above and below this average. In the GML System a 13 period weekly SMA is used with band values at the same 2 standard deviations above and below this SMA. The addition of a 7 period weekly SMA allows market action to be divided into 4 Zones. It is important to note that the precise values at which the Zones form will differ in the two formats. I will use SMA 13-C to refer to the average on a CSK chart when differentiation from SMA 13-R, the average on a RKO chart, becomes necessary.

Zone 1 is formed above both averages and does not become fully established until The GML SYSTEM 11

Fig. 1



Two good-looking Step 1 signals



Renko Charts showing valid and non-valid Step 2 signals

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both simple moving averages are rising with SMA 7 above SMA 13. The upper Bollinger band marks the upper boundary of the Zone. SMA 13-C and SMA 13-R play a crucial role in the GML system dividing both chart types into bullish and bearish areas. Zone 1 is bullish in both formats.

Zone 2 is demarcated between SMA 7 above and SMA 13 below. On CSK charts this zone is still bullish. On a RKO chart sale of and exit from a long position usually occurs in this Zone as will be examined.

Zone 3 is formed below both averages, with the lower Bollinger band forming the lower boundary. It does not become fully established until both averages are falling with the shorter SMA 7 below SMA 13. This Zone is bearish in both formats. On the RKO chart naked put options should be bought in this Zone when this strategy is being used as an effective short side component of the GML System.

Zone 4 is demarcated between SMA 13 above and SMA 7 below. On a RKO chart this signals that a potential move to the upside may be underway in the security making a move into this Zone. Put purchases should be sold in this Zone.

Fig. 1. SSO is displayed in CSK format. Notice that the Price Labels box, Color Prices and Show Legends boxes are enabled. The four Zones are also identified.

Fig. 2. The same underlying data are presented in RKO format. The Zones are easier to identify. Notice particularly that the Bollinger bands in the RKO chart are tighter to the action than those in the CSK chart, because the volatility is less in RKO format. Also that the values of SMA 13 and SMA 7 are not identical in the two formats. I have The GML SYSTEM



can reveal underlying harmonic fluctuation.

added Wilder's well-known RSI at a 7 period setting and Appel's MACD in histogram format at the default setting. The RSI 7 will usually record a value around 70 as a GML buy occurs on the RKO chart. No timing decisions are based on this indicator. MACD has a role to play in the assessment of a continuation buy signal in over-bought territory. Such a trade should not be taken unless this indicator is above the zero line.

The charts presented here are from the StockCharts platform, <u>www.StockCharts.com</u> **RKO** charts are available in the free area so those who wish to find out more about such charts can examine them immediately without charge. I use and have used other trading The GML SYSTEM 14 platforms but for RKO charting the StockCharts platform is used exclusively. The charts are excellent. Stock values are adjusted to take into account the effect of dividends, splits and other distributions. When a dividend is declared the value of the underlying stock will drop by the amount of the dividend. Over time this effect is substantial with some programs failing to adjust for dividends. On the StockCharts platform the opening value at the beginning of 2007 for SPY is correctly identified as 125.27 with closure at 142.41 on 12/31/12. Thus the overall gain was 7.52%. On the TradeStation platform, where no dividend adjustments are made, the two values are recorded as 142.25 in 2007 and 142.41 in 2012. This is an unacceptable inaccuracy when calculating long term performance. The platform is excellent in all other aspects.

Soon after I started using Bollinger bands on Candlestick charts I noticed that there would be times when the action hit and turned the upper band upwards and then trekked with it in buy mode, sometimes for a considerable distance. More recently I found this statement in Bollinger's book on page 70. When the chosen indicator confirms a tag of the bands, you do not have a buy or sell signal; you have a continuation signal. He was talking about confirming indicators. I decided to test this formation as a primary buy signal using RKO charts where the bands are tighter to the action because of the selective nature of this charting format. I knew almost at once that I was exploring a valuable idea as the constriction of the bands in the RKO format suggested that a reliable entry method could be based on this observation. The problems would be a) to find the most advantageous setup for the signal and b) to determine the best approach to brick sizing. Both tasks proved to be more difficult than anticipated. The first problem was solved by the biphasic approach and the second by applying a percentage difference to the appropriate Zig highs and Zag lows identified on a Line chart. The GML System acquired its present format based on these observations and is presented for consideration as an active timing model and asset management system.

BUY SIGNALS USING DIRECT ETFs or SINGLE STOCK POSITIONS.

- 1. MAIN BUY SIGNAL. This signal occurs in two phases, Step 1 on a Candlestick, CSK chart and Step 2 on a Renko, RKO chart. Step 1 is present when SMA 13-C has been penetrated from below by a weekly white candle. The underlying security enters Zone 1 as a white candle. This is the buy setup on a weekly chart. No action may be taken on the RKO chart until Step 1 has occurred. Step 2 is identified on an RKO chart when a white brick reaches the upper Bollinger band. Ideally such an event will coincide accurately with Step 1. It will usually do so promptly, but if it has not done so by the closing date of the weekly candle daily candlesticks should be monitored to make sure that the entry on Step 2 is associated with market strength.
- ORDER ENTRY. After **Step 1** is in place, a good-til-cancelled, GTC, buy stop with limit order should be entered using the value at which the rising white brick would meet the upper Bollinger band as **Step 2**. If the upper band has a value of 128.97 and is above the present value of the highest white brick high with the next one being due at 129.20, then the order should be placed as follows; Buy X number of shares at

129.20 stop, with a limit of 129.20 plus the value of the present brick. This order will be entered in separate boxes on the order entry screen. The limit value should be at least a full brick above the stop level but may be set at any value equal to or greater than the stop value entered as the first segment of the order. Actual details will vary with the brokerage. There is sound reasoning behind this approach since a large opening gap say to 132.80 may occur. A simple buy stop, which must always be entered as an order placed above the present market, would be filled at this higher value as a stop order at 129.20 becomes a market order whenever the market trades through the selected stop value. The fact that it did so in the over-night session does not offer protection. This is provided only by the limit side of the order meaning that a fill will not occur unless the market returns to the limit value. If there is a large opening gap, I believe that it is better to cancel the order and wait for a time to buy into the market on strength, which may mean entering at a higher brick than the one previously identified. Fortunately this is not a common problem. It is also important to avoid any **Step 2** signal which has been reached without the presence of **Step 1** on the CSK chart.

2. CONTINUATION BUY SIGNALS. There are two continuation buy signals, a) This buy signal may be taken when a trader decides to begin trading the GML System or has missed the correct buy entry value at a time when the selected underlying security is already in buy mode and is rallying well. The action must be tagging the upper band. The formation of a new white brick will provide the signal for entry which I recommend should be taken no later than as the fourth brick after the one producing the buy signal. This signal is discretionary and does not feature in the back-tests. b) A true continuation buy occurs in an ongoing up move which has been exited when a sell stop became triggered. Re-enter on a simple buy stop at a value coinciding with the high of the next white brick providing SMA 7 and the upper Bollinger band are both up-trending with positive momentum. In a solid move these two entities will usually move in parallel. MACD must be in positive territory.

SELL SIGNALS

3. MAIN SELL SIGNAL. An initial resting stop should be placed at 5 brick units below the high of the entry brick. This is the 'fail-safe' stop, the one guarding against a violent and unpredicted adverse move in the underlying security. Since it is not possible to place more than one stop on a position, an initial 'mental' stop should be set at a distance of four units below the entry price. It must be carried in the trader's mind as an obligation to visit the market during the trading day to assess the action especially towards the end of the regular session. If the market rallies to form 4 white bricks above the entry value, the necessity for having two stops will disappear as a single stop should now be placed as a trailing 4 unit stop based on the weekly high closing value. Trailing the stop accurately is important and is based on the weekly RKO high value. This value is never altered during the week in response to daily appreciation.

At the end of each trading week note if a new white brick or bricks have formed, then
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raise the stop by a similar amount. The stop will be 4 brick units below the highest brick high. It will be composed of 1 white and 3 red bricks. Do not alter it during the week, only on the week-end and only on appreciation in the underlying asset. If the market fails to form even a single white brick on the weekly chart above the entry value, exit at the low of the second red brick, i.e. a 3 unit stop.

Each day when trading in real time, check the opening of the afternoon session to see if the trailing stop has been hit. If all is well, note if daily market action has contributed any new white bricks as their presence is deceptive and must be disregarded. The stop is situated at the low of the third red brick below the <u>weekly</u> white brick high. The presence of 3 red bricks without careful examination of the day's action can lead to premature and unnecessary departure from the trade.

When running a back-test use the weekly RKO chart but activate a <u>daily</u> RKO chart of the position by simple keystrokes on the StockCharts platform if any red bricks are noted on the weekly chart. The daily chart will demonstrate if the trailing stop signal provided by 3 valid red bricks based on the weekly stop would have been hit.

4. CONTINUATION SELL SIGNALS (to close out continuation buys). Use a 4 unit brick size from the highest RKO weekly value recorded in the trade and exit on the low of the third red brick checking daily action as above both in real-time and when running a back-test. The highest brick will be white with 3 underlying red bricks. If the brick size is greater than 1.0 use a 3 brick trailing stop with 1 white and 2 red bricks and if it is less than 0.25 use a 5 unit stop. Since I have for many years believed in the concept of taking positions on both sides of the market, I decided to examine in detail the returns which might be obtainable from trading a pair of exchange-traded funds, ETFs, using a direct fund for 'long' signals and the inverse fund to provide the equivalent of 'short' signals. My hope was to find a method with comparable signals for each ETF as I surmised that if the correlation between them was accurate, then a signal to sell the direct fund should soon be followed, if the down move in the direct fund continued, by a 'buy' signal in the inverse fund providing 'short' side profit based on the same buy setup as the one used for the direct fund. Furthermore I believed this concept would provide any investor with a valuable market trading model as the system would be fully acceptable in a retirement account such as an IRA, 401-K or 403-B arrangement.

This strategy did not work as well as I had hoped and for these reasons. 1) The GML timing model had been designed to buy strength as soon as an upturn becomes established. It performs best in a market trending upwards without significant moves against the trend. It follows that an ETF trading this action inversely will underperform. 2) Many inverse funds trade in low price ranges at which RKO signals become more sensitive to small fluctuations in value. Later research demonstrated that superior returns were obtainable by buying 'naked' put options, as described below, based on the original position after it had been sold in Zone 2. There is however a problem with this approach in that individual company charters may prohibit such action. Inverse ETFs may also be prohibited. Puts purchases, even if permissible, should be used

with caution as it is important to preserve the equity already acquired. If an initial equity position of \$20,000 has appreciated to \$26,000 I rarely use more than a third of the appreciation for put trading, in this case \$2000. If 5 \$4.00 options are bought at a strike price of \$50 on an underlying security trading at \$50 and the value then declines to \$42, each option will have an intrinsic value of \$8, so it is not difficult to imagine the profit potential achievable by a skillful put trader. It should also be noted that inverse ETFs will offer advantageous trading possibilities when a significant and persistent downtrend is identified as in 2008, recognizing that a change in overall trend is involved, one which takes time to develop. When trading single stock positions the ability to trade put options will facilitate success.

- PUT OPTION TRADING: BUY SIGNALS. Put options are bought, after any recalculation of brick size, as a primary method of establishing a position on the short side of the market. Using the RKO chart based on the security recently sold, buy puts when the underlying security closes as a red brick at or below SMA 13-R, meaning that it is in Zone 3 or about to enter it. Puts that are slightly in the money or at the money should be purchased making sure that a) option expiration is at least a month away, b) that the bid/ask spread is no more than 30 cents for puts based on a position trading at or under \$60 and c) that there is open interest of at least 500 options. The underlying security will be in Zone 3 but will not be held in the account.
 PUT OPTION TRADING: CONTINUATION BUY SIGNAL. After exit using the
- standard sell signal described below, buy puts at the low of a new red brick if the

underlying position keeps falling and takes out the previous low. Exit as given below. 3. PUT OPTION TRADING : SELL SIGNALS. Both long put positions are sold on a stop placed to coincide with a rise in the underlying position to reach Zone 4 at SMA 7.

The GML System allows individual money managers great flexibility as there are hundreds of ETFs now available for trading. Only trading in regular bond positions is not recommended owing to insufficient underlying movement. The GML System will provide a clear-cut view of the general market and any security of interest, including all those securities with available options as well as those mutual fund companies such as the ProFunds group which allow un-restricted daily trading. Leveraged ETFs and mutual funds seeking a <u>daily</u> return based on daily action at x 2 or even x 3 that of an un-leveraged fund should be used with care, but since the GML System is geared to select only those periods when steady price appreciation is expected, the results of trading the x 2 leveraged ETF SSO based on the underlying S&P index were examined and are recorded as the first of five long asset positions chosen to show the flexibility of the system. They differ from the recommendations I made to Genevieve which advised her to divide her account into 5 equal positions trading each independently. I suggested a large-cap domestic ETF, IVV based on the S&P 500 index, a small cap ETF, RWM based on the Russell 2000 index, a foreign ETF, EFA based on the Morgan Stanley International Index made up of securities from Europe, Australia and the Far East, plus the real estate ETF, IYR based on the Dow Jones Real Estate Index. These four ETFs may be traded commission-free at Fidelity. GLD, the State Street SPDR Gold ETF was

the choice for the fifth position.

In this paper these are the five positions chosen to illustrate the flexibility of the system.

- Position 1. The x 2 leveraged ETF, ProShares Ultra S&P 500, SSO with put options traded on the short side. The details are recorded in Table 1.
- Position 2. The un-leveraged ETF, SPY also based on the S&P, the first SPDR ETF offered for trading, with put options.
- Position 3. The x 2 leveraged ProFunds Ultra Bull mutual fund, ULPIX another position based on the S&P 500. No put options are available.

These three positions will allow comparison between the choices available on some other underlying securities.

Position 4. The x 2 leveraged ETF, RXL a ProShares Ultra ETF based on the Dow Jones Health Care Index, with put options, and

Position 5. McDonalds Corp. MCD with put options.

For the back-test each position was allocated \$20,000 with \$70 per round turn for commissions and slippage subtracted from leveraged trades and \$35 from un-leveraged trades. There are no fees associated with trading mutual funds. There is nothing immutable about the trading parameters described. They should serve as reference points to be modified to suit an individual manager's trading style. Also noted will be the results from purchasing puts to illustrate the appreciation possibilities which exist during market declines. This technique will not be available to all market participants. Back-test results using long side positions and the results of purchasing puts to achieve short-side profit will be given for the years 2010, 2011 and 2012. These years followed 2008 and 2009, both years of unusual market action. The three following years used in the back-tests behaved in more normal fashion.

For put option positions, profits will be recorded simply as the percentage change in value between the price of the security on which the trade had been based at put purchase and the price at put sale. It is impossible to run an accurate back-test on options as they are very volatile and previous prices are not accessible. If the underlying security declines significantly then some flamboyant percentage profits may be achieved by trading put options. Since no accurate purchase and sale data on options are available other than for those presently trading actively, I believe that the much smaller percentage change in the base security will provide a convenient way to record the results which are not included with the figures obtained on the long side.

The GML System may also be used advantageously to trade options as a separate investment without having to employ any of the complicated strategies which are frequently promoted as the sure road to riches. Naked puts should be sold as cashcovered puts on stocks which are viewed favorably, those which would be welcomed into your portfolio if 'put' to you. Such sales represent the 'long' strategy with the direct purchase of puts the 'short' side. Both operations may be made in a retirement account.

Running a back-test. There is important information in this section. Here is the back-test for Position 1, SSO and its put options for the years 2010-2012.

- 1. The first step is to determine the correct brick sizes to be used when running the test. This operation is performed on a Line chart accessed either directly or by a simple conversion of a CSK chart. Data for the years 2009-2012, must be collected to insure that the correct brick size is found from a full year's data prior to the run of the actual back-test. Identify the highest Zig highs and the lowest Zag lows occurring within a twelve month period. The correct brick sizes are found by multiplying the difference between the values obtained from the Line chart by 3.23% These prospective brick sizes values and the point where they change should be marked on the line chart.
- 2. Now examine CSK charts for the test years noting where the **Step I** signals in the biphasic process occur. Mark each time SMA 13 has been penetrated by a white candle opening below it and note the dates.

Table 1 will record the results of trading SSO for the years 2010-2012. The calculation of the appropriate the brick size soon becomes routine. These values will be valid until recalculation becomes necessary and will only become inactive when replaceable by Zig or Zag values at least 3.5 % higher or lower than the present values. Here are the first two values. The value of 14.38 on 3/2/09 runs to 39.50 on 1/4/2010 yielding a brick size of <u>0.81</u> This is active until the reaction to the high on 4/19/10 at 44.62 provides the next brick size of <u>0.69</u> using the low on 7/6/09 at 23.23

3. Then access RKO charts from 2010 onwards examining each period based on the calculated specific brick size separately. The first trade would have been made on the

week of 3/15/10 at <u>39.69</u> The brick size is 0.81. Examination of the daily action is The GML SYSTEM [25] negative, i.e. shows no unexpected daily red brick activity which might have signaled that exit from the trade was in order. Exit is on the week of 5/3/10 at <u>41.31</u> The new brick size is 0.69. On 8/2/10 there is a RKO Step 2. signal but no trade as Step 1 on the CSK chart is not in place. This non-trade and a similar setup under # 5 are included to show the importance of honoring Step 1. Neither trade would have been successful.

4. The penultimate trade triggered during the week of 6/18/12 at an opening value and trade entry at 53.66, the buy stop having been placed at 53.60 The daily CSK chart should be consulted to clarify the action. This trade illustrates the risk of entry during the week rather than only at week-end as this entry was premature and promptly triggered the sell stop at 50.92 at the low of the third red brick. Re-entry was on 6/25/12 at 54.27 This trade ran nicely to 60.30 on the week of 10/8/12

Allowing \$70 per round turn for commissions and slippage, \$20,000 traded on SSO as Position 1 grew as shown in Table 1 to \$32,962 This is an annualized return on investment of 18.0 %. There were 5 winning trades with an average gain of 13.83 % and average duration of 15.2 weeks. There were 2 losing trades for an average loss of 6.02% over an average period of 1.5 weeks. There were 8 option trades with 6 winning trades showing an average profit of 6.85% , a single loss of 2.94 % and 1 break-even trade before slippage and commissions.

The GML System provides a sound and uncomplicated method of trading puts with the advantage that buy signals may be taken as soon as Zone 3 is reached. When trading The GML SYSTEM [26] inverse ETFs the buy signal must await the arrival of the underlying ETF at the upper Bollinger band in Zone 1, equivalent to the lower Bollinger band being tagged in Zone 3.

The other positions have been worked out in exactly the same way.

Position 2 using SPY showed 5 winning trades with an average profit of 5.77% and 1 losing trade at 3.3%. The final equity was \$26,404 for an annualized return on investment of 9.7%. There were 8 put option trades, 6 winners at an average of 4.33%, 1 loser at 3.2% and one break-even trade.

Position 3 using ULPIX showed 6 winning trades at an average gain of 9.32% and 2 losers at 4.3%. The final equity was \$30,990 for an annualized investment return of 15.7%

Position 4 using RXL showed 5 winning trades with an average profit of 12.8% and 1 losing trade at 1.9%. Final equity reached \$35,581 for an annual return on equity of 21.0%. 4 winning put trades averaged 10.8% with 2 losing trades at 1.5% This was the most profitable position.

Position 5 using MCD showed 5 winning trades at 7.56% and 1 loser at 2.1%. Final equity of \$28,130 was achieved with an annualized return of 12.0%. 4 put option trades were all winners at an average 3.1%

The 5 positions studied achieved a total increase in long equity of \$54,067 on \$100,000 for a percentage annual return of 15.5%. All put option positions were profitable overall. The win/loss ratio for the four positions where puts were available was 19.5 to 1, calculated on the decline in the base security.

 The GML System in its present form is cumbersome. It is my hope that this paper

 The GML SYSTEM
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will attract attention to the Renko charting method and that percentage sizing of Renko bricks will become possible thereby simplifying the procedure. It will be interesting to find out if the biphasic approach will still be necessary. My belief is that the underlying tethering of Renko signals to a move into Candlestick Zone 1 will still retain its usefulness.

TABLE I - TRADING SSO WITH GML SYSTEM

Results:

7 Trades 5 Wins @ an Average of 13.83% over 15.2 weeks. 2 Loses @ an Average of 6.02% over 1.5 weeks Annualized Percentage Return - 18.0 %

							TIME IN				
				BRICK			TRADE				
TRADES		DATE	BUY	SIZE	SELL	DATE	(weeks)	EQUITY	% W	% L	NOTES
SSO	1	3/8/10	39.69	0.81	41.31	5/3/10	9	20746	3.73	_	
	2	8/2/10	37.26	0.69	No Trade	—	_	_	_	_	No Step 1
	3	9/20/10	37.95	_	51.06	3/7/11	25	27843	34.21	_	Daily OK
	4	4/25/11	54.76	0.74	No Trade	—	_	_	_	_	MACD Neg.
	5	9/12/11	43.66	_	No Trade	—	_	-	_	_	No Step 1
	6	10/10/11	43.66	—	45.14	11/14/11	6	28717	3.14	—	
	7	12/5/11	45.88	_	42.92	12/14/11	2	26794		6.70	
	8	12/19/11	46.62	—	54.76	5/7/12	21	31402	17.20	—	
	9	6/18/12	53.66	0.67	50.92	6/18/12	1	29729	_	5.33	See Text
	10	6/25/12	54.27	_	60.3	10/8/12	15	32962	10.87	_	

PUT TRADES

Results: 8 Trades as given below.

			BRICK			TIME IN TRADE				
TRADES	DATE	BUY	SIZE	SELL	DATE	(weeks)	EQUITY	% W	%L	NOTES
1	5/3/10	40.71	0.69	36.57	6/14/10	7		10.17	_	
2	6/28/10	33.81	_	33.81	7/6/10	2		_	_	
3	3/14/11	50.32	0.74	51.8	3/28/11	3		_	2.94	
4	5/31/11	51.80	_	51.06	6/27/11	5		1.43	_	
5	7/25/11	51.06	_	39.96	8/22/11	5		21.74	_	
6	11/14/11	44.40	_	42.18	11/28/11	2		5.00	_	
7	4/30/12	55.61	0.67	50.25	5/4/12	6		9.64	_	
8	10/22/12	59.63	_	56.95	11/19/12	5		4.49	_	
9							Average:	6.85		

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