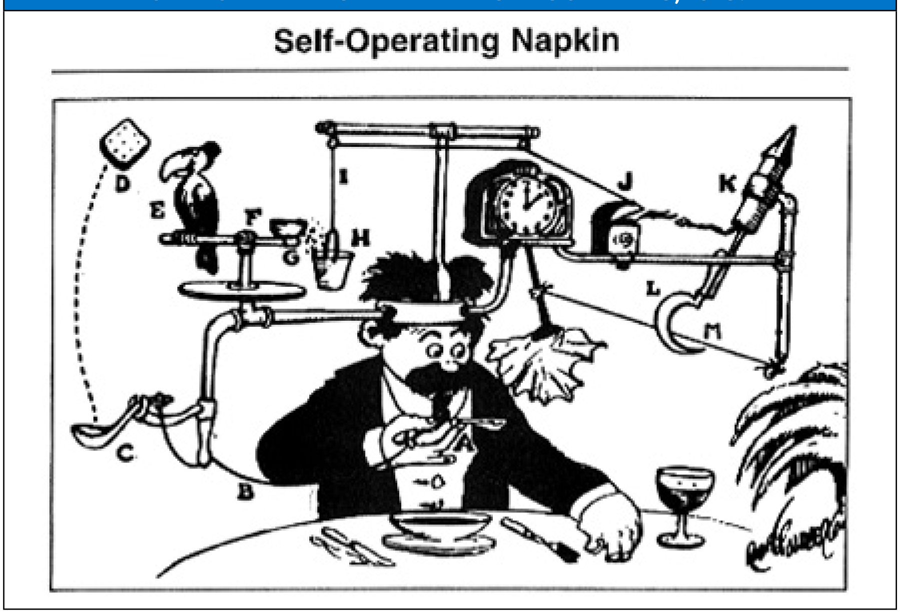
The Substantial Equivalence Test

By John Kaufmann

John Kaufmann examines the substantial equivalence test and offers potential solutions to some of the problems posed by the test. John also discusses a number of simpler tests that could be used to determine whether complex contracts should be treated as Code Sec. 871(m) transactions.

We will begin the current article with an empirical test of the old saw "A picture is worth a thousand words." Exhibit A contains an image of a design for a self-operating napkin, created by Rube Goldberg in 1915 (now in the public domain), and Exhibit B contains the text of Temporary Reg.

EXHIBIT A—SELF-OPERATING NAPKIN—RUBE GOLDBERG, 1915.



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§1.871-15T(h)(1)–(5), which contains the "substantial equivalence test," by which the IRS and taxpayers are meant to test whether a complex contract constitutes an 871(m) transaction for purposes of Reg. §1.871-15(e)(2). At 1,091 words, the regulation is slightly over the 1,000 limit, but for purposes of this experiment, we will assume that the excess 91 words are statistically insignificant. Readers are encouraged to write in to let us know whether the self-operating napkin or the substantial equivalence test is clearer in their minds after examining Exhibit A and Exhibit B.

Exhibit B—Substantial Equivalence Test, Temporary Reg. §1.871-15T(h)(1)-(5):

(h)(1) Substantial equivalence test - In general. The substantial equivalence test described in this paragraph (h) applies to determine whether a complex contract is a section 871(m) transaction. The substantial equivalence test assesses whether a complex contract substantially replicates the economic performance of the underlying security by comparing, at various testing prices for the underlying security, the differences between the expected changes in value of that complex contract and its initial hedge with the differences between the expected changes in value of a simple contract benchmark (as described in paragraph (h)(2) of this section) and its initial hedge. If the complex contract contains more than one reference to a single underlying security, all references to that underlying security are taken into account for purposes of applying the substantial equivalence test with respect to that underlying security. With respect to an equity derivative that is embedded in a debt instrument or other derivative, the substantial equivalence test is applied to the complex contract without taking into account changes in the market value of the debt instrument or other derivative that are not directly related to the equity element of the instrument. The complex contract is a section 871(m) transaction with respect to an underlying security if, for that underlying security, the expected change in value of the complex contract and its initial hedge is equal to or less than the expected change in value of the simple contract benchmark and its initial hedge when the substantial equivalence test described in this paragraph (h) is calculated at the time the complex contract is issued. To the extent that the steps of the substantial equivalence test set out in this paragraph (h) cannot be applied to a particular complex contract, a taxpayer must use the principles of the substantial equivalence test to reasonably determine whether the complex contract is a section 871(m) transaction with respect to each underlying security. For purposes of this section, the test must be applied and the inputs must be determined in a commercially reasonable manner. If a taxpayer calculates any relevant input for non-tax business purposes, that input ordinarily is the input used for purposes of this section.

(2) Simple contract benchmark. The simple contract benchmark is a closely comparable simple contract that, at the time the complex contract is issued, has a delta of 0.8, references the applicable underlying security referenced by the complex contract, and has the same maturity as the complex contract with respect to the applicable underlying security. Depending on the complex contract, the simple contract benchmark might be, for example, a call option, a put option, or a collar.

(3) Substantial equivalence. A complex contract is a section 871(m) transaction with respect to an underlying security if the complex contract calculation described in paragraph (h)(4) of this section results in an amount that is equal to or less than the amount of the benchmark calculation described in paragraph (h)(5) of this section.

(4) Complex contract calculation.

(i) In general. The complex contract calculation for each underlying security referenced by a potential section 871(m) transaction that is a complex contract is computed by:

(A) Determining the change in value (as described in paragraph (h)(4)(ii) of this section) of the complex contract with respect to the underlying security at each testing price (as described in paragraph (h)(4)(iii) of this section);

(B) Determining the change in value of the initial hedge for the complex contract at each testing price;

(C) Determining the absolute value of the difference between the change in value of the complex contract determined in paragraph (h)(4)(i)(A) of this section and the change in value of the initial hedge determined in paragraph (h)(4)(i)(B) of this section at each testing price;

(D) Determining the probability (as described in paragraph (h)(4)(iv) of this section) associated with each testing price;

(E) Multiplying the absolute value for each testing price determined in paragraph (h)(4)(i)(C) of this section by the corresponding probability for that testing price determined in paragraph (h)(4)(i)(D) of this section;

(F) Adding the product of each calculation determined in paragraph (h)(4)(i)(E) of this section; and

(G) Dividing the sum determined in paragraph (h)(4)(i)(F) of this section by the initial hedge for the complex contract.

(ii) Determining the change in value. The change in value of a complex contract is the difference between the value of the complex contract with respect to the underlying security at the time the complex contract is issued and the value of the complex contract with respect to the underlying security if the price of the underlying security were equal to the testing price at the time the complex contract is issued. The change in value of the initial hedge of a complex contract with respect to the underlying security is the difference between the value of the initial hedge at the time the complex contract is issued and the value of the initial hedge if the price of the underlying security were equal to the testing price at the time the complex contract is issued.

(iii) Testing price. The testing prices must include the prices of the underlying security if the price of the underlying security at the time the complex contract is issued were alternatively increased by one standard deviation and decreased by one standard deviation, each of which is a separate testing price. In circumstances where using only two testing prices is reasonably likely to provide an inaccurate measure of substantial equivalence, a taxpayer must use additional testing prices as necessary to determine whether a complex contract satisfies the substantial equivalence test. If additional testing prices are used for the substantial equivalence test, the probabilities as described in paragraph (h)(4)(iv) of this section must be adjusted accordingly.

(iv) Probability. For purposes of paragraphs (h)(4)(i)(D) and (E) of this section, the probability of an increase by one standard deviation is the measure of the likelihood that the price of the underlying security will increase by any amount from its price at the time the complex contract is issued. For purposes of paragraphs (h)(4)(i)(D) and (E) of this section, the probability of a decrease by one standard deviation is the measure of the likelihood that the price of the underlying security will decrease by any amount from its price at the time the complex contract is issued.

(5) Benchmark calculation. The benchmark calculation with respect to each underlying security referenced by the potential section 871(m) transaction is determined by using the computation methodology described in paragraph (h)(4) of this section with respect to a simple contract benchmark for the underlying security.

The Current Rule

The only way to fully appreciate a Rube Goldberg creation is to walk through the numbered or lettered steps sequentially. Similarly, the only way to understand the substantial equivalence test is to work through the example in the Temporary Regulation with real numbers. That said, there is some value in describing the procedurally defined rules of the Temporary Regulation in conceptual terms. Generally, the rules compare two comparisons, *i.e.,* they say that a complex contract will be an 871(m) transaction if the difference (as adjusted) between the change in value of the complex contract and the change in value of the "initial hedge," given a rise or fall of one standard deviation in the price of the underlying security, is equal to or less than the difference (as adjusted) between the change in value of a specified "simple contract benchmark" and the change in value of a delta hedge of the simple contract benchmark.

Stated more generally, a complex contract is treated as an 871(m) transaction if it correlates with its initial hedge more closely than its single contract benchmark correlates with *its* initial delta hedge. This makes sense because the substantial equivalence test is best understood as a proxy for delta in the case of contracts for which delta is difficult or impossible to compute. Delta is a measure of correlation between the value of a derivative and the price of its underlier.[1] As discussed below, a complex contract's simple contract benchmark is a simple contract comparable to the complex contract under review that has a delta of 0.8 (the minimum delta needed for a simple contract to be a specified equity-linked instrument, *i.e.,* a "specified ELI"). In the case of both complex contracts and simple contracts, the Temporary Regulations assume that the issuer of the contract will hedge with an offsetting position in the underlier.[2] Therefore, if a complex contract correlates with its initial hedge to an equal or greater degree than its simple contract analog (*i.e.,* the simple contract benchmark) with a delta of 0.8 does so with its initial hedge, it makes sense to say that the complex contract correlates with the underlier to an equal or greater degree than a contract with a delta of 0.8 does so. This should justify treating the complex contract as if it were a simple contract with a delta of 0.8 or greater.

Defined terms used in the Temporary Regulation are as follows:

- **Equity-Linked Instrument:** An ELI is a financial instrument other than a notional principal contract, a securities lending transaction or a sale-repurchase transaction that references one or more "underlying securities" (as defined).[3]
- **Simple Contract:** A simple contract is a notional principal contract or an ELI for which, with respect to each underlying security, (i) all amounts to be paid or received are calculated with reference to a single, fixed number of shares of the underlying security which may be ascertained when the contract is issued, and (ii) the contract has a single maturity date on or before which the contract may be exercised.[4]
- **Complex Contract:** A complex contract is a notional principal contract or an ELI that is not a simple contract.[5]
- **Simple Contract Benchmark:** The simple contract benchmark is a simple contract that is "closely comparable" to the complex contract under review that, at the time the complex contract is issued, has a delta of 0.8, references the underlying security referenced by the applicable complex contract, and has the same maturity date thereas.[6]
- **Testing Price:** The testing prices are the prices of the underlying security if they increase or decline by one standard deviation.[7] As discussed below, the regulation does not define which time series should be used to calculate the applicable standard deviation.
- **Probability:** The "probability" referred to in the regulation is the probability that the underlying security will increase or decrease by any amount by the maturity date.[8]
- **Initial Hedge:** The "initial hedge" is the hedge entered into by the issuer of the applicable complex contract to hedge its position therein on the date of issue.[9]

In most cases, the test for whether a complex contract is an 871(m) transaction will be performed by the issuer.[10] The process for testing whether a complex contract is substantially equivalent to a simple contract with a delta of 0.8 or more is as follows[11]:

1. The party making the determination (assumed here to be the issuer of the complex contract) decides upon a simple contract benchmark (the "SCB").
2. The issuer determines what its initial hedge of the complex contract will be (the "IH"). From the regulations, it appears that this value is the number of shares that the issuer will purchase or sell short in order to hedge its position in the complex contract. This number will be referred to hereinafter as [N]IH.
3. The issuer determines what the initial delta hedge of the simple contract benchmark would be (the "SCBIH"). From the regulations, it appears that this value is the number of shares that the issuer will purchase or sell short in order to hedge its position in the complex contract. This number will be referred to hereinafter as [N]SCBIH.
4. The issuer determines the testing prices for the underlying security.
5. The issuer determines the probability of whether the price of the underlying security at the maturity of the complex contract will be greater or less than its price at inception. These values will be referred to hereinafter as P+ and P-, respectively.
6. The issuer determines what the value of the complex contract, the initial hedge, the simple contract benchmark and the hedge of the simple contract benchmark would be if price of the underlying security were to be equal to the testing prices at expiration of the complex contract. These values will be referred to hereinafter as given in Table 1.

TABLE 1.

	Price at Contract Inception	Price at Maturity—Underlier Increases 1 SD	Price at Maturity—Underlier Decreases 1 SD
Complex contract	CC_i	CC_t	CC_{-t}
Initial hedge	IH_i	IH_t	IH_{-t}
Simple contract benchmark	SCB_i	SCB_t	SCB_{-t}
Simple contract benchmark initial hedge	$SCBIH_i$	$SCBIH_t$	$SCBIH_{-t}$

7. The issuer then determines the absolute value of the change in value of the respective instruments if the price of the underlying security were to be equal to the testing prices at maturity (*see* Figure 1).
8. The issuer then performs the two calculations in Figure 2 and compares *x* to *y*:

FIGURE 1.

$$\Delta^{+}CC = |(CC_i - CC_t)|$$
$$\Delta^{-}CC = |(CC_i - CC_{-t})|$$
$$\Delta^{+}IH = |(IH_i - IH_t)|$$
$$\Delta^{-}IH = |(IH_i - IH_{-t})|$$
$$\Delta^{+}SCB = |(SCB_i - SCB_t)|$$
$$\Delta^{-}SCB = |(SCB_i - SCB_{-t})|$$
$$\Delta^{+}SCBIH = |(SCBIH_i - SCBIH_t)|$$
$$\Delta^{-}SCBIH = |(SCBIH_i - SCBIH_{-t})|$$

FIGURE 2.

(i) $$\frac{|(\Delta^{+}CC - \Delta^{+}IH)|*P_{+}\ |(\Delta^{-}CC - \Delta^{-}IH)|*P_{-}}{[N]IH} = x$$

(ii) $$\frac{|(\Delta^{+}SCB - \Delta^{+}SCBIH)|*P_{+}\ |(\Delta^{-}SCB - \Delta^{-}SCBIH)|*P_{-}}{[N]SCBIH} = y$$

If $x \leq y$, the complex contract is an 871(m) transaction. As described above, this makes sense because (x) represents the variance (*i.e.,* lack of correlation) between the values of the complex contract and its hedge given a significant change in the price of the underlying securities, and (y) represents the same with respect to the simple contract benchmark. To the extent that x is greater than y, the complex contract should not be treated as a proxy for its underlier.

The foregoing is illustrated by the example in the Temporary Regulations.[12] In the example, an investor purchases an instrument from the issuer thereof for $10,000. Under the terms of the instrument, the investor has a right at maturity to a sum equal to $10,000 *plus* 200 percent of any appreciation in the value of a lot of 100 shares of *X* stock over $100 per share, up to $110 per share, and *minus* 100 percent an amount equal to 100 percent of the depreciation on the value of a lot of 100 shares of *X* stock below $90 per share. Shares of *X* stock are trading at $100 per share on Day 1. On Day 1, the issuer hedges its position by purchasing 64 shares of *X* stock—*i.e.,* [N]IH = 64.

Because the contract does not reference a fixed number of shares, it is a complex contract. In performing the substantial equivalence analysis, the issuer makes the following determinations:

- There is a 52-percent probability that shares of stock *X* will have a price greater than $100 per share on the maturity date of the contract, and a 48-percent chance that they will have a price lower than $100 on that date—*i.e.,* P+ = 0.52, and P– = 0.48.
- The simple contract benchmark is a call option with a strike price of $79 on 100 shares of *X* stock and the same maturity date as the complex contract. If this option were to be issued, it would have a delta of 0.8, and it would have a value of $22. A Day 1 delta hedge of this option would be a long position in 80 shares of *X* stock—*i.e.,* [N]SCBIH = 80.
- Historical volatility of shares of *X* indicates that one standard deviation is approximately $20. Therefore, the testing prices are $79 and $120.[13]

Values of the respective instruments given the applicable testing prices are shown in Figure 3. Given the values in Figure 3, the issuer makes the calculations shown in Figure 4 and plugs them into the formula in Figure 5. Since $7.68 \geq 4.47$, the complex contract is not an 871(m) transaction.

FIGURE 3.

CC_i = $10,000
CC_t = $12,000
CC_{-t} = $8,900
IH_i = $6,400
IH_t = $7,680
IH_{-t} = $5,056
SCB_i = $2,200
SCB_t = $4,105
SCB_{-t} = $105
$SCBIH_i$ = $8,000
$SCBIH_t$ = $9,600
$SCBIH_{-t}$ = $6,320

FIGURE 4.

$\Delta^{+}CC = \|(10{,}000-12{,}000)\|$	= $2,000
$\Delta^{-}CC = \|(10{,}000-8{,}900)\|$	= $1,100
$\Delta^{+}IH = \|(6{,}400-7{,}680)\|$	= $1,280
$\Delta^{-}IH = \|(6{,}400-5{,}056)\|$	= $1,344
$\Delta^{+}SCB = \|(2{,}200-4{,}105)\|$	= $1,905
$\Delta^{-}SCB = \|(2{,}200-105)\|$	= $2,095
$\Delta^{+}SCBIH = \|(8{,}000-9{,}600)\|$	= $1,600
$\Delta^{-}SCBIH = \|(8{,}000-6{,}320)\|$	= $1,680

FIGURE 5.

(i) $$\frac{|(2{,}000-1{,}280)|*.52_{+}\ |(1{,}100-1{,}344)|*.48}{64} = 7.68$$

(ii) $$\frac{|(1{,}905-1{,}600)|*.52\ |(2{,}095-1{,}680)|*.48}{80} = 4.47$$

Problems with the Current Rule

The current rule was criticized almost as soon as the ink was dry.[14] Criticisms fall into three categories: (i) the rules are meaningless as currently drafted; (ii) the rules grant the taxpayer too much discretion; and (iii) simpler alternatives are available. Some of these criticisms could be used to fix the current regulatory framework, while others provide support for replacing it.

a. It Is Meaningless as Currently Drafted

The current Temporary Regulations define the testing prices of a complex contract as the prices of the underlying security if the price of the underlying security at the time the complex contract is issued were alternatively decreased by one standard deviation and increased by one standard.[15] This definition is deficient because it does not specify the applicable time series for the sample from which the standard deviation is to be calculated; without specifying the sample values, the reference to a standard deviation is as meaningful as a reference to "the weight of a gallon." It can be fixed by specifying the time series to be used to gather the sample values used to calculate the applicable standard deviation. As discussed below, the most reasonable way to do this would be to specify the applicable time series as the period of time immediately preceding the issue date of the complex contract equal in length to the period of time from the issue date to the maturity date.

By way of background—the standard deviation of a group of values is the square root of the variance thereof. The variance of the sample is the average of the squared differences of each individual value from the mean. The process for calculating standard deviation is as follows:

1. Find the mean of the sample. This is the arithmetical average of all values in the sample.
2. Subtract the mean from each value in the sample.
3. Square each value computed in step 2.
4. Find the mean (*i.e.,* the arithmetical average) of all of the values computed in step 3. This is the variance,
5. Find the square root of the average computed in step 4. This is the standard deviation.

In a normal probability distribution, there is approximately a 68.2-percent chance that any value will be within one standard deviation of the mean.

This raises the question: What sample should be used to calculate the standard deviation referred to in establishing the testing prices? In looking at prices of financial assets, it is most common to use end-of-period prices within a given time series to calculate standard deviation. For example, 30-day standard deviation in shares of stock XYZ is the square root of the average of the squares of the differences between end-of-day prices in XYZ shares on 30 trading days and the mean of those prices.[16] Sixty-day standard deviation is the same, *mutatis mutandis*. Since the value of a standard deviation is calculated with reference to values within a given sample, the concept is meaningless unless the sample is defined. What time series should be used to construct the sample in this case?

In the instant case, it appears that the government chose to base the definition of testing price on the concept of standard deviation because a movement equal to a standard deviation can be considered big enough to constitute a significant "stress" on the applicable instruments. Because the change that would precipitate such a stress is assumed to occur at the maturity of the complex contract, it would make the most sense for the sample used to calculate the relevant standard deviation to be end-of-day prices in the underlying security over the period of time immediately preceding the date of issue of the complex contract equal in length to the term to maturity of the complex contract. This would allow for the relevant standard deviation to be a true test of the likelihood of variance in price of the underlying security from its Day 1 price as of the maturity date of the complex contract. Allowing the taxpayer to use a different sample to calculate the testing price (*e.g.*, 30-day standard deviation used to calculate testing prices for a complex contract that matures three years from the issue date) would not adequately reflect the scale of a "large" move in the underlying security given the time-depth applicable to the complex contract under scrutiny.

Solution: Keep the concept of a one-standard-deviation stress test, but define "standard deviation" more precisely.

b. It Provides Too Much Discretion to the Taxpayer

Certain concepts used to calculate substantial equivalence leave significant discretion to the taxpayer. Query whether this could give rise to abuse or complications on audit.

i. Probability

As discussed above, one of the variables in the calculation of substantial equivalence is the probability that the price of the underlying securities will be greater or less than the price thereof on the date on which the complex contract under scrutiny is entered into.[17] This grants significant discretion to the taxpayer. Determining the future direction of asset prices is as much an art as it is a science, and traders who have an edge (or who think that they have an edge) in this regard do not share their secret sauce. Traders use many ways to try to predict the future, including technical indicators (*e.g.,* support and resistance, chart patterns, Bollinger bands, stochastics, simple and compound moving averages, Elliot waves, Fibonacci numbers), fundamental measures (*e.g.,* price-to-book ratio, price-to-earnings ratio, price to expected earnings ratio) and extrinsic factors, such as astrological signs and tide patterns. Some of these indicators may be useful (whether asset prices are a truly "random walk" is far outside the scope of the present article); however, in most contexts, most traders have *no way of knowing* whether a security will increase or decrease in value between Time 1 and Time 2, regardless of whether they think that they do, and sophisticated, well-informed investors can disagree about these issues. Because of this, it would be best to replace the "probability" value in the substantial equivalence calculation with a constant value of 50 percent. Use of a constant probability value of 50 percent would, likely, be correct as often as an issuer-produced probability calculation supplied in good faith would be; it would preclude taxpayer manipulation in an area that admits of substantial uncertainty; and, since it would be a constant value, there would be no risk that either the government or the taxpayer would be systematically short-changed.

Solution: replace "probability" with "50 percent."

ii. Simple Contract Benchmark

In the current Temporary Regulations, the simple contract benchmark is a closely comparable simple contract that, at the time the complex contract is issued, has a delta of 0.8, references the underlying security referenced by the applicable complex contract and has the same maturity date as the applicable complex contract.[18] The taxpayer is granted significant flexibility in choosing the simple contract benchmark. The Temporary Regulation states that, depending on the applicable complex contract, the simple contract benchmark might be, "for example, a call option, a put option, or a collar."[19] Because the Temporary Regulation describes the three named types of contracts as "examples" of what could constitute a simple contract benchmark, it appears that a simple contract benchmark can consist of *any* derivative, so long as it (i) references the same underlying security as does the complex contract, (ii) has the same maturity date as the complex contract, (iii) is susceptible to delta calculation, and (iv) has a delta of 0.8. In the example in the Temporary Regulation, the simple contract benchmark is specified as a deep-in-the-money call option with a substantial premium.[20] However, given the terms of the complex contract under scrutiny in the example, it appears that a collar on Stock *X* shares, consisting of a long position in a call on Stock *X* shares and a short position in a put in Stock *X* shares, could also constitute a simple contract benchmark for the applicable complex contract, provided the aggregate position had a delta of 0.8 and an appropriate maturity date; and, even if this were not as good a benchmark as a deep-in-the-month call, it is unlikely that the IRS could challenge this choice successfully on audit.[21] Effectively, this allows the taxpayer to "cherry-pick" the simple contract benchmark that provides it the best result.

Solution: unclear.

c. Simpler Solutions Are Available

i. Disaggregate and Re-Aggregate When Possible

Many complex contracts may be disaggregated into separate components consisting of long or short positions in the underlier, a position in a bond, and/or option positions, and then re-aggregated into one or more simple contracts. Doing this when possible would simplify the rules in the current Temporary Regulation and would allow complex contracts to be evaluated within the framework of rules applicable to simple contracts.

(1) Combined Positions. In order to discuss potential disaggregation of complex contracts, it is necessary first to discuss the current regulations' treatment of combined positions in simple contracts. In order to do that, some background regarding the delta of combined positions is in order.

Generally, delta is a value attributed to option positions by certain option pricing models that reflects the amount by which the value of a given option position should change per unit of change in the instrument underlying the option. For example, if a long position in a call has a delta of 0.85, the value of the call should increase by $0.85 if the price of the underlying instrument increases by $1.00, and the value of the call should decrease by $0.85 if the price of the underlying instrument decreases by $1.00.[22] The delta of a given position may be positive or negative, depending on the kind of option and the "side" (long or short) taken by the taxpayer. An option that references a fixed number of shares will always have a delta with an absolute value between 0 and 1. Deltas approach these limits asymptotically as they move far out of the money or deeply into the money, respectively. Because the value of a call correlates positively with the price of its underlier, long positions in calls have positive deltas; because the value of a put correlates negatively with the price of its underlier, long positions in puts have negative deltas. These values are reversed, in the case of short option positions. Table 2 summarizes the positive and negative delta values of long and short option positions.

For purposes of the following discussion, the quality of being a put or a call will be referred to as an option position's "kind," and the quality of a trader's being long or short an option will be referred to as the position's "side."

TABLE 2. OPTION DELTA VALUES

	Long	Short
Call	+	-
Put	-	+

Delta is additive. In order to determine the exposure of a party to price moves in an underlying asset, it is necessary to aggregate the delta of all of the party's option positions with respect to that asset. This is done by simply adding the deltas of the applicable positions together.

DIAGRAM 1. PROFIT AND LOSS AT EXPIRATION - SHORT PUT

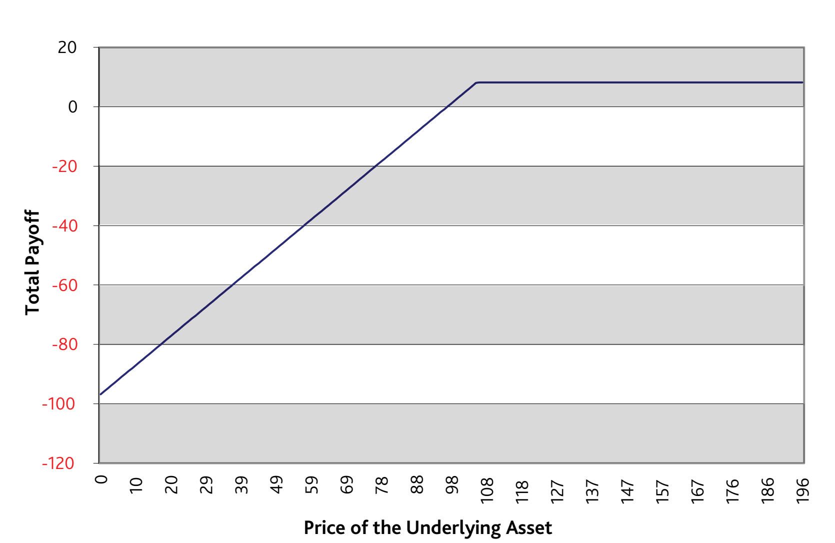
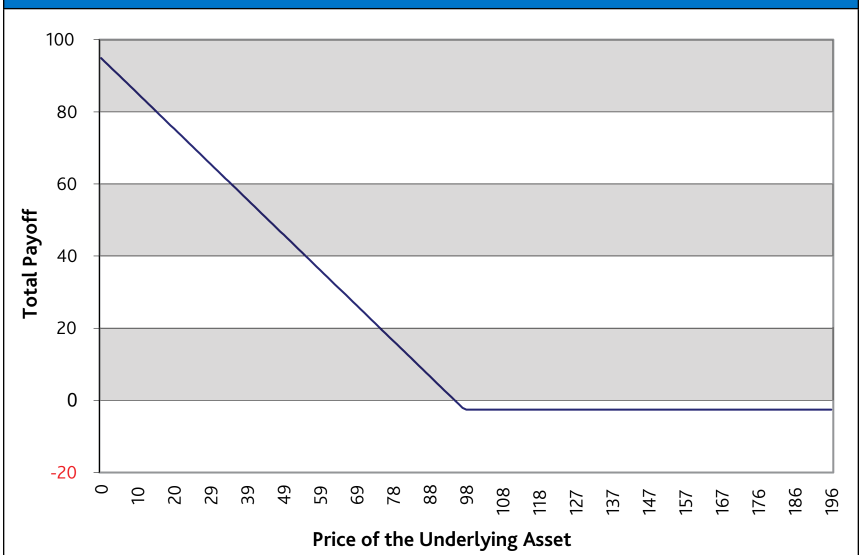


DIAGRAM 2. PROFIT AND LOSS AT EXPIRATION - LONG PUT



The simplest example of this principle is a "vertical spread," *i.e.*, a complex position made up of a long position in either a put or a call with an offsetting short position in a similar option with the same underlier and maturity date, but with a different strike price. Traders enter into vertical spreads either to reduce the cost of gaining exposure to the underlier—or to reduce position delta.

For example—assume that Stock *X* is trading at $98 per share. If a trader were to sell an in-the-money put with a maturity of 31 days and a strike price of $105 for a premium of $8.18, potential profit and loss from that trade at expiration would be as represented in Diagram 1.

Assume that, at the time the trade is entered into, the position has a delta of 0.85. In other words, if the price of Stock *X* increases in price by $1, the value of the short position should increase by $0.85, and if Stock *X* shares *decrease* in price by $1, the value of the short option position should decrease in price by $0.85.

Now, assume that the trader did not want to take on that much risk with respect to the price of shares of Stock *X*. To offset some of this risk, he or she might buy an out-of-the money put on shares of Stock *X* with an equal maturity date to offset some of this risk. If the premium paid for this option would be $2.60, profit and loss at expiration from the second option purchased in isolation would be as represented in Diagram 2.

Assume that Option 2 has a delta of –0.45. If the trader were to enter into both of the two options, gain from Option 2 would offset loss from Option 1 once Option 2's strike price was hit. Profit and loss at expiration from the two options entered into together (the "vertical spread") would be as represented in Diagram 3. Prices and deltas of the two options and the aggregate position are summarized in Table 3, below. As shown in Table 3, the delta of the aggregate position is –0.40, and the premium received to enter the position is $5.58.

Complex positions may also increase aggregate position delta. For example, assume that shares of Stock *X* are trading at $98.65 per share. A call option to purchase 100 shares of Stock *X* at a strike price of $100 with a maturity date of 31 days is trading at $2.00 per share, and a put option to sell 100 shares of Stock *X* with the same maturity date is trading at $3.45 per share. Purchased in isolation, profit and loss at maturity at expiration on a long position in the call would be as represented in Diagram 4. Purchased in isolation, profit and loss at expiration on a short position in the put would be as represented in Diagram 5.

Since the short position in the put loses value as shares of Stock *X* decrease in value, and the long position in the call increases in value in the opposite scenario, if the trader were to combine the two positions, profit and loss at expiration would be the same as outright ownership of shares of Stock *X*, or as a forward contract on the shares. *See* Diagram 6. If we assume that the long call in this example has a delta of 0.45, and the short put has a delta of 0.55, Table 4 summarizes prices and deltas for the aggregate position.

The aggregate position has a delta of 1.0 (*i.e.,* changes in the value of the aggregate position correlate perfectly with changes in the price of shares of Stock *X*).[23]

The current final regulations recognize the foregoing by providing that, when the delta test for 871(m) transaction status is performed, the deltas of multiple positions are to be aggregated and treated as the delta of a single, integrated transaction, provided:

- a person (or a related person within the meaning of Code Sec. 267(b) or 707(b)) is the long party with respect to the underlying security for each potential 871(m) transaction;
- the potential 871(m) transactions reference the same underlying security;
- the potential 871(m) transactions, when combined, replicate the economics of a transaction that would be an 871(m) transaction if the transactions had been entered into as a single transaction; and
- the potential 871(m) transactions are entered into in connection with each other.[24]

DIAGRAM 3. PROFIT AND LOSS AT EXPIRATION - VERTICAL PUT SPREAD

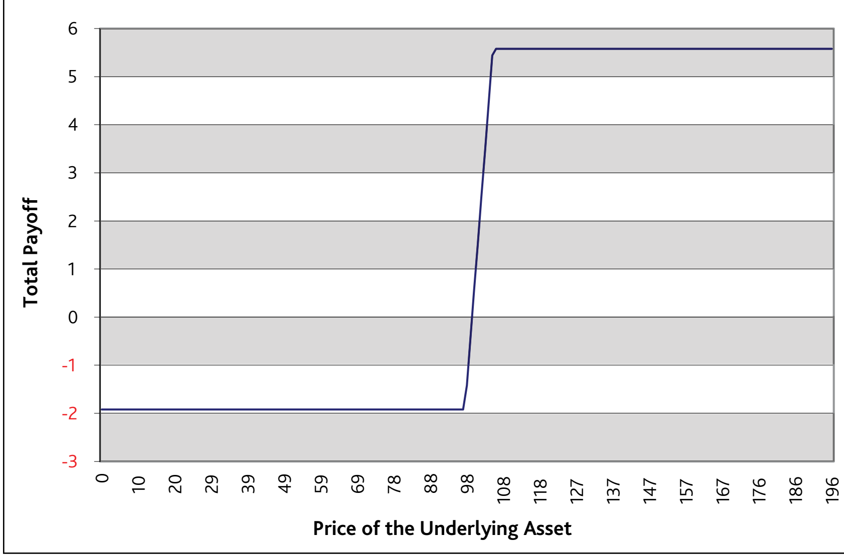


TABLE 3.

	Strike	Kind	Side	Maturity	Premium	Delta
Option 1	$105	Put	Short	31 Days	$8.18	-0.85
Option 2	$97.5	Put	Long	31 Days	($2.60)	0.45
Aggregate				31 Days	$5.58	-0.40

DIAGRAM 4. PROFIT AND LOSS AT EXPIRATION - LONG CALL

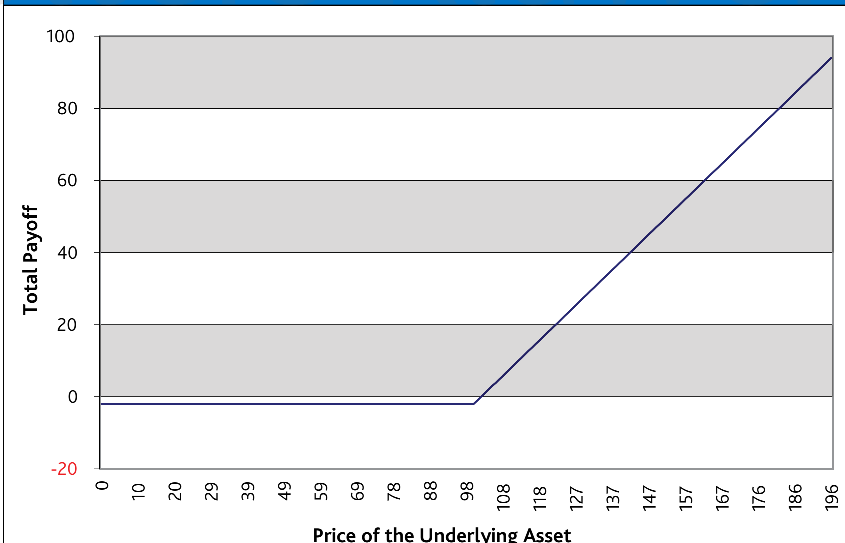


TABLE 4.

	Strike	Kind	Side	Maturity	Premium	Delta
Option 1	$100	Call	Long	31 Days	($2.00)	0.45
Option 2	$100	Put	Short	31 Days	$3.45	0.55
Aggregate				31 Days	$1.45	1.0

DIAGRAM 5. PROFIT AND LOSS AT EXPIRATION - SHORT PUT

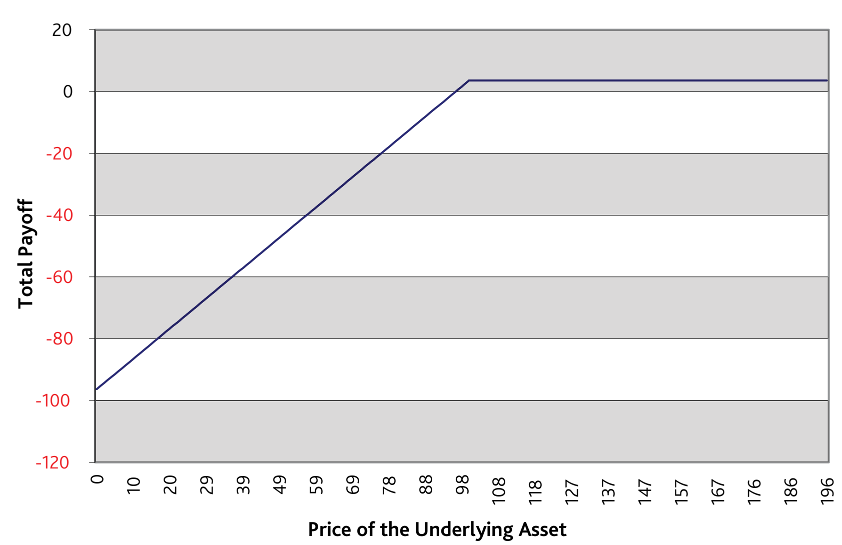
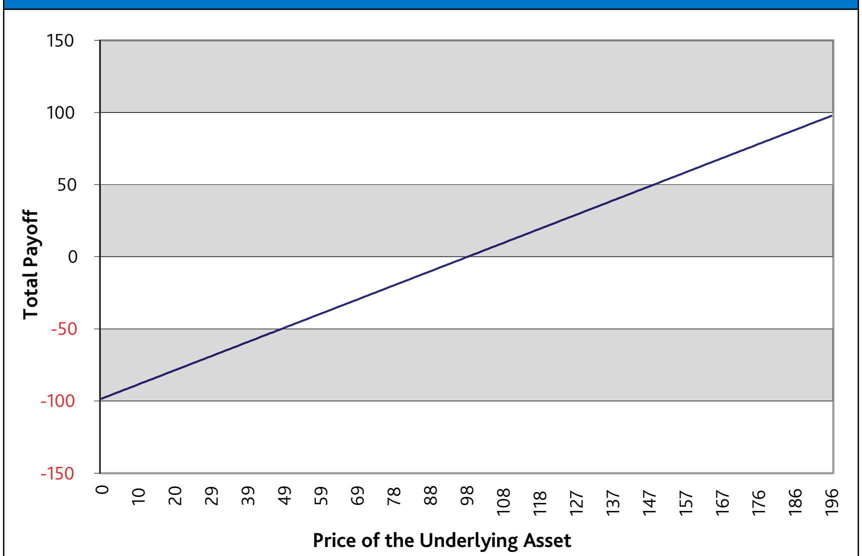


DIAGRAM 6. PROFIT AND LOSS AT EXPIRATION - SYNTHETIC FORWARD



Certain presumptions apply to help the government and the short party determine whether two positions are entered into in connection with each other.[25] No presumptions apply to guide the taxpayer in determining whether transactions are entered into in connection with each other.[26]

Commentators raised questions about how the aggregation rule should be applied when earlier proposed regulations came out.[27] For example, if a taxpayer purchases two calls, each with a delta of 0.5, and each referencing 100 shares of Stock *X*, does he or she hold two options on 100 shares with a delta of 0.5 each, or does he or she have a single option on 100 shares with a delta of 1.0? If a taxpayer owns seven at-the-money calls, each of which references 100 shares of Stock *X*, and sells one at-the-money put that references 100 shares of Stock *X*, does he or she hold a synthetic forward position in 100 shares of Stock *X* and six at-the-money calls in 100 shares of Stock *X*? Although the answers to these questions are intuitive to any trader, "we-know-it-when-we-see-it" is not a good basis for a rule of law.

Current regulations attempt to deal with this issue as follows:

> *Ordering rule for transactions entered into in connection with each other.* If a long party enters into more than two potential Code Sec. 871(m) transactions that could be combined under this paragraph (n), a short party is required to apply paragraph (n)(1) of this section by combining transactions in a manner that results in the most transactions with a delta of 0.8 or higher with respect to the referenced underlying security. Thus, for example, if a taxpayer has sold one at-the-money put and purchased two at-the-money calls, each with respect to 100 shares of the same underlying security, the put and one call are combined. Similarly, a purchased call on 100 shares and a sold put on 200 shares of the same underlying security can be combined for 100 shares with 100 shares of the put remaining separate. The two calls are not combined because they do not provide the long party with economic exposure to depreciation in the underlying security. Similarly, if a long party enters into more than two potential Code Sec. 871(m) transactions that could be combined under this paragraph (n), but have not been combined by a short party, the long party is required to apply paragraph (n)(1) of this section by combining transactions in a manner that results in the most transactions with a delta of 0.8 or higher with respect to the referenced underlying security.[28]

Although this rule aims at the correct result, it appears to either assume the conclusion, to state the rule ambiguously or to state a rule that is not consistent with economic reality.[29] A better process for aggregating option positions is summarized below.

Method for Aggregating Option Positions

1. Collect all option positions that reference the same underlying security and were entered into "in connection with each other" by the same person or by a related group of persons.
2. Determine the largest amount of shares referenced by all of the options (the "largest common notional"). Make a second group of options that only reference this amount. For example, if a taxpayer enters into three options that reference 200, 500 and 900 shares of Stock *X*, respectively, the largest common notional is 200. Accordingly, create a group of three options of the same kind and side as the original group, each of which references 200 shares of Stock *X*. Portions of positions that are carved out from the group under review should be "set aside." They will be reviewed after the first group is reviewed.
3. Identify the option positions in the group produced in Step 2 by kind and side.
4. Pair unlike options with each other. An option position is unlike another option if it differs from the other option position in either kind or side. Any option may be paired with any other option, provided the two are unalike is either or both side or kind.
5. If, after Step 4 is completed, there are more than one option positions of the same side and kind in the group that have not been paired off with an un-like position, remove all but the closest to the money (in the case of out-of-the-money options),or deepest into the money (in the case of in-the-money options) of these "leftovers." The group of options produced by this Step 5 is treated as a single, integrated transaction.
6. Repeat the process with option positions that were eliminated in Steps 2 and 5, until no more positions can be combined.

This is illustrated in Example 1.

Example 1. Taxpayer enters into the following option positions with respect to shares of Stock *X* in connection with each other:

- Short a put on 200 shares of Stock *X* with a strike price of $90;
- Long a put on 100 shares of Stock *X* with a strike price of $100;
- Short a call on 100 shares of Stock *X* with a strike price of $100;
- Long a call on 100 shares of Stock *X* with a strike price of $110; and,
- Long a call on 300 shares of Stock *X* with a strike price of $120.

Stock *X* is trading at a per-share price of $98 when the positions are entered into. Per-share deltas of these five positions at the time of entry into the positions are listed in Table 5.

TABLE 5.

	Kind	Side	Strike	Per-Share Delta
Position 1	Short	Put	$90	0.0931
Position 2	Long	Put	$100	-0.6153
Position 3	Short	Call	$100	-0.3861
Position 4	Long	Call	$110	0.0135
Position 5	Long	Call	$120	0.0001

Using the method described above, the foregoing positions are aggregated as follows:

1. Since all of the positions are entered into by the same taxpayer in connection with each other, and reference the same underlying security, they are all examined.
2. Since the largest notional amount referenced by all of the positions is 100, the largest common notional is 100. Therefore, a group consisting of the following positions is created:
   a. **Position 1** A short put on 100 shares of Stock *X* with a strike price of $90;
   b. **Position 2** A long put on 100 shares of Stock *X* with a strike price of $100;
   c. **Position 3** A short call on 100 shares of Stock *X* with a strike price of $100;
   d. **Position 4** A long call on 100 shares of Stock *X* with a strike price of $110; and,
   e. **Position 5** A long call on 100 shares of Stock *X* with a strike price of $120.

   Further to this, two positions are carved out and "put aside", *i.e.* (i) a long call on 200 shares of Stock *X* with a strike price of $120, and (ii) a short put on 100 shares of Stock *X* with a strike price of $90. These positions will be reviewed after the former group has been reviewed.
3. The five positions in the group identified in Step 2 are identified by side and kind:
   a. **Position 1** Short, Put;
   b. **Position 2** Long, Put;
   c. **Position 3** Short, Call;
   d. **Position 4** Long, Call;
   e. **Position 5** Long, Call.

4. Positions in the group produced in Step 2 are paired with positions of unlike side or kind. It does not matter which positions are paired with which, so long as each position is paired with an unlike position. Since there is an odd number of positions, there will be one nonpaired position.

   One possible set of pairings would be:
   - 1 = 2
   - 3 = 4
   - 5

   Another would be:
   - 1 = 4
   - 2 = 3
   - 5

   The only pairing that would not be allowed would be 4 = 5 because position 4 and position 5 are alike both in kind and in side.
5. In any possible pairing scenario in Step 4, there will never be more than one un-paired position of the same side and kind. Therefore, all of the positions in the group should be aggregated. The graph of the payoff at maturity of the position made up of the five legs in the group is depicted in Diagram 7. Table 6 lists deltas of each individual leg and aggregate delta.

   Since aggregate delta is less than 0.8, the taxpayer should not be treated as the long party with respect to an 871(m) transaction.
6. The process is then repeated for the two positions that were "carved out" in Step 2. Recall that these consist of (i) a long call on 200 shares of Stock *X* with a strike price of $120, and (ii) a short put on 100 shares of Stock *X* with a strike price of $90. Because the largest number of shares referenced by both positions is 100, the largest common notional is 100. Therefore, a group is constructed consisting of (i) a long call on 100 shares of Stock *X* with a strike price of $120, and (ii) a short put on 100 shares of Stock *X* with a strike price of $90, and a long call on 100 shares of Stock *X* with a strike price of $120 is carved out and "put aside."

   Since the long call and the short put are un-alike, and there are no other positions in the applicable group, the two positions would be combined with each other. The graph of the payoff at maturity of the position made up of the two legs of this group is depicted in Diagram 8. Table 7 lists deltas of each individual leg and aggregate delta.

   Since aggregate delta is less than 0.8, the taxpayer should not be treated as the long party on an 817(m) transaction.

   At this point, the only position that has not been aggregated is the long call on 100 shares of Stock *X* with a strike price of $120. Since this has a delta of 0.0001, it is not an 871(m) transaction.

DIAGRAM 7. PROFIT AND LOSS AT EXPIRATION

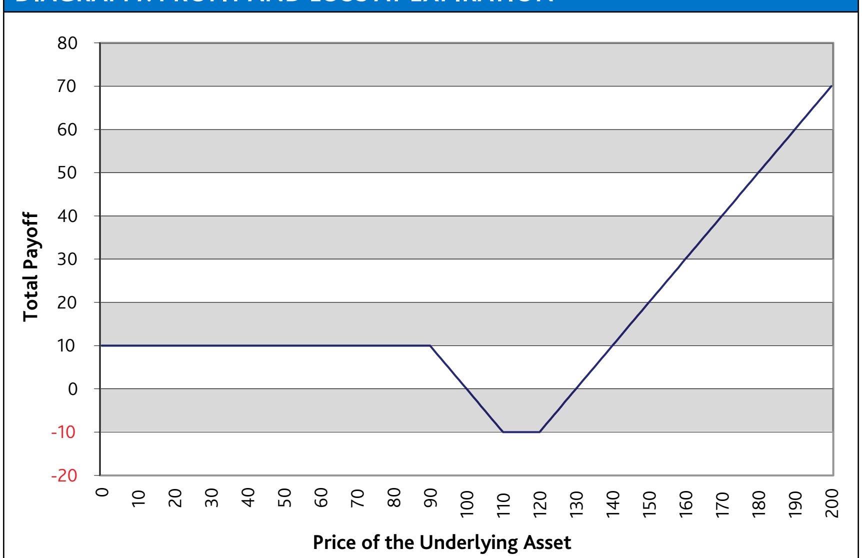


TABLE 6.

	Kind	Side	Strike	Delta
Position 1	Short	Put	$90	0.0931
Position 2	Long	Put	$100	-0.6153
Position 3	Short	Call	$100	-0.3861
Position 4	Long	Call	$110	0.0135
Position 5	Long	Call	$120	0.0001
Aggregate				-0.8947

(a) Netting of Negative Deltas. The foregoing suggested process for integrating positions differs from the aggregation rule in the current final regulations in one crucial respect; the proposed method allows the netting of positions with negative deltas against positions with positive deltas, while the existing rule only allows the aggregation of positions that *increase* total position delta.[30] In the preamble to the current final regulations, Treasury stated that several commentators objected to this rule as it was formulated in previous proposed regulations.[31] However, Treasury stated that they chose to retain the rule because none of the comments to the proposed regulation "proposed an administrable test that could be used to reliably combine long and short positions and

DIAGRAM 8. PROFIT AND LOSS AT EXPIRATION

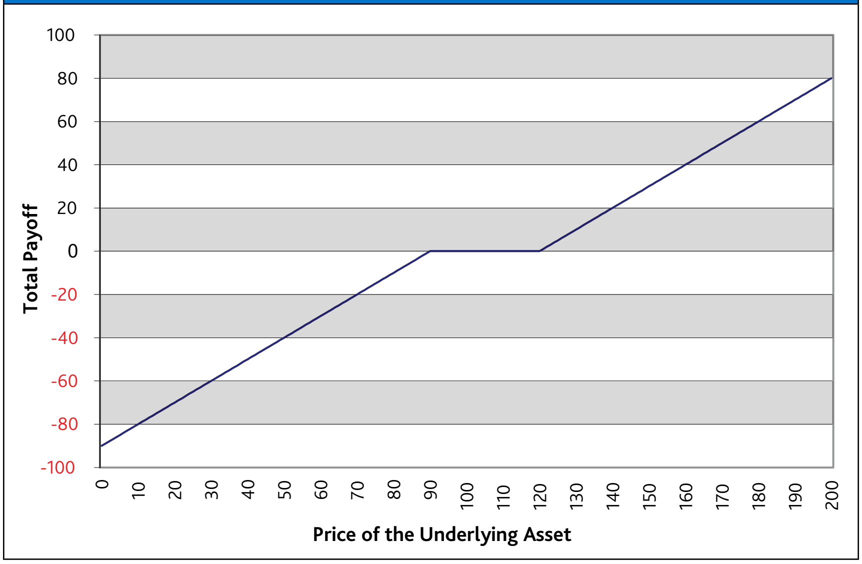
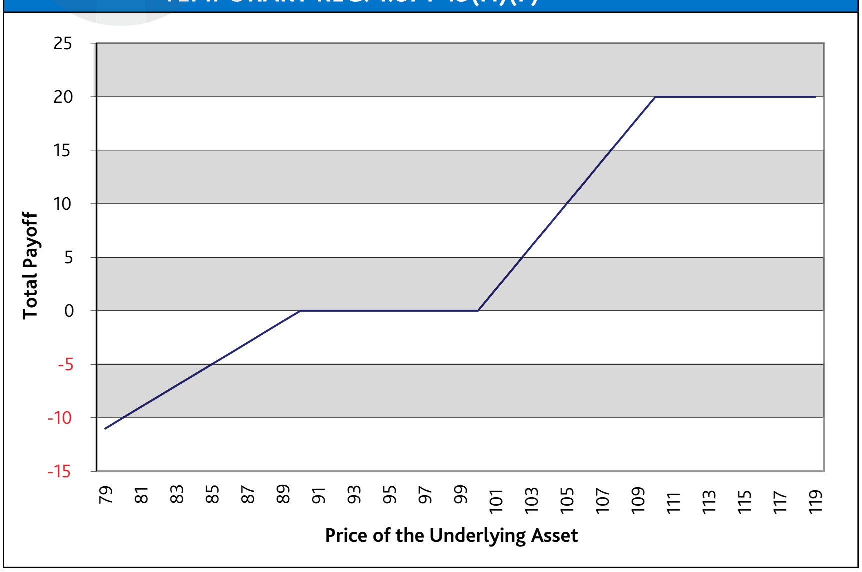


TABLE 7.

	Kind	Side	Strike	Delta
Position 1	Short	Put	$90	0.0931
Position 2	Long	Call	$120	0.0001
Aggregate				0.0932

DIAGRAM 9. TOTAL PAYOFF TEMPORARY REG. 1.871-15(H)(7)



net the resulting deltas."[32] In light of the foregoing discussion, this does not seem to be true. As noted above, delta is additive. Traders with exposure to underlying securities can (and often do) reduce this exposure by entering into negative delta positions. Failure to net negative deltas against positive deltas yields results that are not consistent with economic reality. The process outlined above provides an administrable method for netting positive and negative deltas that is consistent with economic reality. Treasury is encouraged to adopt it when final regulations are promulgated.

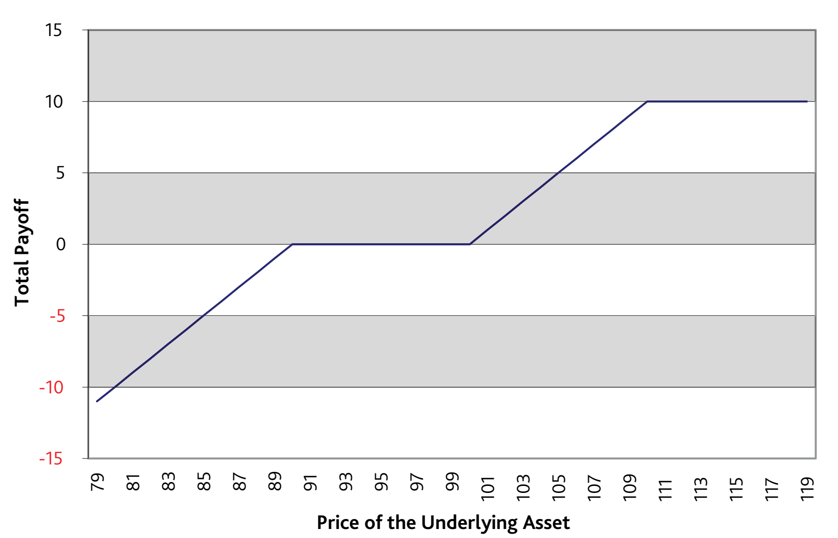
(2) Disaggregate and Re-Aggregate Complex Contracts. The best method for evaluating whether a complex contract constitutes an 871(m) transaction within the framework of the rules applicable to simple contracts is to disaggregate the contract into its component parts, and to then re-aggregate the parts according to the process applicable to combined positions described above. This may not be possible for all transactions that are classified as complex contracts under the existing rules; however, it should be possible for many. The foregoing is illustrated by Example 2.

Example 2. The facts are the same as in the example in the Temporary Regulation. The contract under review references a variable number of shares in Stock *X*. At the time of issue, Stock *X* is trading at $100 per share. At maturity, the holder will receive $10,000, *plus* 200 percent of any increase in the value of 100 shares of Stock *X* above $100 per share up to a maximum of $2,000, in the event that shares of Stock *X* increase in value, *minus* 100 percent of the depreciation in the value of 100 shares of Stock *X* below $90 per share, in the event that shares of Stock *X* decrease in value. Potential pay-offs at maturity on a per-share basis for the contract in the example are represented in Diagram 9.

The entry into the following three individual option positions (the "component positions") would yield the same payoff at maturity:

- Short a put on 100 Stock *X* shares with a strike price of $90;
- Long a call on 200 Stock *X* shares with a strike price of $100; and,
- Short a call on 200 shares of Stock *X* with a strike price of $110.

DIAGRAM 10. TOTAL PAYOFF
THREE-LEGGED COLLAR



Therefore, all three of the options in the group produced in Step 2 are combined.

The payoff diagram for the resulting combined transaction is depicted in Diagram 10. Assume the deltas for the three legs of the trade listed in Table 8.

Aggregate delta for this position would be 0.536. Because this is less than 0.8, this position would not be an 871(m) transaction.

The foregoing process should be repeated for the positions that were "carved out" in Step 2. After the notional amount of the call positions was reduced to find the greatest common notional in Step 2, a long position in a call on 100 shares of Stock *X* with a strike price of $100, and a short position in a call on 100 shares of Stock *X* with a strike price of $110 were "left over." Since these both reference 100 shares, the greatest common notional of this group is $100. Because the two positions are of unalike side, they can be combined with each other. The result is a vertical call spread. The payoff of this position is depicted in Diagram 11. Assuming the same deltas for Call 1 and Call 2, aggregate position delta is 0.4034. Because this is less than 0.8, this, also, would not be an 871(m) transaction. *See* Table 9.

TABLE 8.

	Strike	Side	Per-Share Delta	Notional
Put	$90	Short	0.1326	100
Call 1	$100	Long	0.4606	100
Call 2	$110	Short	-0.0572	100
Total			0.536	100

Because the component positions would yield the same result as the complex contract, the complex contract is disaggregated into the component positions. The component positions are then re-aggregated using the methodology described above:

1. Since the component positions all reference Stock *X*, they are grouped together for Step 1.
2. Since the largest number of shares referenced by all three options is 100, the largest common notional is 100. Therefore, a group consisting of (i) a short position in a put on 100 shares of Stock *X* with a strike price of $90; (ii) a long position in a call on 100 shares of Stock *X* with a strike price of $100; and (iii) a short position in a call on 100 shares of Stock *X* with a strike price of $110 is created.
3. The three positions in the group produced in Step 2 are identified by kind and side: one short put, one long call, one short call.
4. The short put is matched with the long call (or the short call is matched with the long call; or the short put is matched with the short call).
5. After the pairing is done in Step 4, no more than one position of the same side and kind is "left over."

The foregoing is consistent with economic reality; it allows for no taxpayer discretion, and it is simpler than the economic equivalence test in the existing regulations. It also allows taxpayers and the IRS to evaluate the 871(m) transaction status of complex contracts within the framework of the delta rule of the existing Final Regulations.

ii. A Way to Cut the Gordion Knot?

Another alternative to the economic equivalence test would be to compare the complex contract's initial hedge with the probability-weighted notional amount of the complex contract itself. This would be simpler than either the substantial equivalence test outlined in the current Temporary Regulation, or the disaggregation-reintegration method discussed above. It would also be applicable to complex contracts that may not be susceptible to the disaggregation-re-aggregation approach described above.

Using this method, the process for calculating the delta of a complex contract would be as follows:

1. Calculate the notional number of shares to be delivered under each pricing scenario. If a continuously variable number of shares is to be delivered under a given pricing scenario, divide the pricing scenario into smaller "chunks," treat each chunk as a separate pricing scenario and assign the smallest possible number of notional shares to each chunk.
2. Calculate the probability of each pricing scenario. In calculating probability, use the price range and standard deviation reflected by end-of-day prices over the period of time prior to issue equal in length to the term to maturity of the contract. Samples may either be actual historical prices over that period or random prices within the historical price range.
3. Multiply the probability of each pricing scenario by the corresponding number of notional shares.
4. Sum the products produced in Step 3.
5. Divide the number of shares in the issuer's initial hedge by the number produced in Step 4. If the product is equal to or greater than 0.8, the complex contract is an 871(m) transaction.

Reasons for using this method to evaluate complex contracts in lieu of the substantial equivalence method include the following:

- It provides less discretion to the taxpayer. As discussed above, the definition of simple contract benchmark is broad enough to grant the taxpayer significant leeway in choosing the benchmark against which a complex contract is to be measured.
- It is simpler. Instead of comparing two comparisons, this method merely calculates a weighted average and compares it to a real position (*i.e.,* the issuer's Day 1 hedge). New computer systems do not have to be invented to perform these calculations; they can be done on an ordinary Excel spreadsheet.
- Because this method compares the issuer's initial hedge to the weighted average notional number of shares referenced by the complex contract, it essentially treats the initial hedge as though it were a delta hedge. Therefore, instead of discarding the notion of delta in the case of complex contracts, it adapts the test applicable to simple contracts to use with complex contracts.

DIAGRAM 11. TOTAL PAYOFF VERTICAL CALL SPREAD

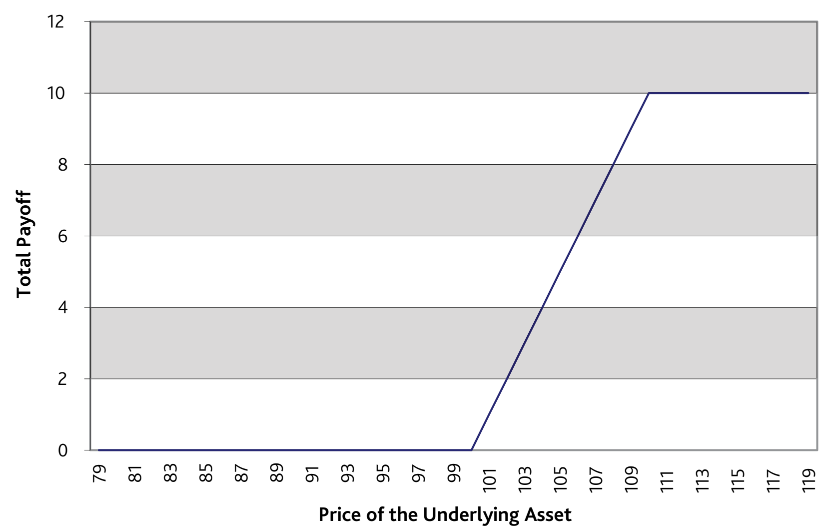


TABLE 9.

	Strike	Side	Per-Share Delta	Notional
Call 1	$100	Long	0.4606	100
Call 2	$110	Short	-0.0572	100
Total			0.4034	100

The method is illustrated in Example 3.

Example 3. The facts are the same as in the example in the Temporary Regulation. The contract under review references a variable number of shares in Stock *X*. At the time of issue, Stock *X* is trading at $100 per share. At maturity, the holder will receive $10,000, *plus* 200 percent of any increase in the value of 100 shares of Stock *X* above $100 per share up to a maximum of $2,000, in the event that shares of Stock *X* increase in value, *minus* 100 percent of the depreciation in the value of 100 shares of Stock *X* below $90 per share, in the event that shares of Stock *X* decrease in value.

First, the number of notional shares associated with each potential pricing scenario is calculated. In the current example, each potential pricing references a continuously variable numbstock price, stock exchanges typically set the ex-dividend dateer of notional shares. For example, if the per-share price of Stock *X* were $95 at maturity, the holder of the contract would receive $10,000, while the holder of 100 shares of Stock *X* would receive $9,500. Therefore, in this case, the contract will reference

TABLE 10.

Share Price	Contract Pay-Out	Shareholder Pay-Out	Notional Shares
$5.00	$1,500.00	$500.00	300.00
$10.00	$2,000.00	$1,000.00	200.00
$15.00	$2,500.00	$1,500.00	166.67
$20.00	$3,000.00	$2,000.00	150.00
$25.00	$3,500.00	$2,500.00	140.00
$30.00	$4,000.00	$3,000.00	133.33
$35.00	$4,500.00	$3,500.00	128.57
$40.00	$5,000.00	$4,000.00	125.00
$45.00	$5,500.00	$4,500.00	122.22
$50.00	$6,000.00	$5,000.00	120.00
$55.00	$6,500.00	$5,500.00	118.18
$60.00	$7,000.00	$6,000.00	116.67
$65.00	$7,500.00	$6,500.00	115.38
$70.00	$8,000.00	$7,000.00	114.29
$75.00	$8,500.00	$7,500.00	113.33
$80.00	$9,000.00	$8,000.00	112.50
$85.00	$9,500.00	$8,500.00	111.76
$90.00	$10,000.00	$9,000.00	111.11
$95.00	$10,000.00	$9,500.00	105.26
$100.00	$10,000.00	$10,000.00	100.00
$105.00	$11,000.00	$10,500.00	104.76
$110.00	$12,000.00	$11,000.00	109.09
$115.00	$12,000.00	$11,500.00	104.35
$120.00	$12,000.00	$12,000.00	100.00
$125.00	$12,000.00	$12,500.00	96.00
$130.00	$12,000.00	$13,000.00	92.31
$135.00	$12,000.00	$13,500.00	88.89
$140.00	$12,000.00	$14,000.00	85.71
$145.00	$12,000.00	$14,500.00	82.76
$150.00	$12,000.00	$15,000.00	80.00
$155.00	$12,000.00	$15,500.00	77.42
$160.00	$12,000.00	$16,000.00	75.00
$165.00	$12,000.00	$16,500.00	72.73
$170.00	$12,000.00	$17,000.00	70.59
$175.00	$12,000.00	$17,500.00	68.57
$180.00	$12,000.00	$18,000.00	66.67
$185.00	$12,000.00	$18,500.00	64.86
$190.00	$12,000.00	$19,000.00	63.16
$195.00	$12,000.00	$19,500.00	61.54
$200.00	$12,000.00	$20,000.00	60.00

TABLE 11.

Range	Probability
0<SP≤$5	0.00 percent
5<SP≤$10	0.00 percent
10<SP≤$15	0.00 percent
$15<SP≤$20	0.00 percent
$20<SP≤$25	0.01 percent
$25<SP≤$30	0.02 percent
$30<SP≤$35	0.05 percent
$35<SP≤$40	0.10 percent
$40<SP≤$45	0.21 percent
$45<SP≤$50	0.41 percent
$50<SP≤$55	0.74 percent
$55<SP≤$60	1.27 percent
$60<SP≤$65	2.04 percent
$65<SP≤$70	3.08 percent
$70<SP≤$75	4.38 percent
$75<SP≤$80	5.84 percent
$80<SP≤$85	7.32 percent
$85<SP≤$90	8.63 percent
$90<SP≤$95	9.55 percent
$95<SP≤$100	9.94 percent
$100<SP≤$105	9.72 percent
$105<SP≤$110	8.93 percent
$110<SP≤$115	7.71 percent
$115<SP≤$120	6.26 percent
$120<SP≤$125	4.77 percent
$125<SP≤$130	3.42 percent
$130<SP≤$135	2.30 percent
$135<SP≤$140	1.46 percent
$140<SP≤$145	0.87 percent
$145<SP≤$150	0.48 percent
$150<SP≤$155	0.25 percent
$155<SP≤$160	0.13 percent
$160<SP≤$165	0.06 percent
$165<SP≤$170	0.03 percent
$170<SP≤$175	0.01 percent
$175<SP≤$180	0.00 percent
$180<SP≤$185	0.00 percent
$185<SP≤$190	0.00 percent
$190<SP≤$195	0.00 percent
$195<SP≤$200	0.00 percent

TABLE 12.

Range	Probability	Notional Shares	Weighted Notional Shares
$0<SP≤$5	0.00 percent	300.00	0.00
$5<SP≤$10	0.00 percent	200.00	0.00
$10<SP≤$15	0.00 percent	166.67	0.00
$15<SP≤$20	0.00 percent	150.00	0.00
$20<SP≤$25	0.01 percent	140.00	0.01
$25<SP≤$30	0.02 percent	133.33	0.03
$30<SP≤$35	0.05 percent	128.57	0.06
$35<SP≤$40	0.10 percent	125.00	0.13
$40<SP≤$45	0.21 percent	122.22	0.26
$45<SP≤$50	0.41 percent	120.00	0.49
$50<SP≤$55	0.74 percent	118.18	0.88
$55<SP≤$60	1.27 percent	116.67	1.48
$60<SP≤$65	2.04 percent	115.38	2.35
$65<SP≤$70	3.08 percent	114.29	3.52
$70<SP≤$75	4.38 percent	113.33	4.96
$75<SP≤$80	5.84 percent	112.50	6.57
$80<SP≤$85	7.32 percent	111.76	8.18
$85<SP≤$90	8.63 percent	111.11	9.59
$90<SP≤$95	9.55 percent	105.26	10.06
$95<SP≤$100	9.94 percent	100.00	9.94
$100<SP≤$105	9.72 percent	104.76	10.18
$105<SP≤$110	8.93 percent	109.09	9.74
$110<SP≤$115	7.71 percent	104.35	8.05
$115<SP≤$120	6.26 percent	100.00	6.26
$120<SP≤$125	4.77 percent	96.00	4.58
$125<SP≤$130	3.42 percent	92.31	3.16
$130<SP≤$135	2.30 percent	88.89	2.05
$135<SP≤$140	1.46 percent	85.71	1.25
$140<SP≤$145	0.87 percent	82.76	0.72
$145<SP≤$150	0.48 percent	80.00	0.39
$150<SP≤$155	0.25 percent	77.42	0.20
$155<SP≤$160	0.13 percent	75.00	0.09
$160<SP≤$165	0.06 percent	72.73	0.04
$165<SP≤$170	0.03 percent	70.59	0.02
$170<SP≤$175	0.01 percent	68.57	0.01
$175<SP≤$180	0.00 percent	66.67	0.00
$180<SP≤$185	0.00 percent	64.86	0.00
$185<SP≤$190	0.00 percent	63.16	0.00
$190<SP≤$195	0.00 percent	61.54	0.00
$195<SP≤$200	0.00 percent	60.00	0.00
Aggregate			105.24

105.26 shares of Stock *X* (*i.e.,* the holder of the contract will receive value equal to the price of 105.26 shares of Stock *X* at maturity). Similarly, if the per-share price of Stock *X* is $115 at maturity, the contract will reference 104.35 shares of Stock *X*, because in that event the holder will receive $12,000, which is equal to the price of 104.35 shares of Stock *X* in that instance. The number of notional shares associated with a given pricing scenario is represented by the equation in Figure 6.

FIGURE 6.

N = (100 SP)/PO * 100

Where:
N = Notional shares
SP = Share Price
PO = Pay Out under the contract.

Assume, further, that historical share prices of Stock*X* indicate that per-share values as of maturity will be between $0 and $200. In order to avoid calculating an infinite number of potential notional share amounts, this range may be broken down into smaller increments. For purposes of the current example, notional share amounts at $5 increments from $5 to $200 are calculated, as shown in Table 10.[33]

Second, the probability of the per-share price of Stock *X* falling within any given $5-increment is calculated. For the current example, a sample made up of 1,000 randomly generated numbers between 0 and 200 and a standard deviation of 20 was used to calculate probabilities. Were this test adopted by the government, applicable regulations should specify whether historical prices should be used, or whether randomly generated numbers within the applicable price range should be used. Probabilities associated with each $5 price range are listed in Table 11.

Third, the probability-weighted notional amounts associated with each $5 range are calculated and summed. This is done in Table 12.

The final step is to divide the number of shares referenced by the issuer's initial hedge by the probability-weighted average notional shares of the contract, and to compare that number with 0.8. As indicated, the probability-weighted average notional number of shares is 105.24. In the example in the Temporary Regulations, the issuer purchases 64 shares of Stock *X* on Day 1 to hedge against changes in the value of its short position in the contract. Because 65/105.24 < 0.8, the contract should not be treated as an 871(m) transaction.

ENDNOTES

1 Generally, delta is a value that measures the rate of change in the value of an option per increase of one (small) unit in the price of the option's underlier. For example, an option with a delta of 0.5 should increase by $0.50 if the value of its underlier increases by $1.00. Code Sec. 871(m) and Reg. §1.871-15(g).

2 To the extent that a contract does not have a delta with an absolute value of 1.0, the hedging party will hedge by either buying or shorting an amount of the underlier that is less than the notional amount of the derivative. In the example in the Temporary Regulation, the issuer of the complex contract initially hedges its position by purchasing 64 shares of the underlying stock, while the issuer of the simple contract benchmark, which is a call option on 100 shares of the same underlier with a delta of 0.8, would hedge its initial delta by purchasing 80 shares of the underlying stock.

3 Reg. §1.871-15(a)(4). An "underlying security" is a security, distributions on which constitute U.S.-source dividends under Reg. §1.861-3. Reg. §1.871-15(a)(15).

4 Reg. §1.871-15(a)(14)(i).

5 Reg. §1.871-15(a)(14)(ii).

6 Temporary Reg. §1.871-15T(h)(2).

7 Temporary Reg. §1.871-15T(h)(4)(iii).

8 Temporary Reg. §1.871-15T(h)(4)(iv).

9 Temporary Reg. §1.871-15T(h)(1).

10 Final regulations provide that, if one party to a transaction is a broker dealer, the broker dealer is required to determine whether the transaction is a potential 871(m) transaction, and, if either both or neither party to a transaction is a broker dealer, the short party is required to make this determination. Reg. §1.871-15(p)(1). If a complex contract is issued by a broker dealer to a retail client, the burden of determining whether the contract is an 871(m) transaction will fall on the issuer.

11 The algorithm for determining substantial equivalence is outlined in Temporary Reg. §1.871-15T(h)(4). The formalism introduced herein is an attempt to clarify the rules contained in the Temporary Regulation.

12 Temporary Reg. §1.871-15T(h)(6).

13 The Temporary Regulation does not indicate why the negative testing price is $21 from the current price and the positive testing price is $20 from the current price. Since each testing price should be the same distance (*i.e.,* one standard deviation) from the current price, it is not clear why the two testing prices differ in this respect. Clarification from the government would be helpful here—for the present example, it is assumed that this is the consequence of rounding.

14 *See, e.g.*, Marie Sapirie, *The Novelty of the Substantial Equivalence Test,* TNT, Oct. 19, 2015, as well as the stunned silence that greeted it at the meeting of the ABA Section of Taxation in Chicago on September 17–19, shortly after the Temporary Regulations were promulgated.

15 Temporary Reg. §1.871-15T(h)(4)(iii).

16 In fact, when traders speak of "30-day standard deviation" or "30-day moving average," they usually refer to 30 calendar-day values, with weekends and holidays omitted.

17 Temporary Reg. §1.871-15T(h)(4)(iv).

18 Temporary Reg. §1.871-15T(h)(2).

19 *Id.*

20 *Id.*

21 As discussed below, delta is additive. Therefore, the delta of a collar consisting of a long position in a call on shares of Stock *X* with a delta of 0.6, and a short position in a put on shares of Stock *X* with a delta of 0.2, will have an aggregate delta of 0.8.

22 Code Sec. 871(m) and Reg. §1.871-15(g). Note that delta is not constant; it changes as other factors, such as time to expiration and distance from or into the money change. *Id.*

23 The trader has been paid an aggregate premium of $1.45 to enter into the position, but this does not indicate a net gain to the trader because the obligation to buy 100 shares of Stock *X*, worth $98.65 per share at inception for $100, imposed by the short position in the put, has a cost of $1.45 per share.

24 Reg. §1.871-15(n)(1). Certain presumptions apply as to whether transactions are entered into "in connection with" each other. Reg. §§1.871-15(n)(3) and 1.871-15(n)(4).

25 Reg. §§1.871-15(n)(3) and 1.871-15(n)(4).

26 *Id.*

27 *See, e.g.*, David Hariton, *Will the New Swap Regs Work to Implement Section 871(m)?,* 2014 TNT 323 (Jan. 20, 2014), commenting on proposed regulations issued on Dec. 5, 2013 (REG-120282-10, 2013-2 CB 837, 78 FR 73128).

28 Reg. §1.871-15(n)(6).

29 The statement that positions should be combined in the way that produces "the most transactions with a delta of 0.8 or higher" assumes that the taxpayer knows how to combine positions in a way that increases delta in the first place. The statement that the two calls in the example should not be combined because they "do not provide the long party with economic exposure to depreciation in the underlying security" may mean that options of the same side and type should not be combined. However, it could also mean that, say, a short put and a long call should not be combined—which is, clearly, the wrong result.

30 Reg. §1.871-15(n)(2).

31 T.D. 9734, Sept. 17, 2015; *See also,* T.D. 9648, Dec. 5, 2013 (proposed regulations containing original aggregation rule).

32 *Id.*

33 Increments start at $5, rather than $0, because, if share price at maturity were $0, the notional share amount would be infinite.