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PUT-CALL PARITY AND THE LAW

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Things are seldom what they seem;
Skim milk masquerades as cream.
William S. Gilbert
H.M.S. Pinafore

The above couplet from one of Gilbert and Sullivan's most enduring operettas, H.M.S. Pinafore, illustrates a common literary theme, the conflict between appearance and reality. That conflict also frequently arises in the law where it is usually cast as one between substance and form. It arises because

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2 In the operetta, the captain of H.M.S. Pinafore will not allow himself to fall in love with a bumboat woman nor allow his daughter, who is already deeply in love, to marry one of the ship's seamen because of his family's apparent high social rank. It is, however, later discovered that the captain and the seaman were switched at birth, so it is the seaman and not the captain that is of high rank. Social rank no longer a bar, the two couples marry. GILBERT & SULLIVAN, supra note 1, at 11-81.

3 P. ATIYAH & R. SUMMERS, FORM AND SUBSTANCE IN ANGLO-AMERICAN LAW: A COMPARATIVE STUDY IN LEGAL REASONING, LEGAL THEORY AND LEGAL INSTITUTIONS 261-66 (1987). Courts frequently rely on the doctrine that substance prevails over form to justify a holding. E.g., Gregory v. Helvering, 293 U.S. 465, 470 (1934) (holding that a 'reorganization' brought about to transfer stock held by a corporation in a second corporation was a taxable dividend because to treat the transaction as a nontaxable reorganization would be “to exalt artifice above reality”); Comm. v. Court Holding, 324 U.S. 331, 345 (1945) (holding that what was formally a sale by taxpayers of property conveyed to them by the corporation was a sale of that property by the corporation in a liquidating dividend on the grounds that “[t]o permit the true nature of a transaction to
legal rules are almost always written using concepts from everyday experience. Thus, for example, usury rules restrict the interest that a borrower can pay to a lender and the income tax requires the seller of common stock to pay tax on any capital gain when the stock is sold. In recent years, financial innovators have recognized that cash flows can be disaggregated and rebundled in almost limitless combination. Viewed from the perspective of the modern financial engineer, there is nothing fundamental and immutable about the classic financial contracts (e.g., a loan) and transactions (e.g., a sale) that have been around for centuries. The cash flow streams these contracts and transactions represent can easily be repackaged to create "hybrids", which do not have the cash flow of any single existing contract or recognized transaction, or "synthetics", which have a cash flow identical to that of an existing contract or recognized transaction without using the contract itself or engaging in the transaction directly.

Not surprisingly, financial engineering has created nightmares for regulators and tax authorities. In order to provide guidance to taxpayers and those subject to regulations, rules are promulgated that are intended to be stable and to cover most cases. As a result, tax and regulatory authorities are forced to work within existing categories and to fit new innovations into those categories. The tax and regulatory treatment of traditional financial contracts and transactions are well established. They are also often inconsistent.

The pressure that financial innovation has placed on tax and regulatory authorities is not incidental.

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4 See discussion in parts II.A. and II.B.2., infra.


6 Smith & Smithson, supra note 5, at 3.


8 Gegen, supra note 7, at 833 n.1.

The inconsistencies in the tax and regulatory regimes is one of the major impetuses for financial innovation.\textsuperscript{10} Indeed, it might even be the primary such impetus.\textsuperscript{11} There is a strong incentive for financial innovators to disaggregate and rebundle cash flows in order to avoid prohibited or disadvantaged transactions.\textsuperscript{12} When this occurs the innovator can charge a premium for its product, at least until others catch on, that reflects the saving. Such innovations are commonly referred to as tax or regulatory arbitrage.

The basis for much of this arbitrage is the put-call parity theorem. The theorem states that given any three of the four following financial instruments--a riskless zero-coupon bond, a share of stock, a call option on the stock and a put option on the stock--the fourth instrument can be replicated.\textsuperscript{13} Thus, the theorem implies that any financial position containing these assets can be constructed in at least two different ways. Its legal significance arises when economically equivalent holdings receive different legal treatments simply because they are constructed from different instruments. If this happens, the legal system is inconsistent, some cash flow patterns correspond to more than a single legal treatment, form takes precedence over substance, and regulatory arbitrage is possible.

Regulatory arbitrage that exploits legal inconsistencies is appropriately a concern of those who draft and enforce the laws. That is because such arbitrage creates both inefficiency and unfairness. It is inefficient because it wastes resources. The additional cost that parties incur contracting around the less favorable treatment could be eliminated by changing the rule. Legal inconsistency produces unfairness because the less wealthy and less sophisticated are often unable to avail themselves of the arbitrage and so they alone are left paying the higher regulatory cost.

This Essay shows how the put-call parity theorem has been used to evade a wide range of rules by synthesizing a contract or transaction that is identical in substance to either a prohibited or disadvantaged one, but which differs from it in form. Some of these techniques still work; others no longer do because the authorities have recognized the equivalence and have taken steps to treat the two alternatives in the same way. However, before applying the put-call parity theorem to legal issues, it is stated and proved in the next section.

\section*{I. The Put-Call Parity Theorem}

\textsuperscript{10} Clifford Smith and Charles Smithson provide four rationales for financial innovation: tax and regulatory arbitrage; classic arbitrage; reducing the expected costs of financial distress; and increasing the corporation's debt capacity. Smith & Smithson, \textit{supra} note 5, at 10-12.


\textsuperscript{12} I use the terms evasion and avoidance synonymously. Specifically, I do not make the distinction, well-known in the tax law, between permissible planning (avoidance) and impermissible planning (evasion).

\textsuperscript{13} \textit{See} discussion of put-call parity theorem in Part I, \textit{infra}.
The first step in illustrating the put-call parity theorem is to define the financial instruments that are its constituents. There are four such instruments. However, there are eight positions with respect to these instruments because each instrument can be held either long or short.

A. The Basic Instruments

In finance, it is common to use position or payoff diagrams to study portfolios containing options. The vertical axis in the position diagram represents the value of the position at maturity, which is the amount in dollars the investor will receive (or pay) from liquidating the position. The horizontal axis gives the price of a given asset (usually common stock) at the same date. Thus, the position diagram represents the value of the position as a function of the value of a given asset at the same date.14

1. Underlying Stock

The position diagram for a portfolio consisting of 1 share of Yahoo! is drawn in Figure 1. The value of the portfolio on any date, say March 1, 2003, is just equal to the price of one share of Yahoo! on that date. Thus, the position line is the bold line drawn from the origin at 45 degrees.

![Figure 1--Stock](image)

14 See RICHARD BREALEY & STEWART MYERS, PRINCIPLES OF CORPORATE FINANCE 586 (6th ed. 2000). If the diagram takes into account what the investor paid to obtain the position, it is called a profit diagram. Zvi BODIE, ALEX KANE & ALAN MARCUS, INVESTMENTS 555-58 (1989). For general discussions of profit diagrams, see JOHN COX & MARK RUBINSTEIN, OPTION MARKETS 5-23 (1985); ROBERT JARROW & ANDREW RUDD, OPTION PRICING 22-33 (1983).
share of Yahoo!. An investor shorts a stock by borrowing a share from another investor or a broker and selling that share in the market. The investor, who now holds cash, is obligated to return one share of Yahoo! to the lender at a later date. The investor closes out the short position by purchasing one share of Yahoo! and tendering it to the lending party.\textsuperscript{15}

An investor who shorts a stock is betting that the stock will go down. If the price of the stock falls between the time the short position is opened and closed, the investor's gain (ignoring the time value of money) is the difference between the price when the transaction was opened and when it was closed. If the stock price rises, the difference is the investor's loss.

Regardless of whether the investment produces a gain or loss, the investor will have to pay something to the lender when the transaction is closed, unless the stock is worthless. Accordingly, the position value is negative for all positive stock prices, as indicated in Figure 2. The position of shorting one share of Yahoo! is given by the bold line sloping down at 45 degrees because the investor is $1 out-of-pocket for each $1 of the share price.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{short_stock.png}
\caption{Short Stock}
\end{figure}

A quick comparison of Figures 1 and 2 reveals that Figure 2 is just the mirror image of Figure 1 about the horizontal (stock price) axis. This relationship, that the long position and short position are mirror images about the horizontal axis, holds for all four instruments. This is because the holder of the long position receives what the holder of the short positions pays.

\section*{2. Zero-Coupon Bond}

The second instrument is a riskless zero-coupon bond. The periodic interest payment on a bond is called the coupon. Accordingly, a zero-coupon bond is one on which interest is not paid periodically,

\textsuperscript{15} The investor must also compensate the lender for the dividends that were paid on the stock in the interim. To simplify the discussion dividends are ignored.
but only at maturity along with repayment of principal.\textsuperscript{16}

Consider a zero-coupon bond that will pay $100 on March 1, 2003. The investor who holds the bond will receive $100 on that date regardless of the price of any stock on that date, including Yahoo!. Figure 3 is the position diagram for an investor who holds such a bond. The bold line is horizontal at $100 because the payment is invariant with respect to the price of Yahoo! on that date.

\textbf{Figure 3}--Lending Transaction (Purchase Bond)

The transaction depicted in Figure 3 is a lending transaction. The opposite of lending is borrowing. Figure 4 is the position diagram for a borrowing transaction. The investor is borrowing money today and must pay $100 on March 1, 2003. Since the obligation is $100 regardless of the price of Yahoo! on that date, the bold payoff line is horizontal at minus $100.

\textsuperscript{16} For many years, bonds were issued in bearer form with coupons attached. When an interest payment was due, the holder would clip the appropriate coupon and send it to the issuer’s bank for payment. The periodic interest payment, thus, came to be called the coupon. Bearer bonds were an effective means of tax avoidance because the authorities could not track the payment. Accordingly, in 1982 Congress added Section 163(f) to the Internal Revenue Code, which denies issuers an interest deduction for bonds in bearer form. Tax Equity and Fiscal Responsibility Act of 1982, Pub. L. No. 97-248, sec. 310(b)(2), 96 Stat. 596 (1982), approved Sept. 3, 1982. As a result, corporate bonds are issued in registered form with the periodic interest sent to the registered owner along with IRS Form 1099, a copy of which is also sent to the government.
3. Call Option

Puts and calls are derivative instruments. A derivative does not exist independently, but only in relation to an underlying asset, and its payoff is related to the price of the underlying asset. In this example, the underlying asset is one share of Yahoo!

One of the simplest derivative instruments is a call option. A call option gives its holder the right to buy a fixed number of units of the underlying asset at a fixed price on or before a given date. The holder of a call option has the right to make the purchase, but is not obligated to do so.

Options have their own terminology. Purchasing the underlying asset through the call option is exercising the call. The fixed price is the exercise price or the strike price, and the given date is the maturity or expiration date. The individual who issues the call is the seller or writer, and the individual who purchases it is the buyer or holder. The market price of the call is the premium or the call price. Options can be divided into American and European options. An American option can be exercised

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18 COX & RUBINSTEIN, supra note 14, at 1; BREALEY & MYERS, supra note 14, at 586; STEPHEN ROSS, RANDOLPH WESTERFIELD & JEFFREY JAFFE, CORPORATE FINANCE 547 (5th ed. 1999).

19 COX & RUBINSTEIN, supra note 14, at 1; ROSS, WESTERFIELD & JAFFE, supra note 18, at 546.

20 COX & RUBINSTEIN, supra note 14, at 1; ROSS, WESTERFIELD & JAFFE, supra note 18, at 546.

21 COX & RUBINSTEIN, supra note 14, at 1; ROSS, WESTERFIELD & JAFFE, supra note 18, at 547, n.2.

22 COX & RUBINSTEIN, supra note 14, at 1.
anytime up to the expiration date; a European option can only be exercised on the expiration date.\textsuperscript{23} The basic put-call parity theorem illustrated here is strictly true only for European options. There is a slightly different version for American options.

Options are widespread. In theory, an option can be written on any asset that can be bought or sold. In practice, there are limits, but not many. For example, options are commonly written on real estate and businesses.\textsuperscript{24} Options can even be implicit, such as the option to develop a proven oil reserve or to produce a sequel to a hit movie.\textsuperscript{25} Although options and assets with option characteristics are ubiquitous, the most familiar options are written on common stocks. In this section, the discussion will focus on options on common stocks, and principally on those options traded on organized exchanges.

Consider a call on Yahoo! that gives the holder the right to buy one share of Yahoo! from the writer for $100 on March 1, 2003.\textsuperscript{26} Since the holder is not obligated to make the purchase, the holder should permit the option to lapse unexercised if the price of Yahoo! on March 1, 2003, is less than $100. If the price of Yahoo! is less than $100, the holder can buy a share of Yahoo! for less on the open market than by exercising the option. In this case, the option is said to expire out-of-the-money.\textsuperscript{27} On the other hand, if the price of Yahoo! at maturity is above $100, the holder should exercise the option and the option is said to expire in-the-money.\textsuperscript{28} For example, if Yahoo! is selling at $120, the holder can make a $20 profit by exercising the option, the difference between the stock price and the exercise price. Thus, the value of a call option at maturity is zero if the stock price is at or below the exercise price ($100) and it increases $1 for every dollar that the stock price increases.\textsuperscript{29} This is indicated in Figure 5.

\textsuperscript{23} BREALEY & MYERS, supra note 14, at 586; ROSS, WESTERFIELD & JAFFE, supra note 18, at 546. The put-call parity theorem described here does not hold for American options because the holder might exercise an option early.

\textsuperscript{24} Roche Holdings, Ltd., a Swiss drug company, acquired 60 percent of Genetech and an option to purchase the remaining 40 percent. Genetech to Use Some of Roche Funds for Research, REUTERS, June 8, 1990, available in LEXIS, Nexis Library, Finrep File.

\textsuperscript{25} Such options, called real options, have recently become an important field of study. E.g., AVINASH K. DIXIT & ROBERT S. PINDYCK, INVESTMENT UNDER UNCERTAINTY (1994); LENOS TRIGEORISIS, REAL OPTIONS (1996); MARTHA AMRAN & NALIN KULATILAKA, REAL OPTIONS (1999); TOM COPELAND & VLADIMIR ANTIKAROV, REAL OPTIONS (2001).

\textsuperscript{26} Exchange-traded call options give the holder the right to buy 100 shares of the underlying asset. To simplify the discussion, put and call contracts will be assumed to be written on only one share each.

\textsuperscript{27} ROSS, WESTERFIELD & JAFFE, supra note 18, at 547.

\textsuperscript{28} ROSS, WESTERFIELD & JAFFE, supra note 18, at 547.

\textsuperscript{29} Mathematically, the payoff on the call option at maturity is max (S-100,0), where S is the stock price at maturity.
The writer of the call option pays what the option holder receives.\textsuperscript{30} Assuming that the holder follows the value-maximizing exercise strategy described above, the writer's position value is zero for stock prices at maturity below the exercise price and it decreases $1 for every dollar that the stock price increases. This is described in Figure 6. The writer of a call option promises to deliver the underlying asset to the option holder if the holder exercises the call. Thus, in contrast to the holder, the writer does not have the option of performing, but is obligated to perform if the holder exercises the call.

\textsuperscript{30} This ignores transactions costs, including brokerage fees.
In effect, the writer of a call option is betting that the stock price will not rise above the exercise price. Since the writer at best receives nothing at maturity and might have to pay the holder, writing a call is a losing proposition (and holding one is a winning proposition). Consequently, if calls were free, everyone would want to hold them and no one would be willing to write them. Accordingly, in order to induce investors to write calls, holders pay writers a premium when the transaction is undertaken.\textsuperscript{31}

4. Put Option

The last instrument in the put-call parity theorem is the put option. A put option gives its holder the right, but not the obligation, to sell the underlying share of stock to the writer in exchange for the exercise price. Thus, a $100 put option on Yahoo! expiring on March 1, 2003, gives the holder the right but not the obligation to sell one share of Yahoo! to the writer for $100. Obviously, that right should be exercised only if the share price of Yahoo! is below $100. It, therefore, follows that the position value from holding the $100 Yahoo! put at maturity is $0 if the price of Yahoo! is at or above $100 at maturity and it is $1 for every dollar that the price of Yahoo! is below $100.\textsuperscript{32} The position diagram for the holder of the put option at maturity is given in Figure 7.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{Figure7.png}
\caption{Put Option}
\end{figure}

\textsuperscript{31} Options are settled by delivery. That is, a call option is settled by tendering the strike price and receiving the underlying security. To avoid the additional brokerage costs of the transaction in the underlying security, exchange-traded options can also be settled by closing out the position. In the case of a held call, this is done by writing the identical call and then tendering the held and written calls to the exchange and having the exchange cancel the transaction. The payoff from exercising the original call comes from writing the later call. Similarly, the loss from a written call is realized by purchasing the identical call. The same principle applies to puts. \textsc{William A. Klein & John C. Coffee}, \textit{Business Organization and Finance} 286 (7th ed. 2000).

\textsuperscript{32} Mathematically, the payoff on the put option at maturity can be written as $\max(100-S,0)$. 

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The writer of the put option is out-of-pocket what the holder receives. Thus, assuming the holder follows the value-maximizing exercise policy, the value of the writer's position is zero if the price of Yahoo! is at or above $100 at maturity and it falls by $1 for each dollar that the price is below $100. The position diagram for the writer of such a put at maturity is drawn in Figure 8.

The put-call parity theorem states that the payoff from a portfolio consisting of one share of the underlying stock and the right to sell that share (at date T for exercise price E) is equivalent to a portfolio consisting of a riskless zero-coupon bond (that pays E at date T) and the right to buy one share of the underlying stock (at date T for exercise price E). Therefore, because the payoffs at maturity from the two portfolios are equal, the value of the two portfolios at any date prior to maturity must be equal.

Using the convention that a subscript T indicates the payoff from holding an instrument at maturity and allowing S to denote the underlying stock, P a (European) put on that stock and C a (European) call, with both the put and the call having expiration date T and exercise price E, and E a riskless zero-coupon bond that pays E at date T, then at maturity, the put-call parity theorem implies that the payoffs from the four securities at maturity have the following relationship:

\[ E - C_T = S_T - P_T. \]  \hfill (1)

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33 More formal proofs of the put-call parity theorem are provided by Cox & Rubinstein, supra note 14, at 39-44 and Jarrow & Rudd, supra note 14, at 47-56, 69-79. Informal proofs along the lines described below are given by Bodie, Kane & Marcus, supra note 14, at 564-66; Ross, Westerfield & Jaffe, supra note 18, at 552-54.
Letting \( PV(E) \) denote the market price of a bond that will pay \( E \) at date \( T \),\(^{34}\) the claim that the market price of the two portfolios is equal at any date prior to maturity can be written as follows:

\[
PV(E) \% C - S \% P
\]

where \( S \) is the market price of the stock and \( P \) and \( C \) are the current premiums on the put and call.

There are several possible ways to demonstrate the put-call parity theorem. The method most consistent with intuition is to describe the bond in terms of the three remaining instruments. The convention with financial instruments is that a plus sign (+) indicates that the instrument is held and a minus sign (−) indicates that it is sold short in the case of the underlying stock, borrowed in the case of the bond, or written in the case of the put or call. Thus, subtracting \( C \) from both sides, Equation 2 can be rewritten as:

\[
PV(E) \% S \% P \& C
\]

Equation 3 states that the zero-coupon bond that pays \( E \) at date \( T \) is equivalent to a portfolio consisting of stock plus a put on the stock and a call written on the stock, with the put and call sharing the same exercise price \( (E) \) and maturity date \( (T) \). The intuition behind the put-call parity theorem is easily demonstrated using a bond that pays $100 on March 1, 2003, one share of Yahoo!, a put that gives the holder the right to sell one share of Yahoo! to the writer for $100 on March 1, 2003, and a call that gives the holder the right to purchase one share of Yahoo! from the writer for $100 on March 1, 2003.

A portfolio consisting of one share of Yahoo!, the held put and the written call will pay $100 on March 1, 2003, regardless of the price of Yahoo! on that date. If Yahoo! is selling for less than $100, the written call will expire worthless. The stock and the put will together be worth $100 because the put can be used to sell the stock for $100.\(^{35}\) Alternatively, if Yahoo! is selling for more than $100, the put expires worthless and the stock and the written call are worth $100 because the holder of the call will buy the stock from the writer for $100.\(^{36}\) Finally, if the stock is worth exactly $100, the put and call both expire worthless, so the portfolio is again worth $100. Therefore, whatever the price of Yahoo! on March 1, 2003, the portfolio will be worth exactly $100.

Of course, the financial instrument that pays $100 on March 1, 2003, regardless of the price of

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\(^{34}\) \( PV(E) \) is the present value of \( E \) to be received at time \( T \).

\(^{35}\) In terms of our notation, if \( S_T < 100 \), then \( S_T + P_T = 100 \). This is because \( P_T = 100 - S_T \), when \( S_T > 100 \). Thus, if the price of Yahoo! on March 1, 2003, is below $100 a share, say $80, the share of stock can be sold for $80 and the put can be closed out netting the investor $20, so the portfolio is worth $100. For any other price of Yahoo! below $100, the portfolio is still worth $100 because any decline in the price of the stock is exactly offset by an increase in the value of the put.

\(^{36}\) Again using our notation, if \( S_T > 100 \), then \( S_T - C_T = 100 \), because \( -C_T = 100 - S_T \), when \( S_T > 100 \). Thus, if the price of Yahoo! on March 1, 2003 is above $100, say $120, then the stock is worth $120, but the written call will cost the investor $20 to close out. For any other price of Yahoo! above $100, the portfolio is still worth $100 because any increase in the price of the stock is exactly offset by the loss on the written call.
Yahoo! is a $100 zero-coupon bond maturing on that date. It follows, therefore, as is also demonstrated graphically in Figure 9, that the payoff on a portfolio consisting of one share of Yahoo! (tight dotted line), one held put on Yahoo! (spread out dotted line), and one written call on Yahoo! (dashed line), with the put and the call both having a $100 exercise price and maturing on March 1, 2003, is equivalent to the payoff on a $100 zero-coupon bond maturing on March 1, 2003 (bold solid line). The intuition is straightforward. The stock and the held put together guarantee that the investor will not receive less than $100 on March 1, 2003, and the stock and written call together imply that the investor will not receive more than $100.

![Figure 9--Put-Call Parity Theorem](image)

The analysis has so far shown that the put-call parity theorem holds at maturity.\(^{37}\) The theorem

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\(^{37}\) Variations of the put-call parity theorem apply when the stock pays dividends, interest rates vary, and American options replace European options. They are more complex, less intuitive and often contain inequalities.
must also hold before maturity because the no-arbitrage condition will ensure that the price of the zero-coupon bond on any date before maturity must equal the cost of assembling the portfolio on that same date.\textsuperscript{38}

II. Legal Applications

This section describes several applications of the put-call parity theorem. These applications, which illustrate how the theorem has been used to circumvent various legal rules, fall into two groups. The first group involve taking positions that if taken directly would be legally disadvantaged and the second involve engaging in transactions that if done directly would be legally disadvantaged.

A. Evading Usury: Loans With Title Transfers

\textsuperscript{38} If the no-arbitrage condition was violated, it would be possible for investors to make a certain profit with no investment by shorting the more expensive side of the transaction and investing the proceeds in the less expensive side. Such an arbitrager could pocket the difference today and be confident because of put-call parity that the proceeds from the held portfolio can be used at maturity to satisfy the obligation on the short portfolio. Arbitragers would obviously want to increase their arbitrage and because the position requires no net investment the amount of arbitrage is potentially unlimited. As a result, it is widely recognized in finance and economics that a necessary condition for equilibrium is that arbitrage, the simultaneous purchase and sale of the same security (or of an economically equivalent security) at different prices, not be possible. \textsc{Andrei Shleifer}, \textsc{Inefficient Markets: An Introduction to Behavioral Finance} 3 (2000). The notion is that if the portfolio is cheaper than the bond, an investor can make unlimited arbitrage profits by borrowing (shorting the bond) to purchase the portfolio, and conversely. Assume on March 1, 2002, the market price of Yahoo! is $80, the put premium is $25 and the call premium is $15. The cost to the investor of purchasing the stock and the put is $105 and the investor receives $15 for writing the call. Thus, the cost of assembling the portfolio is $90. If the price of the bond on March 1, 2002, is above $90, say $92, arbitrage is possible: the investor can short the bond (borrow) receiving $92 and take $90 to assemble the portfolio. The investor will pocket $2. On March 1, 2003, she will get $100 for her portfolio, which will be just enough to pay principal and interest on the money borrowed. The investor, thus, makes $2 on no investment. The investor and many others would like to do as much of this arbitrage as possible. Thus, the price of the bond on March 1, 2002, cannot be above $90. Similarly, if the price of the bond on March 1, 2002, is below $90, say $88, the investor can make an arbitrage profit by shorting the portfolio and purchasing the bond. The investor shorts the portfolio consisting of one share of Yahoo!, the put on Yahoo! and the written call on Yahoo! by shorting the share, writing the put and purchasing the call. If the investor follows this strategy, she will receive $90. Taking $88 to purchase the bond, leaves her with $2. At maturity, the bond yields the investor $100, which she can use to pay the $100 owed on the shorted portfolio. Thus, by an argument similar to the one above, the price of the bond cannot be below $90. It, therefore, follows that the price of the bond is $90, the cost of assembling the original portfolio.
The put-call parity theorem can be used to circumvent usury laws, which limit the legal rate of interest on loans. Assume that Anne has agreed to lend Bob $200 and that Bob has agreed to repay the loan in one year along with $100 interest. If the maximum legal interest rate is below 50 percent, then Anne will be prevented from making the loan to Bob. Anne and Bob, however, can avoid the usury provision if Bob sells Anne securities or other assets for $200, Bob writes Anne a (European) put on the securities with a $300 exercise price, and Anne writes Bob a (European) call on the securities with the same $300 exercise price.\(^{39}\) Such an arrangement will ensure that Anne receives $300 at the end of the year.\(^{40}\)

Expressing the above transaction using the put-call parity theorem, Bob would sell the stock to Anne and receive a call on the stock with a strike price equal to the $300 transfer price. Thus, Anne's position can be represented as \(S - C + P\), which from the put-call parity theorem is equivalent to \(PV(E)\). Although the transaction is in substance a loan from Anne to Bob, in form it is not. In form, Anne holds stock and the option to sell that stock to Bob, and she has written Bob the option to buy that stock from her. Since none of those transactions are subject to a restriction on the permissible rate of return, the transaction will escape the prohibition on usury, unless the prohibition also covers transactions that are in substance (but not in form) loans.

The two alternative versions of the transaction between Anne and Bob are illustrated below in Figure 10.

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\(^{39}\) It does not matter what the securities are actually worth. The parties could use a peppercorn. Of course, the greater the value transferred, the more security Anne has if Bob refuses to pay or is insolvent.

\(^{40}\) If the securities are worth less than $300, Anne will exercise her put; if they are worth more, Bob will exercise his call. The only instance in which Anne will end up with less than $300 is if the securities are worth less than $300 and Bob is bankrupt. However, she would be in the same place had she made a loan to Bob and took a security interest in the securities.
3. The bottom half illustrates a synthesized loan: Anne pays Bob $200 and receives stock in return (S); Anne writes a call to Bob at $300 (-C); and she receives a put from Bob at $300 (P). Thus, viewed from Anne’s perspective, her position can be written as S-C+P, the right half of equation 3.

The use of put-call parity to avoid usury restrictions is more than theoretical. Today, put-call parity is being used to avoid Islam’s prohibition on paying or receiving interest. That prohibition, which has made it difficult for many Muslims living in the West to purchase homes, has spurred some innovative home financing techniques. In one of the simplest of these transactions (used in and around London), the bank buys the house and agrees to sell it to its client for a higher price through an installment sale. Thus, instead of owning the house and taking out a mortgage, which in our notation would be written as S-PV(E), the client has agreed to buy the house, which can be written as C-P.

Viewed from the Bank’s perspective, it owns the house subject to the agreement to sell it to its client for the promised payments. Thus, its position can be written as S-C+P, which from put-call parity is equivalent to PV(E), a simple loan.

In another variation (used in parts of the United States), the Bank buys the house and enters into a contract to sell it to the client for the same price in a series of installments over a number of years. The Bank also agrees to rent to the client that portion of the house the client does not own. If the client fails to make the payments, the Bank will take over the house and sell it. Thus, the client has the option to buy the entire house by making all of the payments, which can be written as C. From the put-call parity theorem, this is equivalent to the client owning the house, S, and financing it with a nonrecourse mortgage, -PV(E)+P.

Viewed from the Bank’s perspective, it owns the house, but has written a call on it (S-C), which is economically equivalent to making a nonrecourse loan with the house as security (PV(E)-P).

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43 Technically, the contract is not a simple forward, but a series of forward contracts. In a forward contract, the holder is obliged to purchase the underlying asset from the writer. Thus, a held forward combines a held call and a written put, so it can be written as C-P.

44 Noguchi, *supra* note 41, at E1. If the rental rate is fixed, the transaction is similar to a fixed-rate mortgage; if the rental varies over time, it is similar to a variable rate mortgage. Steed, *supra* note 41, at 11; Marla Dickerson, *The Price of Piety in Islam*, *Los Angeles Times*, March 17, 1999, at A1.

45 Technically, this is not a single option, but a series of embedded options. Each month, the client has to decide whether to make the next payment, in which case it has the right to continue to make payments, or to stop making payments. If it chooses the latter, the bank takes the property and sells it.

46 The borrowers right to walk away from the transaction by transferring the property to the lender is the right to sell the property to the lender for the outstanding balance of the loan. This right is, thus, a put option.
Of course, the bank’s profit from this rent-to-purchase transaction comes from the rent it receives on its portion of the house. Interestingly, the Treasury Department considers the rent—which replaces the interest a bank would receive from an ordinary loan transaction—to be interest and requires the bank to include these payments in income and allows the client to deduct these payments as qualified home mortgage interest.\[47\] Thus, in effect, Treasury is using put-call parity to treat the transaction as a nonrecourse loan for tax purposes.

Although the tax authorities consider these transactions to include interest, Muslims who finance their homes through these transactions seek assurances that they are not paying interest. Accordingly, both kinds of transactions are supported by opinions from clerics and scholars that they are consistent with Islamic principles.\[48\] Nonetheless, some experts believe these transactions are impermissible disguised loans.\[49\] In effect, those critics are also using put-call parity to look through these transactions.

**B. Transferring Tax Losses with Leases: Ownership Without Title**

The previous Section illustrated how put-call parity has been used to construct positions that are in substance debt interests, but are in form ownership interests. Put-call parity has also been used to construct positions that are in substance ownership interests, but are in form debt interests.

A simple example that illustrates how put-call parity can be used to construct a position that is equivalent to an ownership interest without transferring title follows. Assume that Diane owns a commercial building, that Diane and Eric have agreed in principle that Eric will purchase the building for $1 million, but that regulations prevent Eric from currently owning the building. The parties would appear to be stymied. However, Diane can in effect sell the building to Eric by borrowing $1 million from Eric, giving Eric the option to buy the building for $1 million, and receiving from Eric the option to sell the building to him for $1 million.\[50\] In terms of our notation, Eric’s position can be written as PV(E) + C! P, which is equivalent

\[47\] Noguchi, supra note 41, at E1.


\[49\] See Dickerson, *supra* note 44, at A1 (“Islamic banking isn’t without its critics, most of whom are Muslims wary of financial institutions using religion as a marketing tool. Some view the ‘fees’, ‘markups’, and ‘profit-sharing’, of Islamic transactions as a thinly veiled subterfuge for interest.”).

\[50\] Diane would also lease the building to Eric and the loan from Diane to Eric would call for interest equal to the rent Eric pays Diane on the building. This arrangement ensures that Eric receives the benefit from using or renting the building as well as any rise or fall in the building’s value. In addition, if Eric does not have $1 million cash and intends to finance the purchase through a third-party, the parties can achieve the same result by having Diane finance that portion of the loan with an outside lender.
to S. After the transaction, Diane has no financial interest in the building, but she still holds title.\(^{51}\) Thus, if the regulatory prohibition only prevents Eric from holding title, put-call parity can be used to transfer the financial equivalent of ownership to Eric.

The above example is similar to the facts in *Frank Lyon Co. v. Comm.*\(^{52}\) In *Frank Lyon*, then-applicable Federal Reserve regulations prevented the Worthen Bank from constructing the new bank building it wanted to own.\(^{53}\) Accordingly, Worthen entered into the following arrangement with Frank Lyon Co. (a home appliance distributor run by a member of Worthen’s board of directors). Worthen constructed a new building and sold it to Frank Lyon for $7.6 million, $500,000 of which was funded by Worthen and the rest was borrowed from a third-party lender, using a 25-year self-amortizing loan.\(^{54}\) Frank Lyon then leased the building for 25 years to Worthen (using a net lease, so Worthen paid all maintenance costs) for exactly Frank Lyon’s mortgage payment. Worthen also had the option after the loan was repaid of repurchasing the building from Frank Lyon for a price equal to Frank Lyon’s $500,000 investment plus a 6 percent return on that investment (roughly $2 million). Using our notation, Frank Lyon’s position can be described as owning the building (S) and having written a call to Worthen with a strike price of $2 million (-C). Through put-call parity, this is equivalent to Frank Lyon being owed $2 million from Worthen in 25 years (PV(E)) and Worthen having the right to satisfy that obligation by transferring the building and land to Frank Lyon (P). Frank Lyon’s position was, thus, the economic equivalent of a nonrecourse loan.\(^{55}\) Similarly, Worthen’s call option on the building (C) is through put-call parity equivalent to owning the building (S), owing Frank Lyon $2 million in 25 years (-PV(E)) and having the right to satisfy that obligation by transferring the building and land to Frank Lyon (P). In other words, Worthen’s position was equivalent to owning the building (S) subject to a $2 million nonrecourse loan from Frank Lyon (-PV(E)+P), which was the very position the regulations prohibited Worthen from taking.\(^{56}\)

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51 By extending the options when they mature, the arrangement can be extended indefinitely if Eric is still precluded from owning the building.


54 The building, which cost more than $10 million to construct (excluding the land) was sold to Frank Lyon as it was being constructed. Thus, at all times, Worthen’s investment in the building was less than its capital stock.

55 Moreover, it was unlikely that Worthen would exercise the put because the expected value of the building in 25 years was more than $25 million. In other words, the strike price of the put was set so that it would very likely be out-of-the-money.

56 Because the $7.1 million self-amortizing third-party loan would be repaid in 25 years it can be excluded from the notation. However, whether Worthen owned a call on the building or owned the building subject to a
\textit{Frank Lyon} is a tax case and the issue was whether Frank Lyon or Worthen would receive the depreciation deductions. As for avoiding the regulatory prohibition, the transaction appeared to be completely effective.

Today, put-call parity is widely used to shift ownership in order to transfer depreciation deductions. Although the owner of property can depreciate it on its tax return, frequently the party that can make best use of the property in its business does not place the highest value on the depreciation deductions. Thus, to ensure that the user realizes the full value of the deductions, ownership is transferred to a third party. The classic example involves commercial airliners.

The airline industry is cyclical and highly volatile and, as a result, airlines frequently operate in the red. Consequently, because of incomplete loss offsets, depreciation and interest deductions are not worth as much to airlines as they are to more stable and profitable firms. Accordingly, most airlines no longer own their own planes, choosing instead to lease them. The principal advantage of leasing is that it allows the airline to realize the full value of the depreciation deductions by transferring those deductions to another party. The airline benefits from the transfer because it is, in effect, paid for the deductions through reduced aircraft payments.

Consider, for example, a $35 million Boeing 737 aircraft that United Airlines plans to purchase and use for 10 years, at which time the aircraft is estimated to have a resale value of $25 million. Assume that Boeing offers United a $30 million, 10-year loan that calls for an annual payment of $2.5 million and a balloon payment of $20 million. If the airline purchased the jet, it would have to pay $5 million when it took delivery. It would also suffer any gain or loss on the craft from changes in its resale value. In our notation, United's position is \( S - \text{PV}(E) \), where \( E \) is the $20 million balloon payment. In addition, United would be allowed to take the depreciation deductions, which might have little or no value to it.

In that case, what United might do is find a party that values the depreciation deductions more

\textsuperscript{57} See discussion immediately following.

\textsuperscript{58} Other well-known examples of actual and proposed tax-motivated leases include municipal buses, trains and subway cars, university and municipal buildings and Navy support vessels.

\textsuperscript{59} If a corporation loses money, it does not generally receive a refund from the government above what it has already paid in taxes. There is no negative corporate income tax. Instead, loss corporations can carry losses forward for up to twenty years (after which time they expire) and use them to offset income in future years. I.R.C. \S\ 172. Because of the time value of money, these losses decline in value with delay even when they do not expire. See\textsc{Myron S. Scholes et al., Taxes and Business Strategy: A Planning Approach} 157-58 (2d ed. 2002).

\textsuperscript{60} The loan has an effective annual interest rate of 5.78 percent.
highly, say GE Capital, and have it purchase the aircraft using Boeing’s financing and lease it to United. For example, GE might lease the aircraft to United for $2.5 million a year plus an initial payment of $2 million. GE could also write a call to United on the aircraft at $20 million and it could take a put from United at $20 million. With this transaction, GE Capital would not be exposed to the risk of price fluctuations. In effect, GE will have paid $3 million for the depreciation deductions, because the other payments are a wash.

This leasing transaction can be expressed using put-call parity. However, unlike the previous examples, there are now three parties. Fortunately, that complication presents no difficulty because although GE holds title to the aircraft, it has no other interest in the transaction, either as an owner or as a lender or borrower. In form, GE owns the plane (S) and has agreed to sell it to United for $20 million in ten years (-C+P), at which time GE must also make a $20 million balloon payment to Boeing (-PV(E)). Thus, from put-call parity, GE’s position (S-C+P-PV(E)) is the economic equivalent of not having any financial interest in the transaction.

In contrast, United will be fully exposed to the risk of price fluctuations. In form, United has agreed to pay $20 million for the aircraft in 10 years (C-P). This is economically equivalent to buying the aircraft (S) and financing the purchase using a loan that calls for a $20 million balloon payment in 10 years ((-PV(E))). Of course, Boeing’s position is just the right to receive the $20 million balloon payment (PV(E)).

The benefit to United from entering into the lease transaction is that United reduces its cost of

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61 The value of the depreciation tax shield is the present value of the deductions in excess of the aircraft’s actual decline in value.

62 Its only exposure is if both United is bankrupt and the jet is worth less than $20 million in ten years.

63 This is the $3 million of the $5 million downpayment paid by GE.

64 The $2.5 million lease and loan payments offset one another.

65 Substituting in the payments at maturity for the variables in GE’s position, S-C+P-PV(E), yields:
   \[ S - \max(S-20,0) + \max(20-S,0) - 20 = S + (20-S) - 20 = 0, \]
   which is to say GE has no financial interest in the aircraft.

66 Substituting in the payments at maturity for the variables in United’s position, C-P, yields:
   \[ \max(S-20,0) - \max(20-S,0) = S-20, \]
   which is through put-call parity equivalent to owning the plane (S) and having to pay $20 million in ten years (-PV(E)).

67 There is also a $2.5 million annual lease payment from United to GE and a $2.5 million annual loan payment from GE to Boeing. These payments are in essence a $2.5 million annual loan payment from United to Boeing because GE is just a conduit for the payments. These interim payments do not appear in the equations that describe the parties’ positions because they are not payments at maturity.
Operating the aircraft. In effect, GE pays United $3 million for the aircraft's depreciation deductions. If the depreciation deductions were worthless to United, it has gained $3 million by leasing instead of buying the jet. The role of put-call parity in the leasing transaction is that it allows United to transfer the depreciation deductions to GE without also transferring exposure to fluctuations in the aircraft’s resale price.

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The tax authorities generally do not permit the putative owner/lessor to transfer the full economic consequences of ownership to the putative lessee. If this is done, the authorities will consider the lessee to be the owner for purposes of the tax law and will not permit the putative owner to take the depreciation deductions. To ensure that the putative owner can take the deductions, the owner must be exposed to some of the risk of price movements. See Rev. Procs. 75-21, 1975-1 C.B. 715, and 75-28, 1975-1 C.B. 752 (IRS guidelines for advance rulings that certain equipment leases will be respected for tax purposes). A simple way to do this is to use different exercise prices for the put and call. In ten years, when the aircraft lease expires, the craft, which is expected to be worth $25 million, might be worth substantially more or less. If the lessor's right to put the plane to the lessee and the lessee's right to call the plane from the lessor both have the same strike price, as in the example in the text, then any difference in the price of the craft from $25 million will benefit or harm the lessee. If, however, the put has a $22 million strike price and the call has a $28 million strike price, the first $3 million deviation in either direction will be borne by the lessor. Such an exposure might be enough to ensure that the lessor is treated as the owner for tax purposes. If, however, the variation in possible prices in ten years is very large, then the lessee will still have most of the risk in residual value. The payoff to the putative owner/lessor with this arrangement is illustrated in the following figure.

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The Airline Lease (Lessor's Perspective)

Although the Internal Revenue Service will not give an opinion approving a major lease transaction unless the lessor is exposed to substantial risk, the Service is not always effective in challenging leases where the lessor has eliminated practically all risk. For example, in Frank Lyon, the taxpayer had shifted all of the risks from the building to Worthen except for the very small risk that the building would be worth less than the mortgage and that the bank would be insolvent. Accordingly, the Commissioner recharacterized the transaction as Worthen borrowing $500,000 from Frank Lyon and paying 6 percent interest. This recharacterization also shifted the depreciation deductions from Frank Lyon, which valued them highly, to Worthen, which did not. A majority of the Supreme Court, however, refused to recharacterize the sale-leaseback as a loan and permitted Frank Lyon to deduct the depreciation. The decision is forcefully criticized in Wolfman, supra note 53, at 1075.
or the use of the aircraft. Put-call parity accomplishes this by separating legal and economic ownership and allowing United to transfer only title to the aircraft to GE.

C. Sales That Are Not Sales

This section provides two examples in which the put-call parity theorem has been used to achieve the economic equivalent of a sale without incurring the disadvantages that would result from a formal sale. Of the two techniques described below, one remains viable and the other was only recently eliminated.

1. Insider Short-Swing Profits

Section 16(b) of the Securities Exchange Act permits a corporation to recover from any of its officers, directors or 10 percent shareholders the profit realized on a purchase and sale or a sale and purchase of any equity security of the corporation within 6 months. Until closed by rules released by the Securities and Exchange Commission in 1991, the put-call parity theorem provided a means to escape from section 16(b), as illustrated by the following example.

On January 15, Helen, an officer of Cycle Corporation purchases 1000 shares of Cycle at $20 a share. By April 30, Cycle's price has risen to $38 a share and Helen would like to sell the 1000 shares because she believes that Cycle's price will fall. If Helen were to sell her shares, her $18,000 profit would be subject to the disgorgement provision. What Helen does instead is purchase put contracts and write call contracts on 1000 shares of Cycle at $40 that expire on September 30, which is after the 6-month holding period expires. By purchasing the puts and writing calls, Helen has converted her portfolio of Cycle stock, which can be written as S, into a portfolio, which can be written as S+P-C. Through put-call parity, that portfolio is equivalent to a zero-coupon bond, PV(E).

On July 15, when the six-month holding period expires (or any date thereafter until the options

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69 The rationale for leaving with United as much exposure to fluctuations in the aircraft’s resale value is to give United the correct incentives to care for the aircraft. Shifting that exposure to GE would shift the incentive to maintain the aircraft from United to GE. This would require that GE monitor United, which would directly provide the maintenance. This is less efficient because monitoring is costly and imperfect.

70 15 U.S.C. § 78p(b). Section 16(a) requires that directors, officers and 10 percent shareholders of a class of equity securities file a report with the Securities and Exchange Commission (SEC) at the end of each month in which the investor acquires or disposes of equity securities of the corporation. U.S.C. § 78p(a).


72 Exchange-traded option contracts give the right to buy or sell 100 shares of the underlying stock. Thus, Helen would purchase 10 put contracts and write 10 call contracts.
expire), Helen can sell the stock, close out the option position, and take her profit.\textsuperscript{73} This chronology is illustrated in Figure 11.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{chapter11-0122.png}
\caption{Evading the Section 16(b) Disgorgement Provision}
\end{figure}

In promulgating its new rules, the SEC recognized that the profit is not guaranteed by the exercise of the option, but by its purchase. In purchasing the puts, Helen obtained the right to dispose of her stock at a predetermined price, thereby insuring her profit. Thus, the new SEC rules treat Helen as if she sold the covered stock at $38 a share when she bought the puts.\textsuperscript{74}

2. The Realization Trigger for Capital Gains

Another use of put-call parity is to eliminate the risk from holding an asset and even to “monetize” the asset without selling it. This technique has been used to defer capital gains by avoiding the realization trigger contained in Section 1001 of the Internal Revenue Code.\textsuperscript{75}

Consider Carol who went to work for High Flying Corporation 35 years ago. Carol, who started as the assistant accountant of a small business and is now chief financial officer of a much larger one, has been acquiring stock all these years. Her portfolio, which is valued at $5 million and has negligible basis, is entirely in the stock of High Flying. Carol intends to retire this year and wants to convert her portfolio

\textsuperscript{73} Helen could also exercise the option if it is an in-the-money American option.

\textsuperscript{74} The new SEC rules are broad enough to cover variations of this technique.

\textsuperscript{75} This provision provides that “[t]he gain from the sale or other disposition of property shall be the excess of the amount realized therefrom over the adjusted basis . . .” I.R.C. Sec. 1001.
The capital gain tax rate is currently capped at 20 percent. Thus, Carol is apparently faced with a dilemma: she must either pay $1 million tax, leaving her with only $4 million in bonds, or keep an undiversified portfolio with a market value of $5 million. Fortunately for Carol, put-call parity provides a way out of her dilemma.

Assume the current price of High Flying is $50, so Carol has 100,000 shares, and that risk-free bonds pay interest of 5 percent annually. If Carol writes calls on High Flying at $52.50 that mature in one year and purchases puts at $52.50 that expire in one year, she will have a guaranteed return of 5 percent on each covered share. If she writes calls and purchases puts covering all 100,000 shares, she will have effectively converted her $5 million portfolio of risky High Flying stock into a $5 million portfolio of safe bonds. (Since the return on a risk-free bond is 5 percent, the cost to Carol of purchasing the puts should equal her revenue from writing the calls.) Thus, over the year, Carol is guaranteed a return of $250,000 on her portfolio.

Expressed in terms of our notation, Carol’s initial position where she is holding only the stock of High Flying can be written as S. By writing calls, -C, and purchasing puts, P, Carol’s portfolio becomes S-C+P, which through put-call parity is equivalent to investing her proceeds in zero-coupon bonds, PV(E). Thus, Carol has been able to eliminate the risks from holding High Flying without selling the shares and thus without having to pay capital gains tax currently.

At the end of the year, Carol will settle in cash either the calls or the puts, depending upon which is in the money. Thus, for example, if the price of High Flying falls to $47.50, Carol will receive $5 from each put for a total of $500,000. (Of this $500,000, $250,000 is exactly offset by the fall in the value of her High Flying shares.) Carol will have to pay $100,000 tax, 20 percent of her $500,000 gain from her options trades, leaving her $400,000 with which to purchase bonds. Assuming the risk-free interest rate remains at 5 percent, next year Carol will purchase 100,000 puts at $49.88 and write 100,000 calls with this same exercise price. Her $400,000 in bonds will generate $20,000 interest.

The other possibility is that the price of High Flying rises over the year. Thus, for example, if High Flying’s price rises to $55, Carol will lose $2.50 on each call or $250,000. She covers her loss by selling

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76 The capital gain tax rate is currently capped at 20 percent. I.R.C. §1(h).

77 The put-call parity theorem implies that the premiums on the call and put are equal when the locked-in return is the risk-free rate on the market value of the underlying asset. Thus, the only cost to Carol of the proposed transaction is any fee imposed by her broker to cover transaction costs.

78 She settles by closing out her position not by delivery. She does not want to purchase more shares of High-Flying and because she wants to postpone gain she should not sell more shares of High-Flying than necessary.

79 Puts and calls with strike prices of $49.88 are unlikely to be traded because options usually trade with strike prices that are multiples of $2.50 in a range around current and recent stock prices. However, puts and calls with strike prices of $50 would do almost as well.
4545 shares of High Flying.\textsuperscript{80} Since the High Flying stock is assumed to have zero basis, her capital gain on the High Flying shares she sells exactly offsets her loss on the calls. This leaves Carol with 95,455 shares of High Flying with an aggregate value of $5,250,000. Assuming the risk-free interest rate remains 5 percent, next year Carol will purchase 95,455 puts at $57.75 and write 95,455 calls with this same exercise price.

The effect of this technique is to defer income taxes. Although Carol pays some tax if High Flying falls,\textsuperscript{81} she defers taxes relative to converting her portfolio immediately. Of course, the value of the deferral is a function of the time value of money. However, if Carol intends to give some of her portfolio to her children as a bequest, she will avoid income taxes, but not estate taxes, on that portion of her portfolio that is in appreciated High Flying stock when it passes to her children upon her death. This is because of a long-standing tax rule that the tax basis of inherited property is its fair market value at death.\textsuperscript{82}

In effect, Carol used the put-call parity theorem to avoid the impact of the realization requirement. Because of the practical problems involved in assessing the market value of infrequently traded property, the federal income tax does not capture gains each year as they accrue. Instead, with rare exceptions, increases and decreases in value are taxed only when the property is sold. The put-call parity theorem allows Carol to sell her High Flying stock, without physically selling the shares. Thus, it allows her to make an end-run around the realization requirement.\textsuperscript{83}

Moreover, a simple extension would allow Carol to cash out her position in all or part without triggering capital gain. This might be important if she wanted to live off the money or use it to make an investment other than in tradeable securities.\textsuperscript{84} To “monetize” her position, all Carol has to do is to borrow. Using her portfolio as collateral, she should be able to borrow a large amount at a low interest rate because the portfolio is riskless.\textsuperscript{85} Thus, in form her portfolio would become S+P-C-PV(E), which through put-call parity is identically zero. Since she used to own the stock, Carol has engaged in the economic equivalent

\textsuperscript{80} This is calculated as follows: 4545 shares = $250,000 ÷ $55 per share.

\textsuperscript{81} The tax Carol pays is directly related to the fall in the price of High Flying. Carol pays tax in this case because she cannot offset her gains from the puts against losses on the stock.

\textsuperscript{82} I.R.C. § 1014.

\textsuperscript{83} The put-call parity theorem makes such an end-run optional. If Carol wanted the realization to occur now, perhaps because she thought capital gains rates would increase or because she had a large loss, she would sell the stock. The put-call parity theorem, thus, expands her options by allowing her to realize or defer realization.

\textsuperscript{84} Carol can convert her position in High Flying to any portfolio of tradeable securities using options. For example, if she wanted to invest the whole $5 million in the S&P 500 she would buy S&P calls and write S&P puts covering a $5 million investment.

\textsuperscript{85} For example, one small investment bank offers to provide hedged investors with a loan of 90 percent of the value of their hedged stock position. Http://www.devirium.com/Services/Stock_Loan.cfm.
of a sale of her stock, but because she still holds title to her original shares, she has not triggered capital gains on her gains from High Flying.

For years, the technique described above and other similar techniques were used to defer, and sometimes permanently avoid, the capital gain tax on appreciated securities. 86 Several high-profile transactions in the late 1990's, 87 however, led Congress to add section 1259 to the Internal Revenue Code as part of the Tax Reform Act of 1997. Section 1259 provides that if a taxpayer makes “a constructive sale of an appreciated financial position”, gain is recognized as if the taxpayer had sold the financial position to a third party for its fair market value. 88 The term “appreciated financial position” generally means any investment position with respect to stock, debt or partnership interests if there would be a gain were such position sold. 89 The term “constructive sale” is defined as any of several enumerated transactions in which the taxpayer terminates his economic interest in the appreciated asset. 90 These transactions are the economic equivalent of the transaction described above, 91 but they are not formally the same. 92 The


87 See Diana B. Henriques with Floyd Norris, Wealthy, Helped by Wall St., Find New Ways to Escape Tax on Profits, NEW YORK TIMES (Dec. 1, 1996) (Eli Broad effectively sold $194 million in highly appreciated Sun America stock without triggering any capital gain tax by issuing securities that were tied to the return on his Sun America’s shares and Estee Lauder and her son Ronald Lauder avoided $95 million in taxes by borrowing shares of Estee Lauder Co. from friends and relatives and selling those borrowed shares instead of selling their own shares).

88 I.R.C. § 1259(a), as added by TRA 1997, sec. 1001(a).

89 I.R.C. § 1259(b)(1).

90 I.R.C. § 1259(c). The transactions listed in this section include:
   (A) a short-sale-against-the-box (where the taxpayer would borrow the same stock as she owns and sell the borrowed stock in the market), which would eliminate the risk from holding the original stock because any gain or loss on the held stock is exactly offset by the loss or gain on the short sale;
   (B) a notional principal (swap) contract (which is equivalent to a series of forward contracts); and
   (C) writing a forward contract to deliver the same or substantially identical property (forwards are contracts to sell property at a preset price at a predetermined date; a forward contract differs from a call option because the holder is obligated to purchase the underlying asset and the issuer is obligated to sell it), which has the same payoff as writing a call and buying a put at the forward price).

91 A short-against-the-box is represented by -S. According to the put-call parity theorem, this is equivalent to borrowing, writing a call and holding a put (-PV(E)-C+P). Holding a forward contract is equivalent to holding a call and writing a put (C-P), so writing a forward contract is equivalent to writing a call and holding a put (-C+P). Thus, the difference between the short-against-the-box and writing a forward contract is that with the former the investor receives the proceeds today and with the later they are in effect invested in a zero-coupon bond. The two are identical if the investor either invests the proceeds from the short-against-the-box in zero
provision also gives Treasury the authority to issue regulations that would treat other transactions that have substantially the same effect as the listed transactions as constructive sales. It remains to be seen whether the Treasury will use that authority to treat taxpayers as if they sold shares when they buy puts and write calls covering those shares. However, as of today, taxpayers can still use put-call parity to sell appreciated securities without triggering capital gains tax.

III. Implications

The use of put-call parity to avoid a wide range of legal rules has a number of implications for academics, policymakers and practicing attorneys who are interested in business and financial matters.

The first implication is that because there are often multiple ways of achieving the same result, rules—to be effective—must generally be consistent. That is to say, they must treat economically equivalent transactions in the same way. That means that legal treatment should turn on cash flow, and not on such malleable concepts as whether a transaction is called a loan, or who holds title, or whether title has changed hands. Thus, for example, Section 16(b) of the Securities Exchange Act was only effective in preventing insiders from earning short-swing profits after it was extended to cover options. Similarly, usury restriction to be effective must not only cover loans, but also agreements to purchase and later resell property back to the original owner.

The second implication takes off from the qualifier generally in the first implication. An inconsistent rule that could be avoided by using put-call parity might not be avoided because there are important differences between the legally disadvantaged contract or transaction and the synthesized version. In the tax literature, these differences are called frictions and include the potentially higher cost of assembling the synthetic and the different rights and risks the party has with the synthetic as opposed to the original transaction. For example, Helen and Carol both bear some risk that the put contracts they purchased will be in-the-money, but that the counterparty or exchange from which they purchased them will default and not pay. Such credit risk if large enough might discourage Helen and Carol from their proposed transactions. Frictions, then, are not only a potential hindrance to tax arbitrage; they have the potential to

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92 Section 1259 does not include transactions in puts and calls ostensibly because businesses uses puts and calls to hedge their exposure to price changes in their inventory. However, by exempting transactions in puts and calls from Section 1259, the law leaves a large hole.


94 Even if it did, that would still leave the interesting question how much risk taxpayers can rid themselves of without triggering a constructive sale.

95 SCHOLES ET AL., supra note 59, at 9.
derail any kind of regulatory arbitrage.

The third implication is that it is important for practicing lawyers to understand basic financial principles, how those principles relate to the transactions on which they are working, and the relevant frictions. The transactional lawyer creates value for her clients by helping them to structure their transactions to minimize the cost of complying with the relevant rules. When the law treats similar transactions differently, lawyers can assist their clients by selecting (and sometimes developing) transactional forms that minimize their clients’ compliance costs. This work requires not only that the lawyer understand the transaction and the relevant law, but also how the transaction can be synthesized and the frictions that would be incurred. Thus, for example, financially sophisticated lawyers play a large role in designing and negotiating leases of capital equipment, such as airplanes, utility plants, and buildings.

The fourth implication is that inconsistent legal rules encourage waste and create a perception of unfairness. Although inconsistent legal rules create lucrative opportunities for lawyers, from society’s viewpoint, the rules cause waste. Much high-priced talent goes into designing, marketing and implementing strategies that exploit legal inconsistencies. Nowhere is this clearer than with tax planning. The resources devoted to tax planning are wasted in as much as the rules could be rewritten to produce roughly the same result without requiring all the effort. Also, inconsistent legal rules create traps for the unwary and for those who cannot afford to pay the experts’ fees and the costs of other frictions. For example, the fixed costs of writing calls and buying puts makes it unfeasible for investors with small gains to effectively sell their property without triggering realization. That has created a tax system where those with the largest gains pay no capital gain tax, but everyone else does. Not surprisingly, inconsistent tax laws erode support for the tax system.

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98 Schizer, supra note 86, at 1348-49 (arguing that such transactions are prohibitive for investors with positions worth less than $1 million).

99 A few years ago, the Wall Street Journal observed: “The simple fact is that anyone sitting on a big pot of money today probably isn’t paying capital gains taxes,” said David Bradford, an economist at Princeton University and a critic of the current income tax system. “And the Government can adopt rule after rule after rule — but the people who will get stuck paying capital gains taxes will be the ordinary investors who own mutual funds.” Henriques, supra note 87.

100 As the Wall Street Journal observed: “The consequences of Wall Street’s ingenuity even worry some who profit from it. ‘I am torn on that issue,’ said Robert Willens, a managing director and tax analyst at Lehman Brothers.
The fifth implication is related to the first four. When writing laws, policymakers should be aware of alternative ways of achieving the same result. If a regulation is going to be effective, and not just a trap for the unwary and the less wealthy, it must cover all of the available alternatives. If it does not, it will simply drive much of the activity into the uncovered paths. For example, section 1259 which taxes constructive sales of appreciated financial positions, but exempts transactions using options, is unlikely to raise much revenue. That is because well-advised taxpayers will avoid the transactions that section 1259 taxes and use put-call parity to avoid paying tax.

IV. Conclusion

This Essay has examined the legal significance of the put-call parity theorem. The put-call parity theorem states that given any three of the following four financial instruments—a zero-coupon bond, a share of stock, a call option on the stock and a put option—the fourth instrument can be synthesized from the other three. Thus, the theorem implies that any position containing at least one of these elements can be constructed in at least two different ways. When the law treats the different ways of constructing the same position differently (as it often does), form takes precedence over substance, sophisticated parties will spend resources to achieve the preferred result, and only the unsophisticated will be subject to the greater burden. The put-call parity theorem is not the only relationship that has been used to engage in tax and regulatory arbitrage. Work is only beginning on the legal significance of financial arbitrage relationships.

‘As someone who makes my living catering to these clients, I find these products useful and successful. But as a citizen, which I am after about 6:30 every evening, I worry that there is a growing perception that these tax techniques are available only to the wealthy few, that the average citizen and investor doesn’t have access to them. Nothing does more to undermine our tax system than that.’”

Henriques, supra note 87.