



ARE PUTS THE WRONG PRICE?

INTRODUCTION

All investing requires investors to be able to distinguish value from price. Sometimes this is difficult, sometimes this can be a lot easier. An example of the latter may be the pricing of puts on equity market indices. The premium for a 6 year at the money put on a major equity market index can be up to 24%. The average maturity value of a put like this has been 7.3% across the 4 main equity markets. Is the current premium the right price, or is this too much? Would you as a European equity investor use about 20% of your assets to protect the capital value of the other 80% over a 6-year term?

The answer to our main question depends on your perspective. From a technical standpoint, the short answer is clearly no, puts are not the wrong price, markets don't mis-price options. But when we look at the pricing of puts as a real-world investor it's clear that the premium is excessive.

In this essay we look at why puts are priced as they are and propose that the current premium means that a fund that is based on put writing strategy may offer investors an opportunity to earn an attractive risk adjusted return.

PUT PRICES

We should start with the facts; the table below shows the mid-price of at the money 6-year puts for the main equity market indices

MARKET	PREMIUM
S&P 500	14.6%
FTSE 100	21.6%
EUROSTOXX 50 E	24.3%
NIKKEI 225	23.4%

Source: Levendi Investment Management

We know that markets are efficient, and that these premiums are "correct" from a hedged or risk neutral perspective. As we will look at below, the price of these options reflects the forward value of the equity indices and implied volatility. These are values that can be hedged or replicated by market participants.

However, that does not mean that the pricing of these options eliminates the opportunity for investors to earn a return. Far from it, the pricing of put options gives investors an opportunity to earn an attractive return. Investors have a different perspective to risk-neutral traders, they want to take on some risk to earn a return, they are not looking for arbitrage profits and they may anticipate an equity risk premium.

BACK TEST

If we want to think about the value a buyer would get from these options or the risks faced by a seller, we could look back at how markets have performed over time:

- If we compare the level of the FTSE at one point with the level 6-years later, since 1992-12-31 the index has only dropped on 29.6% of the 4750 overlapping periods
- On these occasions the index has on average been 11.1% lower



- The maximum fall over any 6-year window has been 30.6%

The table below summarizes the drawdown of some of the main market indices over the last 25 years since the start of 1993 for the 4 main developed markets:

	S&P 500	FTSE 100	EUROSTOXX 50	NIKKEI 225
HOW OFTEN HAS THE INDEX FALLEN OVER A 6-YEAR PERIOD	18.5%	29.6%	42.2%	62.7%
WHAT IS THE AVERAGE DRAWDOWN	6.9%	11.1%	19.1%	26.5%
WHAT IS THE MAXIMUM DRAWDOWN	19.5%	30.6%	43.6%	61.4%
WHAT IS THE AVERAGE FINAL VALUE OF AN AT THE MONEY PUT?	1.3%	3.3%	8.1%	16.6%

Source: Levendi Investment Management

The results from our simple trawl through history would seem to indicate that the premium for these options massively over-compensates sellers who provide insurance and penalized buyers who want protection. The question we then need to ask are:

- Is there really an opportunity?
- If there is, how investors can capitalize this opportunity? and
- Why this gap persists?

THE OPPORTUNITY

The cursory analysis of put pricing and maturity values highlights the fact that there does seem to be an opportunity for investors from selling puts. The historic record shows that buying puts is a losing strategy, and so conversely, selling puts is a winning trade

The existence of the opportunity for investors was highlighted recently in a paper “Embracing Downside Risk” AQR illustrated that investors that were prepared to accept downside risk on the S&P achieved significantly better risk/return profile than investors that protected their downside risk. They conclude:

“To many, it may sound risky to actively seek out concentrated downside exposure. Yet, for example, the insurance industry is seemingly devoted to accepting the risk of potentially significant loss for profits that are capped at moderately sized insurance premiums. Although it may appear rather unconventional to do so in financial markets, we show that downside exposure has the potential to offer greater rewards than does the highly sought-after upside participation”

Before we look at the investment solution it is worth delving a bit more into the nature of the opportunity. The basic thesis is that put premium looks to be too high. Part of the premium is because of a well-documented premium of implied volatility over historic volatility. Academic journals have for a long time justified this premium on investor risk aversion. Investors are prepared to pay a premium to de-risk their investments, and on the flip side, investors need to receive a premium to provide protection.

However even an acute level of risk aversion would seem to be insufficient to justify the premiums that these options trade at in the market. To really understand why this pricing environment persists we need to understand the different ways that investors and traders look at downside risk.



MARKET PRICING

If we start with the way that these options are priced, we can unravel the market neutral pricing and start to see if taking advantage of the pricing environment is sensible or not.

There are two parts to any option price, the intrinsic value and the time value.

- The intrinsic value is simply the difference between the index level and the strike of the option. Specifically, the intrinsic value is the gap between the strike and the forward value. At the moment, because for many markets dividends are significantly higher than interest rates, the “forward values” of many indices are at a significant discount to the spot levels. This means that for at the money options like the ones we have been looking at, the intrinsic value is a significant part of the option premium
- The time value reflects the level of implied volatility over the period. For some time, the implied volatility derived from the price paid for index options has shown that the implied volatility increases for longer dated and lower strike options.

The table below breaks down the mid-market premium for 6-year at the money options into Intrinsic Value and Time Value

MARKET	PUT PREMIUM	FORWARD VALUE AS A % OF CURRENT INDEX	FORWARD INTRINSIC VALUE	TIME VALUE
S&P 500	14.6%	103.7%	0%	14.6%
FTSE 100	21.6%	84.5%	14.3%	7.3%
EUROSTOXX 50 E	24.3%	82.4%	17.2%	7.1%
NIKKEI 225	23.4%	85.7%	14.2%	9.2%

Source: Levendi Investment Management

The low forward values for the FTSE 100, Eurostoxx 50 and Nikkei 225 is the main reason why the at the money puts are a much higher price than the S&P 500 puts. Because the forward levels are below 100% the at the money puts on these markets contain a significant amount of intrinsic value. For these particular options, the intrinsic value makes up about 2/3 the total premium. Interestingly, because the strike of the S&P 500 Puts is closer to the forward, the time value is much higher.

INVESTOR VALUE

When looking at the “value” of a put to an investor, rather than a risk-neutral trader, the key is to appreciate that the forward is just a forward and not a forecast, simply a risk-neutral fair value. It’s a mathematical calculation, any other value would provide a buy (or sell) and hold arbitrage.

The forward level represents the price at which investors can buy and sell the underlying index at the forward date, and so only reflects prevailing interest rates and dividends. However, as we have seen above the forward value has a significant influence on the price that the market will pay for puts.

If we look at the way an investor could place a value on these puts, the difference between the two perspectives becomes clear. A real-world investor does not operate in a risk neutral world. Investors have views and expect to earn a return by having positions. We approximate the views of a standard investor by using a consensus long term capital market assumption for each market. (We calculate an average of the return forecast from several major investment managers, banks and research companies). We can use this to calculate an implied “Forecast Level” for each index in 6-years’ time that takes into account the implied level of dividends for each market.

INDEX	CONCENSUS TOTAL RETURN	FORECAST INDEX LEVEL
S&P 500	4.5%	121%
FTSE 100	6.0%	115%
EUROSTOXX 50 E	5.5%	114%
NIKKEI 225	5.3%	121%

Source: Levendi Investment Management

The consensus estimates for the equity market total return means that the Forecast Level of most equity market indices is higher than the current level and significantly higher than the Forward Level.

INDEX	FORECAST LEVEL	FORWARD LEVEL	FCST / FWD
S&P 500	121%	104%	116%
FTSE 100	115%	85%	136%
EUROSTOXX 50 E	114%	82%	138%
NIKKEI 225	121%	86%	141%

Source: Levendi Investment Management

If we want to approximate the “value” of these puts to an investor, one simple way is to use the premium of the Forward Level over the Forecast Level to adjust the strike. Heuristically, the strike is reduced by the same proportion as the “forecast level” increases. Using FTSE as an example, the Forecast Level is 136% of the Forward Level, so to calculate the value of this option we calculate the price of a put with a strike of $1/136\% = 73\%$ of the current index level.

INDEX	STRIKE	PRICE	ADJUSTED STRIKE	VALUE	PRICE-VALUE
S&P 500	100%	15%	86%	9%	6%
FTSE 100	100%	22%	73%	8%	14%
EUROSTOXX 50 E	100%	24%	72%	9%	15%
NIKKEI 225	100%	23%	71%	8%	15%

Source: Levendi Investment Management

The table above shows how this adjustment reveals the value to investors from selling these puts. As expected, the value is greatest where the difference between the Forward and Forecast levels is the greatest. The value reflects the investors view about the level of returns that they expect and the market implied volatility.

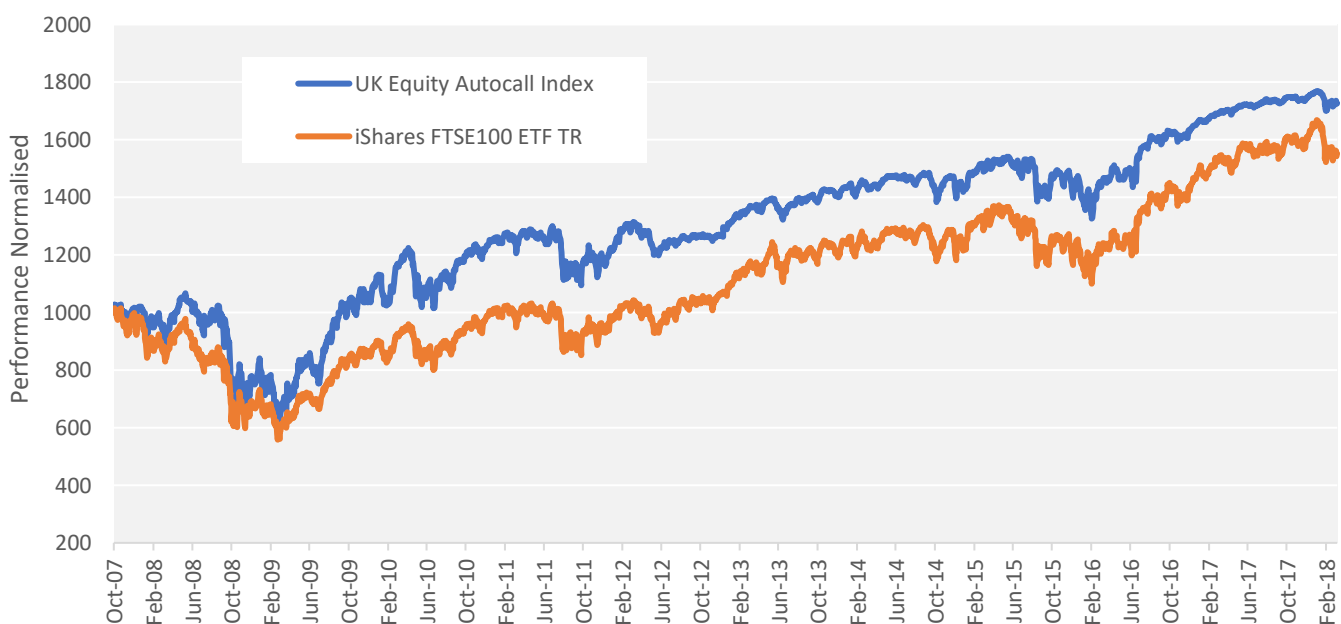
In the interests of completeness an analysis like this would also demonstrate that calls look cheap and that borrowing to buy equity markets is expected to earn a positive return. However, the significance of looking at puts on their own is a put selling strategy does not need markets to rise, they simply need the markets to remain at current levels.



VALIDATING THE OPPORTUNITY

Investors will need some validation that a put selling strategy works. Generic indices like the CBOE Put Write Index illustrate the performance of a simple put selling strategy. The PUT index is one of a suite of option-based indices that has been created and sponsored by CBOE. The report from Wilshire Analytics showed that PUT offered a better risk/return framework than the other strategies. Our UK Autocall Index shows the returns from a portfolio of FTSE linked Autocalls over the last 10 years. Both our index and the CBOE index demonstrate the returns from a put writing strategy, and the results affirm the findings of the AQR report.

PERFORMANCE FOR UK EQUITY AUTOCALL INDEX



Source: Highcharts

It's fashionable to describe the "factors" that drive the returns of any strategy. If we want to describe why selling puts works in this way, the strategy can be seen to add value through capturing the following;

- The equity risk premium
- The premium of implied volatility over historic volatility that is in part ascribed to risk aversion
- The term structure and skew of implied volatility which is a result of the balance of demand and supply. This imbalance is in turn, largely a result of regulatory pressure and product design.

CAPTURING THE OPPORTUNITY

There are several ways to capture the opportunity. For institutional investors, holding cash and selling listed puts is an obvious strategy. For investors that don't have the opportunity or inclination to trade listed or OTC options the alternative is to look for funds and strategies that look to capture this premium.



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Funds like the Levendi Thornbridge Defined Return Fund are explicitly looking to generate a return by holding a portfolio of physical or synthetic equity linked notes. These notes offer an enhanced premium for accepting downside risk. Equity linked notes are simply an alternative way to hold cash and sell puts. Wrapping the strategy into single securities is the equivalent of using OTC options to sell longer dated, lower strike options than are available through exchanges.

Although a put selling strategy looks like an equity investment it offers investors bond like returns and requires a bond investor's mindset. Investors know the maximum return that they may get and need to balance this against the chance and scale of losses. As our analysis shows there can be a significant difference between the price and value of this risk. The skill required by a manager is to identify the sweet spot that maximizes the risk/return profile. To do this Levendi have developed proprietary quantitative software that allows us to calculate the terms we will receive from the market and to calculate the risk / return profile of each product, and the portfolio, in a real-world framework.

The final caveat that investors must be aware of, is that a strategy like this will be correlated to equity market returns. This is not a diversification strategy, it is an alternative way to get investment exposure. The analysis suggests that over the medium to long term, investors are over-compensated for the risk that they take on. However, in the short term, the value of a fund that implements this strategy will move up and down with the markets. The value of a fund will be particularly vulnerable to a sharp large fall in equity index levels. The global financial crisis was, in many ways, a perfect storm for the strategy; markets fell, volatility increased, and credit spreads expanded. Investors must be prepared to accept that they have equity market exposure.

Levendi are at the forefront of this new wave of investment management, capturing value through identifying the dislocation between risk neutral market pricing and investor value. For more information about the Levendi Thornbridge Defined Return Fund visit our website <https://www.levendi-im.com/product/defined-return-fund/>.

FURTHER INFORMATION

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