

# PORTFOLIO INSURANCE: WHAT IS IT AND HOW IS IT IMPLEMENTED?

by

**R. Bird and M. Tippett**

Professor and Reader, Department of Commerce,  
Australian National University

In 1980, a California-based firm first offered a service that appeared too good to be true — the opportunity to invest in an equity portfolio without the risk of losing any capital. The firm was called Leland, O'Brien and Rubenstein Associates and the name they gave to the service was Protective Portfolio Management. Not surprisingly there has been a great deal of interest in this service. By the end of 1985 funds in excess of \$10 billion were managed under this or similar schemes offered by one of several competing organisations. Estimates are that funds invested in this way will exceed \$20 billion by the end of 1986<sup>1</sup>.

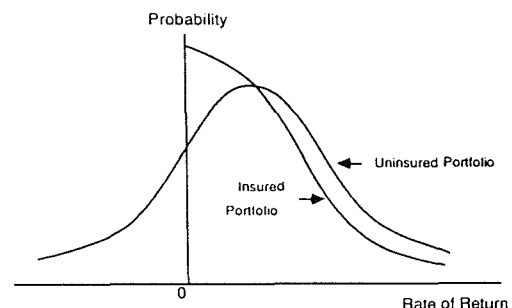
The techniques used to eliminate the possibility of downside movements in the value of portfolios have come to be known under the generic title of portfolio insurance. The principal benefit that portfolio insurance provides to a fund manager is an assurance that as a minimum, the funds under his control will be maintained over a specified period irrespective of the performance of the equity market and, in particular, the shares in which he invests. For example, assume a manager commences with \$1m. in funds and wishes the term of the insurance to be one year. Portfolio insurance allows the manager to determine the shares in which to invest during the year but guarantees that the minimum value of his fund will be \$1m. at the end of the year. Such an assurance does not come without cost; this being that the insured portfolio will earn less than an identical uninsured portfolio in a bull market. Perhaps the best way to illustrate these costs and benefits is by way of Figure 1 which sketches the return distribution for an insured portfolio and an identical uninsured portfolio over a particular time period. It can be seen from this figure that the insurance has the effect of removing the negative tail from the return distribution but at the cost of achieving a slightly lower rate of return as compared to an uninsured portfolio, when the market is performing well.

There are many ways that one can eliminate the downside risk of a portfolio. A very simple approach is to use a stop-loss order. In this case the \$1m. would be fully invested in shares at the beginning of the year and

there would be no reason to move any funds out of equities provided the value of the portfolio remained above \$1m. during the entire year. However, if the value of the portfolio did fall below \$1m. there could be no assurance that its end-of-year value would be less than \$1m. The essence of the stop-loss approach is that if the equity portfolio is not performing well, it is entirely sold off and the funds invested in government securities at a time that ensures the invested funds will accumulate to \$1m. by the end of the year. The problem with the use of this strategy is that it involves a once-and-for-all switch from equities and there is no way of moving back into equities until the end of the year (even if the equity market subsequently rises). A modified version of the stop-loss approach allows partial movements both into and out of equities during the year unless a point is reached when the funds are fully invested in debt securities. Although neither of the stop-loss approaches are recommended, they do introduce us to the practice of switching between equities and government debt securities which is the basis of the most popular portfolio insurance technique.

An efficient way to create an insured portfolio is to combine a long position in a portfolio of equities with a long position in a put option on this portfolio (ie. buy a put option written against the underlying portfolio). This strategy is described as a protective put as the investor is protected against any fall in the value of the equity portfolio. In our example where the portfolio

**Figure 1**



has an initial value of \$1m., the strategy would be to buy a put option(s) with a striking (exercise) price of \$1m. and an expiration date one year hence. In the event that the value of the portfolio was greater than \$1m. at the end of the year, then the value of the portfolio would be greater than the original amount and the put option would not be exercised. On the other hand, if the value of the portfolio fell below \$1m. at this time, then the put option would be exercised and this would amount to selling the portfolio for \$1m. Therefore, this protective put strategy effectively insures the portfolio against loss at a cost (i.e. premium) which is equivalent to the price paid for the put. This approach to portfolio insurance is illustrated in Figure 2 where a payoff table is drawn for each of the equity portfolio, the put option and the protected put strategy.

There are a number of problems associated with using puts to insure a portfolio. The main one being that it would be almost impossible to buy the required put because:

- (i) the only options traded are written against the Sydney Stock Exchange All Ordinaries Index and the shares of a limited number of companies,
- (ii) the trading in these put options is fairly thin and almost entirely restricted to puts with a maximum period to expiration of less than three months, and
- (iii) only a limited number of specified striking prices are available for each put option contract.

As a consequence, it is unlikely that a position could be created using put options that would perfectly insure the underlying portfolio. Further, the use of a protective put would prove quite expensive as there would be a need to roll-over the put options a number of times in order to achieve a term of insurance of one year. It also should be noted that traded options allow the holder to exercise them at any time up to the

expiration date (i.e. American options), whereas portfolio insurance only requires an option which can be exercised at the expiration date (i.e. European option). As a consequence those using traded puts to implement a protective put strategy are paying for a facility that they do not require.

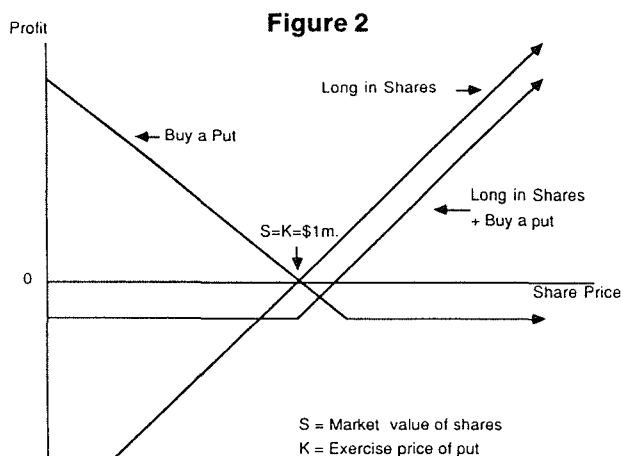
Largely because of these problems portfolio insurance is usually implemented with the use of synthetic puts. A synthetic put is created by a short position in equities and a long position in government debt securities. At the beginning of each insurance period, the available funds are allocated between a portfolio of shares and government debt securities. During the period, this mix will be adjusted with the proportional holding of equity being increased (decreased) as the value of the share portfolio increases (decreases). The actual mix throughout the term of the insurance is determined with the objective of ensuring the initial capital is maintained. Perhaps the best way to demonstrate how this is achieved is by way of an extension of our simple example. As before we commence with \$1m. which if totally invested in shares will yield either \$900,000 or \$1.2m. at the end of the year. Further, we assume that the riskless rate of interest is 12.5 percent. In this case an insured portfolio can be achieved by creating a synthetic put as follows:

Investments	Beginning of period	End of period	
		$S_1 = \$0.9m.$	$S_1 = \$1.2m.$
Shares	\$666,666.66	\$600,000	\$800,000
Gov't Securities	355,555.56	400,000	400,000
	<u>\$1,022,222.22</u>	<u>\$1,000,000</u>	<u>\$1,200,000</u>

In effect, the synthetic put in this example involves a short position in shares equivalent to \$333,333.34 and a long position in government debt securities of \$355,555.56. The difference between these two positions is \$22,222.22 which represents the cost of the put option. This is exactly the situation represented in Figure 2 where the cost of the option (i.e. insurance premium) would be lost in the event of the equity portfolio not maintaining its initial value. This cost can be avoided by rebalancing the initial portfolio as follows:

Investments	Beginning of period	End of period	
		$S_1 = 0.9m.$	$S_1 = \$1.2m.$
Shares	\$555,555.56	\$500,000	\$666,666.66
Gov't Securities	444,444.44	500,000	500,000.00
	<u>\$1,000,000.00</u>	<u>\$1,000,000</u>	<u>\$1,166,666.66</u>

This rebalanced position has the advantage that it can be financed with the initial funds of \$1m. and these funds will be maintained irrespective of the performance of the equity portfolio. Although, no additional cost is borne at the time of the establishment of the synthetic put, a cost is borne by way of a reduced return in a "bull" market.



Although the above example is very simple, it does illustrate the essential elements of using synthetic puts to create portfolio insurance. Computer programs are used to track the value of the insured portfolio and generate the information which leads to changes in the mix of funds invested in the share portfolio and government securities. The important advantage of this approach is that it provides customised insurance to the specific portfolio held by the fund manager. As such it is not subject to the problems previously discussed in implementing the protective put strategy.

There are a number of key decision variables in the above synthetic put strategy. These include<sup>2</sup>:

1. **The term of the insurance policy:** A popular choice being one year as this is consistent with the typical period for the evaluation of fund managers. It should be noted that some US pension funds have taken out insurance for periods in excess of five years.
2. **The period between rebalancing:** It is not possible to allow too great a change in the underlying share portfolio to occur without a change in the mix of shares and government securities as this would endanger the ability to fully insure the initial funds. Therefore, it is usual to change this mix whenever the value of the underlying share portfolio moves by a specified percentage (eg. four per cent). It is also common to reassess this mix every month if a change has not been triggered during this period by a movement in the value of the share portfolio.
3. **The locking in of any increase in the value of the share portfolio:** The "pure" form of portfolio insurance as outlined above does not lock in any increase in the value of the share portfolio during the insurance period. For example, if the value increased by 25 per cent in the first half of the period but then fell by 40 per cent, then the insured portfolio would only maintain its initial value. It is possible to implement a decision rule into the insurance process which enables the locking in of certain pre-specified increases in the value of the share portfolio (eg. lock in every successive increase of ten per cent). The benefit of so doing would be to lock in past gains but at the expense of giving up a small proportion of any subsequent increases.

Before completing this brief introduction to the relatively new concept of portfolio insurance, there are two additional issues that the potential user should

find of potential interest. First, there is the cost of implementing the alternative methods of portfolio insurance. Basically, these costs come from two sources — the insurance premium (e.g. the cost of a put option) and the cost of transacting (e.g. between shares and government securities.) Early indications are that these costs will approximate four per cent of the insured value of the portfolio where the insurance is effected using either put options or synthetic puts. An alternative is to use futures contracts to effect the insurance which will result in a reduction of transactions costs to approximately three and a half per cent. This approach involves combining a long position in a share portfolio with a short position in a futures contract which (ideally) is written against this portfolio. The actual mix between these two positions is determined in a way similar to that utilised in creating a synthetic put. In terms of our example, the initial \$1m. would be invested in a share portfolio and a futures contract(s) would be written against a proportion of the holdings of the underlying portfolio. Subsequently either more futures contracts would be sold if the value of the share portfolio fell or futures contracts would be repurchased if the value of the portfolio rose. The difficulties of implementing this strategy are similar to those associated with the implementation of the protective put strategy — e.g. futures contracts that replicate diverse equity portfolios do not exist; there is no trading in longer term futures contracts.

Second the above discussion may erroneously suggest that the use of the techniques that have been surveyed are limited to insuring the initial value of a fund. One alternative that some users have utilised is to specify the percentage loss that they are prepared to accept — e.g. they insure that the maximum which will be lost over any insurance period will be five per cent of the initial funds. These restrictions on downside risk can be easily implemented and would result in giving up less on the upside than where complete insurance of initial capital is required. Referring back to Figure 1, the portfolio insurance techniques can be used to achieve whatever transformation is required on the return distribution for the uninsured equity portfolio. A different approach is to combine portfolio insurance with an immunised bond portfolio to lock in a minimum guaranteed return over a specified time period. Finally, it should not be thought that the use of this insurance is limited to share portfolios as it also can be used to hedge against other types of risk such as those associated with holding foreign currencies.

## FOOTNOTES

1. W. Falloon, "Drench the Downside", *Intermarket*, January 1986 pp29-32.
2. The authors have simulated the consequences for the return distribution of substituting different values for these decision variables. The preferred values in a particular portfolio will depend upon the preferences of the fund manager.