EQUITY QUANTITATIVE & DERIVATIVES RESEARCH

Equity-Linked Notes

An Introduction

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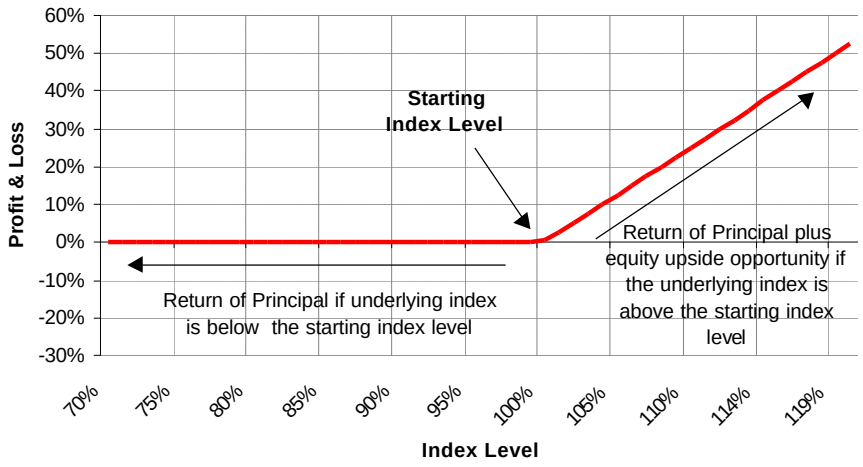
An Equity-Linked Note (ELN) is an instrument that provides investors fixed income-like principal protection together with equity market upside exposure.

- An ELN is structured by combining the economics of a long call option on equity with a long discount bond position.
- The investment structure generally provides 100% principal protection. The coupon or final payment at maturity is determined by the appreciation of the underlying equity.
- The instrument is appropriate for conservative equity investors or fixed income investors who desire equity exposure with controlled risk.

Profit Diagram (at Expiration) of an Equity-Linked Note



Source: Lehman Brothers

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Security Description

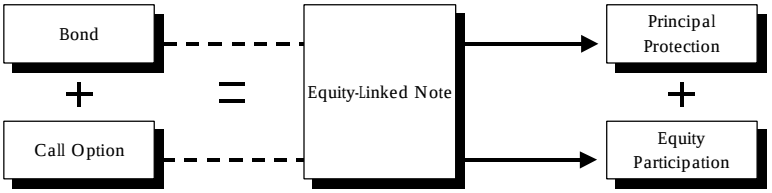
An Equity-Linked Note (ELN) is a debt instrument that differs from a standard fixed-income security in that the coupon is based on the return of a single stock, basket of stocks or equity index (the "underlying equity"). An ELN is a principal-protected instrument generally designed to return 100% of the original investment at maturity, but diverges from a standard fixed-coupon bond in that its coupon is determined by the appreciation of the underlying equity.

There are many groups of investors who incorporate ELN's into their investment strategies, including:

- Conservative, risk averse equity investors or intermediate-term fixed-income investors.
- Tax-exempt / tax-deferred accounts and off-shore accounts.
- Investors for whom structural problems prohibit or limit equity allocations (e.g., certain trusts, retirement accounts / pension funds or insurance companies).

The Equity-Linked Note can be constructed by packaging a call option and a zero coupon bond. The call option provides the note buyer with exposure to the underlying equity. The zero coupon bond provides the note buyer with principal protection. A zero coupon bond allows for principal protection since it accretes from its discount value to its par value over a specified period of time without periodic payments of interest. The discount from the par value of the zero coupon bond can be used to purchase the call option on the underlying equity. Figure 1 illustrates the structure.

Figure 1: Structure of an Equity-Linked Note



Source: Lehman Brothers

Economic Performance and Structure

The payoff of a typical equity-linked note is equal to the par amount of the note plus an equity-linked coupon. In general, the equity-linked coupon is equal to either:

(a) zero, if the underlying equity has depreciated from an agreed upon strike level (usually the index level on the issue date of the note), or

(b) the participation rate *times* the percentage change in the underlying equity *times* the par amount of the note, if the underlying appreciated[1]

The *participation rate* is the rate at which the ELN investor participates in the appreciation of the underlying equity. For example, a participation rate of 100% implies that a 10% increase in the underlying equity will result in a final equity-linked coupon of 10%. If the participation rate were instead 75%, a 10% increase in the underlying equity would mean a final equity-linked coupon of 7.5%. The participation rate is typically adjusted so that the ELN may sell at par.[2]

As an example of an ELN, assume an investor buys a hypothetical five-year 100% principal protected Equity-Linked Note with 100% participation in the upside of the S&P 500 Index for $1,000. The starting index level is 1,400.

- At maturity, if the S&P 500 Index level is above 1,400, then the payoff of the note will be $1,000 in principal plus an equity-linked coupon equivalent to any increase in the index. For example, if the index level in five years is 2,100 (an appreciation of 50%), then the coupon would be $500 (100%*50%*1,000) and the total payoff would be $1,500 ($1,000 + $500).

- If the index level is below 1,400 at maturity, i.e., the underlying equity performance is negative, the final payoff to the investor will be $1,000 in principal.

Figure 2 illustrates the payout and return analysis for the hypothetical ELN described above.

[1] Let P be the par amount of the bond, K be the agreed upon strike, S be the price of the underlying equity, and r be the participation rate. Then the payoff of the equity-linked note is:

P if $K \geq S$ and

$$P + r * \left(\frac{S}{K} - 1 \right) * P \text{ if } K < S .$$

[2] For the note to sell at par, the participation rate has to equal the interest amount on the bond divided by the call premium.

Figure 2: Payout and Return Analysis of a hypothetical Equity-Linked Note

Final SPX Level	Price Return on SPX	Principal Payout	Equity Participation	Total Payout	Return on Notes
2,100 (150%)	50%	$1,000	$500	$1,500	50%
1,960 (140%)	40%	$1,000	$400	$1,400	40%
1,875 (134%)	34%	$1,000	$339	$1,339	34%
1,820 (130%)	30%	$1,000	$300	$1,300	30%
1,680 (120%)	20%	$1,000	$200	$1,200	20%
1,540 (110%)	10%	$1,000	$100	$1,100	10%
1,400 (100%)	0%	$1,000	$0	$1,000	0%
1,260 (90%)	-10%	$1,000	$0	$1,000	0%
1,120 (80%)	-20%	$1,000	$0	$1,000	0%
980 (70%)	-30%	$1,000	$0	$1,000	0%
840 (60.0%)	-40%	$1,000	$0	$1,000	0%
700 (50%)	-50%	$1,000	$0	$1,000	0%

Source: Lehman Brothers

Note: The hypothetical ELN assumes 100% participation in the upside of the S&P 500 Index.

Upside potential. The upside potential for this hypothetical ELN is unlimited. The potential positive return on the notes is the same as the positive price return on the S&P 500 Index.

Downside risk. The downside risk is limited. The equity-linked note provides full principal protection. Regardless of the final S&P Index level, principal is returned.

Opportunity Cost. Although ELN's repay an investor their principal at maturity, there is an opportunity cost even where an investor receives a return of principal in down markets; i.e., that investor has lost the use of his/her invested principal for the term of the ELN (in an investment in a risk-free asset like a T-bill, for example).

> Opportunity cost can be defined as the forgone "risk-free rate of return" that could have been achieved had the principal been invested in safe fixed-income securities, such as US Treasury bills, for the same period. For example, an investment of $1,000 on a 6% per annum coupon bond will return $1,338 at maturity, $338 higher than the ELN. The equity-linked note will outperform the bond as long as the S&P 500 Index reaches a level higher than $1,875 at maturity. See Figure 2 above.

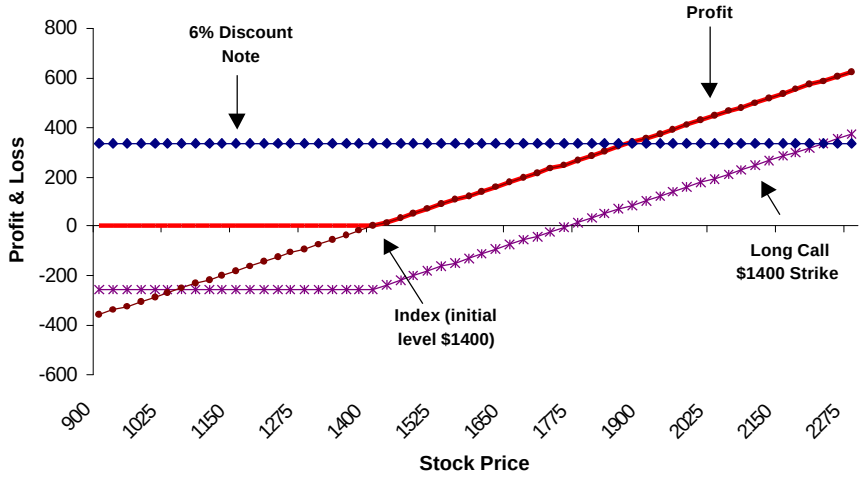
Synthetic Equivalent. To synthetically create an ELN, an investor would (1) invest in a five-year 6% discount bond for $747.26 (1,000/(1.06)^5) and (2) buy a five-year, S&P 500 at-the-money call option on $1,000 notional amount with a $1,400 strike for $252.74. The initial investment for this structure is $1,000, the same as for the ELN ($747.26+$252.74).

- If the S&P 500 Index level in five years is above 1,400, then the call option expires in-the-money. For example, if the S&P level is 2,100, then the payoff of the option is $500 (50% appreciation of the index multiplied by $1,000 notional amount). The payoff of the option, combined with the $1,000 principal from the bond equals the $1,500 payoff of the ELN.

- If the S&P 500 Index level is below 1,400, then the call option expires out-of-the-money, or worthless. The total payoff is therefore $1,000 from the discount bond, same as the ELN.

The structure of the ELN and its components is illustrated in Figure 3.

Figure 3: Profit Diagram (at Expiration) of ELN and its Components



Source: Lehman Brothers

Additional Considerations

Equity-Linked notes are flexible securities that can be structured to match the investor's risk-reward objectives. For example, the equity-linked coupon can be based on a variety of domestic and international market indices and individual stocks. By adjusting the amount of principal protection or capping the upside potential, there may be opportunity for increased participation and/or higher potential returns. The note can be designed to have coupons payable on a monthly, quarterly or semiannual basis. For international indices, the equity component can be priced with and without currency exposure. Finally, the note can be structured so as to achieve a desired participation rate. Figure 4 describes the factors affecting the participation rate.[3]

Figure 4: Factors Affecting the Participation Rate of an ELN

Change in Factor	Option Premium	Interest on Note	Participation Rate
Increase in Volatility	↑	--	↓
Increase in Dividend Yield	↓	--	↑
Improved Credit Rating	-	↓	↓
Increase in Time to Expiration	↑	↑↑	↑
Equity Averaging	↓	--	↑

Source: Lehman Brothers

Creditworthiness of the Issuer. Investors should consider the ability of ELN issuers to repay principal and interest, if any, at maturity. This will be based on the issuer's credit quality.

Taxes. The notes are subject to U.S. Treasury regulations that apply to contingent payment debt instruments. As a result, U.S. holders are subject to federal income tax on the accrual of original issue discount in respect of the notes. In other words, even though the interest coupon is paid at maturity of the ELN, during the intervening periods, accumulated interest would be treated as having been received for income tax purposes. In addition, gain or, to some extent, loss, on the sale, exchange or other disposition will generally be ordinary gain or loss. Investors should consult their own tax advisors concerning the federal income tax consequences of an ELN investment.

An increasing number of Equity Linked Notes are being issued and listed on exchanges. There are many different names for Equity Linked Notes, and each brokerage firm uses it's own acronym when listing such structures. Although some may have slightly different characteristics, i.e., some have interim coupons, some don't provide full protection, some have participation rates less than 100%, most follow the general ELN structure.

- SUNS: Stock Upside Note Securities (Lehman Brothers)

[3] Remember that the participation rate is equal to the interest on the note *divided by* the option premium.

- MITTs: Market Index Target-Term Securities (Merrill Lynch & Co., Inc.)
- ELKS: Equity-Linked Securities (Salomon Brothers, Inc.)
- SIGN: Stock Index Growth Notes (Goldman, Sachs & Co.)
- Stock Index Return Securities (Paine Webber Group Inc.)

Factors Affecting the Value of ELNs before Expiration

The interim performance of the ELN is contingent on the contributions of the underlying economic components: the long bond and long equity call positions. The long bond component rises (or falls) when interest rates decrease (or increase); the equity component declines (or rises) in connection with declines (or rises) based on the underlying equity; time to maturity; volatility and interest rates. Also, a rise (or decline) in expected dividend payout of the underlying equity would decrease (or increase) the call option value. Figure 5 summarizes the effect on the different factors that affect the bond and the call on the ELN price.

Figure 5: Factors Affecting the Price of Equity-Linked Notes

Change in Factor	Long Call	Long Note	ELN
Increase in Equity Price	↑	--	↑
Increase in Volatility	↑	--	↑
Increase in Interest Rates	↑	↓	↑ or ↓
Increase in Time to Expiration	↑	--	↑
Increase in Dividend Yield	↓	--	↓
Improved Credit Rating	--	↑	↑

Source: Lehman Brothers

Summary

Most investments that offer a significant upside opportunity also involve significantly more risk. Equity-Linked Notes combine the principal protection feature of traditional fixed-income assets with the higher return potential of equity assets. They allow investors to avoid falling into either too-risky or too-low return investments.

The interim performance of an ELN is contingent on the contributions of the underlying economic components: the long bond and long equity call positions. These components are affected by changes in the underlying equity price, volatility, interest rates, time to expiration, dividend yield and issuer credit rating.

The strategy may be appropriate for conservative and risk-averse equity investors or fixed income investors with a long-term bullish view on the equity market.

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