Wharton
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Equity Swaps and Equity Investing

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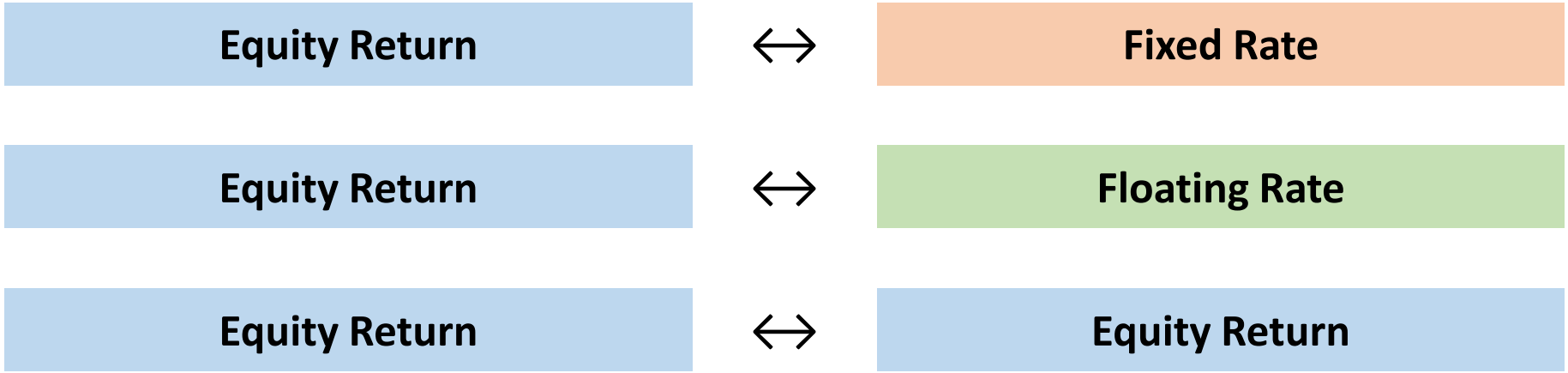
Chance, Don M. "Equity swaps and equity investing." The Journal of Alternative Investments 7.1 (2004): 75-97.

Overview

- Swap: Financial transaction in which one party agrees to make a series of payments to another at regularly scheduled dates
- Equity Swap: At least one side of the payments is determined by a stock or stock index
  - Some equity swaps may come very close but are not identical to the return on stock or index
- Three main types



Type 1: Equity Return ↔ Fixed Rate

On December 15 of a given year, Dynamic Money Management enters into a swap to pay a fixed rate of 5% with payment terms of 90/360 and receive the return on the S&P 500 with payments to occur on March 15, June 15, September 15, and December 15 for one year. Payments will be calculated on a notional principal of $20 million. The counterparty is the swaps dealer Total Swaps, Inc. The S&P 500 is at 1105.15 on the day the swap is initiated.

- Fixed rate of 5%
  - Calculated so that the PV of equity payments is the same as the PV of fixe payments
- 90/360
  - Adjustment factor for calculating the interest rate (5% in this case)
  - In the example above, for each payment, pay the interest of $5\% \cdot \frac{90}{360} = 1.25\%$ as fixed rate
- Return on S&P 500 & Notional Principal of $20 Million
  - On each settlement date, the return on the S&P 500 is calculated and applied to the $20 million notional principal to determine the payment to be received

Type 2: Equity Return ↔ Floating Rate

On December 15 of a given year, Dynamic Money Management enters into a swap to pay a floating rate of 90-day LIBOR with payment terms of 90/360 and receive the return on the S&P 500 with payments to occur on March 15, June 15, September 15, and December 15 for one year. Payments will be calculated on a notional principal of $20 million. The counterparty is the swaps dealer Total Swaps, Inc. The S&P 500 is at 1105.15 and 90-day LIBOR is 4.75% on the day the swap is initiated.

- Floating rate of 90-day LIBOR
  - LIBOR (London Interbank Offer Rate): most common interest rate used in dollar-based derivative transactions
- 90/360
  - Adjustment factor for calculating the interest rate once the LIBOR gets known
- Return on S&P 500 & Notional Principal of $20 Million
  - On each settlement date, the return on the S&P 500 is calculated and applied to the $20 million notional principal to determine the payment to be received

Type 3: Equity Return ↔ Equity Return

On December 15 of a given year Dynamic Money Management enters into a swap to pay the return on the NASDAQ Composite index and receive the return on the S&P 500 with payments to occur on March 15, June 15, September 15, and December 15 for one year. Payments will be calculated on a notional principal of $20 million. The counterparty is the swaps dealer Total Swaps, Inc. The S&P 500 is at 1105.15 and NASDAQ is at 1705.51.

- Return on the NASDAQ and S&P 500
  - The party that is paying the NASDAQ return may end up receiving the NASDAQ return
  - This is the case when NASDAQ earned negative return (See below)

Date	S&P 500 Index	Periodic Return on S&P 500	S&P 500 Cash Flow	NASDAQ Index	Periodic Return on NASDAQ	NASDAQ Cash Flow	Net Cash Flow
December 15	1105.15			1705.51			
March 15	1129.48	2.2015%	$440,300	1750.78	2.6543%	-$530,860	-$90,560
June 15	1084.30	-4.0001%	-800,020	1689.25	-3.5144%	+702,880	-97,140
September 15	1055.29	-2.6755%	-535,100	1609.67	-4.7110%	+942,200	407,100
December 15	1099.52	4.1913%	838,260	1678.51	4.2767%	-855,340	-17,080

Applications

Diversifying a Concentrated Portfolio

- Useful in a situation where selling the stocks is not a feasible option
- Enter into equity swap to pay return on stocks and receive return on stock index

Achieving International Diversification

- Direct investment in international stocks may result in additional costs
  - Withheld dividends (the dividends can be recovered, but the interests may not)

Executing Asset Allocation Decisions

- Flexible changes in allocation enabled by equity swaps

Hedging Equity Position

- Corporate executives often have significant investment in stocks of their employers
  - Often used to maintain voting rights and reduce stock exposure at the same time

Advantages and Disadvantages

ADVANTAGES

- Very customizable (nature of OTC)
  - Suited to address specific time horizons, portfolio compositions, or other terms and conditions that are not matched by exchange-listed instruments
- Hide signals sent to investors of the intention and position of a particular investor
- Low transaction costs
  - No custodial cost that would be associated with the holding of stock and no withholding taxes on positions related to foreign stock indices

DISADVANTAGES

- Substantial cash flows
  - When large cash outflows are not offset by gains on stock positions, the gains on the stock may have to be liquidated to fund cash flows
- Re-establishment of contract necessary
  - No termination date
- Bid-ask spread
  - The more customized the swap, the more costly in terms of bid-ask spread that the dealer would impose
- Credit Risk
  - Use of the equity swap assumes the risk of the dealer defaulting

Pricing & Valuation - Example

Equity Return ↔ Fixed Rate

- Consider a swap initiated at time 0 and has a set of $n+1$ payments that occur at time $t, t+1, \ldots, t+n$
- Let $S(j)$ be the price of the stock at time j and let R be the fixed rate specified in the swap
- Let $B(j,k)$ be the price of a zero coupon bond at time j that pays \$1 at its maturity time $k, k \geq j$.
- Let $V(j;0,t+n)$ be the value of the swap at time j given that the swap was initiated at time 0 and has a final payment scheduled at time $t+n$
- The cash flows on this swap to the party paying a fixed rate R and receiving equity return are:

$$\text{time } t: \quad \frac{S(t)}{S(0)} - (1+R)$$

$$\text{time } t+1: \quad \frac{S(t+1)}{S(t)} - (1+R)$$

$$\vdots$$

$$\text{time } t+n: \quad \frac{S(t+n)}{S(t+n-1)} - (1+R)$$

Pricing & Valuation - Example

Replicating Cash Flows

- The first cash flow, $S(t)/S(0) - (1+R)$ can be replicated by
  - At time j, invest the amount $S(j)/S(0)$ in the stock + Borrow $(1+R)B(j,t)$
  - At time t, the invested amount becomes $S(t)/S(0)$ and the borrowed amount becomes $(1+R)$
- The second cash flow, $S(t+1)/S(t)$ can also be replicated similarly:
  - At time j, invest the amount $B(j,t)$ in a risk-free bond + Borrow $(1+R)B(j,t+1)$
  - At time $t+1$, the invested amount becomes $S(t)/S(0)$ since at time t, it was at $\$1$
- Using these two replicating mechanisms, we can substitute the original cash flows and arrive at:

$$V(j;0,t+n) = \frac{S(j)}{S(0)} - B(j,t+n) - R\sum_{i=0}^{n} B(j,t+1)$$

- To get R, we can plug in $j=0$ to arrive at:

$$R = \frac{1 - B(0,t+n)}{\sum_{i=0}^{n} B(0,t+1)}$$