

Goldman, Sachs and co. nikkei put warrants – 1989



**ASSIGN
BUSTER**

Problem Statement

What should be the right pricing strategy for Nikkei Put Warrants (NPWs)?

Structure of Nikkei-Linked Euro-Yen Transactions

The European bank sold a bond that promised to make annual interest payments in yen at a fixed interest rate. However, through a set of swaps, the issuer transformed its annual fixed-rate yen payments into dollar-denominated LIBOR-based payments. This is represented by the left side transaction of the above figure.

At maturity, the issuer would redeem the bonds from the investor at a price tied to the Nikkei. If the Nikkei fell since the bonds were issued, the issuer would pay less than par to redeem the bonds. Thus, it would be as if the issuer sold bonds with the final principal payments at par but also bought a put option on the Nikkei maturing in the same year as the bond. If the Nikkei fell, the put would rise in value benefiting the issuer. This reflects the embedded nature of the put option.

The issuer had no interest in holding this put. It often resold the embedded put options to financial intermediaries like Goldman Sachs by promising to deliver, at maturity, the difference between the bond's par value and its Nikkei-linked redemption price. In exchange for promising to make this payment, which equaled the intrinsic value of the embedded put, the bond issuer would be paid an up-front put premium. This is represented by the right side transaction in the above figure.

Goldman Sachs then could sell these puts to institutional customers. Not all of these puts were sold to institutional customers. As of December 1989, <https://assignbuster.com/goldman-sachs-co-nikkei-put-warrants-1989/>

Goldman Sachs had a significant inventory of European-style puts on Nikkei and it was offsetting the risk on these puts through the futures offered by Singapore, Tokyo and Osaka stock exchanges. The sales force of Goldman Sachs gave extremely positive feedback on the embedded put options and it was decided that exchange-traded put warrants would be a good product offering from the company's point of view.

Role of Kingdom of Denmark

Goldman Sachs was a private partnership and non-SEC registrant and hence could not issue the warrants publicly without making material public disclosures. Therefore it was necessary for it to work with an issuer registered with the SEC. The issuer would sell the warrants to the public but simultaneously enter into a private contract with Goldman Sachs that exactly offset the obligation under the warranty contract. In return, it would receive a fee from Goldman Sachs without effectively having any exposure to Nikkei. In addition to the above argument, the issuer should be a highly creditworthy and non-US sovereign entity due to adverse reporting implications for a US corporate issuer. Based on the above criteria, Goldman Sachs entered into an agreement with the Kingdom of Denmark, which would get a fee of \$1.3 million from these transactions. Risks exposure for Goldman Sachs

Risk of bearing the unsold inventory of NPWs

If the investors find prices too high then much of the inventory would remain unsold and GS will have to bear the costs of unsold warrants.

Risk Mitigation

GS would offset its risk through a futures position in the Nikkei offered by the Singapore, Osaka & Tokyo stock exchanges.

Exchange Rate Risks

Considering the preference of U. S investors, GS would bear the exchange rate risks for its investors. This implies that GS has to sell NPWs in terms of dollars whereas the same has been purchased by it in terms of yen. Also, in the 1980s, the Nikkei and the yen/dollar exchange rate were moving in opposite directions which further increased its exposure to exchange rate risk.

Risk Mitigation

This can be mitigated through Quantos, a product offered by its currency and commodity division. A complete hedge would cost GS about \$1 per warrant whereas hedging 80% of its risk would cost it \$0.50 per warrant only. Reputable at risk GS would not like to keep the prices very low. At the same time, it cannot price them very high as there is a risk that competitors might copy the product and start selling it at lower prices. Also, if NPWs started trading at lower prices in the secondary market this would bring disrepute for the organization and its partners involved.

Price Calculation Assumptions

- Constant Volatility
 - Securities are traded continuously
 - Zero transactions costs
 - The risk free rate is constant and it is possible to borrow and lend infinitely at this rate
- Variables for put intrinsic value calculation
- S_0 = Nikkei index = 38586.16
 - Exercise price = 38587.68
 - q = dividend yield = 0.49%

- Risk-free rate = 5.85% • T = time to maturity = 3 years

Based on the above inputs, the price of the American option is 1852.9 yens which is \$2.57. When the cost of hedging is added, this becomes \$3.57.

Fixed Costs Fee for the Kingdom of Denmark: \$ 1300000 Legal and listing fee: \$ 350000 Commissions: \$ 3000000 Costs of R&D: \$ 1250000 Total:

\$5900000 Cost per NPW: \$0.621 Total fixed plus variable: \$4.191 Hence,

this is the minimum price Goldman Sachs can charge for NPWs.