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Hedging FX Exposures: Which Strategy is Right for Your Business?

This article addresses foreign exchange (FX) risk, examines a large Swiss multinational company and the impact on its financial statements (second half of 2011), and suggests various hedging strategies using FX options.

Udi Sela - Vice President - Numerix - 27 Oct 2011

Since the sub-prime crisis, the markets have witnessed unprecedented levels of volatility across all asset classes. The impact of unpredicted volatility could be significant for the core businesses of corporations across the globe. In response, various hedging strategies were prepared towards the end of August 2011, and subsequently measured the performance of all strategies six weeks later (the beginning of October 2011).

The FX Market: Facts and Figures

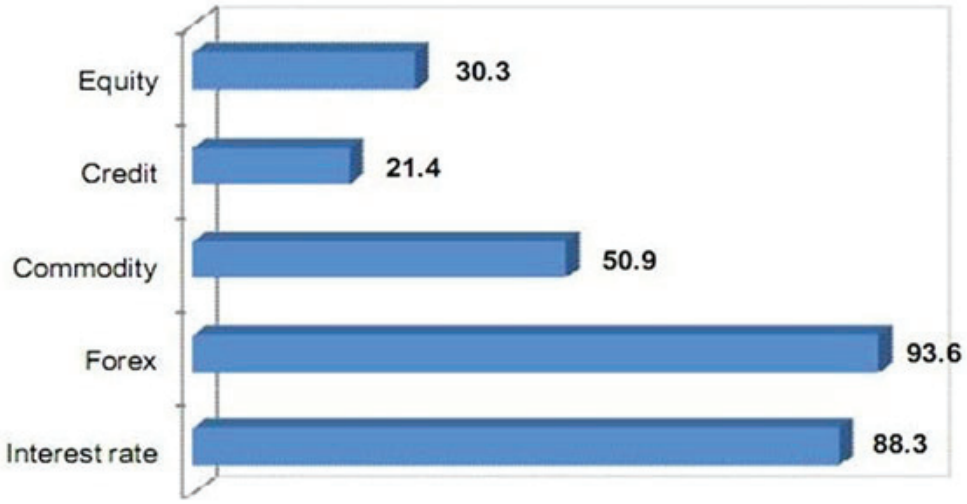
The foreign exchange (FX) market is the most liquid market today, serving a crucial role in facilitating international trade. According to the latest Bank of International Settlements (BIS) survey, published in April 2010, the market's daily volume is US$4 trillion. This represents a 20% growth rate, as compared to April 2007 when the previous survey was carried out.

Over the same period, FX derivatives volume has increased by 9%. Interestingly, the market has become more global as the cross-border trading represents now 65% of all FX trading.

Corporations Hedging

A new survey shows that 94% of the world's largest corporations report using derivatives to manage business and macroeconomic risks. Another study recently conducted amongst Fortune 500 corporations reveals that FX and interest rate derivatives are the most widely used instruments among large global corporations.

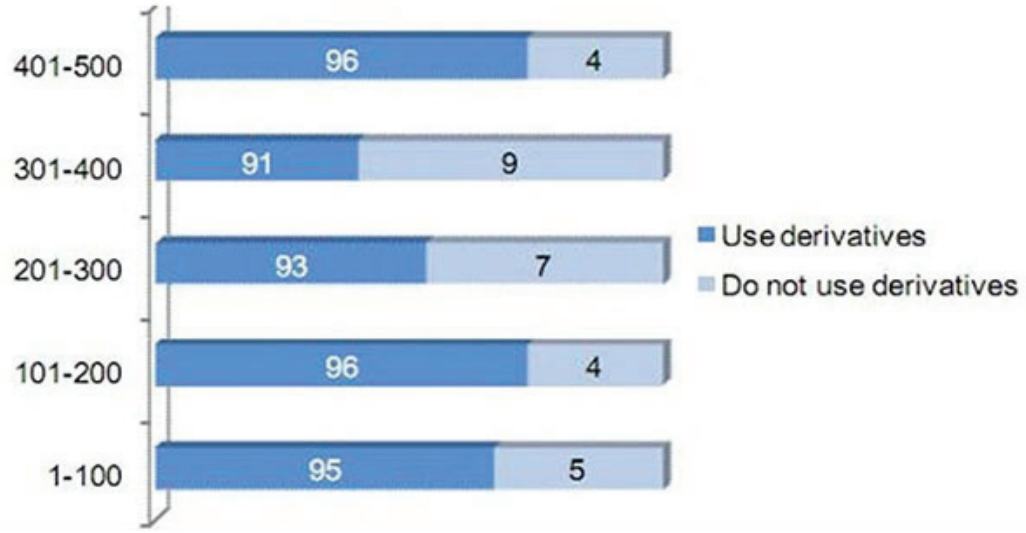
Figure 1: Derivatives Types Used by Fortune 500 Companies



Source: Numerix

Interestingly, the usage of derivatives is almost evenly spread among the different tiers of the companies of the Fortune 500, as the following Figure 2 illustrates. This may seem counterintuitive.

Figure 2: Hedging Usage by Tier Among Fortune 500 Firms



Source: Numerix

The Swiss Franc

The recent turmoil in the markets has triggered a run to financial assets that market practitioners perceive as a 'safe haven' currency. Among these assets, one can find US and German government bonds (which traded last month at very low yields - 1.78% and 1.75% respectively), gold (which traded last month at US$1900 per ounce), as well as other assets.

Traditionally, the Swiss franc has been perceived as a 'safe haven' currency. The country's economy is one of the world's most stable economies thanks to its policy of long-term monetary security and political stability.

The Swiss economy is strong, characterised by low inflation and unemployment, as well as low national debt (38.3% in 2010) and unemployment (3.0% May 2011). As one might have expected, the Swiss franc did strengthen over the course of the past three years, as Figure 3 illustrates.

Figure 3: US Dollar/Swiss Franc Three Years Spot Rate Chart

Source: Numerix

Case Study: Nestle

Nestle is one of the world's largest nutrition, health and wellness companies. It operates in almost all countries in the world, and its annual sales in 2010 were almost CHF110bn.

As a genuine global company, Nestle's financial performance (1H11) was significantly impacted by the strengthening of the Swiss franc. The overall impact on its various businesses was minus 13.8%, as Figures 4 and 5 illustrate.

Figure 4: Changes in Main Currencies and the Impact on Nestle's Financial Performance

Weighted Average Exchange Rates

CHF per	1H 2010	1H 2011	(%)
US Dollar (1)	1.09	0.90	-17
Euro (1)	1.44	1.27	-12
£ Sterling (1)	1.65	1.46	-11
Real (100)	60.34	55.36	-8
Mex. Peso (100)	8.55	7.62	-11
Yen (100)	1.19	1.11	-7

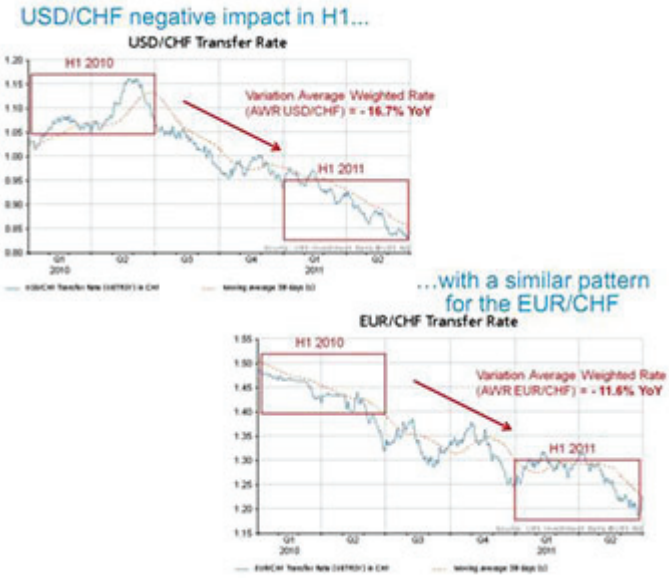
Currency Impact on Translation

Sales	Trading Operating Profit	Underlying EPS	Operating Cash Flow	Balance Sheet
-13.8%	-20bps	~ -15%	CHF 600mn to CHF 700mn	~CHF 5bn

Source: Numerix

Figure 5: Impact of Strengthening Swiss Franc on Nestle's Business Lines

(%)	1Q11	HY11
Nestlé Waters	-11.5	-15.8
Zone Americas	-9.4	-15.1
Nestlé Nutrition	-10.5	-15.0
Zone AOA	-8.1	-13.4
Other	-9.9	-12.7
Zone Europe	-10.8	-11.5
Total	**-9.8**	**-13.8**



Source: Numerix

Suggested Hedging Strategies

This part of the article will suggest various hedging strategies that could be applied by Nestle (and perhaps are being used to a certain extent by the company). For simplicity reasons, let's assume that on 22 August 2011 the firm has one projected cash flow of US$100m expected in six months that it needs to convert to Swiss francs. The possibilities the firm faces are:

- Take no action and convert to Swiss francs once the funds are delivered.
- Enter a six months forward transaction:
- Spot rate: 0.7900 (Swiss francs per US dollar).
- Six months forward rate: 0.7860 (Swiss francs per US dollar).

- Buy a vanilla option (put US dollar/call Swiss franc).
- Hedge the exposure by entering into a multi-leg strategy - there are several hedging strategies.

Buying a Vanilla Option

Buying a six months vanilla option (put US dollar/call Swiss franc), on a notional amount of US$100m, would give the firm the right to sell the US dollar amount and buy Swiss francs at the pre-agreed strike price. The premium is determined by the strike price. The higher the strike price is, the higher the prepaid premium. Table 1 displays various strike price and the cost of each respective option. In general, the option's premium increases as:

- The strike price is higher (the premium for an option struck at 0.7960 is higher than the premium for an option struck at 0.7860, for the same expiry date). In the case of call US dollar options, the premium reduces as the strike price increases.
- The option's expiry date is longer (the premium for an option expiring in one year is higher than an option expiring in six months for the same strike price).

Table 1: US Dollar Put/Swiss Franc Call Pricing Grid (Premium in Swiss Franc, Notional Amount US$100m)

	0.736	0.746	0.756	0.766	0.776	0.786	0.796	0.806	0.816	0.826	0.836
1w	130.07	1,368.16	9,738.94	48,387.48	173,724.30	468,858.25	994,550.39	1,739,970.78	2,634,087.06	3,600,446.50	4,592,269.79
1m	71,845.83	145,431.20	271,677.35	471,284.61	763,946.05	1,164,454.43	1,679,546.97	2,306,600.13	3,034,566.71	3,846,680.08	4,723,887.14
2m	263,086.76	410,818.84	615,641.76	887,981.80	1,236,308.35	1,666,169.94	2,179,593.96	2,774,954.13	3,447,305.94	4,189,094.63	4,991,078.35
3m	515,835.70	718,533.28	974,961.90	1,290,886.65	1,670,628.27	2,116,757.91	2,629,945.52	3,208,973.90	3,850,906.30	4,551,376.50	5,304,957.78
6m	1,173,104.62	1,454,909.76	1,780,574.81	2,152,019.78	2,570,497.52	**3,036,564.26**	3,550,081.87	4,110,249.53	4,715,660.96	5,364,381.82	6,054,041.09
9m	1,725,907.04	2,046,919.43	2,405,575.98	2,802,766.81	3,238,987.91	3,714,341.47	4,228,547.75	4,780,967.38	5,370,632.26	5,996,283.26	6,656,412.61
1y	2,220,746.22	2,567,102.96	2,946,788.76	3,360,251.50	3,807,676.70	4,288,993.46	4,803,885.72	5,351,808.21	5,932,006.21	6,543,538.20	7,185,300.57

Source: Numerix

Entering a 'Forward Extra'

This strategy is commonly-used by corporate treasurers. It is composed of buying one option and selling the other. The options are typically structured in a way that the overall cost for the corporate hedger is zero (the premium of the sold option offsets the premium of the bought option). The details of the strategy are as following:

- Buy a vanilla option: put US dollar/call Swiss franc strike 0.7800.
- Sell call US dollar, put Swiss franc SP07800 reverse knock in (RKI) with an activation trigger set at 0.8403. The trigger is 'American', implying that the option could be triggered anytime during the life of the option. However, if the market never trades at the trigger level (0.8403, in this example) or above, the option could not be exercised.
- Even amounts US$100m (each option).
- Same expiry date (six months).

The payoff of the forward extra strategy, at expiry would be as follows:

- Fully protected if market trades on expiry date at 0.7800 or below (sell at 0.7800).
- Sell the US dollar amount at the prevailing market rate if the underlying asset (USD/CHF) didn't trade at 0.8403, since the inception of the trade.
- Sell at 0.7800 in case the market traded at 0.8403.

The advantages of this strategy are:

- The worst case is known in advance (0.7800).
- Potential to sell up to 6.9% above the forward rate (best case 0.8403-0.7860).
- The strategy could be structured at zero initial cost.

The disadvantages of this strategy are:

- Limited upside: in case the Swiss franc weakens above 0.8403, the hedger is locked into 0.7800 and misses the unlimited upside potential.
- The worse-case scenario is inferior to the forward rate.

Entering a 'Bonus Forward'

This strategy is composed of three options. Two are bought by the hedger and one is sold. The premium that is received from the sold option is used to purchase the other two, in order to generate a zero cost strategy. The strategy is comprised of the following options (all non-vanilla options):

- Buy US dollar put, call Swiss franc strike price 0.7600 with a knock out trigger set at 0.8200.
- Buy US dollar put, call Swiss franc strike price 0.7890 with a knock in set at 0.8200.
- Sell US dollar call, Swiss franc put strike price 0.7890 with a knock in set at 0.8200.
- Even amounts US$100m per option.
- Same expiry date (six months).

The payoff of the bonus forward strategy, at expiry, would be as following:

- The hedger is fully protected if market trades on expiry date at 0.7600 or below.
- If the spot rate never traded at 0.8200, the company would sell its US dollar amount at the prevailing market rate (up to 0.8200).
- In case the US dollar/Swiss franc spot traded above 0.8200 the firm would sell its US dollars at 0.7890.

The advantages of this strategy are:

- The worst case is known in advance (0.7600).
- In the best case, the firm could sell the US dollar receivables at 0.8199 (4.31% above the forward rate).
- The strategy could be structured at zero initial cost.

The disadvantages of this strategy are:

- Limited upside: if the USD/CHF spot rate trades at 0.8200 or above, the firm would be locked to selling its US dollars at 0.7890 (still above the forward rate). Essentially, once 0.8200 level trades a synthetic forward deal is activated (the two knock-in options).
- The worse-case scenario is inferior to the forward rate.

Entering a Risk Reversal

This is yet another strategy frequently used by firms. It is also known as 'collar', 'cylinder', 'fence' or tunnel. It is composed of two vanilla options (one bought and one sold):

- Buy US dollar put, call Swiss franc at strike price 0.7600.
- Sell US dollar call, Swiss franc put struck at 0.8030.
- Even amounts US$100m per option.
- Same expiry date (six months).

The payoff of the risk reversal strategy, at expiry, would be as following:

- The hedger is fully protected if spot rate trades on expiry date at 0.7600 or below.
- If the USD/CHF trades between 0.7600 and 0.8030, the hedger would sell at the prevailing market rate.
- In case the market trades above 0.8030 the US dollar amount would be sold at 0.8030.

The advantages of this strategy are:

- The worst case is known in advance (0.7600).
- In the best case, the firm could sell the US dollar receivables at 0.8030 (2.16% above the forward rate) and up to this level the hedger participates in any potential upside.
- The strategy could be structured at zero initial cost.

The disadvantages of this strategy are:

- Limited upside: if the USD/CHF spot rate trades at 0.8030 or above, the firm would be locked to selling its US dollars at 0.8030 (still above the forward rate).
- The worse-case scenario is inferior to the forward rate.

Entering a Participating Forward

This strategy is composed of two vanilla options, one put US dollar and one call US dollar. Both options are struck at the same strike price and expire on the same day. However, the notional amounts are considered to be uneven.

In our example, the strategy is composed of the following options (at zero cost):

- Buy US dollar put, Swiss franc call struck at 0.8060, notional amount US$100m.
- Sell US dollar call, Swiss franc put struck at 0.8060 notional amount US$200m.
- Same expiry date (six months).

The payoff of the participating forward strategy, at expiry, would be as follows:

- The hedger is fully protected if spot rate trades on expiry date at 0.8060 or below and would sell US$100m to buy Swiss francs.
- In case the market trades above 0.8060, the hedge would sell US$200m at 0.8060.

The advantages of this strategy are:

- The hedging rate is known in advance (always fixed at 0.8060).
- The hedging rate in 200 points above the forward rate.
- The premium received from selling a call US dollar option with a doubled notional amount, is used to purchase an in the money US dollar put option, and thus generating a zero cost strategy.
- This strategy is used by clients that would sell additional amounts (beyond the original amount - US$100m in this example) in case the market goes their way (receive more Swiss francs per US dollar).

The disadvantages of this strategy are:

- Limited upside: if the USD/CHF spot rate trades above 0.8060 the firm would be obliged to selling its US dollars at 0.8060 (still above the forward rate).
- The hedger is forced into selling more US dollar than perhaps initially planned.

Entering a Reset Forward

This strategy is composed of eight options, including barrier options that generate a strip of four synthetic forward contracts (one active at a time). This strategy is structured at zero cost and offers participation in favourable market moves. Each time a certain barrier is met, one synthetic forward is deactivated (knocked out) and an additional contract is activated (knocked in).

In this example, the strategy is composed of the following options:

- Buy US dollar put, Swiss franc call struck at 0.7725 knock-out 0.8200.
- Sell US dollar call, Swiss franc put struck at 0.7725 with knock-out at 0.8200.
- Buy US dollar put, Swiss franc call struck at 0.7800 with knock-in at 0.8200, knock-out at 0.8600.
- Sell US dollar call, Swiss franc put struck at 0.7800 with knock-in at 0.8200, knock-out at 0.8600.
- Buy US dollar put, Swiss franc call struck at 0.7900 with knock-in at 0.8600, knock-out at 0.9000.
- Sell US dollar call, Swiss franc put struck at 0.7900 with knock-in at 0.8600, knock-out at 0.9000.
- Buy US dollar put, Swiss franc call struck at 0.8000 with knock-in at 0.9000.
- Sell US dollar call, Swiss franc put struck at 0.8000 with knock-in 0.9000.

The payoff of the reset forward strategy, at expiry, would be as following:

- The hedger is fully protected at 0.7725 or below, which is the worst case scenario level.
- If the spot rate trades above 0.8200 the hedging rate improves to 0.7800.
- If the spot rate trades higher, at 0.8600, the hedging rate improves again, to 0.7900.
- In case the spot rate trades at 0.9000 (or above), the final hedging rate would be 0.8000.
- All triggers could be activated anytime during the, life time of the option.

The advantages of this strategy are:

- The firm is fully hedged below 0.7725.
- The hedging rate improves in case the Swiss franc weakens up to 0.8000.
- Two levels, if triggered (0.7900 and 0.8000) offer a hedging rate above the forward rate (0.7860).
- Structured as a zero cost strategy.

The disadvantages of this strategy are:

- Limited upside: the best case scenario is limited to 0.8000.
- The worst case scenario (0.7725) is below the forward rate 0.7860).

Entering a 'Flipper'

This strategy is composed of four fade-in options with a knock-out trigger (all triggers are set at the same level). Upon inception, six monthly fixings are set and are compared to the fade-in level, as a result, a synthetic forward deal is generated (for 1/6 of the overall notional amount per fixing date). The fade-in level is set at one unique spot rate, so only two outcomes are possible.

The strategy is composed of the following options:

- Buy fade-in US dollar put, Swiss franc call option struck at 0.7800 fade-in level below 0.7800, with knock- out set at 0.6500.
- Sell fade-in US dollar call, Swiss franc put option struck at 0.7800 fade-in level below 0.7800 with knock- out set at 0.6500.
- Buy fade-in US dollar put, Swiss franc call option struck at 0.7975 fade-in level above 0.7800 with knock- out set at 0.6500.
- Sell fade-in US dollar call, Swiss franc put option struck at 0.7975 fade-in level above 0.7800 with knock- out set at 0.6500.

The payoff of the reset forward strategy would be as follows:

- Once a month (until expiry date 22 February 2012), the daily rate of the USD/CHF spot rate is sampled.
- If it settles below 0.7800, you sell US$16,666,666.67 at 0.7800.
- If it settles above 0.7800, you sell US$16,666,666.67 at 0.7975.
- If the spot rate trades below 0.6500, the structure knocks-out and the buyer of structure would sell the US dollar amount at the prevailing market rate.

The advantages of this strategy are:

- The firm is hedged below 0.7800 (worst case scenario), as long as the spot rate doesn't trade below 0.6500 during the six months post-inception (over 7.7% below the lowest level the USD/CHF spot rate has ever traded).
- The best case scenario is 0.7975 (1.46% above the forward rate).
- The strategy is structured at zero cost.

The disadvantages of this strategy are:

- Limited upside: selling at 0.7975 would be the best case scenario.
- If the USD/CHF spot rate trades at 0.6500 or below the whole structure knock-out and the hedger is unprotected from further Swiss franc appreciation (the accumulated hedge is kept).
- The worst case scenario is inferior to the forward rate.

Conclusion

This article revolves around a realistic example of hedging challenges treasurers typically face. We have suggested various strategies that could solve this business problem. These strategies express different approaches to hedging, and as a result are structured differently. They are composed of vanilla and exotic strategies and are structured as zero cost. It is important to remember that one can set the hedging levels according to one's view and that these strategies shouldn't necessarily be structured at zero cost. The table below summarises the various strategies.

Table 2: Suggested Strategies Performance Summary

	Initial Cost	Best Case Scenario	Worst case Scenario
Forward	Zero	Sell at 0.7860	Sell at 0.7860
Vanilla	3,036,564 for S.P 0.7860 (Forward)	unlimited, if Spot rate end higher	Sell at 0.7860
Forward Extra	Zero	Sell at 0.8402	Sell at 0.7800
Bonus Forward	Zero	Sell at 0.8199	Sell at 0.7600
Risk Reversal	Zero	Sell at 0.8030	Sell at 0.7600
Participating Forward	Zero	Sell at 0.8060	Sell at 0.8060 twice the amount
Reset Forward	Zero	Sell at 0.8000	Sell at 0.7725
Flipper	Zero	Sell at 0.7975	Sell at 0.7800 (as long as 0.6500 doesn't trade, else market)

Source: Numerix

Since this article was initially written, the volatility in the market has increased and the Swiss National Bank has announced that it would buy any amount of euros and sell Swiss francs at the level of 1.2000 (Swiss francs per euro). This has triggered a major shift in market's sentiment and the Swiss franc has weakened since against the US dollar and hovers currently at 0.9000 (Swiss francs per US dollar).

We thought it would be interesting to display the changes in the market values of the suggested strategies as of today (mid-October 2011) assuming the market will trade at the same level at the expiry date.

Table 3: One Month on Summary

	Initial Cost	The hedger would:	Comments
Forward	Zero	Sell at 0.7860	Opportunity loss of almost 15%
Vanilla	3,036,564 for S.P 0.7860 (Forward)	Sell at prevailing Market rate	Sell at spot0.9035 , forward 0.8998 (Gain of almost 12%)
Forward Extra	Zero	Sell at 0.7800	Sell at 0.7800 at RKI option was triggered
Bonus Forward	Zero	Sell at 0.7890	30 points above Forward (very limited participation in upside
Risk Reversal	Zero	Sell at 0.8030	170 points above Forward rate
Participating Forward	Zero	Sell at 0.8060	Sell at 0.8060 twice the amount
Reset Forward	Zero	Sell at 0.8000	140 points above Forward rate
Flipper	Zero	Sell at 0.7975	115 points above the Forward rate

Source: Numerix

Udi Sela, vice president at Numerix, has worked in the foreign exchange (FX) derivatives markets for 18 years. A senior derivatives trader and trading manager at Citibank and JPMorgan, he has developed expertise in derivatives spanning both vanilla and complex FX options. During the last seven years, Sela has led product development and pre-sales functions within a range of financial software vendors.

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