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Hedging Discontinuous FX Risk: The EUR/CHF Floor Removal

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ABSTRACT

On 15 January 2015, the Swiss National Bank abandoned its EUR/CHF 1.20 floor. The exchange rate collapsed from 1.20 to below 0.90 within seconds. This paper compares stop-loss orders with option-based hedging using Bloomberg market data from 2012-2014 and the Garman-Kohlhagen framework. One-year put options cost EUR 6,951 per EUR 100,000 of exposure with guaranteed payoff. The stop-loss alternative cost between EUR 4,696 (best case) and EUR 33,778 (worst case). The stop-loss apparent cost advantage is illusory: its cost is unbounded precisely when protection is most needed.

Keywords: Derivatives · FX Risk · Garman-Kohlhagen · Hedging · Gap Risk · Central Bank Policy

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SECTION 1

Executive Insight

On 15 January 2015, the Swiss National Bank abandoned its three-and-a-half-year-old floor of 1.20 CHF per euro. EUR/CHF collapsed from 1.20 to below 0.90 within seconds, a 25% gap with no intervening tradable prices. Stop-loss orders placed at 1.15 executed between 0.90 and 1.15, depending on broker latency. Billions of dollars in currency-hedged positions were destroyed.

This paper provides a quantitative comparison of stop-loss orders versus option-based hedging for foreign-currency loan exposures. Using Bloomberg data and the Garman-Kohlhagen pricing framework, we demonstrate that 1-year put options cost EUR 6,951 per EUR 100,000 of exposure with guaranteed protection, while a stop-loss strategy costs between EUR 4,696 (best case) and EUR 33,778 (worst case). The stop-loss cheapness is an illusion: its cost is unbounded precisely when protection is needed most.

SECTION 2

The EUR/CHF Shock: Event Anatomy

The SNB established its 1.20 floor in September 2011, pledging to buy unlimited quantities of euros to defend it. For 3.5 years, EUR/CHF traded in a narrow band around 1.20, with implied volatility compressing to historic lows. On 15 January 2015, without warning, the SNB abandoned the floor.

Stop-loss orders are market orders triggered by a price level. They guarantee execution but not execution price. When EUR/CHF gapped from 1.20 to below 0.90 with no intervening quotes, stop-loss orders at 1.15 could not execute at 1.15. They executed at whatever price was available. Many retail brokers reported fills at 1.00-1.05. Institutional ECN order books were empty between 1.20 and 0.92.

Put options, by contrast, pay max(K - S_T, 0) regardless of the price path. A European put with strike 1.20 paid 1.20 - 0.98 = 0.22 CHF per euro at settlement, exactly as contracted.

SECTION 3

Historical Precedent: GBP/DEM 1992

The study draws a direct parallel to Black Wednesday (16 September 1992), when the UK was forced out of the European Exchange Rate Mechanism. GBP/DEM had been stable at 2.80-3.00 for two years, with a politically guaranteed floor at 2.773.

On 16 September, the rate broke to approximately 2.70; within weeks it reached 2.50. For a 100,000 GBP foreign-currency loan in DEM: the no-hedge strategy produced a loss of 15.08%, the stop-loss at 2.77 (executed at 2.70) produced 7.41%, and put options at strike 2.77 produced 10.07%. In this case the stop-loss outperformed the put, but only because the GBP/DEM decline was gradual over days, allowing the stop-loss to execute near its trigger level.

SECTION 4

Garman-Kohlhagen Pricing Framework

Currency options are priced using the Garman-Kohlhagen model (1983), which extends Black-Scholes to accommodate two interest rates, domestic (r_d) and foreign (r_f). The put price is: $P = \exp(-r_d \cdot T) * K * \Phi(-d2) - \exp(-r_f \cdot T) * X * \Phi(-d1)$, where $d1 = [\ln(X/K) + (r_d - r_f + \sigma^2/2) \cdot T] / [\sigma*\sqrt{(T)}]$ and $d2 = d1 - \sigma*\sqrt{(T)}$.

X is the spot exchange rate, K is the strike, σ is implied volatility, and Φ is the standard normal CDF. The model assumes continuous price paths, an assumption the hedge comparison stress-tests. The collapsing implied vol regime leading up to January 2015 made put options extraordinarily cheap, yet few borrowers purchased them.

SECTION 5

Bloomberg Market Data: 2012-2014

Put option prices are calibrated using Bloomberg terminal data for three annual snapshots. On 31 January 2012: EUR/CHF spot 1.204, 1Y implied vol 9.375%, 1Y put at strike 1.20 priced at CHF 0.051. On 31 January 2013: spot 1.236, IV 5.583%, put CHF 0.014. On 31 January 2014: spot 1.222, IV 4.780%, put CHF 0.015.

The decline in implied volatility from 9.375% to 4.780% reflects the market's growing belief that the SNB floor was permanent. This belief made put options progressively cheaper and, simultaneously, gap risk progressively more dangerous. By January 2014, a one-year put at strike 1.20 cost CHF 0.015 per euro. 10-year implied vol: 13.31%, 10-year put: CHF 0.2365, 20-year put: CHF 0.3025.

SECTION 6

Quantitative Hedging Comparison

The central result is a cost comparison for hedging EUR 100,000 at a spot rate of 1.204. Five hedging variants are evaluated:

1-year put options (rolled annually, 3 years): EUR 6,951 (6.95% of exposure). 10-year put options: EUR 20,041 (20.04%). 20-year put options: EUR 25,541 (25.54%). Stop-loss best case (trigger 1.15, fill at 1.15): EUR 4,696 (4.70%). Stop-loss worst case (trigger 1.15, fill at 0.90): EUR 33,778 (33.78%).

The 1-year rolling put costs EUR 6,951, just EUR 2,255 more than the stop-loss best case. But the stop-loss worst case costs EUR 33,778, which is 4.9 times the put cost and nearly 5 times the anticipated savings from avoiding option premiums.

SECTION7

Gap Risk and Stop-Loss Failure Mechanics

The fundamental problem with stop-loss orders is that they conflate two independent properties: the trigger condition (price reaches a level) and the execution guarantee (the order fills at or near that level). In continuous markets, these properties are approximately equivalent. In discontinuous markets, they diverge catastrophically.

The EUR/CHF event is not unique. Comparable FX discontinuities include Samsung Heavy Industries (2006, USD 2 billion in KRW/USD losses), Brazilian Airlines (2008, over USD 5 billion in BRL/USD options losses), and Metallgesellschaft (1993, USD 1.3 billion in oil hedging losses exacerbated by liquidity-driven discontinuities).

SECTION8

Institutional Implications

For corporate treasurers: stop-loss orders should never be the sole hedging instrument for multi-year foreign-currency exposures. Put option premiums are not costs to be minimized but insurance premiums with guaranteed payoffs. The correct comparison is not put premium versus zero, but put premium versus the expected loss from an unhedged or stop-loss-hedged position under stressed conditions.

For risk managers and boards: any hedging policy relying on stop-loss mechanisms must include explicit stress scenarios under discontinuous price dynamics. Falling implied volatility makes put options cheaper but simultaneously signals growing complacency. The cheapest time to buy protection is often the most dangerous time to go without it.

SECTION9

Methodology and Citations

FX option pricing: Garman and Kohlhagen (1983, Journal of International Money and Finance). Market data: Bloomberg terminal, EUR/CHF spot, implied volatilities, LIBOR rates, and swap curves from January 2012 through January 2014. Event analysis: SNB floor removal (15 January 2015); Bank of England ERM exit (16 September 1992). Discontinuous dynamics: Merton (1976, jump-diffusion); Cont and Tankov (2004, Financial Modelling with Jump Processes).

All put option prices are computed from the Garman-Kohlhagen formula using observed market inputs. No Monte Carlo simulation or proprietary models are required. The analysis is fully reproducible from publicly available Bloomberg data.

KEY EQUATION

$$\text{GK Put:}\quad P = K \cdot \exp(-r_d \cdot T) \cdot \Phi(-d_2) - X \cdot \exp(-r_f \cdot T) \cdot \Phi(-d_1)$$

Working Paper 03 — Principal Formula

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