

**CITY UNIVERSITY OF HONG KONG**  
**香港城市大學**

**Managing Currency Options  
in Financial Institutions  
with Vanna-Volga Method**  
**在金融機構應用  
萬納 - 伏爾加方法管理外匯期權**

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## **Abstract**

This research study examines the application of Vanna-Volga method in managing currency options for a financial institution, following the Basel III regulatory requirements which demand a high consistency between the currency option valuation and market risk measurement methodologies of financial instruments.

The research study extends the application of Vanna-Volga method from currency option valuation to value-at-risk (“VaR”) amount calculation and dynamic portfolio replication. The accuracy of currency option valuation is assessed with the variation between the volatility smiles derived by the Vanna-Volga method and those implied from the market prices of traded currency options. The efficiency of VaR amount calculation is verified by the back testing results of one-day VaR amount at the 99<sup>th</sup> percentile confidence level. The effectiveness of dynamic portfolio replication is measured by the discrepancy between the value of the dynamic replicating portfolio and the currency option’s payoff at maturity.

The research study aims at demonstrating that the Vanna-Volga option valuation framework, while providing an effective valuation correction to the classical Black-Scholes model, is also a practical and affordable approach for VaR amount calculation and dynamic portfolio replication. The relevant computations can be derived with data readily available from major financial information providers and in closed form solutions. These advantages are less observable in other advanced option valuation frameworks.