

# Structured Product Details

Name		e Contingent Coupon ed Securities Based on Apple Inc
Issue Size Issue Price Term Annualized O	Coupon	\$6.60 million \$1,000 12 Months 12.00%
Pricing Date Issue Date Valuation Da Maturity Dat		May 30, 2012 June 4, 2012 May 30, 2013 June 4, 2013
Issuer CDS Rate Swap Rate		Citigroup 145.69 bps 1.07%
Reference As	set	Apple Inc's stock
Initial Lev Dividend I Implied Vo	Rate	\$579.17 0.00% 38.18%
Fair Price at	Issue	\$937.05

CUSIP SEC Link	1730T0XJ3 www.sec.gov/Archives/edgat/
	data/831001/000095010312002897/ dp30907_424b2-0244.htm

Report Prepared On: 10/28/12

# Autocallable Contingent Coupon Equity Linked Securities Based on Apple Inc

**Structured Products Research Report** 

# Description

Citigroup issued \$6.60 million of Autocallable Contingent Coupon Equity Linked Securities Based on Apple Inc on June 4, 2012 at \$1,000 per note.

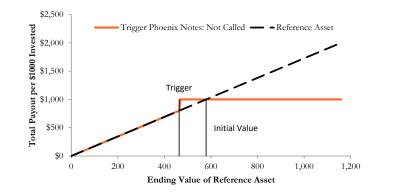
These 12-month notes are UBS-branded reverse convertible notes. On the quarterly coupon observation date, if the notes are not called back, they pay either quarterly coupon at an annualized rate of 12.00% if Apple Inc's stock price closes above the coupon barrier \$463.34, or no coupon if the stock price closes below the barrier. The first coupon ob-servation date is August 30, 2012. This Equity Linked Securities will be called back if the reference stock price on any quarterly call observation date after August 30, 2012 exceeds the initial stock price. In this case, investors receive the principal plus any unpaid coupons. At maturity, the notes convert into shares of the reference security—1.73 shares of Apple Inc's stock in this case-if the market value of the reference stock at the note's maturity is below the trigger price \$463.34 (80% of Apple Inc's stock price on May 30, 2012). Otherwise, investors will receive the \$1,000 face value.

# Valuation

This Citigroup Autocallable Contingent Coupon Equity Linked Securities Based on Apple Inc can be viewed as a combination of a zero-coupon note from Citigroup, a series of contingent coupon payments, and a short put option on Apple Inc's stock. For reasonable valuation inputs this note was worth \$937.05 per \$1,000 face value when it was issued on June 4, 2012, including \$985.47 for the present value of the zero-coupon note, (\$92.22) for the short put options, and \$43.80 for the present value of all future contingent coupon payments.

There is no active secondary market for most structured products. Structured products, including this note, therefore are much less liquid than simple stocks, bonds, notes and mutual funds. Investors are likely to receive less than the structured product's estimated market value if they try to sell the structured product prior to maturity. Our valuations do not incorporate this relative lack of liquidity and therefore should be considered an upper bound on the value of the structured product.

### Payoff Curve at Maturity



The payoff diagram shows the final payoff of this note given Apple Inc's stock price (borizontal axis). For comparison, the dashed line shows the payoff if you invested in Apple Inc's stock directly.

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### **Related Research**

#### **Research Papers:**

www.slcg.com/research.php

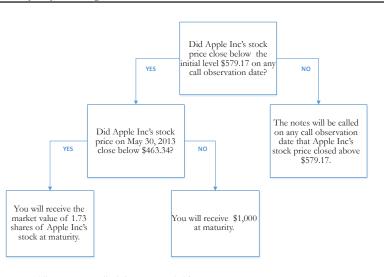
- "Are Structured Products Suitable for Retail Investors?" December 2006.
- "Structured Products in the Aftermath of Lehman Brothers," November 2009.
- "What TiVo and JP Morgan Teach Us about Re-verse Convertibles," June 2010.

Olivia Wang, Ph.D., Senior Financial Economist, SLCG

#### Principal Payback Table

Apple Inc's Stock	Note Payoff
\$0.00	\$0.00
\$57.92	\$100.00
\$115.83	\$200.00
\$173.75	\$300.00
\$231.67	\$400.00
\$289.59	\$500.00
\$347.50	\$600.00
\$405.42	\$700.00
\$463.34	\$800.00
\$521.25	\$1,000.00
\$579.17	\$1,000.00
\$637.09	\$1,000.00
\$695.00	\$1,000.00
\$752.92	\$1,000.00
\$810.84	\$1,000.00
\$868.76	\$1,000.00

#### Maturity Payoff Diagram



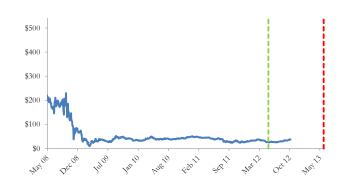
The contingent payoffs of this Equity Linked Securities.

## Analysis

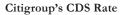
The 12.00% coupon rate on this Equity Linked Securities is higher than those paid by Citigroup on its straight debts but, in addition to Citigroup's credit risk, investors bear the risk that, 1) the note may be called; 2) the note may pay zero coupon because of the coupon contingency; 3) and the note will be converted into shares of Apple Inc's stock when Apple Inc's stock is worth substantially less than the face value of the note.

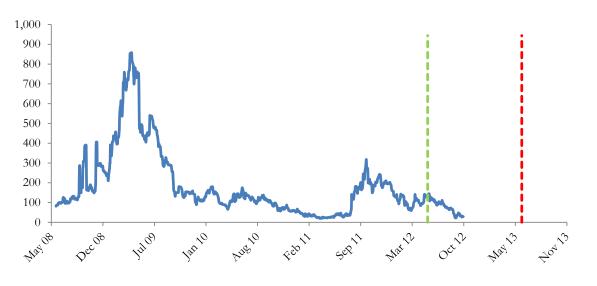
Investors purchasing these autocallable phoenix notes effectively sell contingent put options to Citigroup and post the note's issue price as collateral to secure satisfaction of the investors' obligations under the option contracts. Citigroup pays investors a contingent coupon that is part payment for the put options and part interest on the investors' posted collateral. This Equity Linked Securities is fairly priced if and only if the difference between the contingent coupon and interest paid on Citigroup's straight debt equals the value of the contingent put options investors are giving to Citigroup. Whether this Equity Linked Securities is suitable or not is identically equivalent to whether selling put options on the reference stock at the option premium being paid by Citigroup was suitable for the investor.

#### **Citigroup's Stock Price**

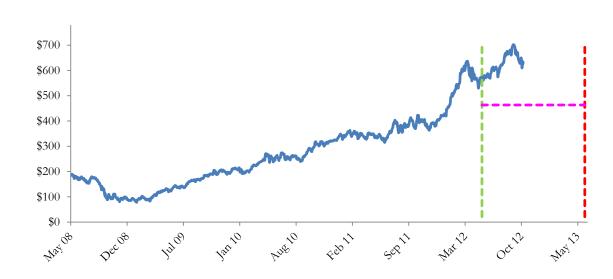


The graph above shows the adjusted closing price of the issuer Citigroup for the past several years. The stock price of the issuer is an indication of the financial strength of Citigroup. The adjusted price shown above incorporates any stock split, reverse stock split, etc.





Credit default swap (CDS) rates are the market price that investors require to bear credit risk of an issuer such as Citigroup. CDS rates are usually given in basis points (bps). One basis point equals 0.01%. Higher CDS rates reflect higher perceived credit risk, higher required yields, and therefore lower market value of Citigroup's debt, including outstanding Equity Linked Securities. Fluctuations in Citigroup's CDS rate impact the market value of the notes in the secondary market.



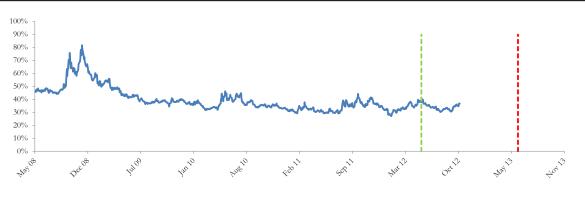
#### Apple Inc's Stock Price

The graph above shows the historical levels of Apple Inc's stock for the past several years. The final payoff of this note is determined by Apple Inc's stock price at maturity. Higher fluctuations in Apple Inc's stock price correspond to a greater uncertainty in the final payout of this Equity Linked Securities.

#### **Realized Payoff**

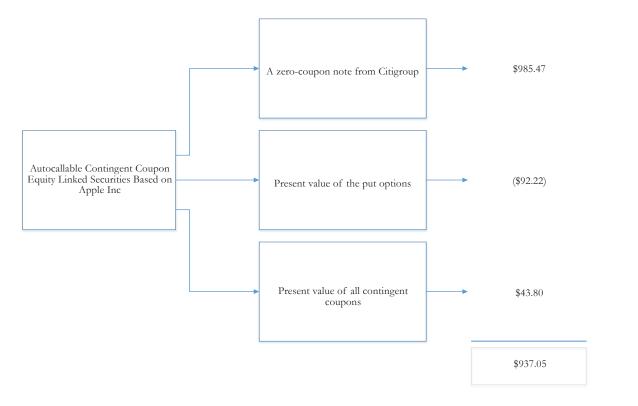
This note was early terminated on August 30, 2012 due to its automatic call feature. The Apple Inc's stock price on August 30, 2012 was \$663.87, higher than the initial level \$579.17. Investors received \$1,000 per note plus any unpaid coupons.

### Reference Asset Apple Inc's Stock's Implied Volatility



The annualized implied volatility of Apple Inc's stock on May 30, 2012 was 38.18%, meaning that options contracts on Apple Inc's stock were trading at prices that reflect an expected annual volatility of 38.18%. The higher the implied volatility, the larger the expected fluctuations of Apple Inc's stock price and of the Note's market value during the life of the Notes.

### Decomposition of this Equity Linked Securities



This note can be decomposed into different components, and each component can be valued separately. The chart above shows the value of each component of this Equity Linked Securities.

- Delta measures the sensitivity of the price of the note to the Apple Inc's stock price on May 30, 2012.
  CDS rates can be considered a measure of the probability that an issuer will default over a certain period of time and the likely loss given a default. The lower the CDS rate, the lower the default probability. CDS rate is given in basis points (1 basis point equals 0.01%), and is considered as a market premium, on top of the risk-free rate, that investors require to insure against a potential default.
  Fair price evaluation is based on the Black-Scholes model of the Apple Inc's stock on May 30, 2012.
  Calculated payout at maturity is only an approximation, and may differ from actual payouts at maturity.
  Our evaluation does not include any transaction fees, broker commissions, or liquidity discounts on the notes.

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