OFR MARKETS MONITOR
OFFICE OF FINANCIAL RESEARCH

February 2015
(data as of February 18)

A monthly review of financial market developments

Volatility Returns Amid Oil Price Declines, European Developments

Financial market volatility has increased significantly since late 2014. This is a shift from several years of largely depressed volatility, which contributed to excessive financial risk-taking as discussed in the OFR 2014 Annual Report. In recent months, volatility in key asset classes has approached or exceeded long-term average levels amid plunging oil prices, sizable currency moves, and divergent monetary policies. It remains to be seen whether this is an enduring normalization of volatility and what lasting effect, if any, it will have on financial risk-taking and stability.

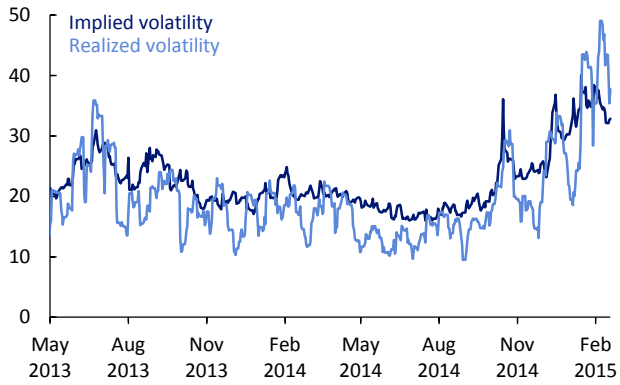
Developments since last month

- Euro area governments reached an agreement on near-term financing for Greece, easing market concerns
- Oil prices rebounded somewhat, following months of sharp declines
- U.S. Treasury yields rose and corporate credit spreads narrowed, partially reversing previous trends
- U.S. equities extended their gains, further stretching valuations

Cross-asset volatility has increased in recent months…

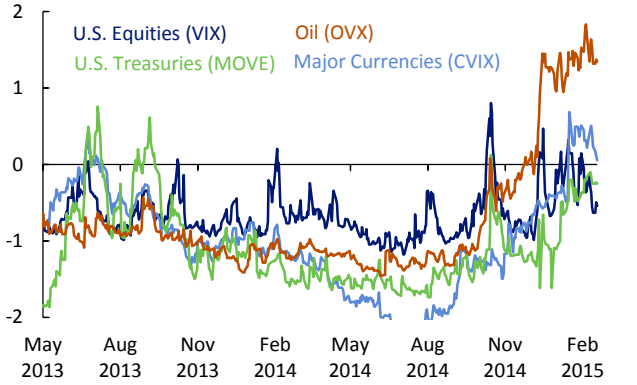
Volatility has increased significantly since late 2014 for major asset classes, as oil prices sharply declined, the U.S. dollar surged, and central banks announced major policy actions (Figure 1). Option-implied volatility — an estimate of future asset price volatility derived from options pricing — is now near or above long-term average levels for U.S. Treasuries, U.S. equities, currencies, and commodities, a notable departure from the past few years (Figure 2). By some measures, realized volatility is even higher than option-implied volatility, a rare occurrence that reflects a divergence between expectations of future volatility and current asset price dynamics. The term structure of volatility and skew (demand for protection against asset price declines) have also started to normalize.

Figure 1. Market volatility rising
Cross-Asset Implied and Realized Volatility (percent)



Note: Simple averages of realized and option-implied volatility in four asset classes: U.S. equities (VIX), U.S. Treasuries (MOVE), developed market currencies (CVIX), and oil (OVX).
Source: Bloomberg L.P.

Figure 2: Volatility now near or above long-term averages
Implied Volatility by Asset Class (z score)



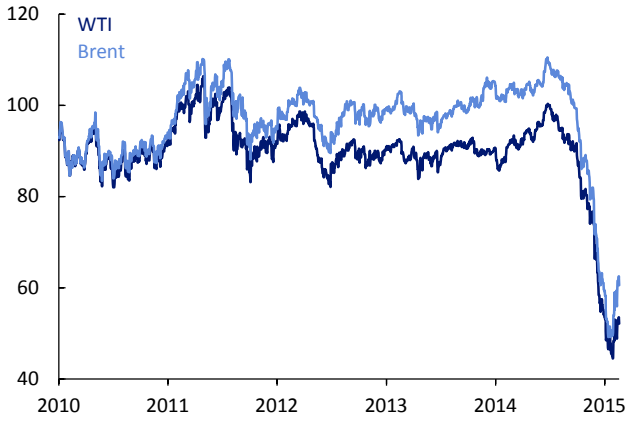
Note: Z score indicates the distance from the average value, expressed as the number of standard deviations. Averages are based on data since 1991, except oil data, which is since May 2007.
Source: Bloomberg L.P.

 Contributors: Viktoria Baklanova, Theodore Berg, Daniel Bresler, Daniel Maddy-Weitzman, Rebecca McCaughrin, Adam Minson, Thomas Piontek, Warren Reed, William Shi.

...catalyzed by oil's sharp descent.

An outsize decline in oil prices since late 2014 is one of the primary drivers of increased cross-asset volatility. Oil prices fell over 50 percent in the second half of 2014, though they have partially retraced over the last month in response to indications of tightening supply (Figure 3). Even so, the slump in oil prices is expected to persist for some time, as global oil supply is projected to exceed demand over the next several months. The West Texas Intermediate (WTI) oil futures curve projects that the price will remain below $70 per barrel over the next five years.

Figure 3. Oil rebounds somewhat from extraordinary decline
Crude Oil Prices ($US per barrel)

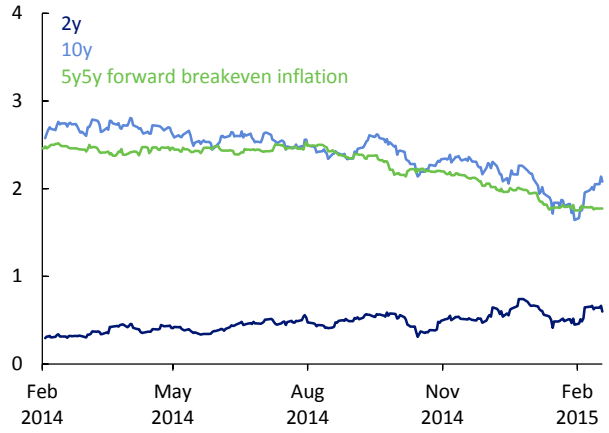


Source: Bloomberg L.P.

Volatility in oil has contributed to price action in broader markets.

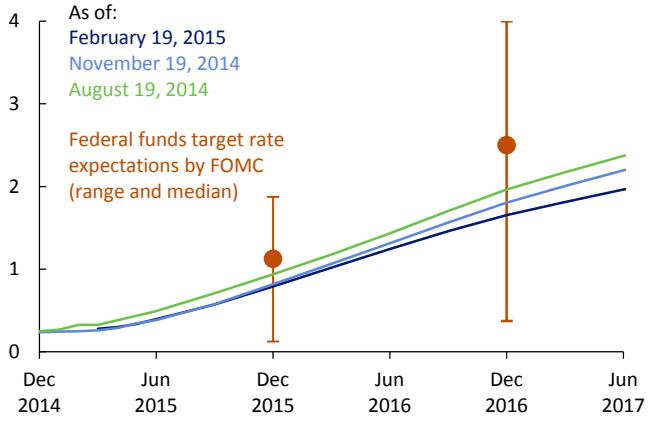
Long-term U.S. Treasury yields rose notably in February, though they remain at very low levels (Figure 4). The primary causes appear to be the recent uptick in oil prices and a stronger-than-expected labor market report. Market-implied inflation expectations were little changed at low levels (Figure 4). Meanwhile, market-implied interest rate expectations remain considerably more dovish than median Federal Open Market Committee (FOMC) forecasts (Figure 5).

Figure 4. U.S. long-term Treasury yields are back up
U.S. Treasury Yields and Implied Inflation Rate (percent)



Source: Bloomberg L.P.

Figure 5. Market interest rate expectations are dovish
Three-month Eurodollar Futures Rates (percent)



Note: Federal Open Market Committee expectations are from 12/17/2014 meeting.
Sources: Bloomberg L.P., Federal Reserve Board

In U.S. equities, analysts have significantly reduced expectations for corporate earnings growth in 2015, responding to the decline in oil prices and, to a lesser extent, the strength of the U.S. dollar. In Q3 2014, analysts had forecast 2015 earnings growth of approximately 12 percent; the current consensus estimate is 4 percent, while revenues are expected to remain flat. The principal cause of this change is the decline in oil prices, and its sizable impact on energy firm earnings. The other main cause is the stronger U.S. dollar, as roughly one-third of U.S. corporate profits are earned overseas. Meanwhile, earnings results from Q4 2014 have been mixed.

Despite the markdown in expected earnings, broad U.S. equity prices remain near all-time highs. The forward price-to-earnings ratio is at 17, the highest since 2002 (Figure 6), while the cyclically-adjusted price-to-earnings ratio is highly elevated at 27.

The corporate bond market benefitted from the recent rebound in oil prices (Figure 7). Both investment grade and high-yield corporate bond spreads tightened in response to the bounce in oil prices, the better-than-expected labor report, and the rise in U.S. Treasury yields. Following several weeks of retail fund outflows, high-yield flows turned positive. However, energy credits have continued to underperform the broader market year-to-date. Issuance in credit markets remains bifurcated: investment grade bond issuance is on pace with last year, while high-yield bond and leveraged loan issuance is off to its slowest start since 2011 due to waning demand amid increased credit quality concerns. Market contacts report that weak loan issuance was partly driven by low demand from collateralized loan managers following disappointing Q4 returns.

Unconventional monetary easing and negative policy rates are on the rise in Europe.

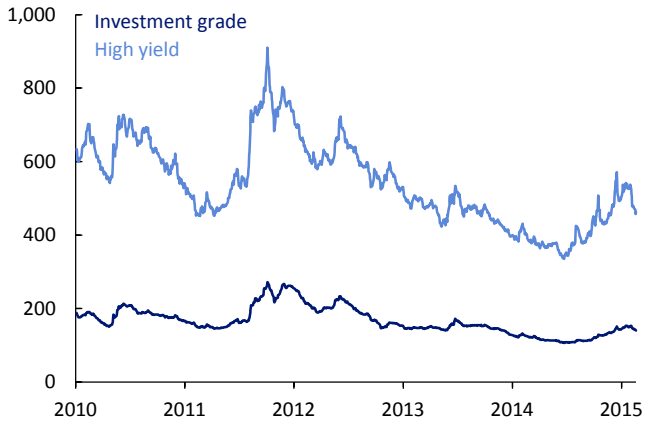
The number of European markets with negative interest rates is growing, following the European Central Bank's (ECB) announcement of expanded asset purchases and the Swiss National Bank's abandonment of its currency floor (Figure 8). Since the Swiss central bank abandoned its exchange rate floor in January, the Danish central bank has cut interest rates repeatedly to stem capital inflows and maintain its currency peg against the euro. The Danish central bank deposit rate is now at -75 basis points. The Swedish central bank also cut rates from zero to -10 basis points in February and announced plans to begin purchasing government bonds to control currency appreciation and combat deflation.

European cross-currency basis swap markets have started to come under pressure, for reasons largely unrelated to funding stress and fragmentation risk (Figure 9). The five-year euro-dollar cross currency basis swap rate, a measure of the cost for banks to convert euro-denominated cash flows into dollars, has risen to its most expensive level in over two years. Reportedly, the spread widening reflects an imbalance in the supply of euro- and dollar-

Figure 6. U.S. equity valuations are elevated
S&P 500 Price-to-Earnings and Price-to-Book Ratios

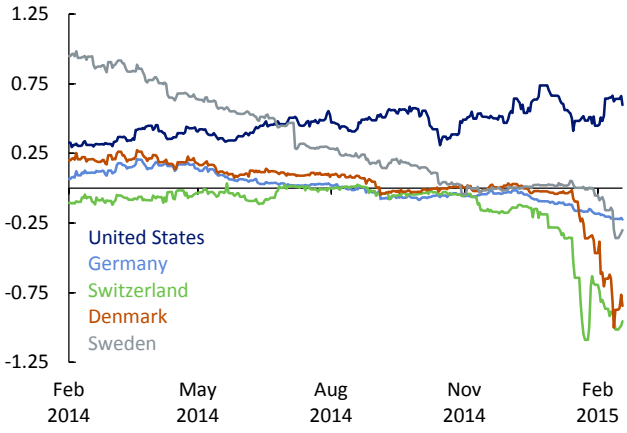
Source: Bloomberg L.P.

Figure 7. Corporate bond markets benefit from oil rebound
Corporate Bond Option-Adjusted Spreads (basis points)



Source: Haver Analytics

Figure 8. Many European rates are increasingly negative
2-Year Sovereign Bond Yields (percent)



Source: Bloomberg L.P.

denominated liquidity as a result of diverging U.S. and euro area central bank balance sheets. Other technical dynamics, such as hedging by corporate issuers, have also contributed to the widening.

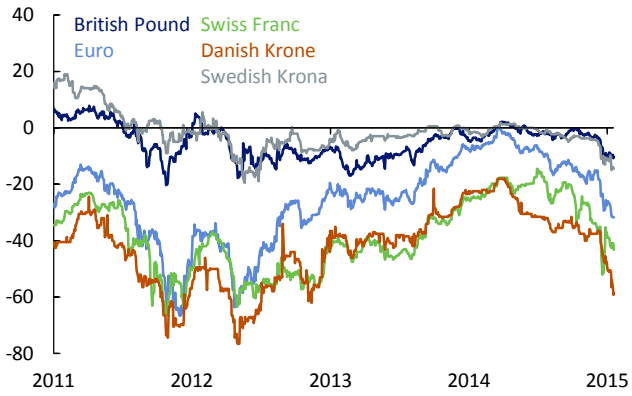
Market pressure increased in Greece and in several emerging markets, but spillovers were limited.

Disagreement between the new Greek government and official sector lenders caused a sharp sell-off in Greek assets, until a compromise was reached (Figure 10). Greece depends on financing from euro area governments and the International Monetary Fund to service its sovereign debts. The new Greek government sought to renegotiate existing agreements with those institutions, which renewed market fears of a Greek exit from the euro currency union. Concerns were eased in recent days when Greece and euro area governments agreed to a short-term extension of Greece's current financial support program.

Tensions between Greece and its official sector lenders caused disruptive spillover to other vulnerable euro area markets in 2011-12, but not during the latest episode. Southern European government bond spreads to German bunds widened only slightly, and remain much lower than during 2011-12 (Figure 10). This is due largely to greater confidence in euro area financial backstops and the willingness of the ECB to stabilize markets where governments comply with EU policy conditions. However, the 2011-12 experience shows vulnerable euro area markets can remain stable for some time before a sudden and disruptive repricing.

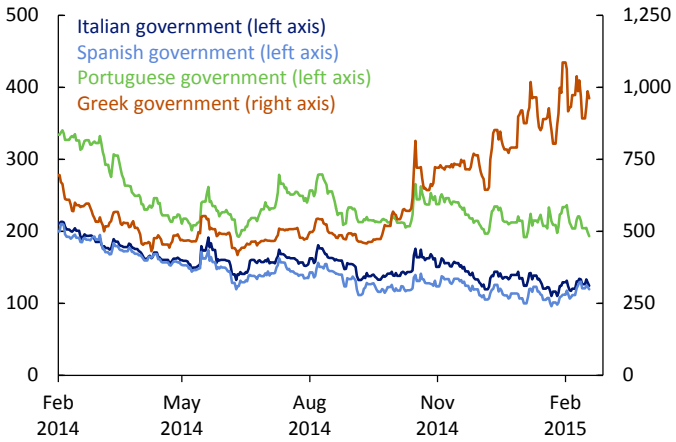
In emerging markets, Brazilian and Turkish currencies sold off and the Russian financial crisis continued (Figure 11). The Brazilian *real* fell 8 percent over the last month, reaching its weakest level in more than 10 years, responding to disappointing economic data and the ongoing corruption scandal at state-owned Petrobras. In Turkey, concerns about central bank independence have led to foreign outflows from equities and bonds and a sharp depreciation in the currency. Meanwhile, Russia's financial and currency crisis continued, sparked by U.S.-EU sanctions and exacerbated by the sharp price declines in oil, a major source of revenue for the economy and government. Local asset markets have sold off significantly in recent months, responding to oil prices, news from the conflict in Ukraine, ratings downgrades, and various shifts in monetary policy.

Figure 9. Cross-currency funding markets under pressure
5-Year Cross Currency Basis Swap Rates vs. Dollar (basis points)



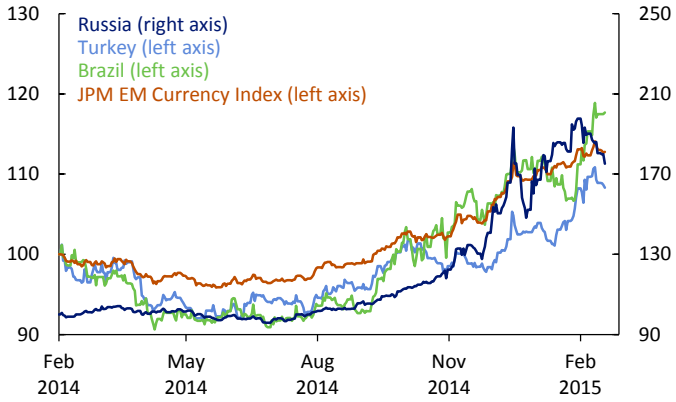
Note: A cross currency basis swap is an agreement where two parties exchange floating-rate payments in different currencies.
Source: Bloomberg L.P.

Figure 10. Little spillover from Greece
10-Year Government Spreads Over German Bunds (basis points)



Source: Bloomberg L.P.

Figure 11. Brazilian and Turkish currencies sell off
Foreign Currency Unit per U.S. Dollar (Index 100 = February 1, 2014)



Note: The EM Currency Index is inverted to provide the same interpretation as other currency indexes.
Source: Bloomberg L.P.

FEATURE: Potential U.S. Financial Stability Implications of the Decline in Oil Prices

Oil prices are almost 50 percent lower than in June 2014, even after the recent rebound. Oil's extraordinary descent and the associated volatility have had a pronounced effect on financial markets. If large oil price declines are sustained, they could have implications for U.S financial stability. Notably, transmission to specific asset markets and financial institutions could be material.

There are three main direct channels for the decline in oil prices to affect U.S. financial stability: (1) the macroeconomic channel, (2) spillovers to U.S. financial institutions and assets, and (3) spillovers from foreign oil producers. Indirect channels — such as broader confidence shocks or second order effects — could also be important, but they are difficult to observe.

The Macroeconomic Channel: Lower oil prices are broadly considered positive for overall U.S. growth by acting as an effective consumption boost.[1] However, U.S. localities with a large concentration of oil producers, particularly newer, high-cost producers, could face sizable losses in economic activity.

Spillovers to U.S. Financial Institutions and Assets: Some regional and community banks have sizeable exposure to the energy sector and surrounding local economies. Individually, they are unlikely to pose systemic concerns, but regionally concentrated bank problems are a potential risk if sustained low oil prices increase borrower defaults. Further analysis of these risks is warranted.

Corporate credit markets have material exposure to the energy sector. Debt issuance by energy companies has outpaced issuance in other corporate sectors over the last few years and energy now constitutes 15-20 percent of the high-yield corporate bond market. Some borrowers may not be viable if oil price declines persist. Spillovers to the broader corporate credit market are a concern; a sell-off in energy firms has already weighed on investment grade and high-yield corporate bond indexes and liquidity in these markets is fragile, creating the potential for asset fire sale dynamics.

Spillovers from Foreign Oil Producers: Some foreign oil producers face considerable risks from low oil prices, and their distress could spill over to other markets. Russia is uniquely vulnerable, given its dependence on oil revenues and the economic and financial burden of U.S. and EU sanctions. Other oil producers and emerging markets are also vulnerable to an investor retrenchment that, in the extreme, could impair financing and create risks for U.S. creditors.

Falling oil revenues for oil exporting nations could reduce the "recycling" of their current account surpluses into U.S. financial markets; their holdings now total nearly $1 trillion, about 40 percent of which is invested in U.S. Treasuries. While a sustained decline in oil prices would beneficially reduce the value of U.S. oil imports, it could also pare capital inflows into U.S. securities, potentially offsetting the effects of declining inflation from the oil price decline on borrowing costs and financial conditions.

[1] There is broad consensus that a large oil price decline has a net positive impact on U.S. economic activity, but there is considerable debate on the magnitude of the impact. For recent reviews of relevant literature, see James Hamilton's "Nonlinearities and the Macroeconomic Effects of Oil Prices," published in *Macroeconomic Dynamics* 15, Supplement 3 (2011) and Robert Hoffman's "Estimates of Oil Price Elasticity," published in *IAEE Energy Forum*, First Quarter 2012 (International Association for Energy Economics).

Select Global Asset Price Developments

	Latest Level (2/18/2015)	1M Change (bps or %)	1M Change (standard deviations)*	YTD Change (bps or %)	Year-to-Date Range**
Equities					
S&P 500	2100	4.0%	0.8	2.0%	----------x----------o
U.S. KBW Bank Index	72	6.7%	0.9	-3.2%	----------x----------o-----
Russel 2000	1228	4.4%	0.6	1.9%	----------x----------o
Nasdaq	4906	5.9%	0.7	3.6%	----------x----------o
Euro Stoxx 50	3466	8.2%	1.4	10.2%	----------x---------o
Shanghai Composite	3247	-3.8%	-0.4	0.4%	----------x-o----------
Nikkei 225	18199	7.9%	1.4	4.3%	----------x----------o
Hang Seng	24832	3.0%	0.3	5.2%	----------x--------o--
FTSE All World	283	4.8%	1.0	2.9%	----------x----------o
Rates					
U.S. 2-Year Yield	0.60%	11	0.5	-7	----------x------o--------
U.S. 2-Year Swap Rate	0.88%	15	0.6	-2	----------x--------o------
U.S. 10-Year Yield	2.08%	24	1.0	-9	----------x----------o---
U.S. 10-Year Swap Rate	2.21%	25	1.0	-7	----------x----------o---
U.S. 30-Year Yield	2.71%	26	1.1	-4	----------x----------o-
U.S. 2y10y Spread	148	13	0.7	-2	----------x----------o
U.S. 5Y5Y Inflation Breakeven	1.90%	-5	-0.2	-24	----------xo----------
U.S. 5Y5Y Forward Rate	2.70%	27	0.9	-6	----------x----------o-
Germany 10-Year Yield	0.38%	-7	-0.3	-16	----------ox----------
Japan 10-Year Yield	0.41%	17	1.1	8	----------x----------o----
U.K. 10-Year Yield	1.85%	31	1.4	9	----------x----------o
Germany 5Y5Y Inflation Breakeven	1.98%	5	0.2	12	----------x---------o----
Funding					
1M T-Bill Yield	0.01%	-1	0.0	-1	----------o--x----------
DTCC GCF Treasury Repo	0.13%	-3	-0.3	-12	----------o---x----------
3M Libor	0.26%	0	0.1	0	----------x----o--------
Libor-OIS Spread	13	0	0.0	-1	----------x-o----------
3M Eurodollar Sep 2016 Mid Yield	0.58%	8	0.4	-7	----------x------o---------
EURUSD 3M CCY Basis Swap	-23	-4	-0.2	-8	-o----------x----------
U.S. MBS					
FNMA Current Coupon	2.80%	22	0.9	-3	----------x----------o----
FHLMC Primary Rate	3.69%	3	0.2	-14	----------x------o---------
Credit					
CDX Investment Grade 5-Year CDS Spread	65	-8	-0.6	-1	o----------x----------
CDX High Yield 5-Year CDS Spread	346	-40	-0.3	-11	-o----------x----------
CDX Itraxx Euro 5-Year CDS Spread	56	-5	-0.3	-7	----------o-----x----------
U.S. 5-Year Sovereign CDS Spread	18	1	0.1	0	----------x-o-------
Implied Volatility					
VIX Index	15	-26.3%	-1.5	-19.5%	---o----------x----------
V2X Index	23	-20.4%	-1.1	-10.9%	-------o-----x----------
VDAX Index	19	-17.3%	-1.0	-4.0%	--o----------x----------
MOVE Index	91	-1.3%	-0.2	32.6%	----------x---o---------
3M2Y Swaption Volatility	65	5.0%	0.2	-4.8%	----------x----o----------
3M10Y Swaption Volatility	88	-3.4%	-0.3	19.9%	----------x----o----------
DB G10 FX Volatility Index	11	-8.3%	-0.8	20.3%	----------x-o----------
JPM EMFX Volatility Index	10	-6.0%	-0.5	-3.7%	----------o------x----------
Foreign Exchange & Commodities					
Bloomberg Dollar Index	1162	2.0%	0.8	2.7%	----------x---o----------
EUR/USD	1.14	-1.5%	-0.5	-5.8%	----------o-x----------
USD/JPY	119	1.1%	0.3	-0.8%	----------x---o----------
GBP/USD	1.54	1.9%	0.8	-0.9%	----------x----------o
USD/CHF	0.94	9.7%	3.2	-5.2%	----------x----o----------
Brent Crude	61	17.6%	3.6	2.3%	----------x----------o----
Gold	1212	-5.3%	-1.3	2.4%	-o----------x----------
S&P GSCI Commodities Index	421	7.4%	1.1	0.6%	----------x----------o---
Emerging Markets					
JPM EMFX Index	76	-1.3%	-0.5	-3%	----------o-----x----------
MSCI Emerging Market Equity Index	985	2.9%	0.4	3.0%	----------x--------o-----
CDX EM 5-Year CDS Spread	369	-20	-0.4	34	--o----------x----------

Source: Bloomberg L.P., OFR analysis

* 1M Change standard deviations based on monthly data from January 1994, or earliest available thereafter.
** Year-to-date range (-----), Average (x), Latest (o)