Is the Federal Reserve’s Extended, Low Interest-Rate Policy Fueling an EM Carry-Trade Bubble?

“Monetary policy works in the first instance by affecting financial conditions, including the levels of interest rates and asset prices. Changes in financial conditions in turn influence a variety of decisions by households and firms, including choices about how much to consume, to produce, and to invest.”

*Federal Reserve Chairman Ben S. Bernanke, March 2, 2007*
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### Yield Spread/Volatility Watch

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#### Financial Conditions Relative to Crisis-Period Averages

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#### Notes:
- Unless noted otherwise, all indicators are basis-point yield spreads.
- Indicators highlighted in orange are significantly above or below their January 7, 2000-June 29, 2007 average levels.
Is the Federal Reserve’s Extended, Low Interest-Rate Policy Fueling an EM Carry-Trade Bubble?

It has been argued by a number of prominent economists and market observers that the Federal Reserve’s pursuit of a persistently low interest-rate policy in the early 2000s might have played a significant role in fueling the U.S. housing bubble, the surge in U.S. household and business credit demands, and the dramatic rise in highly leveraged transactions undertaken by financial firms in the period leading up to the 2007-09 global financial crisis. Since it is widely felt that the bursting of those bubble-like conditions was one of the principal causes of the 2007-09 global economic downturn, there has been a growing chorus among analysts and policymakers that, going forward, central-bank policy mandates should be expanded from the traditional objectives of price stability and maximum sustainable employment to include a financial stability objective. Such an objective would compel central banks to lean against asset-price bubbles that might pose significant risks to the economy and financial markets in the future.

The problem for policymakers is that the transmission of interest-rate changes to economic activity, inflation, and the broad financial markets operates through a myriad of channels, which makes the identification of asset-price bubbles difficult. As shown in Figure 1, the pursuit of an ultra-low interest-rate policy—which could be justified on the grounds that low rates were needed to jumpstart a seriously depressed economy or reduce the chances that the economy might slip into outright deflation—could fuel the demand for risky assets and, in the process, set the stage for a domestic real-estate and/or financial asset-price bubble. At the same time, those same low interest rates could encourage capital to flow overseas, where yields might be considerably higher. If such capital flows were pervasive and persistent, the pursuit of low interest-rate policies by large-country central banks (such as Japan, and now the U.S.) could plant the seeds of asset-price bubbles in overseas markets.

This raises an important issue for policymakers. If financial stability were to become an important objective for the major central banks, whose financial stability should policymakers be concerned with? For instance, take the case of low U.S. interest rates supporting a U.S. economic recovery and with no signs of a domestic asset-price bubble forming. How concerned should Fed policymakers be if those same low interest rates were encouraging internationally mobile capital to flow overseas, particularly to emerging markets (EM), where yields were more likely to be considerably higher?

This appears to be the dilemma facing U.S. and global policymakers at the present time. The expectation that U.S. short-term interest rates are likely to remain low well into the future makes long-EM/short-U.S. dollar carry trades particularly attractive on an absolute as well as on a risk-adjusted basis. An example would be a long-Brazil, India, and Turkey/short-U.S. dollar carry trade shown in Figure 2, which would have generated average annual excess returns of 14.2% with a Sharpe Ratio of 1.4 since 2003.

As we argue below, a confluence of factors could actually push more investors into this trade, which, if unchecked, could fuel a new global financial bubble centered on the EM/dollar carry trade. If and when that bubble bursts, it could have significant ramifications for global economic growth in the future.

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**Figure 1**

The Transmission of Ultra-Low U.S. Interest Rates to Economic Activity, Inflation, Domestic Assets,

- Increase in U.S. Capital Outflows
- Increase in U.S. Economic Activity
- Increase in U.S. Asset Prices
- U.S. Inflation Trends Higher
- Foreign Asset-Price Bubble
- U.S. Asset-Price Bubble

Source: Bloomberg
Figure 3 illustrates how the Federal Reserve’s large-scale asset purchase program and the Fed’s commitment to maintain the Fed Funds rate at a low level for an extended period are encouraging a wave of capital to flow overseas, particularly to higher-yielding emerging markets.

As illustrated, the capital outflow from the U.S. has an impact on asset prices in emerging markets in a variety of ways. First, it acts to drive up the values of EM currencies. Second, to the extent that EM monetary authorities intervene to limit the appreciation of their currencies, the buildup of dollar reserves acts to foster easier financial conditions in EM financial markets. Third, many EM monetary authorities have attempted to discourage carry-trade-induced capital inflows by maintaining their domestic interest rates at levels that are lower than would otherwise be warranted on the grounds of price stability.

Source: Bloomberg

Figure 3

The Impact of Recent Changes in Federal Reserve Policy on Emerging-Market Currencies

Changes in Fed Policy

Fed Commitment to Keep Short-Term Interest Rates Low for an Extended Period

Decline in U.S. Interest Rates \((i_{US}^-)\)

LSAP – the Fed’s Large-Scale Asset Purchase Program

Increase in Capital Outflow from U.S. (and Other Lower-Yielding Markets) \((K_{US}^-)\)

Changes in EM Economies

Increase in Spot Exchange Rate \((\Delta S_{EM})\)

FX Intervention = Reserve Buildup

Easier Financial Conditions

Increase in EM Interest Rates \((i_{EM}^-)\)

Decrease in EM Interest Rates \((i_{EM}^+)\)

Increase in EM Capital Controls

Overheating of EM Economies

Increase in EM Interest Rates \((i_{EM}^+)\)

Source: Bloomberg
Nevertheless, one would have to assume that, given the overheating of EM economies and the rapid increase in EM inflation, most astute carry-trade investors will recognize that the pursuit of low interest rates in many of those emerging markets is not likely to last. Hence, if it is expected that EM policy rates will eventually have to move higher, this will only increase the attractiveness of the EM currencies, thereby attracting even more carry-trade-related capital flows into the emerging markets.

Furthermore, what might not be fully appreciated is that EM central-bank intervention—designed to moderate the rise in the value of their currencies and minimize overall exchange-rate volatility—could also be adding to the wave of carry-trade investor interest in EM investments.

This is because most carry-trade investors weigh the opportunities for yield pick-up against the underlying volatility of the exchange rate before undertaking a carry-trade position. The greater the positive carry relative to the expected volatility of the exchange rate, i.e., the higher the carry/risk ratio, the more favorable the carry-trade opportunity looks.

Now, if market expectations of carry/risk ratios are a principal driver of carry-trade activity, and if EM central-bank intervention is effective in reducing EM exchange-rate volatility, such intervention could inadvertently enhance the attractiveness of EM carry trades by boosting market expectations of EM carry/risk ratios.

A recent IMF Working Paper (Hiroko Oura, “Indian Rupee Market Intervention: Managing FX Volatility or Inducing Additional Capital Inflows?”, October 2008) sheds some interesting light on this dilemma. The Indian monetary authorities have intervened regularly to moderate movements in the Indian rupee/U.S. dollar exchange rate. This has led to considerably lower volatility in the INR/USD carry trade than in INR/JPY and INR/CHF carry-trade positions.

As shown in Figure 4, this lower volatility results in an impressive Sharpe ratio of 1.5 for the long-rupee/short-dollar carry trade (as compared to 0.9 for the long-rupee/short-yen carry-trade and 0.2 for the long-rupee/short-Swiss franc position). Therefore, even though an investor could have enjoyed a larger, absolute yield pick-up on a short-yen or short-Swiss franc position than on a short-dollar position, the greater volatility associated with the yen and Swiss franc versus the rupee makes them less appealing on a risk-adjusted basis.

What the Indian rupee example demonstrates is that intervention to moderate movements in EM currencies versus the U.S. dollar could actually make dollar-based carry-trade investments more, not less attractive on a risk-adjusted basis.

The dilemma faced by EM policymakers would not be as problematic if U.S. short-term interest rates were ready to move higher on a sustained basis, which would help stem the inflow of capital into the emerging-market currencies. But does the U.S. economic situation warrant a rate hike by the Fed?

To get a reading on where U.S. interest rates are likely to head over the next two years, we turned to two widely used models of the Federal Reserve’s policy reaction function to estimate where we could expect the Fed Funds rate to move above its current zero setting.
The first model is the Taylor Rule, which is named after Professor John Taylor of Stanford University who designed a simple mathematical formulation that describes fundamental criteria that the Federal Reserve considers when setting its policy rate. As shown in Equation 1 in Figure 5, the (modified) Taylor Rule breaks down the Federal Reserve’s decision making into two parts: (1) a “neutral” setting for the real Fed Funds rate, estimated to be around 2%, and (2) the recommended deviation from that neutral rate setting.

The recommended deviation from the neutral rate setting is dictated by how far inflation is rising or falling relative to the Fed’s implicit inflation target (the inflation gap) and how far the unemployment rate stands relative to the Fed’s estimate of the maximum sustainable level of U.S. unemployment (the unemployment gap, which is a proxy for the output gap).

A second model that has attracted recent market attention is the Rudebusch Model (see Equation 2 in Figure 5), named after Glenn Rudebusch, an economist at the Federal Reserve Bank of San Francisco. The Rudebusch model is similar in spirit to the Taylor Rule, except that it assumes that the Fed decision-making process places a greater weight on the unemployment gap than does the Taylor Rule.

Figures 6 and 7 compare the estimates of the recommended setting of the Fed Funds rate for each model over the 2001-2010 period. As shown, both models are in agreement that, for now, the Fed Funds rate should not rise above zero, which is in line with the ultra-low interest-rate policy that the Federal Reserve is pursuing. Note that the Rudebusch Model, given the greater weight it attaches to the unemployment gap, is currently recommending a far lower policy rate (-5.8%) than the Taylor Rule (-2.1%).
When could we expect the Fed to abandon its ultra-low interest-rate policy and begin hiking the Fed Funds rate? To get an idea of the timing for the first Fed rate hike, we simulated Fed policy in 2011 and 2012 by inputting the FOMC’s central-tendency estimates for the core-PCE inflation rate and the unemployment rate into both models. We then considered the Fed’s reaction to possible changes in NAIRU, the so-called natural rate of unemployment.

The FOMC’s central tendency estimates are shown in Figure 8. The core PCE inflation rate is expected to average around 1.30% in both 2011 and 2012. The unemployment rate is expected to decline to 9% by year-end 2011 and to 8% by year-end 2012.

We then took into account the possibility of a structural shift in unemployment in the wake of the Great Recession. Based on the work of two San Francisco Fed economists, Justin Weidner and John C. Williams (see Figure 9), we assumed three different scenarios for NAIRU, the natural rate of U.S. unemployment. In the first scenario, we assume that NAIRU remains at 5%, which is in line with the long-standing Congressional Budget Office estimate. In the second scenario, we assume that the crisis might have pushed the sustainable long-run unemployment rate up to 5.5%, which is the mid-point of the FOMC’s long-run unemployment projection shown in Figure 8. Finally, in the third scenario, we assume that NAIRU has risen to as high as 6.8%, which is the mid-point of the Weidner/Williams 2010 estimates shown in Figure 9.
We then plug the FOMC’s 2011 and 2012 projections (from Figure 8) and the NAIRU estimates (from Figure 9) into the Taylor Rule and Rudebusch Model equations to determine the direction of Fed policy over the next two years. As shown in Figure 10, if both unemployment and core-PCE inflation progress along the path projected by the FOMC, and assuming that the Fed believes that NAIRU remains at 5%, both the Taylor Rule and the Rudebusch Model call for the Fed to keep policy on hold in both 2011 and 2012.

In the FOMC’s latest long-term projections, FOMC participants estimated that NAIRU might have risen to somewhere between 5.0% and 6.0%. That estimate has been revised gradually higher during the past few years because it is expected that the crisis will likely have a negative, permanent effect on the U.S. unemployment outlook. If we take the mid-point of that range (5.5%) as the Fed’s best guess for NAIRU, the Taylor Rule would argue for the Fed Funds rate to remain at zero in 2011 before rising to 0.75% by year-end 2012. The Rudebusch Model—which posits that the Fed is more concerned about unemployment than inflation—recommends that the Fed Funds rate stay at 0% throughout both 2011 and 2012.

If instead the Fed believes that there has been a larger structural shift in unemployment and that NAIRU has shifted up to 6.8%, the Taylor Rule would call for the Fed to begin tightening this year, raising the Fed Funds rate to just shy of 1% by the end of 2011 and then climb to around 2.0% by the end of 2012. The Rudebusch Model would recommend that the Fed Funds rate stay at 0% through 2011 and then rise to around 1.4% in 2012.

The major inference that we draw from all these simulations is that the Fed is unlikely to lift the Fed Funds rate from its zero bound in 2011. The Taylor Rule would argue for rate hikes beginning this year only if NAIRU increased substantially, and otherwise would not argue for any Fed Funds rate hikes until mid-2012. The Rudebusch Rule would not call for any rate hike in either 2011 or 2012 unless you could make the case that the Fed’s estimate for NAIRU has been revised substantially upward.

This has important implications for global capital flows in general, and the EM carry trade in particular. It appears that, based on the Taylor Rule and the Rudebusch Model simulations, the Fed Funds rate is likely to remain at or near zero through 2011 and possibly into 2012 as well. With persistently low U.S. short-term interest rates, EM central banks are likely to have their hands full coping with carry-trade related capital flows emanating from the U.S. (and possibly Japan as well). This implies that EM carry trades should do relatively well in this environment. Nevertheless, investors should also be mindful that this has all the looks of another asset-price bubble being fed by ultra-low interest rate policies of the major central banks.

Michael R. Rosenberg
(212) 617-3984
mrosenberg10@bloomberg.net

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**Figure 9**

<table>
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<th>Taylor Rule Estimates</th>
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<td>NAIRU = 5.0</td>
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<td>NAIRU = 5.5</td>
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<td>NAIRU = 6.8</td>
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Note: Negative numbers indicate a recommended Fed Funds rate setting of 0%.

Source: Bloomberg
Bloomberg Financial Conditions Index

Bloomberg’s composite Financial Conditions Index (BF-CIUS Index) tracks the overall stress in the U.S. money, bond, and equity markets and provides a useful gauge to assess the availability and cost of credit.

The table below lists the components and weights used to calculate the Financial Conditions Index. The spreads and indices are normalized and combined, and then presented in BF-CIUS Index as a Z-score (defined as the number of standard deviations that financial conditions lie above or below the average level of financial conditions observed during the January 1994-June 2008 period).

According to the index, U.S. financial conditions are now roughly 0.25 standard deviations above their neutral level.

Bloomberg’s U.S. Financial Conditions Index Components and Weights

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<td>Commerical Paper/T-Bill Spread</td>
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<td><strong>Equity Market</strong></td>
<td>33.3%</td>
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<tr>
<td>S&amp;P 500 Share Prices</td>
<td>16.7%</td>
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<tr>
<td>VIX Index</td>
<td>16.7%</td>
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<tr>
<td><strong>Total</strong></td>
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Contributions of the Money, Bond, and Equity Markets to Financial Conditions

U.S. financial conditions appear to have stabilized over the past two months, which has probably been healthy for the economy. The Financial Conditions Index has now been positive for two months, reaching as high as 0.5 in mid-January before tapering off to .25 again by the end of the month, most likely in response to uncertainty over mid-East political stability.

Of the three FCI major components, U.S. money-market conditions have been positive for the past six months and are now 0.6 standard deviations above their long-term average levels. U.S. bond-market spreads have been consistently positive for the last two months and are now more than 0.2 standard deviations above normal levels. The U.S. equity market still lies below its normal levels, though not significantly so.
U.S. Financial Conditions — Money-Market

**TED Spread**
(Three-Month US$ Libor less Three-Month T-Bill Rate)

**U.S. Libor-OIS Spread**
(Three-Month US$ Libor less Three-Month Swap Rate)

**Commercial Paper/Three-Month T-Bill Spread**
(90-Day Commercial Paper less 3-Mo. T-Bill Rate)

**Market Expectations of the Three-Month Euro-$ Rate**
(CME 90-Day Euro-$ Futures)

**Market Expectations of the Fed Funds Rate**
(Actual Fed Funds Rate and the Futures Implied Rate)

**Market Expectations of the U.S. 2-Year/Fed Funds Rate Spread**
(Two-Year Treasury Yield less Fed Funds Rate)
U.S. Financial Asset Prices

**S&P 500 Index**
(Last Five Years)

**S&P Financials Index**
(Last Five Years)

**U.S. Equity Market Volatility**
(VIX Index of S&P 500 Volatility)

**S&P 500 Price/Earnings Ratio**
(Last Five Years)

**Euro-Dollar Volatility**
(Three-Month Implied EUR Volatility)

**Dollar-Yen Volatility**
(Three-Month Implied JPY Volatility)
Euro-Area Financial Conditions

**ECB Policy Rate**
(ECB Refinancing Rate)

**EUIBOR-OIS Spread**
(Three-Month Euribor Rate less Effective Overnight Swap Rate)

**Euro-Area Equity Prices**
(Dow-Jones Euro Stoxx Index)

**Euro-Area Yield-Curve Spread**
(10-Year less Three-Month Rate Euro Gov't Bond Yield)

**Euro 10-Year Swap Spreads**

**Europe Credit Default Swap Spreads**
(iTraxx Europe Credit Default Swap Spread)
Japan’s Financial Conditions

Bank of Japan Policy Rate
(BoJ Overnight Call Target Rate)

TIBOR-OIS Spread
(Three-Month Tibor Rate less Effective Overnight Swap Rate)

Japanese Equity Prices
(Tokyo Stock Price/TOPIX Index)

Japan’s Yield-Curve Spread
(10-Year less Three-Month Japanese Government Bond Yield)

Japan 10-Year Swap Spreads

Japan Credit Default Swap Spreads
(iTraxx Theoretical Five-Year Credit Default Swap Spread)
U.K. Financial Conditions

Bank of England Policy Rate
(BoE Base Rate)

UK Libor-OIS Spread
(Three-Month Libor Rate less Effective Overnight Rate)

UK Equity Prices
(FTSE 100 Share Price Index)

U.K. Yield-Curve Spread
(10-Year less Three-Month Gilt Yield)

U.K. 10-Year Swap Spreads
Federal Reserve Policy Watch

**Modified Taylor Rule Estimates of the Fed Funds Rate**
(1987-2010)

**Fed Funds Rate Outlook Matrix**
Modified Taylor Rule Estimates of the Fed Funds Rate at Selected Levels of Inflation and Unemployment

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<th>2012 Federal Reserve Forecasts</th>
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**Rudebusch Model Estimates of the Fed Funds Rate**
(1987-2010)

**Rudebusch Model Assumptions**
Neutral Real Rate = 2.1
alpha = 0.3
target = n/a
beta = 2.0
Okun Factor = 1.0
NAIRU = 5.0
### U.S. Economic Outlook

#### U.S. Economic Indicator

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<tr>
<th>Indicator</th>
<th>Jan-10</th>
<th>Feb-10</th>
<th>Mar-10</th>
<th>Apr-10</th>
<th>May-10</th>
<th>Jun-10</th>
<th>Jul-10</th>
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<th>Sep-10</th>
<th>Oct-10</th>
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<td>9.7</td>
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<td>Retail Sales (yoy %)</td>
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<td>Personal Income (yoy %)</td>
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<td>Trade Balance (US$ bn)</td>
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<td>Gov't Surplus/Deficit (% of GDP)</td>
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<td>3.1</td>
<td>3.2</td>
<td>3.4</td>
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</tr>
</tbody>
</table>

#### U.S. Real GDP Growth

(Quarter-over-Quarter Seasonally Adjusted Annualized Rate)

#### U.S. Consumer Price Inflation Rate

(Year-over-Year % Change)

#### U.S. Unemployment Rate

(%) (Quarter-over-Quarter Seasonally Adjusted)

#### U.S. Current-Account Balance

(%) (Quarter-over-Quarter Seasonally Adjusted)
U.S. Dollar at a Glance

U.S. Dollar Index (DXY Index)

U.S. Short-Term Interest Rate (Three-Month Deposit Rate)

U.S. Dollar PPP % Over/Undervaluation (Based on Bloomberg’s Long-Term Averaging Methodology)

U.S. Cumulative Carry Return (Long-Dollar/Short-Euro Carry Return)

Euro-Dollar Implied Volatility (One-Month Implied Volatility)

U.S. Credit Default Swap Spread (Five-Year CDS)
## Euro-Area Economic Outlook

### Economic Indicators

<table>
<thead>
<tr>
<th></th>
<th>Jan-10</th>
<th>Feb-10</th>
<th>Mar-10</th>
<th>Apr-10</th>
<th>May-10</th>
<th>Jun-10</th>
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<th>Sep-10</th>
<th>Oct-10</th>
<th>Nov-10</th>
<th>Dec-10</th>
<th>Jan-11</th>
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<tr>
<td><strong>Real GDP (yoy %)</strong></td>
<td>0.8</td>
<td>1.0</td>
<td>2.0</td>
<td>1.9</td>
<td>1.9</td>
<td>1.9</td>
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<td>1.9</td>
<td>2.2</td>
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<tr>
<td><strong>Consumer Price Index (yoy %)</strong></td>
<td>1.0</td>
<td>0.9</td>
<td>1.4</td>
<td>1.6</td>
<td>1.4</td>
<td>1.7</td>
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<td>1.9</td>
<td>2.2</td>
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<tr>
<td><strong>Core CPI (yoy %)</strong></td>
<td>0.9</td>
<td>0.9</td>
<td>1.0</td>
<td>0.8</td>
<td>0.8</td>
<td>0.9</td>
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<td>10.1</td>
<td>10.0</td>
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<tr>
<td><strong>Industrial Production (yoy %)</strong></td>
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<td>7.4</td>
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<td>7.1</td>
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<td><strong>M2 Money Supply (yoy %)</strong></td>
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### Economic Indicators Graphs

- **Euro-Area Real GDP Growth** (Year-over-Year % Change)
- **Euro-Area Consumer Price Inflation Rate** (Year-over-Year % Change)
- **Euro-Area Unemployment Rate** (%)
- **Euro-Area Current-Account Balance** (% of GDP)
Euro at a Glance

U.S. Dollar/Euro Exchange Rate
(Spot Rate)

Euro Short-Term Interest Rate
(Three-Month Deposit Rate)

Euro PPP % Over/Undervaluation
(Based on Bloomberg’s Long-Term Averaging Methodology)

Euro Cumulative Carry Return
(Long-Euro/Short-U.S.Dollar Carry Return)

Euro Implied Volatility
(One-Month Implied Volatility)

Germany Credit Default Swap Spread
(Five-Year CDS)
## Japan Economic Outlook

<table>
<thead>
<tr>
<th>Japan Economic Indicators</th>
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<th>Feb-10</th>
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<td>5.1</td>
<td>5.1</td>
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<td>Industrial Production (yoy %)</td>
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<td>31.3</td>
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<td>Leading Indicator (yoy %)</td>
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### Japan Real GDP Growth
(Year-over-Year % Change)

![JGDPNSAQ Index GP](go)

### Japan Consumer Price Inflation Rate
(Year-over-Year % Change)

![JNCP Index GP](go)

### Japan Unemployment Rate (%)

![JNUE Index GP](go)

### Japan Current-Account Balance (% of GDP)

![EHCAJP Index GP](go)
Japanese Yen at a Glance

Japanese Yen/U.S. Dollar Exchange Rate
(Spot Rate)

Japan Short-Term Interest Rate
(Three-Month Deposit Rate)

Japanese Yen PPP % Over/Undervaluation
(Based on Bloomberg’s Long-Term Averaging Methodology)

Japanese Yen Cumulative Carry Return
(Long-Yen/Short-U.S. Dollar Carry Return)

Yen Implied Volatility
(One-Month Implied Volatility)

Japan Credit Default Swap Spread
(Five-Year CDS)
U.K. Economic Outlook

<table>
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<tr>
<th>U.K. Economic Indicators</th>
<th>Jan-10</th>
<th>Feb-10</th>
<th>Mar-10</th>
<th>Apr-10</th>
<th>May-10</th>
<th>Jun-10</th>
<th>Jul-10</th>
<th>Aug-10</th>
<th>Sep-10</th>
<th>Oct-10</th>
<th>Nov-10</th>
<th>Dec-10</th>
<th>Jan-11</th>
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<td>Real GDP (qoq % saar)</td>
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<td>Retail Price Index (yoy %)</td>
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<tr>
<td>Core RPI (yoy %)</td>
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<td>Producer Price Index (yoy %)</td>
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<td>Unemployment Rate (%)</td>
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<td>7.8</td>
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<tr>
<td>Industrial Production (yoy %)</td>
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<td>3.5</td>
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<td>Leading Indicator (yoy %)</td>
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<td>Retail Sales (yoy %)</td>
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<td>Trade Balance (US$ bn)</td>
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<td>Gov’t Surplus/Deficit (% of GDP)</td>
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<td>M4 Money Supply (yoy %)</td>
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U.K. Real GDP Growth
(Year-over-Year % Change)

U.K. Retail Price Inflation Rate
(Year-over-Year % Change)

U.K. Unemployment Rate
(%)
British Pound at a Glance

U.S. Dollar/British Pound Exchange Rate
(Spot Rate)

British Pound PPP % Over/Undervaluation
(Based on Bloomberg’s Long-Term Averaging Methodology)

British Pound Implied Volatility
(One-Month Implied Volatility)

U.K. Short-Term Interest Rate
(Three-Month Deposit Rate)

British Pound Cumulative Carry Return
(Long-Sterling/Short-U.S. Dollar Carry Return)

U.K. Credit Default Swap Spread
(Five-Year CDS)
Canada Economic Outlook

Canada Economic Indicators Jan-10 Feb-10 Mar-10 Apr-10 May-10 Jun-10 Jul-10 Aug-10 Sep-10 Oct-10 Nov-10 Dec-10 Jan-11

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Canada Real GDP Growth
(Quarter-over-Quarter % Change, Seasonally Annualized Rate)

Canada Consumer Price Inflation Rate
(Year-over-Year % Change)

Canada Unemployment Rate
(%)

Canada Current-Account Balance
(% of GDP)
Canadian Dollar at a Glance

Canadian Dollar/U.S. Dollar Exchange Rate
(Spot Rate)

Canadian Dollar Implied Volatility
(One-Month Implied Volatility)

Canadian Dollar PPP % Over/Undervaluation
(Based on Bloomberg’s Long-Term Averaging Methodology)

Canadian Dollar Short-Term Interest Rate
(Three-Month Deposit Rate)

Canadian Dollar Cumulative Carry Return
(Long-CS/Short-US$ Carry Return)

Canadian Dollar PPP % Over/Undervaluation
(Based on Bloomberg’s Long-Term Averaging Methodology)
Australian Dollar at a Glance

**U.S. Dollar/Australian Dollar Exchange Rate** (Spot Rate)

**Australia Short-Term Interest Rate** (Three-Month Deposit Rate)

**Australian Dollar PPP % Over/Undervaluation** (Based on Bloomberg’s Long-Term Averaging Methodology)

**Australian Dollar Cumulative Carry Return** (Long-A$/Short-US$ Carry Return)

**Australian Dollar Implied Volatility** (One-Month Implied Volatility)

**Australia Credit Default Swap Spread** (Five-Year CDS)
New Zealand Dollar at a Glance

U.S. Dollar/New Zealand Dollar Exchange Rate
(Spot Rate)

New Zealand Dollar PPP % Over/Undervaluation
(Based on Bloomberg’s Long-Term Averaging Methodology)

New Zealand Dollar Implied Volatility
(One-Month Implied Volatility)

New Zealand Dollar Cumulative Carry Return
(Long-NZ$/Short-US$ Carry Return)

New Zealand Short-Term Interest Rate
(Three-Month Deposit Rate)

New Zealand Credit Default Swap Spread
(Five-Year CDS)
Swiss Franc at a Glance

Swiss Franc/U.S. Dollar Exchange Rate
(Spot Rate)

Switzerland Short-Term Interest Rate
(Three-Month Deposit Rate)

Swiss Franc PPP % Over/Undervaluation
(Based on Bloomberg’s Long-Term Averaging Methodology)

Swiss Franc Cumulative Carry Return
(Long-Swiss Franc/Short-US$ Carry Return)

Swiss Franc Implied Volatility
(One-Month Implied Volatility)

Switzerland Credit Default Swap Spread
(Five-Year CDS)
Danish Krone at a Glance

**Danish Krone/U.S. Dollar Exchange Rate**
(Spot Rate)

**Denmark Short-Term Interest Rate**
(Three-Month Deposit Rate)

**Danish Krone PPP % Over/Undervaluation**
(Based on Bloomberg’s Long-Term Averaging PPP Methodology)

**Danish Krone Cumulative Carry Return**
(Long-Krone/Short-US$ Carry Return)

**Danish Krone Implied Volatility**
(One-Month Implied Volatility)

**Denmark Credit Default Swap Spread**
(Five-Year CDS)
Norwegian Krone at a Glance

Norwegian Krone/U.S. Dollar Exchange Rate
(Spot Rate)

Norway Short-Term Interest Rate
(Three-Month Deposit Rate)

Norwegian Krone PPP % Over/Undervaluation
(Based on Bloomberg’s Long-Term Averaging PPP Methodology)

Norwegian Krone Cumulative Carry Return
(Long-Krone/Short-US$ Carry Return)

Norwegian Krone Implied Volatility
(One-Month Implied Volatility)

Norway Credit Default Swap Spread
(Five-Year CDS)
Swedish Krona at a Glance

**Swedish Krona/U.S. Dollar Exchange Rate**
(Spot Rate)

![Swedish Krona/U.S. Dollar Exchange Rate Chart](chart1.jpg)

**Sweden Short-Term Interest Rate**
(Three-Month Deposit Rate)

![Sweden Short-Term Interest Rate Chart](chart2.jpg)

**Swedish Krona PPP % Over/Undervaluation**
(Based on Bloomberg’s Long-Term Averaging PPP Methodology)

![Swedish Krona PPP % Over/Undervaluation Chart](chart3.jpg)

**Swedish Krona Cumulative Carry Return**
(Long-Krona/Short-US$ Carry Return)

![Swedish Krona Cumulative Carry Return Chart](chart4.jpg)

**Swedish Krona Implied Volatility**
(One-Month Implied Volatility)

![Swedish Krona Implied Volatility Chart](chart5.jpg)

**Sweden Credit Default Swap Spread**
(Five-Year CDS)

![Sweden Credit Default Swap Spread Chart](chart6.jpg)
Czech Koruna at a Glance

Czech Koruna/U.S. Dollar Exchange Rate
(Spot Rate)

Czech Koruna Short-Term Interest Rate
(Three-Month Deposit Rate)

Czech Republic Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Czech Krona Cumulative Carry Return
(Long-Czech Koruna/Short-US$ Carry Return)

Czech Koruna Implied Volatility
(One-Month Implied Volatility)

Czech Republic Credit Default Swap Spread
(Five-Year CDS)
Hungarian Forint at a Glance

Hungarian Forint/U.S. Dollar Exchange Rate
(Spot Rate)

Hungarian Forint Short-Term Interest Rate
(Three-Month Deposit Rate)

Hungary Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Hungarian Forint Cumulative Carry Return
(Long-Forint/Short-US$ Carry Return)

Hungarian Forint Implied Volatility
(One-Month Implied Volatility)

Hungary Credit Default Swap Spread
(Five-Year CDS)
Icelandic Krona at a Glance

Icelandic Krona/U.S. Dollar Exchange Rate
(Spot Rate)

Iceland Short-Term Interest Rate
(Three-Month Deposit Rate)

Iceland Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Icelandic Krona Cumulative Carry Return
(Long-Krona/Short-US$ Carry Return)

Iceland Credit Default Swap Spread
(Five-Year CDS)
Poland Zloty at a Glance

Polish Zloty/U.S. Dollar Exchange Rate
(Spot Rate)

Poland Short-Term Interest Rate
(Three-Month Deposit Rate)

Poland Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Polish Zloty Cumulative Carry Return
(Long-Zloty/Short-USS Carry Return)

Polish Zloty Implied Volatility
(One-Month Implied Volatility)

Poland Credit Default Swap Spread
(Five-Year CDS)
Russian Ruble at a Glance

Russian Ruble/U.S. Dollar Exchange Rate
(Spot Rate)

Russia Short-Term Interest Rate
(Three-Month Deposit Rate)

Russia Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Russian Ruble Implied Volatility
(One-Month Implied Volatility)

Russia Credit Default Swap Spread
(Five-Year CDS)
Turkish Lira at a Glance

Turkish Lira/U.S. Dollar Exchange Rate
(Spot Rate)

Turkey Short-Term Interest Rate
(Three-Month Deposit Rate)

Turkey Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Turkish Lira Cumulative Carry Return
(Long-Lira/Short-USD Carry Return)

Polish Zloty Implied Volatility
(One-Month Implied Volatility)

Turkey Credit Default Swap Spread
(Five-Year CDS)
South African Rand at a Glance

South African Rand/U.S. Dollar Exchange Rate
(Spot Rate)

South Africa Short-Term Interest Rate
(Three-Month Deposit Rate)

South Africa Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

South African Rand Cumulative Carry Return
(Long-Zloty/Short-US$ Carry Return)

South African Rand Implied Volatility
(One-Month Implied Volatility)

South Africa Credit Default Swap Spread
(Five-Year CDS)
## China Economic Outlook

### China Economic Indicators

<table>
<thead>
<tr>
<th>Jan-10</th>
<th>Feb-10</th>
<th>Mar-10</th>
<th>Apr-10</th>
<th>May-10</th>
<th>Jun-10</th>
<th>Jul-10</th>
<th>Aug-10</th>
<th>Sep-10</th>
<th>Oct-10</th>
<th>Nov-10</th>
<th>Dec-10</th>
<th>Jan-11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real GDP (yoy %)</td>
<td>--</td>
<td>--</td>
<td>11.9</td>
<td>--</td>
<td>--</td>
<td>10.3</td>
<td>--</td>
<td>--</td>
<td>9.6</td>
<td>--</td>
<td>--</td>
<td>9.8</td>
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<tr>
<td>Consumer Price Index (yoy %)</td>
<td>1.5</td>
<td>2.7</td>
<td>2.4</td>
<td>2.8</td>
<td>3.1</td>
<td>2.9</td>
<td>3.3</td>
<td>3.5</td>
<td>3.6</td>
<td>4.4</td>
<td>5.1</td>
<td>4.6</td>
</tr>
<tr>
<td>Industrial Product Price Index (yoy %)</td>
<td>4.3</td>
<td>5.4</td>
<td>5.9</td>
<td>6.8</td>
<td>7.1</td>
<td>6.4</td>
<td>4.8</td>
<td>4.3</td>
<td>4.3</td>
<td>5.0</td>
<td>6.1</td>
<td>5.9</td>
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<tr>
<td>Unemployment Rate (%)</td>
<td>--</td>
<td>--</td>
<td>4.2</td>
<td>--</td>
<td>--</td>
<td>4.2</td>
<td>--</td>
<td>--</td>
<td>4.1</td>
<td>--</td>
<td>--</td>
<td>4.1</td>
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<tr>
<td>Industrial Production (yoy %)</td>
<td>12.8</td>
<td>18.1</td>
<td>17.8</td>
<td>16.5</td>
<td>13.7</td>
<td>13.4</td>
<td>13.9</td>
<td>13.3</td>
<td>13.1</td>
<td>13.3</td>
<td>13.5</td>
<td></td>
</tr>
<tr>
<td>Leading Indicator (yoy %)</td>
<td>25.5</td>
<td>23.7</td>
<td>21.7</td>
<td>19.6</td>
<td>17.4</td>
<td>15.2</td>
<td>13.2</td>
<td>12.0</td>
<td>11.6</td>
<td>11.5</td>
<td>11.5</td>
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<tr>
<td>Manufacturing PMI</td>
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<td>55.7</td>
<td>53.9</td>
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<td>51.2</td>
<td>51.7</td>
<td>53.8</td>
<td>54.7</td>
<td>55.2</td>
<td>53.9</td>
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<tr>
<td>Retail Sales (yoy %)</td>
<td>14.0</td>
<td>22.1</td>
<td>18.0</td>
<td>18.5</td>
<td>18.7</td>
<td>18.3</td>
<td>17.9</td>
<td>18.4</td>
<td>18.8</td>
<td>18.6</td>
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<td>19.1</td>
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<tr>
<td>Consumer Confidence Index</td>
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<td>104.2</td>
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<td>108.5</td>
<td>107.8</td>
<td>107.3</td>
<td>104.1</td>
<td>103.8</td>
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<tr>
<td>Trade Balance (US$ bn, sa)</td>
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<td>7.6</td>
<td>-7.2</td>
<td>1.7</td>
<td>19.5</td>
<td>20.0</td>
<td>28.7</td>
<td>20.0</td>
<td>16.9</td>
<td>27.2</td>
<td>22.9</td>
<td>13.1</td>
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<tr>
<td>M2 Money Supply (yoy %)</td>
<td>26.1</td>
<td>25.5</td>
<td>22.5</td>
<td>21.5</td>
<td>21.0</td>
<td>18.5</td>
<td>17.6</td>
<td>19.2</td>
<td>19.0</td>
<td>19.3</td>
<td>19.5</td>
<td>19.7</td>
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<tr>
<td>Official Reserve Assets (US$ bn)</td>
<td>2415</td>
<td>2425</td>
<td>2447</td>
<td>2491</td>
<td>2540</td>
<td>2546</td>
<td>2539</td>
<td>2548</td>
<td>2648</td>
<td>2761</td>
<td>2768</td>
<td>2847</td>
</tr>
</tbody>
</table>

### China Real GDP Growth

(Year-over-Year % Change)

### China Consumer Price Inflation Rate

(Year-over-Year % Change)

### China Unemployment Rate

(%)
Chinese Renminbi at a Glance

**Chinese Renminbi/U.S. Dollar Exchange Rate**
(Chinese Renminbi/U.S. Dollar Spot Rate)

**China Short-Term Interest Rate**
(Three-Month Implied NDF Rate)

**China Foreign Exchange Reserves**
(Official Reserve Assets, US$ bn.)

**Chinese Renminbi Implied Volatility**
(One-Month Implied Volatility)

**China Credit Default Swap Spread**
(Five-Year CDS)
Hong Kong Dollar at a Glance

Hong Kong Dollar / U.S. Dollar Exchange Rate
(Hong Kong Dollar/U.S. Dollar Spot Rate)

Hong Kong Short-Term Interest Rate
(Three-Month Deposit NDF Rate)

Hong Kong Foreign Exchange Reserves
(Official Reserve Assets, US$ bn.)

Hong Kong Dollar Cumulative Carry Return
(Long HKD/Short US$ Carry Return)

Hong Kong Dollar Implied Volatility
(One-Month Implied Volatility)

Hong Kong Credit Default Swap Spread
(Five-Year CDS)
Indian Rupee at a Glance

Indian Rupee/U.S. Dollar Exchange Rate
(Chinese Renminbi/U.S. Dollar Spot Rate)

India Short-Term Interest Rate
(Three-Month Deposit Rate)

India Foreign Exchange Reserves
(Official Reserve Assets, US$ bn.)

Indian Rupee Cumulative Carry Return
(Long INR/Short US$ Carry Return)

Indian Rupee Implied Volatility
(One-Month Implied Volatility)
Indonesian Dollar at a Glance

Indonesian Rupiah /U.S. Dollar Exchange Rate
(Indonesian Rupiah/U.S. Dollar Spot Rate)

Indonesia Short-Term Interest Rate
(Three-Month NDF Rate)

Indonesia Foreign Exchange Reserves
(Official Reserve Assets, US$ bn.)

Indonesia Rupiah Cumulative Carry Return
(Long IDR/Short US$ Carry Return)

Indonesian Rupiah Implied Volatility
(One-Month Implied Volatility)

Indonesia Credit Default Swap Spread
(Five-Year CDS)
Malaysian Ringgit at a Glance

Malaysian Ringgit / U.S. Dollar Exchange Rate
(Malaysian Ringgit/U.S. Dollar Spot Rate)

Malaysia Short-Term Interest Rate
(Three-Month Deposit Rate)

Malaysia Foreign Exchange Reserves
(Official Reserve Assets, US$ bn.)

Malaysian Ringgit Implied Volatility
(One-Month Implied Volatility)

Indonesia Credit Default Swap Spread
(Five-Year CDS)
Philippines Peso at a Glance

Philippines Peso/U.S. Dollar Exchange Rate
(Spot Rate)

Philippines Short-Term Interest Rate
(Three-Month Implied NDF Rate)

Philippines Foreign Exchange Reserves
(Official Reserve Assets, US$ bn.)

Philippine Peso Cumulative Carry Return
(Long PHP/Short US$ Carry Return)

Philippines Peso Implied Volatility
(One-Month Implied Volatility)

Philippines Credit Default Swap Spread
(Five-Year CDS)
Singapore Dollar at a Glance

Singapore Dollar /U.S. Dollar Exchange Rate
(Spot Rate)

Singapore Short-Term Interest Rate
(Three-Month Deposit Rate)

Singapore Foreign Exchange Reserves
(Official Reserve Assets, US$ bn.)

Singapore Dollar Cumulative Carry Return
(Long SGD/Short US$ Carry Return)

Singapore Dollar Implied Volatility
(One-Month Implied Volatility)
South Korean Won at a Glance

South Korean Won/U.S. Dollar Exchange Rate
(Spot Rate)

South Korea Short-Term Interest Rate
(Three-Month Deposit Rate)

South Korea Foreign Exchange Reserves
(Official Reserve Assets, US$ bn.)

South Korean Won Cumulative Carry Return
(Long KRW/Short US$ Carry Return)

South Korean Won Implied Volatility
(One-Month Implied Volatility)

South Korea Credit Default Swap Spread
(Five-Year CDS)
Taiwan Dollar at a Glance

Taiwan Dollar /U.S. Dollar Exchange Rate
(Spot Rate)

Taiwan Short-Term Interest Rate
(Three-Month Deposit NDF Rate)

Taiwan Foreign Exchange Reserves
(Official Reserve Assets, US$ bn.)

Taiwan Dollar Cumulative Carry Return
(Long IDR/Short US$ Carry Return)

Taiwan Dollar Implied Volatility
(One-Month Implied Volatility)
Thai Baht at a Glance

Thai Baht /U.S. Dollar Exchange Rate
(Spot Rate)

Thailand Short-Term Interest Rate
(Three-Month Deposit NDF Rate)

Thailand Foreign Exchange Reserves
(Official Reserve Assets, US$ bn.)

Thai Baht Cumulative Carry Return
(Long THB/Short US$ Carry Return)

Thai Baht Implied Volatility
(One-Month Implied Volatility)

Thailand Credit Default Swap Spread
(Five-Year CDS)
Argentine Peso at a Glance

Argentine Peso/U.S. Dollar Exchange Rate
(Spot Rate)

Argentina Short-Term Interest Rate
(Three-Month Deposit Rate)

Argentina Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Argentina Peso Cumulative Carry Return
(Long-Peso/Short-US$ Carry Return)

Argentine Peso Implied Volatility
(One-Month Implied Volatility)

Argentina Credit Default Swap Spread
(Five-Year CDS)
Brazil Real at a Glance

Brazil Real/U.S. Dollar Exchange Rate
(Spot Rate)

Brazil Short-Term Interest Rate
(Three-Month Deposit Rate)

Brazil Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Brazil Real Cumulative Carry Return
(Long-Real/Short-US$ Carry Return)

Brazil Real Implied Volatility
(One-Month Implied Volatility)

Brazil Credit Default Swap Spread
(Five-Year CDS)
Chilean Peso at a Glance

Chilean Peso/U.S. Dollar Exchange Rate
(Spot Rate)

Chile Short-Term Interest Rate
(Three-Month NDF Rate)

Chile Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Chilean Peso Cumulative Carry Return
(Long-Peso/Short-USD Carry Return)

Chilean Peso Implied Volatility
(One-Month Implied Volatility)

Chile Credit Default Swap Spread
(Five-Year CDS)
Colombian Peso at a Glance

Colombian Peso/U.S. Dollar Exchange Rate
(Spot Rate)

Colombia Short-Term Interest Rate
(Three-Month Deposit Rate)

Colombia Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Colombian Peso Cumulative Carry Return
(Long-Peso/Short-US$ Carry Return)

Colombian Peso Implied Volatility
(One-Month Implied Volatility)

Colombia Credit Default Swap Spread
(Five-Year CDS)
Mexican Peso at a Glance

Mexican Peso/U.S. Dollar Exchange Rate
(Spot Rate)

Mexico Short-Term Interest Rate
(Three-Month Deposit Rate)

Mexico Foreign Currency Reserves
(Official Reserve Assets, US$ bn.)

Mexican Peso Cumulative Carry Return
(Long-Peso/Short-US$ Carry Return)

Mexican Peso Implied Volatility
(One-Month Implied Volatility)

Mexico Credit Default Swap Spread
(Five-Year CDS)
Peruvian Sol at a Glance

Peruvian Sol/U.S. Dollar Exchange Rate
(Spot Rate)

Peru Short-Term Interest Rate
(Three-Month Deposit Rate)

Peru Foreign Currency Reserves
(Of Official Reserve Assets, US$ bn.)

Peruvian Sol Cumulative Carry Return
(Long-Sol/Short-US$ Carry Return)

Peruvian Sol Implied Volatility
(One-Month Implied Volatility)

Peru Credit Default Swap Spread
(Five-Year CDS)