



See the Disclosure Appendix on page 12 for the Analyst Certification and Other Disclosures.

ECONOMIC &

MARKET

ANALYSIS

October 22, 2007

Currency Research

Global

Contributing Economists

Gabriel de Kock
1-212-816-3954
gabriel.dekock@citi.com

Masafumi Yamamoto
81-3-5574-4731
masafumi.yamamoto@nikkociti.com

FX Themes

Carry's Coming Back

- ✱ ☆ In August, the JPY surged against the AUD and NZD, as speculative carry trades unraveled when surging volatility cut the reward-to-risk back to 2003 levels.
- ✱ ☆ Money markets and bank balance sheets remain strained and credit concerns persist, posing risk for further JPY and CHF appreciation.
- ✱ ☆ But, the Fed's bold move, along with incoming news, which has eroded information asymmetries, has reduced the risk of another market meltdown and supercharged deleveraging.
- ✱ ☆ FX vols have fallen from August's peaks, sweetening carry trade incentives, but investors remain skittish. Gradually normalizing market conditions should lead to a sustained vol decline, if not to last spring's lows.
- ✱ ☆ Policy rate spreads should remain very wide, underpinning the JPY-funded carry trade and Japanese retail outflows longer term.
- ✱ ☆ High-yielding commodity currencies with high yield, including AUD, NZD, BRL and ZAR should remain attractive carry-trade targets, while the NOK likely will take the GBP's place.



Carry's Coming Back

Executive Summary

The JPY surged as carry trades collapsed over the summer.

In late July and August, the JPY surged as investors unwound carry trades amid heightened market volatility. Subsequently, the Fed's bold policy action bolstered market sentiment and risk-taking, in part by lowering the perceived risk of a broad and deep US slowdown that could seriously damage global economic activity. Many equity markets reached new highs, commodity currencies and emerging market assets, generally, rallied powerfully, and the JPY at one point had retraced about one-half of its earlier gains. Then, highlighting that the recovery in financial markets remains fragile and incomplete, riskier assets fell sharply last week, while Treasuries rallied hard.

Fed action and incoming news have lowered the risk of renewed deleveraging.

The past week's volatile price action bore out our earlier concern that it is too early to rebuild significant carry-trade positions. But, the risk of another meltdown and supercharged deleveraging should decline over time. Money markets are still strained and considerable uncertainty remains about the fate of the US housing market, the state of banks' balance sheets, the ownership and valuation of illiquid structured products incorporating subprime mortgages, and the losses incurred during the summer's violent market moves. However, substantial write-downs at many major financial institutions are behind us, suggesting that the remainder third-quarter reporting season may pose less risk of renewed turbulence than we had feared.

Markets remain skittish, but vols are well off their peaks...

Looking further ahead, the incentives for a resumption of the carry trade remain powerful.¹ Incoming news is eroding the information asymmetries at the heart of the subprime-related market disruption, with the third-quarter financial reports marking a significant step forward. As a result, FX market volatility should subside again from this week's rebound, although the experience this summer probably will leave a lasting imprint on investors' willingness to take risk.

...while rate spreads should remain very wide.

Our baseline economic forecasts suggest that short-term interest rate differentials between Japan and Switzerland, on the one hand, and the G10 and EM high yielders, on the other, will remain very wide. We anticipate solid near-trend global economic growth led by the world's emerging market powerhouses, China and India, which should support commodity prices, buoying activity and interest rates in the largest commodity exporters, including Australia, New Zealand, Brazil and South Africa. The key risk to our forecast is tighter financial conditions dampening industrial-world economic activity by more than we expect, resulting in a significant global economic slowdown.

The carry trade and long-term household portfolio outflows should keep the JPY weak.

Our forecast for a resumption of the yen-funded carry trade suggests that the JPY will remain significantly undervalued relative to past norms. Since the beginning of 2005, when the carry trade took off, the JPY has weakened markedly by past standards, despite Japan's steadily improving macroeconomic fundamentals. Over this period, Japanese households also increasingly diversified their highly liquid portfolios into foreign currency denominated assets, in many cases dwarfing traditional institutional flows. However, notwithstanding the magnitude of past flows, the stock of liquid assets remains very large, pointing to persistent outflows over a multi-year horizon.

¹ Indeed, indicators suggest that some market participants prematurely put on new carry-trade positions.

Summertime Carry Trade Unwind

FX carry-trade positions unraveled over the summer...

From late July to mid-August, currency markets, arguably, witnessed the most intense unraveling of carry trades since the late summer-early fall of 1998. The JPY jumped 9½% on a trade-weighted basis in a broad withdrawal from risk across markets. Against the AUD and NZD — the preeminent G10 carry-trade targets of the past two years — the JPY surged 14% and 18% respectively over this period. By comparison, the roughly 1½% trade-weighted appreciation of the CHF, commonly seen as the other important funding currency carry, was modest.

...resulting in sharp moves in AUD/JPY and NZD/JPY.

The recent AUD/JPY and NZD/JPY declines far exceed the moves triggered by the Shanghai stock market crash in February-March this year and the sell-off precipitated by a range of shocks, including a jump in US inflation, the end of the BoJ’s quantitative easing policy and the G7 *communiqué’s* focus on global imbalances, in the spring of 2006. Indeed, the latest moves on these crosses appear comparable to the supercharged carry-trade unwind sparked by the Russian default and LTCM collapse in the late summer/early fall of 1998.

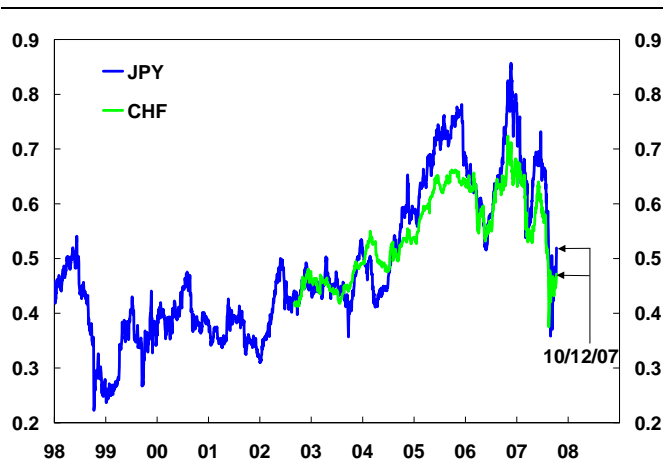
...as surging market volatility cut the carry reward-to-risk back to late-2003 levels.

During the summer’s financial market turbulence, FX volatility surged, sharply increasing the risks associated with carry trades relative to the rewards. In Figure 1, the average carry-to-risk ratio (three-month interest-rate spread divided by implied three-month volatility) for short JPY and CHF positions, against the AUD, GBP, and NZD show the attractiveness of carry trades collapsing to levels last seen in 2003 before recovering somewhat in recent weeks. In this environment, macroeconomic fundamentals had little, if any impact on the currency markets. Japanese high-frequency data released over this period increasingly cast a shadow on prospects for exports, consumer demand and corporate capital outlays. At the same time, the ruling LDP lost control of the Upper House, casting doubt on its economic reform agenda, but the JPY rallied nevertheless.

It is impossible to measure the carry trade accurately.

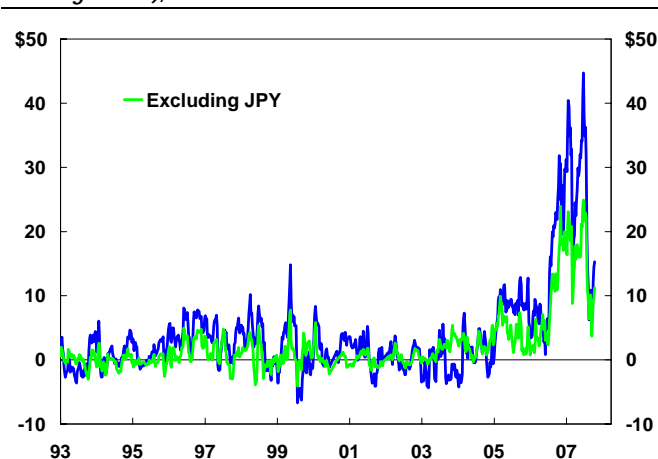
It is impossible to measure the volume of carry trades with any precision and hence to determine how large the carry trade was at its peak in the early summer. A carry trade is classically defined as “borrowing in a low-yielding funding currency (JPY, say) and

Figure 3. JPY and CHF — Average Carry-to-Risk Ratio Against AUD, NZD and GBP, 1998-12 Oct 07



Note: The carry-to-risk ratio is the target currency-funding currency 3-month interest rate spread divided by the 3-month implied volatility of the cross.
Sources: Bloomberg, Citi Investor Risk Advisory Group and Citi Currency Research.

Figure 2 Combined Non-Commercial Net Long Positions in AUD, NZD and GBP Plus Net Short Positions in JPY and CHF (USD Bill at 2Jan 07 Exchange Rates), 1993-16 Oct 07



Sources: Commodity Futures Trading Commission and Citi Currency Research.

lending in a higher-yielding target currency (NZD, say) without hedging the currency exposure,” suggesting that carry trades can be tracked in the balance sheets of international banks. But the same economic result can be achieved more efficiently through derivatives transactions, for example a forward a sale of JPY against NZD or a currency forward swap. As a result, the bulk of carry trades occur in the interbank or OTC derivatives markets and remain off balance sheet.

Highly speculative carry-trade positions likely were eliminated...

However, the available evidence indicates that the most speculative carry trade positions largely were flushed out during this deleveraging episode. As a measure of these positions, we calculate the sum of the noncommercial net long futures positions on the CME in the major carry-trade target currencies, the AUD, NZD and GBP and the net short positions in the JPY and CHF. The measure, which converts the value of contracts into USD at 2 January 2007 exchange rates to eliminate valuation effects, shows that carry trade “positions” surged to a peak of \$45 billion on June 26th before collapsing to \$6 billion (the lowest level since July 2006) when market volatility spiked during the week of August 21 (see Figure 3).

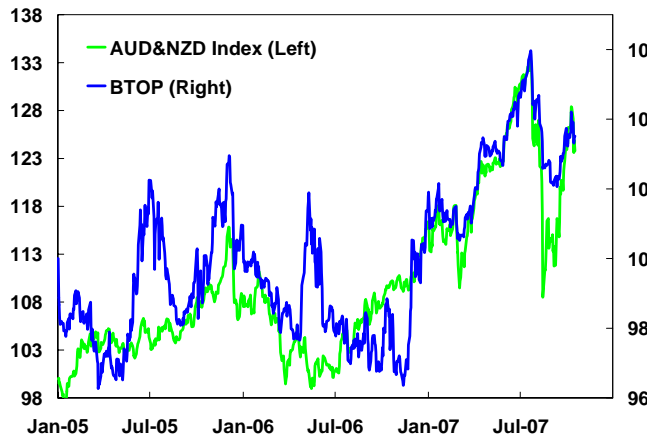
...driving down FX fund performance.

The performance of FX fund managers, as captured by the BTOP index, corroborates our conclusions from the IMM positioning data. The index, which blends the major styles of fund management, has been highly correlated with AUD/JPY and NZD/JPY since 2005, suggesting that carry-trade positions made a key contribution to performance. The correlation has been especially tight since late-2006 when our measure of carry-trade positioning in Figure 2 spiked higher, (see Figure 3). FX fund performance slumped as the AUD and NZD plunged during the yen carry-trade unwind in the weeks of July 23rd and August 13th. After the second wave of carry unwinds in mid-August, fund performance appeared to decouple from the moves in AUD/JPY and NZD/JPY, possibly because the bulk of the carry positions were eliminated. Over the past two weeks, FX fund performance improved, apparently in part reflecting the rally of commodity currencies before slipping again last week.

Japanese retail margin investors have become more cautious.

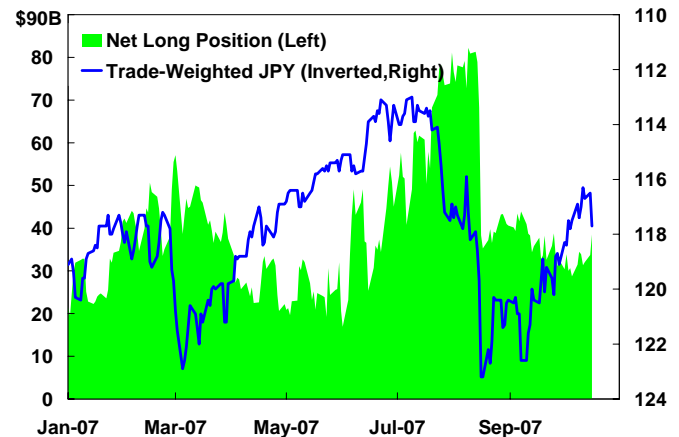
Margin calls triggered by the mid-August JPY surge slashed the net long foreign currency positions of Japanese retail margin investors by roughly half after positions largely

Figure 3. BTOP Index of FX Manager Performance and Equal-Weighted AUD/JPY and NZD/JPY Index (3 Jan 05=100), 2005-18 Oct 07



Sources: Federal Reserve Board, The Barclays Group and Citi Currency Research.

Figure 4. Estimated Net Long FX Position of Japanese Retail Margin Investors (USD Bill. at 1 Jan 07 Exchange Rates) and Trade Wtd. JPY (1990=100), Jan 07-16 Oct 07



Note: Estimates are based on figures from the Tokyo Financial Exchange, which has approximately 5% market share in the retail FX-on-margin business. Sources: Tokyo Financial Exchange and Citi Currency Research.

survived the JPY’s late-July jump intact (see Figure 4). Since then, retail margin traders, who, by some estimates accounted for roughly one-fifth of the JPY trading volume in Tokyo time, have behaved more cautiously. In contrast to previous episodes, they have taken profits on JPY weakness, cutting their exposure, rather than taking short-term JPY rallies as opportunities to extend long positions.

A Halting Comeback

Vols collapsed to near their 2005-06 troughs, as markets appeared to recover.

As financial markets away from credit appeared to normalize following the Fed’s September 18 rate cut, FX volatilities collapsed (see Figure 5). Three-month implied volatilities for both USD/CHF and USD/JPY fell below their February-March peaks and subsequently the lows for all of 2005 and most of 2006. As a result, carry-to risk ratios recovered to levels close to those seen in early 2005 when, in our opinion, the carry trade started gaining momentum (see Figure 3, again).

More risk-tolerant investors re-entered the carry trade...

Indeed, some indicators, for example the BTOP index, suggest that more risk-tolerant investors were putting on new carry-trade positions. But with volatilities still well above their troughs recorded last June, we suspect that currency moves attributed to carry trade positioning in news report often reflect other fundamentals, including strong stock market performance, commodities and soft Japanese cyclical indicators.

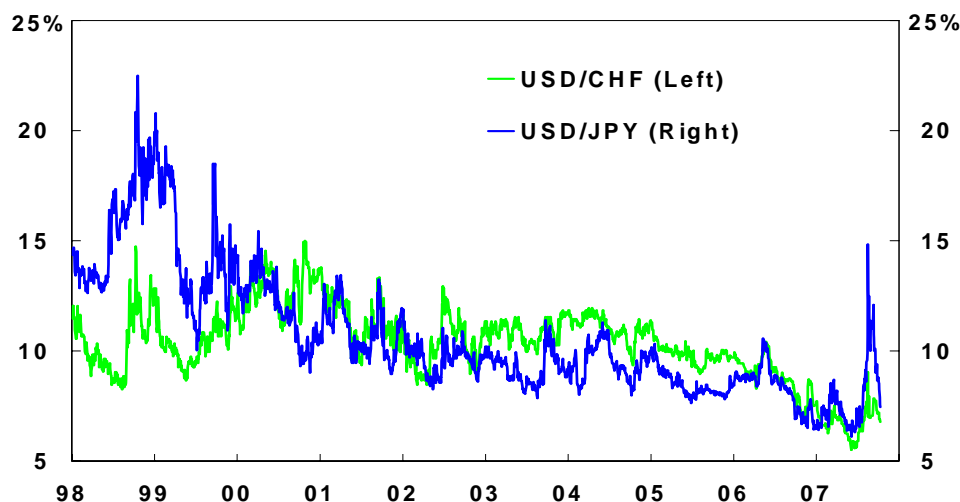
...but the market recovery remains uneven and fragile.

In this environment, we cautioned that it was too early to rebuild carry-trade positions ahead of likely market instability during the third-quarter corporate reporting season. Indeed, last week’s volatile market moves served as a painful reminder that the market recovery is uneven and remains incomplete. Money markets remain strained. The latest economic data failed to dispel acute uncertainty about the fate of the US housing market at the heart of the subprime mess. And the week’s quarterly reports by large financials did little to relieve concerns about strained bank balance sheets and the valuation of illiquid structured products, as evidenced by the investor skepticism about the fund for SIV assets. Against a backdrop of uncertainty about the G7 meeting, FX volatilities spiked above the highs seen during the February-March carry unwind.

The risk of another market meltdown is receding.

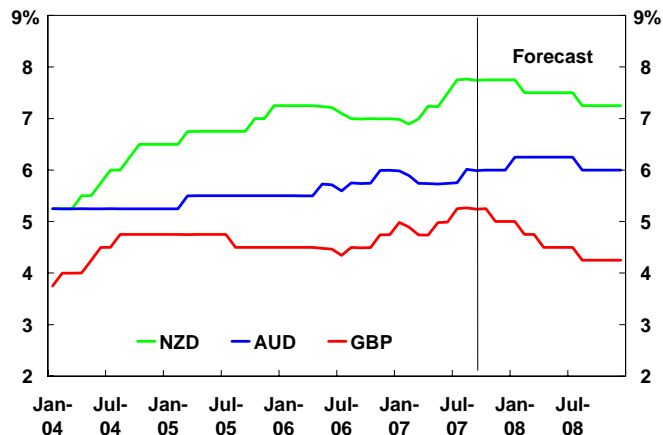
However, the risk of another market meltdown and supercharged deleveraging should decline over time. Equity markets in many countries have rallied to new highs and even

Figure 5. USD/JPY and USD/CHF Implied 3-Month Volatilities (Percent Annualized), 1998-10 Oct 07



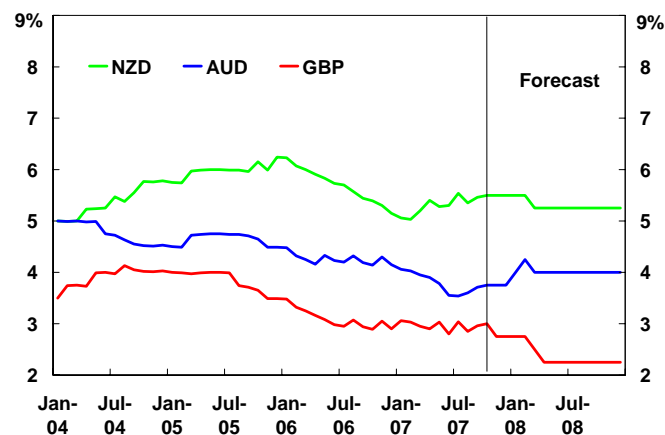
Source: Bloomberg.

Figure 6. Policy Rate Spreads vs Japan (Percent), 2004-08F



Sources: Bank of England, Bank of Japan, Reserve Bank of Australia, Reserve Bank of New Zealand, and Citi.

Figure 7. Policy Rate Spreads vs Switzerland (Percent), 2004-08F



Sources: Bank of England, Bank of Japan, Reserve Bank of Australia, Reserve Bank of New Zealand, and Citi.

after last week’s sell-off remain far above their recent lows, helping to support risk-taking. Moreover, many of the large write-downs at major financial institutions are behind us, suggesting that the risk of further shocks from this source that could trigger another bout of market turbulence is receding. In short, incoming news, even bad news, that erodes the information asymmetries at the heart of the subprime-related market disruption, should help pave the way for more normal market functioning down the road.

Longer-Term Carry Prospects

Looking ahead into 2008, the incentives for the resumption of the carry trade not only appear powerful, but broader economic fundamentals suggest that the trade has a long life ahead of it. The surprisingly steep drop in FX volatilities to previous ranges, though partly reversed last week, underscores one of our core views: that the so-called “great moderation” in global economic volatility wrought by sound macroeconomic policies and the decline in information costs, would cap market volatilities over the medium to long term. Regulatory shifts, innovations in risk management in the wake of the summer’s market turbulence probably will leave a lasting imprint on investors’ willingness to bear risk and on market liquidity. Nevertheless, recent market trends suggest that the pullback in risk attitudes will be relatively modest.

At the same time, spreads over Japanese short-term interest rates are likely to remain near their peaks of recent years. Spreads over Swiss short-term interest, though somewhat less attractive, should narrow only modestly (see Figures 6 and 7). UK spreads, by contrast are expected to narrow significantly, as past policy tightening and persistent money market strains trigger a sharp housing market correction and consumer slowdown.

The macroeconomic trends underlying the BoJ’s accommodative policies and the JPY’s attractiveness as a funding currency remain firmly in place. We expect only a 0.2% increase in Japanese core consumer prices (excluding fresh food) in 2008, consistent with very gradual policy normalization. Moreover, the risk to our inflation forecast may be on the downside. Strikingly, per capita wages in Japan are falling despite solid employment growth (see Figure 10). This trend points to persistent declines in unit labor costs and little or no upward price pressures in an environment where many domestic firms have

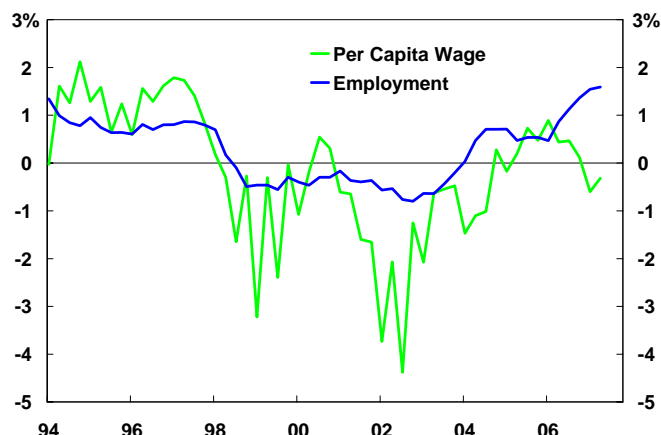
We remain constructive on the carry trade.

Low economic volatility underpins low FX vols.

Policy rate spreads likely will stay very wide.

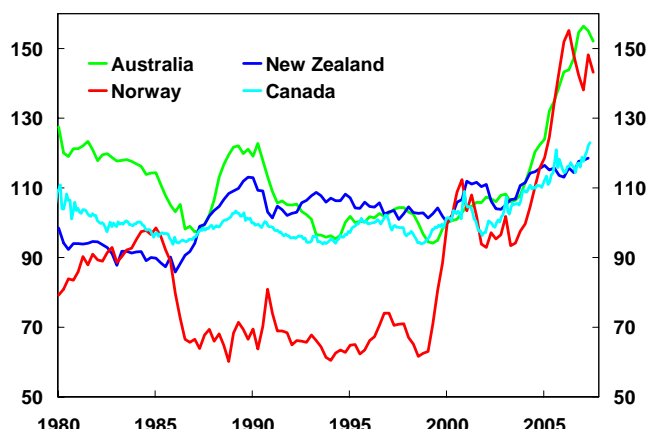
Longer-term trends underlie the JPY’s attractiveness as a funding currency.

Figure 8. Japan — Employment and Per capita Wage (Year-to-Year Percent Change), 1994-2Q 07



Source: METI, Ministry of Health, Labor and Welfare and Citi.

Figure 9. Australia, Canada, New Zealand and Norway —Terms of Trade (Jan 2000=100), 1980-Sep 07



Sources: IMF and national sources.

limited pricing power.² The economic forces driving weak wage growth, including the re-entry into the labor force by workers who withdrew during the deflationary period, the replacement of retiring baby boomers by lower-paid young workers and the acceptance of lower-paid temporary jobs by retirees, likely will persist beyond 2008.

The SNB can be relaxed about CHF weakness.

Similarly, recent trends suggest that the Swiss National Bank (SNB) could be fairly relaxed about CHF weakness, even though EUR/CHF has made new highs. Leading indicators point to a moderation in the pace of economic activity and stubborn money-market strains pose downside risks.³ Moreover, third-quarter consumer price inflation at 0.7% year on year not only is far below the SNB's 2% target, but also fell well short of the SNB's forecast for a 1% increase, in part because ex-energy import prices continue to fall.

The commodity currencies remain attractive carry-trade targets.

On the other side of the carry trade, the high-yielding commodity currencies remain very attractive targets. Since the start of the decade, the commodity exporters have experienced substantial terms of trade gains, which have buoyed profits, incomes and domestic demand, putting pressure on capacity, lifting inflation risks, and raising real interest rates (see Figure 9).

Our forecast for two RBA rate hikes may be too cautious.

The standout in this group is the AUD. Australian economic activity powered ahead at a 4.3% year-to-year pace through mid-2007 and the unemployment is at a new 32-year low of 4.2%. But, in recent months, robust East Asian demand for Australia's bulk commodity exports, iron ore and coal, have compelled us to revise upward our outlook for Australia's terms of trade yet again. At the same time, state governments have put in place ambitious spending plans to relieve infrastructure bottlenecks that have capped commodity export volumes, while the Federal election campaign has spawned significant new tax cut proposals. We estimate that these spending plans and tax cuts will boost aggregate demand by a full percentage point over the next year, further increasing pressures on capacity. Against this backdrop, our above-consensus call for 50 basis points RBA tightening by 1Q 08 appears cautious.

² The September *Tankan* survey suggests that domestically focused small firms and non-manufacturers have been unable to pass on higher materials costs and energy prices. Indeed, margin pressures in these sectors may have contributed to the surprising decline in wages.

³ See Michael Saunders, Switzerland — SNB and the CHF, Again, *Euro Weekly*, Citi, October 11, 2007.

Similarly, while the RBNZ's cash rate target is by far the highest in the G10, dairy-price driven increases in the terms of trade and resilient sentiment readings gradually are bringing the market over to our view that rate cuts are not on the cards.

The GBP may lose its status as a target currency...

The GBP probably will lose its status as a first-ranked G10 carry trade target next year. Policy tightening already has turned housing market leaders, but we expect a sharp housing slowdown, with turnover falling 20% and prices flat over the next 12 months. The repricing of credit and ongoing money market strains have catapulted the funding costs of non-bank (non-building society) mortgage lenders, which account for roughly one-quarter of UK mortgage originations. Higher funding costs are being passed on to homeowners, all of whom are highly leveraged and 56% of whom have variable-rate mortgages. As a result we expect a severe consumer spending slowdown that eventually will compel the BoE to cut rates by at least 50 basis points.

...making room for the NOK.

In Europe, the NOK could replace the GBP as a first-ranked carry-trade target currency. Elevated oil prices continue to boost demand, while capacity is tight. Wages have accelerated and increasingly are feeding through to domestic consumer prices. As a result, we expect three Norges Bank rate hikes by mid-2008, taking the policy rate target to 5.75%.

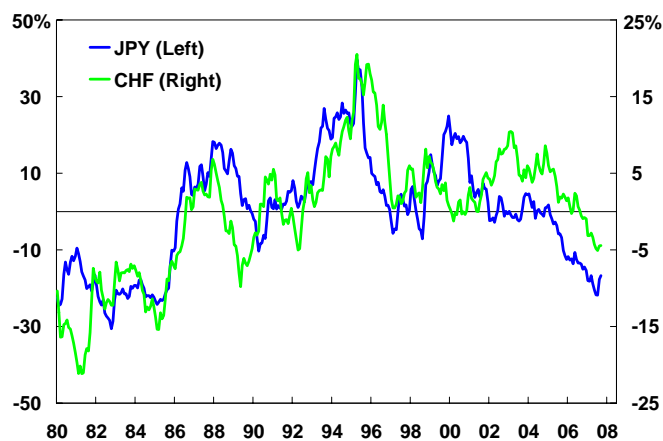
...and EM commodity exporters.

Beyond the G10, commodity exporters that benefit disproportionately from economic growth in EM Asia, including exporters of bulk commodities like South Africa and Brazil, likely will continue experiencing strong commodity-price driven pressure on domestic demand and interest rates. Indeed, the South African Reserve Bank took out further inflation insurance last week, raising its repo rate to 10½%. As a result, their currencies likely will remain attractive carry-trade targets and popular among Japanese retail investors as well.

A US-led global slowdown poses the greatest risk to carry trades.

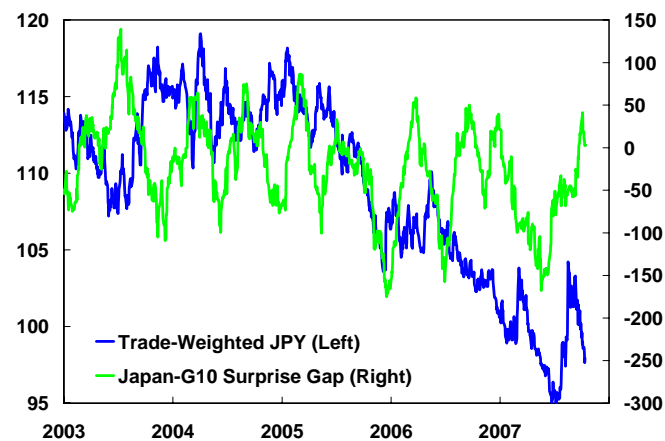
Last week was a sobering reminder that the risk of renewed market turbulence cannot be dismissed lightly. However, we believe that a US-led global economic slowdown deep enough to trigger widespread policy easing, as well as undercut commodity markets and the macroeconomic fundamentals in the emerging world, likely is the most important risk

Figure 10 Real Trade-Weighted JPY and CHF (Deviations from Post-1979 Average), 1998-Sep 07



Sources: Bank of Japan and Citi Currency Research.

Figure 11. Trade-Weighted JPY vs G10 (ex Japan) and Japan-G10 (ex Japan) Economic Surprise Index Gap, 2003-15 Oct 07



Note: Citigroup's economic surprise indexes are constructed by weighting data surprises relative to the Street consensus by their currency market impact. Sources: Federal Reserve Board, Citi Investment Research Advisory Group and Citi Currency Research.

to our constructive view on carry trades. Markets already appear to understand that healthy underlying fundamentals, including strong corporate profits and balance sheets limit the risk of a severe slowdown. Decisive Fed action, along with the FOMC’s readiness to act again, also has limited the risk of a severe economic downturn. But we cannot dismiss the possibility that outsized economic shocks, including a severe disruption of oil supplies, could trigger such a shift.

Sustained JPY (and CHF?) Weakness

The JPY and CHF appeared undervalued in recent years...

Both the JPY and the CHF have appeared increasingly undervalued in recent years, notwithstanding economic growth performance significantly surpassing the norms of the prior decade. On a real trade-weighted basis, the JPY hit a trough about 22% below its post-1980 average in June this year. And while the JPY rallied impressively in August, its gains over the summer came to only about 5% on a real trade-weighted basis (see Figure 10). CHF weakness is a more recent phenomenon and also appears much less pronounced.

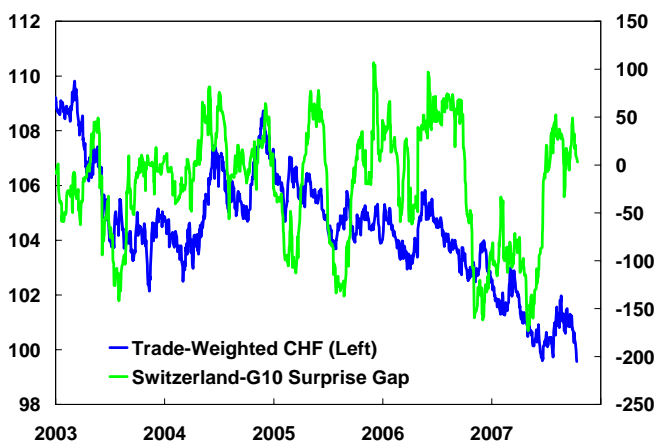
...and seem to have decoupled from cyclical fundamentals..

Notably, the marked JPY downtrend (on a trade-weighted basis) that has been in place since early 2005 does not match up closely with Japan’s relative cyclical performance. In Figure 11, the gap between Citi’s economic surprise index for Japan, and a trade-weighted aggregate surprise index for Japan’s G10 trading partners appears to have decoupled from the trade-weighted value of the JPY against the currencies of its G10 trading partners. Indeed, negative Japanese data surprises appear to have triggered JPY depreciation while positive surprises failed to gain significant traction. A similar pattern applies to the CHF (see Figure 12).

...as the carry trade took off and Japanese households diversified into foreign currency assets.

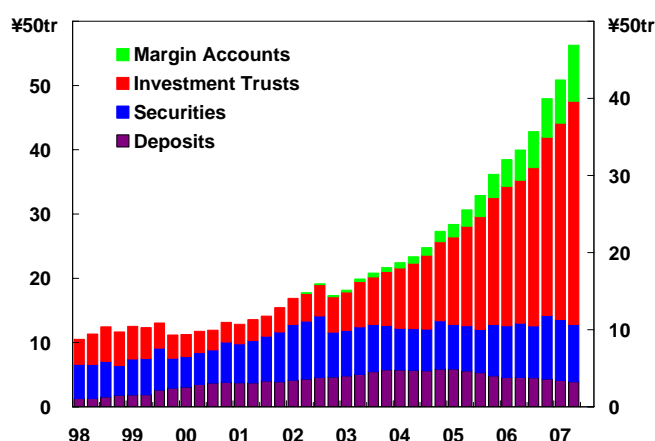
The disconnect between the JPY and CHF and their cyclical drivers matches up closely with the buildup of highly speculative carry-trade positions shown in Figure 2 and the more recent surge in long foreign exchange positions held by Japanese retail margin investors shown in Figure 4. However, for the JPY another important driver appears to have been in play: the steady diversification of household financial assets into foreign currency investment trusts. Foreign currency denominated investment trusts are by far

Figure 12. Trade-Weighted CHF vs G10 (ex Switzerland) and Switzerland-G10 Economic Surprise Index Gap, 2003-15 Oct 07



Note: Citigroup’s economic surprise indexes are constructed by weighting data surprises relative to the Street consensus by their currency market impact. Sources: Federal Reserve Board, Citi Investment Research Advisory Group and Citi Currency Research.

Figure 13. Foreign Currency Assets Held by Japanese Households (JPY Trill.), 1998-2Q 07



Sources: BoJ, Investment Trusts Association, MoF and Citi Currency Research.

the largest foreign currency asset class in household portfolios, and holdings have more than doubled since the end of 2004 (see Figure 13). Indeed, most months retail-driven outflows from Japan dwarf traditional institutional investor flows.

The new carry trade probably will be less robust, especially in CHF...

We have argued before that policy considerations and falling risk aversion presage a return of the carry trade, even if the risk-reward in recent weeks has been low enough to deter most investors from putting on new carry positions. But we also suspect that a durable rise in risk aversion would limit the volume of carry trades relative to the peaks of last spring. Indeed, short-term interest rate spreads over Swiss franc money market rates may not be attractive to justify a fully-fledged CHF-funded carry trade.

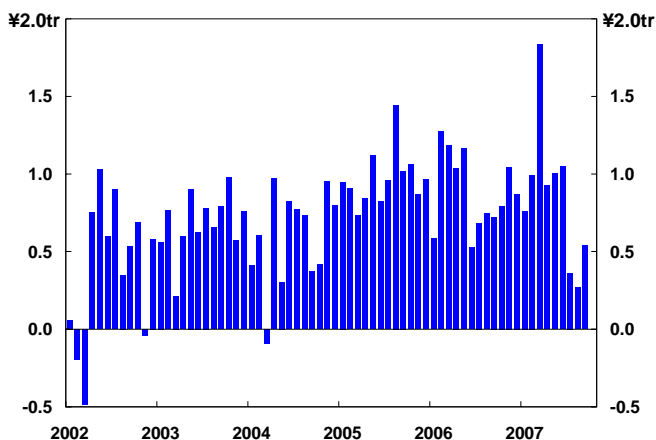
...and Japanese retail investors have become more cautious...

Japanese retail margin investors appear much more cautious than before the summer's market turbulence. Recently they have used JPY depreciation as an opportunity to take profits on long FX positions. Similarly, monthly retail outflows into foreign securities and foreign currency investment trusts have slowed dramatically, to rates last seen in 2004, suggesting that households have become much more wary of currency risk and downside risk of overseas equity markets.

...but the JPY likely will remain undervalued.

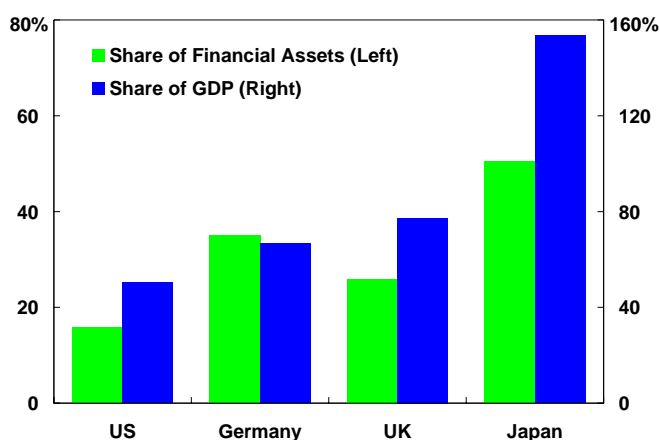
Reflecting a less attractive risk-reward trade-off and greater investor caution, we do not expect to revisit the spring's extremes in JPY valuation against the weakening USD. At the same time, however, past experience with the carry trade indicates that the JPY will remain undervalued by the norms of the past three decades. Moreover, following the deflationary experience of the past 15 years, Japanese households remain massively overweight liquid low-yielding JPY assets. These assets not only make up roughly one-half of Japanese household portfolios but amount to more than one and a half times Japan's gross domestic product. With fairly steady, if modest, economic growth gradually eroding retail investor risk aversion this large stock of liquid assets probably will continue to generate flows into foreign currency and other riskier assets.

Figure 14. Outward Investment by Japanese Retail Investors (JPY Trill.), 2002-Sep 07



Note: Total outflow by investment trusts companies and securities firms.
Sources: Mof and Citi Currency Research.

Figure 15. Germany, Japan, U.K. and U.S. — Liquid Deposits (Share of Household Asset and Share of GDP), Dec 06



Source: National flow-of-funds and financial accounts.

Disclosure Appendix

Each individual contributing to this report hereby certifies that, with respect to the material contributed by him or her, all of the views expressed in this report accurately reflect his or her personal views about such subject securities, issuers, currencies, commodities, futures, options, economies or strategies. Further, each of these individuals also certifies that no part of his or her compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this report.

Other Disclosures

ADDITIONAL INFORMATION REGARDING THIS REPORT IS AVAILABLE ON REQUEST.

Citigroup research analysts receive compensation based on a variety of factors. Like all Citigroup employees, analysts receive compensation that is impacted by Citigroup's overall profitability, which includes revenues from, among other things, investment banking activities. Analyst compensation is determined by Citigroup research management and other senior management (not including investment banking personnel).

ISSUER-SPECIFIC DISCLOSURES

Citigroup, its officers, directors and/or employees, may from time to time have long or short positions in, act as principal in connection with, and buy or sell securities or derivatives (including options and warrants) discussed in this report. For purposes of your review of this report, you should assume that this is the case with respect to the securities covered herein.

Citigroup does and/or seeks to do business with many issuers, including through the provision of investment banking or other services. For purposes of your review of this report, you should assume that Citigroup has acted as a manager or co-manager of an offering of securities discussed in this report within the prior 12 months or has provided other services to the issuer within the prior 12 months for which it has received or expects to receive compensation.

Citigroup is an active market maker or liquidity provider for many fixed-income securities and from time to time takes principal positions in such securities or related derivatives. For purposes of your review of this report, you should assume that this is the case with respect to the securities covered herein.

OTHER GENERAL DISCLOSURES

This research report was prepared by Citigroup Global Markets Inc. ("CGMI") and/or one or more of its affiliates (collectively, "Citigroup"), as further detailed in the report, and is provided for information and discussion purposes only. It does not constitute an offer or solicitation to purchase or sell any securities or other financial products.

This report does not take into account the investment objectives, financial situation or particular needs of any particular person. Investing in securities and other financial products entails certain risks, including the possible loss of the entire principal amount invested. Certain investments in particular, including those involving structured products, futures, options and other derivatives, are complex, may entail substantial risk and are not suitable for all investors. The price and value of, and income produced by, securities and other financial products may fluctuate and may be adversely impacted by exchange rates, interest rates or other factors. Prior to effecting any transaction in options or options-related products, investors should read and understand the current Options Clearing Corporation Disclosure Document, a copy of which may be obtained on request from your Citigroup representative. Certain securities may not be registered with, or subject to the reporting requirements of, the US Securities and Exchange Commission or any comparable regulatory authority. Information available on such securities may be limited. Investors should obtain advice from their own tax, financial, legal and other advisors and only make investment decisions on the basis of the investor's own objectives, experience and resources.

The information contained in this report is based on generally available information and, although obtained from sources believed to be reliable, its accuracy and completeness is not guaranteed. The analysis contained in this report is based on a number of assumptions. Changes in such assumptions could produce materially different results. This communication is not intended to forecast or predict future events. Past performance is not a guarantee or indication of future results.

Citigroup research analysts may communicate with sales and trading personnel and other Citigroup personnel for the purposes of gathering and analyzing market information and may discuss with such personnel information regarding, among other things, market trends, economic trends, the market for bonds of a specific issuer and other market information (such as current prices, spreads and liquidity), so long as such communications do not impair the analyst's independent ability to express accurately his or her personal views about any and all of the subject securities or issuers. Other Citigroup personnel who do not function as research analysts, including sales and trading personnel, may provide oral or written market commentary or trade ideas to Citigroup's customers or proprietary trading desks that differ from the views expressed in this report. Citigroup's proprietary trading and asset management businesses may make investment decisions that are different from the recommendations contained in this report.

Citigroup has no duty to update this report and the opinions, estimates and other views expressed in this report may change without notice. No liability whatsoever is accepted for any loss (whether direct, indirect or consequential) that may arise from any use of the information contained in or derived from this report.

Securities recommended, offered or sold by Citigroup (unless expressly stated otherwise): (i) are not insured by the Federal Deposit Insurance Corporation or any other body; and (ii) are not deposits or other obligations of Citibank, N.A. or any other insured depository institution.

Citigroup does not provide tax advice and nothing contained herein is intended to be, or should be construed as, tax advice. Any discussion of US tax matters contained in this report was written to support the promotion or marketing of the transactions or other matters addressed herein and is not intended to be used, and must not be used by any recipient, for the purpose of avoiding US federal tax penalties. Recipients of this report should seek tax advice based on the recipient's own particular circumstances from an independent tax adviser.

This report is intended for distribution solely to customers of Citigroup in those jurisdictions where such distribution is permitted. No part of this report may be copied or redistributed by any recipient for any purpose without Citigroup's prior written consent.

Local law requirements may prohibit certain investors from effecting a transaction in the security or securities covered in this report. US persons wishing further information or to effect a transaction should contact a registered representative of CGMI in the United States. Non-US persons wishing further information or to effect a transaction should contact a Citigroup entity located in their own jurisdiction unless applicable governing law permits otherwise.

AUSTRALIA: This report is made available in Australia to wholesale clients through Citigroup Global Markets Australia Pty Ltd. (ABN 64 003 114 832 and AFSL No. 240992) and to retail clients through Citigroup Wealth Advisors Pty Ltd. (ABN 19 009 145 555 and AFSL No. 240813), participants of the ASX Group, and regulated by the Australian Securities & Investments Commission. Citigroup Centre, 2 Park Street, Sydney, NSW 2000. **CANADA:** If this report is being made available in certain provinces of Canada by Citigroup Global Markets (Canada) Inc. ("CGM Canada"), CGM Canada has approved the Product. Citigroup Place, 123 Front Street West, Suite 1100, Toronto, Ontario M5J 2M3. **CHINA:** This report is made available in China through Citibank, N.A. Beijing Branch, 16F Tower 1 Bright China Chang-an Bldg., 7 Jianguomen

Nei Avenue, Beijing, 100005 P.R. China. Citibank, N.A. Beijing Branch is regulated by the China Banking Regulatory Commission. **CZECH REPUBLIC:** This report is being distributed within the territory of the Czech Republic by Citibank a.s. Citibank a.s. is a bank and securities broker/dealer regulated by the Czech National Bank, Na Příkopě 28, Prague 1, Czech Republic. Unless expressly stated otherwise, Citibank a.s. is only distributing this report and, upon its distribution, it has not changed or amended the actual content of this report in any way (as such was prepared by respective entities and/or individuals as further detailed in the report). **HONG KONG:** If this report is made available in Hong Kong by, or on behalf of, Citigroup Global Markets Asia Ltd., it is attributable to Citigroup Global Markets Asia Ltd., Citibank Tower, Citibank Plaza, 3 Garden Road, Hong Kong. Citigroup Global Markets Asia Ltd. is regulated by the Hong Kong Securities and Futures Commission. If this report is made available in Hong Kong by Citibank, N.A., it is attributable to Citibank, N.A. Citibank Tower, Citibank Plaza, 3 Garden Road, Hong Kong. Citibank, N.A. is regulated by the Hong Kong Monetary Authority. **INDIA:** The Product is made available in India by Citigroup Global Markets India Private Limited, which is regulated by Securities and Exchange Board of India. Bakhtawar, Nariman Point, Mumbai 400-021. **INDONESIA:** This report is made available in Indonesia through Citibank, N.A. Indonesia Branch, Citibank Tower Lt 7, Jend. Sudirman Kav 54-55, Jakarta. Citibank, N.A. Indonesia Branch is regulated by the Bank of Indonesia. **JAPAN:** This report is being distributed in Japan by Nikko Citigroup Limited. If this report was prepared by a Citigroup affiliate of Nikko Citigroup Limited, it is being distributed by Nikko Citigroup Limited under license. If this report was prepared by Nikko Citigroup Limited, it may be based in part on a report produced by one of its affiliates used under license. If this report was prepared by Nikko Citigroup Limited and is being distributed in other jurisdictions by other Citigroup affiliates, or by Nikko Cordial Securities Inc., it is being distributed by them under license. Nikko Citigroup Limited is regulated by Financial Services Agency, Securities and Exchange Surveillance Commission, Japan Securities Dealers Association, Tokyo Stock Exchange and Osaka Securities Exchange. Akasaka Park Building, 2-20, Akasaka 5-chome, Minato-ku, Tokyo 107-6122. **KOREA:** The Product is made available in Korea by Citibank Korea Inc., which is regulated by the Financial Supervisory Commission and the Financial Supervisory Service. Address is Dadong 39, Jung Gu, Seoul, Korea, 100-180. **MEXICO:** This report is made available in Mexico by Acciones y Valores Banamex, S.A. De C. V., Casa de Bolsa, and Banco Nacional de México S.A. Acciones y Valores Banamex is regulated by Comisión Nacional Bancaria y de Valores. Its address is Reforma 398, Col. Juárez, 06600 Mexico, D.F. Banco Nacional de México S.A. is regulated by the Comisión Nacional Bancaria y de Valores. Its address is Actuario Roberto Medellín 800, Col. Santa Fé, (01210) Mexico City, Mexico. **NEW ZEALAND:** This report is made available in New Zealand through Citigroup Global Markets New Zealand Limited (Company No. 604457), a Participant of the New Zealand Exchange Limited and regulated by the New Zealand Securities Commission. Level 11, 23 Customs Street East, Auckland, New Zealand. **PHILIPPINES:** This report is made available in the Philippines through Citibank, N.A. Philippine Branch, 8741 Paseo de Roxas, Makati City, Philippines. Citibank, N.A. Philippine Branch is regulated by the Bangko Sentral ng Pilipinas. **POLAND:** The Product is made available in Poland by Dom Maklerski Banku Handlowego SA, an indirect subsidiary of Citigroup Inc., which is regulated by Komisja Papierów Wartościowych i Giełd. Bank Handlowy w Warszawie S.A. ul. Senatorska 16, 00-923 Warszawa. **RUSSIA:** The Product is made available in the Russian Federation through ZAO Citibank, which is licensed to carry out banking activities in the Russian Federation in accordance with the general banking license issued by the Central Bank of the Russian Federation and brokerage activities in accordance with the license issued by the Federal Service for Financial Markets. Neither the Product nor any information contained in the Product shall be considered as advertising the securities mentioned in this report within the territory of the Russian Federation or outside the Russian Federation. The Product does not constitute an appraisal within the meaning of the Federal Law of the Russian Federation of 29 July 1998 No. 135-FZ (as amended) On Appraisal Activities in the Russian Federation. 8-10 Gasheka Street, 125047 Moscow. **SINGAPORE:** The Product is made available in Singapore through Citigroup Global Markets Singapore Pte. Ltd. and Citicorp Investment Bank Singapore Ltd. Citigroup Global Markets Singapore Pte. Ltd. is a Capital Markets Services License holder and regulated by the Monetary Authority of Singapore. 1 Temasek Avenue, #39-02 Millenia Tower, Singapore 039192. Citicorp Investment Bank Singapore Ltd. is a Merchant Banking License holder and regulated by the Monetary Authority of Singapore. 3 Temasek Avenue, #17-00 Centennial Tower, Singapore 039190. **SOUTH AFRICA:** Citigroup Global Markets (Pty) Ltd. is incorporated in the Republic of South Africa (company registration number 2000/025866/07) and its registered office is at 145 West Street, Sandton, 2196, Saxonwold. Citigroup Global Markets (Pty) Ltd. is regulated by the JSE Securities Exchange South Africa, the South African Reserve Bank and the Financial Services Board. The investments and services contained herein are not available to private customers in South Africa. **TAIWAN:** The Product is made available in Taiwan through Citibank, N.A., Taipei Branch, which is regulated by the Financial Supervisory Commission. No portion of the report may be reproduced or quoted in Taiwan by the press or any other person. F.8 No. 169, Section 4, Jen Ai Road, Taipei, Taiwan. **UNITED KINGDOM:** This report is being distributed in the United Kingdom by Citibank, N.A., London Branch, or Citigroup Global Markets Limited, Citigroup Centre, Canada Square, Canary Wharf, London E14 5LB, UK. This material is directed exclusively at market professional and institutional investor customers in the United Kingdom and is not for distribution to private customers in the United Kingdom as defined by the Financial Services Authority. Any investment or service to which this material may relate will not be made available to such private customers. This material may relate to investments or services of a person outside the United Kingdom or to other matters which are not regulated by the Financial Services Authority and further details as to where this may be the case are available on request in respect of this material. **UNITED STATES:** This report is being distributed in the United States by CGMI. If this report was prepared in whole or in part by a non-U.S. affiliate of CGMI, CGMI accepts responsibility for its contents (subject to the notices above). If this report covers non-U.S. securities, U.S. investors should be aware that non-U.S. companies may not be subject to uniform audit and reporting standards, practices and requirements comparable to those in the United States. Securities of some non-U.S. companies may be less liquid and their prices may be more volatile than securities of comparable U.S. companies. Exchange rate movements may have an adverse effect on the value of an investment in non-U.S. securities and its corresponding dividend payment for U.S. investors. CGMI is a member of the Securities Investor Protection Corporation. **EUROPEAN UNION:** Unless specified to the contrary, within EU Member States, the Product is made available by Citigroup Global Markets Limited, which is regulated by the Financial Services Authority. Many European regulators require that the firm must establish, implement and make available a policy for managing conflicts of interest arising as a result of publishing or distribution of investment research. The policy applicable to research analysts within Citigroup's Fixed Income Strategy and Analysis and Economic & Market Analysis divisions, as well as the investment research they produce, can be obtained by contacting Citigroup Global Markets Inc., 388 Greenwich Street 11th floor, NY NY 10013, Attention: Fixed Income Publishing.

© Citigroup Global Markets Inc., 2007. All rights reserved. Smith Barney is a division and service mark of Citigroup Global Markets Inc. and its affiliates and is used and registered throughout the world. Citi and Citi and Arc Design are trademarks and service marks of Citigroup Inc. or its affiliates and are used and registered throughout the world. CitiFx® is a service mark of Citicorp Inc.. Nikko is a service mark of Nikko Cordial Corporation. Any unauthorized use, duplication or disclosure is prohibited by law and may result in prosecution.