Economics

27 January 2012 | 12 pages

Sterling Weekly

Setting the Stage for Extra Stimulus

Michael Saunders
+44-20-7986-3299
michael.saunders@citi.com

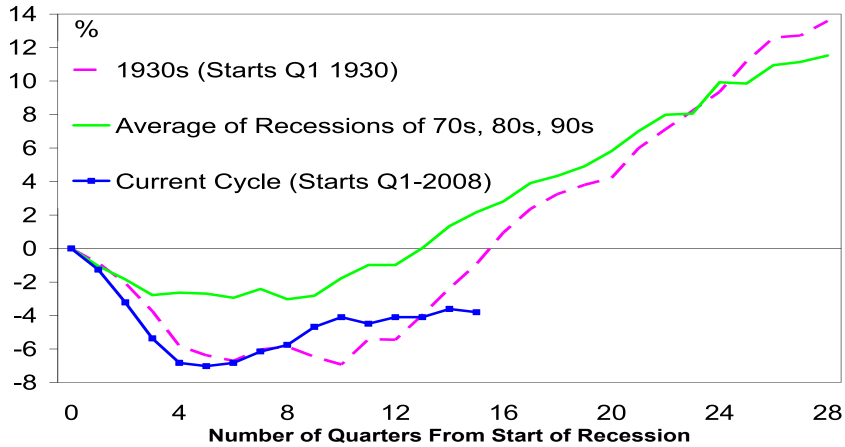
- Recent events set the stage for a further substantial increase in QE at the February MPC meeting, in our view. We expect an extra £75-100bn at the February meeting and about £600bn in total (ie £325bn on top of the existing £275bn), well ahead of the consensus (which appears to be for £50bn in February and £350bn in total).
- Data and surveys suggest that the economy is weak, and it is touch and go whether there will be a new recession. Even if the economy does not shrink further, this is the worst recession/recovery cycle of the past 100 years for the UK outside major World Wars. Moreover, the Governor's speech and new BoE research make it clear the BoE believe that QE is a useful tool to provide extra stimulus to the economy, and does not generate much inflation, but that a lot of QE is needed to have much effect.
- The MPC recently have shown a preference for policy gradualism — expanding QE while also forecasting that their actions will leave inflation below target — in order to avoid destabilising inflation expectations and allow evidence of falling inflation to come through. But, with inflation expectations falling and lead guides pointing to a sharp drop in inflation this year , these worries will (we expect) gradually fade, allowing a series of further increases in QE during this year.

Figure 1. Citigroup Market Forecasts

	Base Rate	QE Target	10 Year Yield	Spread vs Bunds	$/£	£/€
Mid 2012	0.50	£450bn	1.85	35bp	1.52	0.81
End 2012	0.50	£600bn	1.60	10bp	1.50	0.80

Source: Citi Investment Research and Analysis

Figure 2. UK — Change in Real GDP In Recessions and Recoveries, 1930-2011



Sources: ONS, NIESR and Citi Investment Research and Analysis

See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

Setting the Stage for Extra Stimulus

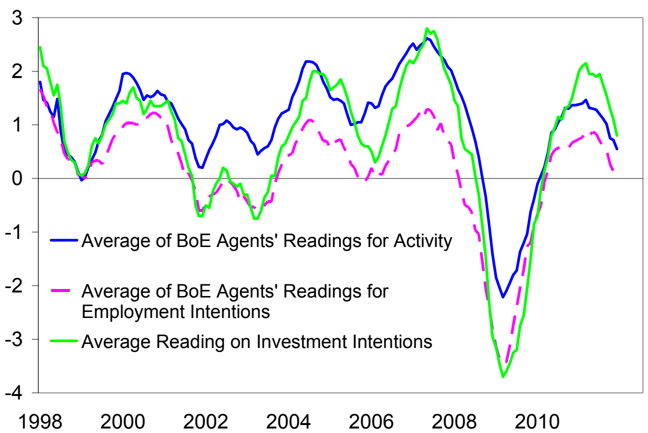
We continue to expect a further large increase in QE at the February MPC meeting, with more to come thereafter

Recent events set the stage for a further substantial increase in QE at the February MPC meeting, in our view. Moreover, we continue to expect that the QE programme will be substantially greater than the consensus, with an extra £75-£100bn at the February meeting and about £600bn in total (ie £325bn on top of the existing £275bn). By contrast, the consensus (surveyed by Reuters) for the total QE programme has stabilised at £350bn since mid-November, and it appears that the consensus for the upcoming meeting has edged down to £50bn from £75bn a month ago. We highlight several key developments that, we believe, suggest that QE is likely to be greater than many expect.

Recent GDP data and surveys show broadbased weakness in the economy…

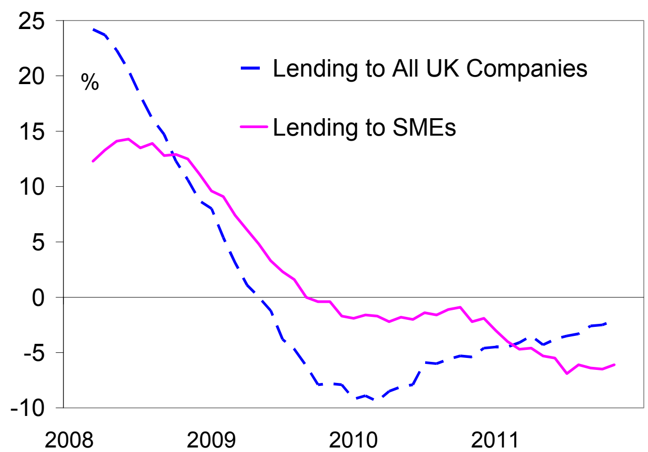
First, the economy remains weak and probably is even softer than the MPC forecast in the November *Inflation Report* (and back then they already forecast that the recovery would be so weak that inflation would fall below target over time). GDP fell 0.2% QoQ in Q4, whereas the Nov-11 IR projected roughly zero growth. The latest surveys by the CBI and BoE Agents show broadbased weakness in activity. In particular, the CBI manufacturing survey shows a sharp drop in new orders over recent months, and also shows that the share of firms reporting that investment is being held back by the uncertain outlook for demand is the fifth highest of the last 30 years. The CBI also report renewed weakness in retail sales. The BoE Agents report that capacity use is falling in both manufacturing and services, and that there is a marked deterioration in firms' intentions for employment and investment.

Figure 3. UK – BoE Agents Survey Readings on Activity, Employment and Investment, 1998-11



Note: The activity index is the average of the readings for retail sales, consumer services, business services, manufacturing output and construction output. We show the average of the readings for investment and jobs in manufacturing and services.
Sources: BoE andCiti Investment Research and Analysis

Figure 4. UK – Bank Lending (Sterling and FX) to UK Private Non-Financial Companies, 2008-11



Sources: BoE and Citi Investment Research and Analysis

…with powerful headwinds internally and externally

The UK continues to face substantial headwinds from high private debts, poor credit availability and the EMU crisis. The BoE's latest "*Trends in Lending*" publication shows that bank lending to small and medium-sized firms (SMEs) plunged 6.1% YoY in November. The ECB's massive LTRO programme appears to have succeeded in establishing a short-term liquidity backstop for EMU banks, as well as for Italy and Spain (since banks are buying their short-term debt). However, while the "tail risk" of disorderly EMU breakup has been greatly reduced for now, ECB liquidity probably will not prevent a deep EMU recession this year given the drag from deleveraging by governments, banks and the private sector.

Even if the economy does not shrink further, this is the worst recession/recovery cycle of the past 100 years, outside WW1 and WW2

We expect the economy will be roughly flat in coming quarters and it is touch and go (in our view) whether the economy will record a renewed recession (two consecutive negative quarters). Moreover, this dismal outlook must be put in the context of the deep recession of 08/09 and sluggish recovery since then. The recent recession was the deepest of the past 60 years and — even if the economy does not shrink further — the overall recession/recovery cycle will probably prove to be the worst of the past 100 years (outside the two World Wars). For example, the level of real GDP in Q4-11 was still 3.8% below the pre-recession peak reached 15 quarters earlier. By contrast, the economy had already regained and exceeded the pre-recession level of GDP 13-14 quarters after the start of the big recessions of the 1970s, 80s and 90s. The economy regained the pre-recession peak after 16 quarters in the 1930s slump. In this cycle, we do not expect the economy will regain the precession peak until Q1-2015, fully 28 quarters after the peak.

New BoE research reinforces their view that QE can give a modest lift to the economy

Second, new BoE research reinforces the Committee's view that QE can give a useful stimulus to growth and is not recklessly inflationary. The BoE has today published three papers on the effects of QE[1], and the general message is that QE gives a modest lift to growth, but that it takes a lot of QE to have much effect. The BoE believe that the first QE programme (£200bn, about 14% of nominal GDP) had a peak effect on real GDP of about 1½%, and a slightly smaller effect on inflation (peak effect of about 1¼%). This is a far smaller effect than the MPC's initial hopes: in early 2009, when they assumed that QE would have a 1:1 effect on nominal GDP (which implies that £200bn of QE would raise nominal GDP by £200bn, or 14%). As a result, whereas in 2009 the MPC believed that £75bn of QE was a big stimulus, now it really appears quite modest. In turn, this implies that a bigger scale of QE is needed to create a given amount of stimulus to the economy. The BoE published similar research in Sep-11, just ahead of the Oct-11 decision to expand QE sooner and on a bigger scale than markets expected. The timing and content of these new publications hints that a similar softening up process is under way now.

The MPC will not use LTROs as a substitute or alternative to QE

Third, the Governor made it subtly clear in his latest speech that the MPC do not intend to adopt the ECB's approach of using generous longterm liquidity measures as a substitute for monetary stimulus via QE. The Governor stressed the differing roles of QE and liquidity measures: "*And, with inflation falling back and wage growth subdued, there is scope for interest rates to remain low, and, if necessary, for further asset purchases, to prevent inflation falling below the 2% target…The Bank of England stands ready to provide liquidity to healthy banks against good collateral should market conditions deteriorate*." The MPC's approach is to use QE as a normal monetary policy tool to prevent inflation undershooting the 2% target and to reserve liquidity measures (eg LTROs) for rare periods of severe market dislocation. The BoE seem to believe that LTROs subsidise banks and reduce pressure for the banks to make much-needed reforms. By contrast, the ECB seem to be more willing to use LTROs to ease monetary conditions but more reluctant to use substantial QE, believing it should be reserved for periods when deflation threatens. The BoE and ECB have very differing views on the roles of these monetary tools.

Central banks have generally surprised by being more dovish than expected

Fourth, recent central bank actions have generally gone beyond market expectations, with bigger-than-expected QE from the UK MPC in October, early rate cuts and huge liquidity expansion from the ECB, and the Fed's forecast that it expects to keep rates low for an even longer period. It is not the case that central

[1] See "*The impact of QE on the UK economy – some supportive monetarist arithmetic*" by Jonathan Bridges and Ryland Thomas, "*Assessing the economy-wide effects of quantitative easing*" by George Kapetanios, Haroon Mumtaz, Ibrahim Stevens and Konstantinos Theodoridis, "*Asset purchase policy at the effective lower bound for interest rates*", by Richard Harrison, Bank of England Working papers numbers 442-444, January 2012.

banks are gloomier on economic prospects than the consensus. Rather, with ample disinflationary slack across advanced economies, central banks in general appear more reflationary than many expect.

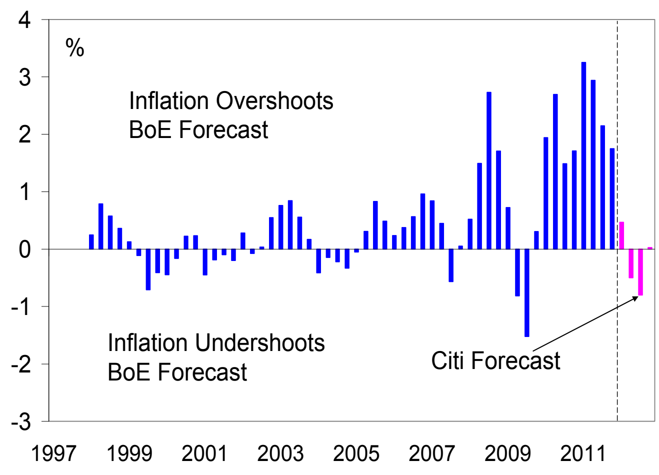
The pace and timing of extra QE is slightly uncertain, reflecting the MPC's recent preference for policy gradualism…

The precise scale and timing of the QE programme in coming quarters is, of course, somewhat uncertain, partly reflecting the MPC's recent preference for policy gradualism with QE. When Bank Rate was the main policy tool, the MPC usually set rates at whatever level they believed was needed to put the inflation forecast close to 2% 2-3 years ahead. In late-08 and early-09, in the runup to QE, the MPC did publish forecasts that inflation would undershoot markedly, but then cut rates sharply the next month. By contrast, in late-2011, the MPC announced an extra £75bn of QE but also acknowledged that this extra QE would probably not be enough to prevent inflation falling well below target 2-3 years ahead. So the MPC has, rather unusually, been willing to implement a policy stance that they believe will leave inflation below target.

…driven by worries over their external credibility and the recent repeated inflation overshoots

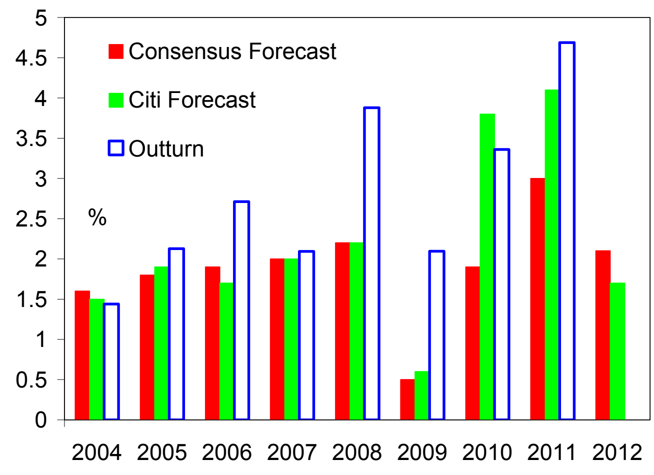
Recent MPC comments suggest the Committee opted for gradualism rather than an even bigger QE programme in late-11 because of (a) worries that a bigger-than-expected QE programme at a time of high inflation might undermine the external credibility of their commitment to the 2% inflation target; and (b) internal worries over the accuracy of their forecasts that inflation will fall well below 2% over time. In our view, these worries are totally understandable, given that CPI inflation has repeatedly overshot the MPC's forecasts (and the consensus) in recent years. By contrast, in 2009, the MPC implemented QE with CPI inflation below the 2% target and amidst worries over global deflation.

Figure 5. UK – Inflation Outturns Compared to MPC Forecasts Made Four Quarters Earlier, 1997-2012F



Note: We use the MPC's mode forecast with stable rates, using RPIX inflation to end-04, CPI inflation since then.
Sources: ONS, BoE and Citi Investment Research and Analysis

Figure 6. UK – Outturns for CPI Inflation YoY (Q4) Compared to Consensus and Citi Forecasts Made in January Each Year, 2004-12



Note: Citi and consensus forecasts are as published in the HM Treasury survey in January each year. For 2012 we show our latest forecast.
Sources: ONS, HM Treasury and Citi Investment Research and Analysis

In practice, inflation expectations have fallen in recent months…

However, in our view, these arguments for policy gradualism over QE have diminished somewhat — enough to allow another installment of QE — and will probably gradually fade further in coming months. The resumption of QE has not destabilised inflation expectations. YouGov report that the median for inflation expectations in the year ahead fell to 2.6% in January from 3.9% in June-11 and is the lowest since H1-10. The median for longer-term inflation expectations is down to 3.2% YoY in January, having peaked at 4.1% YoY last June.

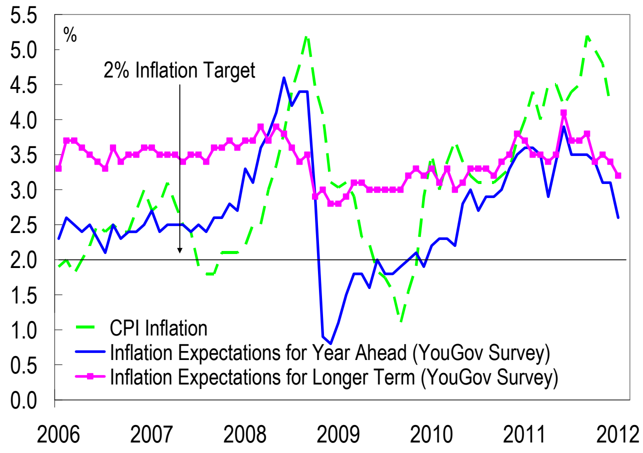
…and early signs of lower inflation are starting to come through…

Moreover, there are early signs that the renewed weakness in the economy will overwhelm lingering inflation pressures from the weak pound and deterioration in the UK's supply side, hence driving inflation sharply lower during this year.

…with weakness in output prices…

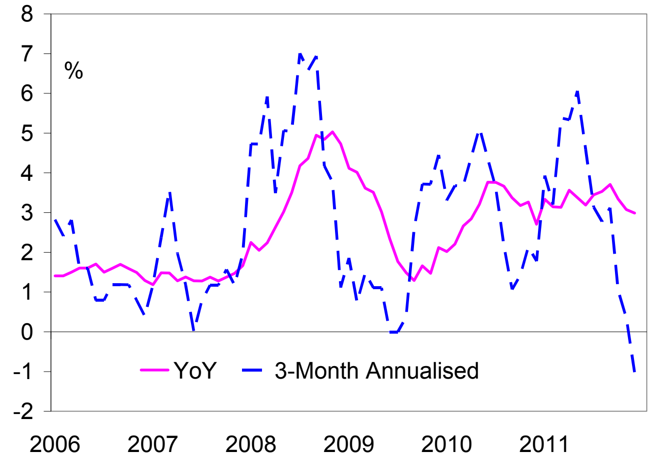
- Output prices for manufactured goods, which are very sensitive to external cost pressures, have weakened sharply. The core series, which excludes food, drink, tobacco and energy products, shows falling prices over the last three months, for the first time since 2004. The CBI's survey of manufacturing prices, another useful lead inflation guide, also has weakened sharply since early 2011.

Figure 7. UK – CPI Inflation and Inflation Expectations Among the General Public, 2006-12



Sources: ONS, YouGov and Citi Investment Research and Analysis

Figure 8. UK – Output Price Inflation (Excluding Food, Drink, Tobacco, Energy), 2006-11



Sources: ONS and Citi Investment Research and Analysis

…and in core CPI inflation

- Core CPI inflation is already slowing. The CPI is not seasonally adjusted, and hence it can be hard to disentangle seasonal effects from underlying trends in the MoM CPI changes. But, we believe a useful benchmark is to compare MoM changes in the core CPI (excludes food, drink, tobacco, energy products) with the longrun average MoM change for each month. On this basis, it is evident that the MoM changes in core CPI began to pick up quite sharply in early 2009 (as the weak pound began to feed through) and stayed high until mid-11[2]. But, since mid-11, the MoM changes in core CPI have roughly matched the 1997-10 average, a period in which core CPI averaged 1.4% YoY (and headline CPI averaged 1.9% YoY). Or, to put it another way, since mid-11, the MoM figures for core inflation have already been roughly consistent with inflation at or below target, even before the disinflationary effects of the slowdown really take hold.

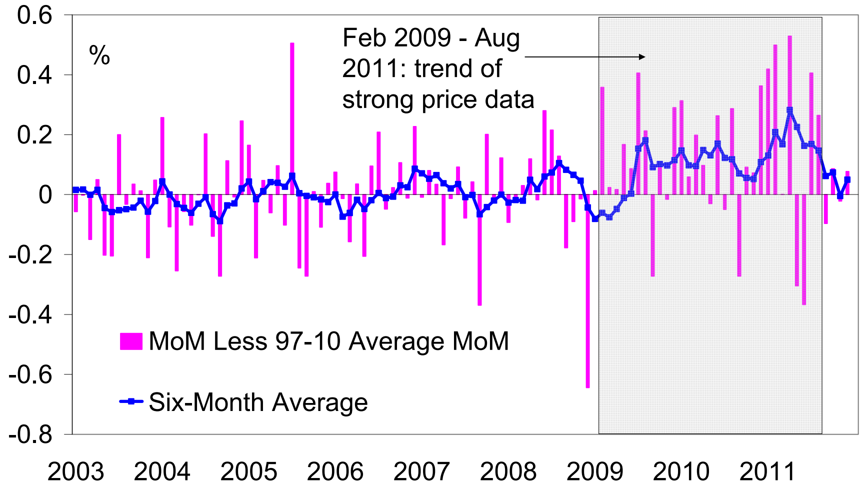
We expect that the MPC's forecast of a sharp drop in inflation this year will prove broadly correct

Since mid-09, we have repeatedly warned that inflation would overshoot the consensus and MPC forecasts. But, for this year, we expect that CPI inflation will fall sharply, dropping below the 2% target in September and averaging about 1.7% YoY in Q4, somewhat below the 2.1% consensus[3]. Hence, we expect that inflation data in coming months will gradually reassure the MPC that their forecast of low inflation is on track.

[2] Clearly, this measure includes VAT changes.

[3] The consensus is taken from "*Forecasts for the UK Economy*" by HM Treasury.

Figure 9. UK — MoM Changes in Core CPI Compared to 1997-10 Average for Each Month, 2003-11



Sources: ONS and Citi Investment Research and Analysis

We expect another installment of QE at the February meeting, and further installments subsequently

Overall, we expect the MPC will expand QE again at the February meeting, probably aiming to do a little more than the market expects. So if the market consensus for February centers around £50bn, the MPC will probably do £75bn; whereas if the consensus expects £75bn, the MPC may feel sufficiently emboldened to go for £100bn. They should continue to pursue a policy of gradualism, accompanying QE with forecasts (in the upcoming *Inflation Report*) that the extra QE will still probably leave inflation below target over time, hence signalling that further QE will be likely. We anticipate a series of further expansions in QE, scaled in response to evidence of economic weakness, benign price data and non-threatening inflation expectations, taking the total up to about £600bn around yearend or in early 2013. We expect the MPC will continue to expand QE until it is clear that a strong and sustained economic recovery is underway, unless they face constraints from rising inflation expectations or a lack of gilts to buy. Our forecast for QE is far bigger than the market consensus, but we regard it as quite cautious given the weak position of the UK economy, powerful headwinds from public and private deleveraging, plus the marked decline in inflation that is now likely to materialise. The exit strategy for QE is probably quite distant and, while it will doubtless pose challenges, these have to be set against the overwhelming need to stabilise the economy.

Economic Indicators

Wed 1 Feb	***Manufacturing PMI (Jan)***	**Forecast: 47.6**	**Prior: 49.6**
	The manufacturing PMI picked up quite sharply in December, by about 2 points, but we look for renewed weakness in January. The PMI has been below 50 in six of the last seven months, signalling ongoing contraction in the manufacturing sector.		
Fri 3 Feb	***Services PMI (Jan)***	**Forecast: 52.0**	**Prior: 54.0**
	The services PMI picked up quite sharply in December, by about 2 points, but we look for renewed weakness in January. Such a figure would suggest that the overall economy is roughly stagnant.		
Thu 9 Feb	***Trade Balance – Goods & Services (Dec)***	**Forecast: £-2.0 billion**	**Prior: £-2.6 billion**
	The trade deficit has fallen quite markedly in October and November, and figures in line with our forecast would put the Q4 deficit at £6.4bn, down from £9.9bn in Q3 and the lowest deficit since Q1-2011. Exports have picked up quite sharply in the prior two months, especially to non-EU countries, while imports have been quite flat – probably capped by weak domestic demand.		
Thu	***Industrial Production (Dec)***	**Forecast: -0.3% MoM, -3.6% YoY**	**Prior: -0.6% MoM, -3.1% YoY**
9 Feb	***Manufacturing Output (Dec)***	**Forecast: -0.2% MoM, -0.1% YoY**	**Prior: -0.2% MoM, -0.6% YoY**
	Surveys suggest that manufacturing output continues to fall and a figure in line with our forecast would represent the sixth drop in the last seven months (with one unchanged reading). Industrial production has fallen more than manufacturing output recently, because the relatively mild winter reduced energy demand. This effect may continue for a further month or two.		
Fri 10 Feb	***Producer Input Prices (Jan)***	**Forecast: -0.2% MoM, 6.1% YoY**	**Prior: -0.6% MoM, 8.7% YoY**
	Although commodity prices have ticked up in recent weeks, lagged effects of their previous decline probably will ensure that input prices edge down again. The YoY rate certainly is likely to weaken, given the helpful base effects from a year ago.		
Fri	***Producer Output Prices (Jan)***	**Forecast: 0.1% MoM, 3.7% YoY**	**Prior: -0.2% MoM, 4.8% YoY**
10 Feb	***Output Prices Ex Tax (Jan)***	**Forecast: 0.1% MoM, 3.8% YoY**	**Prior: -0.2% MoM, 4.8% YoY**
	Excluding Food, Drink, Tobacco, Energy (Jan)	**Forecast: 0.1% MoM, 2.3% YoY**	**Prior: -0.1% MoM, 3.0% YoY**
	These data are likely to show a sharp further drop in output price inflation as the lagged effects of sterling weakness diminish and the disinflationary effects of the renewed weakness in the economy start to dominate. Output price inflation is likely to collapse in coming months.		
Tue	***Consumer Prices (Jan)***	**Forecast: -0.5% MoM, 3.6% YoY**	**Prior: 0.4% MoM, 4.2% YoY**
14 Feb	***CPI Ex Food, Drink, Tobacco, Energy (Jan)***	**Forecast: -0.8% MoM, 2.6% YoY**	**Prior: 0.5% MoM, 3.0% YoY**
	Retail Prices (Jan)	**Forecast: -0.6% MoM, 3.9% YoY**	**Prior: 0.4% MoM, 4.8% YoY**
	RPIX – Excludes Mortgages (Jan)	**Forecast: -0.6% MoM, 4.0% YoY**	**Prior: 0.4% MoM, 5.0% YoY**
	We expect these data will show another sizeable drop in CPI inflation, with the YoY rate at the lowest since late 2010. A substantial part of the Jan-11 2.5% VAT hike will drop out of the YoY inflation rate, and in addition the sluggish trend in consumer spending is likely to squeeze retail margins. We currently expect CPI inflation will drop below 2% YoY in September and Q4.		

Sources: : BoE, CBI, CML, ONS, national sources and Citi Investment Research and Analysis

Economic Calendar, 23 January — 10 February 2012

23 January	24 January	25 January	26 January	27 January
Eurogroup Meeting **Of EA Finance Ministers** (Brussels)	**Public Sector Net** **Borrowing, Dec** Dec 11 £15.9bn Deficit Dec 12 £13.7bn Deficit **Fiscal Year to Date** Apr-Dec 11 £114.6bn Deficit Apr-Dec 12 £103.3bn Deficit **EcoFin Meeting of** **EU-27 Finance Ministers** (Brussels) **BoE Governor King Speaks** (Brighton, evening) **US: State of the Union** **Address**	**GDP (Q4, Preliminary)** Q3 0.6% QoQ, 0.5% YoY Q4 -0.2% QoQ, 0.8% YoY **Service Sector Output (Nov)** Oct -0.6% MoM, 1.2% YoY Nov 0.6% MoM, 1.5% YoY **MPC Minutes (Jan 12)** **BoE Agents' Summary of** **Business Conditions (Jan)** **CBI Quarterly Industrial** **Survey (Jan, 11:00)** **Qrtly Industrial Conf (Jan)** Oct -30% Jan -25% **Output Expectations (Jan)** Dec -8% Jan +15% **Order Books (Jan)** Dec -23% Jan -16% **Selling Prices (Jan)** Dec +7% Jan +13% **FOMC 2-Day Meeting Ends**	**CBI Retail Survey (Jan)** (11:00) Dec Sales +9% YoY Jan Sales -22% YoY	
30 January	**31 January**	**1 February**	**2 February**	**3 February**
European Council of **EU Heads of State &** **Government** (Brussels)	**GfK Consumer Confidence** **(Jan, 00:01)** **Personal Borrowing (Dec)**	**Nationwide House Prices** **(Jan, 07:00)** **Manufacturing PMI (Jan)** Dec 49.6 JanE 47.6		**Services PMI (Jan)** Dec 54.0 JanE 52.0 **Insolvencies (Q4)**
6 February	**7 February**	**8 February**	**9 February**	**10 February**
During the Week **Halifax House Prices** **(Jan, 09:00)**		**MPC Meeting Starts**	**Trade Balance – Goods &** **Services (Dec)** Nov £-2.6bn DecE £-2.0bn **Industrial Production (Dec)** Nov -0.6% MoM, -3.1% YoY DecE -0.3% MoM, -3.6% YoY **Manufacturing Output (Dec)** Nov -0.2% MoM, -0.6% YoY DecE -0.2% MoM, -0.1% YoY **Mortgage & Landlord** **Possessions (Q4)** **MPC Meeting Ends:** **Outcome at Noon** **ECB Meeting Ends:** 12:45 Announcement 13:30 Press Conference	**Producer Input Prices (Jan)** Dec -0.6% MoM, 8.7% YoY JanE -0.2% MoM, 6.1% YoY **Prod. Output Prices (Jan)** Dec -0.2% MoM, 4.8% YoY JanE 0.1% MoM, 3.7% YoY **Ex Tax (Jan)** Dec -0.2% MoM, 4.8% YoY JanE 0.1% MoM, 3.8% YoY **Ex Food, Drink, Tobacco,** **Energy (Jan)** Dec -0.1% MoM, 3.0% YoY JanE 0.1% MoM, 2.3% YoY **Construction Output** **(Dec)**

E Citi estimate. B Billion. P Provisional. R Revised. Note: All data are released at 9.30 a.m., except those marked otherwise.
Sources: BoE, CBI, CML, ONS, national sources and Citi Investment Research and Analysis.

Appendix A-1

Analyst Certification

The research analyst(s) primarily responsible for the preparation and content of this research report are named in bold text in the author block at the front of the product except for those sections where an analyst's name appears in bold alongside content which is attributable to that analyst. Each of these analyst(s) certify, with respect to the section(s) of the report for which they are responsible, that the views expressed therein accurately reflect their personal views about each issuer and security referenced and were prepared in an independent manner, including with respect to Citigroup Global Markets Inc and its affiliates. No part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendation(s) or view(s) expressed by that research analyst in this report.

IMPORTANT DISCLOSURES

Analysts' compensation is determined based upon activities and services intended to benefit the investor clients of Citigroup Global Markets Inc. and its affiliates ("the Firm"). Like all Firm employees, analysts receive compensation that is impacted by overall firm profitability which includes investment banking revenues.

For important disclosures (including copies of historical disclosures) regarding the companies that are the subject of this Citi Investment Research & Analysis product ("the Product"), please contact Citi Investment Research & Analysis, 388 Greenwich Street, 28th Floor, New York, NY, 10013, Attention: Legal/Compliance [E6WYB6412478]. In addition, the same important disclosures, with the exception of the Valuation and Risk assessments and historical disclosures, are contained on the Firm's disclosure website at www.citigroupgeo.com. Valuation and Risk assessments can be found in the text of the most recent research note/report regarding the subject company. Historical disclosures (for up to the past three years) will be provided upon request.

NON-US RESEARCH ANALYST DISCLOSURES

Non-US research analysts who have prepared this report (i.e., all research analysts listed below other than those identified as employed by Citigroup Global Markets Inc.) are not registered/qualified as research analysts with FINRA. Such research analysts may not be associated persons of the member organization and therefore may not be subject to the NYSE Rule 472 and NASD Rule 2711 restrictions on communications with a subject company, public appearances and trading securities held by a research analyst account. The legal entities employing the authors of this report are listed below:

Citigroup Global Markets Ltd	Michael Saunders

OTHER DISCLOSURES

For securities recommended in the Product in which the Firm is not a market maker, the Firm is a liquidity provider in the issuers' financial instruments and may act as principal in connection with such transactions. The Firm is a regular issuer of traded financial instruments linked to securities that may have been recommended in the Product. The Firm regularly trades in the securities of the issuer(s) discussed in the Product. The Firm may engage in securities transactions in a manner inconsistent with the Product and, with respect to securities covered by the Product, will buy or sell from customers on a principal basis.

Securities recommended, offered, or sold by the Firm: (i) are not insured by the Federal Deposit Insurance Corporation; (ii) are not deposits or other obligations of any insured depository institution (including Citibank); and (iii) are subject to investment risks, including the possible loss of the principal amount invested. Although information has been obtained from and is based upon sources that the Firm believes to be reliable, we do not guarantee its accuracy and it may be incomplete and condensed. Note, however, that the Firm has taken all reasonable steps to determine the accuracy and completeness of the disclosures made in the Important Disclosures section of the Product. The Firm's research department has received assistance from the subject company(ies) referred to in this Product including, but not limited to, discussions with management of the subject company(ies). Firm policy prohibits research analysts from sending draft research to subject companies. However, it should be presumed that the author of the Product has had discussions with the subject company to ensure factual accuracy prior to publication. All opinions, projections and estimates constitute the judgment of the author as of the date of the Product and these, plus any other information contained in the Product, are subject to change without notice. Prices and availability of financial instruments also are subject to change without notice. Notwithstanding other departments within the Firm advising the companies discussed in this Product, information obtained in such role is not used in the preparation of the Product. Although Citi Investment Research & Analysis (CIRA) does not set a predetermined frequency for publication, if the Product is a fundamental research report, it is the intention of CIRA to provide research coverage of the/those issuer(s) mentioned therein, including in response to news affecting this issuer, subject to applicable quiet periods and capacity constraints. The Product is for informational purposes only and is not intended as an offer or solicitation for the purchase or sale of a security. Any decision to purchase securities mentioned in the Product must take into account existing public information on such security or any registered prospectus.

Investing in non-U.S. securities, including ADRs, may entail certain risks. The securities of non-U.S. issuers may not be registered with, nor be subject to the reporting requirements of the U.S. Securities and Exchange Commission. There may be limited information available on foreign securities. Foreign companies are generally not subject to uniform audit and reporting standards, practices and requirements comparable to those in the U.S. Securities of some foreign companies may be less liquid and their prices more volatile than securities of comparable U.S. companies. In addition, exchange rate movements may have an adverse effect on the value of an investment in a foreign stock and its corresponding dividend payment for U.S. investors. Net dividends to ADR investors are estimated, using withholding tax rates conventions, deemed accurate, but investors are urged to consult their tax advisor for exact dividend computations. Investors who have received the Product from the Firm may be prohibited in certain states or other jurisdictions from purchasing securities mentioned in the Product from the Firm. Please ask your Financial Consultant for additional details. Citigroup Global Markets Inc. takes responsibility for the Product in the United States. Any orders by US investors resulting from the information contained in the Product may be placed only through Citigroup Global Markets Inc.

Important Disclosures for Morgan Stanley Smith Barney LLC Customers: Morgan Stanley & Co. LLC (Morgan Stanley) research reports may be available about the companies that are the subject of this Citi Investment Research & Analysis (CIRA) research report. Ask your Financial Advisor or use smithbarney.com to view any available Morgan Stanley research reports in addition to CIRA research reports.

Important disclosure regarding the relationship between the companies that are the subject of this CIRA research report and Morgan Stanley Smith Barney LLC and its affiliates are available at the Morgan Stanley Smith Barney disclosure website at www.morganstanleysmithbarney.com/researchdisclosures. For Morgan Stanley and Citigroup Global Markets, Inc. specific disclosures, you may refer to www.morganstanley.com/researchdisclosures and https://www.citigroupgeo.com/geopublic/Disclosures/index_a.html.
This CIRA research report has been reviewed and approved on behalf of Morgan Stanley Smith Barney LLC. This review and approval was conducted by the same person who reviewed this research report on behalf of CIRA. This could create a conflict of interest.

The Citigroup legal entity that takes responsibility for the production of the Product is the legal entity which the first named author is employed by. The Product is made available in **Australia** through Citigroup Global Markets Australia Pty Ltd. (ABN 64 003 114 832 and AFSL No. 240992), participant of the ASX Group and regulated by the Australian Securities & Investments Commission. Citigroup Centre, 2 Park Street, Sydney, NSW 2000. The Product is made available in Australia to Private Banking wholesale clients through Citigroup Pty Limited (ABN 88 004 325 080 and AFSL 238098). Citigroup Pty Limited provides all financial product advice to Australian Private Banking wholesale clients through bankers and relationship managers. If there is any doubt about the suitability of investments held in Citigroup Private Bank accounts, investors should contact the Citigroup Private Bank in Australia. Citigroup companies may compensate affiliates and their representatives for providing products and services to clients. The Product is made available in **Brazil** by Citigroup Global Markets Brasil - CCTVM SA, which is regulated by CVM - Comissão de Valores Mobiliários, BACEN - Brazilian Central Bank, APIMEC - Associação dos Analistas e Profissionais de Investimento do Mercado de Capitais and ANBID - Associação Nacional dos Bancos de Investimento. Av. Paulista, 1111 - 11º andar - CEP. 01311920 - São Paulo - SP. If the Product 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. This product is available in **Chile** through Banchile Corredores de Bolsa S.A., an indirect subsidiary of Citigroup Inc., which is regulated by the Superintendencia de Valores y Seguros. Agustinas 975, piso 2, Santiago, Chile. The Product is made available in **France** by Citigroup Global Markets Limited, which is authorised and regulated by Financial Services Authority. 1-5 Rue Paul Cézanne, 8ème, Paris, France. The Product is distributed in **Germany** by Citigroup Global Markets Deutschland AG ("CGMD"), which is regulated by Bundesanstalt fuer Finanzdienstleistungsaufsicht (BaFin). CGMD, Reuterweg 16, 60323 Frankfurt am Main. Research which relates to "securities" (as defined in the Securities and Futures Ordinance (Cap. 571 of the Laws of Hong Kong)) is issued in **Hong Kong** by, or on behalf of, Citigroup Global Markets Asia Limited which takes full responsibility for its content. Citigroup Global Markets Asia Ltd. is regulated by Hong Kong Securities and Futures Commission. If the Research is made available through Citibank, N.A., Hong Kong Branch, for its clients in Citi Private Bank, it is made available by Citibank N.A., Citibank Tower, Citibank Plaza, 3 Garden Road, Hong Kong. Citibank N.A. is regulated by the Hong Kong Monetary Authority. Please contact your Private Banker in Citibank N.A., Hong Kong, Branch if you have any queries on or any matters arising from or in connection with this document. 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. The Product is made available in **Indonesia** through PT Citigroup Securities Indonesia. 5/F, Citibank Tower, Bapindo Plaza, Jl. Jend. Sudirman Kav. 54-55, Jakarta 12190. Neither this Product nor any copy hereof may be distributed in Indonesia or to any Indonesian citizens wherever they are domiciled or to Indonesian residents except in compliance with applicable capital market laws and regulations. This Product is not an offer of securities in Indonesia. The securities referred to in this Product have not been registered with the Capital Market and Financial Institutions Supervisory Agency (BAPEPAM-LK) pursuant to relevant capital market laws and regulations, and may not be offered or sold within the territory of the Republic of Indonesia or to Indonesian citizens through a public offering or in circumstances which constitute an offer within the meaning of the Indonesian capital market laws and regulations. The Product is made available in **Israel** through Citibank NA, regulated by the Bank of Israel and the Israeli Securities Authority. Citibank, N.A, Platinum Building, 21 Ha'arba'ah St, Tel Aviv, Israel. The Product is made available in **Italy** by Citigroup Global Markets Limited, which is authorised and regulated by Financial Services Authority. Via dei Mercanti, 12, Milan, 20121, Italy. The Product is made available in **Japan** by Citigroup Global Markets Japan Inc. ("CGMJ"), which is regulated by Financial Services Agency, Securities and Exchange Surveillance Commission, Japan Securities Dealers Association, Tokyo Stock Exchange and Osaka Securities Exchange. Shin-Marunouchi Building, 1-5-1 Marunouchi, Chiyoda-ku, Tokyo 100-6520 Japan. If the Product was distributed by SMBC Nikko Securities Inc. it is being so distributed under license. In the event that an error is found in an CGMJ research report, a revised version will be posted on the Firm's Global Equities Online (GEO) website. If you have questions regarding GEO, please call (81 3) 6270-3019 for help. The Product is made available in **Korea** by Citigroup Global Markets Korea Securities Ltd., which is regulated by the Financial Services Commission, the Financial Supervisory Service and the Korea Financial Investment Association (KOFIA). Citibank Building, 39 Da-dong, Jung-gu, Seoul 110-180, Korea. KOFIA makes available registration information of research analysts on its website. Please visit the following website if you wish to find KOFIA registration information on research analysts of Citigroup Global Markets Korea Securities Ltd. http://dis.kofia.or.kr/fs/dis2/fundMgr/DISFundMgrAnalystPop.jsp?companyCd2=A03030&pageDiv=02. The Product is made available in **Malaysia** by Citigroup Global Markets Malaysia Sdn Bhd (Company No. 460819-D) ("CGMM") to its clients and CGMM takes responsibility for its contents. CGMM is regulated by the Securities Commission of Malaysia. Please contact CGMM at Level 43 Menara Citibank, 165 Jalan Ampang, 50450 Kuala Lumpur, Malaysia in respect of any matters arising from, or in connection with, the Product. The Product is made available in **Mexico** by Acciones y Valores Banamex, S.A. De C. V., Casa de Bolsa, Integrante del Grupo Financiero Banamex ("Accival") which is a wholly owned subsidiary of Citigroup Inc. and is regulated by Comision Nacional Bancaria y de Valores. Reforma 398, Col. Juarez, 06600 Mexico, D.F. In **New Zealand** the Product is made available to 'wholesale clients' only as defined by s5C(1) of the Financial Advisers Act 2008 ('FAA') through Citigroup Global Markets Australia Pty Ltd (ABN 64 003 114 832 and AFSL No. 240992), an overseas financial adviser as defined by the FAA, participant of the ASX Group and regulated by the Australian Securities & Investments Commission. Citigroup Centre, 2 Park Street, Sydney, NSW 2000. The Product is made available in **Pakistan** by Citibank N.A. Pakistan branch, which is regulated by the State Bank of Pakistan and Securities Exchange Commission, Pakistan. AWT Plaza, 1.1. Chundrigar Road, P.O. Box 4889, Karachi-74200. The Product is made available in the **Philippines** through Citicorp Financial Services and Insurance Brokerage Philippines, Inc., which is regulated by the Philippines Securities and Exchange Commission. 20th Floor Citibank Square Bldg. The Product is made available in the Philippines through Citibank NA Philippines branch, Citibank Tower, 8741 Paseo De Roxas, Makati City, Manila. Citibank NA Philippines NA is regulated by The Bangko Sentral ng Pilipinas. The Product is made available in **Poland** by Dom Maklerski Banku Handlowego SA an indirect subsidiary of Citigroup Inc., which is regulated by Komisja Nadzoru Finansowego. Dom Maklerski Banku Handlowego S.A. ul.Senatorska 16, 00-923 Warszawa. 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. The Product is made available in **Singapore** through Citigroup Global Markets Singapore Pte. Ltd. ("CGMSPL"), a capital markets services license holder, and regulated by Monetary Authority of Singapore. Please contact CGMSPL at 1 Temasek Avenue, #39-02 Millenia Tower, Singapore 039192, in respect of any matters arising from, or in connection with, the analysis of this document. This report is intended for recipients who are accredited, expert and institutional investors as defined under the Securities and Futures Act (Cap. 289). The Product is made available by The Citigroup Private Bank in Singapore through Citibank, N.A., Singapore Branch, a licensed bank in Singapore that is regulated by Monetary Authority of Singapore. Please contact your Private Banker in Citibank N.A., Singapore Branch if you have any queries on or any matters arising from or in connection with this document. This report is intended for recipients who are accredited, expert and institutional investors as defined under the Securities and Futures Act (Cap. 289). This report is distributed in Singapore by Citibank Singapore Ltd ("CSL") to selected Citigold/Citigold Private Clients. CSL provides no independent research or analysis of the substance or in preparation of this report. Please contact your Citigold//Citigold Private Client Relationship Manager in CSL if you have any queries on or any matters arising from or in connection with this report. This report is intended for recipients who are accredited investors as defined under the Securities and Futures Act (Cap. 289). 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 JSE Securities Exchange South Africa, South African Reserve Bank and the Financial Services Board. The investments and services contained herein are not available to private customers in South Africa. The Product is made available in **Spain** by Citigroup Global Markets Limited, which is authorised and regulated by Financial Services Authority. 29 Jose Ortega Y Gassef, 4th Floor, Madrid, 28006, Spain. The Product is made available in the **Republic of China** through Citigroup Global Markets Taiwan Securities Company Ltd. ("CGMTS"), 14 and 15F, No. 1, Songzhi Road, Taipei 110, Taiwan and/or through Citibank Securities (Taiwan) Company Limited ("CSTL"), 14 and 15F, No. 1, Songzhi Road, Taipei 110, Taiwan, subject to the respective license scope of each entity and the applicable laws and regulations in the Republic of China. CGMTS and CSTL are both regulated by the Securities and Futures Bureau of the Financial Supervisory Commission of Taiwan, the Republic of China. No portion of the Product may be reproduced or quoted in the Republic of China by the press or any third parties [without the written authorization of CGMTS and CSTL]. If the Product covers securities which are not allowed to be offered or traded in the Republic of China, neither the Product nor any information contained in the Product shall be considered as advertising the securities or making recommendation of the securities in the Republic of China. The Product is for informational purposes only and is not intended as an offer or solicitation for the purchase or sale of a security or financial products. Any decision to purchase securities or financial products mentioned in the Product must take into account existing public information on such security or the financial products or any registered prospectus. The Product is made available in **Thailand** through Citicorp Securities (Thailand) Ltd., which is regulated by the Securities and Exchange Commission of Thailand. 18/F, 22/F and 29/F, 82 North Sathorn Road, Silom, Bangrak, Bangkok 10500, Thailand. The Product is made available in **Turkey** through Citibank AS which is regulated by Capital Markets Board. Tekfen Tower, Eski Buyukdere Caddesi # 209 Kat 2B, 23294 Levent, Istanbul, Turkey. In the **U.A.E**, these materials (the "Materials") are communicated by Citigroup Global Markets Limited, DIFC branch ("CGML"), an entity registered in the Dubai International Financial Center ("DIFC") and licensed and regulated by the Dubai Financial Services Authority ("DFSA") to Professional Clients and Market Counterparties only and should not be relied upon or distributed to Retail Clients. A distribution of the different CIRA ratings distribution, in percentage terms for Investments in each sector covered is made available on request. Financial products and/or services to which the Materials relate will only be made available to Professional Clients and Market Counterparties. The Product is made available in **United Kingdom** by Citigroup Global Markets Limited, which is authorised and regulated by Financial Services Authority. This material may relate to investments or services of a person outside of the UK or to other matters which are not regulated by the FSA and further details as to where this may be the case are available upon request in respect of this material. Citigroup Centre, Canada Square, Canary Wharf, London, E14 5LB. The Product is made available in **United States** by Citigroup Global Markets Inc, which is a member of FINRA and registered with the US Securities and Exchange Commission. 388 Greenwich Street, New York, NY 10013. Unless specified to the contrary, within EU Member States, the Product is made available by Citigroup Global Markets Limited, which is regulated by Financial Services Authority.

Pursuant to Comissão de Valores Mobiliários Rule 483, Citi is required to disclose whether a Citi related company or business has a commercial relationship with the subject company. Considering that Citi operates multiple businesses in more than 100 countries around the world, it is likely that Citi has a commercial relationship with the subject company.

Many European regulators require that a firm must establish, implement and make available a policy for managing conflicts of interest arising as a result of publication or distribution of investment research. The policy applicable to CIRA's Products can be found at www.citigroupgeo.com.

Compensation of equity research analysts is determined by equity research management and Citigroup's senior management and is not linked to specific transactions or recommendations.

The Product may have been distributed simultaneously, in multiple formats, to the Firm's worldwide institutional and retail customers. The Product is not to be construed as providing investment services in any jurisdiction where the provision of such services would not be permitted.

Subject to the nature and contents of the Product, the investments described therein are subject to fluctuations in price and/or value and investors may get back less than originally invested. Certain high-volatility investments can be subject to sudden and large falls in value that could equal or exceed the amount invested. Certain investments contained in the Product may have tax implications for private customers whereby levels and basis of taxation may be subject to change. If in doubt, investors should seek advice from a tax adviser. The Product does not purport to identify the nature of the specific market or other risks associated with a particular transaction. Advice in the Product is general and should not be construed as personal advice given it has been prepared without taking account of the objectives, financial situation or needs of any particular investor. Accordingly, investors should, before acting on the advice, consider the appropriateness of the advice, having regard to their objectives, financial situation and needs. Prior to acquiring any financial product, it is the client's responsibility to obtain the relevant offer document for the product and consider it before making a decision as to whether to purchase the product.

With the exception of our product that is made available only to Qualified Institutional Buyers (QIBs), CIRA concurrently disseminates its research via proprietary and non-proprietary electronic distribution platforms. Periodically, individual CIRA analysts may also opt to circulate research posted on such platforms to one or more clients by email. Such email distribution is discretionary and is done only after the research has been disseminated via the aforementioned distribution channels. CIRA simultaneously distributes product that is limited to QIBs only through email distribution.

The level and types of services provided by CIRA analysts to clients may vary depending on various factors such as the client's individual preferences as to the frequency and manner of receiving communications from analysts, the client's risk profile and investment focus and perspective (e.g. market-wide, sector specific, long term, short-term etc.), the size and scope of the overall client relationship with Citi and legal and regulatory constraints.