Citi Research

April 2013

Citi 1Q13 CIO Survey

Spending Outlook Improving Despite Uncertain Macro Backdrop

Jim Suva, Hardware
jim.suva@citi.com
+1 415-951-1703

Kevin Dennean, Data Networking
kevin.dennean@citi.com
+1 212-816-4673

Joe Yoo, Hard Drives
joe.yoo@citi.com
+1 415-951-1688

Ashwin Shirvaikar, IT Services
ashwin.shirvaikar@citi.com
+1 212-816-0822

Walter Pritchard, Software
walter.h.pritchard@citi.com
+1 415-951-1770

Amit Harchandani, Europe Technology
amit.harchandani@citi.com
+44-20-7986-4246

Published: April 8, 2013

1Q13 CIO Survey – IT Budgets Improving, Macro Outlook Still Gloomy

- **2013 IT Budget Up Modestly** – Our survey of 260 CIOs across the U.S., Europe and Asia continues to point to a modest increase in 2013 IT budgets (+0.5% Y/Y vs. +0.1% Y/Y). Regionally the US and Europe saw an uptick in spending expectations, while Asia saw some erosion.
- **New Project Spending Picking Up** – U.S. and European CIOs intend to spend more than a quarter of their IT budget on new projects, up from low 20s, a fairly sizeable increase versus our 4Q survey. Two likely interpretations: (i) Enterprises could be back on the offensive or (ii) Strategic (e.g., Mobility, Cloud, Analytics) or Mandatory (e.g., Regulation) projects are kicking off
- **Macro Concerns Persist** – CIO responses suggest decreased confidence in the global economy. Overall, the number of CIOs that expect an improvement in the macro environment has decreased for the fourth consecutive survey. According to the survey, 26% of respondents believe the economy will improve in the next 12 months, while 34% believe it will deteriorate further. By geo, confidence in the global economy fell sharpest among Asia CIOs.
- **IT Budgets Holding, But a Dip in Macro Sentiment Could Have Negative Impact –** Our survey results show that 2013 IT budgets are starting to see some pressure due to macro concerns. Roughly 60% of respondents down from 68% in the previous survey noted that macro commentary has not impacted budgets. Not surprisingly, the concern is highest amongst European CIOs.
- **Budget Priorities & Deferrals** – Server consolidation/virtualization and Improving information and network security remain top 3 priorities across all 3 regions. Call center & HR outsourcing migrations remain a low priority items, as does Windows migrations (a negative change from past couple surveys).
- **Spending by Category** – Security software was the only IT initiative that was cited in top-5 (top-2) to receive an increase in budget allocation across all three regions. Networking equipment, application software (ERP, CRM) were on the cusp. Consistent with past surveys, CIOs highlighted Printers and Tape Storage as the two areas where spending is decreasing the most.

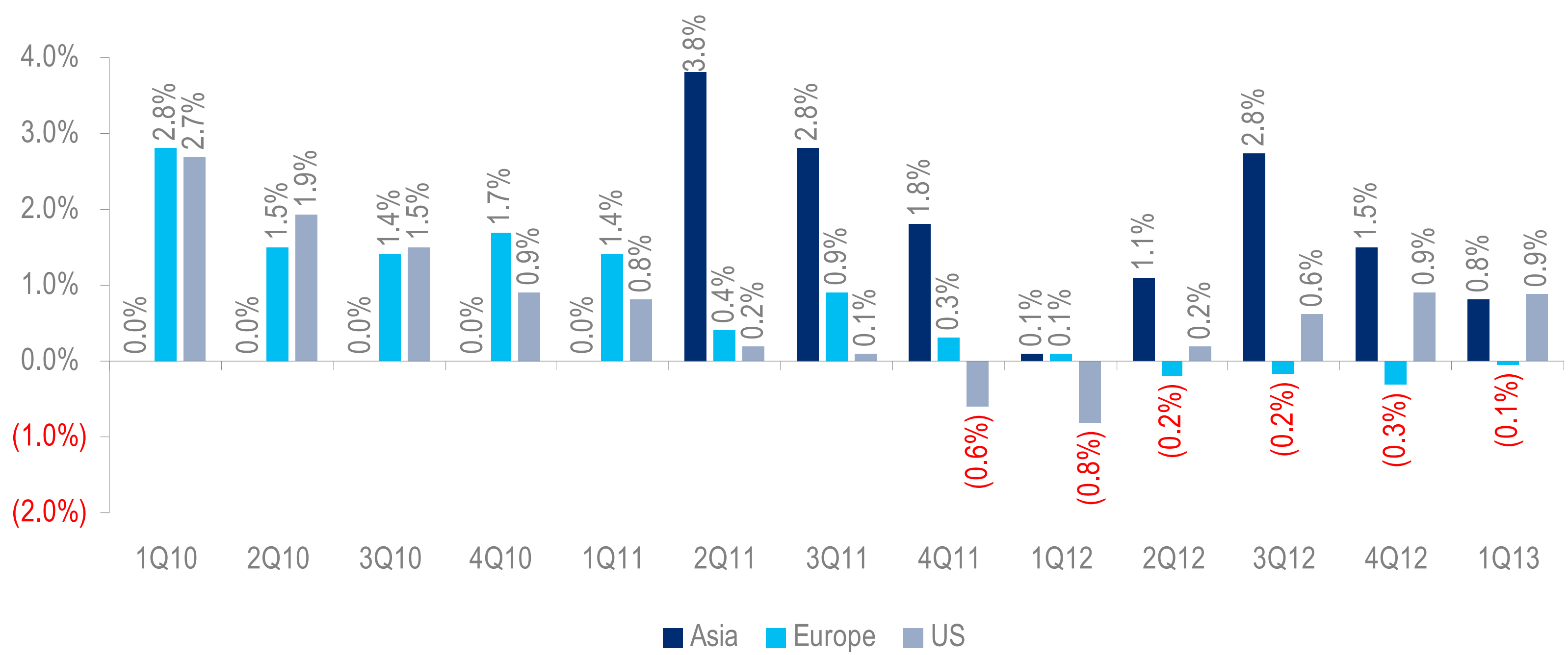
Sector Commentary

- **PCs / Hardware** – Our 1Q’13 survey indicates that PC replacement cycles remains lengthened. Only 57% of respondents cited that PC replacements have or are expected to normalized within 1H’13. Almost 20% of respondents went as far as to say that PC refresh will not normalize until 2014 (up from 17% in the prior survey). Meanwhile, our survey also suggests that an increasing number of CIOs have adopted or are planning to launch within the next two years BYOD for corporate PCs, again highlighting BYOD (Bring-Your-Own-Device) as a potential new disruption to traditional PC procurement.
- **Networking** – On balance, the weighted average response indicated a modest 0.9% increase in data network spending intentions; this is relatively flat versus the prior quarter’s 1.0% increase and is modestly below the 1.1% expected increase from the prior year. Asia’s planned weighted average networking spend continued its sequential decline for the second straight quarter; this decline markets the largest sequential decline (-110bps) for any region since 2Q11. Both the U.S and Europe, experienced modest improvements with weighted average spending intentions increasing to 1.2% (from 0.9% in the prior quarter) and 0.6% (from 0.4% in the prior quarter), respectively. Network Security, Wireless, and WAN bandwidth remain as priority spending areas for CIOs, while Application Delivery Networking, Video Content & Delivery, and Unified Communications/VoIP remain as top candidates for potential deferrals.
- **Services** – Analytics remains an important growth driver for services vendors. Business Process Outsourcing interest seems to have jumped and the three pure-play BPO vendors – EXLS, WNS and G – had a good wallet share performance. Gaining share is increasingly important as vendor consolidation has become a significant priority. Pricing remains steady. ACN and EPAM were the key market share gainers among US-listed IT services companies.
- **Software** – Software initiatives are top of mind representing the top 5 priorities of CIOs. Software priorities are strengthening in areas with obvious near-term catalysts (Security: persistent threats). Improving network security is a Top 3 priority across all 3 regions. Short-term ROI projects such as server virtualization remain a high priority but has trended lower through the year with datacenter consolidation projects may be reaching later stages.

2013 IT Spending Improving Slightly; Now Seeing Modest Growth

Anticipated IT Budget Growth at Beginning of Year							2013	
	2007	2008	2009	2010	2011	2012	4Q12	1Q13
Asia	N/A	N/A	N/A	N/A	N/A	0.0%	1.1%	0.8%
Europe	0.6%	0.4%	(2.2%)	1.2%	1.6%	0.1%	(0.7%)	(0.1%)
US	2.7%	1.3%	(3.2%)	1.7%	0.8%	(0.5%)	0.3%	0.9%
Total	**1.6%**	**0.8%**	**(2.7%)**	**1.5%**	**1.2%**	**0.1%**	**0.1%**	**0.5%**

- Survey continues to show relatively flattish (0.5%) IT budget growth in 2013 with spend expectations up slightly vs. preliminary 2013 growth projections from 4Q12 (0.1%).
- IT budget expectations improved across the US ($0.3% to 0.9%) and Europe (-0.7% to -0.1%). Slight decrease in spending outlook across Asia (+1.1% to +0.8%).



Source: Citi Research

Expected 2013 IT Spending by Size and Vertical

Vertical	Aggregate 2013 Spending Growth (Anticipated) 1Q13	4Q12	Top IT Priority
Financials	2.0%	0.2%	Improving Network Security
Telecommunication Services	1.7%	1.6%	Windows migration
Materials	1.5%	(0.3%)	Evenly spread across projects
Health Care	1.4%	2.3%	Application / BI development
Consumer Staples	0.9%	(0.1%)	Cloud Computing
Industrials	0.5%	(0.3%)	Evenly spread across projects
Other	0.4%	(0.6%)	Reducing # of IT vendors
Energy	0.0%	2.3%	Application / BI development
Information Technology	(0.3%)	1.5%	Reducing # of IT vendors
Consumer Discretionary	(0.4%)	1.8%	BPO
Manufacturing	(0.6%)	0.9%	Improving Network Security
Utilities	(1.5%)	0.0%	PC upgrade / Windows migration

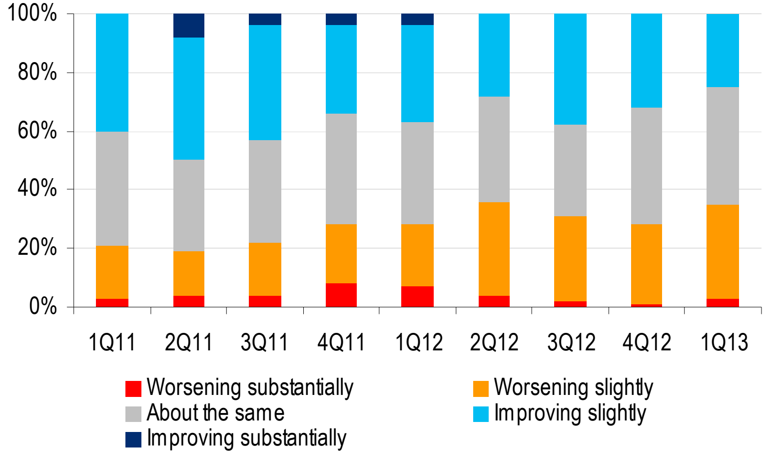
Company Revenue	Aggregate 2013 Spending Growth (Anticipated) 1Q13	4Q12
<$1 billion	1.0%	0.6%
$1-5 billion	(0.2%)	0.2%
$5-10 billion	1.0%	0.7%
>$10 billion	0.4%	1.3%

- Financials showed highest growth and greatest increase from last quarter (+0.2% to 2%). Financials vertical had been called out as a source of weakness on recently.
- Manufacturing and Utilities showing the biggest declines.
- Equal number of verticals that showed modest sequential increases versus declines. However, decreases in sector budgets were more pronounced than positive revisions.
- Windows migrations, beefing up network security and application / BI development stood out as top priorities
- Large enterprises (>$10B in revenue) saw the biggest sequential declines in spending expectations (-0.9% Q/Q). Sub-billion dollar companies saw the largest sequential increases (+0.4% Q/Q)

Source: Citi Research

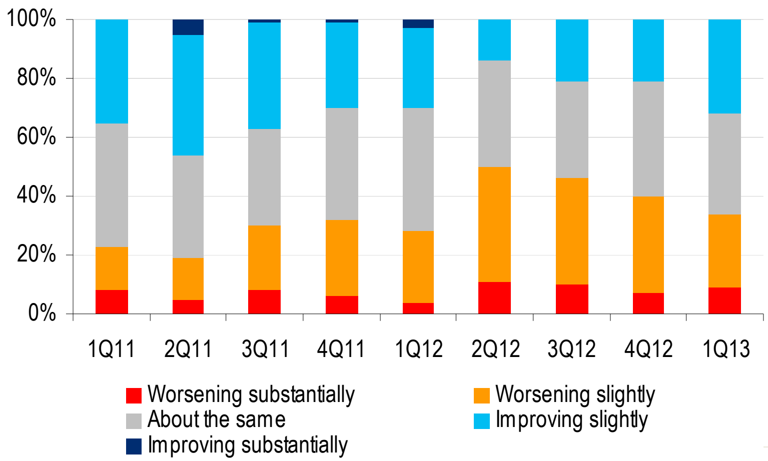
CIOs Not Seeing Signs of Macro Recovery Yet

U.S.: While there were fewer CIOs that expect the global macro environment is getting better, the overall sentiment is still better than Q1 last year.

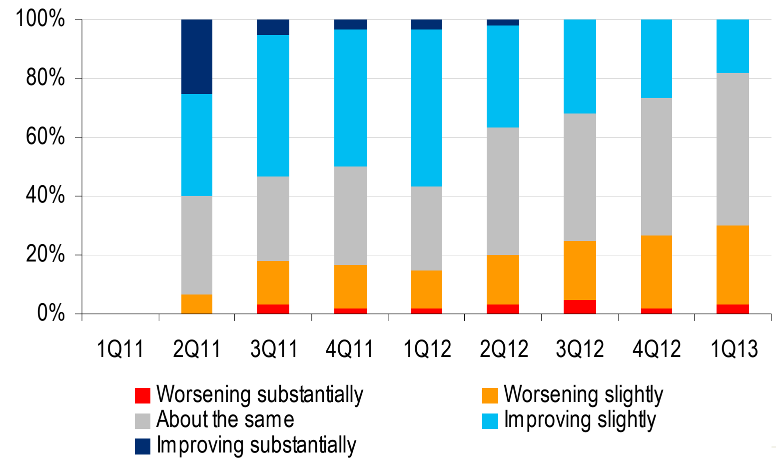


CIOs were asked: What is your general outlook for the next 12 months regarding the global economy?

Europe: Macro outlook has improved from previous quarter. However, European CIOs still showing a good deal of concern for global economy.



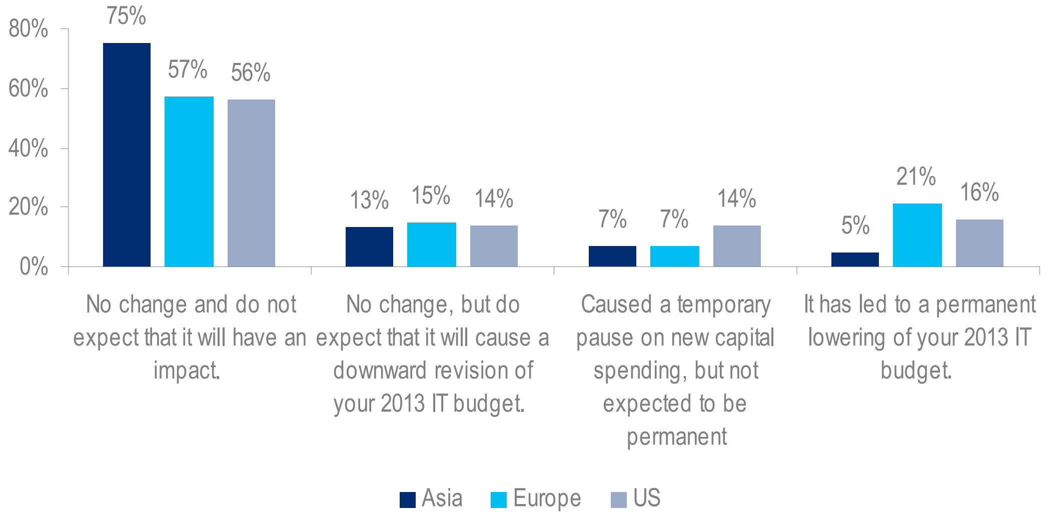
Asia: Compared to the previous surveys, the global outlook among Asia CIOs appears continues to worsen with 4th straight quarter of eroding confidence.



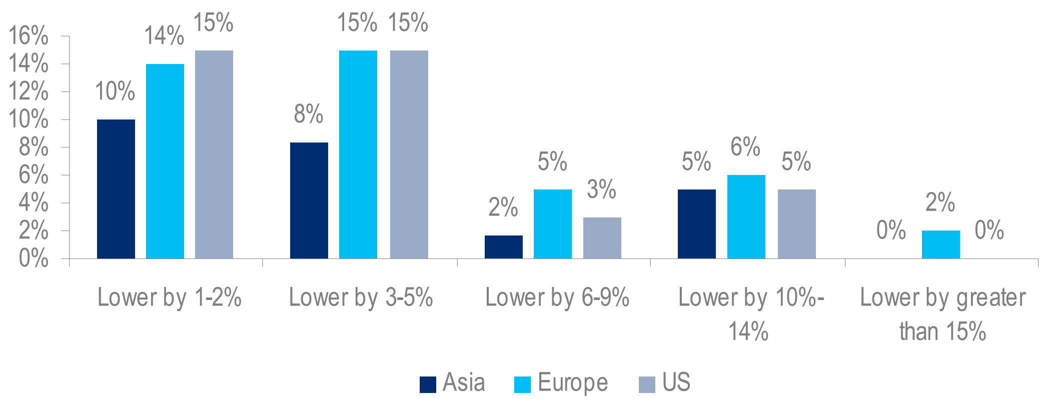
Source: Citi Research

Economic Outlook: The Effect on IT Budgets

Has the recent commentary around the economy increased scrutiny on your 2013 IT budget?



If the economy has, will, or you believe it will, lower your 2013 IT budget, by how much will it decrease?

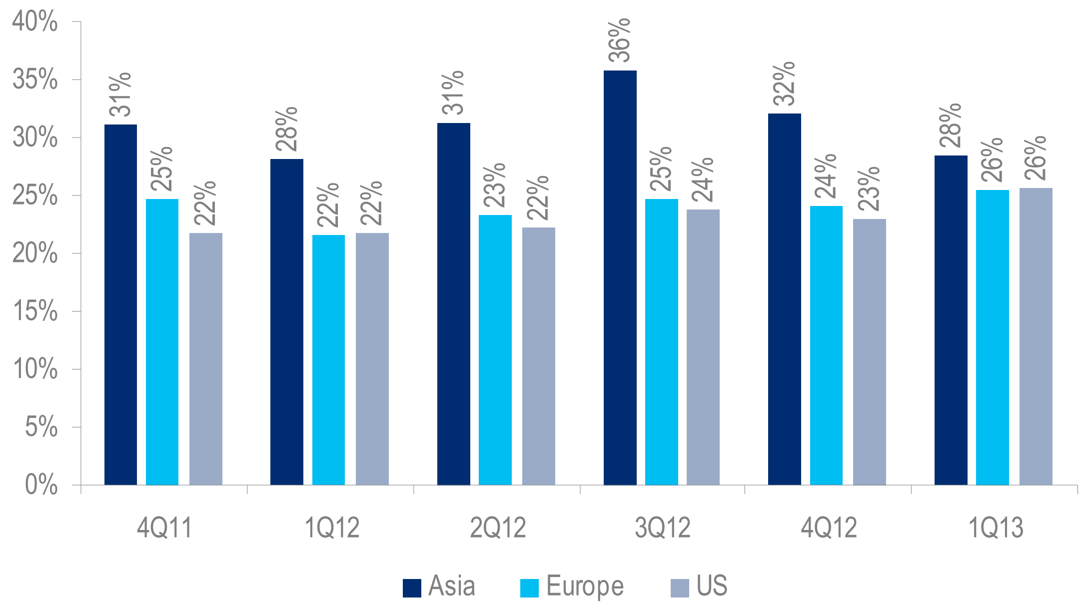


- Overall, 2013 IT budgets are starting to see some pressure due to macro concerns. Roughly 60% of respondents down from 68% in the previous survey noted that macro commentary has not impacted budgets.
- Not surprisingly, European CIOs remain the most pessimistic with about 21% indicating that the macro environment has led to a permanent reduction in IT budgets.
- In Asia, 75% of CIOs do not expect macro factors to have a negative impact to 2012 budgets, which is down slightly from 78% in the previous survey.
- On average, CIOs believe that a worsening economy could result in a ~5.0% decrease in IT budgets

Source: Citi Research

Enterprises Possibly Shifting Back to Offense: Uptick in New Project Spending

What percentage of your IT spending over the next 12 months will be on new projects (vs. existing) projects?



- U.S. CIOs intend to spend 26% of their IT budget on new projects. A fairly sizeable increase versus our 4Q survey.

  > One interpretation is that enterprises could be back on the offensive

  > However, this increased spending may be for strategic or mandatory projects (e.g, mobility or regulation) and not necessarily discretionary spend that implies confidence

- Europe CIOs intend to spend 26% of their IT budget on new products. Also an increase versus our previous survey.

- Consistent with our previous surveys, Asia respondents indicated a meaningfully higher budget allocation for new projects. However, consistent with last quarter Asia CIOs also reduced budget allocation for new projects.

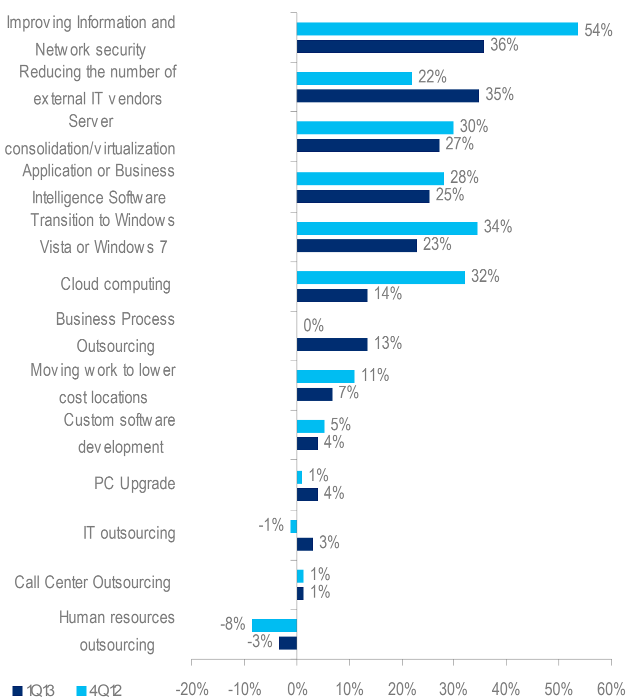
Source: Citi Research

Network Security and Server Consolidation Remain Priorities

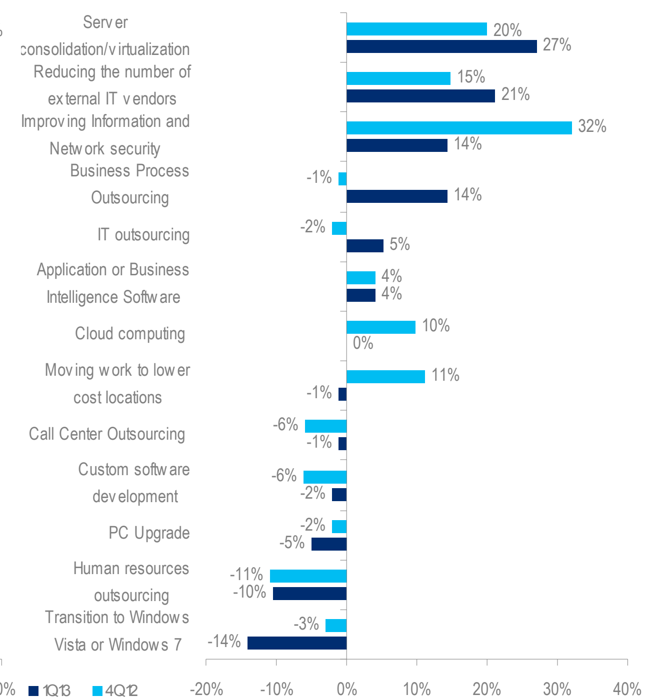
- Server consolidation/virtualization and Improving information and network security remain top 3 priorities across all 3 regions.
- Call center & HR outsourcing migrations remain a low priority items, as does Windows migrations
- Interestingly, transition to Win 7 (or Vista) were high IT priorities for past few quarters so many client OS upgrades may now be in the rear view.
- Business process outsourcing saw a meaningful sequential jump across all three regions

Are the following items a "priority" or "candidate for deferral" during the next 12 months?

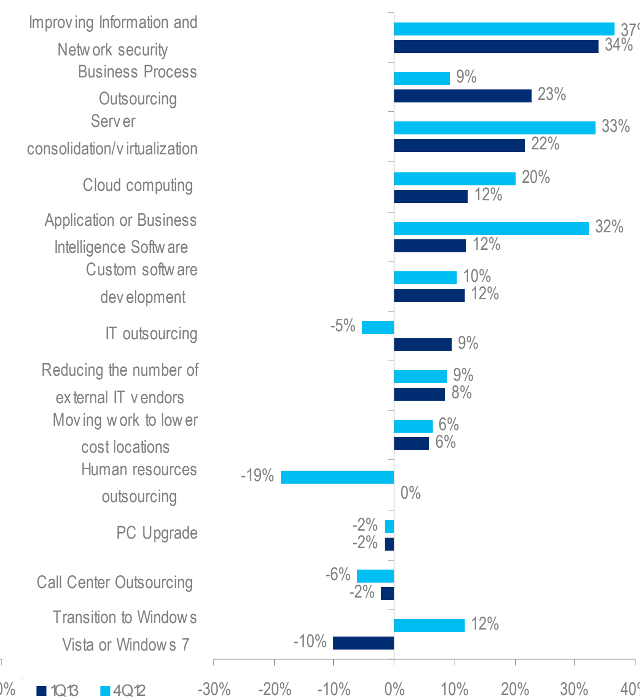
U.S.



Europe



Asia

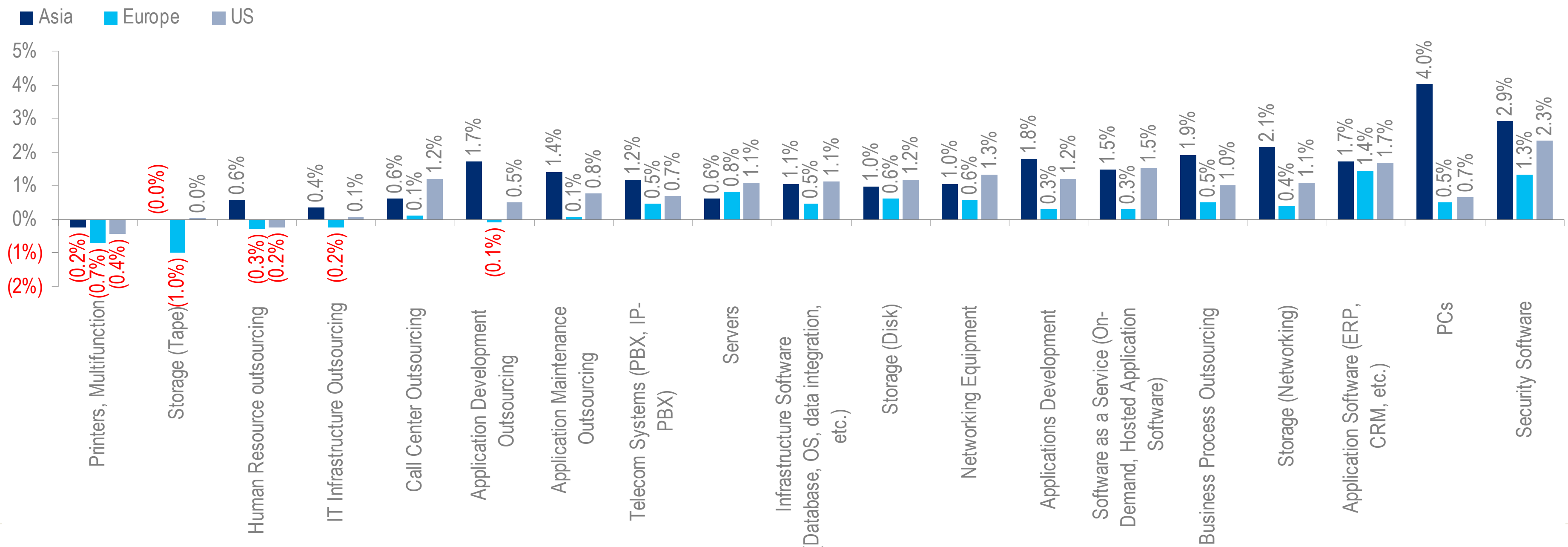


Source: Citi Research

Areas of IT Budget Growth in 2013

- Security software was the only IT initiative that was cited in top-5 (top-2) to receive an increase in budget allocation across all three regions
  - -- Networking equipment, Application Software (ERP, CRM) on the cusp
- Consistent with past surveys, CIOs highlighted Printers and Tape Storage as the two areas where spending is decreasing the most
  - -- While Outsourcing in general is consistently ranked in the bottom quartile, every type of outsourcing saw a sequential rise in “priority” level with BPO increasing considerably in importance
- While PCs remain the area of highest IT spend increase for Asia CIOs (+4% Y/Y), US and European CIOs expect only modest growth (+1% Y/Y)

Relative to 2012, characterize the change in spending in the following categories during 2013



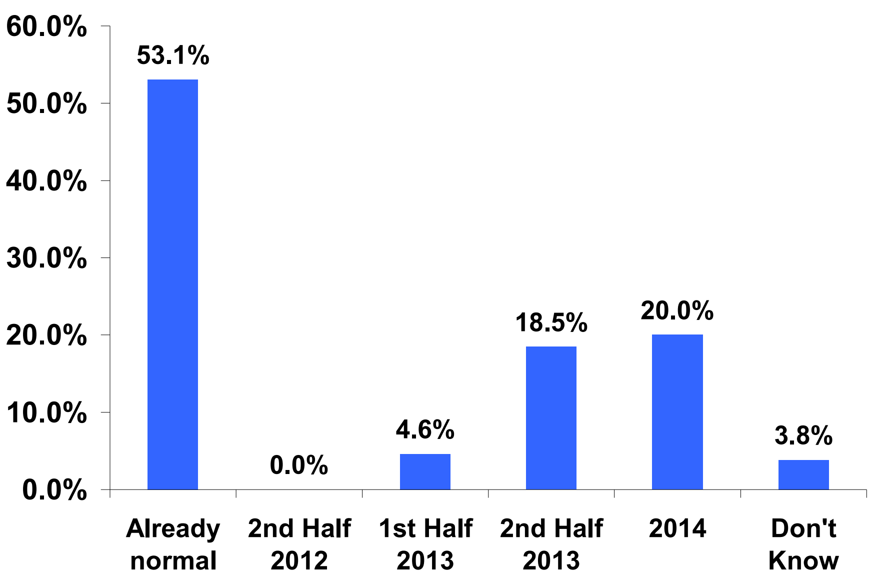
Source: Citi Research

Sector Commentary

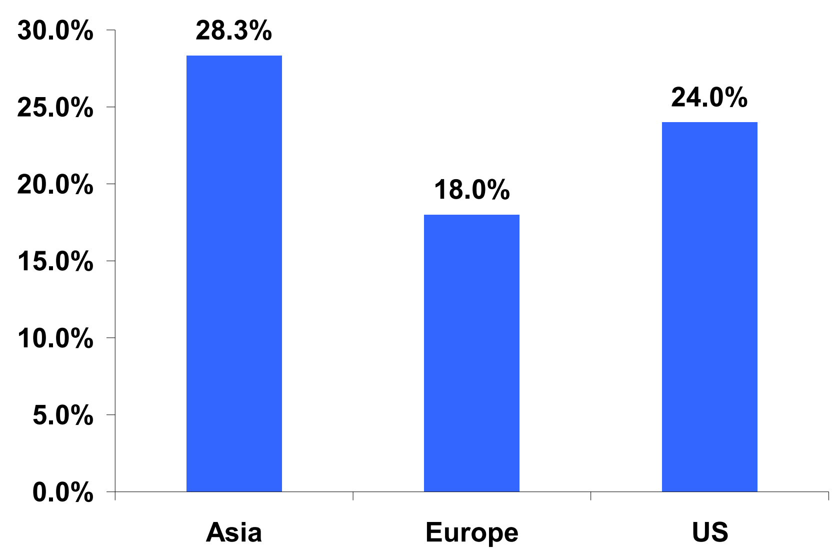
PC Replacement Cycle Lengthens Again

- Roughly 57% of CIOs indicated that PC replacement cycles have or will normalize by 1H13, generally inline with the 56% indicated in our 4Q'12 survey. Approximately 20% of respondents indicated 2014 for PC refresh cycle to return to normal, slightly up from 17% in our prior survey.
- On average, 23% of the PC installed base is expected to be replaced in 2013 (same as in our prior report), a slight increase from the 21% estimated for 2012.
- This is moving to an over 4 year PC replacement cycle versus the historical normal 3.8 years replacement cycle.

When do you expect your PC refresh cycle to return to normal?



What percent of your current PC installed base will you replace in 2013?

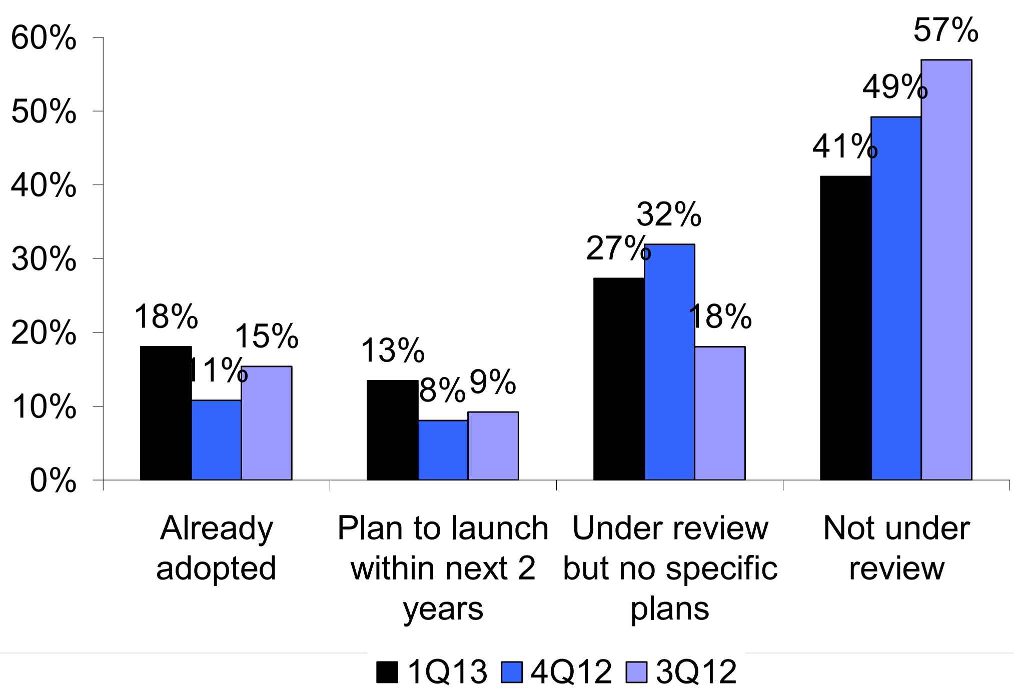


Source: Citi Research

BYOD Trend Expanding into PCs

- Roughly 18% of respondents cited that their employees are already using their personal PCs/tablets at work , up from 11% in the prior quarter
- An additional 40% of respondents noted that they are either planning to or at least reviewing the possibility of BYOD for PCs, about the same as our last survey. Only 41% of respondents said not under review down from 49% from last quarter.
- The top two reasons for BYOD adoption remain 1) increases employee satisfaction and 2)consumer PCs/tablets are suitable for a local computing device.

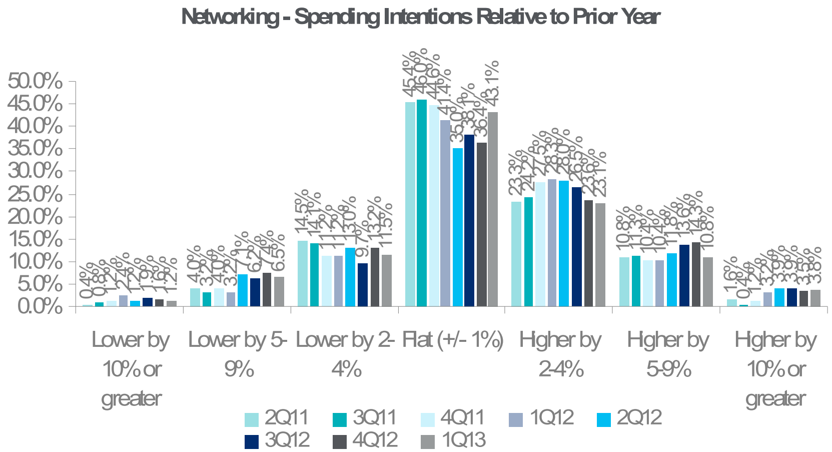
Do you plan to adopt a BYOD policy for employee PCs?

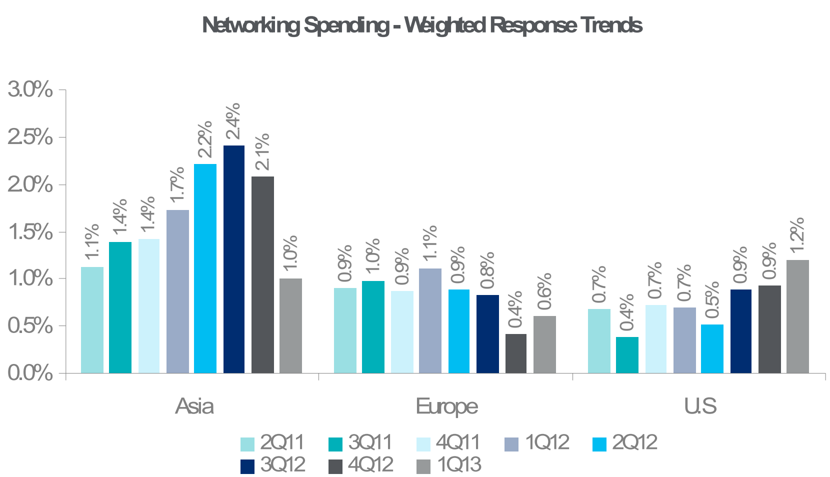


Source: Citi Research

Data Networking

The expected annual changes in Data Networking spending intentions were mixed; expectations are modesty lower versus the prior year, but relatively flat versus the prior quarter.



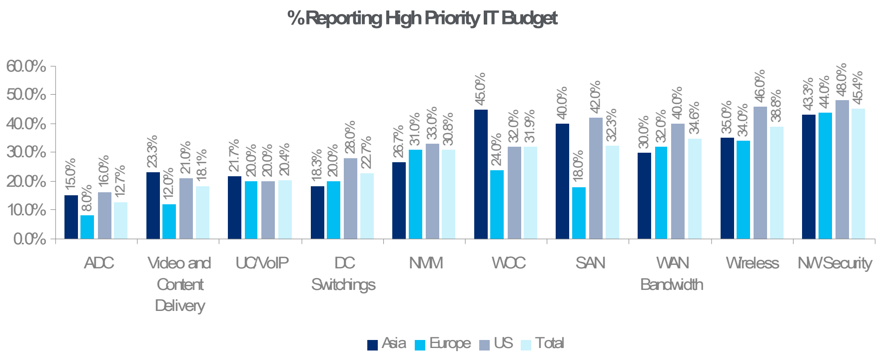


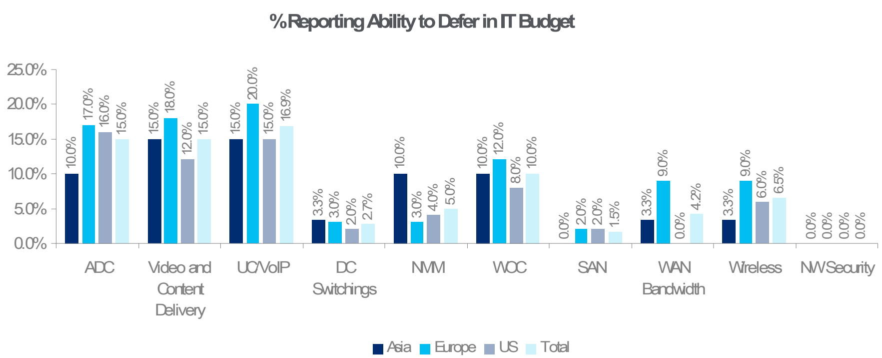
- On balance, the weighted average response indicates a modest 0.9% increase in data networking spending plans; this is slightly lower than prior year results and relatively flat versus the previous quarter
- Spending intentions largely shifted to a more flattish (+/- 1%) outlook from a more negative view in the prior quarter
- Asia's spending intentions continued their decline for the second straight quarter; this represents the largest quarterly decline (-110 bps) for any region
  - Spending in Europe and the U.S. experienced a modest sequential improvement

Source: Citi Research

Data Networking

Network Security, Wireless & Mobility, and WAN Bandwidth remain top priorities. Consistent with prior responses CIOs indicated the most ability to defer spending in Application Delivery Networking, Video & Content Delivery, and Unified Communications/VoIP





- Network Security is consistently a top focus for CIOs and is currently viewed by 45.4% of survey respondents as a high priority spending item
  - Wireless (38.8%) and WAN bandwidth (34.6%) are also perennial spending priorities
- Conversely, Unified Communications/VoIP ranks as the category with highest propensity to experience spending deferrals with 16.9% of survey respondents indicating an ability to push out spending
  - CIOs also view Application Delivery Networking and Video & Content Delivery as deferral targets

Source: Citi Research

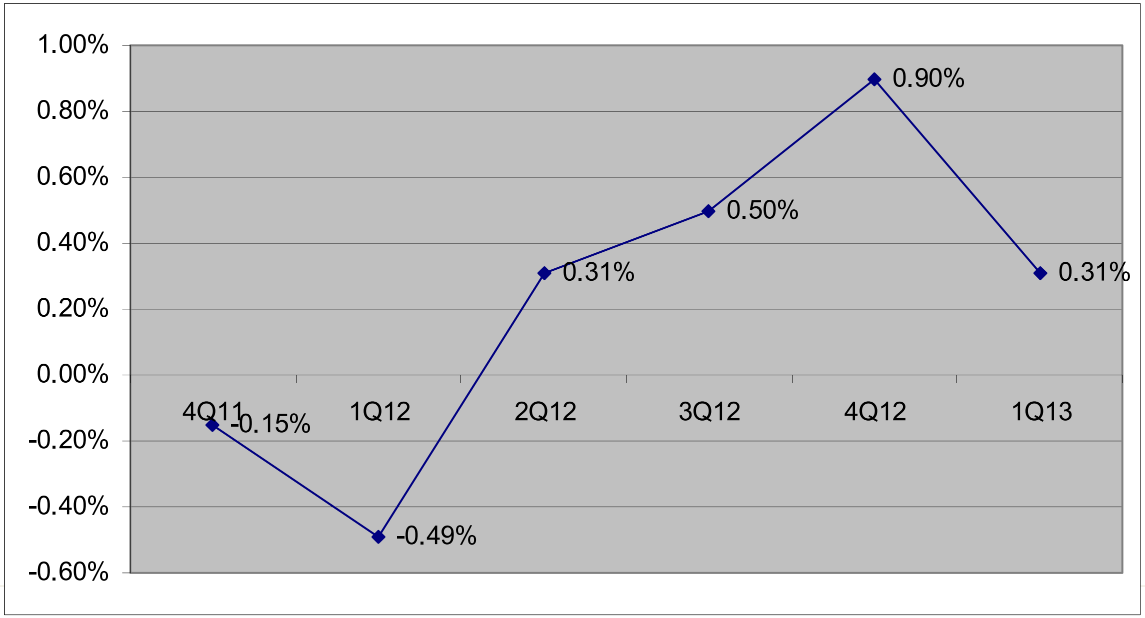
Services Pricing Trend Remains Stable

- Our data indicates per unit pricing for IT Services has stabilized at a modest positive level – it was positive for the fourth quarter in a row. The average unit price change across the 260 CIOs is expected to be +0.3% based on the 1Q13 survey data. This is compared to our 4Q12 survey result of +0.9%, +0.5% in 3Q12, +0.3% in 2Q, and negative 0.49% in 1Q [see chart below]. The percentage of CIOs not looking for unit price reductions remains roughly stable – 31% in 1Q13; 29% in 4Q12; 34% in 3Q, 32% in 2Q, and 33% in 1Q12.

- The survey trends, which imply per unit pricing is improving modestly, combined with our recent channel checks where most vendors have an outlook of “flattish” pricing, gives us a high level of confidence that pricing will be neutral-to-slightly-positive for most IT Services vendors in 2013.

Asia, Europe, U.S. – Average

CIOs were asked: What level of unit price increase or decrease do you expect from your IT services vendor in 2012?



Source: Citi Research

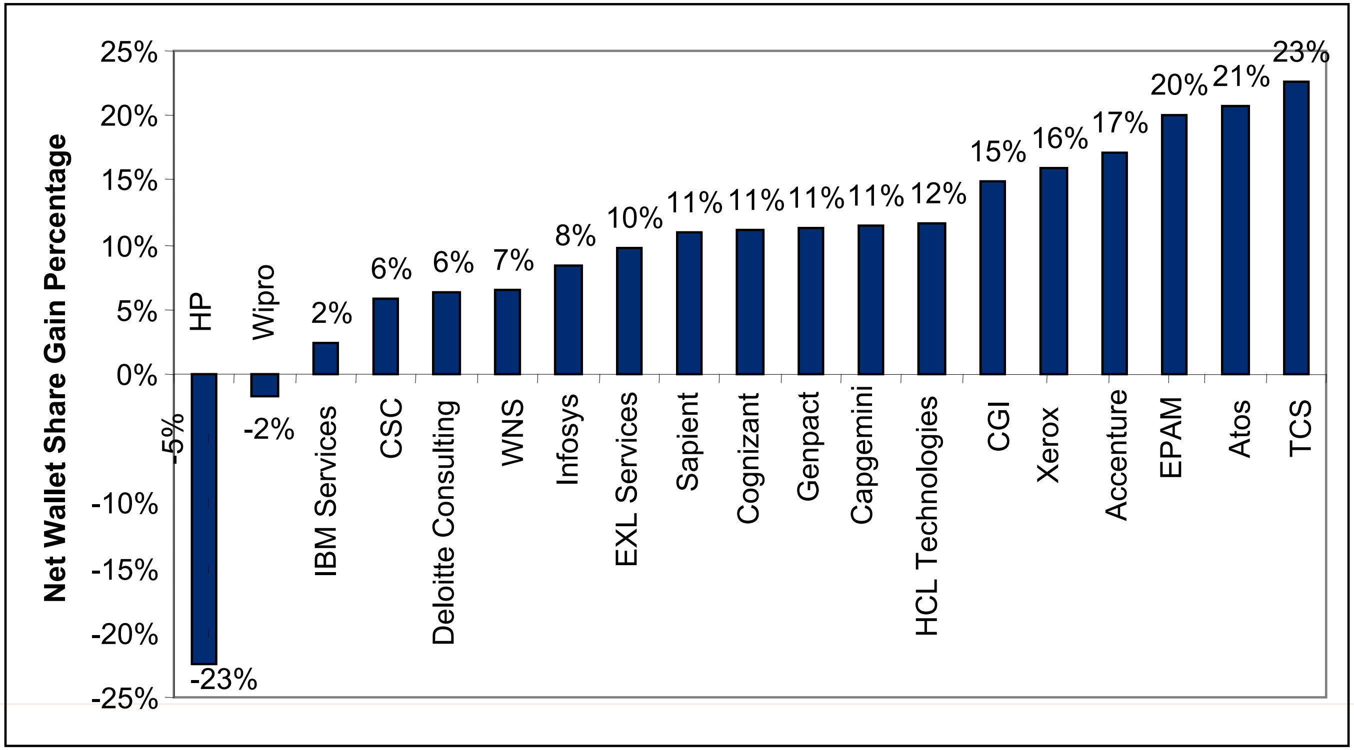
Services "Wallet-Share" Trends

- IT vendors had solid performance in 1Q13 with respect to maintaining or increasing wallet share. Just 2 vendors – HP and Wipro – that we track lost share, vs. 1 in 4Q, 4 in 3Q and 6 in 2Q.
- HCL, Xerox, EPAM and Atos showed the best sequential improvement – of these EPAM is notable since it improved over an already strong quarter last time. IBM, which fell from the top spot in 3Q, slid some more but remained a positive.
- HP Services performance continues to suffer. Wipro's slide into negative territory was surprising – in the past it has been a middling but steady performer.

Asia, Europe, U.S.

CIOs were asked: Which IT services vendors are gaining or losing share of the IT spending dollars at your organization?

Note: When reading this chart, vendor share is calculated using the cumulative number of wallet share "gain" responses minus "losing" responses for a specific vendor, divided by the number of respondents who use the vendor. It is meant to be a directional indication of wallet share performance, not an indicator of forward revenue growth rates.



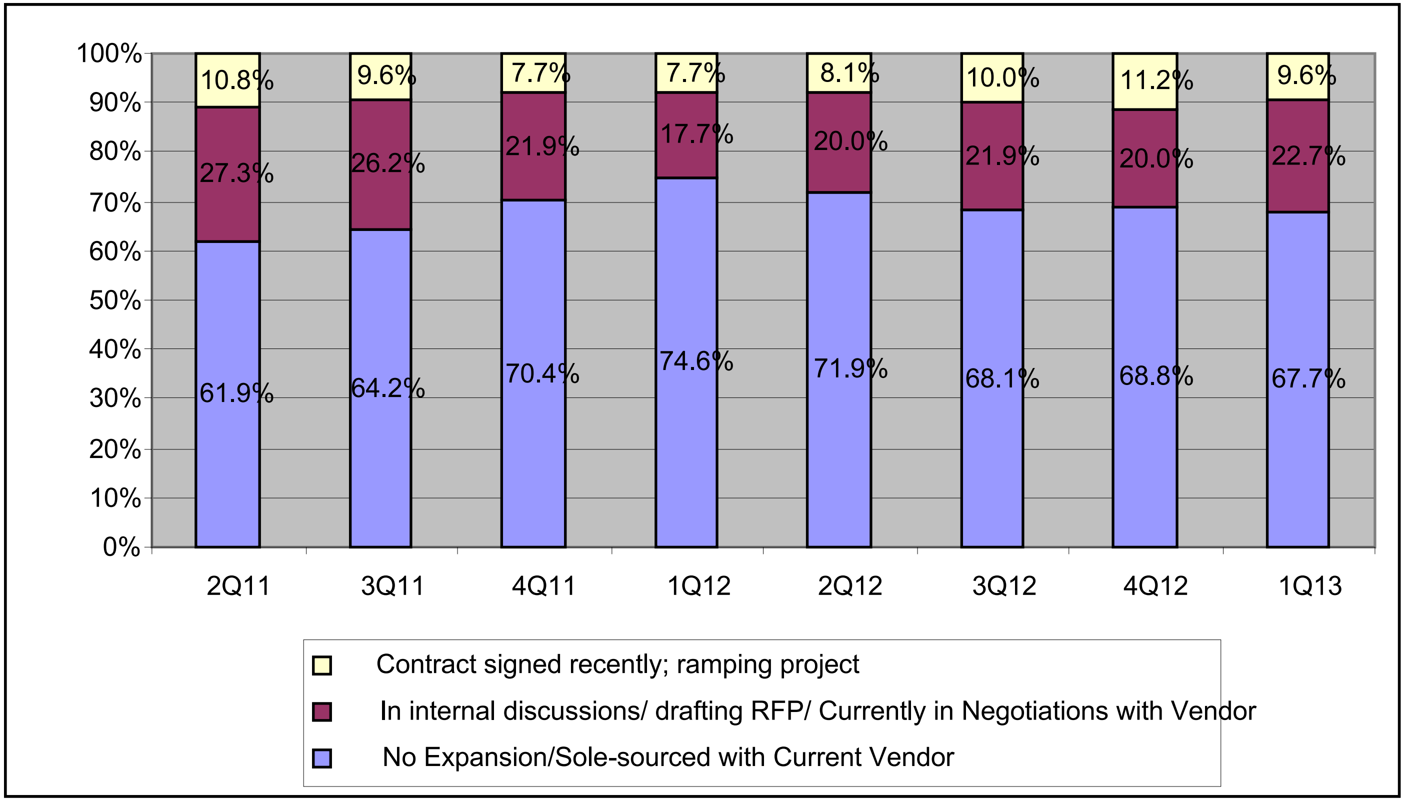
Source: Citi Research

Outsourcing Trends Remain Steady

- CIOs either exploring outsourcing additional functions or currently ramping incremental projects mildly rose to 32.3% in 1Q13 from 31.2% in 4Q12. The long term trend is relatively steady.
- Note that this chart typically applies primarily to large traditional IT outsourcing, and not to smaller incremental offshore outsourcing deals.

Asia, Europe, U.S.

CIOs were asked the following: If you are currently in the process of outsourcing incremental functions in your organization, what stage of the process are you in?

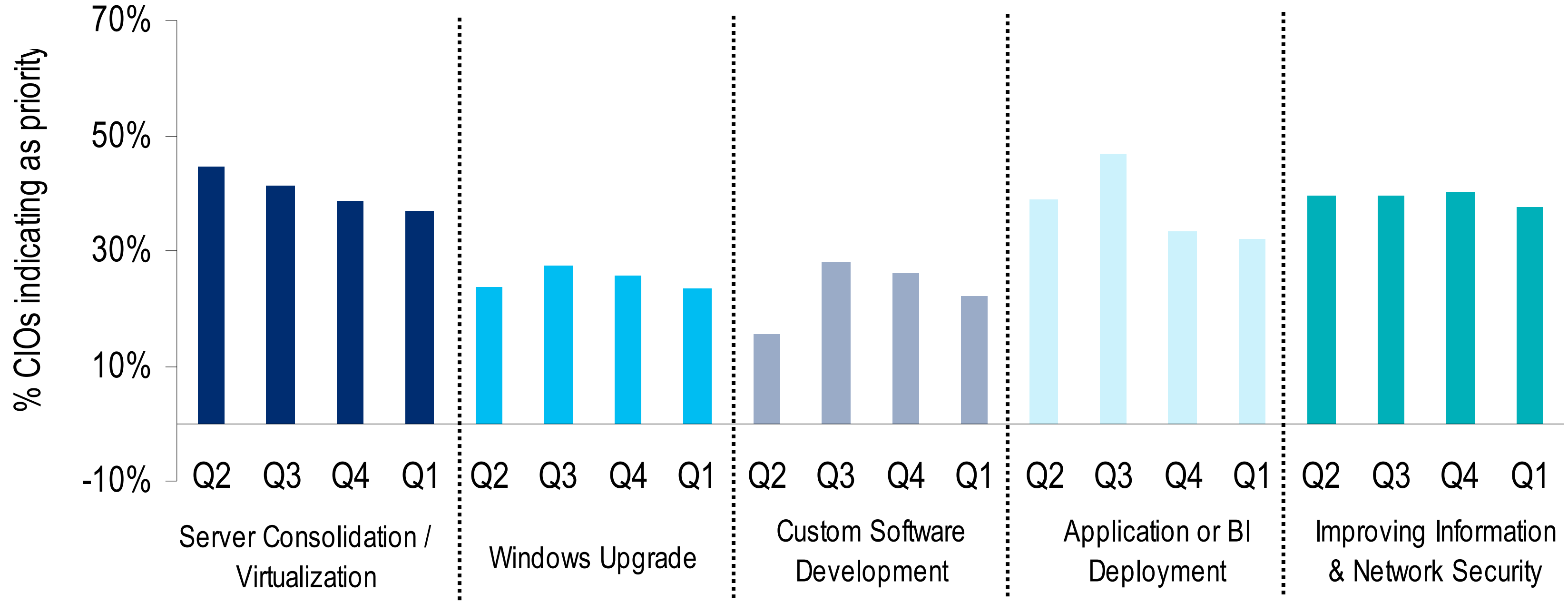


Source: Citi Research

Software Budgets Favor Network Security; Other Initiatives More Mixed

- Server Virtualization as an IT priority remains relatively high but has trended lower over the past 5 quarters after consistently strong results through 2011
- Applications software development and deployment trends have been choppy; Trending lower the past couple of quarters
- Demand for Information and Network Security has been steady; Consistently cited as a area of greater importance in other parts of our survey
- Looming XP end of life intensified pressure to transition to more current Windows last year; May start to see this initiative soften due to "tougher comps"

CIO Spending Priorities

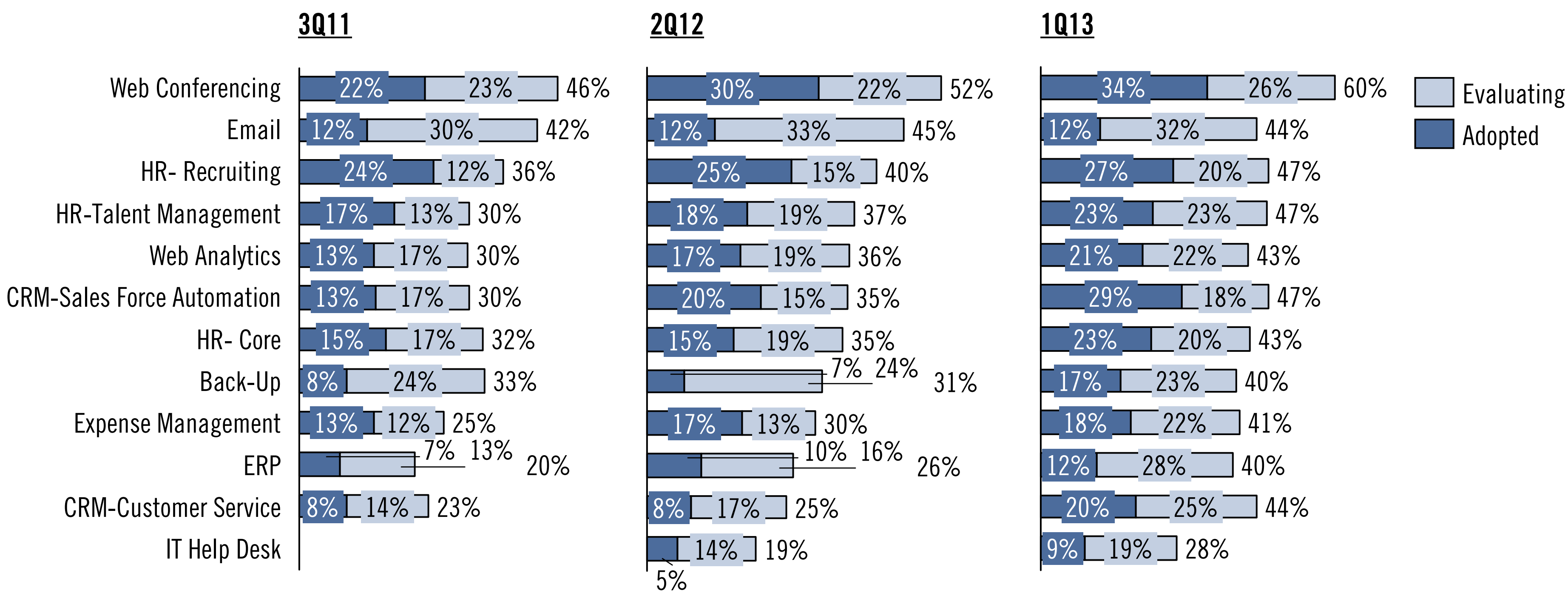


Source: Citi Research

Demand for Cloud Services Depends on Category

- Uptick in nearly every category
- Evaluation of email remains high but no action taken
- IT Helpdesk, Core HR, SFA, Call Center, Talent Management all suggest meaningful increases

Please choose the response that best describes your plans with software as a service in each of the follow areas:

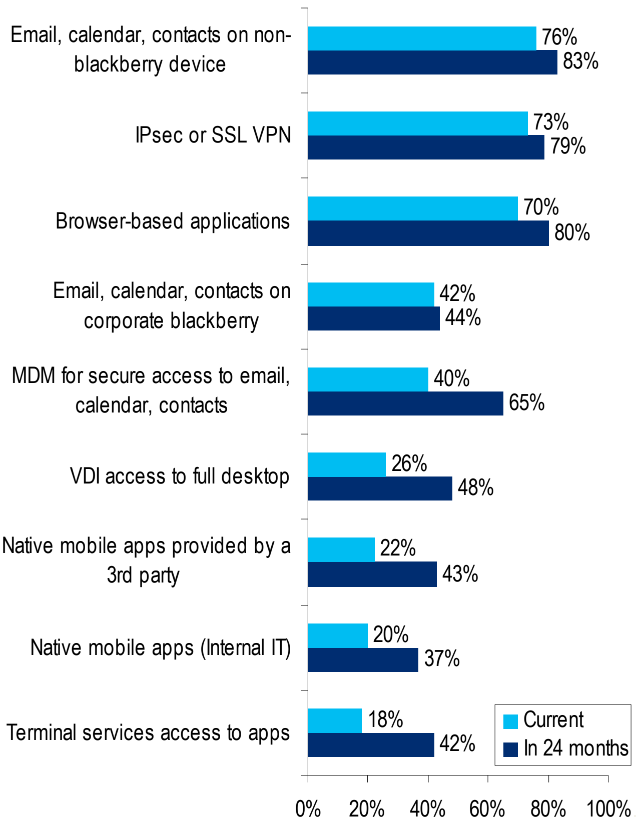


Source: Citi Research

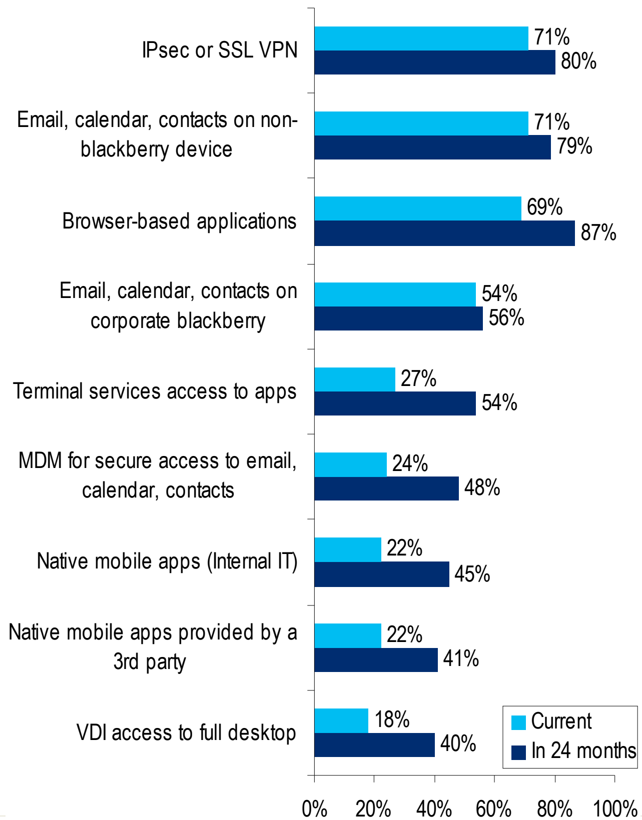
Push For Mobile Workforce Still in the Early Innings

- Email/messaging, IPsec/SSL VPN and browser-based apps are well established within the enterprise
- Blackberry's position as the dominant corporate messaging device appears to be at risk
- Tools to enable mobility across devices could nearly double in the next 2 years (MDM, VDI, Mobile apps, terminal services). This looks good for CTXS.

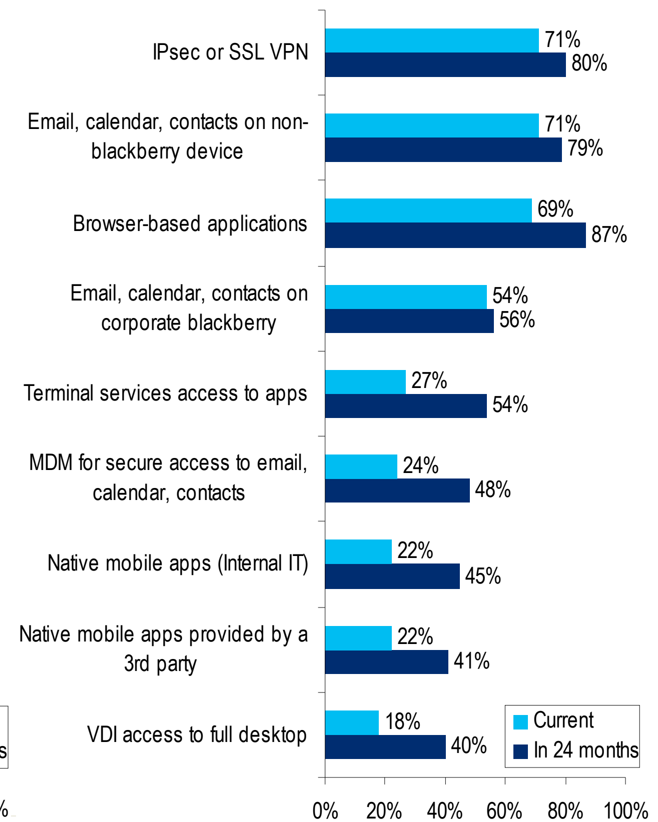
U.S.



Europe



Asia



Source: Citi Research

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 Research product ("the Product"), please contact Citi Research, 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 https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures. 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.

Citi Research Equity Ratings Distribution

	12 Month Rating			*Relative Rating*		
Data current as of 31 Mar 2013	**Buy**	**Hold**	**Sell**	**Buy**	**Hold**	**Sell**
Citi Research Global Fundamental Coverage	48%	39%	12%	7%	87%	7%
% of companies in each rating category that are investment banking clients	53%	49%	43%	65%	49%	51%

Guide to Citi Research Fundamental Research Investment Ratings:

Citi Research stock recommendations include an investment rating and an optional risk rating to highlight high risk stocks.

Risk rating takes into account both price volatility and fundamental criteria. Stocks will either have no risk rating or a High risk rating assigned.

Investment Ratings: Citi Research investment ratings are Buy, Neutral and Sell. Our ratings are a function of analyst expectations of expected total return ("ETR") and risk. ETR is the sum of the forecast price appreciation (or depreciation) plus the dividend yield for a stock within the next 12 months. The Investment rating definitions are: Buy (1) ETR of 15% or more or 25% or more for High risk stocks; and Sell (3) for negative ETR. Any covered stock not assigned a Buy or a Sell is a Neutral (2). For stocks rated Neutral (2), if an analyst believes that there are insufficient valuation drivers and/or investment catalysts to derive a positive or negative investment view, they may elect with the approval of Citi Research management not to assign a target price and, thus, not derive an ETR. Analysts may place covered stocks "Under Review" in response to exceptional circumstances (e.g. lack of information critical to the analyst's thesis) affecting the company and / or trading in the company's securities (e.g. trading suspension). As soon as practically possible, the analyst will publish a note re-establishing a rating and investment thesis. To satisfy regulatory requirements, we correspond Under Review and Neutral to Hold in our ratings distribution table for our 12-month fundamental rating system. However, we reiterate that we do not consider Under Review to be a recommendation.

Relative three-month ratings: Citi Research may also assign a three-month relative call (or rating) to a stock to highlight expected out-performance (most preferred) or under-performance (least preferred) versus the geographic and industry sector over a 3 month period. The relative call may highlight a specific near-term catalyst or event impacting the company or the market that is anticipated to have a short-term price impact on the equity securities of the company. Absent any specific catalyst the analyst(s) will indicate the most and least preferred stocks in the universe of stocks under consideration, explaining the basis for this short-term view. This three-month view may be different from and does not affect a stock's fundamental equity rating, which reflects a longer-term total absolute return expectation. For purposes of NASD/NYSE ratings-distribution-disclosure rules, most preferred calls correspond to a buy recommendation and least preferred calls correspond to a sell recommendation. Any stock not assigned to a most preferred or least preferred call is considered non-relative-rated (NRR). For purposes of NASD/NYSE ratings-distribution-disclosure rules we correspond NRR to Hold in our ratings distribution table for our 3-month relative rating system. However, we reiterate that we do not consider NRR to be a recommendation.

Prior to October 8, 2011, the firm's stock recommendation system included a risk rating and an investment rating. **Risk ratings,** which took into account both price volatility and fundamental criteria, were: Low (L), Medium (M), High (H), and Speculative (S). **Investment Ratings** of Buy, Hold and Sell were a function of the Citi Research expectation of total return (forecast price appreciation and dividend yield within the next 12 months) and risk rating. Additionally, analysts could have placed covered stocks "Under Review" in response to exceptional circumstances (e.g. lack of information critical to the analyst's thesis) affecting the company and/or trading in the company's securities (e.g. trading suspension). Stocks placed "Under Review" were monitored daily by management and as practically possible, the analyst published a note re-establishing a rating and investment thesis. For securities in developed markets (US, UK, Europe, Japan, and Australia/New Zealand), investment ratings were:Buy (1) (expected total return of 10% or more for Low-Risk stocks, 15% or more for Medium-Risk stocks, 20% or more for High-Risk stocks, and 35% or more for Speculative stocks); Hold (2) (0%-10% for Low-Risk stocks, 0%-15% for Medium-Risk stocks, 0%-20% for High-Risk stocks, and 0%-35% for Speculative stocks); and Sell (3) (negative total return). For securities in emerging markets (Asia Pacific, Emerging Europe/Middle East/Africa, and Latin America), investment ratings were:Buy (1) (expected total return of 15% or more for Low-Risk stocks, 20% or more for Medium-Risk stocks, 30% or more for High-Risk stocks, and 40% or more for Speculative stocks); Hold (2) (5%-15% for Low-Risk stocks, 10%-20% for Medium-Risk stocks, 15%-30% for High-Risk stocks, and 20%-40% for Speculative stocks); and Sell (3) (5% or less for Low-Risk stocks, 10% or less for Medium-Risk stocks, 15% or less for High-Risk stocks, and 20% or less for Speculative stocks).

Investment ratings are determined by the ranges described above at the time of initiation of coverage, a change in investment and/or risk rating, or a change in target price (subject to limited management discretion). At other times, the expected total returns may fall outside of these ranges because of market price movements and/or other short-term volatility or trading patterns. Such interim deviations from specified ranges will be permitted but will become subject to review by Research Management. Your decision to buy or sell a security should be based upon your personal investment objectives and should be made only after evaluating the stock's expected performance and risk.

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 Inc	Walter H Pritchard, CFA; Ashwin Shirvaikar, CFA; Jim Suva, CPA; Kevin J Dennean, CFA; Joe Yoo; Leo Kulp, CFA
Citigroup Global Markets Ltd	Amit B Harchandani; Chris Montagu
Citigroup Global Markets India Private Limited	Surendra Goyal, CFA
Citigroup Global Markets Singapore PTE LIMITED	Paul R Chanin

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 Research does not set a predetermined frequency for publication, if the Product is a fundamental research report, it is the intention of Citi Research 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 Research research report. Ask your Financial Advisor or use smithbarney.com to view any available Morgan Stanley research reports in addition to Citi Research research reports.
Important disclosure regarding the relationship between the companies that are the subject of this Citi Research 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.citivelocity.com/cvr/eppublic/citi_research_disclosures.
This Citi Research 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 Citi Research. 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 Citi 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 Citi Velocity website. If you have questions regarding Citi Velocity, 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 100-180, 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 Korea by Citibank Korea Inc., which is regulated by the Financial Services Commission and the Financial Supervisory Service. Address is Citibank Building, 39 Da-dong, Jung-gu, Seoul 100-180, Korea. 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 8 Marina View, 21st Floor Asia Square Tower 1, Singapore 018960, 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 Gasset, 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 Citi Research 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 Citi Research's Products can be found at https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures.

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) and other product that is made available through other distribution channels only to certain categories of clients to satisfy legal or regulatory requirements, Citi Research concurrently disseminates its research via proprietary and non-proprietary electronic distribution platforms. Periodically, individual Citi Research 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. Citi Research simultaneously distributes product that is limited to QIBs only through email distribution.

The level and types of services provided by Citi Research 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.

Citi Research product may source data from dataCentral. dataCentral is a Citi Research proprietary database, which includes Citi estimates, data from company reports and feeds from Reuters and Datastream.

ADDITIONAL INFORMATION IS AVAILABLE UPON REQUEST