Capital Markets Monitor

DECEMBER 2014

INSTITUTE OF INTERNATIONAL FINANCE

HIGHLIGHTS

(DE)LEVERAGING: A MIXED PICTURE

- Since a high level of leverage was thought to have contributed to the 2008 financial crisis, deleveraging has been seen as a desirable process to reduce risk and vulnerability in the financial system.
- Six years after the crisis, while there has been deleveraging in certain sectors, mainly in the U.S., the debt/GDP ratio of most sectors, mainly non-financial sectors, has kept increasing, bringing the total debt-to-GDP ratio of the world's non-financial sectors above 240% by mid-2014.
- In the context of slow global growth and pervasive low inflation, such rising and high level of debt is worrisome both in terms of sustainability and the ability of non-financial sectors to incur new debt to support more vigorous growth.

CONTENTS

Key issues of the month 2
Special Feature I: Infrastructure as an asset class—parsing the problem 5
Special Feature II: An update on shadow banking 8
Special Feature III: Innovations in digital retail payment systems 10

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Key Issues: (De)leveraging: A Mixed Picture

Since a high level of leveraging was thought to have contributed to the 2008 financial crisis, deleveraging has been seen as a desirable process to reduce risk and vulnerability in the financial system. Six years after the crisis, while there has been deleveraging in certain sectors, mainly in the U.S., the debt/GDP ratio of most sectors, mainly non-financial sectors, has kept increasing, bringing the total debt-to-GDP ratio of the world's non-financial sectors above 240% by mid-2014 (Chart 1). In the context of slow global growth and pervasive low inflation, such rising and high level of debt is worrisome both in its sustainability and the ability of non-financial sectors to incur new debt to support more vigorous growth.

DELEVERAGING IN MATURE MARKETS

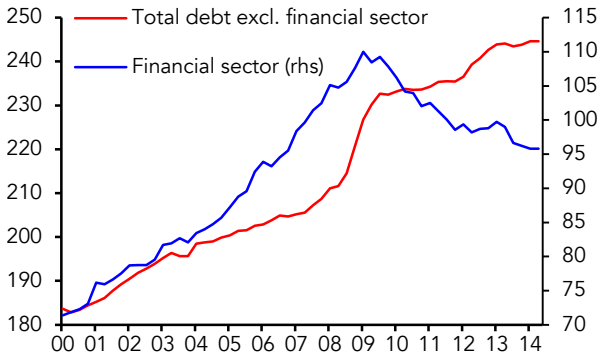
Among the mature market countries, proxied by the G4 (the U.S., U.K., continental Europe and Japan), the financial sector has reduced its indebtedness (not including deposits at banks) by 20 percentage points of GDP since Q1 2009, driven regulatory changes, market pressure and cutback in risk appetite (Chart 2). However, this development has been driven by the U.S. and U.K. financial sectors which have deleveraged by 38 and 22 percentage points, respectively—more than compensating for a relatively small rise in Japan (Chart 3). This is desirable in terms of reducing risk in the financial sector, but as financial intermediaries, their debt reduction does not influence the assessment of sustainability of the debt burden to the economy.

Similarly, the G4 household and non-financial corporate sectors have shown some modest deleveraging, again mainly thanks to U.S. households. Interestingly, corporations have largely replaced bank borrowing with bond issuance, with high-yield (HY) borrowers making up an increasing share of total issuance (Chart 4, next page). As a result, the average credit quality of the corporate bond market has deteriorated, raising refinancing risk in the future. At present, default risk is historically low as almost anyone can refinance, given zero policy rates and plentiful central bank liquidity. If or when monetary conditions normalize, refinancing and default risk will likely rise.

More importantly, the public sector has increased its debt/GDP ratio significantly across the G4--by 30 percentage points in aggregate. This has been a result of the fiscal stimulation efforts undertaken to deal with the great recession. As a consequence, the non-financial sectors of the G4 economies have increased their leveraging by a

Global Total Debt Outstanding*

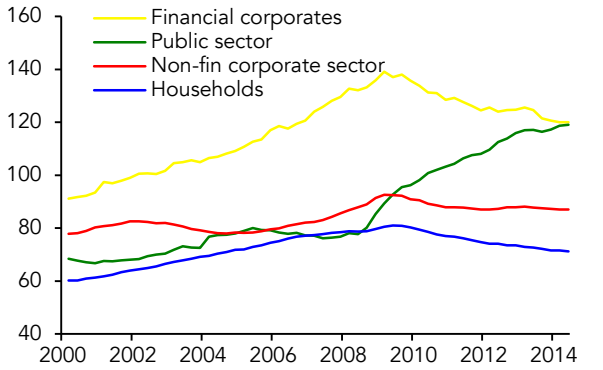
1 *percent of GDP, GDP-weighted average*



Source: Fed, ECB, BoJ, OECD, IMF, BIS, McKinsey, IIF; *Brazil, China, Czech Rep., Hungary, India, Indonesia, Mexico, Poland, Russia, Saudi Arabia, South Africa, Thailand, Turkey, Euro Area, Japan, U.K., U.S.

Mature Markets: Total Debt Outstanding*

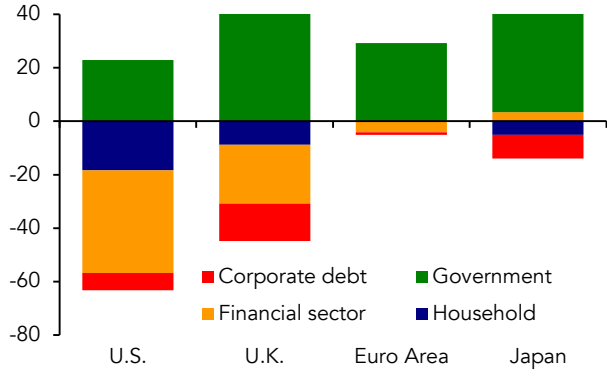
2 *percent of GDP, GDP-weighted average*



Source: Fed, ECB, BoJ, BIS, IMF, IIF; *Euro Area, Japan, U.S. , U.K.

G4: Change in Total Debt

3 *percentage points, between 2009Q1 and 2014Q2 or latest*



Source: Fed, ECB, BoJ, BIS, IMF, IIF.

Key Issues (cont.)

substantial 24 percentage points of GDP compared with the already high debt level at the height of the crisis.

LEVERAGING IN EMERGING MARKETS

From lower bases, leveraging in EM countries has generally increased, in some cases quite significantly to high levels. The drivers of leveraging, however, differ from those in the G4. For a sample of thirteen large EM countries (EM13), the financial sector has kept its indebtedness stable as a whole, at around 23% of GDP (Chart 5). However, there has been a wide range of developments--ranging from a 3.6 percentage point reduction in the debt/GDP ratio in China--the cutback results from current government efforts to moderate the strong pace of credit growth, until recently mediated through various non-bank channels. Because of the lack of transparency about the so-called "shadow banking" activities, other estimates incorporating some of these elements could instead show a large increase in China's financial sector debt. At the other end of the spectrum, the financial sector in Turkey has increased leveraging by more than 11 percentage points of GDP since Q1 2009, and in Brazil by more than 7 percentage points (Chart 6).

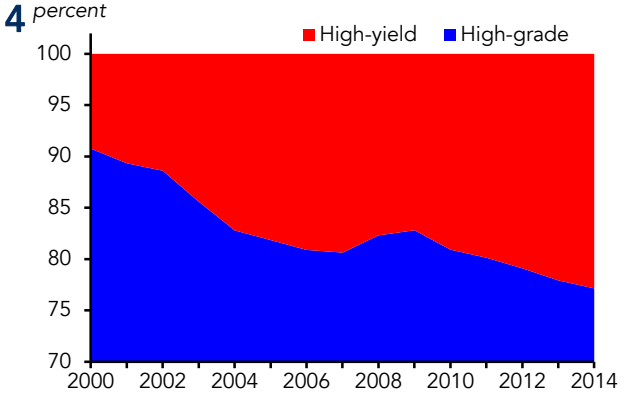
Among the non-financial sectors, the public sector has maintained a fairly stable debt profile at around 40% of the combined GDP. The household sector has also incurred more debt to support strong consumption growth in several countries in recent years. Its debt/GDP ratio has climbed by 7 percentage points to around 27% of GDP--still low compared with the average level in mature economies (more than 70% as of mid-2014).

The most striking development has been the sharp increase in indebtedness by the non-financial corporate sector in almost every emerging market countries analyzed. In addition to borrowing from banks, including international banks, EM corporations, both high-grade and for the first time in size, high-yield have issued record amount of bonds.

Issuance has been strong in both foreign and local currencies (Chart 7, next page). EM non-bank corporates have raised around $1.6 trillion in domestic and international debt markets since 2009 and around 30% of that ($485 billion) was raised in international markets. This increase in firms' reliance on overseas bond issuance, however, could pose refinancing and repayment risks, as well as currency risk particularly during the financial stress periods (Chart 8, next page).

G4 Share of HY in Cumulative Non-Fin. Corp. Bond Issuance

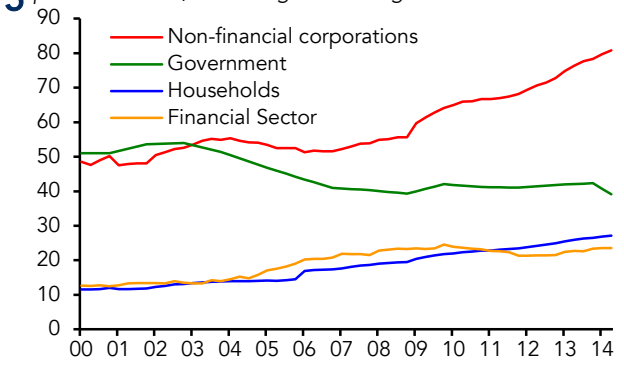
4 *percent*



Source: Thomson ONE, IIF.

Emerging Markets: Total Debt Outstanding

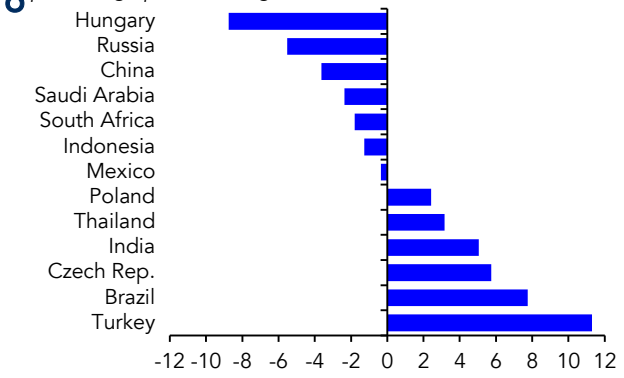
5 *percent of GDP, GDP-weighted average*



Source: BIS, IMF, OECD, McKinsey, IIF; *Brazil, China, Czech Rep., Hungary, India, Indonesia, Mexico, Poland, Russia, Saudi Arabia, South Africa, Thailand, Turkey.

Emerging Markets: Change in Financial Sector Debt

6 *percentage points, change btw Q1 2009 and Q2 2014(or latest)*



Source: McKinsey, BIS, OECD, IIF.

Key Issues (cont.)

As a result, the outstanding volume of EM non-financial corporates bond has reached a record of more than 2.5 trillion. Altogether, the increase in borrowing—by 20 percentage points—has boosted the debt-to-GDP ratio of the non-financial corporate to about 80% in emerging markets.

Of particular interest is the rise in China's non-financial corporate sector debt by 48 percentage points to about 150% of GDP. Bank loans comprise a large part of it, with the outstanding debt securities accounting for around $840 billion (10% of GDP) as of June 2014. Other EM countries, including Turkey, Brazil, Czech Republic, India and Russia have also seen increases in their non-financial corporate sector indebtedness, to levels close to 50% of GDP. South Africa and Hungary have been the only two countries in our sample recording a decline in their non-financial corporate indebtedness since early 2009.

IMPLICATIONS FOR GROWTH AND FINANCIAL STABILITY

The substantial increase in the debt of the non-financial sectors of the global economy to levels much higher than at the height of the financial crisis has worrisome implications for the future.

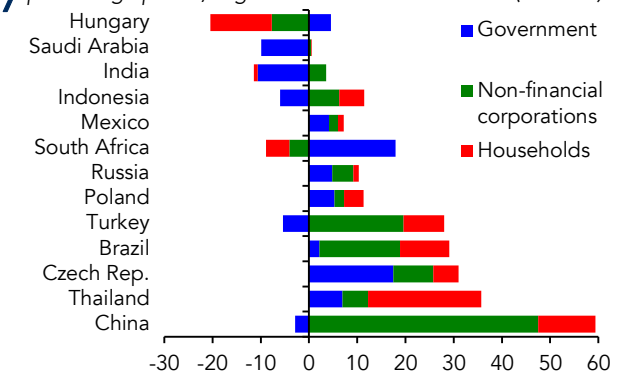
First, from such high levels, it is problematic and even difficult to create new debt at a pace sufficient to support vigorous growth on a sustained basis, especially since the productivity of debt has been declining.

Second, while the debt service burden and default risk have both been low thanks to extraordinary monetary accommodation, both will surely rise as monetary conditions normalize--in some cases potentially leading to stresses. In a rising interest rate environment, subsequent swings in foreign exchange rates could expose companies to redemption and currency risks, particularly in emerging markets (Chart 9). Even before any rate hike, spreads in HY corporate markets have widened substantially by 75 basis points since the start of the year, led by more pronounced corrections in energy HY sub-segment and EM HY markets.

Third, and more generally, high and rising debt amidst slow growth and low inflation is not a sustainable proposition--the divergence will have to be closed at some point. Either the debt-to-GDP ratio will be lowered by strong nominal growth or by other means including debt restructuring in most stressful cases. At present, these include several high-cost energy producers/borrowers.

7 Emerging Markets: Change in Non-Financial Sector Debt

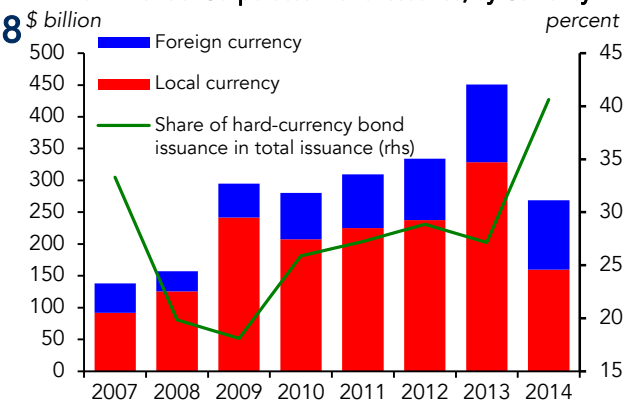
percentage points, chg btw Q1 2009 and Q2 2014 (or latest)



Source: BIS, IMF, IIF.

8 EM Non-Financial Corporates: Bond Issuance, by Currency

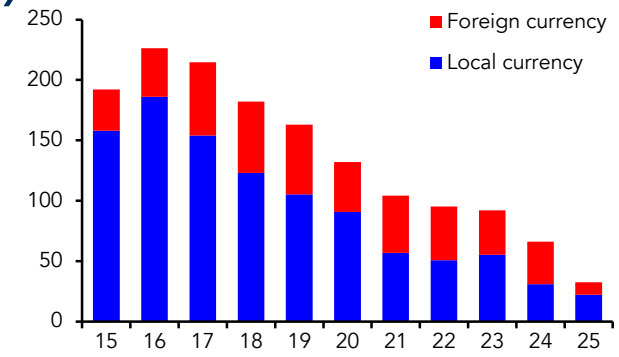
$ billion *percent*



Source: Thomson One, IIF.

9 EM Non-Financial Corporates: Projected Bond Redemptions

$ billion



Source: Thomson One, IIF.

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Special Feature I: Infrastructure as an Asset Class—Parsing the Problem

Demand for infrastructure financing cannot be met by public sector finance alone.

THE CASE FOR INFRASTRUCTURE INVESTMENT

Six years after the financial crisis of 2008, growth is still below historical averages accompanied by low levels of inflation. Investments in infrastructure can play a significant role in reviving much needed growth. Traditionally, infrastructure projects exclude oil exploration, but include power generation and distribution. In addition, these projects include roads, rail, ports, airports, power, water and telecom—both for greenfield (new construction) and brownfield (improvement of existing assets) investments. According to a 2012 paper by the San Francisco Fed the economic multiplier from infrastructure investments, representing the dollar change in output for one dollar of input, is considerable. For every dollar spent, economic output grows by more than one dollar: the number can range from 1.5 to 3, but the multiplier is higher in reality as it does not measure non-GDP items and positive social impact. Whatever the statistics—few need convincing that good roads, clean water and other essential infrastructure are prerequisites for a thriving economy.

THE PROBLEM: GLOBAL DEMAND FOR INFRASTRUCTURE FUNDING FAR OUTWEIGHS SUPPLY OF CAPITAL

Global demand for infrastructure investment outweighs supply: according to McKinsey, global infrastructure demand through 2030 is projected to be approximately $57 trillion (Chart 1); the OECD estimates $50 trillion. The latest B20 meeting estimates a need of $60-70 trillion by 2030. Whatever the estimate, the number is large and infrastructure needs are expected to grow faster than output and tax revenue. McKinsey estimates that infrastructure spending has to increase from 3.8% of world GDP to 5.8% by 2020. Consensus prevails that this need cannot be met by public sector finance alone, and private sector capital has started playing an increasingly important role in the form of Public Private Partnerships ("PPP"). Even with current levels of private sector participation, the B20 estimates a financing gap of around $15-20 trillion between now and 2030.

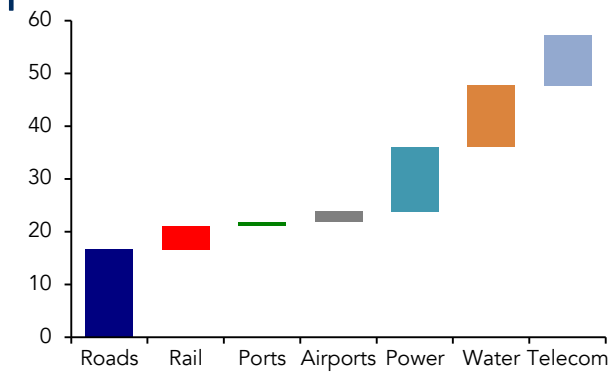
THE CHALLENGE: ATTRACTING PRIVATE CAPITAL

Demand for capital for infrastructure investments is clearly greater than supply, while at the same time, G3 monetary policy has never been more accommodative. Why is there a problem matching infrastructure projects with supply of capital? There are two components that need to be addressed: (i) finding infrastructure projects, and (ii) financing these projects.

(i) **Finding infrastructure projects:** During the July 2014 B20 meeting, the Infrastructure & Investment Taskforce mentioned the "absence of a credible pipeline of productive, bankable, investment-ready infrastructure projects" as the greatest impediment for private capital. The same message was reinforced during the IIF Annual Membership Meeting infrastructure session by the World Bank. As obstacles for a pipeline of projects with good risk-adjusted returns, the B20 list—mirroring to some degree the IIF's Council for Asset and Investment Management (CAIM) top ten impediments to infrastructure investments - includes: (a) inadequate project selection and prioritization, (b) weak project preparation and execution, (c) weak and unstable investment and regulatory environments, and (d) corruption and lack of transparency. Key recommendations from the B20 meeting include the creation of a **Global Infrastructure Hub**, credible infrastructure pipelines at the national level, in-

1 Global Investment Needed for Infrastructure, 2013 - 2030

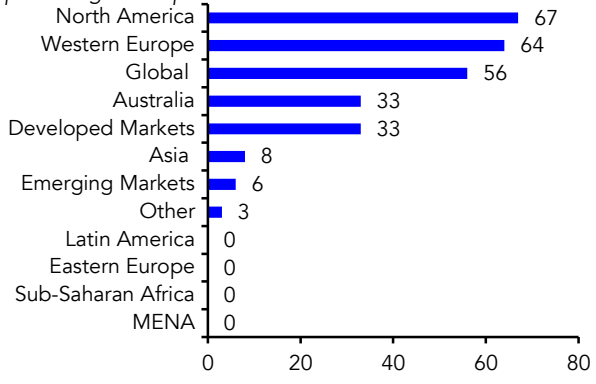
USD trillion, constant 2010 dollars



Source: McKinsey Infrastructure Report Jan, 2013

2 Interest in Infrastructure Funds with Mandates Focused On

percentage of respondents



Source: Probitas Partners Infrastructure Institutional Investor Trends for 2014 Survey

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Special Feature I: Infrastructure as an Asset Class—Parsing the Problem (cont.)

Significant demand for infrastructure investments from institutional investors.

creased availability of long-term financing, better transparency and mechanisms to mitigate certain risks such as regulatory, environmental, approval timelines. A key issue is the standardization of documentation, accounting and data to facilitate investor analysis and securitizations.

(ii) **How to finance infrastructure projects?** As with all investments, infrastructure investors seek fair risk-adjusted returns. This means that they must have the ability and data to estimate cash flows and the uncertainty associated with these cash flows. In the case of infrastructure investments, the life cycle—and associated risks—has two distinct phases: the construction phase in which no cash flow is made but there are capital expenditures, and an operational phase where the project has positive cash flows and capital expenditures are minimal.

Traditionally private capital has been—at least in the construction phase—provided by banks in the form of multiple-tranche syndicated bank loans and equity. However, after the 2008 financial crisis, several changes occurred that reduced the banking sector's appetite to provide such loans. These include regulatory initiatives following the crisis, incentivizing banks to reduce activity in certain business lines or exit others altogether. According to an OECD paper, the new market situation "is experiencing lower credit availability, higher spreads and shorter maturities." According to the OECD, there may be several ways to address this problem of credit retrenchment: a) vendor loans (similar structure to acquisition buyouts of LBOs), b) the contractor may be willing to participate in entrepreneurial risk, and c) equity for infrastructure.

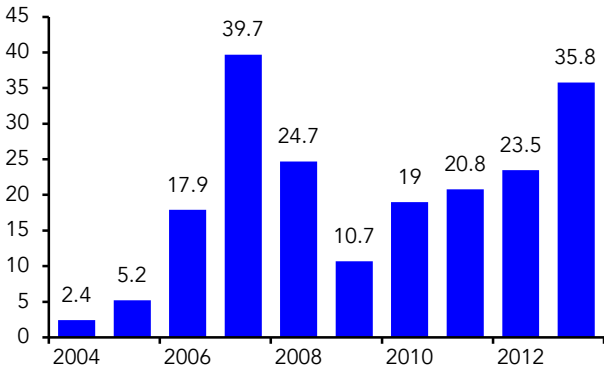
Another avenue for funding is via portfolio investment in debt— Probitas reports that interest in infrastructure debt funds surged in interest in 2013 moving from 12% of fundraising in 2012 to 23% in 2013. Securitization in particular can be an important tool in facilitating funding as it permits the tranching of risk and other attributes, such as duration. The process allows investors with various levels of risk appetite and maturity horizons to select the tranches that fit them best.

THE DEMAND FOR INFRASTRUCTURE INSTRUMENT

Institutional investors, such as pension and insurance funds are prime candidates to provide financing solutions: pension funds in P7 countries alone (see footnote on Chart 5 for list of P7 countries) managed $30.5 trillion by the end of 2013 (Towers Watson). There is considerable demand for infrastructure as an asset class among investors with long-term liabilities such as insurance companies, asset managers or pension plans (Chart 4), or any long-term buy-and-hold investors. Investment decisions in the world of Liability Driven Investing are dominated by the search for long duration assets that match the duration of liabilities; ideally with an inflation hedge— which implies some type of exposure to real assets. Infrastructure assets, with their income-like nature and long duration, fit this description and can help with portfolio diversification since unlisted infrastructure investments have a low correlation with GDP and the market overall. The downside to unlisted infrastructure is illiquidity, but illiquid assets generally pay a liquidity premium and hold the promise of alpha. According to Probitas, 83% of their investor survey respondents expected a return of 12.5% or lower for brownfield funds, 84% expected returns of 12.5% or higher for opportunistic funds while 80% expected returns of less than 10% on debt funds.

Global Infrastructure Fundraising 2004-2013

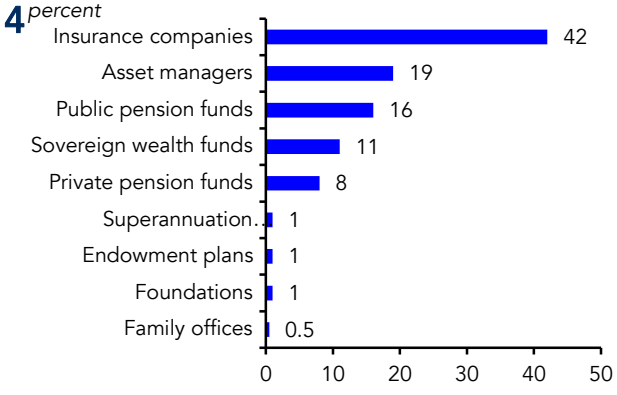
3 *$ billion*



Source: Probitas Partners

Breakdown of Institutional Infrastructure Investor AUM

4 *percent*



Source: Bloomberg, IIF

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Special Feature I: Infrastructure as an Asset Class—Parsing the Problem (cont).

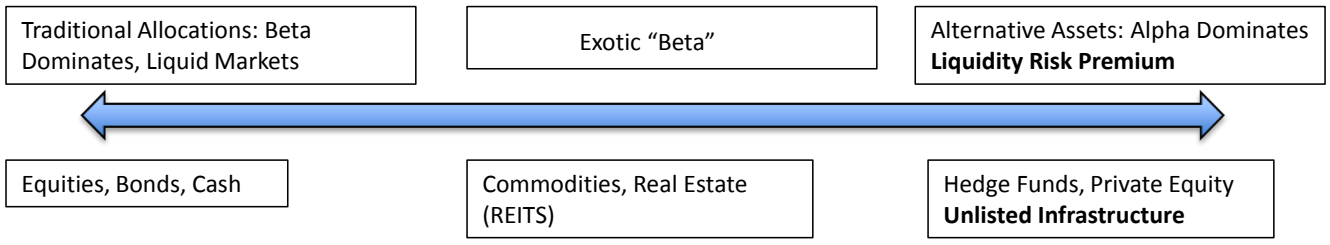
Transparency and standardization will help define the infrastructure asset class.

Retail investors Listed infrastructure investment vehicles, such as ETFs or ETNs, REITS or more recently packaged Master Limited Partnerships (MLPs) —such as the ETRACS Alerian ETF—provide increased liquidity at the price of somewhat higher correlation with the market (moving to the middle in the chart below - to the exotic beta category). However, the correlation with the equity market is less than perfect—and their performance varies considerably (Chart 4). Infrastructure ETFs/ETNs have been gaining ground as an asset class—in the U.S. alone, infrastructure ETFs have gathered over $1.8 billion in assets since Jan 2013. **Infrastructure crowdfunding,** another relatively recent phenomenon, has been gaining traction—on the rationale that in addition to economic benefits, it can provide hard-to-measure social improvements. In the U.S. the website "neighbor.ly" provides retail investors access to specific municipal bonds by yield, category or place, promoting infrastructure investments in the areas where retail investors live. In Europe, another example of crowdfunding financed the construction of pedestrian bridges in Rotterdam.

CONCLUSIONS

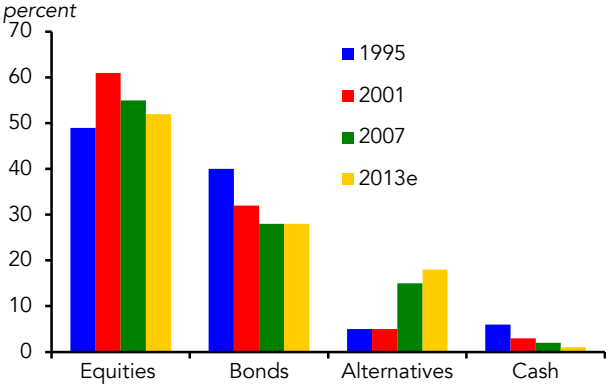
While infrastructure investment faces plenty of challenges and impediments at this point and there are long lists of recommendations how to address them, one need clearly stands out: **the need for standardization**. Standardization will define the asset class, helping to generate a much-needed pipeline of projects and aid in the creation of a secondary market, via project bonds or securitization. Furthermore, standardization will make it easier to organize data into a central database, reduce the cost of analyzing projects, and provide much needed transparency that can establish trust.

Institutional investors—insurance companies and pension funds in particular—have a need for assets that match their long-term liabilities and have plenty of capacity to invest in infrastructure bonds. Their allocations towards alternatives has already been increasing over the past years - despite all existing impediments. It is reasonable to assume that these allocations would increase considerably, if some of the existing impediments were to be addressed.



Aggregate P7 Asset Allocation from 1995 to 2013

5 *percent*

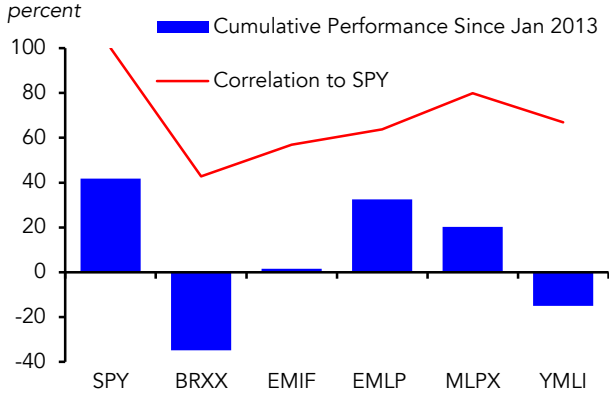


Source: Towers Watson, Global Pension Study 2014

P7=Australia, Canada, Japan, Netherlands, Switzerland, U.K., U.S.

Sample of Infrastructure ETFs vs. S&P 500 ETF (SPY)

6 *percent*



Source: Bloomberg, IIF

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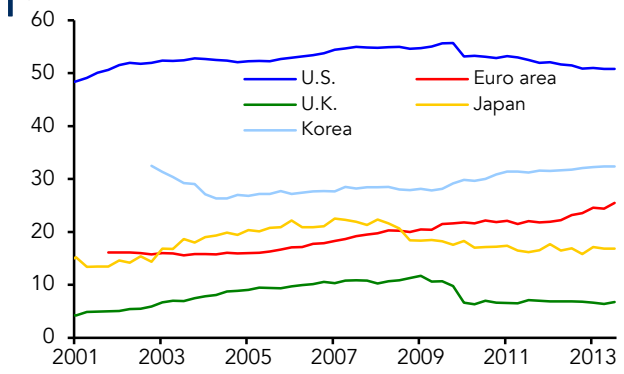
Special Feature II: An Update on Shadow Banking

Assets of non-bank financial intermediaries continue to grow…

Intermediating credit through non-bank intermediaries can have important advantages and contributes to the financing of the real economy. In emerging markets, non-bank financial intermediation broadens access to credit in cases where traditional banking networks often face capacity or regulatory constraints. In advanced markets, various entities have been stepping in to provide long-term credit to the private sector as banks have been lending less. In fact, lending by non-bank financing intermediaries constitute a significant part of total lending in the U.S., and is rising in the Euro Area (Chart 1). These activities also can improve the efficiency of the financial system by deepening market liquidity and risk sharing, for instance by mobilizing illiquid assets via securitization. Yet non-bank financial intermediaries can also become a source of systemic risk, especially when they hold a lot of illiquid assets and perform bank-like functions such as maturity and liquidity transformations and potentially build up excessive leverage. As a result, these institutions are vulnerable to runs by investors. Increasing interconnectedness with the banking system adds to these concerns.

Lending by Non-bank Financing Intermediaries

1 *percent of total bank and non-bank lending*



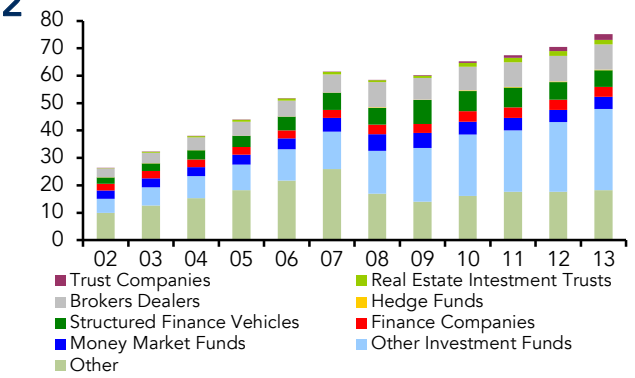
Source: IMF, Haver Analytics, national central banks.

A LOOK AT GLOBAL "SHADOW BANKING"

According to the Financial Stability Board's recent Global Shadow Banking Monitoring Report, non-bank financing intermediaries have grown as a result of stricter bank regulation encouraging non-bank intermediation, banks' balance sheet repair efforts, low interest rate environment, and search for yield. Assets of global non-bank financial intermediaries grew by 7% to $75 trillion in 2013 against a backdrop of roughly stable banking system assets (Chart 2). Assets of non-bank financial intermediaries amount to around 25% of total financial assets or 120% of GDP (close to its peak of 124% in 2007) (Chart 3). The current financial environment with stringent bank regulation combined with ample liquidity supports further growth of these institutions.

Assets of Global* Non-bank Financing Intermediaries

2 *USD trillion*

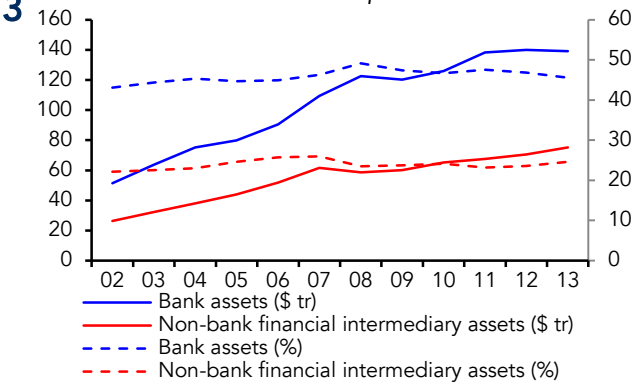


Source: FSB, national financial accounts data, other national sources, IMF. *Argentina, Australia, Brazil, Canada, Chile, China, Hong Kong, Indonesia, India, Japan, Korea, Mexico, Russia, Saudi Arabia, Singapore, Switzerland, Turkey, UK, USA, South Africa, Euro Area.

Developed countries still account for the major share with U.S. and Europe accounting for 80% of global non-bank financial intermediation. Non-bank financial intermediation in emerging markets grew around 10% on average in 2013—much faster than that in developed markets. Although this strong growth has been from a relatively smaller base, it has outstripped EM banking growth. The relative size of the non-bank financial intermediation varies widely across countries, with the Netherlands, UK and Switzerland (760%, 348% and 261% of GDP, respectively) at the higher end of the spectrum, to Russia, Saudi Arabia, Argentina, and Indonesia on the lower end (around 10% of GDP) (Chart 4, next page).

Assets of Global Banks &Non-bank Financing Intermediaries

3 *USD trillion* *percent of financial assets*



Source: FSB, national financial accounts data, other national sources, IMF.

Investment funds (mainly equity, fixed income and mixed funds), broker dealers, and structured finance vehicles are the largest non-bank financial intermediation sub-sectors accounting for 38%, 15%, and 8% of this sector's assets respectively. Trust companies were the fastest growing sub-sector with 42% yoy growth in 2013 (in line with sector's average growth in 2007-12)—albeit from a lower base. Investment funds were the second fastest growing sub-sector with almost 18% yoy growth—much

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Special Feature II: An Update on Shadow Banking (cont.)

...increasing interconnectedness with the banking system adds to systemic risk concerns.

greater than this sub-sector's average growth in 2007-12. Assets of money market funds and broker dealers rose 1-3% only. In contrast, real estate investment trusts and structured finance vehicles and U.S. funding corporations shrank (Chart 5).

SHADOW BANKING AND SYSTEMIC RISK

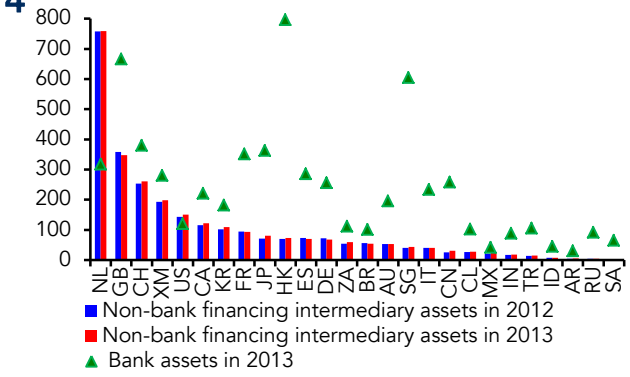
The International Monetary Fund's latest Global Financial Stability Report underlines that increased regulatory burden and compliance costs on banks, decreasing banks' willingness to support certain activities, are shifting these activities to non-banks. Bond funds, mixed funds, and other funds have been growing the fastest in the U.S. and Euro Area. These funds hold increasingly more less-liquid and longer-maturity assets and therefore pose some liquidity and maturity transformation risks as the credit they provide increases (Chart 6). In Japan, broker/dealers have been growing and are relatively more exposed to financing risk and have higher leverage than their U.S. counterparts. In emerging markets, the size and rapid growth of Chinese shadow banking is important to monitor.

The IMF's recent analysis (which treats the financial system as a portfolio consisting of several subsectors and estimates joint probability distribution of portfolio (systemic) losses) concludes that in the U.S., shadow banking accounts for at least a third of total systemic risk, similar to that of banks. This contribution to systemic risk has been growing since the crisis. In the Euro Area and UK, this contribution is much smaller (13% and 7% respectively) relative to risks arising from their banking system. The result that the contribution of shadow banking to systemic risk varies between countries is largely a reflection of the higher importance of non-bank financial intermediation in the U.S. as opposed to largely bank-based Europe.

The challenge for policymakers is to strike a balance between containing potential systemic vulnerabilities related to non-bank financing and preserving the benefits of non-bank financial intermediaries. The recently announced plans in Europe to foster non-bank finance and to complement the new European rules for banks with a Capital Markets Union can be seen in the context of improving the balance between bank and non-bank finance. On a global level, as recognized by the FSB, policy makers will have to better integrate the activities of non-bank financing intermediaries in a macro-prudential framework. To achieve this comprehensive approach, a concrete framework and task sharing among microprudential, macroprudential and business conduct regulators are needed.

Further international policy cooperation is also necessary to prevent cross-border regulatory arbitrage and address risks to global financial stability. Last but not least, data gaps need to be addressed to allow detailed monitoring. To further the understanding and monitoring of different aspects of non-bank financial intermediation all national regulatory authorities should construct sectoral and flow of funds accounts with sufficient details to asses maturity and liquidity risks, as well as interconnectedness.

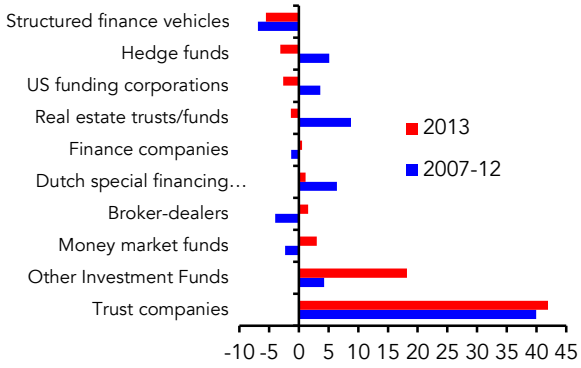
4 Assets of Non-bank Financing Intermediaries and Banks in Selected Countries , *percent of GDP*



Source: FSB, national financial accounts data, other national sources, IMF

5 Growth in Non-bank Financial Intermediation Sub-sectors

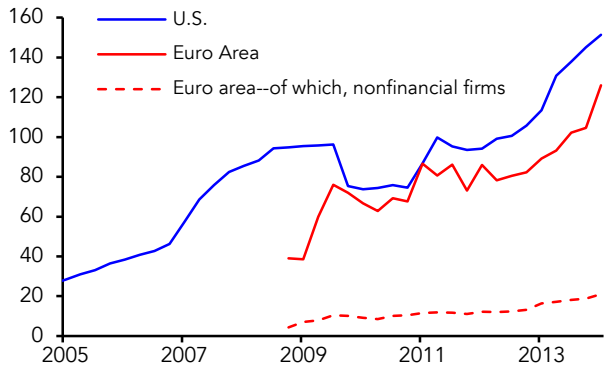
percent, yoy



Source: FSB, national financial accounts data, other national sources, IMF.

6 U.S. and Euro Area: Mutual Fund Loans

$ billion



Source: Fed, ECB.

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Special Feature III: Innovations in Digital Retail Payment Systems

New technologies are ushering in a new era in financial services

Financial services are moving towards a digital future. New technologies, including mobile telephones, sensors, broadband wireless, GPS, Bluetooth, cloud computing, and biometrics, have unlocked the door to new experiences that will usher in a new era for the financial sector. In particular, the landscape of payment systems could be changed significantly. While the digital revolution provides substantial opportunities for banks, it also challenges them to transform their business models to capture those opportunities and respond to new sources of competition from digital players, mobile operators and payment service providers who are all looking to profit from the digitization of finance.

THE CHANGING PAYMENTS ENVIROMENT

With a myriad of companies around the world working to modernize the decades-old system of payments, the industry is witnessing never-before-seen disruptions and opportunities across all regions of the globe. While banks are still the main players in the payments ecosystem—a third of global bank revenues in 2011 were provided through payments according to McKinsey—nonbank entities are making significant strides and are helping to alter the current landscape by offering faster, cheaper and more secure platforms for the exchange of values. Nonbank companies actively pursuing new technologies that facilitate new digital forms of payment include large tech leaders, such as Google and Apple, telecommunication operators such as Vodafone, as well as startups such as Coinbase and Ripple Labs. Many of these companies are in a competitive position vis-à-vis banks to innovate quickly and introduce new technologies as they benefit from key advantages ranging from greater organizational flexibility, specialization, and risk tolerance, as well as fewer regulatory constraints and legacy costs.

Apple, for instance, is in a very unique position to impact the way payments evolve thanks to its advantageous role as a device manufacturer, operating system provider, and its retailing presence online. The corporation's recent launch into the payments space with Apple Pay will likely help accelerate the widespread adoption of mobile payments in the U.S., thanks to the company's extensive economic and cultural influence as well as the biometric authentication and tokenization security features associated with the technology.

Apple Pay relies on partnerships with the three biggest credit card networks, Visa, MasterCard, and American Express—who collectively handled nearly $4 trillion in payments in the U.S. alone last year—to process payments. Banks including Bank of America, Barclays, Capital One, Citigroup, JPMorgan Chase, and Wells Fargo are also part of the Apple Pay service. As a whole this represents 83 percent of the entire country's payment volume. Furthermore, many well-known companies in the United States, including Chevron, Disney, Macy's, McDonald's, Subway, Walgreens, and Whole Foods, have begun accepting the new payment platform and Apple is already planning to expand globally in the near future.

A major hurdle for Apple Pay will be competition from other promising U.S. mobile payment methods, including CurrentC, which is backed by Wal-Mart, the world's largest retailer, and companies such as Best Buy, 7-Eleven, Shell, and Southwest Airlines. CurrentC is expected to roll out across the country in 2015 and it may present merchants with a stronger financial incentive to join as vendors would avoid having to pay interchange fees to banks when their customers pay via the new app. In contrast to Apple Pay, CurrentC is not linked to any credit card; instead consumers can either add money to the app or authorize the app to tap checking or savings accounts directly when a transaction is made. Vendors would then be able to pass on those savings to customers who embrace the system. Another advantage for CurrentC is that its app would operate across various types of mobiles, not just the iPhone.

BITCOIN

Virtual currencies are also playing a transformative role in the digital payments system. Bitcoin, a decentralized cryptocurrency created in open-source software in 2009, is the most well-known. Over the years it has proved to be extremely volatile and has faced security and regulation setbacks and obstacles; nevertheless, it remains resilient thanks mainly to its ability to transfer value in a transparent, inexpensive, and reliable way.

One of the most innovative technologies underlying bitcoin, and other cryptocurrencies, is the distributed ledger system which removes the need for a third party such as a central clearing house or financial establishment to act as an intermediary during a financial transaction. This new technology could have significant ramifications for incumbent companies in the payments space, including those involved in money transfer and credit card transactions, and the larger financial system as a whole.

An estimated 60,000 companies worldwide have begun accepting bitcoin as payment including the computer giant Dell, with annual revenue approaching $57 billion; Expedia, one of the world's largest online travel companies (initially for hotel bookings only); and online retailer, Overstock.com. Coinbase, a company providing digital wallets that allow individuals to buy, use and accept bitcoin currency, and other similar startups, are working to capitalize on bitcoin by bringing the cryptocurrency into the mainstream.

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Special Feature III: Innovations in Digital Retail Payment Systems (cont.)

Non-traditional players are striving to address structural issues associated with inefficient payment networks

RIPPLE

Another potentially transformative payments innovation that also uses a distributed ledger model is Ripple. Created by financial technology (fintech) startup Ripple Labs, Ripple, which supports the exchange of any form of value, is an open-source global payments protocol that facilitates the secure transfer of funds in real time and at nearly no cost.

Users move their funds into the Ripple network through "gateways," a bridge between the system and the external world. Gateways include businesses such as banks and virtual currency exchanges. In addition to allowing people to trade in and out of Ripple, gateways are the regulatory point of the system—regulators can enforce various supervisory measures such as know-your-client (KYC) and anti-money laundering (AML) procedures.

According to Ripple Labs, there are 500 billion digital payments made annually that take 36 trillion hours to process and that costs people tens of billions of dollars in fees. Ripple was created to address the structural issues associated with the slow, inefficient, antiquated, and disconnected payment networks that currently exist by being more open and integrated. The company's CEO, Chris Larsen, has described it as "an HTTP for money…any user can use the protocol just like they would HTTP. You can build on top of it without licensing it from anybody." Indeed, Ripple strives to do for money what the Internet did for information.

While several banks, including Germany's Fidor and U.S.-based CBW and Cross River Banks, have embraced the Ripple platform, the banking sector as a whole has thus far hesitated to venture into this experimental space of fintech. The protocol does, however, have the potential to significantly alter payments in the years ahead.

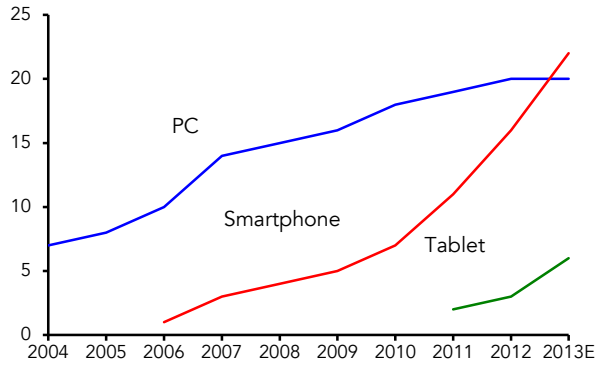
A MOBILE FUTURE

As touched upon above, a major area of change for payments going forward will be advances in mobile technology. The growing ubiquity of smartphones is facilitating a variety of mobile payment methods. Approximately one in five people in the world carry a smartphone according to estimates provided by a December 2013 study by Business Insider (Chart 1). That figure rises to roughly one in three people in developed economies and to more than 50% in the U.S., where 33% of American consumers make payments with their phones according to an August 2014 report by McKinsey.

Unfortunately for banks, many of these payments are performed on mobile apps controlled by e-commerce companies and online payments specialists. Indeed, the meteoric rise of smartphones is producing opportunities and disruptions across the board as businesses such as PayPal, which handled $180 billion in payments last year and has more than 152 million active registered accounts in 203 markets, can disintermediate traditional financial incumbents in the nascent mobile payments space. The company's app provides some convenient new options for consumers to purchase products and services on the go. Recently introduced 'One Touch' enables consumers to purchase goods with their smartphones online seamlessly with the touch of a button, removing the friction of having to type in credit card information, shipping addresses, usernames and/or passwords each time they pay. Additionally, with PayPal Beacon, an in-store sensor that allows consumers to automatically connect with merchants through mobile gadgets using Bluetooth Low Energy technology, customers can make their purchas-

1 Global Device Penetration Per Capita

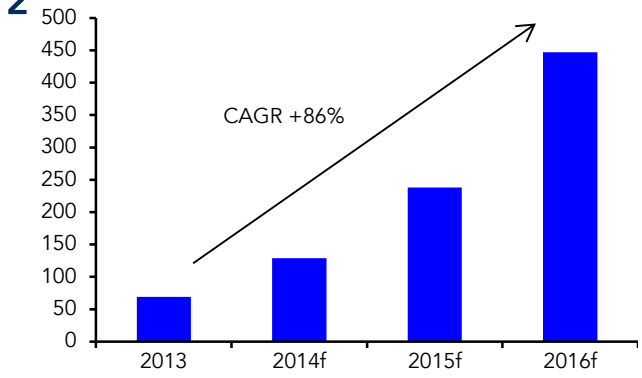
installed bases of devices as a percent of global population



Source: Business Insider, Gartner, IDC, Strategy Analytics, company filings, World Bank.

2 Global Mobile Payments Volume Forecasts

$ billion



Source: Citi.

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Special Feature III: Innovations in Digital Retail Payment Systems (cont.)

Mobile innovations are helping whole regions and populations connect to the formal economy

es in a safe and secure manner, completely hands-free, simply by informing the merchant that they are paying with PayPal. The vendor does the rest and the shopper receives an electronic receipt. The transaction eliminates the need for cash, cards, signatures, and even taps over a terminal. According to the company's website, the service is expected to launch early next year.

Another company having tremendous success with a popular and practical mobile payments system is Starbucks. The Starbucks app allows users to pay for items with their mobiles, accrue reward points, or "Stars," tip digitally, view transaction history, and send and receive electronic gift cards, among other things. Company CEO, Howard D. Schultz, told investors in July that mobile payments represented approximately 15% of its sales transactions in the country. The CEO has also expressed the prospect of leveraging its leadership position in the mobile-payment technology sector outside of the company's own family of stores.

These aforementioned mobile payment features help simplify transactions by removing steps that add time without increasing value, enhancing the overall experience for both the consumer and the merchant.

MOBILES AND FINANCIAL INCLUSION IN EMERGING MARKETS

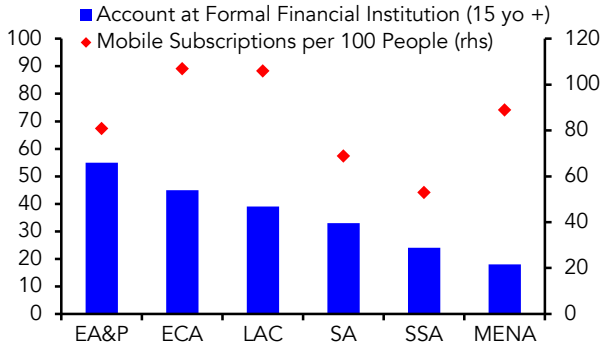
Led by increasing payment convenience and unmet banking needs, global mobile payment volumes are projected to reach $447 billion by 2016, expanding at a compound annual growth rate of 86% between 2013 and 2016 according to analysis conducted by Citi's Mobile Analytics Team (Chart 2, previous page). In emerging economies—where there is relatively high mobile penetration but only around 40% of the adult population has a bank account (Chart 3) according to World Bank estimates—mobile innovations are helping whole regions and populations connect to the formal economy.

Vodafone's M-Pesa, a mobile phone-based money transfer service launched in 2007 in Kenya, enables millions of individuals who have access to a basic mobile phone, but have limited or no access to a bank account, to send and receive money from family and friends, pay bills, and purchase goods and services such as taxi rides and vegetables. Transactions are completed in real time and both parties receive an SMS confirming the details of the transfer. Individuals can add or withdraw cash from their phones by visiting one of the thousands of agents operating throughout the country, many on roadside shops in remote areas.

M-Pesa has had significant success over the years, expanding to Tanzania, Fiji, South Africa, India and Romania, among other countries. In Kenya, 43% of GDP now flows through M-Pesa, according to Safaricom, Vodafone's mobile network operator in the African country. The success of M-Pesa and

3 Financial Inclusion and Mobile Subscriptions in EM, 2011

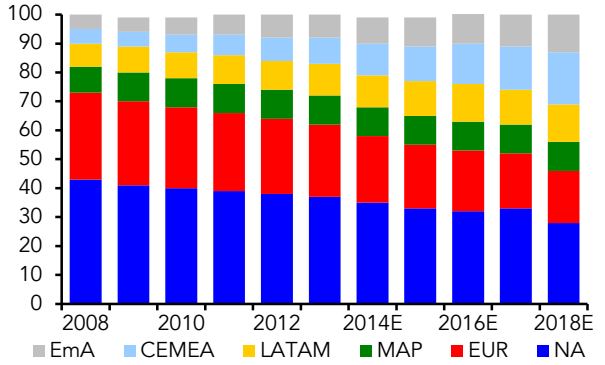
% people with account at formal financial institution / *mobile subscription per 100*



Source: World Bank, Business Insider. EA&P=East Asia & Pacific, ECA=Europe & Central Asia, LAC=Latin America & the Caribbean; SA=South Asia; SSA=Sub-Saharan Africa, MENA=Middle East & North Africa

4 Global Share of Non-Cash Transactions by Region

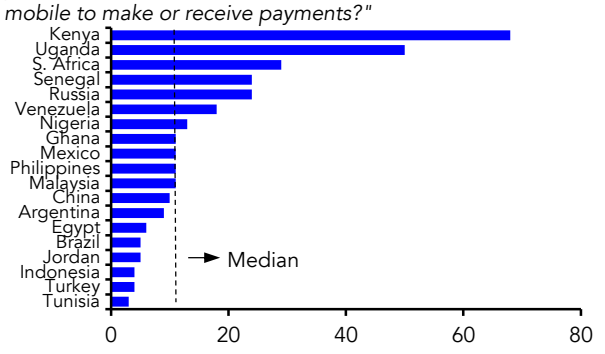
*share of transactions**



Source: Capgemini, Business Insider. *does not always sum to 100 due to rounding. *EmA=EM Asia; CEMEA=Central Europe, Middle East, Africa; LATAM=Latin America; MAP=Mature Asia Pacific; EUR=Europe; NA=North America

5 Mobile Phone Owners who use their Devices for Payments in Emerging Markets - 2013 Survey

percent who answered "Yes" to "Do you regulary use your mobile to make or receive payments?"



Source: Pew Global, Business Insider.

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Special Feature III: Innovations in Digital Retail Payment Systems (cont.)

The digital revolution currently underway is a threat as well as an opportunity to the banking industry

services like it are contributing to greater financial inclusion in emerging markets and to the emerging world's growing share of global non-cash payments (Chart 4 and Chart 5).

IMPACT ON BANKS: RISKS AND OPPORTUNITIES

Many bankers are well aware that the digital revolution currently underway is a threat as well as an opportunity for their sector. A recent report by Accenture estimates that competition from digital players could erode as much as one-third of traditional retail bank revenues by 2020, while a McKinsey report suggests that European banks can eliminate up to a quarter of their cost base by leveraging digitization to change how they operate. These two figures illustrate both the risk and the opportunity facing banks and just how important it is for them to adapt to the changing landscape. Banks unwilling or unable to effectively adapt and develop a holistic business model will likely face the risk of persistent low growth and declining profits resulting from the inability to repel disintermediation threats and compete at a high level with incumbents and new entrants.

With many new competitors in the payments space, a major concern for banks is that they are losing some of the valuable transactional data that is obtained when handling consumer purchases directly. Losing access to this valuable data could limit a bank's ability to customize financial products and services to the specific needs of its customers. On the other hand, banks still have the opportunity, and, increasingly, the incentive, to leverage their vast digital client data and build increasingly innovative, integrated and robust tools across multiple channels in order to provide various tailored offers and services seamlessly to their clients. Capitalizing on this opportunity could potentially multiply payments-related revenue considerably. And with more than $1 trillion in payments-related revenue growth anticipated over the next decade according to The Boston Consulting Group, this is a large opportunity indeed.

FINTECH AND COLLABORATION

Accenture reports that worldwide investment in fintech ventures has grown from $930 million in 2008 to more than $2.97 billion in 2013, an increase of more than 200%, and forecasts that by 2018 it will reach between $6 billion to $8 billion. With such rapid growth in fintech investment and the increasingly significant impact of technological advancements on financial services, many banks are proactively seeking ways to stay ahead of the curve. Many have created in-house venture-capital divisions with hundreds of millions of dollars earmarked for investment in financial technology.

Going forward, a growing number of alliances between big banks and smaller fintech firms will likely emerge so as to help facilitate innovation. By partnering with inventive startups, banks can bolster their competitive position and reduce the time required to develop and launch original products, while startups can capitalize on banks' deep pockets, large base of clients, substantial information on customer behavior, and robust infrastructure. Two initiatives aiming to cultivate a collaborative environment between banks and startups include Innovate Finance, a UK industry body, and FinTech Innovation Lab, an elite mentoring program in New York City.

REGULATION

While regulatory and industry initiatives related to emerging payment systems have developed around the globe, the rapid speed at which innovations are evolving raises various challenges and questions of potential gaps in regulation. To avoid these gaps and to ensure a level playing field in the increasingly crowded space, it is vital that regulators provide (and update as needed) comprehensive yet clear regulatory frameworks.

Most of the regulation and industry initiatives around the world related to the oversight of emerging payment systems aim to ameliorate security and transparency, improve fraud prevention, enhance transactional convenience, and, in particular, foster competition and innovation. According to a 2012 report by the Committee on Payments and Market Infrastructures, many countries around the world have been loosening entry barriers and opening the payments market up to nonbank companies so as to encourage efficiency and cost-reduction through greater competition and innovation.

Going forward, one of the major challenges resulting from the speed at which new payment system technologies appear will be determining the appropriate level and timing of regulation for a particular innovation—too soon and heavy-handed and innovation may suffer, too late and weak and large risks may form in the payments market. Furthermore, as innovation accelerates and new payment systems become more complex, interconnected, and prevalent, the need for stronger regulatory cooperation at both the national and international level will increase.