

SPECIAL REPORT

CLIMATE CHANGE

Business Can Pay Now—Or Pay More Later (p. 12)



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Combat Climate Change**

**China's Carbon Market May
Affect Corporate Credit Quality**

**Carbon Constraints Cast A
Shadow Over Coal's Future**

**Climate Change Could Sting
Unaware Reinsurers**

MID-MARKET EVALUATION

A PURPOSE-BUILT BENCHMARK OF CREDITWORTHINESS

The European mid-market funding environment has reached a crucial juncture.

Mid-market companies are increasingly seeking to diversify their funding sources. Yet progress on linking them with willing capital has been slow. While investors and intermediaries have shown great interest, they have, to-date, struggled to understand and benchmark the relative credit risk of different mid-market companies.

We believe the answer lies with increased transparency.

As such, we have launched Mid-Market Evaluation, an independent assessment of mid-sized companies' creditworthiness. Mid-Market Evaluation is intended to help investors and intermediaries better navigate this complex and opaque market. Ultimately, it may also help to facilitate companies' access to alternative sources of funding.

Mid-Market Evaluation is currently available in a limited number of countries.

To learn more, contact us at midmarket@standardandpoors.com or visit www.standardandpoors.com/midmarket



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SPECIAL REPORT

12 For The U.S. Economy, Climate Change Is A Case Of Pay Now—Or Pay More Later

By Beth Ann Bovino, U.S. Chief Economist, New York

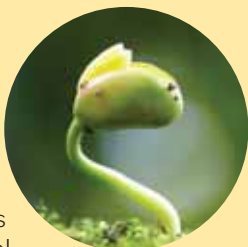
The scientific consensus on global climate change is now essentially unanimous: It's clearly occurring, and humans are producing increasingly large quantities of the greenhouse gases that contribute to global warming. Less clear, however, are the potential economic consequences, regardless of whether we try to mitigate or reverse what has already happened, or simply deal with the results down the road.



18 New U.S. Environmental Rule To Combat Climate Change By Reducing Carbon Emissions

By Michael T. Ferguson, CFA, CPA, New York

The U.S. Environmental Protection Agency's (EPA) much anticipated Clean Power Plan is the most ambitious federal environmental effort in decades, and not surprisingly, the effects on several key energy-related industries could be pronounced. But the plan contains nuances that could affect how federal and state governments implement it.



39 Climate Change Could Sting Reinsurers That Underestimate Its Impact

By Miroslav Petkov, London

There is no scientific consensus on how much climate change may have contributed to extreme weather in recent years. However, the reinsurance industry recognizes that climate change is likely to have a significant impact on future weather events. Many reinsurers actively follow and sponsor scientific research into the topic. They also rely on their ability to adjust premiums in the future for any gradual increase in weather-related claims over time.

27 How China's Transition To The World's Largest Carbon Market Could Affect Corporate Creditworthiness

By Michael Wilkins, London

As China's economy has developed rapidly, its energy consumption has increased in kind—and so have its carbon emissions. As the world's largest carbon emitter, China has contributed more than 20% of the world's total CO2 emissions annually since 2005. However, China has begun to shift its focus from boosting GDP growth to adjusting its economic structure, improving environmental protections, and elevating social welfare.

42 Working With Governments To Increase Disaster Resilience Can Open New Doors For Reinsurers

By Dennis P. Sugrue, London

The rising tide of losses in the wake of natural catastrophes is increasing economic instability in many developing economies. Reinsurers can play a role in building governments' resilience to the financial shocks associated with natural catastrophes. In some cases, extreme events in large developed and developing markets could not only



derail the growth of that economy, but could also cause a ripple effect, affecting the global economy.

33 Carbon Constraints Cast A Shadow Over The Future Of The Coal Industry

By Elad Jelasko, CPA, London

Despite being the most polluting source of power generation, accounting for 41% of global carbon emissions, coal remains a cornerstone of the global economy, delivering 30% of energy and 40% of power generation worldwide. However, as governments globally seek to reduce their CO2 emissions, it looks increasingly likely that the pace of coal demand is likely to slow and "King Coal" will lose its crown.

48 Europe Makes Strides Toward A Low-Carbon Economy With 2030 Targets

By Frank Watson, London

Europe's ongoing progress toward a low-carbon economy shifted into a higher gear this year after the European Commission in January unveiled a draft EU 2030 climate and energy framework. The EC proposed a binding, 40% minimum target cut in EU greenhouse gas emissions from 1990 levels by 2030, which is fully in line with its objective for 2050. The goal for 2050 is to reduce emissions by at least 80% from 1990 levels.

52 S&P Indices Track Bonds In The Growing Green Power Market

By J. Kochetygova, S&P Dow Jones Indices, Moscow

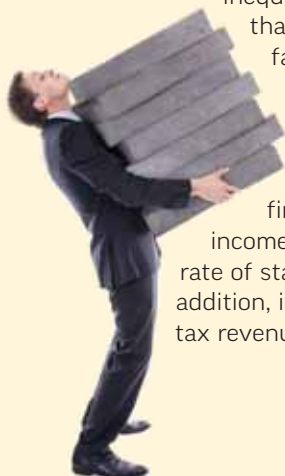
As of mid-year 2014, there were about \$36 billion in green bonds globally. Issuers used them principally to finance solar, hydro, and wind power projects. With renewable energy gaining prominence and generating an increasing share of power globally, S&P Dow Jones Indices has introduced its first indices for fixed-income instruments tied to renewable energy and sustainability: the S&P Green Bond Index and the S&P Green Project Bond Index.

FEATURES

60 Income Inequality Weighs On State Tax Revenues

By Gabriel J. Petek, CFA, San Francisco

Standard & Poor's recently examined income inequality in the U.S. and concluded that rising income inequality is one factor contributing to slower economic growth, and that this represents a structural, rather than a cyclical change. Extending our analysis to public finance, we find that increasing income inequality is undermining the rate of state tax revenue growth. In addition, it is contributing to volatility in tax revenue collections.



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SEMINARS

Topic	Date	Location
Accounting Hot Topics Conference 2014	Sept. 30, 2014	New York
EMEA Automotive Seminar	Sept. 30, 2014	Frankfurt
Request for Comment: Covered Bonds (Presentation in German)	Sept. 30, 2014	Zurich

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Topic	Date	Location
Developing a Corporate Credit Rationale	Sept. 25-26, 2014	São Paulo
U.K. Insurance Seminar	Oct. 2, 2014	London

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The European Central Bank's New Stimulus Measures Come A Step Closer To Full QE

The European Central Bank's (ECB) latest measures to fight deflationary pressures and restore growth to credit markets had an immediate effect on the market, said Standard & Poor's economists on Sept. 12, in their weekly European monetary and financial roundup: *"European Weekly Monetary And Financial Roundup: The ECB Is One Step Closer To Full Quantitative Easing."*

The ECB announced on Sept. 4, that it was cutting all its key interest rates by 10 basis points (bps), taking the deposit rate to -0.2%, the refinancing rate to 0.05%, and the marginal lending rate to 0.3%. It also announced an asset-backed securities and covered bond purchase program (ABSPP and CBPP3) to be launched in October before the results of the ECB's Asset Quality Review of the Eurozone banking system.

"We believe this announcement reflects an important change in the ECB's view on inflation expectations," said Standard & Poor's economist Sophie Tahiri. "Until recently it had maintained its view that inflation expectations remained well anchored."

Immediately following the ECB's announcement, inflation expectations increased to above 2%. The five-year/five-year swap rate (a common measure of medium-term inflation expectations) rose 9 bps to 2.05% on Sept. 4. Two-year note yields dropped below zero in France, while the yield on 10-year sovereign bonds from all eurozone countries, and in particular periphery economies, dropped to record lows. The euro weakened to a 14-month low—below 1.30 to the dollar for the first time since July 2013.

Meanwhile, ABSPP and CBPP3 programs also aim to complement the ECB's commitment to manage its balance sheet much more proactively, the report says. By buying asset-backed securities and covered bonds, the ECB wants to help banks clean up their balance sheets and put them in a better position to deploy more cash for lending, especially to small businesses. The market will only be able to fully estimate the potential size and effectiveness of the new purchasing programs once the details are published next month.

"We believe that the ECB's



...this announcement reflects an important change in the ECB's view on inflation expectations...

recent decisions increase the probability that it will eventually launch a fully fledged quantitative easing program of private sector bond purchases to obtain a meaningful and relatively swift impact on its balance sheet," said Ms. Tahiri. "We believe the vulnerability of the recovery in the eurozone, the elevated risks of a triple dip, and the threat of negative inflation would justify the recourse to additional non-conventional measures."

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China's Growth Targeting And Surging Debt Are Leading To Uneasiness On Financial Stability

China's rigid use of GDP growth targets coupled with incentives that encourage over-performance have led to a potentially dangerous weakening of financial stability, said Standard & Poor's in a report published Sept. 16, titled "Are China's GDP Growth Targets Bad For Financial Stability?"

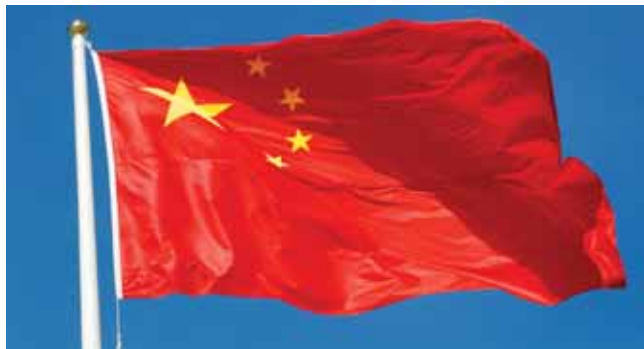
A prime example of worsening financial metrics is China's ratio of bank credit to GDP, which has ballooned to 128% at year-end 2013 from 96% at year-end 2008. Moreover, Standard & Poor's estimates total financial sector credit at about 200% of GDP.

"These GDP growth targets in China appear to be asymmetric," said Paul Gruenwald, Standard & Poor's chief economist, Asia-Pacific. "While underperforming the GDP growth target seems to carry high costs to the authorities, over-performance does not bear the same stigma. Indeed, the Chinese government has incentives at many levels to exceed the official target in the form of compensation and promotion schemes that are based on GDP growth rates."

The risk stemming from China's GDP growth target relates to how the growth is generated—credit creation.

"This rise in debt has moved China to a position where the fragility of its financial sector is seen as the biggest macro risk to the country, if not the global economy," Mr. Gruenwald said.

In our opinion, the continued prominence of GDP growth rates in China is reminiscent of the old central planning days, when everyone had a target to meet.



The views on GDP growth targets in China are already starting to change. "The *Financial Times* recently reported that a number of localities in China have dropped GDP growth as a performance metric. The justification is slightly

different from ours in that it focuses on environmental issues stemming from overly high GDP growth, but the over-reliance on growth as a metric and the unwanted spillovers it creates is very much akin to our view," Mr. Gruenwald said.

Until the government takes some bold steps to move away from rigid and asymmetric growth targets, China's financial stability will continue to be at risk.

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Report Answers Questions On Challenges For The Next Brazilian President

The Brazilian economy has become significantly more stable since a time of turbulence in the late 1980s and the financial market crises in 1999 and 2002. Social indicators have improved as poverty and inequality declined and Brazil's middle class expanded. All of these factors have contributed to sounder sovereign creditworthiness over the past decade and underpin Standard & Poor's Ratings Services' investment-grade sovereign ratings on Brazil. But after national elections in October, the next president will likely face many challenges, Standard & Poor's said in a report published Sept. 15, titled "Credit FAQ: What Challenges Will The

Next Brazilian President Likely Face?"

Robust growth has proven elusive since the 2010 recovery from the 2008-2009 global recession. Among the various challenges facing the next president, raising the rate of real GDP growth and boosting prosperity and standards of living are front and center. The global backdrop is one with more discriminating investors, as monetary conditions in the U.S. normalize and China's growth moves to a moderate pace. In our view, bolstering Brazil's growth would entail strengthening macroeconomic policy; a proactive agenda that addresses long-standing challenges to growth, in particular low investment levels;

and building consensus across party lines to enact these changes.

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Defense Contractors Likely Won't Benefit From Expanded U.S. Efforts To Defeat ISIS, At Least For Now

The U.S.' recent announcement of increased military efforts to defeat ISIS (the Islamic State of Iraq and Syria) likely won't result in a spike in demand for defense contractors during the next six to 12 months, said Standard & Poor's in a published report, titled "Defense Contractors Are Unlikely To Benefit From Expanded U.S. Efforts To Defeat ISIS, At Least For Now."

However, these actions, along with other geopolitical crises (such as that in Ukraine), will likely influence the debate about future defense spending levels—and could effectively raise the floor for U.S. defense budgets in fiscal 2016 (ending Sept.

30) and beyond. Overall, the credit impact for most defense contractors will likely be minimal in the near term, but it could be slightly positive over the next two to three years.

The operations' costs will likely be paid out of current defense funds, or they could be added to the \$59 billion fiscal 2015 supplemental appropriation for Afghanistan that Congress is debating. A higher level of airstrikes in Iraq and Syria will not increase demand for missiles and bombs produced by armament manufacturers such as Raytheon Co. In our opinion, the U.S. military has large stockpiles of these weapons and the number it will use probably won't be

high enough to deplete them unless the conflict lasts many years. Support for coalition partners would likely include relatively small-ticket items, such as light weapons, ammunition, and vehicles, which the U.S. military would also likely draw from existing stockpiles to get them to the region quickly.

"Overall, we don't believe the rise in U.S. military activity in the Middle East will have a significant near-term impact on the revenues and earnings of most U.S. defense contractors," said Standard & Poor's credit analyst Christopher Denicolo. "However, this and other geopolitical crises could result in increased defense spending in the years to come,

supporting somewhat better credit quality for U.S. defense contractors."

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Big Pharma Consolidation Is Unlikely, Although M&A Deals May Continue

Large pharmaceutical firms' renewed appetite for mergers and acquisitions (M&A) has created a stir among investors. But in an article published Sept. 16, "Recent Big Pharma M&A Deals Don't Mean A New Wave Of Consolidation," Standard & Poor's said that it doesn't think the market will see the same level of consolidation that led to today's "Big Pharma" companies.

"In our view, most of the transactions and bids over the past 12 months have different motives from during the 1990s, when becoming bigger was largely a way to fight the competition," said



credit analyst Olaf Toelke.

Instead, we think most of the current M&A activity reflects different ongoing management strategies. For some companies, particularly in the U.S., cross-border transactions help reduce the tax burden and allow them to use

cash at overseas operations. Other deals are the result of strategic repositioning or portfolio management, and are more akin to asset swaps than a typical growth-focused acquisition. We see some exceptions among producers of generic drugs, where the dynamics differ from those in the innovative pharma market. For generic players, absolute size and global reach are relatively more important because of the intensely competitive nature of that market.

"We expect to see Big Pharma companies undertaking more M&A transactions over the next few

years, but not to an extent that would weigh on credit quality," Mr. Toelke added.

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Venezuela Long-Term Ratings Lowered To 'CCC+' On Sustained Economic Deterioration

The downgrade is based on continued economic deterioration, including rising inflation and falling external liquidity, and the declining likelihood that the government will implement timely corrective steps to staunch it. We assign 'CCC+' ratings in instances where we assess that issuers face at least a one-in-two likelihood of default over the next two years. The rating reflects Venezuela's higher vulnerability to nonpayment and its growing dependence upon favorable oil prices to meet its financial commitments. Lowering the local currency rating reflects rising inflation and the government's growing dependence upon shares of local currency debt instruments, which now account for 65% of total government debt.

We expect Venezuela's GDP to decrease by as much as 3.5% in 2014, and another decline might follow in 2015. Inflation could rise up to 65% by year-end, and we don't expect it to decline over the next two to three years, reflecting the inflexibility of Venezuela's monetary policy. Oil prices remain relatively high despite recent declines. Nevertheless, the government's decision to sustain a high level of public spending (including the central government and PDVSA's [Petróleos de Venezuela S.A.] non-oil related expenditure) without addressing growing economic imbalances is leading to a decline in its external liquidity. The economy continues to suffer from a contraction in activity, high inflation, and increasing scarcities, largely resulting from stringent import restrictions.

International reserves fell



significantly throughout 2013 to now reach \$20.8 billion, of which we estimate only \$2.5 billion is liquid. Other external assets held in several government special funds (FONDEN [Fondo de Desarrollo Nacional] and BANDES [Banco de Desarrollo Económico y Social]) have also fallen. While solid oil revenue (estimated at \$82 billion for 2014) will continue to provide dollar inflows, the government could come under greater strain to service its rising level of external debt maturities. The government faces a debt payment for \$1.5 billion in October 2014 and another significant maturity for \$1.3 billion in March 2015. In addition, PDVSA faces a maturity for as much as \$3 billion in October 2014.

Venezuela's main external indicators reflect this deterioration and will remain vulnerable to a further decline in oil prices. We expect gross external financing needs to increase in 2014 to 96% of current account receipts plus usable reserves from 91% as of year-end 2013. We anticipate this deterioration will gradually continue thereafter. Likewise, narrow net external debt also

continues to increase, and we expect it to reach close to 82% of current account receipts at year-end 2014.

The government plans to get financing over the near term from a variety of sources, including a new loan from China for up to \$4 billion. Although the loan would be earmarked for infrastructure development projects in the oil sector, part of the proceeds could be used in a situation of financial stress to repay debt. In addition, the government may seek cross-border bond funding. Finally, both the central government and PDVSA could undertake a liability management operation aimed at reprofiling external maturities due over the next three to four years. If and when there is a proposal to exchange external debt obligations, we will analyze the terms of the exchange and determine whether it should be considered a distressed debt exchange according to our rating methodology.

The Venezuelan government has not been able to introduce corrective measures to stabilize the economy, despite a recent reduction in political tension and

fall in political violence since the beginning of this year. President Nicolas Maduro has strengthened his leadership within the Chavista movement, winning the presidency of his party in internal elections in July. However, successive changes in the economic team over the past two years continue to postpone adjustments in economic policies that would be needed to alleviate shortages, boost economic activity, and strengthen public finances. Such policies include steps to centralize the management of external liquid assets, reduce the divergence between the country's three exchange rates (and the unofficial exchange rate), provide more foreign exchange to liberalize imports, and increase the highly subsidized prices for gasoline and electricity. A greater level of opaqueness in the direction of economic policy, which includes growing delays in the publication of statistical information, exacerbates the failure to implement corrective measures.

As in the past, the government could devalue the official exchange rate to improve fiscal prospects throughout the next 12 months. This will likely happen as the government shifts some foreign exchange operations from 6.3 bolívars per dollar toward the more depreciated exchange rates prevailing in Venezuela (for example, the 11 bolívars of SICAD I [Sistema Complementario de Administración de Divisas] or the about 50 bolívars of SICAD II). Such steps could provide relief to the government's fiscal accounts in the short term by increasing the local currency value of dollar-denominated oil revenues. We expect the general government deficit to remain between 3% and 5% of GDP over the next two years. Venezuela's

net general government debt remains at a relatively low 24% of GDP estimated for 2014. High inflation will continue to erode the real value of the debt denominated in local currency over the next two years.

Expanding oil production over the next few years, taking advantage of Venezuela's large oil reserves, is key to addressing the country's spending needs and deep-seated economic problems. Higher oil output depends in large part on continued access to external funding. Hence, the government has a strong incentive to service external debt payments even if stress in the domestic economy increases. The government has continued to give priority to external debt servicing despite growing arrears to other creditors and recent growing shortages of foreign exchange for importers.

We expect political polarization, erratic economic policymaking that exacerbates both the economy's oil dependence and the prevailing macroeconomic inconsistencies, and weakening external liquidity to remain the main constraints to the ratings on Venezuela.

Growing restrictions on external liquidity as a result of PDVSA's marginally decreasing oil production and a more uncertain outlook for oil prices will continue to limit Venezuela's ability to deal with growing domestic political and economic challenges. The country's vast oil and gas reserves, the government's relatively low debt burden, and its low level of external debt continue to support the rating.

The negative outlook reflects the possibility that growing economic distortions, lower external assets, and sustained political polarization could increase the risks of a government debt default over the next two years.

Our outlook also reflects the risk that, even if the government attempts to take adjustment measures (such as a devaluation or fiscal adjustment), it may not be able to implement them effectively because of the difficult political environment. This is a result of still-strong political opposition as well as disagreements within the government coalition. We could lower the rating by one notch under such a scenario.

Steps to defuse the heightened political tensions in Venezuela would reduce the risks of eroding governability and greater volatility in economic policies. That, along with a growing track record of pragmatic economic policies aimed at containing economic imbalances and strengthening exter-

nal liquidity, could lead us to revise the outlook to stable.

In accordance with our relevant policies and procedures, the Rating Committee was composed of analysts who are qualified to vote in the Committee, with sufficient experience to convey the appropriate level of knowledge and understanding of the methodology applicable (see "Related Criteria And Research"). At the onset of the Committee, the chair confirmed that the information provided to the Rating Committee by the primary analyst had been distributed in a timely manner and was sufficient for Committee members to make an informed decision.

After the primary analyst gave opening remarks and

explained the recommendation, the Committee discussed key rating factors and critical issues in accordance with the relevant criteria. Qualitative and quantitative risk factors were considered and discussed, looking at track-record and forecasts. The chair ensured every voting member was given the opportunity to articulate his/her opinion. The chair or designee reviewed the draft report to ensure consistency with the Committee decision. The views and the decision of the Rating Committee are summarized in the rationale and outlook.

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Challenging Times Test The Resilience Of Sterling Money Market Funds

Money market funds have not been far from the spotlight since the U.S.-based Reserve Primary Fund "broke the buck" in September 2008, after the Lehman Brothers' default. On the European side, euro-denominated money market funds (EMMFs) gained significant attention in 2011 when U.S. investors abandoned them on eurozone concerns, drying up funding for EU banks and triggering significant outflows. Three years on, EMMFs are now battling against historically low investment yields, partly driven by the European Central Bank's decision to lower the deposit facility rate to -0.20%.

Although sterling-denominated money market funds (SMMFs) appear to have

The U.K. economy is showing signs of recovery, but risks primarily stem from the evolving regulatory landscape for U.K.-based banks...

stayed under the radar so far, Standard & Poor's foresees that they could face potential risks over the next two years. The U.K. economy is showing signs of recovery, but risks primarily stem from the evolving regulatory landscape for U.K.-based banks, the European Commission's imminent money market fund reforms, and challenges arising from the move toward industry consolidation. (For more information, see

"Challenging Times Are Testing The Resilience Of Sterling Money Market Funds," published Sept. 17, on RatingsDirect.)

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Refinancing Risks For Western Europe's Top 50 Banks Are Declining, But Have Not Disappeared

The estimated funding gap for Western Europe's largest 50 rated banks declined in 2013 year on year, but some banks still face considerable refinancing risks, said Standard & Poor's in a report published Sept. 16.

Overall, the mismatch between the banks' available stable long-term funding and the amount they need to finance long-term and less liquid assets has, by our measures, narrowed to about €0.9 trillion based on year-end 2013 data, from €1.3 trillion at

year-end 2012 and €2.1 trillion at year-end 2010, says the report titled "Western Europe's Top 50 Banks' Refinancing Risks Are Reducing But Gaps Remain."

At the same time, most banks' liquidity positions—as measured by the mismatch between broad liquid assets and short-term wholesale funding—shrunk to about €240 billion at year-end 2013 from €370 billion at year-end 2012 and €1 trillion at year-end 2010.

Standard & Poor's assesses funding and liquidity as a rating

strength for only two of the 50 banks, as a weakness for seven banks, and as a neutral rating factor for the other 41 banks.

"Even though the median stable funding ratio and liquidity ratio of the top 50 banks improved slightly to 94.4% and 1.05x, respectively, at year-end 2013, from 93.2% and 1.04x at year-end 2012, contingent refinancing risk, although falling overall, is still considerable for some banks," said credit analyst Stefan Best. "Disparities in banks' net borrowings from central banks

under open-market or extraordinary liquidity-providing operations also demonstrate this."

"Our study also indicates that a number of banks would likely fail to meet the regulatory minimum standard of 100% for a net stable funding ratio proposed by the Basel Committee on banking regulation," said Mr. Best. "We therefore believe that banks that display the greatest funding mismatches, according to our metrics, will likely take corrective action."

However, any relaxation of the proposed regulatory minimum standards, or greater incentives for the banks to use central bank borrowing, bear the risk that the banks' efforts to reduce funding mismatches may not sustain, the report says. This could have negative rating implications for several banks on which our current funding and liquidity assessments are neutral based on the expectation that they will further enhance or at least maintain their improved funding and liquidity profiles, the report concludes.

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Proposed Parent Of Burger King/Tim Hortons Combo Assigned 'B+' Corporate Credit Rating

Standard & Poor's on Sept. 15, assigned its 'B+' corporate credit rating to 101178 B.C. Unlimited Liability Co. (Newco), the proposed parent to Burger King and Tim Hortons. The outlook is stable. At the same time, we assigned a '3' recovery rating and 'B+' issue-level rating to Newco's proposed \$500 million senior secured revolving credit facility and \$6.75 billion senior secured first-lien term loan. The '3' recovery rating indicates our expectations of meaningful (50% to 70%) recovery of principal in the event of default. We also assigned a 'B-' issue-level rating to the \$2.25 billion senior secured second-lien notes, with a '6' recovery rating, indicating our expectation of negligible (0% to 10%) in the event of



default. We also removed the rating on Burger King Corp. from CreditWatch with negative implications, and equalized the rating to that of Newco.

"The rating action comes as Newco issues the debt to fund the combination of Burger King and Tim Hortons," said credit analyst Charles Pinson-Rose. "We expect a parent of Newco to issue new equity and receive \$3 billion or

preferred equity investment from Berkshire Hathaway Inc. with a 9% dividend to facilitate the transaction. For the purposes of the rating, we consider the preferred equity as debt-like, adjust debt for the preferred amount and adjust interest for the dividend amount. Accordingly we expect the pro forma ratio of debt to EBITDA to be in the mid- to high-7x range, but we expect the company to reduce leverage quickly, possibly to the mid- to low-6x area over the next two years."

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For The U.S. Economy, Climate Change Is A Case Of Pay Now— Or Pay More Later

The scientific consensus on global climate change is now essentially unanimous: It's clearly occurring, and humans—through industry, transportation, agriculture, and other activities—are producing increasingly large quantities of the greenhouse gases that contribute to global warming. Less clear, however, are the potential economic consequences, regardless of whether we try to mitigate or reverse what has already happened, or simply deal with the results down the road.

Nonetheless, the accumulation of greenhouse gases in the atmosphere, if allowed to continue unabated, will have extensive and costly impacts on regional climates and economies throughout the world. To be sure, there will be some winners to go along with the many losers, under any scenario, but the overall economic effect will be starkly negative—even for large countries, such as the U.S., which seem set to fare better than small, less-developed nations.

In their 2000 study *“Warming the World,”* Yale University economics professor William Nordhaus and research associate Joseph Boyer estimated that, assuming an average global temperature rise of about 11 degrees Fahrenheit by the end of the century (a notably dire scenario, granted), the resulting damages—including estimates of nonmarket damages, along with costs associated with catastrophic outcomes—could add up to about 5% of U.S. economic output and, with substantially

larger losses in a number of other countries, a decline of about 10% of global GDP.

In line with this forecast, Standard & Poor’s Ratings Services puts the cost to the world’s largest economy of doing nothing to be between 2.2% and 5.2% of GDP by 2100.

At the same time, if we act aggressively to both adapt to the changing climate and to mitigate future effects, we can significantly reduce our exposure to the worst economic risks. Naturally, the cost of doing so would also likely be quite large, as it would entail substantial reductions in our carbon footprint—or at least a sharp slowing of its growth. For the U.S., which is responsible for almost one-fifth of global emissions, this represents a long row to hoe.

Here, we should note that the terms “climate change” and “global warming” are generally used synonymously, mostly because the consequences that climate scientists expect are primarily the result of higher temperatures—with the knock-on

effect of rising sea levels, which, in turn, will threaten coastal areas, for example. Whatever the terminology, there is little question that carbon emissions will continue to increase for the foreseeable future, especially with China and India—the two largest countries by population, with a collective 36% of the world’s people—entering energy-intensive phases of their economic development. And this is true even if the U.S.—the third-most-populous country, with about 4.4% of the world’s inhabitants—sharply curtails its contribution to climate change.

However, it’s unlikely that carbon emissions could continue to increase at the current pace. Global population growth is slowing (although this is hardly an efficient way to stem climate change), and the once-breakneck rate of China’s economic expansion is easing. Additionally, greater public awareness and political willingness to confront the challenges of climate change will likely have some effect.

Automakers Face A Long Road Toward Mileage Standards

Standard & Poor’s believes it will be difficult for manufacturers to achieve the Corporate Average Fuel Economy (CAFE) standard of 54.5 miles per gallon (mpg) for passenger vehicles and light trucks by 2025 in the U.S. However, manufacturers have already made significant progress toward this goal, and we believe there are many opportunities for further improvement. Some estimates suggest that the 2025 fuel standard would reduce oil consumption in the U.S. by more than 2 million barrels per day. We believe manufacturers’ and consumers’ focus on fuel savings will significantly reduce the consumption of oil and the associated air pollutant emissions, even if manufacturers do not ultimately achieve the 54.5 mpg target.

Manufacturers will use many different tools to achieve the CAFE standards, which will increase to 35.5 mpg in 2016 from 27.3 mpg in 2011—and increase further to 54.5 mpg in 2025. Although hybrid and electric vehicles garner significant attention, they represented less than 4% of total U.S. car sales in 2013. Therefore, in the coming years, improvements in the efficiency of the internal combustion engine and vehicle weight will be the primary sources of fuel efficiency and carbon footprint reduction. For example, many manufacturers have reduced engine size in their vehicles to improve fuel efficiency while maintaining performance through the use of turbo chargers. Clean diesel engines are also a more efficient choice, and we are likely to see a proliferation in the U.S. despite diesel engines’ negative reputation because of the

dirty and clattering engines of the past. Weight reduction through the use of light materials such as aluminum in place of steel should also improve fuel consumption and offset weight gains from more stringent safety standards. For example, Ford claims to have reduced the weight of its new F-150 full-size pickup by as much as 700 lbs. through the use of aluminum. Other technologies that will contribute to fuel efficiency include engine start-stop systems, cylinder deactivation, transmissions with additional gears that are designed to reduce fuel consumption, friction reduction, electric power steering, and electric motors for various power components that reduce the load on the combustion engine (for example, windshield wipers). We believe that hybrid, electric, and possibly fuel cell vehicles will become more popular as the technologies become cheaper and automakers address consumers’ concerns about driving distance, and if the U.S. develops a more extensive recharging infrastructure.

While stable in recent years, gas prices remain high relative to historical averages, and this has caused a shift in consumer preference for more efficient vehicles. However, a drop in gas prices could reverse this trend in consumer preference, making it more difficult to achieve CAFE targets. The CAFE targets are based on a vehicle’s size. A drop in gas prices could influence consumers to purchase a standard, less efficient vehicle rather than the more efficient hybrid vehicle of similar size, making it more difficult to achieve the mpg targets.

That said, it seems safe to say that troubling events could soon outpace our actions, a position forcefully articulated in the study *“Risky Business—The Economic Risks of Climate Change in the United States,”* published in June by a group co-chaired by former New York Mayor Michael Bloomberg, former U.S. Treasury Secretary Henry Paulson, and Thomas Steyer, founder of the hedge fund Farallon Capital Management LLC. The report concluded that climate change is already causing significant harm and posited that such calamitous effects will almost certainly be far more severe in the future to the agricultural, energy, and coastal-property sectors, as well as to public health and labor productivity, more generally.

No “Average” Effects

A major hurdle in assessing any potential damage is that talking about average temperature rises or aggregate economic effects is inelegant and incomplete. Simply put, the U.S. is too diverse—geographically, socially, and economically—to allow for a simple average. Much of the impact of climate change will be regional, making it all the more difficult to ascribe a headline number to what it will cost us as a country. To paraphrase Mr. Steyer, having one’s head in the freezer and feet in the oven doesn’t mean the “average” room temperature is all that comfortable.

In the U.S. Southeast, for example, 36% of residents live in counties along the coast, and one-third of GDP comes from those counties, according to *“Risky Business.”* Clearly, if significant coastal acreage were to be swallowed by the sea, there would be an outsize effect on the economies of that region, through the loss of arable land, the disappearance of tourist areas, and the destruction of property. In the Northeast, rising sea levels—and the possibility of storm surges that could make Superstorm Sandy seem small by comparison—would threaten infrastructure that is already in desperate need of refurbishment (see *“U.S. Infrastructure Investment: A Chance To Reap More Than We Sow,”* published May 5, 2014, on RatingsDirect). In the Pacific Northwest, meanwhile, more frequent wildfires could hurt the region’s economically important forest products industry.

Nor will we need to wait long to see some effects. Coastal cities in the East could face what amounts to pre-storm damage, with companies deciding that maintaining offices in New York or Boston, for example, isn’t worth the risk of having to shutter their buildings at the approach of another storm—or having to shoulder increased insurance premiums to do so.

Meanwhile, across the country, the demand for more power generation—mainly for air conditioning—would strain a system already struggling to keep pace with demand. And even if power providers were able to construct and maintain plants sufficient to meet the country’s needs, there would clearly be significant costs involved. Costs that, naturally, would ultimately be borne by consumers.

anticipation of this, many companies have been preparing to address the effects of climate change, and, ultimately, we expect that they would fare well by passing along any increased costs to consumers in the form of higher premiums (perhaps, in some cases, becoming more profitable, as recent ratios of premiums-to-payouts demonstrate).

Additionally, in what is surely a sign that the science of climate change has reached a consensus, even global oil companies are doing what they can to prepare. Perhaps counterintuitively, much of this means an increase in the exploration and production of oil and natural gas, with the rampant and accelerating melting of Arctic ice allowing greater access to trapped fossil fuels. (Here, we should note

...In what is surely a sign that the science of climate change has reached a consensus, even global oil companies are doing what they can to prepare.

A surge in the number of Americans—the elderly, in particular—who would require medical attention because of extreme heat could burden the U.S. health care system, which, it’s worth mentioning, has gone through its share of well-documented cost- and care-related issues in recent years.

At the same time, while it seems reasonable to expect that farmers and agricultural companies will be hard hit by climate change, U.S. food producers are among the most prepared to face these challenges, through such efforts as the development and refinement of drought-resistant crops. And each region will be affected differently. While many areas of the South could suffer water shortages and heat so extreme that crop yields would shrink significantly, some Northern regions may enjoy longer growing seasons as the number of frigid days declines, which could be a boon to their local economies.

Insurers, too, have much at stake, given the likelihood of additional claims, especially along the U.S. coastline. In

that the U.S. is one of just five countries with a claim to the Arctic—and all the oil and gas it contains—along with Canada, Russia, Denmark, and Norway.)

Winners And Losers

This naturally leads to a discussion of potential winners and losers.

On a global scale, Greenland, for example, could shake off three centuries of Danish rule and achieve full independence if the revenues it expects to generate from an increase in arable land (as well as a significantly longer growing season), a surge in fishing hauls (as stocks move north in search of colder water), and a jump in tourism (as the morbidly curious flock to see global warming in action) come to fruition.

And not only would Greenland become independent and self-reliant, but it could soon become a fairly wealthy nation. In fact, Greenland is so rich in oil—as well as other commodities, minerals, and precious metals—that the U.S. once tried to buy the island from Denmark in the mid-1940s, for what would have been the bargain sum of

\$100 million—the equivalent of \$1.2 billion in today's money (or about what the so-called oil supermajors collectively earn in a week). Greenland would also become the world's most water-rich country, on a per capita basis, surpassing Iceland.

Greenland wouldn't necessarily be the only—or even primary—beneficiary of the northward creep of desirable farmland. Russia and Canada, the two largest countries in the world by land mass, could benefit in a major way.

Of course, Greenland's emergence as a wealthy nation wouldn't come problem-free, given that the melt rate of the country's ice cap has been increasing 7% a year since 1996, according to the 2014 book *Windfall—The Booming Business of Global Warming* by journalist McKenzie Funk. In fact, Greenland's ice cap is so large—covering about four-fifths of the island nation—that if it were to melt entirely, global sea levels would rise more than 20 feet. In the U.S., Miami and New

That's the thing about assessing the winners and losers of climate change: It's a zero-sum game, at best. For every flourishing Greenland there is a disappearing Maldives. For every day added to the growing season in the U.S.'s Northern Plains, there's a day of drought that eats into crop yields further south. For every shipping lane now accessible because of warming waters, there's a food shortage in a developing nation.

Standard & Poor's looked at the direct costs to the U.S. if nothing changes. In this scenario, with global warming on an average estimated trajectory of a 5-degree Fahrenheit rise by 2100, we could see, once a decade, all regions impacted by climate change to varying degrees. Here, direct losses could add up to more or less a loss of 2.2% of economic output by 2100 in real terms. Assuming a once-in-a-50-year Katrina-like event puts an upper limit to our scenario, with a direct loss between 2.2% and 5.2% to economic output by 2100.

industries and companies—that could benefit most have to counter climate change. The short, sad answer is that there seems to be little, given the upfront costs of doing so.

There's almost no question that rich, Western nations will suffer much less than poorer ones. Evidence of this emerged during the international food-price crisis of 2008. In March of that year, average wheat prices around the world more than doubled from a year earlier, rice prices soared 74%, and the cost of corn rose by almost one-third, according to the Institute for Food and Development Policy (the think tank also known as Food First). In the U.S., this resulted in the relatively mild move by discount retailers such as Sam's Club and Costco to limit the amount of bulk rice customers could buy. In many parts of the developing world, it kicked off rioting, political and economic instability, and a scarcity of affordable dietary staples.

Granted, the causes of that crisis can't all be directly tied to global warming. But severe droughts in many grain-producing nations, along with rising oil prices—which added to the costs of agricultural production and transportation—were major contributing factors.

Nonetheless, the U.N.'s Food and Agriculture Organization says there is more than enough food in the world to feed everyone—about half as much more than is needed—and that food production is growing faster than the global population. While this may ease some concerns about the possibility for a Malthusian catastrophe of pandemic famine and disease, it demonstrates that the knock-on effects of climate change can be as problematic as the direct impact—especially for poorer nations, but also for large, developed economies such as the U.S.

In fact, climate change will likely be far worse than a break-even prospect for the U.S. And this likelihood moves the discussion from a hypothetical one about potential winners and losers to a very real one about Washington's policy response.

Former Treasury Secretary Robert Rubin, a member of the committee that published *Risky Business*, has said the

There's almost no question that rich, Western nations will suffer much less than poorer ones.

Orleans would effectively disappear, and much of lower Manhattan would be under water. Around the world, an astounding number of island nations would disappear completely, forcing their entire populations to flee.

To be sure, those may represent worst-case scenarios. But the effects of glacial depletion are already being felt around the world. The aforementioned economic development of China and India comes as the countries worry about waning water supplies, with the Himalayan glaciers on which they rely continuing to shrink rapidly. Similarly, a number of large ice caps in the central and southern Andes are receding, threatening populations in Argentina and Chile, which depend on water supplies and the hydroelectric power that glacier-fed rivers provide.

Of course, the full economic impact is fraught with hidden costs as well. If incorporated in our scenario, costs would be even larger. Besides the replacement value of infrastructure, there are real costs of rerouting traffic, workdays and productivity lost, provision of temporary shelter and supplies, potential relocation and retraining costs, among others. Likewise, climate change adds an extra layer of uncertainty and risk, which imposes new costs on the insurance, banking, and investment industries, and complicates business planning processes, particularly in the agricultural and manufacturing sectors, as well as public works projects.

What Incentive To Stop It?

In this light, it's pertinent to ask what incentives the countries—as well as

cost of doing nothing to address climate change is, over the long term, far greater than the cost of action. In an opinion piece in the *Washington Post* in July, Mr. Rubin said that “future federal spending to deal with climate change is likely to be enormous” and suggested that this “should be included in fiscal projections, whether in existing estimates or in additional estimates.”

“If nothing is done to prevent climate-related crises, the federal government will be forced to deal with them later—from property losses to public health crises to emergency aid,” Mr. Rubin wrote. “To cover those costs, we will have to increase the deficit; raise taxes; or significantly cut spending on defense, our social safety net, and public investment including infrastructure, education, and basic research.”

Of course, achieving the sorts of reductions in greenhouse gases that would have a material effect could mean a transformation of the U.S. economy from one that runs on fossil fuels to one that increasingly relies on nuclear and renewable fuels—and this would come at some short-term cost to the economy, depending on the level of reductions and on the particular measures employed.

To take just one example, studies show that, under the cap-and-trade system proposed in the American Clean Energy and Security Act (ACESA) of 2009 (passed by the House and defeated in the Senate), a 50% reduction in emissions by 2050 could be achieved at a cost of a year or two of GDP growth in the period.

The Congressional Budget Office (CBO) concluded that ACESA would have trimmed about 0.25% to 0.75% from U.S. real GDP in 2020, and 1% to 3.5% in 2050. The CBO said this damping of economic growth would result from shifts in production, investment, and employment away from industries involved in the production of carbon-based energy and energy-intensive goods and services; declining productivity and increased prices for domestic goods as energy costs rose, leading to a competitive disadvantage relative to international competitors—as well as reduced net inflows of capital

from abroad; and a reduction in the labor supply and workers’ real wages (a primary concern for many).

However, the cost estimates didn’t factor in the potential economic benefits of averting or mitigating climate change. And while the CBO concluded that the net effects of restricting emissions—adding back in the boost to GDP of addressing global warming—would still likely be negative in the next few decades, most of the benefits would accrue in the second half of the 21st century and beyond. Additionally, such remediation policy isn’t a jobs issue, as it would likely create as many jobs as a drop in productivity would eliminate.

Along similar lines, a study by researchers at the Massachusetts Institute of Technology, published in August in the journal *Nature Climate Change*, estimated that the value of health benefits Americans would reap from cleaner air could dwarf the costs of U.S. policies regarding carbon emissions—by more than 10 times.

Not A Question Of “If” We Will Pay—But “When”

Allowing for significant vocal dissension, Standard & Poor’s takes it as fact that global warming is happening, and that humans are contributing to it. In this light, our approach is to assess the economic costs that climate change will carry.

It seems clear to us that there will be significant costs involved, whether we take steps now to tackle the problem or simply deal with the consequences as they come—with costs of the latter likely to significantly outstrip the former. Whether or not bearing the brunt of upfront expenses is preferable is a determination we leave for others to debate. We merely point out that they will be much smaller than the price we would pay for inaction. **CW**

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New U.S. Environmental Rule To Combat Climate Change By Reducing Carbon Emissions

Overview

- The Clean Power Plan sets out carbon emissions reduction goals for U.S. states, which will have to develop strategies to meet the goals.
- We expect a multifaceted response, including carbon trading, increased use of renewables, emphasis on energy efficiency, operational efficiencies, and greater natural gas-fired generation.
- A variety of industries could feel substantial financial effects, but we don't expect them to be immediate.

The U.S. Environmental Protection Agency's (EPA) much anticipated Clean Power Plan is the most ambitious federal environmental effort in decades, and not surprisingly, the effects on several key energy-related industries could be pronounced. But the plan contains nuances that could affect how the federal and state governments implement it.

Although legislative progress on climate change in the U.S. has been slow during the past quarter-century compared with much of the developed world, the timing of President Barack Obama's June 2, Clean Power Plan announcement was not unexpected.

After an ill-fated attempt at a cap-and-trade policy in 2010, President Obama stated in June 2013 that in his second term he would be more proactive on the environment. With the New-Source Regulations for carbon becoming effective in January 2015

(see table 1) and a few favorable Supreme Court rulings under its belt, the EPA is now poised to enact rules that could permanently change the energy industry's trajectory. The implementation, however, may be anything but smooth.

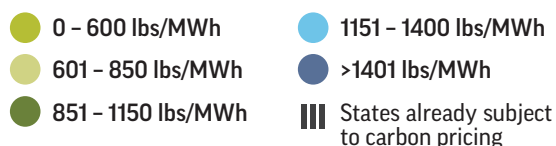
A STATE-BY-STATE LOOK AT THE IMPACT OF THE EPA'S CLEAN POWER PLAN

The plan assigns each state a carbon reduction goal, but the degree and complexity vary significantly. In general, those states that have already made strides in carbon reduction have more achievable goals. But most states will have to rely on renewables, demand-side management, and coal retirements to meet targets.

CO₂ REDUCTION GOALS BY STATE

Percentages are based on pounds per megawatt-hour (lbs/MWh) for fossil fuel Electric Generating Units.

Proposed 2030 Carbon Output

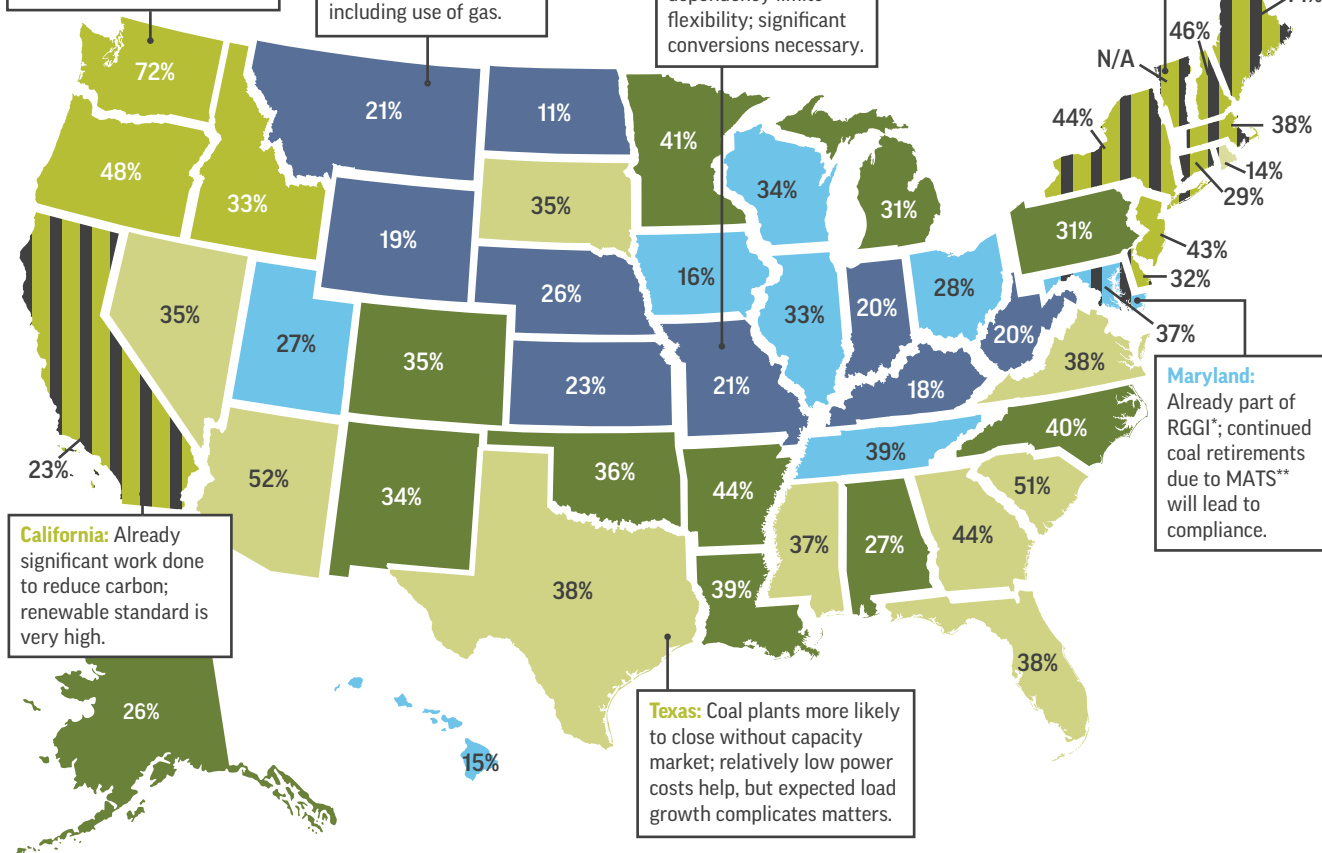


Washington: Hydro-heavy state. Planned closure of the coal-burning Centralia plant makes the goal achievable.

Montana: Relies on relatively old coal plants; significant modernization required, including use of gas.

Missouri: Heavy coal dependency limits flexibility; significant conversions necessary.

Vermont: No goal listed; state has no fossil fuel power plants.



What The Plan Says

The plan is an “outside-the-fence” regulation, in that it does not seek to regulate individual power-generating sources (as the New-Source standards do). Rather, it compels states to do so by setting relative carbon reduction goals (*see*

table 2) that are tailored to the state’s current generating fuel-mix profile and ability to reduce output.

In addition to revealing the goals, which intend to decrease emissions by 30% from 2005 levels by 2030, the plan also makes suggestions, known as

“Building Blocks” (*see table 3*), for complying with the goals. These tools include operational improvements, generation from lower-emitting electricity-generating units (EGU), deployment of nonemitting sources (renewables and nuclear), and promotion of energy efficiency mechanisms. The rule also permits states to choose either a rate-based goal (pounds of carbon dioxide [CO₂] per megawatt-hour) or a mass-based goal (total pounds of CO₂), pending EPA approval.

Although the plan does not expressly discuss “how” to reduce carbon emissions from existing fossil fuel units, we expect states will favor some kind of carbon emission trading scheme, one that will weigh more heavily on significant emitters and that will provide sufficient incentive to reduce carbon emissions.

Not surprisingly, the plan arrives amid controversy. Although the scientific debate over climate change has largely concluded, the political debate continues, and opponents of the rules have leveled accusations that it is an overreach of executive branch authority. Critics have lamented its supposed adverse economic impacts, while some at the opposite end of the spectrum still contend it may be an insufficient attempt to forestall climate change, especially with larger, emerging economies that aren’t fully committed to the task.

A global framework

Indeed, the wider global context in which the U.S. Clean Power Plan is operating is a complicating factor. Clearly, this is the most ambitious initiative aimed at climate change in the U.S. in almost a quarter-century. If implemented as proposed, it could cause a staggering shift in electricity generation, leading to a much less carbon-intensive industry. But part of what complicates the study of climate change is that it is a shared global phenomenon. Although the U.S. and Western European nations may have been responsible for most carbon emissions to date, developing nations are now powering up to a greater degree, and doing so mainly with coal. Although China’s next Five

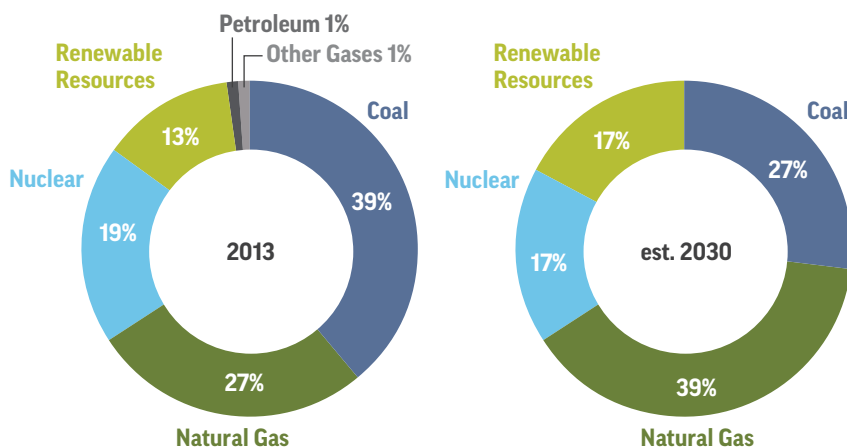
TOTAL COAL CAPACITY RETIRED BY 2030 IN GIGAWATTS

While coal-fired generation had weakened due to the shale boom, the plan should accelerate the shift toward gas-fired generation, especially in areas with aggressive goals.



U.S. POWER GENERATION BY ENERGY SOURCE

The generation profile of the U.S. is in flux; though coal is the dominant fuel source now, its share will drop by more than 25% by 2025.



OVERALL CO₂ REDUCTION

Carbon emissions have already dropped due to a weak economy and state regulations, but a further 19% drop is likely by 2030.



*RGGI: The Regional Greenhouse Gas Initiative. **MATS: Mercury and Air Toxics Standards
Source: EPA, EIA, and Standard & Poor’s Ratings Services.

Year Plan will focus on reducing carbon emissions, it's not clear that other developing nations share its enthusiasm. Without a more coordinated

global approach to mitigating climate change, it's likely that the U.S. will continue to share in the environmental issues that dog other nations.

Table 1 | Existing Environmental Rules

Regulation	When effective?	Regulated emissions
Cross State Air Pollution Rule	2015 (tentative)	Sulfur dioxide, nitrous oxides in 25 states
Mercury Air Toxics Standard	2015	Hazardous air toxins
New Source Carbon Regulations	2015 (likely)	Carbon from new power sources
Assembly Bill 32 (cap and trade)	2012	Carbon in California
Regional Greenhouse Gas Initiative	2009	Carbon in several Northeastern states
Clean Air Act, Clean Jobs Act	2010	Emissions in Colorado
Renewable Portfolio Standards	Varied, 1999–2014	Solar, wind, geothermal, hydro in individual states

Source: Standard & Poor's.

Table 2 | Clean Power Plan Goals

State	Current (2012) (pounds CO2/MWh)	Final goal (2030) (pounds CO2/MWh)	Reduction (%)	State	Current (2012) (pounds CO2/MWh)	Final goal (2030) (pounds CO2/MWh)	Reduction (%)
Alabama	1,444	1,059	26.7	Montana	2,246	1,771	21.1
Alaska	1,351	1,003	25.8	Nebraska	2,009	1,479	26.4
Arizona	1,453	702	51.7	Nevada	988	647	34.5
Arkansas	1,634	910	44.3	New Hampshire	905	486	46.3
California	698	537	23.1	New Jersey	928	531	42.8
Colorado	1,714	1,108	35.4	New Mexico	1,586	1,048	33.9
Connecticut	765	540	29.4	New York	978	549	43.9
Delaware	1,234	841	31.8	North Carolina	1,647	992	39.8
Florida	1,199	740	38.3	North Dakota	1,994	1,783	10.6
Georgia	1,500	834	44.4	Ohio	1,850	1,338	27.7
Hawaii	1,540	1,306	15.2	Oklahoma	1,387	895	35.5
Idaho	339	228	32.7	Oregon	717	372	48.1
Illinois	1,894	1,271	32.9	Pennsylvania	1,531	1,052	31.3
Indiana	1,924	1,531	20.4	Rhode Island	907	782	13.8
Iowa	1,552	1,301	16.2	South Carolina	1,587	772	51.4
Kansas	1,940	1,499	22.7	South Dakota	1,135	741	34.7
Kentucky	2,158	1,763	18.3	Tennessee	1,903	1,163	38.9
Louisiana	1,455	883	39.3	Texas	1,284	791	38.4
Maine	437	378	13.5	Utah	1,813	1,322	27.1
Maryland	1,870	1,187	36.5	Vermont*	N/A	N/A	N/A
Massachusetts	925	576	37.7	Virginia	1,302	810	37.8
Michigan	1,690	1,161	31.3	Washington	756	215	71.6
Minnesota	1,470	873	40.6	West Virginia	2,019	1,620	19.8
Mississippi	1,093	692	36.7	Wisconsin	1,827	1,203	34.2
Missouri	1,963	1,544	21.3	Wyoming	2,115	1,714	19.0

*Vermont does not have a goal (it has no fossil-fuel power plants, so no carbon emissions). CO2—Carbon dioxide.

MWh—Megawatt-hours. N/A—Not applicable.

Source: EPA.

Is the price right?

Plan opponents have contended that it will be prohibitively costly to implement. The Obama Administration asserts that despite short-term cost increases, longer-term reductions in demand and falling renewable construction prices will ultimately lead to end-user prices that are in line with previous expectations. It is imperative to note that the U.S. is at something of a crossroads. The first 11% of carbon reduction (from 2005 to 2012) has come with a relatively affordable price tag, owing in part to weakened demand and cheap natural gas, but it's not clear that this trend will continue indefinitely. However, prices are sure to be a key talking point, especially as November's midterm elections approach. Of course, in states where price increases are the sharpest, we could also see significant stimulus effects from the development of new generating sources, although it's a little more difficult to calculate the extent of this.

What's done is done

Despite the vocal response to the rules, this will merely accentuate some trends that have already taken hold. The rules will clearly accelerate the mass switch to gas from coal that's occurring today, but the economics of power production had begun to favor natural gas in recent years due to the shale gas revolution in the U.S. Moreover, regulatory efforts already in place have hastened the process. The rules expressly reference carbon-trading efforts in California and the Regional Greenhouse Gas Initiative (RGGI) among northeastern states as effective measures for reducing carbon, and they articulate well-established, state-based renewable portfolio standards. Along the same lines, even though they regulate other emissions, the federal Cross-State Air Pollution Rule and the Mercury Air Toxics Standards have led to the planned closure of some aged coal plants due to the high costs associated with making them cleaner. And the EPA's recent New-Source regulations will help shape the grid of the future by capping carbon emissions from coal and gas power plants.

Some Key Themes

We anticipate that the plan's effects will be significant, but they will not be felt uniformly across the energy sector because a host of mitigating factors is at play. Still, we have identified key themes that are common across sectors.

The sources

Because the finger points at coal as the chief culprit behind the power sector's contribution to climate change, these regulations, much like others before them, will seek to minimize the pervasiveness of coal in power production. As of 2013, burning coal accounted for about 39% of power generation in the U.S., but we expect that this figure could drop to about 27% by 2025. And we believe any type of carbon trading scheme would continue to make coal plants relatively less economical.

Thus, the plan makes all parts of the coal supply chain less valuable. But the other side of the coin is a possible proliferation of natural gas-related businesses. In addition to the improved economics of natural gas, its lower carbon content makes it appealing in a power framework that will be characterized by attempts to quantify the cost of carbon. However, we also believe that coal provides such comparatively impressive economics in some parts of the country that it does have considerable staying power, despite this recent effort. Moreover, the plan will also spur the continued use of nuclear power, which had long been on the wane in the U.S., although it's also classified as a zero-emitting source.

A regional effect

Although the plan purports to reduce carbon emissions by 19% nationwide from 2012 levels by 2030, this burden will not fall evenly on the states. In developing these thresholds, the EPA considered not just a state's ability to reduce carbon output, but also work it already has done toward this end. For instance, California has rid itself of nearly all coal generation, so it may meet its goal exclusively by completing its ambitious renewable program and existing energy efficiency measures. Washington state will fall into the same

category. At 72%, its reduction goal is the steepest in the nation, but it has a single coal plant remaining that is slated for closure anyway, which will allow it to meet the seemingly lofty goal.

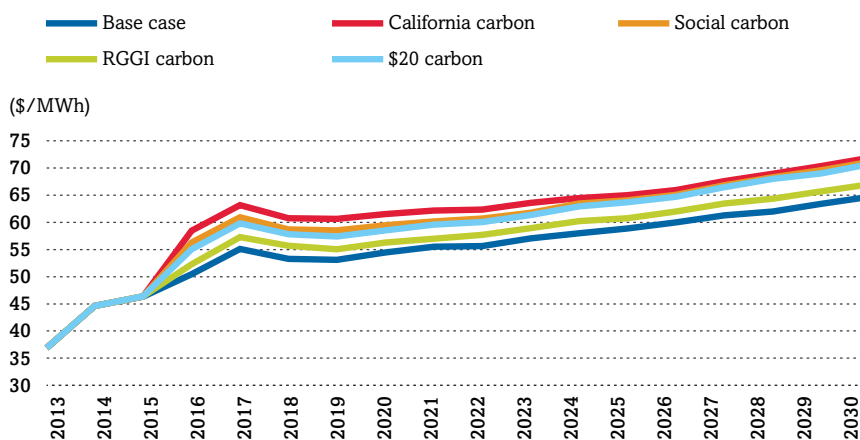
In contrast, states such as Ohio, Texas, and Indiana still largely depend on coal for power generation, and although their goals may be more modest numerically, they may need a significant overhaul of their infrastructure to comply with goals. However, energy efficiency and more renewables may trim these needs. Furthermore, in some states, political considerations could weaken the resolve for change,

and we expect these clashes to be a focal point of the upcoming midterm elections in such states as Kentucky, Montana, West Virginia, and Louisiana.

Time is on their side

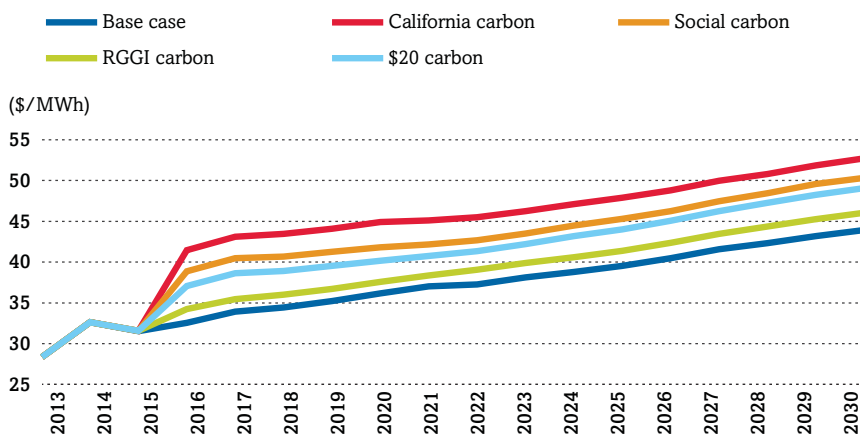
We expect that the plan's financial effects will resonate gradually, in most cases. The plan is not yet final, and states have significant time to comply. We keep in mind, however, that certain types of companies may feel the pinch more immediately. Regulated utilities, for instance, have considerably longer lead times to meet goals. Their financial success hinges on how effectively they navigate the regulatory

Chart 1 | On-Peak Power Pricing In PJM



MWh—Megawatt hour. RGGI—Regional Greenhouse Gas Initiative.
Source: Standard & Poor's.
© Standard & Poor's 2014.

Chart 2 | Off-Peak Power Pricing In PJM



MWh—Megawatt hour. RGGI—Regional Greenhouse Gas Initiative.
Source: Standard & Poor's.
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process. This, of course, is a protracted dance, but it must be in place before utilities can build replacement plants. That process can unfold over several years, forcing utilities to plan more proactively, especially to meet compliance goals that begin as early as 2020. In contrast, merchant generators (i.e., nonutilities) that burn coal or gas may be able to scale production up or down somewhat more quickly in response to market stimuli that are probably more distant.

How Will Each Energy Sector Fare Under The Plan?

We expect the new rules to affect several discrete industries as the regulations develop. Although this could reverberate throughout the economy at large, we believe the following industries will be most directly affected.

Merchant power

We expect the effects on the merchant power sector to be quite pronounced.

Our initial modeling suggests that power prices could respond significantly to any type of carbon trading scheme. Using a cost of \$11.92 per ton of carbon (taken from recent California auctions), we expect power prices in more coal-intensive states to rise by as much as 10% or 15% by 2025 before stabilizing, depending on the region's fuel mix. (Notably, this does not mean that end-user electricity prices will rise by that magnitude; the end-user price is a combination of several factors.) This, of course, can have numerous effects. Some natural gas plants will see increasing energy margins because the rise in power prices and thus their revenue will more than offset their carbon fees (which are variable costs) (*see charts 1 and 2*). Of course, the contrast is that margins at most coal plants will go down because carbon fees will exceed any power price increase. This duality will lead to another consequence: Gas plants are likely to run more often, in general,

because their variable-cost structures will improve, relatively speaking. This is, in fact, what the plan intends and will reduce emissions.

Longer term, coal plants' waning profitability will likely lead to more plant closures. We believe that the resulting void of baseload capacity will largely be filled by new combined-cycle gas plants, which because they use heat from burning fuel more efficiently will be more economical by that point (*see charts 3 and 4*). We also expect greater use of renewables, which we believe will be crucial in meeting carbon reduction goals, especially in states that have onerous targets. Consequently, capacity payments (the fee paid to generators for merely staying available and providing reliability) in these regions are likely to reflect the cost of building new combined-cycle gas capacity, whereas they have historically been based on the cost of maintaining a coal-fired plant.

We expect that widespread carbon emissions trading will be ushered in toward the end of this decade, and it could bring substantial credit impacts almost immediately. Markets like the Electric Reliability Council of Texas could see their coal plants hurt more quickly because of the absence of a capacity market, which would set a minimum level of cash flow for plants. Although the PJM Interconnection market in the Mid-Atlantic region and the Midcontinent Independent System Operator market in the Midwest have capacity markets, the glut of coal plants in both regions may lead to higher carbon costs and more incentive to close coal-fired plants. The California Independent System Operator and Independent System Operator-New England have made significant strides already and are less likely to see their merchant plants severely affected.

Regulated electric utilities

The financial impacts on utilities will be more muted than for merchant power providers because they recover costs through rate regulation rather than through market dynamics. But that doesn't mean they won't need to make

Table 3 | Clean Power Plan's Proposed Methods For Carbon Reduction

Building block	Challenges
Heat rate improvements	Limits of effectiveness, rebound effect
Running lower-emitting electric generating units (coal to gas switching)	Cost of building new capacity, transmission constraints, pipeline capacity constraints, operational challenges of running combustion turbines more
Zero-emitting sources	Very high cost of new nuclear plants, high cost of renewables (including complementary peaking capacity), reliability
End-user efficiency	Creating proper incentives for end-users and utilities

Sources: EPA; Standard & Poor's.

Table 4 | Interregional Natural Gas Pipeline Capacity Added

(Bil. cubic ft./day)						
Originating region	2014-2020	2021-2025	2026-2030	2031-2035	2014-2035	Annual avg. 2014-2035
U.S.	23.2	5.9	7.9	2.9	39.9	1.9
Canada	1	1	0.5	0.5	3	1.8
Central	5	-	1.4	0.8	7.2	0.1
Midwest	3	0.5	-	-	3.5	0.3
Northeast	6	2.3	1.9	-	10.1	0.2
Offshore	-	-	-	-	-	0.5
Southeast	4.4	0.7	1.7	1.1	7.9	-
Southwest	4.8	2	2.9	0.5	10.2	0.4
Western	-	0.5	-	0.5	1	0.5

Source: ICF International.

adjustments. The overhaul of the grid in some states will be substantial and could cost ratepayers dearly. We believe utilities that have been proactive in updating generating technology, whether due to foresight or state mandate, will have fewer hurdles to surpass to comply and will recover their costs more swiftly.

But stranded costs associated with retiring coal assets could be significant, and balancing fair recovery of these with rate hikes is a looming question. (Stranded costs are those that a company can't recoup through rates because money is no longer flowing into the plant.) Indeed, utilities have several different approaches for recovering stranded costs with varying degrees of favorability for them. This continues to hinge on a utility's ability to negotiate the regulatory process.

Along the same lines, the restructuring of the power grid that is likely to ensue due to coal plant closures and new gas plants and renewable generation starting up is going to stress transmission systems. This is the Federal Energy Regulatory Commission's (FERC) bailiwick, and any upgrade will need the commission's approval. This will largely mitigate transmission operators' risk, and we anticipate that the FERC will have significant decisions to make as new gas plants and renewables attach to the grid during the next decade.

Midstream energy

If the rules in place are to favor natural gas as a primary source for generating power, then the infrastructure that supports the midstream sector (such as pipelines and storage tanks) will also have to adjust, and we believe this will create opportunities for new business in the midstream market (*see table 4*). The power grid's vulnerability to inadequate supply was exposed this past winter during the Polar Vortex cold blasts that hit much of the U.S., but the effects will be particularly acute if the plan anticipates more switching to gas from coal. This is a shift that is already well under way.

Much like utilities, pipeline providers have relatively long-lead construction and regulatory times due to the regulatory process. However, the Clean Power

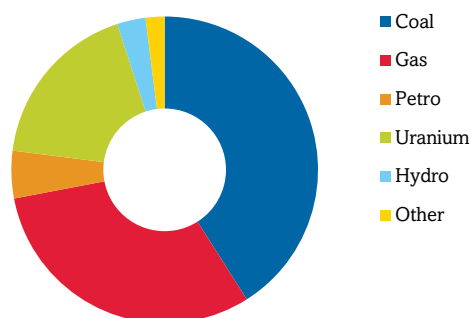
Plan will likely hasten this process by continuing to demonstrate a compelling market need for additional natural gas infrastructure, and these needs are likely to be more pressing in states that are to have sharper reduction targets.

Much like merchant power, particular regions will likely be hotbeds for new pipeline construction, in our opinion, due to what we expect will be increased gas demand. These could include the Midwest, Kentucky, and Texas, all of which could see natural gas generation built to replace coal-fired plants.

Natural gas production

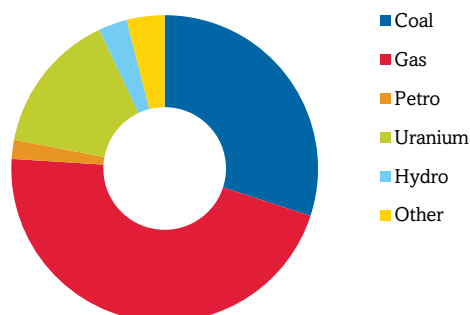
Although the pipes that transport gas could see expansion opportunities, gas production is likely to remain more or less steady through the next three years. Although demand for gas in power generation is likely to increase when the

Chart 3 | PJM Market Capacity 2014



Source: U.S. Energy Information Administration.
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Chart 4 | PJM Market Capacity In 2030 With \$11.92 Carbon Cost



Source: Standard & Poor's.
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rules are ultimately implemented, that is not likely to affect current natural gas prices, which we expect will be around \$4.25 per million Btu in 2015.

Coal production

The coal industry could feel the brunt of the plan, without many of the positive nuances benefiting other industries. Even before the EPA announced the plan, we had estimated about 60 gigawatts of coal capacity would close (it's down to about 336 gigawatts currently), and certainly this process will be accelerated, conspiring with changing gas economics to weaken demand for certain types of coal (*see table 5*).

But regulation is nothing new for the coal industry (emissions have already fallen sharply since 2005), and despite a slew of adverse factors, we're still anticipating that by 2025, the electric industry will be relying on coal for 27% of generation (down from 39% today). Plus, with burgeoning demand for coal-fired generation in the developing world, the export market presents a substitute opportunity.

What's Next?

While the June announcement was decisive on the EPA's part, it was not the final word. The rules are still subject to a lengthy comment period, one that's certain to generate significant interest. Comments will be considered in the final rule, slated for release in June 2015. The EPA will require most states to submit detailed State Implementation Plans for approval by June 2016, but this date could be pushed back in some instances, especially for states that plan to use a collective approach like the RGGI states to meet reduction goals. Interim goal compliance will begin in 2020, with final goals to be reached by 2030 (*see table 6*). The key takeaway is that financial impacts on all these industries could be slow to unfold due to the deliberate schedule. In addition, litigation, which has already been promised, could stall the process longer.

However, despite all the posturing that accompanies rules like these, it's clear to us that the Clean Power Plan is a game changer for the energy sector. The most valuable information for us as a ratings agency is usually shorter-term data, which has more visibility and less variability. In this case, we can't help but feel that the implications are longer term in nature. Although it's hard to say precisely what the financial impacts will be, we know that everyone in the electricity sector will have to respond to the plan's effects, and so will we. **CW**

Table 5 | Switching Point From Coal To Gas

Basin	Natural gas price (mmBtu)
Powder River Basin	\$2.50-\$2.75
Illinois Basin	\$3.25-\$3.50
Central Appalachia	< \$4.50

mmBtu—Million Btus.

Source: "Carbon Constraints Cast A Shadow Over The Future Of The Coal Industry," published on RatingsDirect July 21, 2014.

Table 6 | Plan Timeline

Stage	Approximate time frame
Comment period ends	October 2014
Clean Power Plan finalized	June 2015
State Implementation Plans submitted (individual states)	June 2016
State Implementation Plans submitted (collective states)	June 2017-2018
Interim compliance goals begin	2020
Final carbon reduction goals to be met	2030

Source: EPA.

Renewables and contracted power

The effect on "contracted" fossil fuel plants that sell their electricity directly to utilities and other customers under contract should be relatively minimal. In many instances, their power purchase agreements have provisions that permit them to pass through environmental costs to their customers. Around the margins, electricity generators may elect to run certain plants more or less depending on how it helps them attain compliance with the plan, which could affect margins. However, compliance is still somewhat off in the future.

Similarly, current renewable projects aren't likely to be significantly affected. Given their economics, how much and how often they sell isn't likely to change much. The rules could lead to incentives for new renewable generation in the form of higher electricity prices or enhanced state Renewable Portfolio Standards. However, renewables have long prompted concerns about transmission and reliability, and further penetration could heighten those problems.

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How China's Transition To The World's Largest Carbon Market Could Affect Corporate Creditworthiness

As China's economy has developed rapidly, its energy consumption has increased in kind—and so have its carbon emissions. As the world's largest carbon emitter, China has contributed more than 20% of the world's total CO₂ emissions annually since 2005. However, China has begun to shift its focus from boosting GDP growth to adjusting its economic structure, improving environmental protections, and elevating social welfare.

Heading toward a low-carbon economy, China has committed to cutting CO₂ per unit of GDP by 40% to 45% by 2020 compared with the levels in 2005. Since June 2013, it has established carbon emission trading schemes (ETS) in seven major regions as pilot programs to prepare for the launch of a nationwide carbon market. By end of July 2014, the aggregate trading volume had reached 10.6 million tonnes of CO₂ equivalent (mmtCO₂e). Once fully implemented, its nationwide market will be the world's largest in terms of coverage by an emissions cap. Moreover, Standard & Poor's Ratings Services believes this market will effectively set the benchmark for carbon prices worldwide.

Building on our analysis of the context and performance of these carbon markets and based on interviews with large covered businesses in China, we can draw views on the financial and general risk implications for corporates. Under current market mechanisms in China, we do not observe a material financial impact of carbon trading on corporates in the short term. That said, we expect the impact—both favorable

and unfavorable—to become more significant in the next three years because of regulatory developments and changes to the business environment. The eventual impact will depend on how corporates react to the changes. We believe that the potential financial burden incurred from carbon markets is like a sword of Damocles hanging over corporates' heads. Winners will be those that are proactive in managing their carbon emissions in their business operations and are strategic in managing emission allowances during financial transactions.

In our view, the chief risks that ETS-covered corporates face are:

- The carbon price risk resulting from volatility in carbon markets, which can be material and is not properly captured by conventional risk measurement methods.
- Regulatory risk; this is high, given the quickly evolving regulatory framework for emissions.
- Business risk, which can result from losing customers to competitors that are not covered.
- Financial risk, depending on the extent of cash outflow and carbon liability.

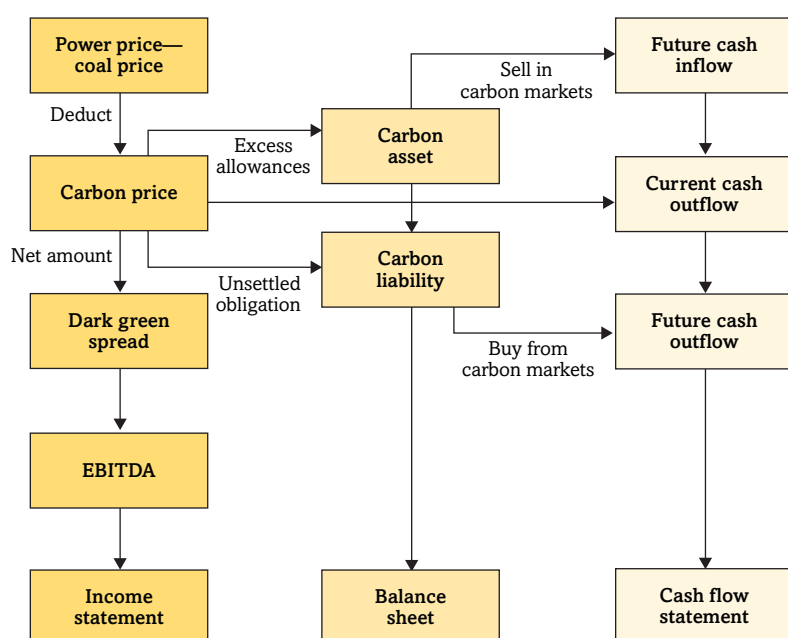
Internalizing Carbon Costs And Risks, Proactive Corporates Could Be Winners

The potential financial burden incurred from enforcement of current carbon ETS markets and a bigger nationwide market in the near future could be a threat to corporates. We believe the most successful companies will be the ones that are proactive in managing their carbon emissions during business operations and are strategic in managing emission allowances through financial policies.

Many Chinese corporates are not yet fully aware of the potential financial burden that could soon follow the enforcement of current carbon markets and a bigger nationwide market. As demonstrated by the ETS market trading performance so far, many corporates are passively waiting until the surrender period to review and manage their emission allowances. Their reluctance is related to both lack of willingness and capacity. On the one hand, the motivation is low because financial costs of obtaining allowances, most of which are at zero cost, and the financial costs of paying penalties for noncompliance are low. Indeed, in the short term, these costs could be even lower than the costs of compliance. Costs of compliance—such as costs to reduce emissions—are high because they are typically large capital expenditures to install or improve equipment. Other compliance costs, such as costs to establish active emission management systems, are also high. On the other hand, corporates might not currently have the capacity to manage emissions proactively, which requires labor forces with carbon expertise, supportive organizational structures, and commensurate operational controls. It will take time and money to build such capabilities.

As such, corporates that have a stronger motivation and ability to build capacity, such as large emitters, are better positioned. They appear to be more proactive and strategic in managing carbon assets. In particular, corporates that have Clean Development Mechanism (CDM) experience possess the advantage of being able to adapt to carbon trading more quickly. The CDM is an arrangement that creates

Chart 1 | Interconnections Among Financial Impacts



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emissions reduction credits through related projects in developing countries. The learning curve for corporates active in more than one ETS pilot market could also be less steep. There could also be competitive advantages for corporates that have the financial capacity to invest in carbon reduction technologies and a cost advantage to those that operate such investments at economies of scale. Besides using the know-how and technology for corporates' internal development, they might find it attractive to seize external business opportunities in carbon markets. For example, China Huaneng Group, one of the largest energy groups in China, has established a subsidiary, Huaneng Carbon Asset Management, to capture potential business opportunities. The subsidiary serves almost the entire carbon management universe, providing services related to carbon allowances trading, CDM project, carbon finance, and carbon reduction advisory.

We have conducted interviews with several corporates that are leaders in their industries and are covered by carbon markets. We have tried to understand their views on carbon markets, the impact of carbon markets, and their

There could also be competitive advantages for corporates that have the financial capacity to invest in carbon reduction technologies...

internal carbon management processes. Most feel positive about carbon markets which, in their opinion, offer creative financial solutions to carbon management and encourage energy-saving technology R&D and adoption. The financial costs of emission allowances for these corporates appear to be minor compared to potential additional revenue. One major concern of interviewees is the regulatory uncertainty, which makes it difficult to forecast carbon costs and discourages sales of excessive allowances.

We've observed different attitudes and approaches to carbon management. For example, one leading Chinese energy group regards carbon management as part of its corporate social responsibility activities rather than just a business or financial management process. Some cor-

porates project future carbon costs and incorporate them into financial budgeting and investment evaluation, and those that haven't are working toward this. For example, one large chemical producer in China has estimated demand for carbon allowances from production forecasts and incorporated the related carbon costs into its annual budget. Corporates are also watching their carbon emissions more frequently and closely. One key Chinese steel producer has planned to implement a carbon emissions information system this year to actively measure and monitor emissions on a monthly basis.

Assessing The Financial Impact And Credit Risk

The financial impact and credit risk associated with carbon can be illustrated with

Major Differences Among China's Carbon ETS Markets

Monitored emissions: While CO₂ is the only monitored emission in six of the carbon ETS markets, Chongqing's—the most recent one to launch—covers the six types of greenhouse gases. In this way, the central government can evaluate the incremental financial burden for corporates if more types of emissions are regulated.

Participants: Some markets—such as the Shenzhen ETS—allow individuals to participate. Unlike covered corporates, which are legally entitled to carbon allowances and must surrender them for compliance purposes, individuals have to buy allowances from the secondary market, but they are free to retain them. Therefore, individuals are more likely to trade for speculative purposes. Although the participation of individuals can make a market more volatile, it can enhance efficiency by increasing liquidity and helping the discovery of allowances' true value.

Allocation methods: To avoid levying heavy financial costs to corporates and to reduce resistance from corporates, most markets allocate carbon allowances for free (the

Guangdong ETS and the Hubei ETS are the exceptions). In the Guangdong ETS, 3% of allowances were mandated to be auctioned, and the actual auction price was 60 Chinese renminbi (RMB) per ton of CO₂ equivalent (tCO₂e). We consider this auction price to be reasonable because it is quite close to the average trading price of RMB62 (see table) in the secondary ETS market. Auctioning can be an effective tool to cap carbon emissions by internalizing the total emissions costs. It is possible that other regions could use such auctions in the future.

Scope of coverage: Depending on the economic structure of each region, the emissions threshold to filter covered corporates varies. Having a mix of heavy and light industries, Shanghai sets separate criteria with a threshold of 20,000 tons of carbon emissions for major sectors and 10,000 tons for sectors such as hospitality and financial services. The percentage of total emissions coverage also varies. For example, Beijing covers about 50% of total emissions, while Tianjin is more aggressive at 60%. Properly defining the scope is critical to the success of carbon controls.

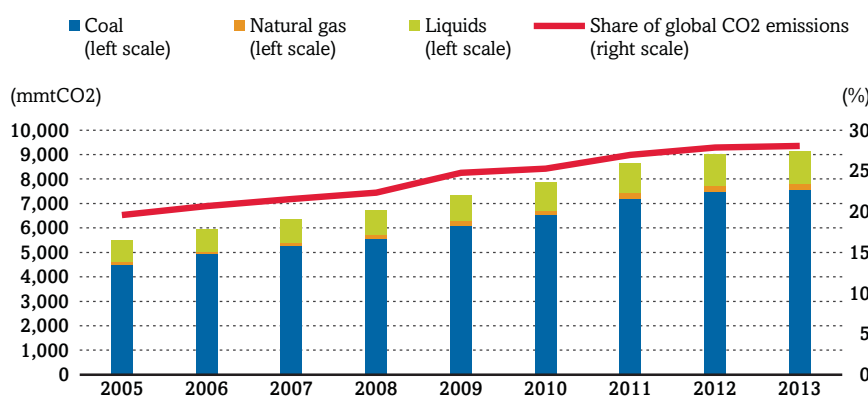
an example of a coal-fired power generator (*see chart 1*). Carbon allowance costs can form part of fuel costs to reduce gross profit margin, thus the bottom line. Specifically, the term “dark green spread” is used in the industry to present the difference between power price and costs of coal and carbon. As the company purchases carbon allowances, the outflow reduces net cash flow from operations, while the carbon asset is recognized under intangible asset category. The unsettled obligation to deliver emission allowances will appear as a liability.

Seemingly straightforward, in reality it is hard to dig out the financial impact. First, corporates might not disclose them in the financial reports because doing so is not mandatory. Second, as there are no specific accounting guidelines for carbon allowances in China, corporates can choose different accounting treatments, resulting in lack of comparability. For example, a company can recognize carbon allowance at cost (zero) or at fair value (the carbon price in the market), and differences between these two valuation methods are significant.

When assessing financial risk, we are most concerned about the extent and pre-

dictability of cash outflow. Carbon liabilities are controlled by regulation but within a fluctuating market environment. From creditors' perspective, cash flow available for them will be eroded by cash flow to purchase emission allowances and debt servicing capacity is lowered by the emergence of carbon liabilities that are even higher in terms of priority than operational liabilities. We consider there are two key factors that are critical for financial risk mitigation: the ability to reduce carbon intensity of production and the ability to pass through carbon costs. Although these risks have not yet triggered rating changes to corporates in China, they do have the potential to do so in the future, as they did with some carbon-intensive corporates covered by the EU ETS. For example, the downgrade of U.K. coal-fired power generator Drax Power Ltd. to 'BB+' from 'BBB-' in May 2009 was partially a result of expected financial pressures related to escalating carbon prices under Phase II of the EU ETS. The increased cost of carbon allowances and higher coal prices resulted in a 10% decline in EBITDA in 2008. Moreover, Phase III of the ETS in 2013 was expected to bring in another structural increase in carbon costs. We believe factoring in potential longer-term carbon price signals could help investors avoid similar pitfalls when evaluating ETS-covered Chinese corporates.

Chart 2 | China's CO2 Emissions By Source

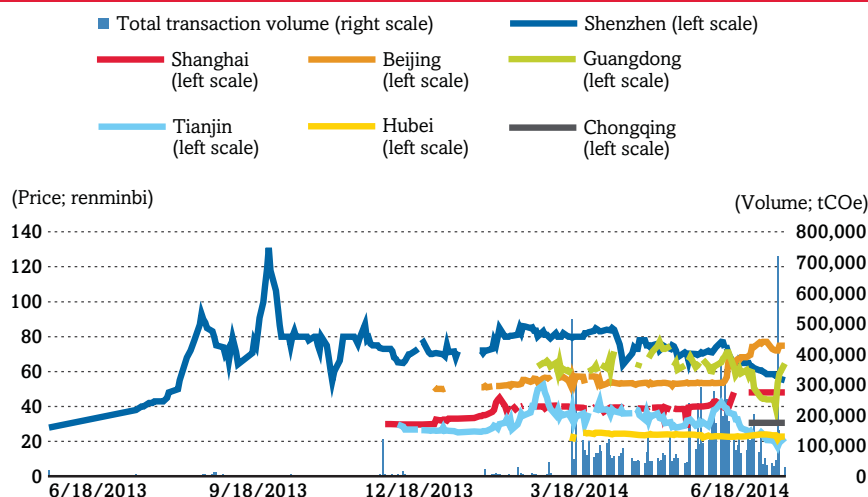


mmtCO2—Million tonnes CO2.

Source: U.S. Energy Information Administration.

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Chart 3 | China ETS Daily Trading Average Prices And Aggregate Volume



tCO2 e—Tonnes of CO2 equivalent. Underlying Trading Data. e—Estimate.

Source: China carbon emissions Website (www.tanpaifang.com).

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China's Ambitious Carbon Reduction Commitments

China has rapidly become an economic powerhouse. It became the world's largest CO2 emitter because of its concentration in energy-intensive industries and its reliance on coal (*see chart 2*). Indeed, its share of global carbon emissions increased to 28% in 2013.

As part of its more recent shift in focus away from pure GDP growth, the government has made some aggressive moves, such as dropping GDP as a performance metric for government officials in more than 70 smaller regions. In its 12th Five-Year Plan, China targeted to cut carbon intensity by 17% in 2015 compared with the 2010 level. Since August 2014, the National Development and Reform Commission (NDRC) has required that

carbon intensity reduction be a performance metric for all provinces. According to the Action Plan on Prevention and Control of Air Pollution, which was issued by State Council in September 2013, the government is also targeting to reduce coal consumption as a percentage of total energy consumption to less than 65% by 2017.

China's Regional Carbon Markets Test The Waters For A Nationwide Scheme

Guided by the carbon intensity reduction targets, China has started to act quickly. Although the central government mandated the creation of pilot carbon ETS markets, it has let the individual regions develop them. Shenzhen's, launched in June 2013, was the first. This year, six other regions—Beijing, Shanghai, Tianjin, Hubei, Guangdong, and Chongqing—set up such markets. They all share some major common characteristics:

- Emission reduction targets are based on carbon intensity.
- Tradable products are carbon allowances and China Certified Emission Reduction (CCER).
- Allowances and CCER transactions are permitted to be exchange-traded only; at this time, no over-the-counter (OTC) transactions are allowed.

- Energy, industrial, and other carbon-intensive sectors are covered.
- Allowances are generally calculated based on historical emissions and are mostly allocated for free.

However, there are differences among regions regarding types of emissions, participants, allocation methods, and coverage scopes. One reason for the variety relates to differences in economic circumstances. In addition, we believe that it's likely that central government wants to compare the regional markets' characteristics and results to establish an optimal one at the national level.

The Chinese government's next goal is to establish a nationwide carbon market within three years. The current carbon market regulations are in effect through 2015, the final year of the current Five-Year Plan. We expect that the forthcoming 13th Five-Year-Plan (2016 to 2020) will outline the relevant implementation details. Already, though, the preparation work has started gaining momentum. Under the sponsorship of the World Bank's Partnership for Market Readiness (PMR), the NDRC has submitted a master plan containing the first concepts on how to implement a national scheme. Working with United Nations Development Program and financed by Norway, China is

implementing a program to design a national emissions and allowances registry.

How China's ETS Differs From That Of The EU

China's fledgling emissions trading schemes are not only different from each other but also from all other schemes worldwide, including the EU ETS. Started in 2005 and developed in three phases, the EU ETS is the largest greenhouse gas ETS market to date and has influenced China's ETS. Nevertheless, major differences between the two markets include:

- Emissions reduction targets: Although EU ETS regulates an absolute amount of greenhouse gas emissions, China's target (carbon intensity) is relative to GDP. The reason is that the EU has reached its peak carbon emissions, while China has not and will not until post-2020. This makes it unrealistic for China, a country with growing emissions, to set a short-term cut in absolute CO₂ emissions.
- ETS market maturity: To a certain extent, ETS markets are similar to commodities markets, and they can be benchmarked to financial markets. Assessed by criteria for financial

China's Carbon ETS Markets Trading Review

Significant disparities in price and volatility: Economic circumstances in each ETS are different, resulting in different intrinsic carbon costs. Besides, market design in each ETS is different, as described earlier, contributing to the disparities in actual trading prices and volatility. Prices in the Shanghai ETS and the Tianjin ETS are similar, probably because of the common characteristics of their economic structures. The high volatility in the Shenzhen ETS might stem from active participation among individuals.

Inactive participation and high price sensitivity: On the demand side, corporates are not active in purchasing allowances from ETS markets prior to the surrender period because they cannot comfortably quantify their demand, given that they have no experience and have no close monitoring of their carbon emissions. On the supply side, corporates are reluctant to sell, and they would rather bank and reserve the free allowances. There is a lack of information regarding both corporates' own emissions and other corpo-

rates' emission allowances, because governments consider such information to be confidential. The resulting lack of transparency and high uncertainty lead to low transaction volume and high price sensitivity. For example, in the Shenzhen ETS, there was a price peak in mid-October 2013 that was driven by 3 tCO₂e worth of transactions.

Compliance-driven trading: As deadlines for the annual carbon allowances surrender were due by late June, corporates rushed into the markets to buy or sell excessive allowances. The cumulative transaction volume since May 2014 is 7.5 mmt CO₂e, which constitutes 70% of total transaction volume since inception of the first ETS market. Corporates wanted to avoid excessive emissions penalties, which would be priced at about 3x to 5x average market price. Other interesting penalties include the incorporation of state-owned enterprises' noncompliance into management performance evaluation, so as to align their interests with those of corporates.

markets, the EU ETS is a more mature market with multiple product offerings, various trading methods, and better liquidity. Derivative products—such as futures—are major components of products in the EU ETS, while spot products dominate China's ETS markets because of their lower complexity and fewer regulatory restrictions. Most corporates in China are not yet familiar with trading, and they are not ready to take the leverage and risk inherent in derivatives. Alternative trading methods—such as OTC trading—are not allowed. In a less mature and less efficient market like China's carbon ETS market, carbon trading prices can deliver wrong signals about the true market supply and demand. The implication for corporates and investors is that they need to pay attention to the market price risk, which can be higher, less predictable, and not appropriately captured by conventional risk measurement methods.

The EU ETS, though initially carefully designed, has experienced low trading prices for a prolonged period because of its surplus emission allowances. Indeed, the prices are so low that some observers believe their carbon reduction effects are becoming counterproductive. Recently, reforms—such as the establishment of a carbon allowances reserve and back-loading—have been adopted to boost the market. What can China learn from the EU ETS to avoid stepping into the same trap? Architects of China's carbon ETS

markets are aware of the current challenges facing the EU ETS and are following very closely the EU ETS reforms through the EU-China Low Carbon Technical Partnership. Regulators could, for example, monitor risks from unexpected changes in economic growth and possible manipulations in carbon emissions measurement, reporting, and verification processes. At the level of local governments, there could be a risk that GDP figures are inflated such that the calculated carbon intensity is artificially small.

After The First Year, How Have China's Carbon ETS Markets Performed?

China's ETS is just one year old, though it is growing quickly. Total transaction volume of carbon allowances in the Chinese ETS markets is 10.6 mmtCO₂e, and the total transaction amount is Chinese renminbi 407 million (US\$66 million) (see table). Average trading prices per ton of CO₂e range from US\$5 to US\$12 across China's ETS markets. A closer examination of trading prices and volumes over the year for ETS markets reveals that markets demonstrate significant disparities in price and volatility and light participation, and they are mainly driven by trading for compliance purposes.

What are the implications for investors and corporates? Depending on their risk preference, aggressive traders could try to exploit mispricing and information

asymmetry, which are common trading strategies in inefficient markets. However, these can be constrained by the lack of arbitrage and hedging mechanisms. Arbitrage opportunities are a lot fewer than might be expected because of the inability to trade allowances across different ETS pilots or to swap them. Beyond this early development stage, we expect market participants to become more experienced, prices to moderate, and rules to become more consistent.

What tangible impact have the Chinese carbon markets had on carbon emissions? Based on available public information, the results might seem inspiring. In Shenzhen, covered corporates have cut their CO₂ emissions by 11% and their carbon intensity by 23% compared with 2011 levels. In Shanghai, covered corporates cut their CO₂ emissions by 3.5%. In Guangdong, it was reported that 80% of covered corporates had reduced their CO₂ emissions. However, while emissions trading isn't responsible for these reductions in their entirety, because other environmental regulations no doubt will also have had an impact, we believe that ETS markets have made—and will continue to make—a significant contribution to helping the world's largest emitter of CO₂ meet its environmental targets. **CW**

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Transaction Summary

	Total transaction volume (mmtCO ₂ e)	Total transaction amount (Mil. RMB)	Average trading price (RMB/tCO ₂ e)	Total transaction amount (mil. US\$)	Average trading price (US\$/tCO ₂ e)
Shenzhen	1.5	105	74	17	12
Shanghai	1.2	49	38	8	6
Beijing	0.9	57	57	9	9
Guangdong	1.0	56	62	9	10
Tianjin	1.0	20	32	3	5
Hubei	4.9	116	24	19	4
Chongqing	0.1	4	31	1	5
Total	10.6	407		66	

tCO₂e—Tonnes of CO₂ equivalent. mmtCO₂e—Million tonnes of CO₂ equivalent. From June 18, 2013, to July 25, 2014. Underlying trading data source: China carbon emissions Web site (www.tanpaifang.com).



Carbon Constraints Cast A Shadow Over The Future Of The Coal Industry

Despite being the most polluting source of power generation, accounting for 41% of global carbon emissions, coal remains a cornerstone of the global economy, delivering 30% of energy and 40% of power generation worldwide. However, recent announcements on carbon regulation in the U.S., attempts to curb pollution in China, and negotiations in the European Union over the 2030 framework for climate and energy policies in October are likely to slow the pace of coal demand. As governments seek to reduce their CO₂ emissions, it looks increasingly likely that “King Coal” will lose its crown. A significant decline in coal production and consumption globally is becoming a much more realistic concept, in Standard & Poor’s Ratings Services’ view. However, the pace and scale of change within the coal industry are far from clear, and investors could potentially remain in the dark for some time.

Overview

- The global coal market is in the doldrums, owing to excess supply and fundamental shifts in the U.S. energy mix toward gas and new coal mining projects.
- We nevertheless anticipate a slight recovery in prices over the medium term, although this will remain highly sensitive to Chinese import balances.
- China will stay by far the most dominant player in the coal industry. However, demand is likely to decelerate to low single digits before potentially flattening by 2020.
- Coal in the U.S. will remain an important, albeit declining, energy source in the medium term and cheap natural gas and other energy sources will only replace a portion of it.
- The demand for electricity and coal is expected to increase further, with other emerging Asian economies (such as India and Indonesia) balancing some of the global pressures.
- Over the long term, coal miners may experience stranded assets as a result of carbon constraints.

The current structural changes in the thermal coal industry aren't uniquely linked to climate change regulation, in our view, but result from the emergence of alternative cheaper energy in the U.S. following the shale gas boom and ramp-up of new coal mining projects. Over the past two years, the price of thermal coal in the seaborne market (coal exported to other countries) has been steadily declining—to \$75 per ton at present from \$105 per ton in early 2012—which is putting pressure on a large part of the industry.

Over the medium term, however, we expect new environmental policies to emerge, which could slow the demand for coal. On June 2, 2014, the U.S. Environmental Protection Agency announced rules to curb CO₂ emissions in the power sector by 30% by 2030 from 2005 levels. Earlier in the year, policymakers in China announced strategic objectives to reduce energy consumption and carbon intensity relative to GDP over the next five years. We believe that countries globally will find it hard to change their energy profiles materially over the next five to 10 years without compromising their economic competitiveness. This is mainly because of the cost of coal compared with other energy sources and the lack of alternative energy infrastructure. As a result, we still expect the demand for coal to grow in absolute terms over the next five years, notably in countries such as India and China, albeit at a

lower-than-historical rate. On the other hand, demand could fall in some OECD (Organisation for Economic Co-operation and Development) countries over the same period.

Under any scenario, we believe that coal will remain a key commodity worldwide. This should give companies time to adjust to evolving market conditions as changes in countries' energy mix take time to play out. However, since coal is a regional commodity, mainly due to the cost of transportation, the dynamics in each region could be different. We believe the main risk will be the speed of change. As we've observed in the U.S., the dramatic fall in gas prices over the past three years has pressured many coal producers.

The changes in the coal industry over the medium and long term could result in stranded assets (coal reserves with no economic return). In our view, those potential impairments are less likely to affect ratings, compared with the equity value of companies, as we give limited weight to coal reserves that cannot be tapped over the short and medium term, under current prices.

Coal's Significance

Coal provides 30% of the world's primary energy, 40% of electricity, and 68% of steel. Its main advantages are availability, efficient heat rate conversion for power generation, and construction costs per megawatt. On the flip side,

coal leaves a big carbon footprint compared with other energy sources.

According to BP, global coal reserves total about 890 billion tons, enough to last more than 110 years at current production levels. However, after analyzing the quality of the reserves, we find that 50% to 60% consists of low-quality, sub-bituminous and lignite coal, mainly in Russia, the U.S., China, Germany, and Indonesia. In a carbon-constrained environment, most of those assets will be turned into stranded assets.

Other key facts:

- Coal consumption rose by 3.9% per year between 2000 and 2013, with an increase of about 3% in 2013, reaching 8 billion tons. According to the International Energy Agency (IEA), coal will become the world's top source of energy, before oil, in the coming years.
- China produces and consumes about 45% of this, with more than half used for electricity generation.
- The top 10 coal producers in 2012 included China (3.5 billion tons), the U.S. (1 billion tons), India (0.6 billion tons), Australia (0.4 billion tons), Indonesia and Russia (0.4 billion tons each), South Africa (0.3 billion tons), Germany (0.2 billion tons), and Kazakhstan and Poland (0.1 billion tons each).
- Most thermal coal, used for power generation, is consumed domestically. The seaborne market makes up just 14% of global demand (*see sidebar*).
- There are about 1,200 coal-fired power plants around the world, with more than 450 in India and 360 in China. The average life of these plants is 40 years.
- Thermal coal accounts for the lion's share of coal demand (87% or close to 7 billion tons), while consumption of coking coal, a key raw material in

Chart 1 | Thermal Coal Price Evolution—Richard Bay (South Africa)



© Standard & Poor's 2014.

Switching Point From Coal To Gas

Region	Natural gas price (mmBtu)
Powder River Basin	\$2.50–\$2.75
Illinois Basin	\$3.25–\$3.50
Central Appalachia	< \$4.50

the steel industry, totaled about 1.1 billion tons in 2013.

How Policies To Halt Climate Change Could Affect Coal Demand

Energy-related CO₂ emissions have increased in emerging countries (*see chart 2*), as they have experienced rapid growth. Climatologists remain concerned about the impact of this increase on global warming and climate change. It's very difficult to predict the turning point and how much emissions can continue to rise before we see irreversible effects on sea levels or changes in rainfall, drought, flood, and other extreme weather conditions (*see "Dealing With Disaster: How Companies Are Starting To Assess Their Climate Event Risks," published May 21, 2014, on RatingsDirect*). International institutions, including the World Bank and NASA, assess that these scenarios could occur if the world's temperature rose by 2°C to 3°C (degrees celsius). Drawing a line between the current policies in place and the impact on climate change, some scientists predict that the world's temperature could increase by more than 6°C toward the end of the century.

The IEA has assembled several scenarios and assessed their impact on the energy market.

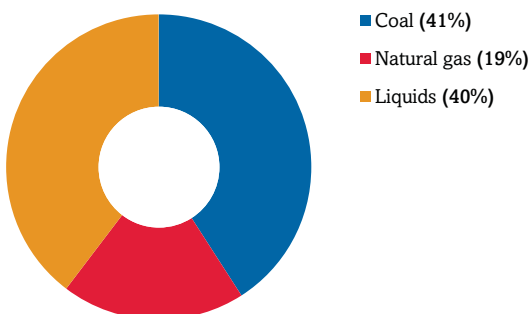
- **New policies.** Under this scenario, governments will introduce energy efficiency programs, support renewables, reduce fossil fuel subsidies, and in some cases put a price on carbon emissions. CO₂ emissions would increase by 20% by 2035 and the world's temperature will rise by 3.6°C.
- **450-parts per million (PPM) scenario.** Governments will implement selected energy efficiency policies, limit the use of inefficient coal power plants, increase the use of renewables and nuclear power, and use carbon capture and storage (CCS) technology to prevent the CO₂ emissions from power generation and industry reaching the atmosphere. In this scenario, the IEA estimates that there will be about a 50% chance of meeting the 2°C target by 2035. What's more, the demand for coal should remain

around current levels (8 billion tons) until 2020 and decline by 2.5% to 3.5% by 2035, to 5 billion tons (including coking coal).

In our opinion, these scenarios appear challenging, as new technologies will need to support a further increase in demand for electricity (an annual increase of 3.4% in demand for coal in the last five years), as well as replace existing coal-fired power plants (*see "Assessing The Credit-Supportiveness Of Europe's Renewable Energy Frameworks," published May 22, 2014*).

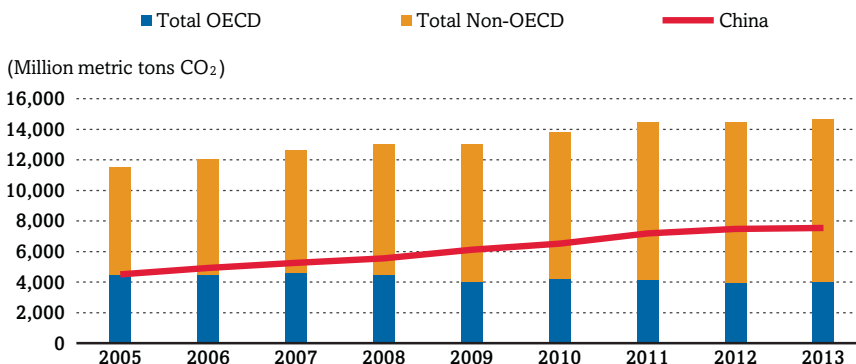
Moreover, given the lack of substitution for coking coal in the steel industry, the decrease in the consumption of thermal coal by 2035 would be higher than 3.5% under the 450-PPM scenario (assuming that the demand

Chart 2 | World Carbon Dioxide Emissions By Fuel In 2013



Source: U.S. Energy Information Administration.
© Standard & Poor's 2014.

Chart 3 | Carbon Dioxide Emissions From Coal Mainly Caused And Driven By Non-OECD



Source: U.S. Energy Information Administration.
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for coking coal remains, at best, at the current level).

As can be seen from the divergence of the IEA's scenarios (see chart 4), the

demand for coal in the future and its price will rely on numerous factors and their timing. Some of the most crucial elements include:

- A change in China's energy profile and that of other countries, with a potential move to shale gas.
- Technological breakthroughs, including reduced manufacturing costs, and the introduction of more efficient methods to generate electricity and capture carbon emissions.
- Carbon pricing through either taxation or cap and trade emission reduction schemes.
- New governmental regulations, such as the recent announcement by the U.S. of a reduction in emissions by 30% by 2030 (compared with 2005).
- Global economic growth and greater urbanization.

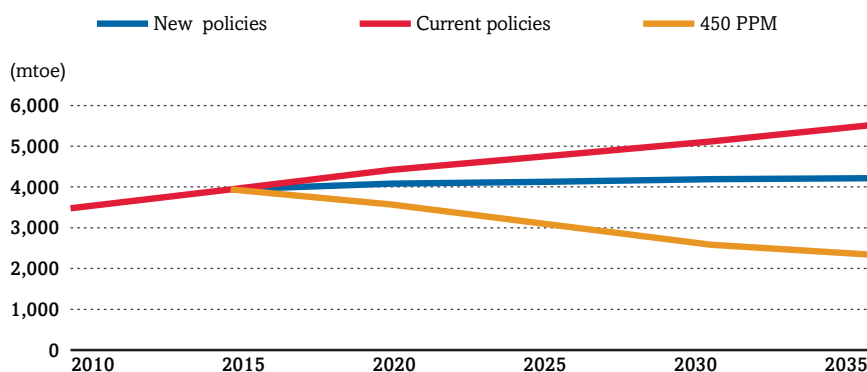
We believe new initiatives, such as those made recently by the U.S. and China, may flatten the growth in coal demand over the coming years. However, whether this will lead to a decline of coal use over time (as in the IEA's 450-PPM scenario) is more uncertain. In our view, any decline in coal demand would depend on the availability of viable alternatives, such as large-scale gas developments in China or renewables.

Clearly, falling demand for coal, both globally and regionally, would be negative for prices and coal miners' ability to service their debt. While we believe that shale gas could be part of the solution, we also note that it has some side effects, which are not always taken into consideration. These include high demand for fresh water, the production of large amounts of waste water, induced seismicity, greenhouse gas emissions, and groundwater contamination.

Increased Environmental Issues Will Support A Gradual Change In China's Energy Mix

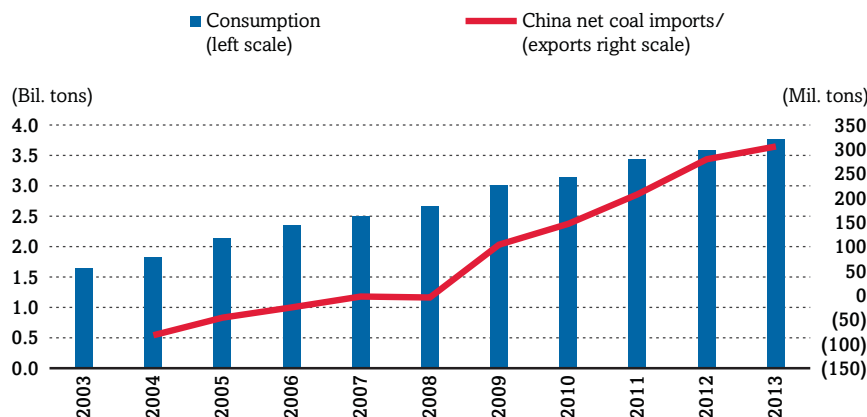
China has increased its coal demand by 7.5% per year between 2005 and 2013 and is now the world's largest consumer, accounting for about 45% of global coal consumption. Besides raising the country's output of CO₂ emissions, this rapid expansion has brought heavy air pollution in industrial provinces and issues regarding the availability of clean water. To

Chart 4 | IEA Scenarios



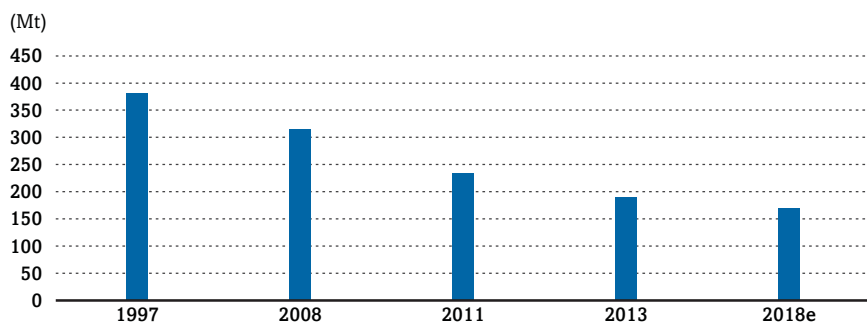
mtoe—Million tons of oil equivalent. PPM—Parts per million scenario.
Source: International Energy Agency (IEA).
© Standard & Poor's 2014.

Chart 5 | The Demand For Coal From China



© Standard & Poor's 2014.

Chart 6 | Appalachian Output



Mt—Million tons. e—Estimate.
© Standard & Poor's 2014.

counter these adverse effects, the Chinese government has recently introduced a new policy to deal with climate change by 2020. One recent initiative would reduce coal consumption as a percent of total energy consumption to below 65% by 2017 from about 67% in 2012.

However, we don't believe the current programs will trigger a fundamental change in China's energy profile, and more steps are needed between 2020 and 2030 to meet the IEA's 450-PPM scenario. In addition, we also need to remember that targets may change. For example, in 2009 the government set a target to cut CO₂ per unit of GDP by 40% to 45% by 2020, compared with 2005 levels. Based on the increase in the consumption of coal in China since 2005, China is already approaching this limit.

In 2013, China's coal demand totaled about 3.6 billion tons (*see chart 3*), compared with domestic production of about 3.7 billion tons. At the same time, imported coal from overseas totaled about 330 million tons (mt), leading to an oversupply of more than 420 mt. Domestic coal producers have had to cut

prices to face both an economic slowdown and lower seaborne prices.

According to BP, China has 113 billion tons of coal reserves (about half is low-quality, sub-bituminous, and lignite coal), meaning that China's reserves are less than 30 years at current consumption levels. We believe that the life and quality of the reserves, in addition to climate change issues, will push the government toward other energy sources.

When will China reach its peak demand for coal? Some assume that demand will peak between 2015 and 2020. For example, the China Development and Reform Commission points to the possibility of peak coal demand in China by 2015. Others, such as the Chinese coal industry association, see the consumption of coal reaching 4.8 billion tons by 2020, well above the level projected by the IEA.

Under our assumption of GDP increasing by 7.4% and 7.2% in 2014 and 2015, respectively, we assume that the coal demand growth in China will decelerate to low-single digits before flattening by 2020. This is due to the slow shift of the economy toward consumption from capital investments, lower

GDP growth, and the Chinese government's increasing focus on tightening emission standards and moving to more renewable energy sources. Other tangible factors include the low level of fresh water and lack of long-term quality coal resources. On the other hand, coal is still the cheapest energy source and the application of new policies in China can take time (*see chart 5*).

Capping demand in China is not necessarily bad news for the industry. In previous years, China has offset the gap between domestic coal production and domestic demand with imports. In our view, the import market will also remain an important balancing factor in the future, due to the country's need to meet higher demand for coal and replace its domestic low quality ore with higher quality coal. In our view, this scenario could support higher prices for seaborne coal in the medium term.

We believe that gas in China is the main threat for the coal industry over the long term. Without it, we think it unlikely that there will be a reduction in the use of coal over time or an ability to deal with its climate change challenges.

The Seaborne Coal Market And Pricing

Seaborne coal totaled 1 billion tons in 2013 (just 14% of world demand), a quarter of which was taken by China. Australia, South Africa, and Colombia are the main seaborne coal-exporting countries.

The seaborne market has markedly increased since 2007 when China became a net importer to meet its electricity needs. However, seaborne imports only equal 5% to 6% of China's coal demand.

In 2013, the seaborne market remained in oversupply, despite disruptions such as industrial unrest in Colombia. This has kept prices depressed (*see chart 1*) and discouraged investment. In 2014, prices for thermal coal have dropped to \$75 per ton from \$105 per ton on average in 2012. We estimate that this price is below the breakeven point for about 30% of seaborne volumes (mainly coal coming from the U.S. and Russia), while coal from countries such as Indonesia, Australia, Colombia, and South Africa is still competitive.

We observe three trends affecting seaborne coal prices in the short term. First, limited growth in capital expenditure. Based on the project pipelines of major coal companies, we

see little seaborne supply coming to the market between 2014 and 2017. Most of the additional capacity will come from Indonesia (approximately 60 to 80 mt) and Australia (about 20 mt). Second, Chinese imports could increase to keep up with rising coal demand and replace lower quality coal, which is both negative from an energy intensity and environmental (water) perspective. And third, we see the prospect of additional coal export infrastructure, which U.S. coal miners are expanding. In 2013, U.S. coal miners exported about 100 mt of thermal coal, compared with 45 mt in 2006. At the current price level, exports from the U.S. remain largely unprofitable.

We believe that prices should rebound from their current depressed levels over the coming years, although not to the level of previous years; for example, \$100 per ton and higher in 2012. Supporting this increase will be some industry curtailment and higher demand for seaborne coal (between 2011 and 2013, the seaborne market grew by about 200 mt, equivalent to the additional export of coal from the U.S. and new capacity coming from Australia and Indonesia).

- **Shale gas.** This may become a game changer, but for now it remains an unknown factor. According to EIA, China's technically recoverable shale gas resources are about 1,100 trillion cubic feet (70% more than U.S. shale gas resources). In 2013, the country produced only 0.5 billion cubic meters (bcm) of shale gas. The Chinese government aims to produce between 60 bcm and 100 bcm of shale gas by 2020 (equivalent to 150 mt to 250 mt of coal). In our view, these targets could be difficult given the geological challenges, missing infrastructure, and local bureaucracy and, even if achieved, they are small compared with overall demand for energy in China.
- **Natural gas.** China recently signed a large natural gas deal with Russia to secure an annual natural gas supply of 38 bcm for 30 years (see *"Standard & Poor's Perspective On Gazprom's Gas Contract With CNPC And Its Implications For Russia And China," published June 6, 2014*). Pipeline construction will take between four and six years. This transaction is part of a larger objective to more than double the consumption of natural gas to about 400 bcm by 2020. To meet this objective, the country will need to build more liquefied natural gas facilities and bring more piped gas to the country.

Gas Rivals Coal In The U.S. Energy Mix

The structural change in the U.S. coal market is probably a more drastic scenario, of the gradual change we anticipate the global coal industry will be going through from 2020. The discovery of large deposits of natural gas in early 2010 triggered a sharp decline in prices from \$7/million Btus (mmBtu) in 2009 to \$1.9/mmBtu in 2012. Natural gas, as a lower cost and lower carbon energy source, has created incentives for utility companies in the U.S. to abandon the use of coal. Since 2010, the demand for coal in the U.S. has dropped by 125 mt. In addition, EPA regulations issued over the past few years are likely to result in the retirement of more than 60 gigawatts of coal-fired capacity by 2016, equal to

80 to 90 mt. The main mines at risk are in Central Appalachia (CAPP).

However, we believe that coal in the U.S. will continue to remain an important, albeit declining, energy source. In our view, discussions on the subject indicate that a complete replacement of coal with shale gas looks unrealistic over the short to medium term. Over time, we assume that cheap natural gas will replace about 200 mt of coal. We base our assumption on long-term natural gas prices between \$4.25 to \$4.5/mmBtu. The impact won't be cross-border: While coal from the Powder River basin will continue to be competitive, it would be uneconomical for many utilities to burn CAPP coal at those higher prices.

In our view, the future of U.S. coal mining companies will rely on domestic natural gas prices, as well as their ability to export coal, as the momentum toward more gas-fired generation is only likely to accelerate following the EPA's recent announcement to curb emissions. In 2013, U.S. coal miners exported about 100 mt of thermal coal, compared with 45 mt in 2006. While U.S. coal miners aim to expand their export capabilities to 220 mt over the coming years, the EIA anticipates that coal exports from the U.S. will decrease slightly to 90 mt in 2015.

In our view, should a material increase of exports from the U.S. occur, this may lead to the following outcomes over the short term:

- More pressure on the European coal industry, characterized by relatively high production costs.
- Coal miners (such as GlencoreXstrata) delaying the development of new coal projects. New coal mines will likely be developed in landlocked regions or mines with excellent unit cash cost.
- Demand from China and India supporting a higher demand for energy and replacing lower-quality coal.

Consequently, we believe that prices will remain depressed with limited upside.

Global Coal Market Growth Still Depends On Emerging Asian Economies

We don't expect CO₂ policies to significantly affect coal mining in Indonesia,

Vietnam, and Australia in the short term. Absolute demand continues to grow and net production (new growth versus shut production) remains positive. We see fairly sizable production growth in Indonesia (20 to 30 mt this year and in 2015 and 2016), even assuming prices of \$75 per ton. This is because the top seven players in the country—who control 60% to 70% of production—remain very profitable and need to grow production to service their large debt burdens.

Even if coal consumption in China is capped, we believe that large energy deficits persist in key countries in Asia (India, Vietnam, and Indonesia, for example), where pollution is not at the top of the agenda or an issue, and electricity growth through coal will continue to encourage production growth. New regulations in those countries could reduce output to the seaborne market, leading companies to sell their output domestically, which could force small domestic coal miners out of business. This will result in a shift of the regional cost curve to the left, leading to lower prices domestically.

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Climate Change Could Sting Reinsurers That Underestimate Its Impact

There is no scientific consensus on how much climate change may have contributed to extreme weather in recent years, and how much it is expected to contribute in the future. However, the reinsurance industry recognizes that climate change is likely to have a significant impact on future weather events. To prepare for that, many reinsurers actively follow and sponsor scientific research into the topic. Moreover, they rely on their ability to adjust premiums in the future for any gradual increase in weather-related claims over time, as most non-life business is renewed yearly. However, most reinsurers do not believe that climate change is having a material quantifiable impact on their current risk exposure, nor do they think it is likely to do so in the near future.

Overview

- The possibility that climate change is already affecting the frequency and severity of extreme events cannot be ruled out, even if it cannot be quantified exactly.
- We created a scenario based on the past 10 years' loss experience to test the potential impact of climate change; the results indicate that, under this scenario, reinsurers might be underestimating their exposure to catastrophe losses by an average of about 50%.
- Under this scenario, key ratings metrics which we use to assess reinsurers' capital adequacy and catastrophe exposure are materially affected.

However, what if climate change is already having an impact and will keep doing so through more frequent and extreme events, as some scientists believe?

Standard & Poor's Ratings Services believes it's unwise to rule out the possibility that climate change has already begun to affect reinsurers' risk exposure, especially given the number of catastrophe events recently triggered by extreme weather. For most reinsurers, their highest catastrophe losses over the past 10 years occurred in 2005 or 2011. Hurricanes Katrina, Rita, and Wilma occurred in 2005. In 2011, catastrophe losses included weather-related events: Thai floods, tornados in the U.S., Hurricane Irene, and flooding in Australia.

Given this recent history, we think it's prudent to ask: If the catastrophe losses of 2005 and 2011 were to become the "new normal," what would it mean to reinsurers' catastrophe exposure and, ultimately, to their ratings? While this scenario is simplistic, it illustrates that reinsurers' exposure to catastrophe losses could be substantially higher than they currently estimate, with climate change likely being a major factor.

Projecting The Catastrophe Risk Landscape Under The Impact Of Climate Change

Due to the complexity of climate systems, there is significant uncertainty about the impact of climate change and

how that impact will develop over time. Nevertheless, we consider the possibility that climate change is already affecting the frequency and severity of extreme events cannot be ruled out, even if it cannot be quantified exactly.

To understand the effect climate change could have on reinsurers' financial strength, we have analyzed a simple scenario based on the assumption that the catastrophe experience over the past 10 years indicates the current probabilistic distribution of extreme events—in other words, that it represents a typical decade.

We have chosen a period of 10 years because the industry has experienced a significant increase in weather-related losses over the past 10 years, even after allowing for inflation and exposure growth. Although natural statistical variability of probabilistic events could cause this, it could also be due to a worsening of the underlying catastrophe risk environment, to which climate change may have contributed. This probabilistic view, based on the past 10 years, implicitly incorporates any impact that climate change has already had on catastrophe losses in that period.

We recognize that 10 years is a short period from which to build a robust probabilistic view and that using longer time periods (50 to 100 years) leads to more robustly calibrated stochastic models. However, it is possible that the risk of extreme events may be underestimated if most of the data come from a period when climate change had less of an effect on the underlying weather risk.

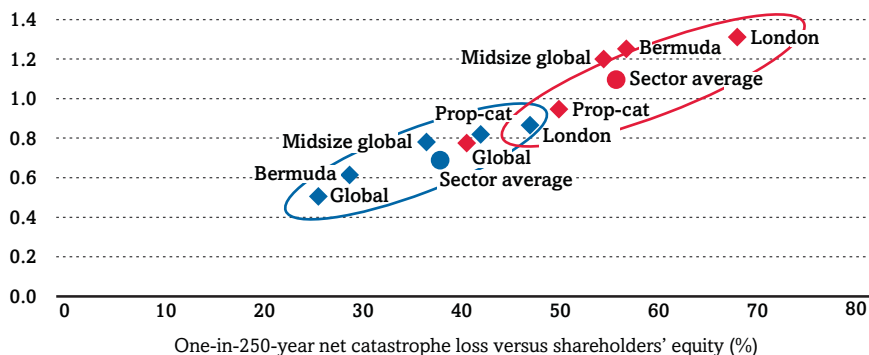
The "new normal" scenario

Our scenario assumes that the past decade is typical, and it considers catastrophe loss experience on a gross basis (that is, excluding the effect of retrocession protection). It projects that the highest catastrophe loss events seen in this period (adjusted for inflation and exposure changes) would recur every 10 years on average, that is, a one-in-10-year event.

Our annual catastrophe surveys include each reinsurer's calculation of its one-in-10-year loss event. To calculate losses under the "new normal" scenario, we took the highest catastrophe loss each reinsurer suffered during the past decade, adjusted for inflation

Earnings Versus Capital At Risk Exposure: The "New Normal" Scenario Impact

One-in-10-year loss versus PBT
[two-year average] excl. catastrophe losses (x)



PBT—Profit before tax. Prop-cat—Property-catastrophe/short-tail. Blue area = reinsurer's modeled results. Orange area = "new normal" scenario.
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and changes in exposure. We calculated how its catastrophe risk exposures would look if that was its one-in-10-year loss.

On average, our scenario's one-in-10-year loss is around 50% higher than the one-in-10-year loss reinsurers are modeling. (Most reinsurers are in the 0% to 80% range.) We then extrapolated from the one-in-10-year loss to find the one-in-250-year loss under the scenario, because we input this level into our capital model to assess a reinsurer's capital needs for catastrophe risk. We estimate that on a gross basis, reinsurers may be understating both the one-in-10 and the one-in-250-year loss by the same magnitude (around 50%).

Even though we did not explicitly quantify it, the impact after retrocession recoveries may be somewhat higher. This is because the average benefit of retrocession protection reduces at this increased level of estimated losses. The benefit of retrocession protection may be further reduced if extreme losses are accompanied by an increase in frequency because most reinsurers have very limited protection after a second catastrophe event occurring within a contract year. Purchasing new retrocession protection may be prohibitively expensive after a second major catastrophe event.

Impact on the rating metrics

Under this scenario, key ratings metrics that we use to assess reinsurers' capital adequacy and catastrophe exposure are materially affected. The reinsurers with the highest catastrophe exposure would be most affected. The average capital adequacy of the reinsurers we rate could fall from extremely strong to the high end of very strong. In addition, in the event of a one-in-250-year loss, capital at risk would be 54% as a percentage of total adjusted capital, up from 36% (see "Global Reinsurers' Appetite For Catastrophe Risk Remains Largely In Check," published Sept. 1, 2014, on RatingsDirect).

Reinsurers' exposure to earnings volatility would also be higher if the one-in-10-year loss were as high as we have projected in this scenario. We use the earnings-at-risk exposure metric (defined as the one-in-10-year loss impact on the two-year average of profit before taxes, excluding catastrophe

losses) to measure earning volatility for rated insurers, which our scenario indicates would increase to 112% from 75% (see chart). Investors may be less willing to support reinsurers with high catastrophe exposure if the probability of increased annual losses is higher.

What Can We Learn From This Scenario?

We recognize that the approach described above is too simplistic to give us a reliable insight of what might be the "new normal." We anticipate that the real impact of climate change on catastrophe experience will likely fall between the view shown in our scenario and reinsurers' currently modeled losses. However, the scenario's pessimistic estimate of potential exposure to catastrophe risk indicates the scale of the impact climate change could have on catastrophe risk and ratings.

Although we recognize the difficulties in accurately capturing the potential impact of climate change on extreme events, we take a favorable view of reinsurers whose capital modeling and exposure management takes into consideration how climate change may affect extreme weather events. We consider that disregarding the possible impact may lead reinsurers to accept higher catastrophic risk than their risk appetite would usually allow. **CW**

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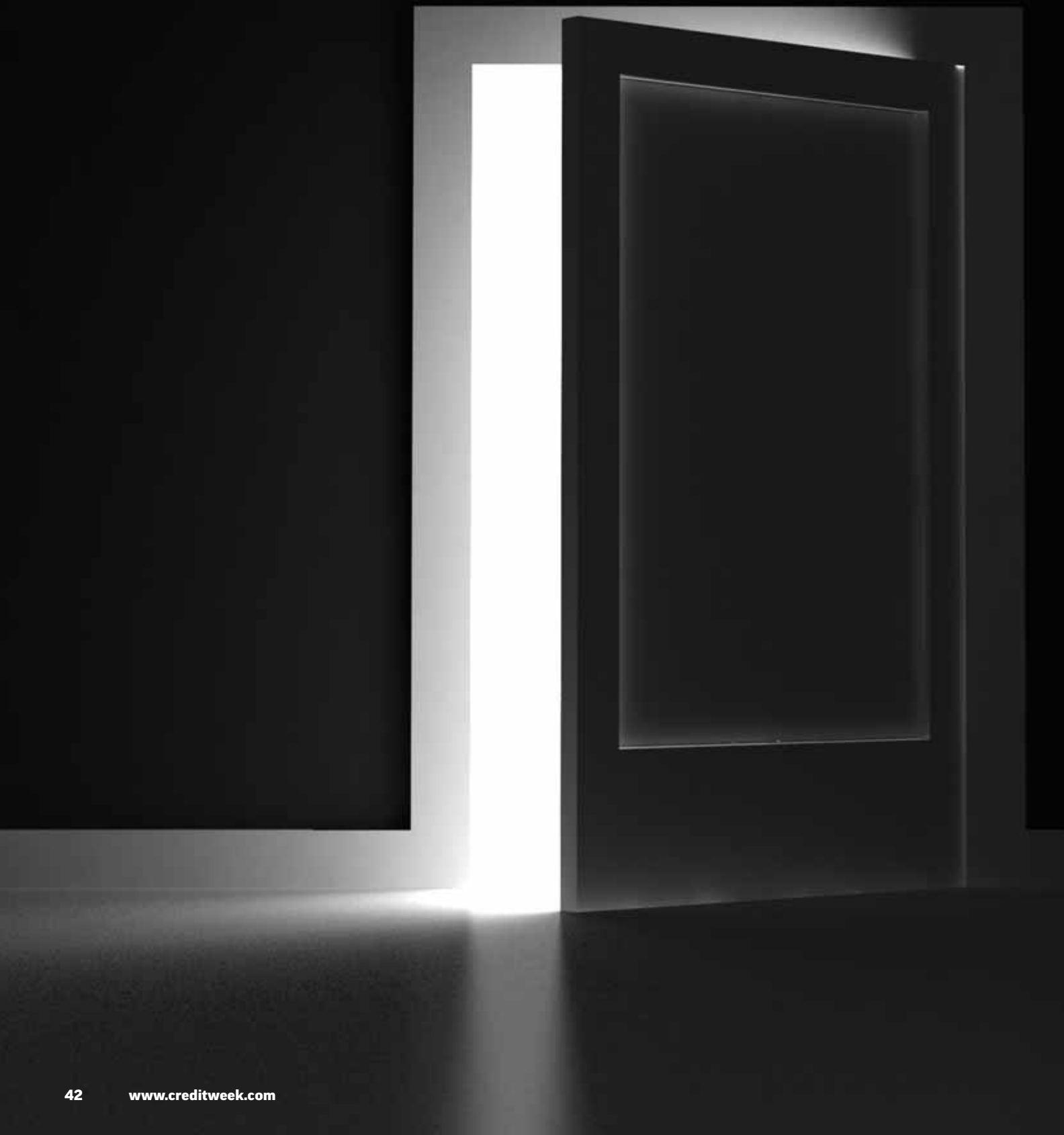


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Working With Governments To Increase Disaster Resilience Can Open New Doors For Reinsurers

Overview

- Growing middle-class wealth in many developing economies is outpacing insurance penetration, increasing the level of uninsured losses a country must absorb after a disaster.
- The higher the level of uninsured losses, the greater the financial shock and the potential for an economy's growth to be derailed.
- By building disaster resilience, before an event, governments can benefit from their ability to devise solutions that will help protect economic stability and provide timely relief, recovery, and reconstruction funding.
- We believe that reinsurers can play a role in protecting governments and their citizens from the financial shocks associated with natural catastrophes, which should reinforce the relevance of the insurance market.

The rising tide of losses in the wake of natural catastrophes is increasing economic instability in many developing economies. Standard & Poor's Ratings Services believes reinsurers can play a role in building governments' resilience to the financial shocks associated with natural catastrophes. In some cases, extreme events in large developed and developing markets could not only derail the growth of that economy, but could also cause a ripple effect, affecting the global economy. Ultimately, developing a market for these products will help reinsurers reinforce their relevance to new clients and new risks should lead to a stronger insurance market and increased insurance penetration (measured as insurance premium as a percentage of GDP).

As part of a recent report on climate change and its impact on sovereign ratings, Standard & Poor's analysis indicated that emerging economies are more vulnerable to extreme weather events (see *"Climate Change Is A Global Mega-Trend For Sovereign Risk," published on May 15, 2014, on RatingsDirect*). The debate is ongoing as to whether or not climate change is already causing the frequency of severe events to increase. However, extreme weather events are occurring more often, and economic losses are increasing as populations and wealth grow. Our research shows that each of the top 20 most vulnerable nations are emerging markets, and the average insurance penetration (insurance premium as a percentage of GDP) in these countries, at 0.9%, is less than half of the global average (2.1%).

In our view, government-backed insurance solutions, supported by the global reinsurance industry, could provide some protection and stability to government budgets, mitigating the potential for instability and growth retardation.

Emerging Economies Risk Being Blown Off Course Following Large Catastrophes

In a 2009 working paper produced for the World Bank, Stefan Hochrainer found that, on average, a country's GDP five years after a catastrophe event is about 4% below what it would have been had no event occurred. Uninsured losses must be absorbed by the economy, either citizens or the state; leading to unbudgeted expenditure. Table 1 shows how events modeled as having extremely low probabilities of occurrence (once in every 100 years, or once in every 250 years) would affect different countries. We calculate that in these scenarios, economic losses could damage GDP in some developing nations.

However, the picture changes when we take insurance protection into account. In some cases, the insurance industry absorbs more than half of the catastrophe loss that the state and citizens would otherwise have to cover (see table 2).

Natural catastrophe events, which include extreme weather events, have

been occurring more frequently around the world. Since 1980, the annual average number of extreme weather events per decade has grown by 141%. At the same time, losses are increasing and, as the trend lines in chart 1 demonstrate, the uninsured losses are growing faster than insured losses. Although this represents a missed opportunity for the insurance industry, it should also, in our view, represent a growing concern for the governments in these underinsured economies.

Catastrophic Losses Can Affect An Economy In Many Ways

Catastrophic events and the uninsured losses that stem from them can damage economic stability in more ways than just by hindering GDP growth. The World Bank cited studies going back as far as 1995 that support the notion that natural disasters can lead to a short-term increase in fiscal deficits as tax revenues fall, as well as an increase in trade deficits as exports decrease while imports rise.

The flow of losses to consumers can also weaken a country's income generation and exacerbate its income inequality because it affects lower-income consumers' spending power more strongly. Additionally, if a government has not put a reserve or other provision in place to act as a rainy day fund, it will have to bear the immediate cost of disaster relief and recovery, which could pose budgetary shocks. Over the longer term, studies have

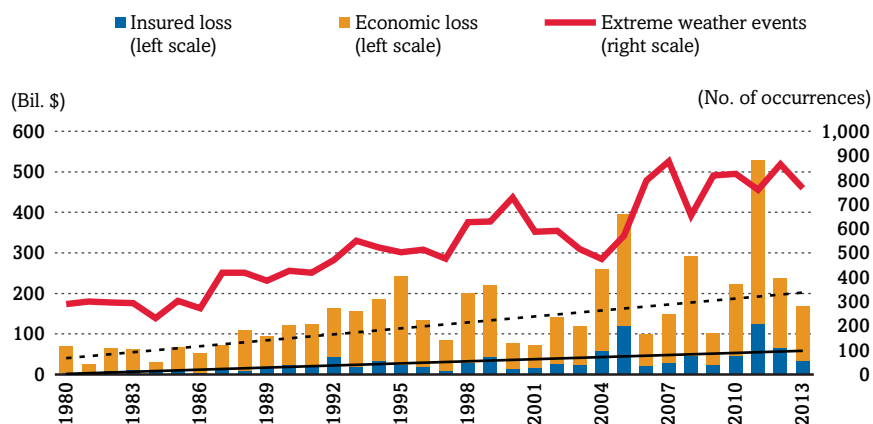
identified associations between disasters and growth in external indebtedness, budget deficit, and inflation.

As if these were not enough, the evidence indicates that natural catastrophes also inhibit a country's development prospects and ability to attract capital. Munich Reinsurance Co.'s research indicates that, in some small countries, economic losses from large catastrophic events can amount to 30 years' worth of net capital formation.

The level of macroeconomic instability caused by catastrophic events largely depends on the size and severity of the event. In certain extreme events in major developing markets, we consider it possible that destabilization and significant reversals of growth could have a ripple effect in the region, or even globally. Our research suggests that, over the long term, climate change and extreme weather events could lead to sovereign rating changes, and could contribute to a divergence in ratings between sovereigns.

In our view, the global reinsurance industry is well placed to help catastrophe-exposed states reduce their liability and protect their economic stability. Reinsurers can offer expertise in modeling and assessing catastrophe risk exposure, educating stakeholders on the level of their exposures, creating bespoke solutions that provide proper protection, and acting as an intermediary with the capital markets to pair buyers and sellers of protection.

Chart 1 | Natural Catastrophes: 1980 To 2013



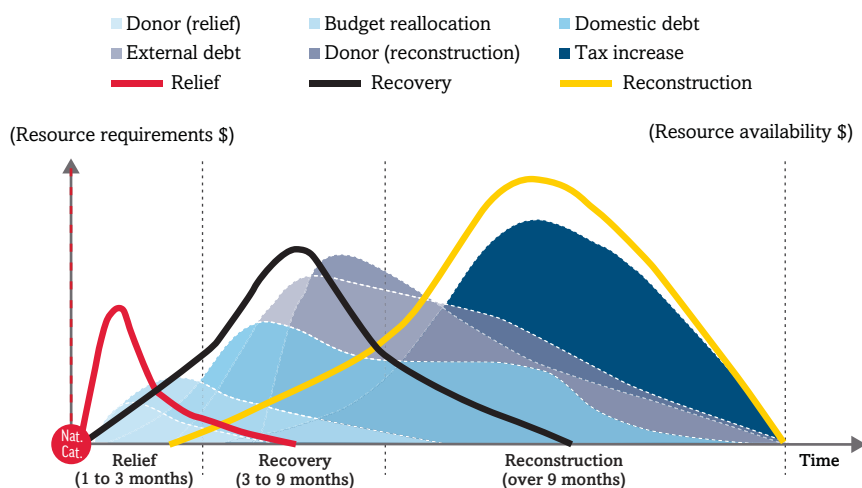
Sources: 2014 Münchener Rückversicherungs-Gesellschaft, NatCatSERVICE.
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Many insurance-based solutions already protect developing economies around the world (see “*Risk Transfer Innovation: The Key To Emerging Markets For Global Reinsurers*,” published on Sept. 9, 2013). Governments have made use of pooling arrangements, structured reinsurance solutions, and bespoke insurance policies. However, these are typically put in place following a major event, as was the case with the Turkish Catastrophe Insurance Pool, set up in 2000 after a series of earthquakes the previous year.

The Benefits Of Being Prepared

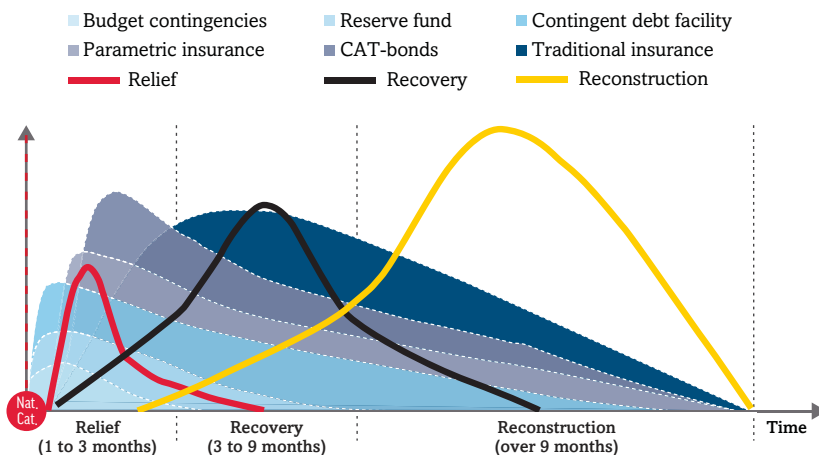
Putting these arrangements in place before a disaster strikes carries clear benefits (see charts 2 and 3). Chart 2 shows the timing mismatch between demand for relief, recovery, and reconstruction funding and when those funds begin to come in from external and domestic sources, such as donor relief, budget reallocation, and debt, which is the current status quo. In contrast, in chart 3, we see that where insurance-based solutions or other mitigants are in use, the funds for

Chart 2 | Supply And Demand Of Funds Following A Catastrophe Using Pre-Catastrophe Financing



Sources: 2014 Münchener Rückversicherungs-Gesellschaft, NatCatSERVICE.
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Chart 3 | Supply And Demand Of Funds Following A Catastrophe Using Post-Catastrophe Financing



Sources: 2014 Münchener Rückversicherungs-Gesellschaft, NatCatSERVICE.
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Table 1 | Modeled Catastrophe Losses

Country	Peril	Vulnerability ranking	-1/100*-		-1/250*-	
			Economic loss	% of GDP	Economic loss	% of GDP
Haiti	Hurricane	N.A.	8,492	100.4	15,338	181.3
Haiti	Earthquake	N.A.	2,293	27.1	7,897	93.4
Albania	Earthquake	104	5,759	44.6	8,003	62.0
Chile	Earthquake	20	22,447	8.1	55,586	20.1
India	Earthquake and hurricane	101	100,422	5.4	215,750	11.5
Philippines	Earthquake and hurricane	110	14,522	5.3	24,001	8.8
Turkey	Earthquake	47	44,184	5.4	68,001	8.3
U.S.	Hurricane	10	N.A.	N.A.	357,860	2.1
U.K.	Windstorm	12	N.A.	N.A.	37,841	1.5
France	Windstorm	9	N.A.	N.A.	16,984	0.6
Germany	Windstorm	8	N.A.	N.A.	17,147	0.5

*Modeled probable maximum losses from Cummins & Mahul (2009) were adjusted for inflation to 2013; figures do not estimate exposure growth. N.A.—Not available.
 Sources: Cummins & Mahul (2009), Standard & Poor's Climate Change Vulnerability Index Rankings, and World Bank.

relief, recovery, and reconstruction begin to flow in very soon after the event. This helps to reduce the short-term strain on government and consumer budgets.

Reinsurers' success in developing the market for this type of product line could reinforce the industry's relevance in many catastrophe-exposed high-growth markets, as it has in Turkey, and open up new insurance markets as these economies mature.

Changing The Mindset

In many developing economies, insurance is viewed as a tax, rather than a valuable protection, particularly if no major loss events have occurred recently in the region. As a result, authorities are likely to underestimate or de-emphasize their catastrophe exposure. Even if they recognize the scale of their exposure to catastrophe risk, elected politicians must consider how the public assesses the value of any insurance-backed transaction, especially in times of austerity.

Because the protection may only provide benefit if an infrequent and severe event occurs, over the short term, the benefit may be significantly less than the premiums paid. Indeed, if reinsurers are to make any money in these transactions, it is likely that over the long term, premiums paid would likely exceed the value of the indemnification received, as any premiums paid would include the reinsurers' profit and cost of capital margins. Reinsurers will

have to invest time and effort to change how politicians and the electorate consider the value of insurance.

Authorities that take a longer-term view may be tempted to choose to self-insure, rather than purchase explicit, insurance-based protection. However, this choice would deprive them of the benefit of protection against very extreme events. Instead, they could choose a product that will pay out after a more frequent event; in other words, the protection kicks in for smaller catastrophes. If insured states receive benefits more regularly, it will be easier for voters and governments to recognize the value of such protection.

Making The Economics Work

Reinsurers are not charities, and at the end of the day the economics of these deals must make sense for them too. In our view, some aspects of these structures could keep the arranging costs high for reinsurers.

Once a government has shown interest, the firm it works with will have to develop a product that takes that country's regulatory framework and decision-making process into account. This is likely to increase the time and cost that reinsurers need to develop and execute the protection plan. These costs may reduce the value of the structures for both reinsurers and states.

In addition, reinsurers may face reputational damage if a major event occurs and the structures do not perform as promised, in the eyes of authorities and the public. For example, some structures may pay claims based on simple parameters such as wind speed or earthquake magnitude. In some scenarios, an event may occur that does not meet these parameters and the protection won't be triggered. Payouts will then differ from the actual losses; this is known as basis risk. Any material differences may undermine the transaction's value and damage a reinsurer's reputation—voters may consider that the reinsurer is avoiding paying the true cost. Although reinsurers may aim to minimize their basis risk, having parameter triggers is an important structural feature that enables reinsurers to pay claims quickly.

Reinsurers may find it difficult to build a robust risk view, because the modeling of some of the perils in developing markets is not as developed as for other key industry perils, such as a U.S. hurricane or Japanese earthquake. Insufficient data on loss history or exposures is one of the primary challenges reinsurers face when building robust models for these new regions and perils.

In our view, it will be important for reinsurers to demonstrate to buyers and investors that the models they use are sufficiently robust. This is because the models are likely to be reinsurers' main tool for

Table 2 | Selected Large Historical Catastrophe Losses

Event	Year	Peril	Economic loss (mil. \$)	Insured loss (mil. \$)	Insurance/ economic (%)	Economic loss/ GDP (%)	Insurance loss/ GDP (%)
Tohoku (Japan)	2011	Earthquake	235,000	35,000	15	4.0	0.6
Katrina (U.S.)	2005	Hurricane	125,000	66,900	54	1.0	0.5
Sichuan (China)	2008	Earthquake	125,000	366	0	2.8	0.0
Kobe (Japan)	1995	Earthquake	100,000	3,000	3	1.9	0.1
Sandy (U.S.)	2012	Hurricane	68,500	29,500	43	0.4	0.2
Thailand	2011	Flooding	45,700	15,500	34	13.2	4.5
Northridge (U.S.)	1994	Earthquake	42,000	15,300	36	0.6	0.2
Ike (U.S.)	2008	Hurricane	38,000	18,500	49	0.3	0.1
China	1998	Flooding	30,700	1,000	3	3.0	0.1
Chile	2010	Earthquake	30,000	8,000	27	13.8	3.7
Andrew (U.S.)	1992	Hurricane	26,500	15,700	59	0.4	0.2

Sources: Munich Re, NatCatSERVICE (2014), World Bank.

demonstrating the benefits of their insurance structures to their clients. Modeling uncertainty presents reinsurers with a difficult balancing act: if their pricing includes margins built in to reflect the modeling uncertainty, it may reduce the value for their customers; but if it doesn't, they risk accepting underpriced risks.

Building Disaster Resilience Could Help Open High-Growth Markets To Reinsurers

In our opinion, there is a strong case to be made for the benefits of government-backed risk protection solutions. The successful development of this market could be key to entrenching the relevance of insurance in high-growth markets. Various market trends—regulatory changes, insurance growth in emerging markets, and insurance-linked securitization—could also help to increase the profile and attractiveness of these insurance-backed solutions. We have also observed that in many emerging markets, the attitude toward insurance and risk awareness is changing and regulators are increasing capital requirements and mandating the purchase of insurance in some lines of business. At the same time, insurers and reinsurers are increasingly looking for ways to expand their presence in emerging markets. They are therefore expending more effort on working with stakeholders to find solutions that help to develop these insurance markets. We also consider that the recent

influx of capital markets capacity and the resultant demand to diversify risks by region and peril could make it easier to find capital to back these solutions.

We consider that the reinsurance industry has a long-term and important role to play in developing awareness and acceptance of insurance-backed solutions for states' catastrophe exposure. In our view, taking on this role will provide diversification of risk exposure, help to educate and develop new insurance markets that can provide growth potential for years to come, and ultimately reinforce reinsurers' relevance to a new set of potential clients. **CW**

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Europe Makes Strides Toward A Low-Carbon Economy With 2030 Targets

EDITOR'S NOTE: The author of this article, Frank Watson, is managing editor of emissions markets at Platts, an entity also owned by McGraw-Hill Financial but operated independently of Standard & Poor's. The opinions expressed are the independent opinions of the author and do not reflect the opinions of Standard & Poor's. Platts operates as an entirely separate entity from Standard & Poor's analytic services in order to preserve the independence and objectivity of each analytic process.

Europe's ongoing progress toward a low-carbon economy shifted into a higher gear this year after the European Commission (EC) in January unveiled a draft EU 2030 climate and energy framework. The EC proposed a binding, 40% minimum target cut in EU greenhouse gas emissions from 1990 levels by 2030, which is fully in line with its objective for 2050. The goal for 2050 is to reduce emissions by at least 80% from 1990 levels. The draft, which seeks to build on the bloc's 2020 climate and energy targets, sets out new goals for reducing Europe's carbon dioxide (CO₂) emissions, boosting renewable energy generation, and revamping its flagship carbon market. The EC followed this up in July with goals for energy efficiency, completing the 2030 framework.

The 2030 framework “aims to build a competitive and secure energy system that ensures affordable energy for all consumers, increases the security of the EU’s energy supplies, reduces our dependence on energy imports, and creates new opportunities for growth and jobs,” the EC said on its website.

The measures have yet to be agreed on, as EU heads of state and governments are expected to discuss the framework in October. But EU leaders agreed at a European Council meeting in March to make a final decision on the framework by October at the latest.

The timing of the new framework is significant because the EU wants to submit its contribution to the United Nations by the first quarter of 2015. This contribution would form Europe’s basic position at UN climate talks scheduled for December 2015 in Paris, at which more than 190 countries will be seeking a global pact to curb climate change.

The EU Seeks Agreement Ahead Of Global Talks

There is little doubt that the EU is serious about cutting emissions by 40% by 2030, a critical milestone to reaching an 80% reduction or more by 2050. Failure to meet this interim goal would increase the difficulty of making the required cuts after 2030 and inflate the cost of doing so, compounding future trouble for Europe’s economy. Missing the 2030 goal would also make it

increasingly difficult to meet the 80% target just 20 years later.

But given the global nature of climate change, unilateral action by Europe alone would not make a significant dent in the problem, particularly in light of rising emissions in fast-developing economies such as China and India. The EU’s 2030 framework is, therefore, seen as an attempt to encourage other countries to take comparable action as part of a global effort.

The key point of the draft is that the EC is seeking to send a clear message to the private sector that it is serious about pushing toward a low-carbon economy and wants to create long-term regulatory clarity and price signals that the markets can work with, including a more robust and resilient carbon market. But finding agreement on the 2030 framework may not be easy. Inevitably, short-term interests can hold more political sway than long-term strategic goals. Some EU member states are concerned about the effect the 2030 framework will have on their economies, and several Eastern European countries are asking for more time to assess these effects fully, according to industry observers in Brussels, meaning full agreement may not be possible in October as planned.

Balancing Economic Challenges And Political Concerns

Overcoming political differences between EU member states and

finding workable compromises will be vital to ensuring that a broad package of measures passes, giving Europe a clear route to delivering emission reductions, more renewable energy, higher energy efficiency, greater energy independence, and a stronger negotiating position at the UN climate talks in Paris.

Europe’s effort to meet the 40% target by 2030 will be shared among the EU Emissions Trading System (ETS) and the non-traded sector, according to the draft package.

The EU ETS regulates carbon dioxide (CO₂) emissions from Europe’s power plants, factories, and airlines—which account for about 45% of the economy’s CO₂ emissions. The non-traded sector includes surface transport, agriculture, and non-commercial buildings, among others. The EU ETS is a cornerstone of EU climate policy, and policymakers want to make sure it continues to play a key role in the road to decarbonization by 2050.

EU ETS CO₂ Emissions And CO₂ Cap To 2020

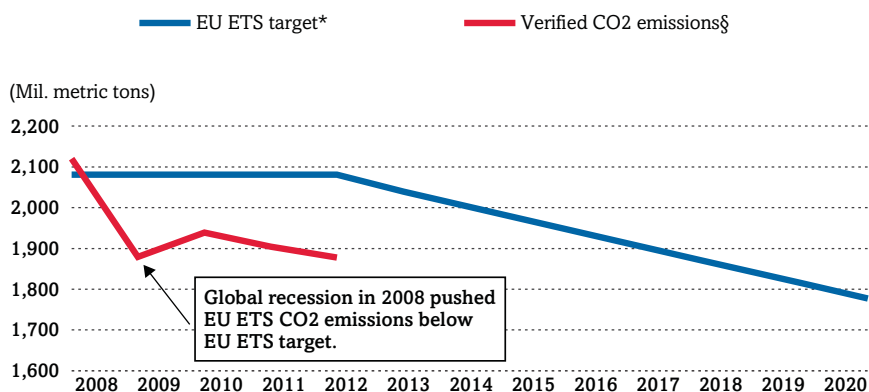
To meet their share of the 2030 target, the EU ETS sectors would be expected to cut their CO₂ emissions by 43% from 2005 levels. The non-traded sector’s target is a 30% reduction below 2005 levels by 2030.

The non-traded sector’s emission reductions are expected to be allocated among EU member states under a so-called “Effort-Sharing Decision,” which will be updated using the latest available data to establish national targets for 2030.

On the market-based approach, the EC is seeking to boost the EU ETS, where the price of carbon allowances has fallen sharply, from as high as €30.00 per metric ton (US\$38.78/mt) in 2008 to about €2.50/mt in April 2013. The price has risen to about €6.00/mt by early September this year.

The drop in carbon prices is entirely appropriate and in line with falling CO₂ emissions, which are well within the CO₂ cap set forth under the EU’s emissions trading legislation. But the price

EU ETS CO₂ Emissions And CO₂ Cap To 2020



*EU ETS “target” refers to the overall CO₂ cap placed on regulated entities. §Verified CO₂ emissions under EU ETS, excluding aviation. ETS—Emissions Trading System.

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is widely considered by market participants to be far too low to send a meaningful signal to make further investments in low-carbon technology.

This has become a highly polarized debate: Emissions-intensive industries say higher carbon prices would curb productivity and damage competitiveness, while the growing clean energy sectors say stronger carbon price signals are essential to ensuring returns on long-term, low-carbon energy and manufacturing investments.

Facing this difficulty, the EU has sought to maintain a robust carbon price—with questionable success—while addressing the industry's competitive concerns with measures such as free allocation of allowances.

In a bid to bolster carbon prices over the long term, the EC has proposed a "Market Stability Reserve," which would automatically remove allowances from the system if the accumulative surplus hits a certain threshold, thereby avoiding the need for future political intervention in what was always intended to be a freely traded market for carbon allowances. The reserve proposal is separate from the 2030 framework but is expected to help shore up the carbon market as the EU moves forward on the wider set of climate and energy policies for 2030.

Renewables Target Of 27%

The EC's draft released in January also included a target to raise renewable energy's share of final energy demand to at least 27% by 2030. This goal is a function of the 40% target reduction because Europe cannot meet the emissions target without a collective effort on increasing renewable energy, according to EU policymakers.

Unlike the earlier EU 2020 target for renewables, the new 2030 target, if agreed on, would not be broken down into binding national targets, according to the EC, potentially giving member states greater flexibility in meeting the collective goal. Member states would be free to set their own domestic renewables policies, including setting financial support structures, as long as

any such measures are within the EU's state aid rules.

The EC estimates that, by fully implementing current policies, the EU would source 24% of its final energy demand from renewable sources by 2030. So the 27% target is considered within reach.

Energy Efficiency Goal

The EC also wants a target to increase the EU's energy efficiency by 30% by 2030, building on results already achieved: New buildings use half the energy they did in the 1980s, and industry is about 19% less energy-intensive than it was in 2001.

Outgoing EU Energy Commissioner Gunther H. Oettinger said in July that the EU should aim for 30% greater energy efficiency by 2030 to help cut its dependence on energy imports. And EC President-Elect Jean-Claude Juncker has made it clear that he wants the 30% energy efficiency goal to be binding.

According to some estimates, for every percentage point increase in energy efficiency above a business-as-usual scenario of 21% by 2030, EU gas imports would drop by 2.6% over that period. EU leaders in June made cutting this dependency one of their top five priorities for the next five years, saying the EU must avoid relying so much on fuel and gas imports. Outgoing Climate Action Commissioner Connie Hedegaard has said Europe spends more than €1 billion every day on imported fossil fuels. Cutting that bill and reducing emissions would be a "win-win" opportunity for Europe.

The crisis in Ukraine this year has thrown those considerations into sharper relief, putting Europe's dependency on imported energy, especially Russian gas, under a more intense spotlight, and cranking up pressure on the new European Commissioners to demonstrate real progress on boosting domestic energy production. **CW**

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S&P Indices Track Bonds In The Growing Green Power Market

Overview

- Green-labeled bonds and green project bonds provide an opportunity for eco-friendly investing, especially in the power generation and energy efficiency segments.
- By applying a set of transparent criteria, we believe it's possible to clearly identify the green slice of the fixed-income market and set benchmarks for it.
- The S&P Green Bond Index and S&P Green Project Bond Index can both meet investor demand for liability matching, diversity across credit ratings, maturities, asset and issuer types, and stable risk/return profiles.
- While some project bonds will be increasingly labeled green and included in both indices, we may also see future project bonds from issuers unwilling to fulfill the requirements for a green label.

As of mid-year 2014, there were about \$36 billion in outstanding green bonds globally. Issuers used them principally to finance solar, hydro, and wind power projects, but these bonds also helped fund energy efficiency projects. With renewable energy gaining prominence and generating an increasing share of power globally, S&P Dow Jones Indices (SPDJI) has introduced its first indices for fixed-income instruments tied to renewable energy and sustainability: the S&P Green Bond Index (GBI) and the S&P Green Project Bond Index (GPBI). These track the market performance of debt issues dedicated to various green projects, such as renewable energy and energy efficiency projects.

The GBI includes only instruments that the issuer has labeled as green and that we determine to be unambiguously dedicated to ameliorating climate change and are fully transparent in their use of the funds they raise. SPDJI developed the GBI methodology in partnership with specialist green alternative investment firm IntraCredit, but calculates and manages the index independently.

The GBPI represents a small but growing subset of the fixed-income market that can be characterized as green based on the nature of the assets financed. This segment now mainly includes unlabeled bonds issued by special-purpose vehicles (SPVs) or pure-play green companies with activities that

directly reduce greenhouse gas emissions, have stand-alone credit profiles, and do not require independent verification. Over time, SPDJI and IntraCredit expect that this segment will grow as investors become more comfortable with the climate benefits these projects can offer and the issuers gain the size and credit capacity to raise long-term debt. The GPBI will include both labeled and unlabeled project bonds that both meet the green criteria and repay their debt solely from a project's (or project portfolio's) revenues.

SPDJI and IntraCredit intend for the GBI and GPBI to be tools for institutional investors that are interested in this growing market, want to track its progress, and might want to diversify their portfolios without selecting individual green bonds.

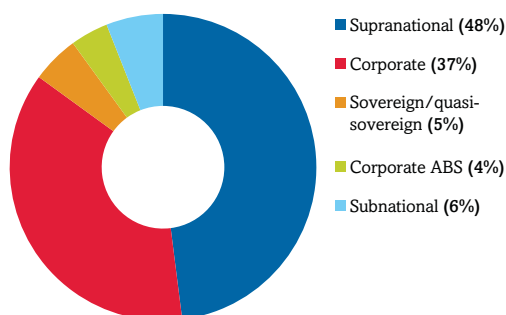
Although climate change has been a topic of discussion among scientists, businesses, politicians, and the general public for decades, green bond issuance has grown sharply only in the past few years. It totaled only \$5 billion in 2012 and jumped to \$11 billion in 2013. We believe \$40 billion will come to market this year, and we estimate that issuance volume could swell to as much as \$200 billion in the next three to five years. The GBI measures this broad market. By contrast, the GPBI tracks a different band of issues—currently outstanding at about \$16 billion and mostly unlabeled—that finance specific projects in place or in development and that typically have low-investment-grade or speculative-grade ratings. Together, these indices capture a substantial part of the green fixed-income universe.

Criteria Of The GBI

The GBI includes bonds that multilateral lending institutions, sovereigns, national development banks, regional issuers, cities, states, and corporations (as bonds or asset-backed securities [ABS]) have issued.

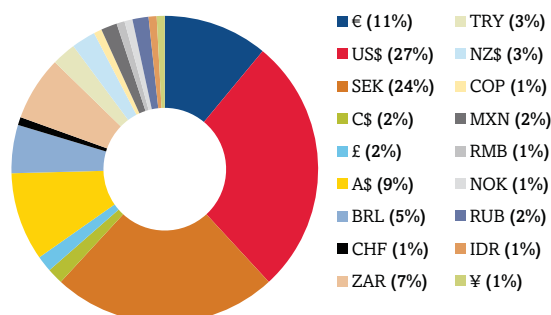
For now, what exactly is required for a bond to be named green isn't completely clear, and the issuer makes that determination. According to current green bond principles developed by a group of invest-

Chart 1 | S&P Green Bond Index Composition By Type Of Issuer



Data as of June 30, 2014.
Source: S&P Dow Jones Indices LLC.
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Chart 2 | S&P Green Bond Index Value Composition By Currency



Data as of June 30, 2014. SEK—Swedish krona. BRL—Brazilian real. CHF—Swiss francs. ZAR—South African rand. TRY—Turkish lira. NZ\$—New Zealand dollars. COP—Colombian pesos. MXN—Mexican pesos. RMB—Chinese renminbi. NOK—Norwegian krone. RUB—Russian ruble. IDR—Indonesian rupiah.
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ment banks in January 2014(1), a bond is green if the issuer uses the proceeds solely for capital expenditures associated with green or climate-related environmental benefits in accordance with certain selection rules and transparent policing standards. However, this requirement neither specifies the type or nature of the project nor mandates a certain threshold of climate or environmental benefits.

SPDJI's and InfraCredit's research and discussion with investors indicate that there is still inadequate information on how green a project actually is, making it difficult to determine whether it can realize its projected environmental benefits. Consequently, SPDJI has imposed a more rigorous set of criteria for the GBI. For a green bond to be eligible for inclusion, the issuer must clearly indicate—through public sources that are credible and related to the company—the rationale behind the bond's "green" label. In this way, the index calls for a higher standard of transparency and accountability in the green bond market than simple self-labeling. This enhances the issuer's ability to signal important sustainability-related information for a given rating, meeting investor demand for a bundled product of fixed-income and green attributes.

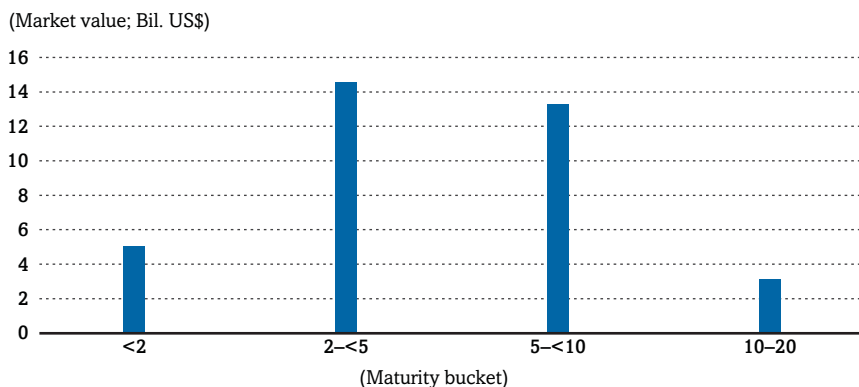
SPDJI and InfraCredit designed GBI for use by institutional investment managers, mutual fund managers, exchange-traded fund providers, and professional advisors. Although green-labeled bonds are only one segment of the green fixed-income market, we believe that the GBI can still serve as an objective and transparent measure of its performance.

Issuer Type, Composition, And Size Of GBI Bonds

Corporate issues account for nearly two-fifths of the total volume (*see chart 1*), while supranational issuers account for half the total. Green bonds that any country issues, in any currency, are eli-

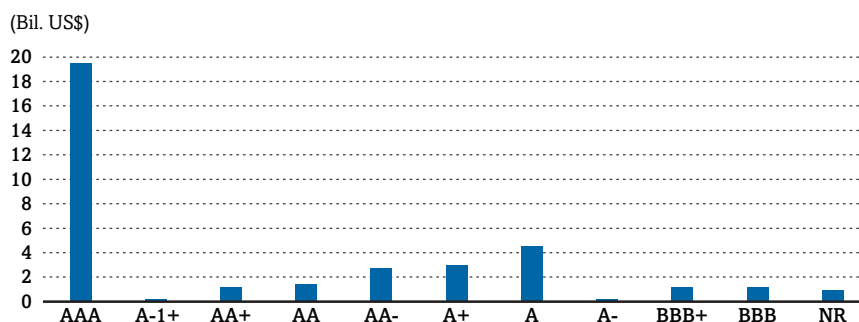
gible for inclusion in the GBI. Historically, the pioneering issues have been denominated in U.S. dollars and Swedish krona, but the rapid development of the European corporate green bond market has led to an increasing number of euro-denominated issues (*see chart 2*).

Chart 3 | Maturity Buckets In The S&P Green Bond Index



Data as of June 30, 2014.
Source: S&P Dow Jones Indices LLC.
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Chart 4 | Credit Rating Distribution Of The S&P Green Bond Index



Ratings have been presented in accordance with Standard & Poor's Ratings Services' rating scale. Data as of June 30, 2014. NR—Not rated.
Sources: S&P Dow Jones Indices LLC and Reuters.
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Table 1 | S&P Green Bond Index And S&P Green Project Bond Index Characteristics

Index	Constituent count	Average outstanding amount (US\$)	Weighted coupon (%)	Weighted modified duration (years)	Weighted time to maturity (years)
S&P U.S. High-Yield Corporate Bond Index	2,690	603,616,582	6.98	4.86	6.51
S&P U.S. Investment-Grade Corporate Bond Index	6,593	807,576,157	4.45	6.39	9.52
S&P U.S. Bond BMI	10,905	1,718,450,843	3.13	4.83	6.33
S&P Green Bond Index	163	245,337,997	2.04	4.70	6.23
S&P/BGCantor 7 To 10 Year US Treasury Bond Index	17	31,227,641,325	2.42	7.75	8.68
S&P Green Project Bond Index	22	396,718,360	6.20	7.27	16.42

The average size of a bond issue in the index is US\$330.3 million, which is slightly more than one-half the average size of a bond issue in the S&P U.S. Bond Broad Market Index (US\$610.7 million). The average life of a bond in the GBI was 5.1 years as of July 1, 2014, with most clustering between the two-year and 10-year marks (*see chart 3*).

Distribution Of Credit Ratings And Coupon Types Of GBI Bonds

Issuers with 'AAA' ratings dominate the index, given the historical presence of the multilaterals. Only a small fraction of the bonds in the index are unrated (*see chart 4*). Aside from these, all bonds in the GBI are investment grade ('BBB-' or higher).

Because the bonds in the GBI are highly rated, as of September 2014, the

average coupon rate was 2.02%, and the average yield was 1.6%. The coupons on GBI bonds may fall into fixed, zero, step-up (with a predetermined schedule), fixed-to-float (provided they are fixed and one month prior to their float date), or floating-rate categories. There are 14 issues with floating rates in the index; all others have fixed-rate coupons.

Key Characteristics And Criteria Of The GPBI

The green project bond market provides an alternative to the labeled green bond market, especially for investors that view the current green labeling standards as weak or prone to manipulation by issuers. In addition, in our view, as the labeled and unlabeled segments of the market evolve, investors are likely to see opportunities, consistent with their risk appetites, to fine-tune their portfolios with the lower-rated, unlabeled issues typically found in the GPBI.

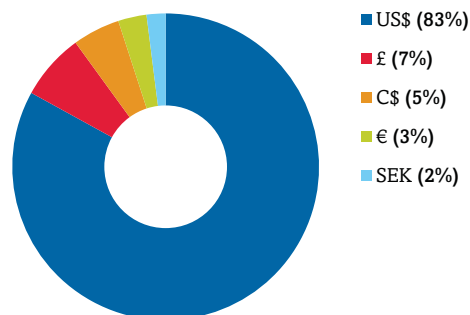
The GPBI includes three types of debt:

- Bonds SPVs have issued to finance or refinance a green project;
- Asset-backed securities of future cash flows from pools of green assets; and
- Certain corporate bonds that pure-play green companies have issued to finance or refinance the build-out or acquisition of green assets. These companies must derive 100% of their revenue from green activities, such as renewable electricity generation and energy efficiency.

Only a few of these bonds are green-labeled. (The labeled issues will also be in the GBI.)

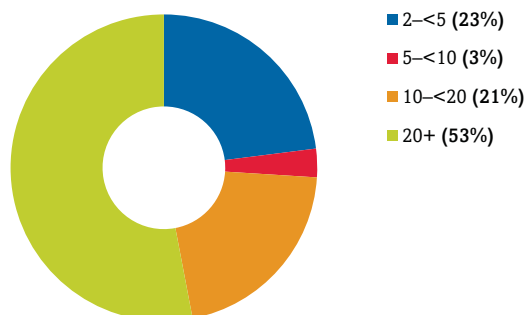
All debt issues included in the GPBI must meet two criteria. The first is that 100% of the proceeds must go toward financing (or refinancing) the development and build-out of a specific green project. This use-of-proceeds criterion is similar to that of the GBI. We must see evidence that the project has a clear and direct (first-order) impact on mitigating damage from climate change. This can be measured in tons or percentage of CO₂ removed or explained verbally, but we require verifiable evidence. Renewable electricity generation

Chart 5 | S&P Green Project Bond Index Value Composition By Currency



SEK—Swedish kronor. Data as of Sept. 1, 2014.
Source: S&P Dow Jones Indices LLC.
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Chart 6 | Maturity Buckets In The S&P Green Project Bond Index



Data as of Sept. 1, 2014.
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from solar, hydro, and wind projects, as well as energy-efficiency projects, potentially qualify for inclusion.

The second criterion is that the bonds must be repaid from revenues the project generates. This criterion is closely linked to the specific project finance structure of these bonds. We might need to confirm that the project has used a nonrecourse stand-alone structure, with its assets and revenues linked to the bond's credit quality. The issuer, generally an SPV with no guarantees from the parent or the sponsor, will own the assets, and the credit quality of the issuer will solely depend on the asset's cash flow. Some bonds, however, could have revenue linkage at the project portfolio level rather than at the level of specific individual project, which is acceptable for inclusion in the index if all constituent assets in the project portfolio are green. (In such cases, the credit quality will be based on that of the entire project portfolio.)

For corporate pure-play green issuers in the GBPI, we are making an exception because such companies—the primary revenue-producing activities of which are projects that directly mitigate greenhouse gas emissions—are at the stage of development when they have the capacity to issue long-term debt. Such projects, which consist mainly of renewable energy generation and energy-efficiency-related assets, account for more than 90% of the currently estimated climate finance flows globally (about \$359 billion annually), according to the World Bank(2). But according to the bank's research, that amount is far below the estimated \$1 trillion annually needed for the investments to cut greenhouse gasses and keep temperatures within acceptable limits.

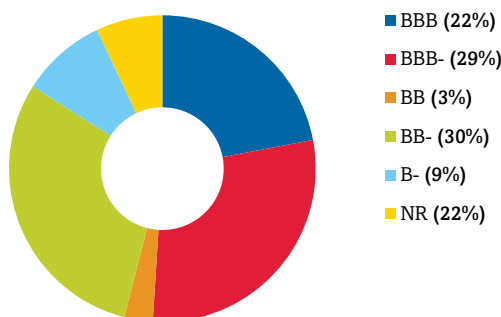
SPDJI and InfraCredit believe that over time, the vast amounts of capital that renewable power and energy-efficiency projects require will be in the form of single-project finance assets, portfolios, or pooled vehicles. Moreover, rapidly declining costs of renewable energy deployment due to technological improvements, innovative financing structures, and national policies that

support investment in green initiatives could attract further long-term institutional capital. Since 2007, about \$4 trillion has been invested in renewable energy and energy-efficiency projects in the Organisation for Economic Co-operation and Development and major emerging markets(3).

Issuer Type, Composition, And Size Of GPBI Bonds

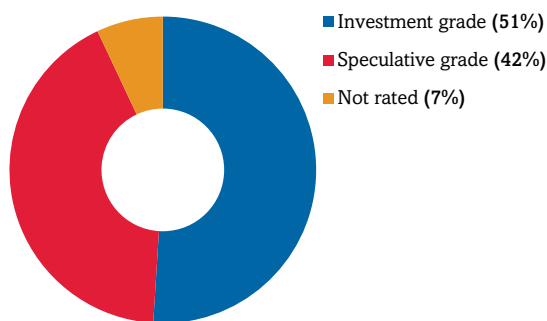
The list of issuers in the GPBI is relatively small. At the time of the launch, it only included 22 bonds, but we expect it to grow. Most of these issues (13) were project bonds, along with eight corporate nonlabeled bonds and one corporate labeled bond. Pricing information was not available as of Sept. 1, 2014, for a handful of ABS

Chart 7 | Credit Rating Distribution Of The S&P Green Project Bond Index



Ratings are presented in accordance with the Standard & Poor's Ratings Services' rating scale. Data as of September 2014. NR—Not rated.
Sources: S&P Dow Jones Indices LLC and Reuters.
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Chart 8 | Investment-Grade/Speculative-Grade Distribution Of The S&P Green



Ratings are presented in accordance with the Standard & Poor's Ratings Services' rating scale. Data as of September 2014.
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transactions that would have qualified for inclusion in the GPBI. We could add these ABS issues to the index later.

Green project bonds that any country issues in any currency are eligible for

inclusion in the GPBI. Currently, the U.S. has a dominant position (*see chart 5*). Because of the long lead time necessary to bring many power generation projects on line, the maturity of the

Table 2 | Comparative Performance Characteristics Of The S&P Green Project Bond Index, S&P Green Bond Index, And S&P U.S. Bond BMI

Index	Year to date	One year	Three years	Five years	Since inception
Index return summary (%)					
S&P Green Project Bond Index	9.3	10.3	8.2	10.2	8.5
S&P Green Bond Index	2.3	5.3	0.8	4.3	
S&P U.S. Bond BMI	4.2	4.9	2.7	4.2	4.9
S&P/BGCantor 7-10 Year US Treasury Bond Index	7.1	6.6	2.7	5.6	6.6
Portfolio standard deviation (%)					
S&P Green Project Bond Index	3.4	4.3	4.5	4.4	5.9
S&P Green Bond Index	3.2	4.0	7.4	8.2	
S&P U.S. Bond BMI	2.3	2.4	2.9	3.5	4.2
Sharpe ratio					
S&P Green Project Bond Index	2.71	2.42	1.80	2.30	1.28
S&P Green Bond Index	0.70	1.32	0.10	0.51	0.52*
S&P U.S. Bond BMI	1.81	2.00	0.90	1.14	0.91

*From Nov. 28, 2008. Data as of Sept. 10, 2014. Index performance is based on U.S. dollar total return index levels. This table reflects hypothetical historical performance for the S&P Green Bond Index and S&P Green Project Bond Index.

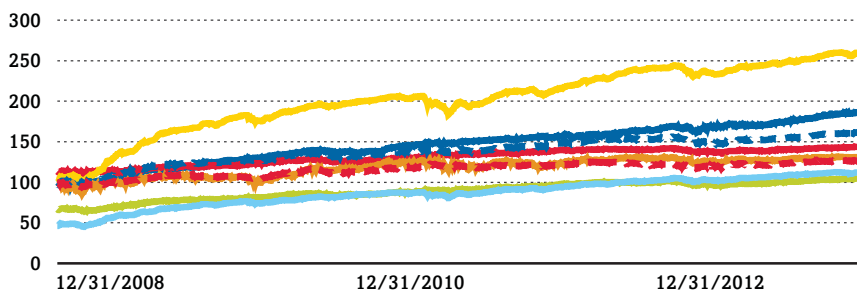
Source: S&P Dow Jones Indices LLC and/or its affiliates.

Chart 9 | Comparative Returns

The S&P Green Project Bond Index, the S&P Green Bond Index, The S&P U.S. Bond BMI, the U.S. and Global High-yield and Investment-grade Indices, and the Barclays Global Aggregate Index



(Index)



Data as of Sept. 10, 2014. Index performance is based on US\$ total return index levels. This chart reflects hypothetical historical performance for the S&P Green Bond Index and S&P Green Project Bond Index.

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bonds in the GPBI is typically at least 20 years, far longer than what is common in the GBI (*see chart 6*). The typical issue of bonds in the GPBI is almost \$400 million (*see table 1*).

Distribution Of Credit Ratings Among GPBI Bonds

As opposed to the GBI, which issuers with high investment-grade ratings dominate, the GPBI provides exposure to a mix of investment- and speculative-grade bonds, with a small fraction of the bonds unrated (*see charts 7 and 8*). As a result of this mix, the average coupon rate is 6.2%, which is triple the roughly 2% average coupon of the GBI. The coupons on GPBI bonds may have fixed, zero, and fixed-to-float (provided they are fixed and one month prior to their float date) rates.

Benchmarks To The Historical Performance Of The GBI And GPBI

For comparative analysis of the GPBI and GBI, we used the set of indices with the closest maturity, geographical, and credit profile, such as the S&P U.S. Bond Broad Market Index, U.S. and Global High-Yield and Investment Grade Indices, and the Barclays Global Aggregate Index. The GPBI has performed well compared with most of its peers, next only to the high-yield indices. The GBI's performance also looks quite consistent with its credit and maturity profile (*see chart 9*).

The S&P Green Bond Index is performing largely in line with its high-investment-grade profile (*see table 2*). The exception is that it has a higher standard deviation in the long run, which should not be the case in normal circumstances. The reason for this might be that during times of high volatility, these bonds, which are of high credit quality, happened to be traded more than others.

Future Green Indices

We expect the size of the renewable energy sector—along with investor interest in it—to grow. Accordingly, we intend to develop other indices that track different aspects of this sector. These might include indices that track green bonds by different

categories, including credit quality, type of issuer, maturity, geographic region, or specific sector. We anticipate that with the growth in the number of green enterprises needing funding, more of them will successfully tap into capital markets, leading investors interested in this segment to a greater use of green indices. We also expect that these indices will ultimately become a true benchmark that reflects the growing interest in green bonds. **CW**

NOTES

- (1) Green Bond Principles, www.ceres.org/resources/reports/green-bond-principles-2014-voluntary-process-guidelines-for-issuing-green-bonds/view.
- (2) "Climate Finance Is Flowing, but It Isn't Enough—Yet," The World Bank, Sept. 5, 2014 <http://www.worldbank.org/en/news/feature/2014/09/05/climate-finance-is-flowing-but-not-enough-yet>.
- (3) Green Transition Score Card, 2014 Mid-Year Update, Green Bonds Growing Infrastructure, Ethical Markets.

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Index returns do not include fees and expenses an investor would pay. Index returns prior to launch date are hypothetical. Refer to <http://us.spindices.com/regulatory-affairs-disclaimers/> regarding index performance calculations.

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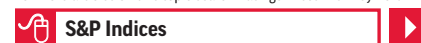
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Income Inequality Weighs On State Tax Revenues

Overview

- A one-unit increase in the share of income going to the top percentile had a negative impact on tax revenue growth.
- We believe that structural, rather than cyclical, forces are leading to slower state tax revenue growth.
- From 1980 to 2011, average annual state tax revenue growth fell to 5% from 10%; meanwhile, the share of total income for the top 1% of earners doubled.
- State tax revenue trends have also become more volatile as progressive tax states have come to rely more heavily on capital gains from top earners.
- Regardless of a state's tax structure—be it income-tax or sales-tax reliant—the pace of revenue growth is declining across the spectrum.
- Reasons for rising income inequality aside, the disparity is contributing to weaker tax revenue growth by weakening the rate of overall economic expansion.
- It's unlikely that states can fully correct for both slower and more volatile tax revenue growth by adjusting their tax policies.

In a recent article, Standard & Poor's Ratings Services examined income inequality in the U.S. and concluded that rising income inequality is one factor contributing to slower economic growth, and that this represents a structural, rather than a cyclical change.

Extending our analysis to public finance, we find that increasing income inequality is undermining the rate of state tax revenue growth. In addition, it is contributing to volatility in tax revenue collections.

Compared with local governments, which rely to a greater extent on property taxes, states generate the bulk of their revenue from taxes levied on current economic activity, namely personal income and consumption. Therefore, when the economy operates below its

potential, state tax revenues tend to suffer. Insofar as income inequality contributes to economic output falling short of potential, it undermines the growth of states' tax bases.

Our analysis found a negative relationship between income inequality and state tax revenue trends. When we tested the relationship by tax structure, we found the negative effect was stronger and only statistically significant in the sales tax-reliant states. The findings support our view that rising income

inequality contributes to weaker tax revenue growth by undermining the rate of overall economic expansion.

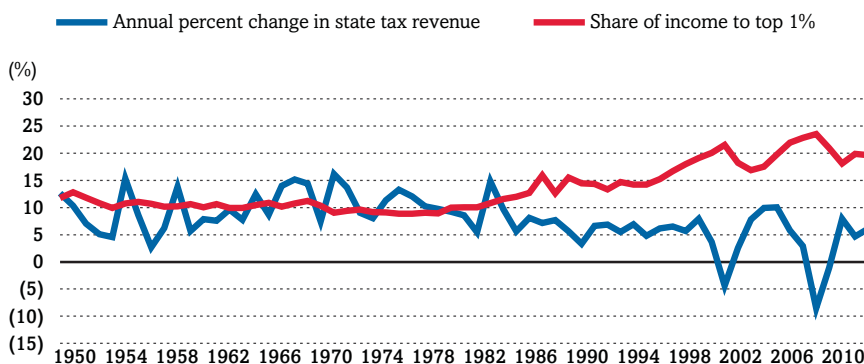
In addition to slower revenue growth, Standard & Poor's believes income inequality has tied the states' revenue performance more closely to that of the financial markets. Reflecting this linkage, state tax revenues have become more volatile, greatly complicating the task of budgeting.

Thus, inequality appears to be a macroeconomic problem with fiscal implications for states. In other words, because it is a structural economic problem, it is unlikely that states can fully correct for it solely by adjusting their tax policies.

Inequality And State Tax Revenue Trends

Our view that greater inequality may be associated with simultaneously slower and more volatile state tax revenue growth rests on three premises. The first is that state tax revenues have, in fact, been growing more slowly. Second, tax revenues are exhibiting greater volatility. Finally, these developments correlate with rising inequality.

Chart 1 | Income Concentration And Annual Percentage Change In State Tax Revenues



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Regression Model Specifications

To test the relationship between inequality and state tax revenues, we employed a fixed-effects panel regression, thus controlling for time-consistent variations across states. Without this adjustment, the correlation coefficients resulting from our model would likely have reflected cross-state effects of omitted variables. Also, because the validity of least squares regression analysis depends on the truth of certain assumptions, we tested for those. One necessary assumption is that the data's error terms not be correlated with one another across time periods (when such correlation is found, it is referred to as auto- or serial correlation). Our test found that the data did not contain autocorrelation.

Another requirement of least squares analysis is that the variations in the error term be constant across observations—which in this case means across the states. The data failed this test, indicating that, not surprisingly, each state is subject to a unique combination of economic, demographic, and policy-based characteristics that can influence its tax revenue performance. We were able to correct for this using a generalized least squares regression with het-

eroskedasticity-consistent standard errors that included state fixed effects.

Finally, although our panel regression approach removes the effects of differences across states, we also recognize that variation is likely within each state due to periodic tax policy changes. However, primarily because of data limitations, we did not control for individual tax rate and policy changes. Nevertheless, although we temper our findings as a result of this caveat, we believe our evaluation was sufficiently robust to offer insight about how rising income inequality has a depressing effect on state revenue growth rates.

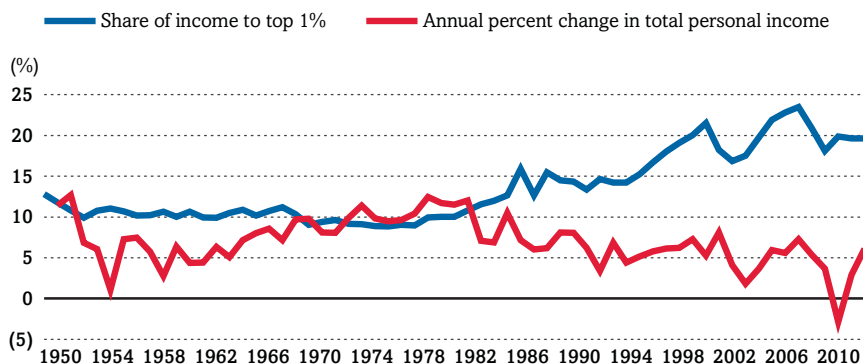
One reason for this is that wholesale changes in state tax regimes during the time period of our review have been few. Other than Connecticut, which enacted a personal income tax in 1991, states' basic tax structures have remained constant since at least 1980. In our view, therefore, our findings do not simply reflect the effects of tax rate or policy changes. We believe the thrust of our findings would almost certainly have pointed in the same general direction even if each incremental tax rate and policy change had been accounted for.

Our analysis of long-term state tax revenue trends confirms this. According to U.S. Census Bureau data, since 1950 the annual average rate (geometric

mean) of state tax revenue growth has drifted downward. Whereas state tax revenues grew at an annual rate of 9.97% from 1950 through 1979, the

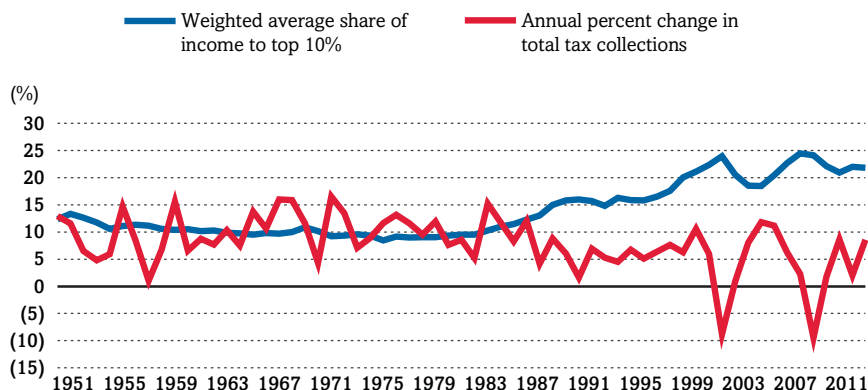
annual average growth rate had fallen to below 4% during the 10 years through 2009. In addition, as measured by its standard deviation, tax revenue growth has turned more volatile, especially since 2000 (*see table 1*). As for whether either the slower or more volatile tax revenues relate to rising inequality, we believe the juxtaposition of revenue trends and rising inequality suggests they do (*see chart 1*).

Chart 2 | Income Concentration And Annual Percentage Personal Income Growth



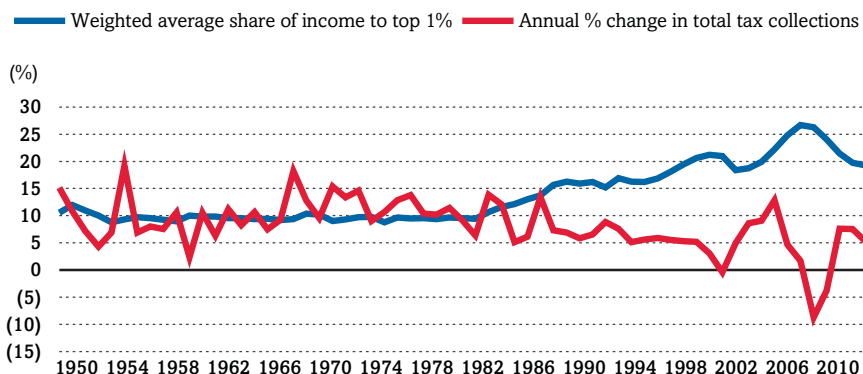
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Chart 3 | Weighted Average Share Of Income To Top 1% Versus Tax Revenue In Income



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Chart 4 | Weighted Average Share Of Income To Top 1% Versus Tax Revenue In Sales



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Income Concentration And Tax Revenue Trends Have Diverged

The year 1980 marked an inflection point in the data. Around that time, inequality began rising while the annual average rate of state tax revenue growth slumped. In the 31-year span from 1980 through 2011, the portion of total income going to the top percentile doubled to about 20% from roughly 10%.⁽¹⁾ During the same span, the annual average rate of state tax revenue growth declined by half, to below 5% from nearly 10%.

Our interpretation, which incorporates the views of our economists, is that beyond a certain point, rising income inequality is a macroeconomic factor that acts as a drag on growth (*see "Increasing Income Inequality Is Dampening U.S. Economic Growth, And Possible Ways To Change The Tide," published Aug. 5, 2014 on RatingsDirect*). There is evidence, although not conclusive at this point, that the higher savings rates of those with high incomes causes aggregate consumer spending to suffer. And since one person's spending is another person's income, the result is slower overall personal income growth despite continued strong income gains at the top (*see chart 2*).

While the trend lines are compelling, we also conducted several regression analyses to test the relationships more formally.

Regression analysis finds a relationship between inequality and tax revenue growth

Our regression model measured the annual percentage changes in state tax

revenues since 1980 for the 50 individual states as reported by the U.S. Census Bureau. The independent variables included the following for each state:

- Income concentration in the top percentile (measured by the share of total adjusted gross income going to the top one percentile),(2)
- Annual rate of total personal income growth, and
- Annual percentage change in the state coincident economic indicators index (a summary of four main statistics), compiled by the Federal Reserve Bank of Philadelphia.(3)

As expected, the results from this regression analysis found a positive relationship between changes in both overall personal income and the coincident economic indicators index and state tax revenues. Regarding the income inequality measure, we found a negative relationship, consistent with our hypothesis (*see table 4*). That is, a one-unit increase in the share of income going to the top percentile had a negative impact on tax revenue growth, holding personal income growth and the state coincident economic indicators index constant. All of these findings were statistically significant at the 1% level.

To ensure our results were not driven by the inequality indicator we selected, we performed another round of regressions using a secondary set of inequality indicators: the Gini Index, Theil Index, Atkinson Index, and the relative mean deviation (*see table 5*). Consistent with our other findings, all of these regressions returned results showing the same negative relationship between income inequality and state

tax revenue growth. Furthermore, all but one of the results were statistically significant at the 1% level.

How Does Inequality Affect State Tax Revenues?

The statistical relationship we found between trends in income inequality and state tax revenue growth is inter-

esting but perhaps less important than understanding how one may relate to the other. In other words, what is the transmission mechanism through which the changes in income inequality influence state tax revenue growth? The answer could be useful both to those interested in state credit quality and to policymakers alike.

Table 2 | Average Annual State Tax Revenue Growth For The 10 Most Income Tax-Dependent States

	1950-1979	1980-1989	1990-1999	2000-2009	Since 2009
California					
Annual average state tax revenue growth (%)	10.91	9.69	5.79	3.39	7.16
Standard deviation (%)	6.73	5.95	2.64	10.14	7.05
Colorado					
Annual average state tax revenue growth (%)	10.06	7.26	8.50	2.83	6.68
Standard deviation (%)	5.38	6.78	2.25	7.25	4.69
Connecticut					
Annual average state tax revenue growth (%)	10.09	10.84	7.18	2.37	7.33
Standard deviation (%)	9.01	4.88	6.77	7.74	4.73
Georgia					
Annual average state tax revenue growth (%)	10.81	10.00	6.98	2.58	2.57
Standard deviation (%)	9.57	2.22	3.42	6.62	6.40
Massachusetts					
Annual average state tax revenue growth (%)	9.89	9.69	4.91	2.94	4.97
Standard deviation (%)	6.85	3.80	2.27	7.92	3.05
Missouri					
Annual average state tax revenue growth (%)	9.07	8.82	6.22	1.84	2.04
Standard deviation (%)	5.06	3.97	3.41	3.74	4.63
New York					
Annual average state tax revenue growth (%)	9.26	8.61	3.83	5.28	3.28
Standard deviation (%)	5.81	3.75	2.90	5.55	3.04
North Carolina					
Annual average state tax revenue growth (%)	9.45	9.72	6.96	3.58	3.74
Standard deviation (%)	4.64	2.72	3.75	6.03	1.38
Oregon					
Annual average state tax revenue growth (%)	9.49	6.45	7.52	2.91	6.52
Standard deviation (%)	8.65	8.75	3.73	8.30	1.63
Virginia					
Annual average state tax revenue growth (%)	10.36	9.95	5.73	3.69	3.68
Standard deviation (%)	9.28	2.52	3.50	6.48	2.92
Weighted average					
Annual average state tax revenue growth (%)	10.04	9.32	5.66	3.60	5.25
Standard deviation (%)	6.64	4.58	3.10	7.79	4.77
Coefficient of variation	0.66	0.49	0.55	2.17	0.91

Table 1 | Average Annual State Tax Revenue Growth

	Average annual state tax revenue growth (%)	Standard deviation (%)
1950-1979	9.97	3.55
1980-1989	8.58	2.52
1990-1999	5.80	1.04
2000-2009	3.62	5.78
Since 2009	4.36	3.36

One possibility is that, similar to its effect on revenue stability, rising income inequality somehow directly undermines tax revenue growth. If so, we would anticipate that tax revenues of the most income tax-dependent states would be more sensitive to rising inequality. Social policy considerations aside, a potential fiscal remedy in this

scenario might be for states to modify their tax codes in ways that offset the effects of rising inequality.

Alternatively, inequality could be dampening overall economic growth, which in turn leads to slower tax revenue growth no matter a state's tax structure. According to this view, rising inequality is weakening state tax

revenue trends through its effect on the economy. In this case, the best fiscal strategy for states might be to pursue policies supportive of economic growth in general, regardless of tax policy.

Either way, to better understand how inequality is influencing tax revenues, we need to explore whether a state's revenue sensitivity to inequality varies depending upon its tax structure. If not, then increasing inequality might be weakening overall economic growth, thereby eroding any state's ability to generate faster tax revenue growth.

Table 3 | Average Annual State Tax Revenue Growth For 10 Most Sales Tax-Dependent States

	1950-1979	1980-1989	1990-1999	2000-2009	Since 2009
Arizona					
Annual average state tax revenue growth (%)	12.66	10.36	6.39	3.97	4.88
Standard deviation (%)	8.63	5.16	2.66	10.10	6.47
Florida					
Annual average state tax revenue growth (%)	11.77	11.25	6.69	3.02	1.92
Standard deviation (%)	6.85	3.83	2.53	8.74	4.00
Hawaii					
Annual average state tax revenue growth (%)	11.38	9.73	3.63	4.06	6.63
Standard deviation (%)	5.82	5.37	4.72	6.29	5.41
Indiana					
Annual average state tax revenue growth (%)	9.29	8.26	5.13	4.35	3.24
Standard deviation (%)	8.43	6.82	3.97	3.43	6.63
Mississippi					
Annual average state tax revenue growth (%)	9.44	6.65	7.22	3.56	3.34
Standard deviation (%)	5.60	3.52	4.94	3.95	4.02
Nevada					
Annual average state tax revenue growth (%)	13.78	11.36	9.72	5.05	5.78
Standard deviation (%)	8.04	11.23	5.07	7.73	2.02
South Dakota					
Annual average state tax revenue growth (%)	6.65	6.76	6.30	4.42	3.40
Standard deviation (%)	7.81	6.12	2.20	2.15	4.46
Tennessee					
Annual average state tax revenue growth (%)	9.04	8.23	5.88	3.78	4.34
Standard deviation (%)	5.21	4.69	4.79	6.06	2.85
Texas					
Annual average state tax revenue growth (%)	10.52	9.31	6.27	4.99	5.48
Standard deviation (%)	6.22	8.63	1.33	6.25	6.79
Washington					
Annual average state tax revenue growth (%)	9.39	9.13	6.60	2.89	3.28
Standard deviation (%)	4.37	4.63	2.90	5.19	3.89
Weighted average					
Annual average state tax revenue growth (%)	10.42	9.50	6.33	3.94	4.07
Standard deviation (%)	6.45	6.01	2.86	6.69	5.15
Coefficient of variation	0.62	0.63	0.45	1.70	1.2

Determining whether tax structure matters

To assess the role of state tax structure, we had to modify our original regression analysis. In that model, we did not control for differences in states' tax structures. To account for this, we revised our original regression methodology by forming two groups of 10 states (*see tables 2 and 3*). One group consisted of the 10 most income tax-reliant states (as a share of their total tax revenues).(4) The second group was made up of the 10 states most dependent on sales taxes, including five of the states that levy no personal income tax. We can see that both groups of states experienced declining tax revenue growth rates and rising rates of revenue volatility. The higher volatility is particularly evident in the coefficients of variations (a statistical measure that normalizes dispersion relative to the mean for a series of data).(5) We then performed regressions for these two groups of states against the same set of independent variables as in the first regression model (*see table 6*).

Results showed that inequality reduces overall economic growth

The results of this analysis found that income inequality for both groups—the income tax and the sales tax-dependent states—relates negatively with tax revenue growth. However, the negative effect was stronger in the sales tax-reliant states than it was for

the income tax-dependent states. In addition, the relationship was only statistically significant at the one percent level for the sales tax-reliant states. This suggests that through a progressive tax structure, it's possible to counteract much of the depressing effect inequality has on tax revenue growth rates. In contrast, the strong negative relationship we found in the sales tax-dependent states reflects how rising income inequality contributes to slower economic growth. And absent the progressivity found in most of the income-tax states' tax structures, the slower economic growth related to inequality gets transmitted to the sales tax-reliant states' budgets as slower tax revenue growth.

A reliance on more progressive tax structures isn't necessarily a fiscal panacea, however, because it may introduce a second problem: greater revenue volatility. Indeed, the income tax-reliant states exhibited greater volatility than the sales tax-dependent

states in three of the five time periods we examined.

Inequality interacts with the tax code to create greater revenue volatility

Although they are less graduated than the federal tax code, the income tax schedules of 33 states include progressive features.⁽⁶⁾ This makes these states' revenue performance more dependent on the income patterns of those at the top of the distribution. Furthermore, as income inequality has risen over time, the overall mix of personal income has shifted in favor of capital gains and away from labor sources. Those at the top obtain more of their income from capital gains, which on the whole, fluctuate much more than income from wages. Tax revenues reflect this—both as a consequence of higher top-end tax rates and because the top end is where the income growth has occurred—and are, therefore, more volatile.

To summarize, our findings indicate that inequality is fundamentally an economic problem—with fiscal implications for states. That makes it unlikely that states can fully correct for its effects—be they slower growth or increased volatility—even from solely a budgetary perspective, by adjusting their tax policies.

Some caveats are warranted

The regression models we constructed measure the effects of changes in inequality on state tax revenue growth. But it's possible our results reflect, at least in part, the effect of a state's level of inequality, as well as changes in inequality. Finally, it is also possible that the results could be a function of the interaction between the two variables—"changes in" and "the level of" inequality.

In an effort to account for this, we added two variables to our model; a Gini coefficient (to capture a state's level of inequality) and an interaction term (*see table 7*).⁽⁷⁾ (Interaction terms are used in regression analysis when the measured effect of one independent variable may differ depending on the value of another independent variable. In this case, the two independent variables are "changes in" and "level of" inequality. The interaction term in our regression is the product of the two.) Results of this regression model showed that, although the variable for changes in inequality remained negatively correlated with state tax revenues, so did the added variables (all results were statistically significant). Our interpretation is that, although rising inequality has a negative effect on

Table 4 | Panel Error-Correction Estimates Of Tax Revenue Growth And Inequality

All states						
Variables	A		B		B	
Income share of top 1%	-0.057	(-0.042)	-0.077*	(0.029)	-0.127§	(0.029)
Personal income	0.504§	(0.067)	0.495§	(0.071)	0.488§	(0.038)
Coincident economic index	0.643§	(0.051)	0.739§	(0.068)	0.765§	(0.029)
Constant	0.025§	(0.008)	0.026§	(0.005)	0.099	(0.065)
Observations	1,650		1,650		1,650	
Fixed effects (state)	N		Y		Y	

Notes: Dependent variable is tax revenue growth rate. Standard error in parentheses. Personal Income and coincident economic index represent annual percent change. A—Pooled OLS regression. B—Pooled fixed effects panel regression. C—Pooled generalized least squares panel regression correcting for heteroskedasticity.

*Significance at the 5% level. §Significance at the 1% level.

Data source: Frank, M. U.S. State-Level Income Inequality Data, 1980-2012. www.shsu.edu/eco_mwfi/inequality.html

Table 5 | Panel Error-Correction Estimates Of Tax Revenue Growth And Inequality, Alternative Measures Of Inequality

All states					
	—Top 10—	—Gini—	—Theil—	—Atkins05—	—RMeanDev—
Coefficient and standard error	-0.121* (0.028)	-0.001 (0.02)	-0.022* (0.008)	-0.282* (0.05)	-0.088* (0.023)
Observations	1,650	1,650	1,650	1,650	1,650

Notes: Dependent variable is tax revenue growth rate. Standard error in parentheses. *Significance at the 1% level. Variables also used in each regression were annual percent change in personal income and coincident economic index. All regressions used the pooled generalized least-squares panel regression correcting for heteroskedasticity.

Data source: Frank, M. U.S. State-Level Income Inequality Data, 1980-2012. www.shsu.edu/eco_mwfi/inequality.html

state tax revenue trends, the beginning inequality level of a state's income distribution also matters.

Indeed, we found that in states with the highest levels of inequality, the negative effects of rising inequality on the state's revenues begin to dissipate. We don't take this to mean that at more extreme levels inequality is actually favorable for state tax revenue growth, however. More likely, it reflects the effects of periodic changes individual states have made to their tax policies. Because of data limitations, we did not control for each individual tax policy adjustment. But these changes likely explain why the top 10 most income tax-dependent states showed less revenue sensitivity to rising income inequality. Among the 10 states with the highest levels of income inequality are Connecticut, California, New Jersey, and New York. All of these states, which are also among the most income tax-reliant, have implemented higher top marginal tax rates at several points in the past decade. The policy changes toward greater income tax progressivity have probably helped offset a portion, although not all, of the effects of inequality on their tax revenue growth rates.

Another caveat is that it's possible the tax revenue slowdown reflects the rise of the service sector more than inequality per se. Many states' sales tax bases have not evolved to fully capture the growth of services as a share of the economy. But it's not clear that, even if they had, this would erase the relation-

ship we found. We tested the effect on year-over-year tax revenue growth rates against changes in inequality. It's certainly possible that overall spending on services would exhibit a similar sensitivity to changes in inequality as spending on goods that are currently taxed. Nevertheless, this is an area that warrants further research.

Implications Of Results For State Tax Policies

As inequality has become more pronounced in recent years, the subject has garnered more attention in the media and has risen in the public's awareness; it's no longer an abstract national macroeconomic issue. And lawmakers have begun responding to its fiscal consequences, perhaps based as much on intuition as any statistical assessment.

Following the onset of the Great Recession, we have observed a more populist impulse among lawmakers, culminating in more progressive income tax structures in some states. For example, since 2009, nine states have increased their top marginal personal income tax rates. (At least three—New Jersey, New York, and Wisconsin—subsequently reversed course, at least partly, and moved away from higher top marginal income tax rates.) The enactment of higher top marginal tax rates has marked something of a reversal from the prior trend, which spanned roughly a generation. From 1985 through 2009, the average overall top marginal tax rate across the states declined by slightly more than 1%.(8)

In a setting of rising income inequality, the move toward more progressive tax rates may help states generate faster tax revenue growth than would flatter tax regimes. In California, the Legislative Analyst's Office (LAO) has indicated as much. Since 1993, the top percentile's inflation-adjusted incomes have increased by 75%. Incomes of the bottom four quintiles, on the other hand, all declined, between 2.9% to 9.3% during this span. California's revenue dependence has mirrored these income trends, with an increasing share of its income tax collections coming from the high-income taxpayers. In 2012, for example, taxpayers with incomes in the top percentile paid almost 51% of the state's personal income tax revenue, up from 33% in 1993.(9) Thanks to the combination of a progressive income tax schedule and divergent income trends, the state's finances have come to rely more heavily on high-income taxpayers.

The LAO has pointed out, however, that while California's progressive tax structure likely delivers faster revenue growth than would a less progressive alternative, it also brings with it greater volatility.(10) Although we don't have the same level of tax incidence data for all the states, we would

Table 6 | Panel Error-Correction Estimates Of Tax Revenue Growth And Inequality, By Tax Structure

	—Top 10 income tax states—	—Top 10 sales tax states—
Income share of top 1%	-0.077 (0.0497)	-0.217* (0.0597)
Personal income	0.462* (0.0775)	0.361* (0.0755)
Coincident economic index	1.028* (0.0669)	0.805* (0.0680)
Constant	0.019 (0.0143)	0.039* (0.0136)
Observations	330	330
Fixed effects (state)	Y	Y

Notes: Dependent variable is tax revenue growth rate. Standard errors are in parentheses. Personal income and coincident economic index represent annual percent change. *Significance at the 1% level.
Data source: Frank, M. U.S. State-Level Income Inequality Data, 1980-2012. www.shsu.edu/eco_mwfi/inequality.html

Table 7 | Panel Error-Correction Estimates Of Tax Revenue Growth And Inequality Growth Rate

All states		
Income share of top 1% growth rate	-0.822*	(0.125)
Gini level	-1.39*	(0.023)
Income share of top 1% growth rate x Gini	1.59*	(0.216)
Personal income	0.416*	(0.039)
Coincident economic index	0.648*	(0.032)
Constant	0.173*	(0.066)
Observations	1,650	
Fixed effects (state)	Y	

Notes: Dependent variable is tax revenue growth rate. Standard errors in parentheses. Personal income and coincident economic index represent annual percent change. Regressions used pooled generalized least-squares panel regression for heteroskedasticity. *Indicates significance at the 1% level.
Data source: Frank, M. U.S. State-Level Income Inequality Data, 2010-2012. www.shsu.edu/eco_mwfi/inequality.html

expect that similar, if less pronounced trends exist in many states, especially those with progressive income tax codes.

The findings from our research indicate that tax revenue growth slows as income inequality rises, especially for the sales tax-dependent states. This suggests to us that inequality is having a detrimental effect on economic growth. But rather than being the direct cause of new rating downgrades, the negative consequences of income inequality on fiscal performance are best thought of as already implicitly reflected in our ratings. For example, despite its recent budgetary stabilization, California's propensity for revenue volatility continues to hold back its credit rating. As we see it, income inequality is part of a broader economic landscape, one that includes not only slower growth but also periodic

tax revenue downdrafts in some states. But given that rising income inequality is fundamentally an economic problem, changes to state tax policies alone won't likely fully reverse any fiscal trends that have emerged as a result. While such an approach might help to partly counteract the slowdown in revenue collections, it does so at the expense of revenue stability, making it a second-best option. **cw**

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NOTES

- (1) Piketty, Thomas. 2003. "Income Inequality in the United States, 1913-1998." *Quarterly Journal of Economics* 118(1), 1-39. Longer version published in A.B. Atkinson and Piketty, T., eds., 2007, Oxford University Press. (Tables and figures updated to 2012 in Excel format, September 2013.)
- (2) Income data reflect adjusted gross income from data published by the U.S. Internal Revenue Service as compiled and published by: Frank, M. (2014). "U.S. State-Level Income Inequality, 1916-2011." http://www.shsu.edu/eco_mwf/inequality.html
- (3) Index for each state includes nonfarm payroll employment, average hours worked in manufacturing, unemployment rate, and wage and salary disbursements deflated by the consumer price index. Variables are then calibrated so that long-term growth in the index aligns with long-term growth in state GDP. <http://www.philadelphiafed.org/research-and-data/regional-economy/indexes/coincident/>
- (4) Top 10 income-tax states based on 2012 U.S. Census Bureau Data. Individual income tax as share of total taxes: Oregon, Virginia, New York, Massachusetts, Georgia, Connecticut, California, Colorado, Missouri, and North Carolina.
- (5) Top 10 sales-tax states: Florida, Washington, South Dakota, Texas, Nevada, Tennessee, Hawaii, Mississippi, Arizona, and Indiana.
- (6) Federation of Tax Administrators. 2014 (February). http://www.taxadmin.org/fta/rate/ind_inc.pdf
- (7) For consistency, we used estimates of Gini coefficients created from the same data set as the income data.
- (8) Bruce, D.; Fox, W.; and Yang, Z. 2010. "Base Mobility And State Personal Income Taxes." In *National Tax Journal* 63(4), Part 2, 945-966. December.
- (9) California Franchise Tax Board, https://www.ftb.ca.gov/aboutFTB/Tax_Statistics/Reports/Revenue_Estimating_Exhibits/05022014.pdf
- (10) Hill, E. 2005. "Revenue Volatility In California." Legislative Analyst's Office. January. http://www.lao.ca.gov/2005/rev_vol/rev_volatility_012005.pdf

RATINGS TRENDS

Standard & Poor's Fixed Income Research

The first three pages of this section display data compiled by Standard & Poor's Global Fixed Income Research, provider of analytical and timely information on Standard & Poor's rating actions, new issuance activity, and secondary market yield spreads.

- Rating actions are tracked and analyzed. Credit trends are followed daily across seven broad industry sectors and numerous subsectors.
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For additional information, contact Diane Vazza, managing director of Global Fixed Income Research at Standard & Poor's.

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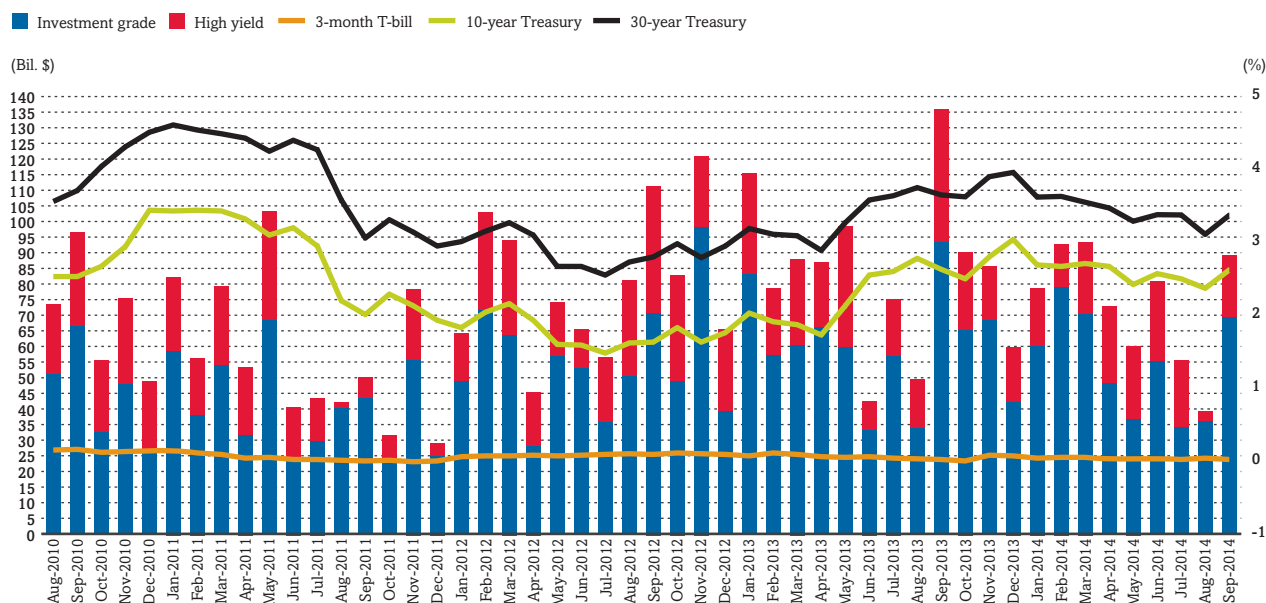
diane_vazza@standardandpoors.com

Rating Actions

Sector	Action	-This Week-		-YTD 2014-	
		No.	Mil. \$	No.	Mil. \$
Industrial	Upgrade	4	5,925	149	370,870
	Downgrade	6	4,062	169	322,267
Telecommunications	Upgrade	1	326	6	36,800
	Downgrade	0	0	6	30,006
Utility	Upgrade	0	0	14	45,403
	Downgrade	0	0	10	73,969
Banking	Upgrade	0	0	5	13,340
	Downgrade	0	0	7	12,981
Financial Institutions/Insurance	Upgrade	0	0	11	40,264
	Downgrade	0	0	3	8,163
Sovereign	Upgrade	1	176,583	11	1,294,187
	Downgrade	1	909,141	14	1,844,483
International	Upgrade	5	6,164	139	594,196
	Downgrade	9	31,740	173	570,361

Data as of Sept. 17, 2014. The rating action data are for issuer credit ratings. International includes all sectors outside the U.S.
Source: Standard & Poor's Global Fixed Income Research.

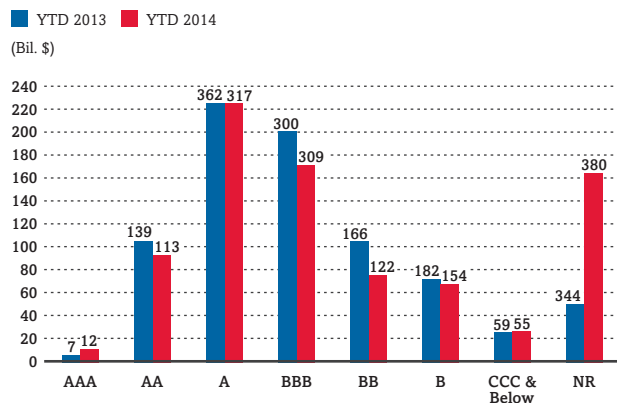
Corporate Issuance Volume And Treasury Yields



Includes all public and Rule 144a issuance of straight debt, convertible debt, floating-rate notes, and medium-term notes by financial and nonfinancial entities into the U.S. market.
Sources: Standard & Poor's Global Fixed Income Research, Thomson Financial.

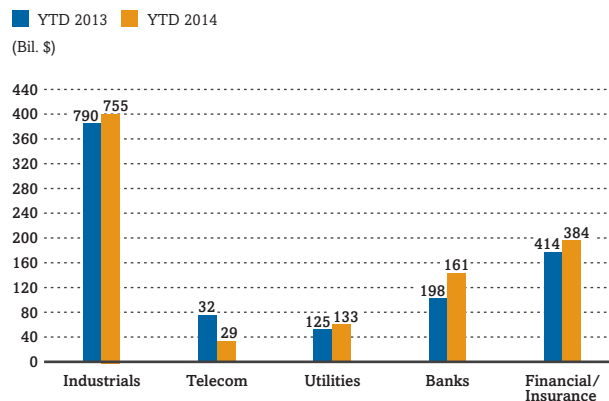
Number Of New Issues And Dollar Volume

By Rating Category



Includes all public and Rule 144a issuance of straight debt, convertible debt, floating-rate notes, and medium-term notes by financial and nonfinancial entities into the U.S. market.
Sources: Standard & Poor's Global Fixed Income Research, Thomson Financial.

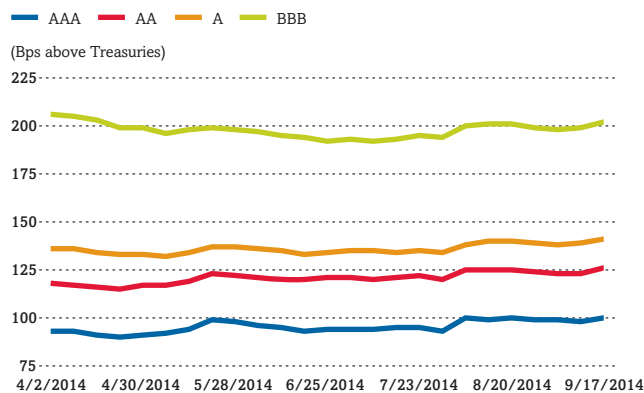
By Sector



Includes all public and Rule 144a issuance of straight debt, convertible debt, floating-rate notes, and medium-term notes by financial and nonfinancial entities into the U.S. market.
Sources: Standard & Poor's Global Fixed Income Research, Thomson Financial.

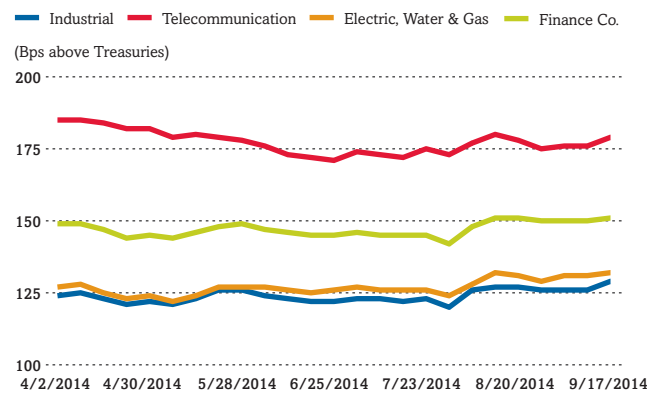
Spread To Treasuries By Rating Category

U.S. Industrial Credit Trends By Rating Category



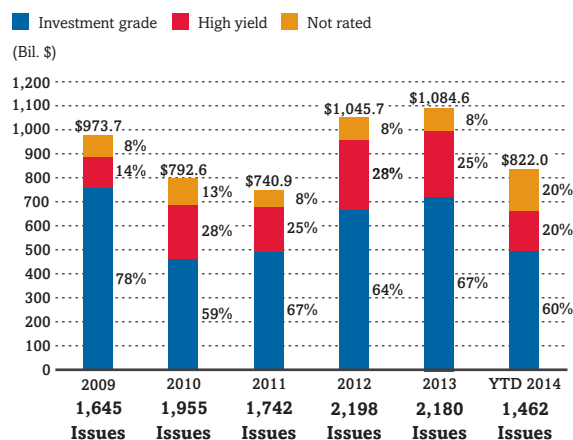
Includes Yankee bond issues. Nine plus years to maturity and minimum \$100 million outstanding.
Source: Standard & Poor's Global Fixed Income Research.

Sector Relative Value Rating Category 'A'



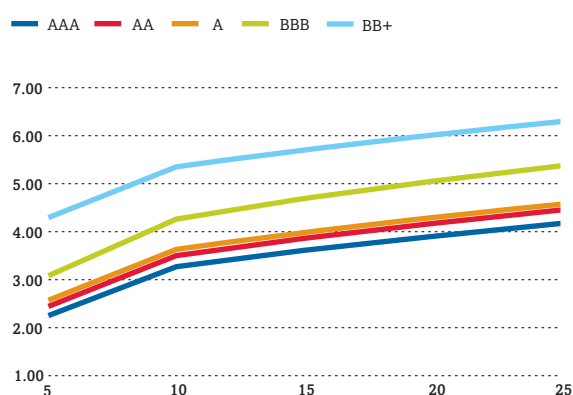
Five-plus years to maturity and minimum \$100 million outstanding.
Source: Standard & Poor's Global Fixed Income Research.

U.S. Corporate Bond Issuance



Includes all public and Rule 144a issuance of convertible debt, straight debt, floating-rate notes, and medium-term notes by financial and nonfinancial entities into the U.S. market.
Sources: Standard & Poor's Global Fixed Income Research, Thomson Financial.

U.S. Industrial Bond Yields



Data as of Sept. 17, 2014.
Source: Standard & Poor's Global Fixed Income Research.

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Wholesale Price Inflation (% Change-1 Yr.)

	Jul-2014	Jun-2014	May-2014
U.S.	2.02	2.03	2.03
U.K.	1.09	1.09	1.09
Germany	1.06	1.06	1.06
Japan	1.04	1.04	1.04

Data presented as monthly averages.
Source: Global Insight.

Long-Term Bond Rates (%)

	This week	One week ago	One year ago
U.S.	2.61	2.54	2.79
U.K.	2.55	2.50	2.93
Germany	0.99	0.97	1.93
Japan	0.57	0.56	0.69

Data presented as weekly averages. Germany is current yield. Other data are yield to maturity. Source: Global Insight.
Data for German and Japanese short-term bond rates have been discontinued.

Short-Term Interest Rates (%)

	This week	One week ago	One year ago
U.S.	0.20	0.20	0.19
U.K.	0.57	0.56	0.52

Standard & Poor's Rated U.S. Money Fund Indices

	7-Day net yield (%)	30-Day net yield (%)	7-Day gross yield (%)	30-Day gross yield (%)	Maturity (days)	Total assets (bil. \$)
Money Fund Indices (Period ended 9/16/2014)						
'AAAm'/Government	0.01	0.01	N.A.	N.A.	43	N.A.
'AAAm'/Taxable	0.01	0.01	N.A.	N.A.	43	N.A.
'AAAm'/Tax-Free	0.01	0.01	N.A.	N.A.	34	N.A.
Government Investment Pool (GIP) Indices* (Period ended 9/12/2014)						
GIP Index/All	0.05	0.05	0.15	0.15	45	86.9
GIP Index/Government	0.02	0.02	0.09	0.09	44	21.3
GIP Index/General Purpose Taxable	0.05	0.05	0.16	0.16	45	65.6

*Comprised of 'AAAm' and 'AAm' rated government investment pools. N.A.—Not available. Sources: Standard & Poor's; Rated Money Fund Report, a service of iMoneyNet, Inc.

Market Attributes®

Index	Yield	1-W	MTD	YTD	Index	Yield	1-W	MTD	YTD
Corporate Bonds					Leveraged Loans				
S&P International Corporate Bond	2.01	0.07	(2.42)	1.67	S&P Global Leveraged Loan	5.06	0.01	(0.52)	1.36
S&P U.S. Issued Inv. Grade Corp.	2.89	(0.62)	(1.57)	5.37	S&P/LSTA Leveraged Loan	4.92	(0.13)	(0.16)	2.56
S&P U.S. Issued High Yield Corporate Bond	5.76	(0.66)	(1.24)	4.39	S&P/LSTA U.S. Leveraged Loan 100	4.59	(0.21)	(0.33)	2.12
S&P U.S. Covered Bond	1.18	(0.02)	(0.17)	1.97	Equity				
DJ Equal Weight U.S. Issued Corp.	2.94	(0.66)	(1.76)	4.89	S&P U.S. Preferred Stock		(0.48)	(1.70)	6.04
U.S. Treasury & Agency					S&P U.S. Floating Rate Preferred		(0.05)	(1.09)	11.72
S&P/BGCantor U.S. Treasury Bill	0.02	0.00	0.00	0.05	S&P/TSX Preferred Share Laddered		(0.76)	(1.15)	1.95
S&P/BGCantor U.S. Treasury Bond	1.15	(0.21)	(0.67)	2.03	S&P South Africa Preference		(0.04)	(1.38)	(3.85)
S&P/BGCantor Current 10-Yr T-Bond	2.60	(0.81)	(2.09)	6.16	Regional				
S&P/Citigroup International Treasury Bond	1.17	(0.57)	(3.00)	1.98	S&P Eurozone Sovereign Bond	1.23	(0.45)	(0.82)	9.41
S&P U.S. Agency	1.03	(0.07)	(0.34)	1.77	S&P/ASX Australian Fixed Interest	3.40	(0.13)	(1.15)	5.13
S&P 10+ Year U.S. Agency Index	3.40	(1.20)	(2.63)	12.17	S&P/ASX Bank Bill	2.62	0.05	0.11	1.89
U.S. Municipal Bonds					S&P India Bond	8.77	0.25	0.66	8.75
S&P National AMT-Free Municipal Bond	2.06	(0.16)	(0.45)	7.05	S&P China Bond	4.80	0.13	0.09	6.18
S&P Municipal Bond	2.49	(0.12)	(0.30)	7.43	S&P/DB ORBIT (USD)	4.04	(0.02)	0.03	2.51
S&P Municipal Bond Investment Grade	2.16	(0.13)	(0.37)	7.02	S&P Pan Asia Bond	4.74	(0.48)	(0.53)	5.19
S&P Municipal Bond High Yield	6.29	(0.01)	0.51	12.90	S&P Thailand Bond	2.96	0.22	0.14	3.62
S&P Municipal Yield	5.51	(0.03)	0.30	11.90	S&P South Korea Bond	2.63	0.30	0.29	4.39
Money Market					S&P/Valmer Mex. Gov. CETES	2.92	0.05	0.13	2.61
S&P U.S. Commercial Paper	0.14	0.00	0.01	0.14	Inflation-Linked				
Credit Default Swaps (Δ in bps)					U.S. TIPS 0-3 Year	(0.62)	(0.00)	(0.26)	(1.37)
S&P/ISDA U.S. 150 Credit Spread		4.06	5.12	(3.89)	U.S. TIPS 10 Year	0.47	(0.80)	(2.36)	6.12
U.S. Homebuilders Select 10		1.48	11.18	10.83	S&P/ASX Gov. Inflation-Linked	1.25	(0.24)	(2.38)	7.24
U.S. Consumer Staples Select 10		1.47	5.42	10.51	S&P/ Valmer Mex. Gov. Inf. 1+yr	2.11	(0.71)	(1.45)	7.92
U.S. Energy Select 10		9.87	18.06	27.66	Sukuk				
U.S. Financials Select 10		(0.12)	0.55	(6.53)	DJ Sukuk Higher Quality Investment	2.39	(0.40)	(0.43)	4.56
U.S. Health Care Select 10		(0.05)	0.47	2.06	DJ Sukuk Total Return Inv. Grade	2.51	(0.41)	(0.45)	4.78

Summary

- Credit default swap spreads of the S&P/ISDA U.S. Energy Select 10 Index widened **(9.87)** basis points since last week suggesting lower market confidence in the sector. This is the second week in a row the sector experienced widening spreads above 9 bps, currently up **27.66** bps YTD.
- The S&P 10+ Year U.S. Agency Index fell **1.2%** over the past week, reducing YTD returns to **12.17%**. Yields on the index are up to 3.4% from 3.29% last week.

- The S&P Municipal Bond High Yield Index which has returned **12.9%** YTD fell slightly this week, as yields nudge up to 6.29%.
- The S&P India Bond Index continues to have high yields of 8.77% with **0.66% MTD** returns.

Source: S&P Dow Jones Indices LLC and/or its affiliates. Data as of September 17, 2014. Index performance is based on total return, and returns for international indices are in USD. Past performance is not a guarantee of future results. It is not possible to invest directly in an index. Index returns do not reflect expenses an investor would pay to invest in securities associated with an index. Go to <http://us.spindices.com/regulatory-affairs-disclaimers/> for more index performance disclosures.

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Sovereign Ratings And Country T&C Assessments

Standard & Poor's Ratings Services currently rates 130 sovereign governments and has established transfer and convertibility (T&C) assessments for each country with a rated sovereign, as shown in the table below. A T&C assessment is the rating associated with the likelihood of the sovereign restricting nonsovereign access to foreign exchange needed for debt service. For most countries, Standard & Poor's analysis concludes that this risk is less than the risk of sovereign default on foreign-currency obligations; thus, most T&C assessments exceed the sovereign foreign currency rating. Foreign currency ratings of nonsovereign entities or transactions generally can be as high as the T&C assessment if their stress-tested operating and financial characteristics support the higher rating. For more information, please see *"Corporate And Government Ratings That Exceed The Sovereign Rating,"* published monthly on *RatingsDirect*.

If a sovereign, through membership in a monetary or currency union, has ceded monetary and exchange rate policy

responsibility to a monetary authority that the sovereign does not solely control, the T&C assessment reflects the policies of the controlling monetary authority, vis-à-vis the exchange of its currency for other currencies in the context of debt service. The same applies if a sovereign uses as its local currency the currency of another sovereign. A T&C assessment may change sharply if a sovereign introduces a new local currency, by entering or exiting a monetary/currency union, or through some other means. This is because the new local currency, and in some cases the new monetary authority, may operate in very different monetary and exchange regimes. The T&C assessment does not normally reflect the likelihood of change in a country's local currency.

For historical information on these ratings and assessments, please see *"Sovereign Rating And Country T&C Assessment Histories,"* published monthly on *RatingsDirect*. Ratings as of Aug. 21, 2014. **CW**

COUNTRY	-SOVEREIGN RATINGS (LT/OUTLOOK/ST)-		TRANSFER & CONVERTIBILITY ASSESSMENT
	LOCAL CURRENCY	FOREIGN CURRENCY	
Abu Dhabi	AA/Stable/A-1+	AA/Stable/A-1+	AA+*
Albania	B/Stable/B	B/Stable/B	BB-
Andorra	A-/Negative/A-2	A-/Negative/A-2	AAA*
Angola	BB-/Stable/B	BB-/Stable/B	BB-
Argentina	CCC+/Negative/C	SD/NM/SD	CCC-
Aruba	BBB+/Stable/A-2	BBB+/Stable/A-2	BBB+
Australia	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA
Austria	AA+/Stable/A-1+	AA+/Stable/A-1+	AAA*
Azerbaijan	BBB-/Stable/A-3	BBB-/Stable/A-3	BBB-
Bahamas	BBB/Negative/A-2	BBB/Negative/A-2	BBB+
Bahrain	BBB/Stable/A-2	BBB/Stable/A-2	BBB+
Bangladesh	BB-/Stable/B	BB-/Stable/B	BB-
Barbados	BB-/Negative/B	BB-/Negative/B	BB-
Belarus	B-/Stable/B	B-/Stable/B	B-
Belgium	AA/Stable/A-1+	AA/Stable/A-1+	AAA*
Belize	B-/Stable/B	B-/Stable/B	B-
Bermuda	AA-/Negative/A-1+	AA-/Negative/A-1+	AAA
Bolivia	BB/Stable/B	BB/Stable/B	BB
Bosnia and Herzegovina	B/Stable/B	B/Stable/B	BB-
Botswana	A-/Stable/A-2	A-/Stable/A-2	A+
Brazil	BBB+/Stable/A-2	BBB-/Stable/A-3	BBB+
Bulgaria	BBB-/Stable/A-3	BBB-/Stable/A-3	A-

COUNTRY	-SOVEREIGN RATINGS (LT/OUTLOOK/ST)-		TRANSFER & CONVERTIBILITY ASSESSMENT
	LOCAL CURRENCY	FOREIGN CURRENCY	
Burkina Faso	B/Stable/B	B/Stable/B	BBB-*
Cambodia	B/Stable/B	B/Stable/B	B+
Cameroon	B/Stable/B	B/Stable/B	BBB-*
Canada	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA
Cape Verde	B/Stable/B	B/Stable/B	BB-
Chile	AA+/Stable/A-1+	AA-/Stable/A-1+	AA+
China	AA-/Stable/A-1+	AA-/Stable/A-1+	AA-
Colombia	BBB+/Stable/A-2	BBB/Stable/A-2	A-
Congo-Brazzaville	B+/Stable/B	B+/Stable/B	BBB-*
Congo-Kinshasa	B-/Stable/B	B-/Stable/B	B
Cook Islands	B+/Stable/B	B+/Stable/B	AAA*
Costa Rica	BB/Stable/B	BB/Stable/B	BBB-
Croatia	BB/Stable/B	BB/Stable/B	BBB
Curacao	A-/Stable/A-2	A-/Stable/A-2	A-
Cyprus	B/Positive/B	B/Positive/B	AAA*
Czech Republic	AA/Stable/A-1+	AA-/Stable/A-1+	AA+
Denmark	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA
Dominican Republic	B+/Stable/B	B+/Stable/B	BB
Ecuador	B+/Stable/B	B+/Stable/B	B+
Egypt	B-/Stable/B	B-/Stable/B	B-
El Salvador	BB-/Negative/B	BB-/Negative/B	AAA*
Estonia	AA-/Stable/A-1+	AA-/Stable/A-1+	AAA*
Ethiopia	B/Stable/B	B/Stable/B	B
Fiji	B/Positive/B	B/Positive/B	B
Finland	AAA/Negative/A-1+	AAA/Negative/A-1+	AAA*
France	AA/Stable/A-1+	AA/Stable/A-1+	AAA*
Gabon	BB-/Stable/B	BB-/Stable/B	BBB-*
Georgia	BB-/Stable/B	BB-/Stable/B	BB
Germany	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA*
Ghana	B/Negative/B	B/Negative/B	B+
Greece	B-/Stable/B	B-/Stable/B	AAA*
Grenada	SD/NM/SD	SD/NM/SD	BBB-*
Guatemala	BB+/Stable/B	BB/Stable/B	BBB-
Honduras	B/Stable/B	B/Stable/B	B+
Hong Kong	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA
Hungary	BB/Stable/B	BB/Stable/B	BBB-
Iceland	BBB-/Positive/A-3	BBB-/Positive/A-3	BBB-
India	BBB-/Negative/A-3	BBB-/Negative/A-3	BBB+
Indonesia	BB+/Stable/B	BB+/Stable/B	BBB-
Ireland	A-/Positive/A-2	A-/Positive/A-2	AAA*

COUNTRY	-SOVEREIGN RATINGS (LT/OUTLOOK/ST)-		TRANSFER & CONVERTIBILITY ASSESSMENT
	LOCAL CURRENCY	FOREIGN CURRENCY	
Israel	A+/Stable/A-1	A+/Stable/A-1	AA
Italy	BBB/Negative/A-2	BBB/Negative/A-2	AAA*
Jamaica	B-/Stable/B	B-/Stable/B	B
Japan	AA-/Negative/A-1+	AA-/Negative/A-1+	AAA
Jersey	AA+/Stable/A-1+	AA+/Stable/A-1+	AAA
Jordan	BB-/Negative/B	BB-/Negative/B	BB+
Kazakhstan	BBB+/Negative/A-2	BBB+/Negative/A-2	BBB+
Kenya	B+/Stable/B	B+/Stable/B	BB-
Korea	AA-/Stable/A-1+	A+/Stable/A-1	AA
Kuwait	AA/Stable/A-1+	AA/Stable/A-1+	AA+
Latvia	A-/Stable/A-2	A-/Stable/A-2	AAA*
Lebanon	B-/Stable/B	B-/Stable/B	B+
Liechtenstein	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA*
Lithuania	A-/Stable/A-2	A-/Stable/A-2	AA-
Luxembourg	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA*
Macedonia	BB-/Stable/B	BB-/Stable/B	BB
Malaysia	A/Stable/A-1	A-/Stable/A-2	A+
Malta	BBB+/Stable/A-2	BBB+/Stable/A-2	AAA*
Mexico	A/Stable/A-1	BBB+/Stable/A-2	A+
Mongolia	B+/Stable/B	B+/Stable/B	BB-
Montenegro	BB-/Negative/B	BB-/Negative/B	AAA*
Montserrat	BBB-/Stable/A-3	BBB-/Stable/A-3	BBB-*
Morocco	BBB-/Stable/A-3	BBB-/Stable/A-3	BBB+
Mozambique	B/Stable/B	B/Stable/B	B
Netherlands	AA+/Stable/A-1+	AA+/Stable/A-1+	AAA*
New Zealand	AA+/Stable/A-1+	AA/Stable/A-1+	AAA
Nigeria	BB-/Negative/B	BB-/Negative/B	BB-
Norway	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA
Oman	A/Stable/A-1	A/Stable/A-1	A+
Pakistan	B-/Stable/B	B-/Stable/B	B-
Panama	BBB/Stable/A-2	BBB/Stable/A-2	AAA*
Papua New Guinea	B+/Stable/B	B+/Stable/B	BB
Paraguay	BB/Stable/B	BB/Stable/B	BB+
Peru	A-/Stable/A-2	BBB+/Stable/A-2	A
Philippines	BBB/Stable/A-2	BBB/Stable/A-2	BBB+
Poland	A/Stable/A-1	A-/Stable/A-2	A+
Portugal	BB/Stable/B	BB/Stable/B	AAA*
Qatar	AA/Stable/A-1+	AA/Stable/A-1+	AA+
Ras Al Khaimah	A/Negative/A-1	A/Negative/A-1	AA+*
Romania	BBB-/Stable/A-3	BBB-/Stable/A-3	A-

COUNTRY	-SOVEREIGN RATINGS (LT/OUTLOOK/ST)-		TRANSFER & CONVERTIBILITY ASSESSMENT
	LOCAL CURRENCY	FOREIGN CURRENCY	
Russia	BBB/Negative/A-2	BBB-/Negative/A-3	BBB-
Rwanda	B/Stable/B	B/Stable/B	B
Saudi Arabia	AA-/Positive/A-1+	AA-/Positive/A-1+	AA
Senegal	B+/Stable/B	B+/Stable/B	BBB-*
Serbia	BB-/Negative/B	BB-/Negative/B	BB-
Sharjah	A/Stable/A-1	A/Stable/A-1	AA+
Singapore	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA
Slovak Republic	A/Positive/A-1	A/Positive/A-1	AAA*
Slovenia	A-/Negative/A-2	A-/Negative/A-2	AAA*
South Africa	BBB+/Stable/A-2	BBB-/Stable/A-3	BBB+
Spain	BBB/Stable/A-2	BBB/Stable/A-2	AAA*
Sri Lanka	B+/Stable/B	B+/Stable/B	B+
Suriname	BB-/Stable/B	BB-/Stable/B	BB
Sweden	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA
Switzerland	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA
Taiwan	AA-/Stable/A-1+	AA-/Stable/A-1+	AA+
Thailand	A-/Stable/A-2	BBB+/Stable/A-2	A
Trinidad and Tobago	A/Stable/A-1	A/Stable/A-1	AA
Turkey	BBB/Negative/A-2	BB+/Negative/B	BBB
Turks and Caicos	BBB+/Stable/A-2	BBB+/Stable/A-2	AAA
Uganda	B/Stable/B	B/Stable/B	B
Ukraine	B-/Stable/B	CCC/Stable/C	CCC
United Kingdom	AAA/Stable/A-1+	AAA/Stable/A-1+	AAA
United States	AA+/Stable/A-1+	AA+/Stable/A-1+	AAA
Uruguay	BBB-/Stable/A-3	BBB-/Stable/A-3	BBB+
Venezuela	B-/Negative/B	B-/Negative/B	B-
Vietnam	BB-/Stable/B	BB-/Stable/B	BB-
Zambia	B+/Negative/B	B+/Negative/B	B+

*These T&C assessments are for countries that are either members of monetary or currency unions or use as their local currency the currency of another sovereign. Because of this, the assessment shown is based on Standard & Poor's analysis of either the monetary authority of the monetary/currency union or the sovereign issuing the currency. Thus, for European Economic and Monetary Union (EMU) members (Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, Netherlands, Portugal, Slovak Republic, Slovenia, and Spain), the T&C assessments reflect our view of the likelihood of the European Central Bank restricting nonsovereign access to foreign exchange needed for debt service. Similarly, the T&C assessments for countries with rated sovereigns in the Eastern Caribbean Currency Union (Grenada and Montserrat) reflect the current and projected policies of the Eastern Caribbean Central Bank. Likewise, the T&C assessments for countries with rated sovereigns in the West African Economic and Monetary Union (Burkina Faso and Senegal) are based on the policies of the Central Bank of West African States, and the T&C assessments for countries with rated sovereigns in the Central African Economic and Monetary Community (Cameroon, Congo-Brazzaville, and Gabon) are based on the policies of the Bank of Central African States. As for countries that use the currency of another, the T&C assessments of El Salvador and Panama are equalized with that of the U.S., while those of Abu Dhabi and Ras Al Khaimah are equalized with that of the United Arab Emirates, Andorra and Montenegro with EMU members, the Cook Islands with New Zealand, and Liechtenstein with Switzerland.

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