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TIAA-CREF Asset Management

Natural Resources & Infrastructure Quarterly

Second Quarter 2015

What's Inside

The Natural Resources & Infrastructure Quarterly features overviews of the following:

Economic Commentary – page 2

- While Greece drew headlines, the broader challenges of liquidity are driving many of the most critical economic actions across the globe.

Markets Summary – page 3

- Bond markets saw higher yields and a widening yield curve; FX markets steadied; wages and labor participation remain drags on U.S. economic growth; energy and agricultural commodities broadly strengthened.

Energy – page 5

- Crude oil prices have rebounded 25% in 2Q however obstacles remain for higher prices with the potential for additional supply from Iran and a large backlog of drilled but uncompleted wells.
- Though overall upstream capital investment has declined, the dollars that are being invested are being deployed more efficiently due to high grading and lower drilling and completion costs.

Infrastructure – page 6

- The global infrastructure market remains competitive in a low-yield environment. The trend toward larger, mega PPPs with fewer projects exacerbates the competitive dynamic.
- A number of recent major infrastructure portfolio sales highlights the continued demand for core-plus infrastructure assets.

Timberland – page 7

- U.S. timber prices continue a slight downward trend, as strong supply and a stronger USD pressure prices. Overall demand remains strong and U.S. housing continues to improve.
- Deal markets for 2015 remain largely to be determined. Several deals are rumored to be in closing stages, though top-quality properties are sparse.

Agriculture – page 8

- Soybean planted acreage closes the gap on corn in the U.S.
- Agri-commodity price volatility picks up across major row crops due to global weather conditions.
- Possible El Niño weather development could help California drought conditions.

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Financial Services

With European leaders demonstrating a magnitude of political dysfunction to make the U.S. political quarrels of recent years pale in comparison, attention can too easily turn to factors of the Greek crisis with little bearing on the economic outcome.

Personality conflicts and fraught interpersonal relationships make for interesting reads, but they also mask what is more important. Greece, through the crisis, is weighing the same issue currently being wrestled with across the globe's major financial institutions. Financial liquidity.

Financial liquidity is, in sum, the ease of one's ability to convert assets into cash. That ease of conversion—and the size and growth of the economy—is driven by supply of cash available and velocity at which it is exchanged. In a world still struggling with the reverberations of the financial crisis, the question of liquidity remains center stage. In the case of Greece, liquidity-driven headlines include the illiquidity of bank deposits and the illiquidity of the IOUs held by Greek creditors. As banks closed, referendums were taken, and political conflict with the rest of Europe escalated, the heart of the discussion amounted to what Greek politicians are willing to do to keep the economy and institutions liquid. Austerity, long the focus, becomes simply one part of a liquidity discussion on averting financial collapse.

One not even need leave Europe to find another of the major liquidity stories driving markets. Lost in the focus on Greece is the broader continent's monetary easing, unprecedented for the region. The European Central Bank is in the full throes of a €1 trillion bond buying program slated to run through at least most of 2016. The reason is that the region, having spent the past years skirting deflation and with low growth, demands more liquidity. Too much cash has been removed from the economy—the impact of shoring up banks, cuts across the continent, and frightened consumers. Growth in Europe remains modest and inflation low, indicating the need for liquidity shows no signs of ebbing.

Similar challenges of liquidity face Japan. Prime Minister Shinzo Abe continues to implement his Three Arrows—fiscal stimulus, monetary easing and structural reforms. At the core, all three arrows are designed to increase market liquidity—at least long term—and thereby lead to economic growth. The balance for Japan is between the liquidity added through stimulus and easing, against short term liquidity removed by market reforms. Though GDP grew at 2.4% for the first quarter, the high inventory component and weak consumer portion of that growth may dictate more easing and stimulus to follow.

China faces its own liquidity challenges, though they are driven more by a loss of investor confidence. Equity markets, coming off an extremely strong run, saw the benchmark stock index suddenly fall by more than 30 percent in 2Q, as investors looking to convert assets to cash found few buyers. With this in mind, Chinese policymakers are injecting liquidity into both equity and currency markets to ensure purchasers are available for investors looking to exit the country's market or currency. The ability for such intervention to succeed has many uneasy.

The U.S. is by no means immune. Though markets in the U.S. are the world's largest and Federal Reserve bond purchases have been unwound, liquidity challenges are critical. Recent bond and equity market spikes have raised concerns around long-term liquidity solutions. The Federal Reserve substituted for much of the demand previously driven by market making institutions. With the Fed out and such institutions removed by the regulations, creating enough market liquidity remains a challenge that is already distorting market movements.

These are just a few of the most prominent ways in which liquidity remains a key driver and key challenge for global markets. Few investment professionals would argue liquidity is lacking—given high competition for assets, robust commodity markets, and significant cash on balance sheets. More broadly, however, the current global economy's greatest challenges revolve around liquidity.

More than a half-decade into the new era of monetary intervention, it is worth being mindful of how much the story of financial liquidity has changed. Even if the headlines turn to the personalities and specifics of the Greek crisis, keeping liquidity in the world's major economies and institutions remains one of the greatest challenges.

Markets Summary

Key Market Metrics, as of June 30, 2015

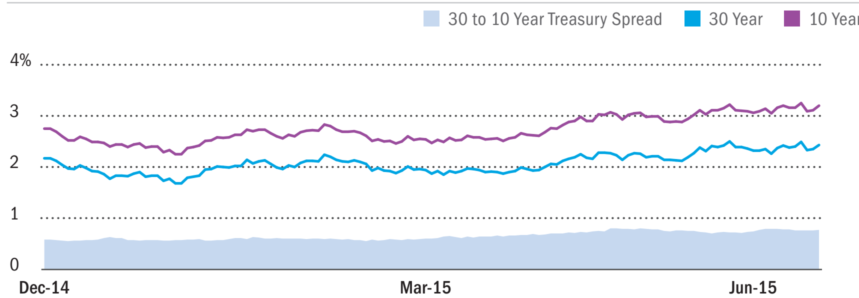
	QTD	Previous QTD	6 Months	1 Year	3 Years	5 Years
Key Market Prices						
U.S. 10 Year Treasury	**2.35%**	1.94%	2.17%	2.54%	1.67%	2.97%
U.S. 30 Year Treasury	**3.21%**	3.21%	3.21%	3.34%	2.76%	3.91%
Initial Unemployment Claims	**281k**	267k	293k	313k	373k	464k
Unemployment Rate	**5.3%**	5.5%	5.6%	6.1%	8.2%	9.4%
CB Consumer Confidence	**101.4**	101.4	93.1	86.4	62.7	54.3
S&P 500	**2,063**	2,068	2,059	1,960	1,362	1,031
FX Markets*						
USD-CAD	**1.25**	1.27	1.16	1.07	1.02	1.06
Euro-USD	**1.12**	1.07	1.21	1.37	1.27	1.23
USD-BRL	**3.11**	3.18	2.66	2.20	2.01	1.79
AUD-USD	**0.77**	0.76	0.82	0.94	1.02	0.85

* FX table displays 1 unit of 1st currency in terms of 2nd currency (e.g. 1 USD is currently equivalent to 1.25 CAD)

Bonds

After facing plummeting yields and compressing spreads in early 2015, bond markets provided modest relief over the remainder of the first half of 2015. From 2015 lows, ten-years added nearly 90 bps and 30 years added a full 100 bps, before a fallback in yields at the end of 2Q. Spreads between 10 and 30-years also widened as much as 25 bps from their tightest levels of the year. At the center was the Fed's rate guidance, driving similar moves higher across global bond markets. The moves were tempered by continued mixed U.S. economic data (which may delay higher rates) and investor desire for perceived safe assets as the markets focused on Greece.

10 & 30 Year U.S. Treasury Bond Yields



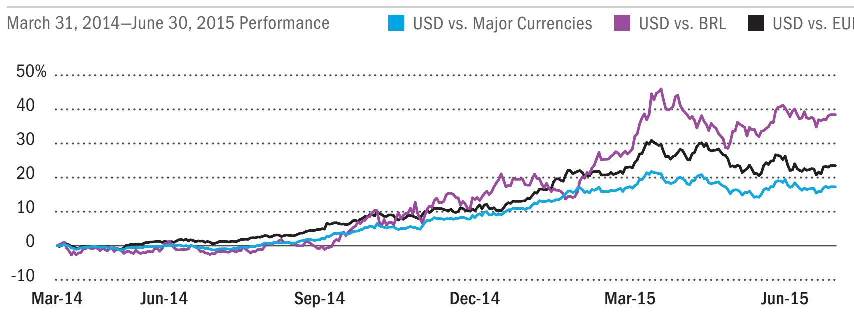
Source: U.S. Federal Reserve Board, Haver Analytics, TIAA-CREF analysis

FX Markets

Currency markets took a breath in 2Q, following the dramatic strengthening of the USD in 1Q 2015. Despite Greece grabbing headlines, the USD lost ground against the Euro for the first time since 1Q 2014. Currency analysts generally expect the USD to resume strengthening, given the monetary easing in Europe. The slight weakening of the USD also provided support to commodity markets, though prices for most major commodities remain well below recent highs. This means that while currencies of commodity-heavy countries such as Brazil and Canada stabilized, the markets do not expect their currencies to gain back lost ground in the near term.

U.S. Dollar vs. Major Currencies, BRL, & EUR

March 31, 2014—June 30, 2015 Performance

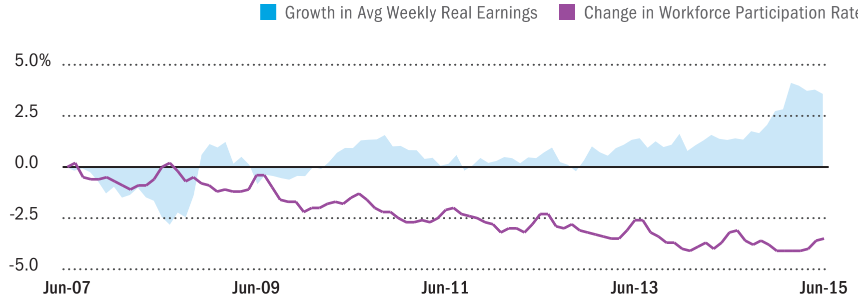


Source: U.S. Federal Reserve Board, Haver Analytics, TIAA-CREF analysis

Employment and Earnings

Eight years after the peak of the prior economic cycle—and more than six years after the trough of the Great Recession—wages and labor participation are the primary challenges for continued U.S. economic growth. Real wage growth slowed in 2Q after some of the strongest recent growth during the first part of 2015. Labor participation rates are at the lowest levels since the late 1970s. Even with headline unemployment near 5% and almost five straight years of job gains, lack of wage growth and low labor participation constrain the overall health of the economic expansion and are critical factors for the Fed in considering the timing and magnitude of rate raises.

Economic Laggards—Participation and Earnings



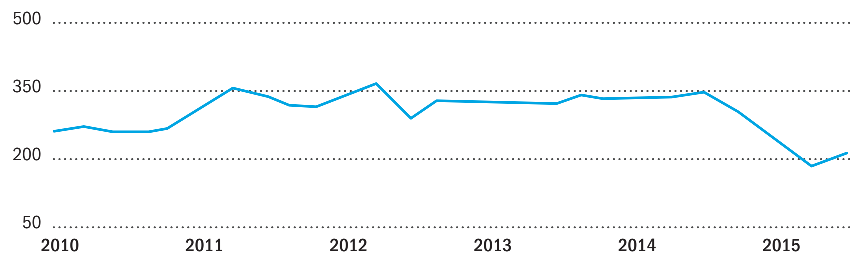
Source: U.S. Census Bureau, U.S. BLS, Haver Analytics, TIAA-CREF analysis

Energy

The energy complex in 2Q 2015 improved on higher prices for both crude oil and natural gas. Despite recently improved pricing in the sector, headwinds remain as U.S. supply has continued to grow despite significantly lower levels of upstream capital investment. Additional uncertainty exists on the demand side with fears of slowing growth in China which impacts both the broader global economy and the demand for energy commodities. Positively, consumers continue to benefit from lower gasoline prices compared to 2014, although the average price of regular gasoline in the U.S. rose 35 cents during the quarter to $2.80.

S&P GSCI Energy Spot Index

Monthly Average



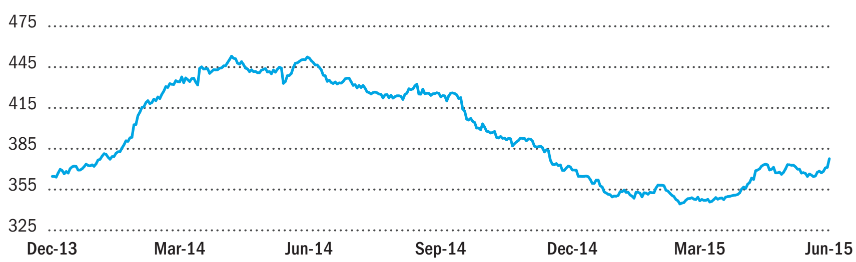
Source: Standard & Poor's, Haver Analytics

Agriculture

Agri-commodity prices rallied significantly in the second quarter on changing supply outlooks and weather related yield concerns. The rally was compounded by CFTC data that revealed for the first time in over three months that managed money had flipped to a net long position. The last week of June represented the biggest bullish swing in hedge fund commodity future positioning dating back to 2006. However, the USDA's acreage report was mixed for most major row crops, which could indicate some market volatility for commodity prices over the next few months.

CRB Foodstuffs Index

1967 = 100



Source: Commodity Research Bureau, Haver Analytics

Market Review

- Oil prices rose during the quarter, with WTI increasing 25% to above $59 from below $48 at the end of March while Brent increased 15% to just below $64 from over $55.
- Lower prices have impacted investment in new production as evidenced by lower planned capital expenditures and U.S. rig counts which have declined 53% since year-end to 859 rigs at the end of June according to Baker Hughes. The rig count has stabilized in June potentially signaling a floor on drilling activity.
- Positively, operators are improving the efficiency of the upstream capital that is invested which is driven by high grading of drilling locations and reductions in drilling and completion costs as a result of lower incurred service costs. IHS estimates an average 25–30% gain in the efficiency of capital invested in 2015 compared to 2014. The improved efficiency is supporting continued drilling activity in the Bakken, Eagle Ford, Niobrara, Marcellus and Permian basins.
- Outside the U.S., there is some activity in Brazil and the North Sea as circumstances and commodity prices make entry into those basins more economic on a contrarian side.
- The prospect of a nuclear agreement with Iran early in Q3 puts downward pressure on oil prices. IHS estimates that Iranian oil production will increase by 600,000 b/d three months after any sanctions relief.
- Despite significant interest from private capital for energy assets (we understand there are over 300+ private equity backed management teams in the market), transaction activity remains muted as sellers are not willing to part with crown jewel assets and the fringe assets that are available don't interest buyers.
- M&A activity during the quarter included Shell's $70 bn acquisition of BG Group and the pursuit of The Williams Companies by Energy Transfer Equity in a potential $48 bn deal.

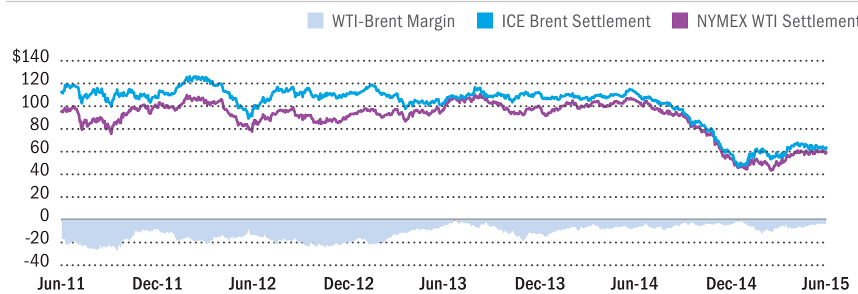
Outlook

- The EIA forecasts WTI crude oil prices will average $56/bbl in 2015 and $62/bbl in 2016 while Brent crude oil prices will average $61/bbl in 2015 and $67/bbl in 2016. The EIA forecast for Henry Hub natural gas is for prices below $4/MMBtu through 2016.
- The EIA forecasts U.S. crude oil production to increase to an average of 9.4 million bbl/d in 2015 compared to the 2014 average of 8.7 million bbl/d, though EIA expects production to begin declining through the second half of 2015 to an average of 9.2 million bbl/d in the first quarter of 2016.

Key Market Metrics

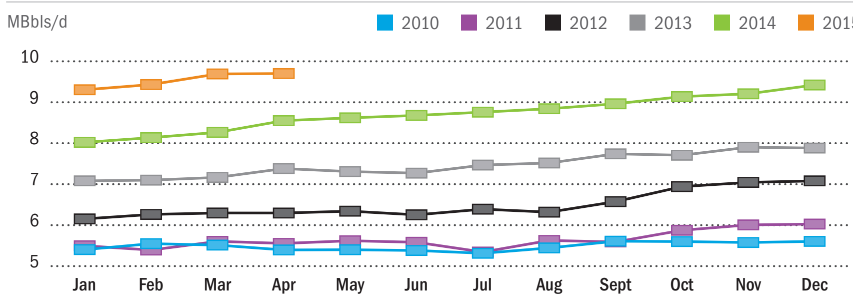
	QTD	Previous QTD	6 Months	1 Year	3 Years	5 Years
NYMEX WTI Crude Oil	**$59.47**	$47.60	$53.27	$105.37	$84.96	$75.63
ICE Brent Crude Oil	**$63.59**	$55.11	$57.33	$112.36	$97.80	$75.01
WCS Crude Oil	**$47.47**	$35.05	$37.27	$84.37	$57.96	$62.93
Henry Hub Nat. Gas	**$2.83**	$2.64	$2.89	$4.46	$2.82	$4.62
Alberta Nat. Gas	**$2.09**	$2.12	$2.46	$4.13	$2.21	$3.50
Wtd. Avg. $/kWh in U.S.	**N/A**	10.30	10.13	10.76	10.13	10.18
OPEC Prod. (Mbbls/d)	**N/A**	31.1M	30.5M	30.1M	31.6M	29.1M
U.S. Oil Imports (Mbbls/d)	**7.0M**[1]	7.6M	7.2M	7.1M	9.2M	9.9M
U.S. Gas Output (Bcf/d)	**91.5B**[2]	91.0B	93.2B	86.6B	79.2B	71.3B

Crude Oil Exchange Prices



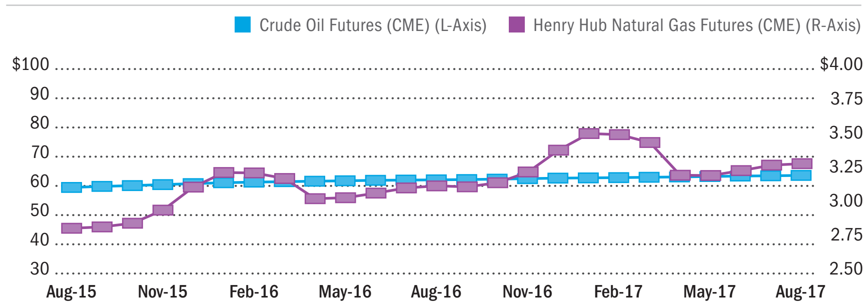
Source: Haver Analytics, TIAA-CREF analysis

U.S. Crude Oil Production



Source: Energy Information Administration, Haver Analytics

Futures Curve—Crude Oil & Natural Gas



Source: CME

[1] Items are as of 5/31/15; [2] Items are as of 4/30/15

Market Review

- Appetite for global infrastructure remains very strong in a competitive, low-yield environment.
- P3 activity in the U.S. and Canada continues to develop, but industry experts forecast a pipeline lull in the U.S. next year.
  - In the U.S., the Freeport LNG expansion and NC's I-77 P3 were among the largest deals to close.
  - The Canadian government selected a consortium to build the new Champlain Bridge. The project cost is CAD2.2 bn.
- A series of mega projects, particularly in Australia, has some market participants complaining about the trend toward larger PPPs with fewer projects.
  - Australian Parliament approved the sale of NSW power networks TransGrid. The estimated AUD20 bn sale proceeds will go toward funding a new metro rail system, Sydney Metro.
  - The AUD2 bn Crown Castle Australia sale reached financial close at an implied price of 20x EBITDA. Macquarie led the winning consortium.
- Demand for European infrastructure investment is vast, though there is uncertainty around regulatory reform. A number of recent portfolio sales highlights the continued demand for core-plus assets.
  - TDF sold its French towers business, TDF France, to Brookfield, Arcus Infrastructure, APG and PSP Investments for EUR3.6 bn (9.5x EBITDA).
  - Fortum Sweden, a EUR6.6 bn deal, closed with Borealis and a local Swedish pension fund buying the regulated distribution business at 16.6x EBITDA.
  - OTPP and Public Sector Pension Investment Board jointly acquired a 66.6% stake in Santander's global renewables portfolio.
- Global M&A activity started the year strong with $17.5 bn worth of transactions having reached financial close in 1Q15.
  - Telecom and renewable energy disposals comprised nearly half of the activity.
  - There is also increased public MLP consolidation activity and increased renewable yieldco activity with private finance being a "bridge" partner to yieldcos. One key advantage private capital provides is flexibility.
- PE fund flows for 2Q15 were below levels year-over-year. According to Preqin, six funds closed and a total of $4.4 bn capital was raised compared to 14 funds closed and $15.5 bn capital raised in 2Q14.

Outlook

- The markets expect deal flow to be robust throughout 2015. It will be important to monitor political developments around future funding strategies.

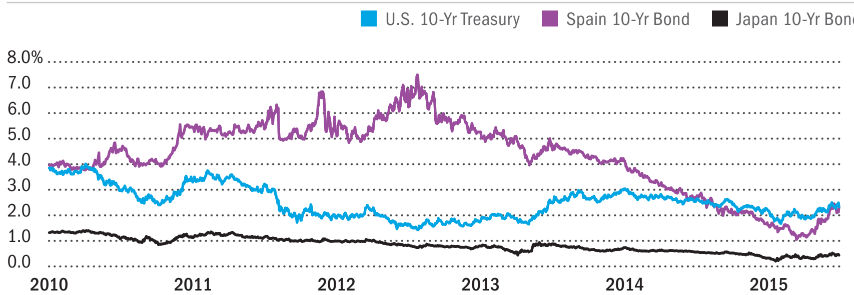
[1] Items are as of 5/31/15; [2] Items are as of 4/30/15

Key Market Metrics

	QTD	Previous QTD	6 Months	1 Year	3 Years	5 Years
U.S. Pop. Growth from '00	**13.15%**[1]	13.0%	12.9%	12.4%	12.0%	10.5%
U.S. Inflation Rate (Y-o-Y)	**0.0%**[1]	-0.1%	0.8%	1.7%	1.5%	2.7%
Y-o-Y U.S. Real GDP Growth	**N/A**	2.9%	2.4%	2.7%	1.9%	2.6%
U.S. Deficit as % of GDP	**N/A**	3.2%	2.4%	3.0%	2.5%	8.3%
U.K. Deficit as % of GDP	**N/A**	1.4%	2.8%	3.4%	3.3%	4.4%
FTSE Utilities*	**440.3**	449.4	471.6	460.7	447.3	N/A
FTSE Constru./Manufact.*	**646.7**	645.8	614.3	645.8	614.3	N/A
U.S. Inv. Priv. Structures**	**N/A**	$492B	$522B	$513B	$488B	$437B
Freight Transport Index	**120.4**[2]	122.6	122.5	121.7	119.2	111.1

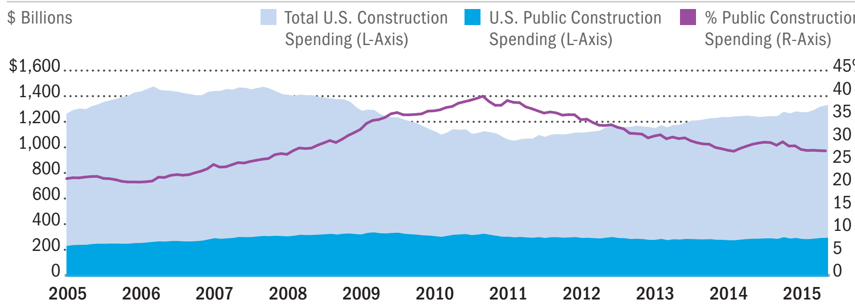
* Global, Total Return Index; ** Total investment ($) in non-residential structures in the U.S.

10-Year Benchmark Government Bond Yields by Country



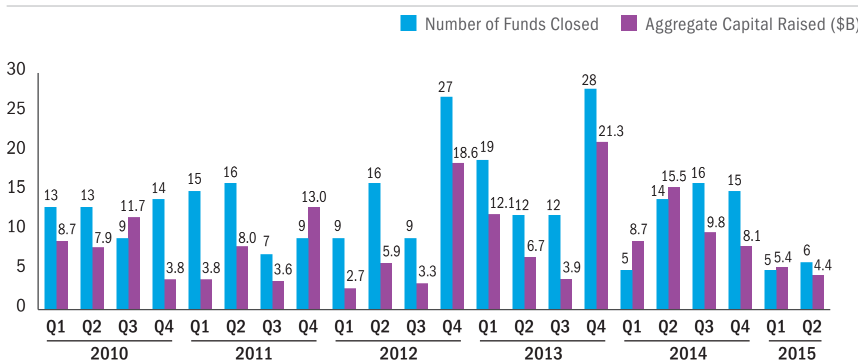
Source: U.S. Treasury, Banco de España, Ministry of Finance Japan, Haver Analytics

10-Year U.S. Construction Spending



Source: U.S. Census Bureau, Haver Analytics, TIAA-CREF analysis

Unlisted Infrastructure Fundraising by Year



Source: Preqin Infrastructure Spotlight

Timberland Market Overview

Market Review

- Sawlog and pulpwood prices generally softened globally in 2Q, though demand and global trade remain healthy. The challenge for many markets comes from an abundance of supply. In the U.S. South, pine sawlogs have gained only slightly since the housing bottom, attributable to high standing inventory. In the U.S. West, the impact on log prices from stronger domestic housing is being offset by competition in the export market, where weak currencies in markets such as New Zealand and Australia provide pricing advantage.
- U.S. housing starts continue to improve, with May's 1.036 million figure following April's 1.165 million.
- In the timberland markets, most sales have been smaller parcels, with several mid and larger sales being marketed to uncertain success. Plum Creek sold 6,500 acres to The Nature Conservancy in Maine, while Rayonier made modest size purchases in the U.S. South and Pacific Northwest. Per *RISI*, as much as 30 deals this year could combine for 1.8 million acres and perhaps $2.75 billion nationwide. The portion that ultimately closes remains uncertain.

Outlook

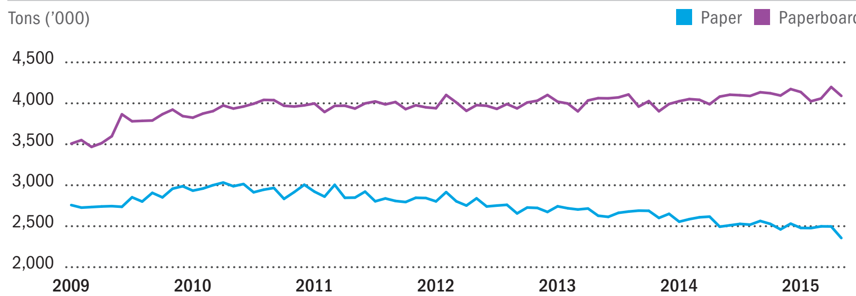
- Though China's log market has slowed, due to high inventory and cooling construction pace, the long term deficit the country faces is still firmly in place. Along with continued growth of U.S. housing, global demand for wood products remains on healthy footing.
- A stronger U.S. Dollar will pressure U.S. producers and returns for U.S. Dollar-based timberland investors; however we believe prices and performance should firm up as the U.S. Dollar's strength has abated since the first quarter.
- Foley Timberlands in Florida and CalPERS/Campbell's Louisiana sales are large parcels known to be in marketing, but the success of both processes remains unclear. Consistent with investor feedback across the timberland markets, many feel there is a dearth of A-class properties available for sale.

Key Market Metrics

	QTD	Previous QTD	6 Months	1 Year	3 Years	5 Years
Total Res. Construction	**$365B[1]**	$364B	$360B	$334B	$284B	$253B
Housing Starts, SA (Vol)	**1,165k[1]**	954k	1,080k	927k	757k	536k
Building Permits (Vol)	**1,140k[1]**	1,038k	1,077k	1,033k	790k	587k
U.S. S. Sawtimber Index	**$25.60**	$26.28	$23.34	$25.23	$22.94	$29.41
CME Lumber ($/1,000BF)	**$269.9[1]**	$278	$331	$335	$273	$195
NBSK U.S. Pulp Index	**$980**	$980	$1,026	$1,030	$899	$1,013
Paper & Paperboard Prod.*	**6,696k[1]**	6,557k	6,705k	6,616k	6,711k	6,976k
Industry Capacity Use (%)	**68.8%[1]**	68%	72%	71%	63%	57%
World Timber Index	**$1,088**	$1,136	$1,068	$1,049	$693	$620

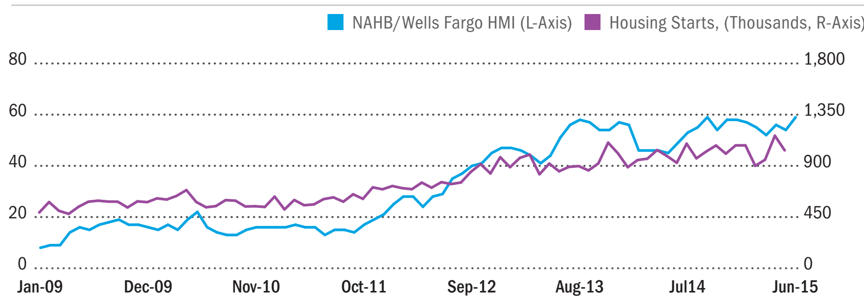
* U.S. Total Production, in Tons

U.S. Total Paper & Paperboard Production



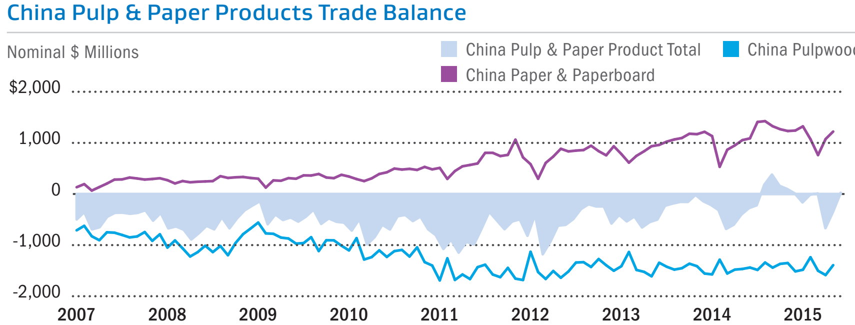
Source: Haver Analytics, TIAA Analysis

Builder Confidence vs. Housing Starts



Source: Haver Analytics, TIAA Analysis

China Pulp & Paper Products Trade Balance



Source: Haver Analytics

[1] Items are as of 5/30/15

Market Review

- Agri-commodity prices finished the first half of 2015 on a significant rally due to a tighter than expected USDA supply outlook and weather-related yield concerns across the U.S. Midwest. However, current futures pricing appears to have surpassed any true improvement in the underlying supply and demand fundamentals. As a result, we believe current abundant supplies and stock selling will dampen the likelihood of a sustained rally with the most likely result being increased price volatility over the short to medium term.
- The most recent NOAA forecast calls for a better than 90% chance that a strong El Niño event will continue through the fall of this year. Historically, these weather events have been associated with sustained rains and a healthy winter snowpack across the Western U.S., which would be a welcome relief from the persistent drought-like conditions over the past few years. However, this same weather event would be expected to reduce rainfall and lead to warmer temperatures across Australia, putting greater pressure on soil moisture levels and crop yields. El Niño outlooks will be closely monitored by market participants moving forward.
- Deal flow and fundraising remains active in the agricultural value-add space highlighted by ConAgra Foods' acquisition of Blake's All Natural Foods, a producer of organic frozen meals. The Ag-Tech and Bio-Science sectors also experienced some notable activity over the quarter.

Outlook

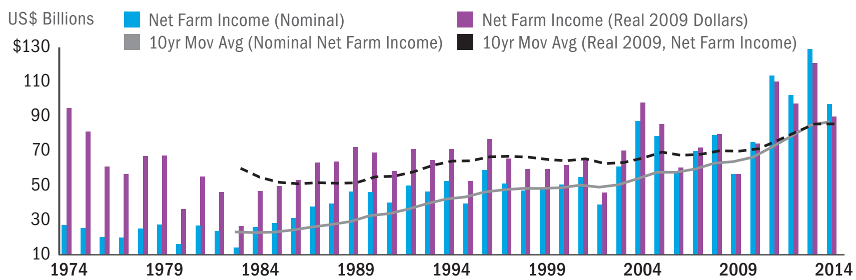
- The USDA's 2Q15 prospective plantings report confirmed corn acreage down 2% with soybean acreage up 2% year-over-year. Corn plantings are estimated at 88.9 million acres, which is the lowest planted acreage in the U.S. since 2010. Whereas soybean plantings are estimated at 85.1 million acres, which will be a record high in the U.S. with states such as Kentucky, Minnesota, Ohio, Pennsylvania and Wisconsin all reaching historic highs.
- Since 2012, consumer demand for wine priced below $10 has decreased nearly 6% while demand for wine priced between $10–$25 has increased by 8%, which has benefitted higher quality and more expensive varietals. This shift in consumer preference is supporting pricing for California coastal wine grapes, particularly in the Napa and Sonoma regions. A warm spring and fast bloom combined with water concerns has this season's almond crop forecast at 1.8 billion pounds, which will be the lowest production in 5 years. We believe the lower crop size and sustained U.S. and international demand for tree nuts should continue to support prices.

Key Market Metrics

	QTD	Previous QTD	6 Months	1 Year	3 Years	5 Years
Corn ($/bu)	**$4.14**	$3.76	$3.97	$4.24	$6.72	$3.54
Soybeans ($/bu)	**$10.56**	$9.73	$10.19	$14.00	$15.13	$9.48
Wheat ($/bu)	**$6.15**	$5.12	$5.90	$5.65	$7.39	$4.65
Sugar ($/100 lbs)	**$12.28**	$11.93	$14.52	$16.62	$21.81	$18.03
Cotton ($/100 lbs)	**$67.51**	$63.10	$60.27	$79.21	$72.16	$82.60
Ethanol ($/gallon)	**$1.61**	$1.49	$1.63	$2.12	$2.23	$1.53
S&P GSCI Agri. Index	**293.5**	297.8	329.7	367.5	404.6	294.8
CRB Foodstuffs Index	**377.7**	346.8	371.6	450.2	434.3	348.6
FAO Food Price Index*	**166.8**	171.5	185.8	208.9	200.6	170.2

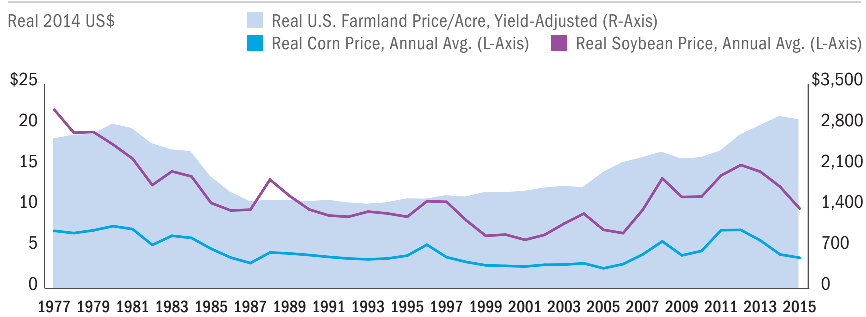
* Most recent value as of 05/31/15

U.S. Annual Net Farm Income



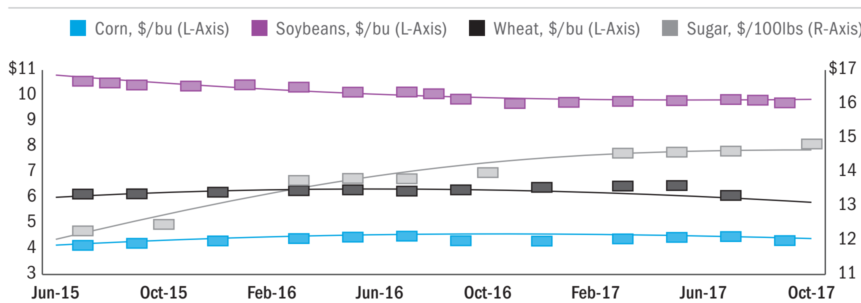
Source: USDA ERS, TIAA-CREF analysis

Average Annual Crop Prices and Yield-Adjusted U.S. Farmland Values



Source: USDA, Haver Analytics, TIAA-CREF analysis

Futures Curve—Key Agricultural Commodities



Source: Haver Analytics

[1] Items are as of 8/30/14

Natural Resources and Infrastructure Investment Quarterly Highlights: Second Quarter 2015 is prepared by TIAA-CREF Asset Management and represents the views of TIAA-CREF's Global Natural Resources and Infrastructure Investment team as of June 2015. These views may change in response to changing economic and market conditions. Past performance is not indicative of future results. The material is for informational purposes only and should not be regarded as a recommendation or an offer to buy or sell any product or service to which this information may relate. Certain products and services may not be available to all entities or persons.

Please note alternative and commodity investments may be subject to the risks of leverage, speculative trading, volatility and political risk.

Data is as of 06/30/2015 unless noted otherwise.

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