First Quarter 2016

TIAA GLOBAL ASSET MANAGEMENT

Natural Resources & Infrastructure Quarterly

What's Inside?

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

- Although the global economy grappled with recovery and recessionary pressures, economies remain poised for a modest growth.

- Decelerated growth prospects spanned across advanced and emerging economies, while monetary policies weigh heavy on currency valuations.

- Crude oil prices rebounded after initial declines, and ended up 3.5% in the quarter. Production cuts in the U.S. helped support the slight recovery in crude oil prices.
- Low commodity prices and limited credit availability have forced stressed energy companies to explore potential sales of valuable assets to restore liquidity.

- The infrastructure asset class continues to grow, supported by strong supply and demand characteristics.
- Excess capital pursuing limited opportunities driving up valuations overall.
- Potential for "deep value" opportunities exists in certain sectors.

- U.S. timber prices remain generally flat. In the Pacific Northwest, flat prices are a reflection of the softening of Chinese demand and cheaper competition due to FX. In the U.S. South, prices are expected to rebound moderately, aligned with U.S. housing demand and available timber supply.
- Discount rates have reached historic lows in developed timberland markets with implied real discount rates for several transactions believed to be lower than 5%.

- Agri-commodity prices remained in a trough through 1Q16 due to continued oversupply and tepid demand growth.
- After a significant decline in almond prices in the 2H15, prices seemed to near a floor as foreign buyers re-entered the market. Despite the price decline, growers remain profitable.
- On the back of a strong El Niño in 2015, which reduced the severity of drought in the U.S. West, the NOAA predicts a 50% chance of La Niña in 2016, which would bring much needed rain to Northern Brazil and much of Australia.

The first quarter of 2016 was affected by market turmoil, a correcting oil-price curve, and diverging monetary policies.

Amid improvement of underlying growth in the U.S. and fears of recession, the economy is poised for decelerated growth. And despite several hawkish Fed President speeches, Ms. Yellen was surprisingly more dovish this quarter. In Europe, the economy continued along its growth trend, while ECB's accommodative policy incentivized banks to lend to the real economy. A struggling China economy experienced a continued slowdown and currency deflation. In Japan, the fragile economy migrated to a negative rate environment.

In the U.S., forecasted 2016 average GDP growth is 2.0%. The revision from 2.6% to 2.0% is largely driven by the lack of demand growth. Further, despite an increase in nominal wages and income, consumers are not spending. It is this lack of fundamental demand that a rate hike will be largely based upon, underpinned by better wage and income growth and consumption. While the Fed and economists have a more optimistic view of growth, the market's outlook is currently more pessimistic. The divergent views of economic health is predicated upon real versus nominal growth perspectives—the former, more favorable, view being the true indicator of underlying demand in the economy.

Europe's growth continued, and this year will likely come close to the mid 1% range. Despite various geopolitical threats within the region, it is unlikely that growth will decelerate due to migration flow and its potential impact on Schengen and the"Brexit" vote. ECB's dovish policy introduced a new series of four targeted longer-term refinancing operations. Although there is likely to be additional monetary policy, a net positive for financial markets, the extent and magnitude of this policy is unknown.

In China, growth and transformation to a service economy was driven by consumer spending. Although spotty growth in certain segments of the Chinese economy begs the question of collapse to either currency or economy, a dramatic downshift in growth is unlikely. Considering it has the capital to do so, the government will defend its currency, but will allow it to devalue to the seven range. Growth is expected to be close to 6.1%, with little help from fiscal stimulus. In response to a shrinking Japanese economy, the Bank of Japan surprisingly lowered its policy rate to -0.1%, making yet another major economy in the negative rate environment. The markets reacted swiftly, with increased equity valuations, and lower yen and yield curve.

In the first quarter, advanced economies grappled with recovery, anemic growth and recessionary pressures. Further, accommodative monetary policies weakened the currencies of the Eurozone, China and Japan against the dollar. Although slower, growth the U.S. persisted under a tight monetary environment, while the larger and longer ECB QE boost tempered the Bank of England rate hikes, and China's consumption and Japan's monetary regime supported growth.

Key market metrics, as of March 31, 2016

	3/31/16	12/31/15	12/31/14	12/31/13	12/31/12	12/31/11
Key market prices						
U.S. 10 Year Treasury	**1.78%**	2.27%	2.17%	3.02%	1.78%	1.89%
U.S. 30 Year Treasury	**2.61%**	3.01%	2.75%	3.96%	2.95%	2.89%
Initial Unemployment Claims	**253k**	285k	293k	337k	363k	376k
Unemployment Rate	**5.0%**	5.0%	5.6%	6.7%	7.9%	8.5%
CB Consumer Confidence	**96.2**	96.3	93.1	77.5	66.7	64.8
S&P 500	**2,060**	2,044	2,059	1,848	1,426	1,258
FX markets*						
USD-CAD	**1.30**	1.38	1.16	1.06	1.00	1.02
Euro-USD	**1.14**	1.09	1.21	1.38	1.32	1.30
USD-BRL	**3.55**	3.96	2.66	2.36	2.05	1.86
AUD-USD	**0.77**	0.73	0.82	0.89	1.04	1.03

* FX table displays 1 unit of first currency in terms of second currency (e.g. 1 USD is currently equivalent to 1.30 CAD)
Source: Federal Reserve Board, United States Department of Labor, Haver Analytics

Bonds

The announcement of the Fed's rate hike on December 16, 2015 spurred volatility in the fixed-income markets. For most of the first quarter, the 10-year yield has traded between 1.81% and 2.10%, settling at 1.78%. Spreads between the 10 and 30 year also widened as much as 9 bps from their tightest levels of the year, likely due to technical factors.

FX Markets

Relative to the U.S., accommodative monetary policies in the Eurozone and Asia and sustained weakened fundamentals in emerging economies contributed to divergent performance in 1Q. Year-to-date, the USD weakened against the Euro, in light of fears of a U.S. recession despite improving economic fundamentals amid stable growth in the Eurozone. Meanwhile, declining commodity markets has many emerging economies reeling from losses against the USD.

Employment and Earnings

Labor participation rates remained at the lowest since the late 1970s, while wage and income growth has experienced strong improvement since the Global Financial Crisis. Although economic fundamentals are improving and there are better wages and income growth, consumption numbers are soft. Unemployment rate and the number of unemployed have changed little since August 2015.

Energy

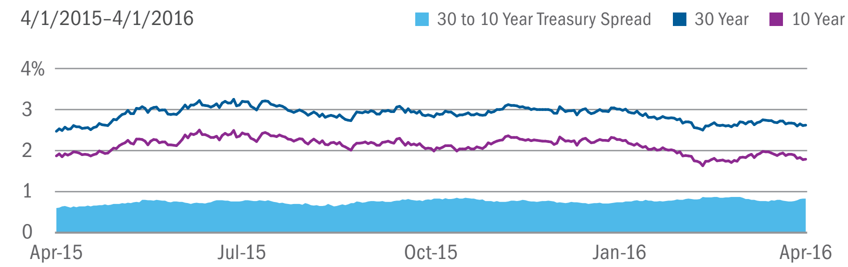
The energy market struggled as natural gas prices declined to new lows in the first quarter while oil experienced a slight recovery. Although the crude oil market remains oversupplied, there is increasing optimism for price improvements with U.S. energy companies cutting production. Until the balance between supply and demand is restored, a recovery in global oil prices will remain restrained.

Agriculture

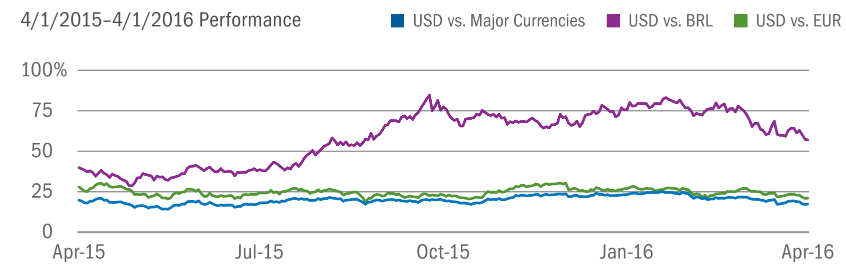
Grain and oilseed prices remained in a trough through 1Q16 due to continued oversupply and tepid demand growth. Notwithstanding a major supply shock, prices are expected to remain flat in the medium-term. Sugar prices, however, are up 29% year-on-year due to a growing 2016 deficit. Growers in the wine grape and tree nut space remain profitable, despite recent price volatility. El Niño, now tapering off, provided limited drought relief for much of the U.S. West.

Sources: U.S. Federal Reserve Board, Haver Analytics, U.S. Census Bureau, U.S. BLS, Standard & Poor's, Commodity Research Bureau, TIAA-CREF analysis

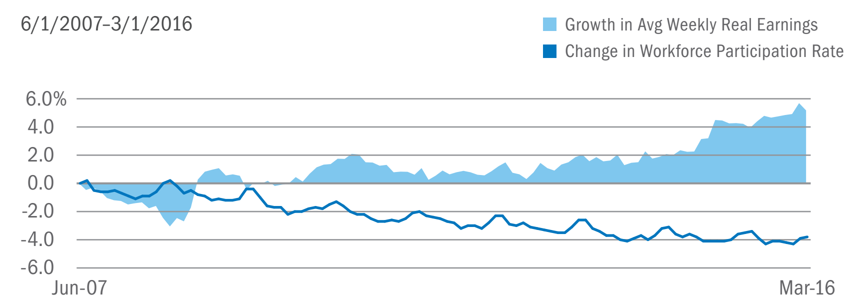
10 & 30 Year U.S. Treasury Bond yields



U.S. dollar vs. major currencies, BRL, & EUR



Economic laggards—participation and earnings



S&P GSCI Energy Spot Index

CRB Foodstuffs Index

Market Review

- Crude oil prices continued declines earlier in the quarter, with WTI and Brent dropping to below $30. Both have since recovered to $40 at the end of March.
- Natural gas prices remained depressed with prices declining as low as $1.70 due to unseasonably warm weather and strong production levels.
- Total U.S. crude oil production declined from its April peak of 9.7 million bbl/d to 9.3 million bbl/d in December. The decline reflects reduced capital investment by operators which is supported by U.S. rig counts which are down 75% since the year-end 2014 according to Baker Hughes.
- Saudi Arabia, Russia, Qatar and Venezuela agreed to halt crude oil production increases if other major oil producers followed suit. They will be meeting in April to discuss production freezes even if Iran and Iraq refuse to comply. Iraq has been increasing production to finance the war against the Islamic State, while Iran is trying to ramp production after western sanctions were lifted. Analysts do not expect the halt to have a large impact on prices.
- Major U.S. banks are reducing their exposure to the energy sector by selling loans at a discount and refusing to renew loans, creating a potential funding crisis in the sector. Consequently, stressed energy companies started to explore potential sales of marquee assets to shore up needed liquidity.
- Numerous MLPs are facing continued low energy prices and increased counterparty risks, and have been forced to access private capital through preferred issuances to restore liquidity as the public markets dried up. Investors have been particularly focused on E&P counterparty risks following the Sabine Oil & Gas ruling in March, which resulted in the rejection of gathering contracts.

Outlook

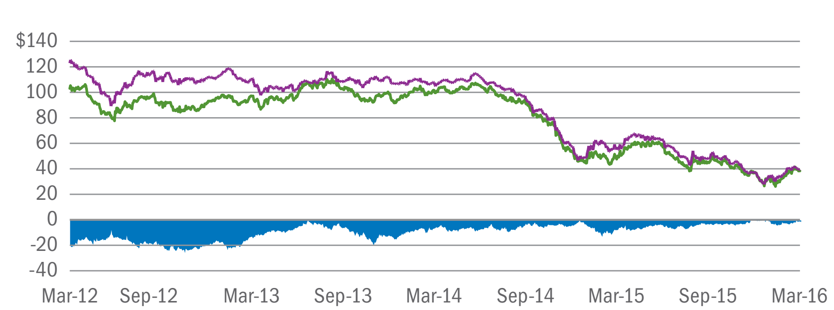
- The EIA forecasts WTI and Brent crude oil prices will both average $34/bbl in 2016. EIA's average price forecast for Henry Hub in 2016 and 2017 is $2.25/MMBtu and $3.02/MMBtu, respectively.
- The EIA forecasts U.S. crude oil production to decline to an average of 8.7 million bbl/d in 2016 and then decline further to an average of 8.2 million bbl/d in 2017.

Key market metrics

	3/31/16	12/31/15	9/30/15	3/31/15	3/31/13	3/31/11
NYMEX WTI Crude Oil	**$38.34**	**$37.04**	$45.09	$47.60	$97.23	$106.72
ICE Brent Crude Oil	**$39.60**	**$37.28**	$48.37	$55.11	$110.02	$117.36
WCS Crude Oil	**$25.19**	**$23.79**	$31.04	$35.05	$82.88	$91.22
Henry Hub Nat. Gas	**$1.96**	**$2.34**	$2.52	$2.64	$4.02	$4.39
Alberta Nat. Gas	**$0.71**	**$1.87**	$2.10	$2.12	$3.51	$3.89
Wtd. Avg. $/kWh in U.S.	**N/A**	**10.00**	10.80	10.27	9.71	9.55
OPEC Prod. (Mbbls/d)	**N/A**	**31.6M**	31.8M	31.1M	30.6M	29.1M
U.S. Oil Imports (Mbbls/d)	**7.9M**[1]	**7.9M**	7.2M	7.6M	7.5M	9.2M
U.S. Gas Output (Bcf/d)	**90.9B**[1]	**90.0B**	90.0B	91.0B	80.8B	77.8B

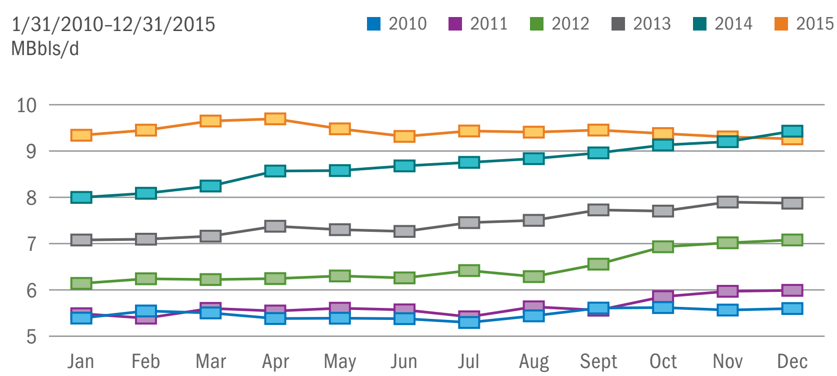
Crude oil exchange prices

3/31/2012–3/31/2016



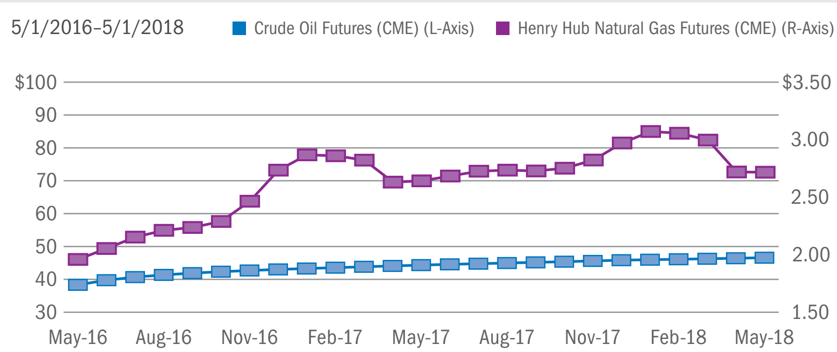
U.S. crude oil production

1/31/2010–12/31/2015
MBbls/d



Futures curve—crude oil and natural gas

5/1/2016–5/1/2018



[1] Items are as of 1/31/16; Sources: Haver Analytics, Energy Information Administration, CME, TIAA-CREF analysis

Market Review

- The infrastructure asset class remains active with a robust global pipeline of primary and secondary opportunities.
- Greenfield public-private partnership (P3) activity continues to make progress in the U.S. with 33 states and Puerto Rico having established P3 frameworks. Canadian authorities remain supportive of the regime.
- Beneficial government action, improving economics, and investor demand continue to support the market for renewable energy assets. Surplus capital pursuing these opportunities, particularly for contracted assets, has increased valuations.
- The U.S. toll road sector has seen a number of post-debt restructuring secondary asset sales after traffic volumes did not reach preconstruction forecasts. Examples include Chicago Skyway, ITR, Pocahontas, Dulles Greenway, and SH130.
- The midstream market, especially MLPs, has experienced challenges accessing capital in the weak commodity price environment. With substantial committed capital expenditure requirements, midstream companies have issued preferred equity and sold assets.
- Australia continues to invest in infrastructure via P3 and privatizations though challenges persist including governmental and regulatory hurdles as well as potential cancellation risks (e.g. Victoria EastWest Link).
- European activity remains robust with 95 deals completed in 1Q16, according to Preqin. The European Investment Bank's Juncker Plan and the 2015 U.N. Climate Change Conference agreement buoy renewables activity.
- Telecommunications is a rapidly growing sector requiring significant capital deployment in communications infrastructure.
- PE fund flows for 1Q16 were above those of 1Q15. According to Preqin, ten funds closed and a total of $15B was raised compared to eleven funds closed and $10.6B raised in 1Q15.

Outlook

- Governmental support, asset recycling, and strong investor demand will fuel sustained activity growth in infrastructure investing.
- Pockets of opportunity exist especially as midstream companies face headwinds and the telecommunications sector grows.

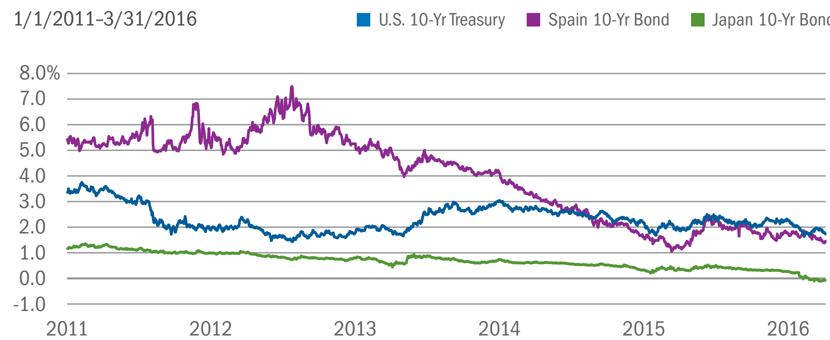
* Global, Total Return Index; ** Total investment ($) in non-residential structures in the U.S.; [1] Items are as of 2/29/16; [2] Items are as of 12/31/15; [3] Items are as of 1/31/16; Sources: Federal Reserve Board, U.S. Census Bureau, Haver Analytics, U.S. Treasury, Banco de España, Ministry of Finance Japan, Preqin Infrastructure Spotlight, TIAA-CREF analysis

Key market metrics

	3/31/16	12/31/15	9/30/15	3/31/15	3/31/13	3/31/11
U.S. Pop. Growth from '00	**13.0%**	**13.5%**	13.2%	12.9%	11.1%	9.5%
U.S. Inflation Rate (Y-o-Y)	**1.0%[1]**	**0.0%**	0.1%	0.8%	1.7%	1.5%
Y-o-Y U.S. Real GDP Grow.	**2.0%[2]**	**2.1%**	2.7%	2.5%	1.3%	2.7%
U.S. Deficit as % of GDP	**2.9%**	**3.1%**	2.1%	2.4%	6.1%	8.8%
U.K. Deficit as % of GDP	**2.0%**	**2.6%**	2.2%	2.8%	4.2%	6.0%
FTSE Utilities*	**473.9**	**429.9**	440.3	471.6	373.0	378.8
FTSE Constru./Manufact.*	**645.3**	**587.0**	587.0	645.3	534.2	531.2
U.S. Inv. Priv. Structures**	**N/A**	**$49B**	$504B	$512B	$444B	$370B
Freight Transport Index	**122.2[3]**	**122.5**	121.9	123.6	112.3	108.8

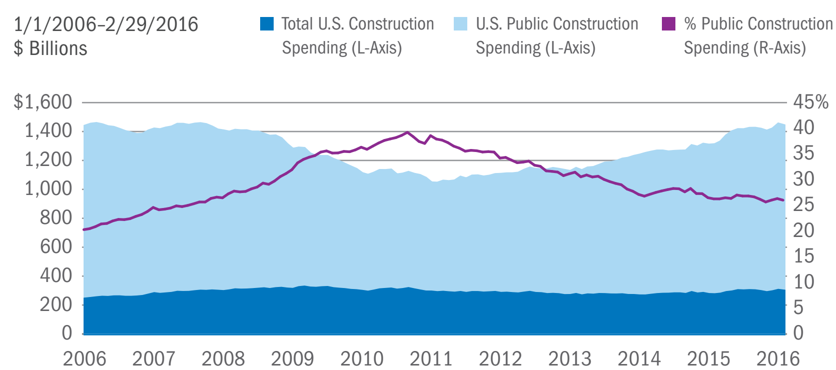
10-year benchmark government bond yields by country

1/1/2011–3/31/2016



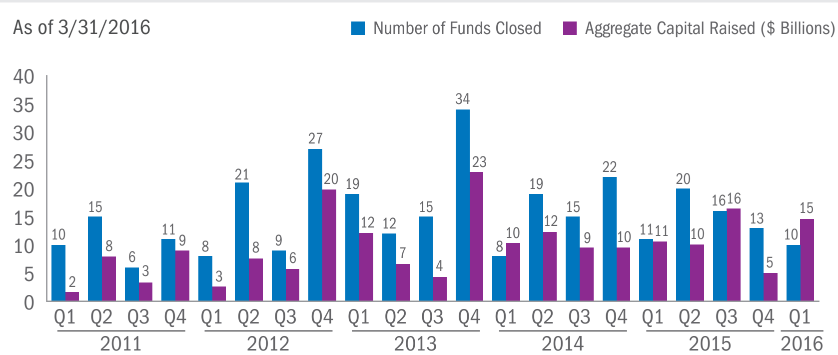
10-year U.S. construction spending

1/1/2006–2/29/2016
$ Billions



Unlisted infrastructure fundraising by year

As of 3/31/2016



Market Review

- U.S. timber prices remained generally flat during 1Q16. New housing demand in the U.S. increased with total housing starts up 31% versus February 2015. Single family starts, which utilize more wood, gained momentum over multifamily starts. Softening in China's economy decreased log and lumber imports by 15% in 2015. However, a long-term deficit remains.
- Per FAO, global production of all major wood products had its largest growth since 2008–09. Production and consumption of wood-based panels and lumber continue to grow in all regions. South America has emerged as the world's capital of pulp production, accounting for 30% of global wood pulp exports in 2015 with additional mills being built in Brazil, Chile, and Uruguay. Demand for wood pellets as a green energy source has increased significantly as more countries commit to address climate change.
- Acadian, a public timberland company based in Canada and Maine, is on the block. Campbell's Menasha 138,000-acre property in the PNW is for sale and expected to top $500 mm. Weyerhaeuser's announced Twin Creek timber management JV in the U.S. South closed for $2,150 per acre (260,000 acres). Hancock's sale of Tasman Bay, a 30,000 ha pine property in New Zealand, is under contract by a Japanese strategic buyer.

Outlook

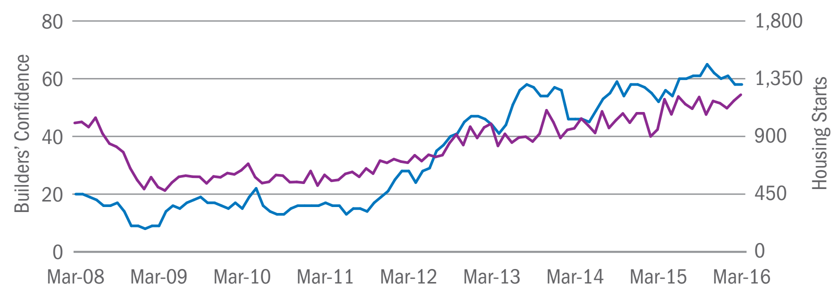
- In the PNW, prices are expected to remain flat, reflecting near-term softening of Chinese demand and cheaper competition due to FX advantages in New Zealand, Russia, and Canada. In the U.S. South, prices are expected to rebound moderately, aligned with U.S. housing demand and available timber supply.
- Discount rates have reached historic lows in developed timberland markets. Implied discount rates for several transactions are believed to be lower than 5% real. The discrepancy between high timberland values and flat timber prices can be explained by high institutional interest in the asset class; an expected long-term U.S. housing recovery; and strategic buyers re-entering the asset class.

Key market metrics

	3/31/16	12/31/15	9/30/15	3/31/15	3/31/13	3/31/11
Total Res. Construction	**$454B[1]**	**$446B**	$432B	$410B	$316B	$250B
Housing Starts, SA (Vol)	**1,178k[1]**	**1,159k**	1,207k	954k	999k	600k
Building Permits (Vol)	**1,177k[1]**	**1,204k**	1,105k	1,038k	932k	583k
US S. Sawtimber Index	**N/A**	**$25.6**	$25.5	$26.3	$24.6	$25.9
CME Lumber ($/1,000BF)	**$258**	**$258**	$229	$278	$386	$303
NBSK US Pulp Index	**$954**	**$940**	$959	$980	$901	$985
Paper&Paperboard Prod.*	**6,618k[1]**	**6,602k**	6,544k	6,709k	6,776k	6,981k
Industry Capacity Use (%)	**71%[1]**	**68%**	67%	71%	70%	59%
World Timber Index	**$979**	**$1,010**	$916	$1,121	$931	$936

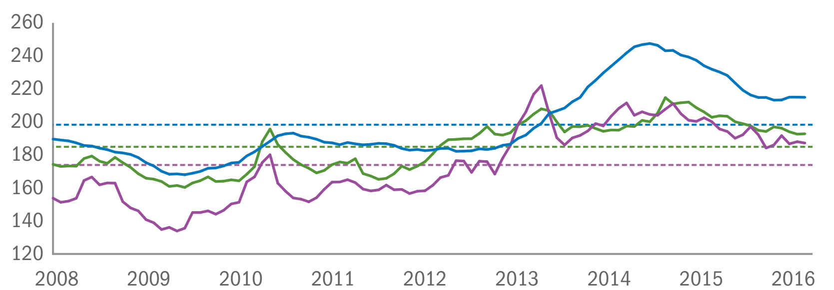
Builder confidence vs. housing starts

3/31/2008–3/31/2016 NAHB/Wells Fargo HMI (L-Axis) Housing Starts, (Thousands, R-Axis)



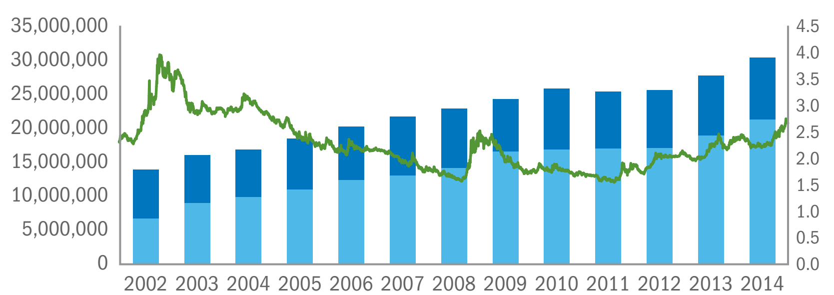
Producer price index

1/1/2008–2/29/2016
1982 = 100 Hardwood Lumber Softwood Lumber Plywood



Brazil pulp production

2002–2014 Domestic Consumption Export Markets BRL/USD



* U.S. Total Production, in Tons; [1] 2/29/2015; Sources: Haver Analytics, Bloomberg, FAO, TIAA-CREF analysis

Market Review

- Grain and oilseed prices remained in a trough through 1Q16 due to continued oversupply and tepid demand growth. The USDA's March 31 planting report confirmed no drastic reductions in plantings and, in conjunction with above-average spring moisture conditions in N. America, did little to lift markets from multiyear lows. Notwithstanding a major supply shock to break the cycle of accumulating stocks, prices are expected to remain flat in the medium term. Sugar prices, however, are experiencing a recovery, up 29% year-on-year due to a growing 2016 deficit.
- Farmer margins in the U.S. Corn Belt have narrowed to breakeven or unprofitable levels. Although declining cash rents and input prices have helped cushion the blow (albeit on a lagged basis), cash rents are still consuming an increasing portion of farmer incomes. Gradually recovering oil prices may cancel out some of the savings from softening fertilizer prices, leading to further downward pressure on U.S. cash rents throughout 2016. With row crop farmers adjusting to lower income levels, which appear to be stabilizing, land price weakness is expected to continue.
- While the pressure of softened prices has been compounded for U.S. producers by a strong dollar, producers in S. America, Australia and the Black Sea region have benefited from local currency depreciation, relative to major traded currencies, as well as liberalizing trade policies.
- Almond prices have softened significantly over the last six months on the back of a larger-than-expected 2015 harvest, strong spring 2016 bloom, and increased price sensitivity among importers; however, prices are likely nearing a floor as buyers re-enter the market following record high prices last fall. Despite lower prices levels, producers remain profitable. Strong demand for mid-level wine (>$9) continues to support high-grower profitability in wine grape sector.
- According to the NOAA, El Niño, as predicted, is beginning to weaken after bringing the most statewide water to California—in the forms of run-off, precipitation and snowpack—since 2011, before the drought began.

Outlook

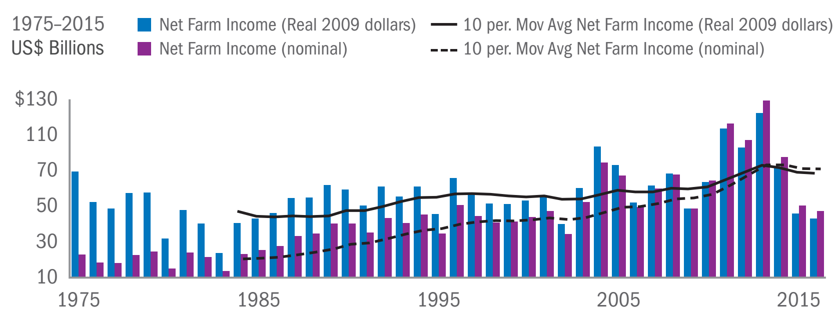
- There is a ~50% chance of La Niña developing in 2016, which would likely decrease U.S. oilseed/grain supply, but not impact overall global supplies, as La Niña is typically associated with above-average rainfall in the grain/oilseed producing regions of S. America and Australia.

[1] Most recent value as of 2/29/2016; Sources: Haver Analytics, TIAA-CREF analysis

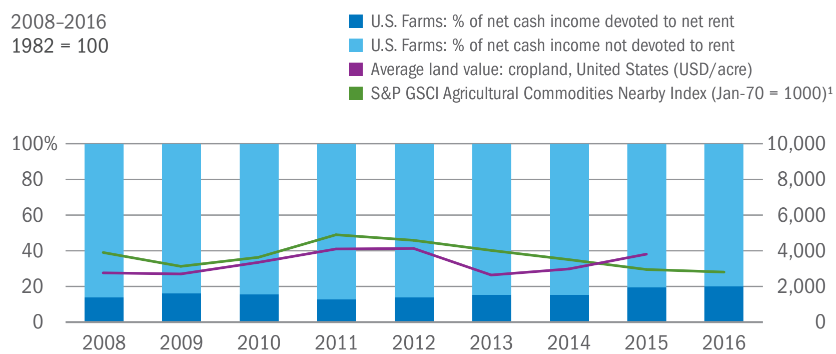
Key market metrics

	3/31/16	12/31/15	9/30/15	3/31/15	3/28/13	3/31/11
Corn ($/bu)	**$3.51**	**$3.59**	$3.88	$3.76	$6.95	$6.93
Soybeans ($/bu)	**$9.11**	**$8.71**	$8.92	$9.73	$14.05	$14.10
Wheat ($/bu)	**$4.73**	**$4.70**	$5.13	$5.12	$6.88	$7.63
Sugar ($/100 lbs)	**$15.35**	**$15.24**	$12.17	$11.93	$17.66	$27.11
Cotton ($/100 lbs)	**$58.44**	**$63.28**	$59.49	$63.10	$88.46	$200.23
Ethanol ($/gallon)	**$1.44**	**$1.40**	$1.54	$1.49	$2.45	$2.66
S&P GSCI Agri. Index	**284**	**288**	283	298	448	530
CRB Foodstuffs Index	**352**	**331**	364	347	410	501
FAO Food Price Index[1]	**151**	**153**	155	172	213	235
USDA Farmer input Price Index[1]	**107**	**106**	109	111	106	99
Baltic Exchange Dry Index	**383**	**519**	889	576	745	1493

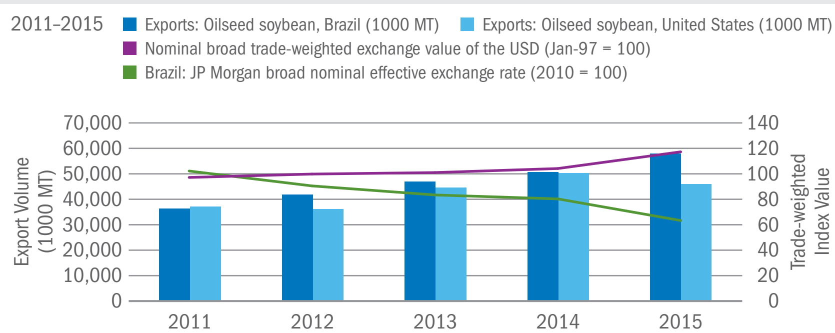
U.S. annual net farm income



Impact of agri-commodity prices on U.S. farmer margins and land prices



Impact of FX on soybean export volumes in the U.S. and Brazil



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Natural Resources and Infrastructure Investment Quarterly Highlights: First Quarter 2016 is prepared by TIAA Global Asset Management and represents the views of TIAA Global Natural Resources and Infrastructure Investment team as of March 2016.

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

Data is as of 3/31/2016 unless noted otherwise.

TIAA Global Asset Management provides investment advice and portfolio management services through TIAA and over a dozen affiliated registered investment advisers.

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