TIAA-CREF Asset Management

Natural Resources & Infrastructure Quarterly

Fourth Quarter 2015

What's Inside

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

- Despite mixed performance across developed and emerging economies, global growth should continue at a modest pace.

- Divergent monetary policies across developed and emerging economies and the strengthening dollar weigh heavy across global bond markets and currency markets.

- Crude oil prices touched new lows during the quarter, with WTI falling 18% during the quarter which partially reflects the persistently high domestic crude oil production despite a significant reduction in capital investment.
- U.S. congress agreed to lift the four-decade old ban on exporting crude oil as part of a larger deal which includes extensions of the tax credits for renewable power.

- The infrastructure asset class continues to expand with new and existing investors seeking diversification and yield in a highly competitive environment.
- Congress passed its first long-term transportation bill since 2005.
- Renewable asset values are benefitting from Congress's extension of tax credits for wind and solar projects.

- Timber prices generally remained low, portraying a year in which high standing supply in the U.S. South, the Chinese slowdown, and a strong U.S. dollar kept downward pressure on prices.
- However, positive housing data and rising builders' confidence in the U.S. indicate an expanding market for wood products in the long-term. Rich valuations suggest that the market is already pricing a long term recovery despite current low timber prices.

- Agri-commodity prices continued on their downward trajectory through 4Q15. This, combined with the continued strengthening of the dollar, is placing downward pressure on U.S. Corn Belt rents.
- Strong demand and weather-related supply constraints continue to support farmer profitability and land values in the tree nut and wine grape spaces.
- El Niño has brought much-needed drought relief to the Western U.S.
- Accelerated depreciation of the Brazilian real and Australian dollar continue to support land values and producer economics in Brazil and Australia.

TIAA CREF Financial Services

The global economy ended 2015 with mixed economic performance.

Positive growth trajectory continued in U.S., bolstered by healthy labor markets and lower oil prices. Europe's recovery, once fragile, remained stable. China's economic slowdown continued but remains cyclically stable. Meanwhile, many emerging markets remained vulnerable to the risk of declining oil prices and weak demand for exports.

As TIAA expected, the Fed voted in December to raise rates for the first time in nearly a decade. The timing of the rate hike itself, however, was less important to the economy than the pace and magnitude of tightening. Chair Janet Yellen assured markets that future rate increases are likely to be gradual and dependent upon economic conditions. The pace of inflation, a key economic indicator, will drive the schedule of upcoming rate hikes. Broad economic growth continued, supported by gains in labor markets and housing. Job gains in the fourth quarter would bring the 2015 total to above 2.5 million, making it the second-best calendar year for job growth this millennium. Strengthened labor markets and stabilized lower oil prices, taken together, have driven increased consumer spending. U.S. manufacturing slowed in December to 51.3, the lowest reading in more than three years and just above the 50 mark, separating expansion from contraction. Low oil prices and a strong dollar remained major headwinds for the manufacturing sector.

ECB policy stimulus targeted purchases and reinvestment. ECB announced that it would cut its deposit rate by 10 basis points to -0.3%, reinvest bond proceeds as they mature and extend its per month bond-buying program for another six months, providing a healthy dose of stimulus. Europe's recovery moved along the same pace as expected. Eurozone GDP for 2015 will come in at 1.4–1.5% and will accelerate modestly towards 1.7% next year.

China's economy, in the near term, although slowing, is stabilizing as growth in domestic and service-oriented areas of the economy offset slowdown in industrial, manufacturing and export areas. Although the PBoC will continue with its easy monetary policy, the policy shift to fiscal policy rather than more monetary policy has left fiscal policy officials considering whether to spend more or accept slower near-term growth. The current fiscal spending has shifted materially to non-infrastructure related projects, a move that has long-term benefits rather than short-term benefits.

Moving toward year-end, the U.S. economy is on solid ground, while attention is set on the new rate cycle. Europe's growth is poised for acceleration. While in China, growth will be choppy in the near term. Despite mixed performance, we believe global growth is poised for modest improvement.

Key Market Metrics, as of December 31, 2015

	12/31/15	9/30/15	6/30/15	12/31/14	12/31/12	12/31/10
Key Market Prices						
U.S. 10 Year Treasury	**2.27%**	2.06%	2.35%	2.25%	1.78%	3.30%
U.S. 30 Year Treasury	**3.01%**	2.87%	3.11%	2.75%	2.95%	4.34%
Initial Unemployment Claims	**282k**	262k	296k	295k	369k	413k
Unemployment Rate	**5.0%**	5.1%	5.3%	5.6%	7.9%	9.3%
CB Consumer Confidence	**96.5**	102.6	99.8	93.1	66.7	63.4
S&P 500	**2,044**	1,920	2,063	2,059	1,426	1,258
FX Markets*						
USD-CAD	**1.38**	1.34	1.25	1.16	1.00	0.99
Euro-USD	**1.09**	1.12	1.12	1.21	1.32	1.34
USD-BRL	**3.96**	3.96	3.11	2.66	2.05	1.66
AUD-USD	**0.73**	0.70	0.77	0.82	1.04	1.02

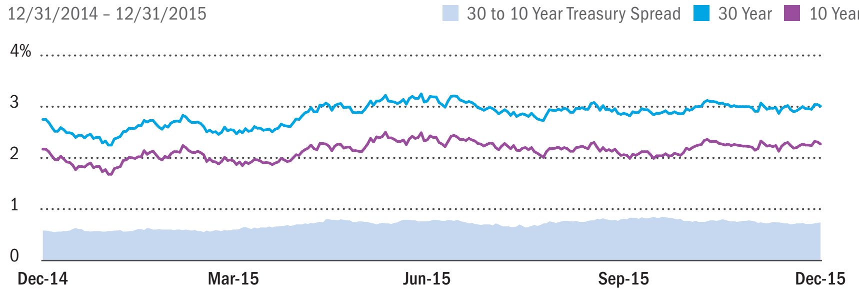
* FX table displays 1 unit of 1st currency in terms of 2nd currency (e.g. 1 USD is currently equivalent to 1.38 CAD)

Source: Federal Reserve Board, United States Department of Labor, Haver Analytics

Bonds
After a period of mixed performance for 3Q2015 year-to-date, fixed income markets rallied in 4Q. The yield on the bellwether 10-year U.S. Treasury rose amid a slight rebound in oil prices but stayed range bound. For most of the fourth quarter, the 10-year yield has traded between 2.05% and 2.30%. On the day of the Fed's announcement, the yield on the 10-year U.S. Treasury rose to 2.30% before closing at 2.21% on December 18. Spreads between the 10 and 30 year also widened as much as 18bps from their tightest levels of the year. The widening spreads may be the result of technical factors as the bond market discounts Fed tightening while simultaneously reacting to weaker U.S. economic data.

10 & 30 Year U.S. Treasury Bond Yields

12/31/2014 – 12/31/2015

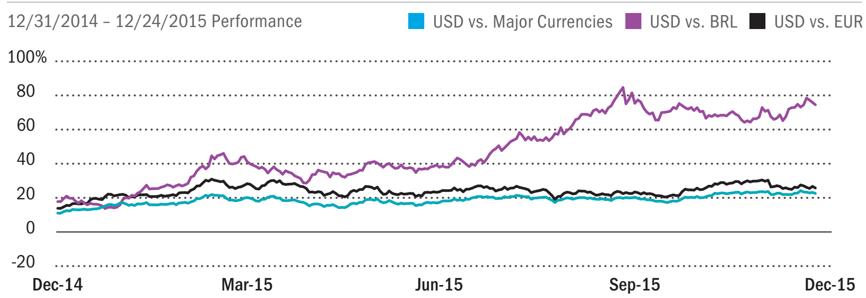


Source: U.S. Federal Reserve Board, Haver Analytics, TIAA-CREF analysis

FX Markets
Currency markets in developed and emerging economies experienced divergent performance in 4Q. Year to date, the USD strengthened against the Euro, in light of improving economic fundamentals in the U.S., Fed-related activity and ECB-related support in the Eurozone. Meanwhile, commodity-heavy economies continued to lose ground against the USD, in light of declining oil prices and weakening demand for exports. The strengthening of the USD, coupled with declining commodity prices, has pressured commodity-heavy currencies, causing stalled-to-declining economic growth.

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

12/31/2014 – 12/24/2015 Performance

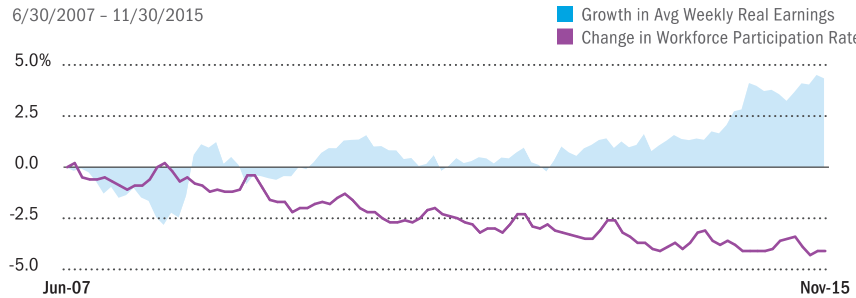


Source: U.S. Federal Reserve Board, Haver Analytics, TIAA-CREF analysis

Employment and Earnings
Labor participation rates remain at the lowest since the late 1970s, while wage growth has experienced its strongest improvement since the Global Financial Crisis. Economic fundamentals are improving, unemployment is 5%, and job gains have persisted for almost five years, yet the gradual decline in labor force participants holds. The decline in the labor-force participation likely relates to retiring baby boomers and younger workers staying in school longer.

Economic Laggards—Participation and Earnings

6/30/2007 – 11/30/2015

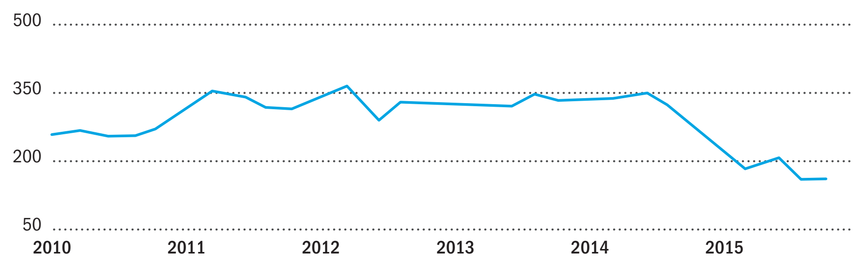


Source: U.S. Census Bureau, U.S. BLS, Haver Analytics, TIAA-CREF analysis

Energy
The energy complex continues to remain depressed with both oil and natural gas prices declining to new lows during the fourth quarter. U.S. consumers have benefitted from the lower price for gasoline to the tune of approximately $100B in 2015 or about $550 per licensed driver according to AAA. Though lower gasoline prices support economic growth, this has been partially offset by the decline in capital investment in the domestic energy industry. Globally, OPEC has declined to curtail oil production and instead let market forces balance supply and demand which may not occur until late 2016 as producers respond to lower prices.

S&P GSCI Energy Spot Index

12/1/2010 – 12/31/2015

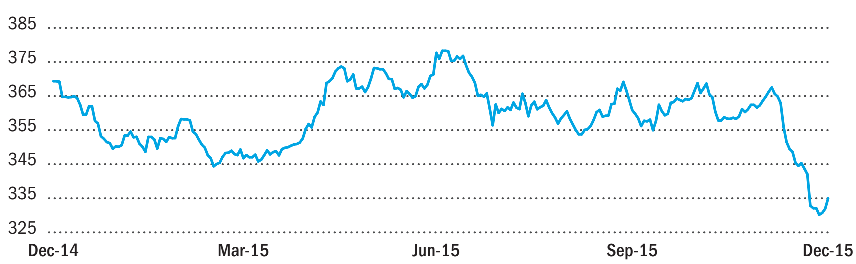


Source: Standard & Poor's, Haver Analytics

Agriculture
Agri-commodity prices, with the exception of sugar and cotton, continued their decline through 4Q15 due to higher than expected global production and stagnant demand growth. In 2015, crop production is expected to be accretive to inventories, thus increasing already high stocks-to-use ratios. Commodity futures reflect this dynamic, showing flat to negative growth over the next two years. In the permanent crop space, consumer demand remains robust and, combined with smaller than expected permanent crop harvests in 2015, has led to grower profitability and land values remaining strong in the permanent crop space. With El Niño in full swing, the Western U.S. is receiving above-average precipitation, which is expected to leave much of the region drought-free by the Spring of 2016.

CRB Foodstuffs Index

12/31/2014 – 12/31/2015



Source: Commodity Research Bureau, Haver Analytics

Energy Market Overview

Market Review

- Crude oil prices hit new lows during the quarter, with WTI declining 18% to above $37 from just above $45 at the end of September while Brent declined 23% to above $37 from above $48.
- Natural gas prices have also remained depressed with prices dipping below $2 at times during the quarter which reflects reduced demand due to unseasonably warm weather during December in much of the U.S.
- Total U.S. crude oil production declined from its April peak of 9.7 million bbl/d to 9.4 million bbl/d in October. The decline reflects reduced capital investment by operators which is supported by U.S. rig counts which are down 62% since the year-end 2014 according to Baker Hughes.
- The U.S. Congress agreed to lift the four-decade old ban on exporting crude oil as part of a larger deal which includes extensions of the tax credits for renewable power. As a result, the spread between WTI and Brent should remain tighter as U.S. producers can now sell abroad.
- OPEC's December meeting ended without an official output target, highlighting Saudi Arabia's commitment to maintain output and let market forces resolve the supply/demand imbalance. Geopolitically there remains significant distrust between Saudi Arabia and Iran which further complicates any coordination in OPEC particularly as Iran returns to the world market.
- The continued low energy price environment has dampened the availability of public capital for the sector. Anecdotally, we understand that there is significant private capital waiting to deploy (potentially in excess of $100B) as operators are forced to seek liquidity to continue operating.
- MLPs and YieldCo vehicles have also seen tightening of capital availability as evidenced by Kinder Morgan slashing its dividend by 75% to use its internally generated cash for growth instead of tapping capital markets.

Outlook

- The EIA forecasts WTI crude oil prices will average $51/bbl in 2016 while Brent crude oil prices will average a $5/bbl premium to WTI over that time. Additionally, IHS projects that WTI will reach $60/bbl by Q4 2016. The EIA 2016 average price forecast for Henry Hub in 2016 is below $3.00/MMBtu.
- The EIA forecasts U.S. crude oil production to decline through September 2016 to an average of 8.5 million bbl/d then increase in 4Q16 returning to an average of 8.7 million bbl/d.

[1] Items are as of 11/30/15; [2] Items are as of 10/31/15

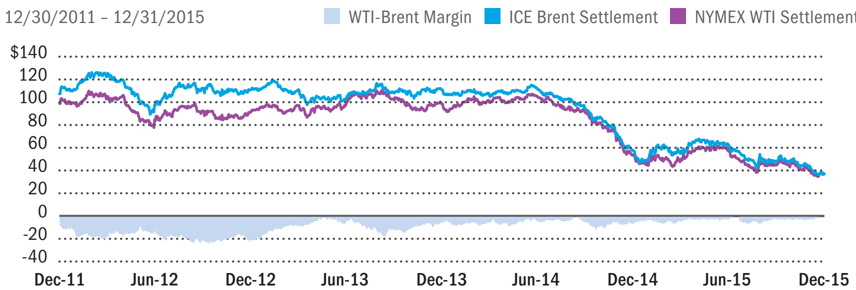
Key Market Metrics

	12/31/15	9/30/15	6/30/15	12/31/14	12/31/12	12/31/10
NYMEX WTI Crude Oil	**$37.04**	$45.09	$59.47	$53.27	$91.82	$91.38
ICE Brent Crude Oil	**$37.28**	$48.37	$63.59	$57.33	$111.11	$94.75
WCS Crude Oil	**$23.79**	$31.04	$47.47	$37.27	$58.82	$71.38
Henry Hub Nat. Gas	**$2.34**	$2.52	$2.83	$2.89	$3.35	$4.41
Alberta Nat. Gas	**$1.87**	$2.10	$2.09	$2.46	$3.06	$3.94
Wtd. Avg. $/kWh in U.S.	**N/A**	10.81	10.64	10.12	9.64	9.52
OPEC Prod. (Mbbls/d)	**N/A**	31.7M	31.8M	30.5M	30.4M	29.6M
U.S. Oil Imports (Mbbls/d)	**7.4M[1]**	7.2M	7.3M	7.2M	7.6M	8.7M
U.S. Gas Output (Bcf/d)	**90.9B[2]**	90.0B	90.0B	89.3B	81.4B	77.4B

Source: Haver Analytics

Crude Oil Exchange Prices

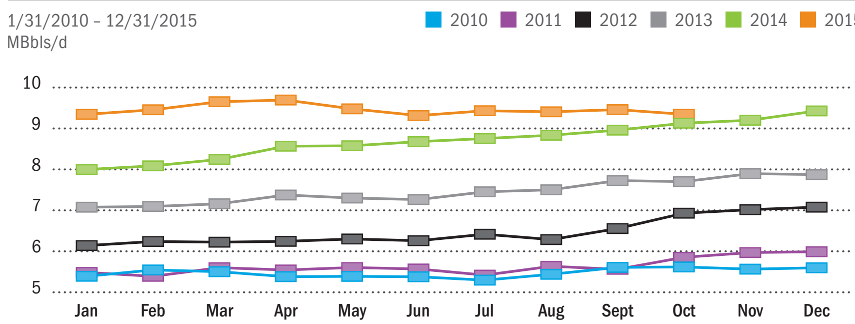
12/30/2011 – 12/31/2015



Source: Haver Analytics, TIAA-CREF analysis

U.S. Crude Oil Production

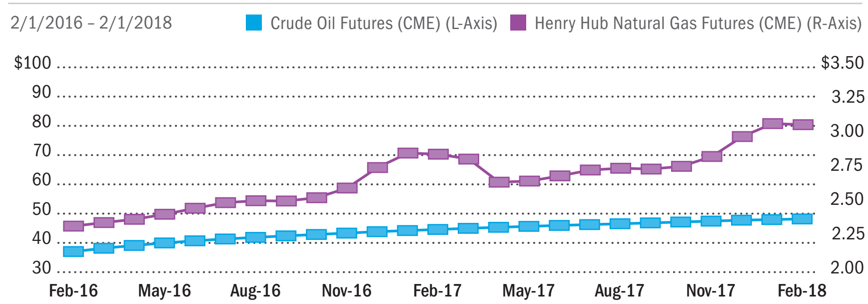
1/31/2010 – 12/31/2015
MBbls/d



Source: Energy Information Administration, Haver Analytics

Futures Curve—Crude Oil & Natural Gas

2/1/2016 – 2/1/2018



Source: CME

Infrastructure Market Overview

Market Review

- The infrastructure asset class continues to expand with new and existing investors seeking diversification and yield in a highly competitive environment.
- Congress passed its first long-term transportation bill since 2005. The five-year bill is called Fixing America's Surface Transportation Act (FAST), and a recent analysis of the bill by ENO Transportation Weekly suggests there will be funding availability for USDOT to lend $36B total, translating to a potential public private partnership (P3) market of about $7.5B per year.
- Recent activity suggests P3s are gaining momentum among colleges and universities. As state legislatures cut funding, P3s can be an attractive solution, providing risk transfer, faster project completion, innovation potential and long-term operational performance guarantees. For example, Ohio State University is currently pursuing a potential P3 for comprehensive energy management, which would support the university's sustainability mission.
- Renewable asset values in the U.S. are benefitting from Congress's extension of tax credits for wind and solar projects. While YieldCo valuations have been adversely affected by technicals in the public market associated with the interest rate rise and growth uncertainty, more recent valuations have trended upward.
- The Australian government is spearheading infrastructure investment through an exemplary and efficient privatization process and creation of an incentive regime for the construction of new assets. This is evidenced by a consortium led by Hastings and CDPQ recently winning the right to lease TransGrid from NSW for AUD 10.26B (1.57x RAB), and A$350M of government funding initiatives to build as many as ten new large-scale solar farms.
- In Europe, Hermes and CDPQ acquired a 40% stake in the train operator Eurostar for GBP 585M, nearly double the valuation estimate provided by the government's advisor. Looking forward, greenfield pipelines appear robust, particularly in the Netherlands, Germany and Norway.
- M&A activity remains steady with about $18B of infrastructure deals reaching financial close in 3Q15.
- PE fund flows for 2015 were below levels year-over-year. According to Preqin, 46 funds secured $36M total in 2015, down 22% and 12% respectively from 2014.

Outlook

- Asset recycling is expected to continue to provide investment opportunities especially for global capital pursuing investments in mature markets.
- Institutional investors may benefit from YieldCo's monetizing projects to generate liquidity and MLPs seeking private capital partners.

[1] Items are as of 11/30/15; [2] Items are as of 10/31/15

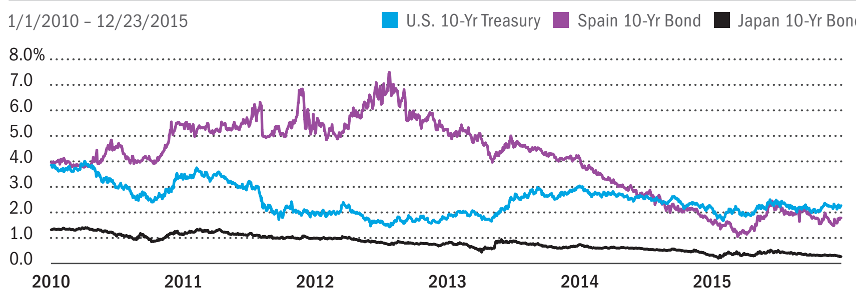
Key Market Metrics

	12/31/15	9/30/15	6/30/15	12/31/14	12/31/12	12/31/10
U.S. Pop. Growth from '00	**13.7%**	13.5%	13.2%	12.9%	11.1%	9.5%
U.S. Inflation Rate (Y-o-Y)	**0.5%[1]**	0.0%	0.1%	0.8%	1.7%	1.5%
Y-o-Y U.S. Real GDP Growth	**N/A**	2.1%	2.7%	2.5%	1.3%	2.7%
U.S. Deficit as % of GDP	**N/A**	3.0%	2.1%	2.4%	6.1%	8.5%
U.K. Deficit as % of GDP	**N/A**	2.6%	2.3%	2.9%	4.4%	6.1%
FTSE Utilities*	**435.0**	429.9	440.3	471.6	373.0	378.8
FTSE Constru./Manufact.*	**587.0**	587.0	587.0	646.7	534.2	531.2
U.S. Inv. Priv. Structures**	**N/A**	$496B	$504B	$512B	$444B	$370B
Freight Transport Index	**123.2[2]**	122.7	122.1	122.6	112.1	108.7

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

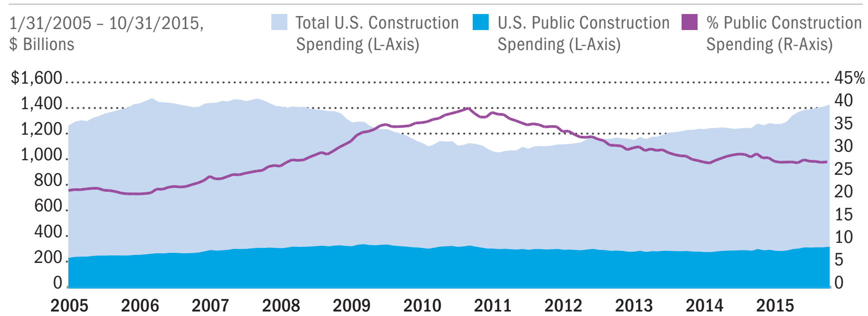
Source: Federal Reserve Board, United States Census Bureau, Haver Analytics

10-Year Benchmark Government Bond Yields by Country



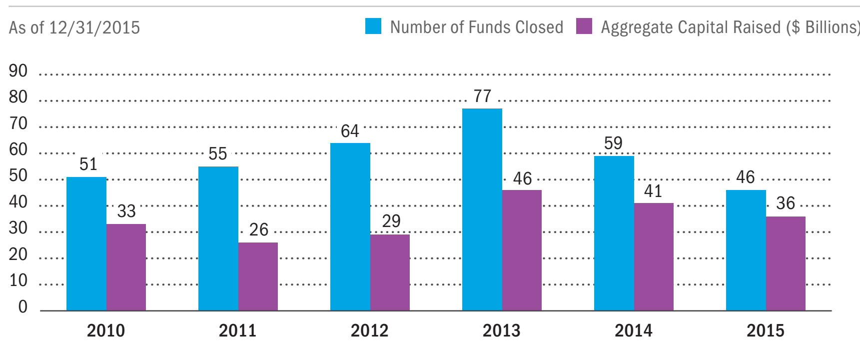
Source: U.S. Treasury, Banco de España, Ministry of Finance Japan, Haver Analytics

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

Market Review

- During 4Q15, timber prices generally remained low, portraying a year in which high standing supply in the U.S. South, the Chinese slowdown, and a strong U.S. dollar kept downward pressure on prices. Despite these macro trends, investments in processing facilities in the U.S. South created some regional price tension. In the Pacific Northwest, producers are hauling longer distances in order to seek higher values in domestic markets.
- The U.S. housing recovery continues to build momentum. In November, housing starts rose by 10.5% from the revised October figure. Single-family and multifamily starts rose 7.6% and 16.4%, respectively. In addition, millennials, the largest share of the American workforce, are aging and facing early signs of income growth. In the long term, these underlying demographic fundamentals could lead to a strong recovery in the U.S. housing market.
- Weyerhaeuser announced the acquisition of Plum Creek. The integrated REIT will be 13.2 million acres, more than twice the size of all other REITs combined. In other major transactions, Foley's offering of 564,000 acres in north FL is now under contract, Molpus acquired 192,000 acres in LA from Campbell, and Lyme sold 234,000 acres in NY to a private buyer. With all major transactions closing, the total U.S. transaction value for 2015 could reach $2B, compared to 2014's total of $2.7B.

Outlook

- Given existing deferred harvest inventories, the current softening in Chinese demand, and the strong U.S. dollar, U.S. timber prices are likely to remain fairly flat through 2016. However, an improved job market and rising builders' confidence could partially offset these market dynamics. Continued U.S. housing recovery will help timber demand.
- Filings from Plum Creek's previously announced venture with institutional investors indicate high per acre values. Rich valuations suggest that the market is already pricing a recovery despite low timber prices. Also, Smurfit Kappa made its first acquisitions in Brazil.

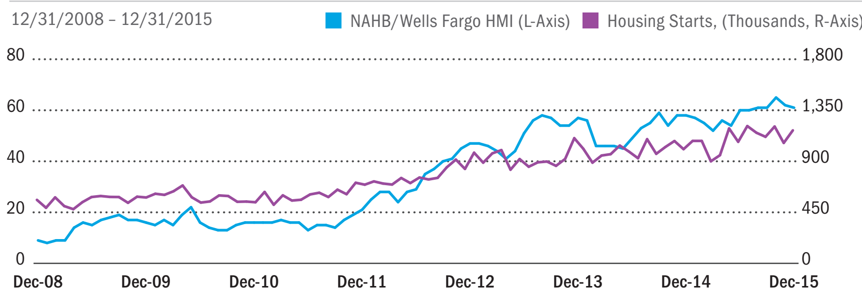
Key Market Metrics

	12/31/15	9/30/15	6/30/15	12/31/14	12/31/12	12/31/10
Total Res. Construction	**$434B[1]**	$432B	$422B	$403B	$302B	$246B
Housing Starts, SA (Vol)	**1,173k[1]**	1,207k	1,211k	1,080k	976k	539k
Building Permits (Vol)	**1,282k[1]**	1,105k	1,337k	1,077k	938k	632k
U.S. S. Sawtimber Index	**N/A**	$25.5	$25.6	$26.3	$23.3	$25.6
CME Lumber ($/1,000BF)	**$258**	$229	$288	$331	$374	$302
NBSK U.S. Pulp Index	**$940**	$959	$980	$1,026	$870	$969
Paper & Paperboard Prod.*	**6,599k[1]**	6,602k	6,544k	6,709k	6,776k	6,981k
Industry Capacity Use (%)	**71%[1]**	70%	69%	72%	67%	57%
World Timber Index	**$1,010**	$916	$1,083	$1,068	$838	$816

* U.S. Total Production, in Tons

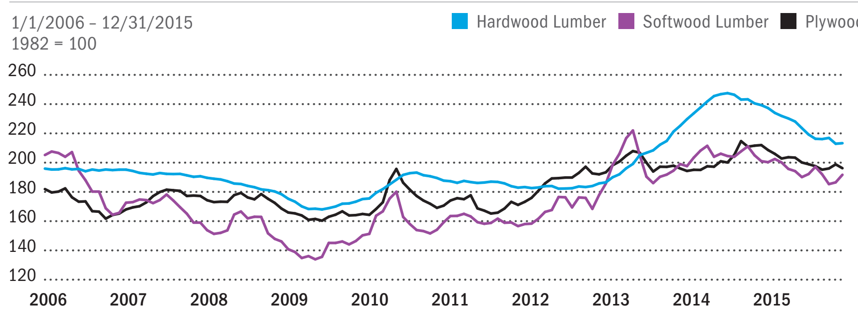
Source: Haver Analytics, Bloomberg

Builder Confidence vs. Housing Starts



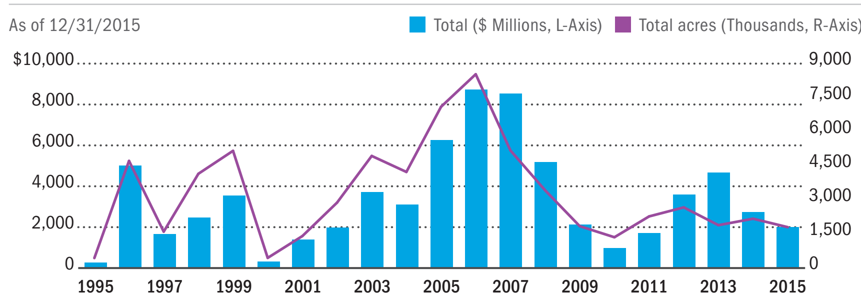
Source: Haver Analytics, TIAA Analysis

Producer Price Index



Source: Haver Analytics

Major U.S. Timberland Transactions



Source: RISI, TIAA-CREF Analysis

[1] Items are as of 11/30/15

Market Review

- Agri-commodity prices, with the exception of sugar and cotton, continued their decline through 4Q15 due to higher than expected global production and stagnant demand growth. 2015 crop production is expected to be accretive to inventories, thus increasing already high stocks-to-use ratios. Commodity futures reflect this dynamic, showing flat to negative growth over the next two years.
- Although U.S. farmer input prices are declining following the multi-year softening of agri-commodity prices, farmer margins in the U.S. Corn Belt have narrowed to break-even or unprofitable levels; U.S. farm incomes are forecasted to be down 38% from last year according to the USDA. While lower input and commodity transportation costs have helped offset farmer losses on a global level, U.S. producers have suffered disproportionately large income losses due to the strengthening of the dollar, up 10.9% as measured by a trade weighted index. Consequently, U.S. rental rates for the 2016 crop year are expected to decline on the back of continued softening of U.S. farmland values in 2015. Conversely, producers in Brazil and Australia have benefited from local currency depreciation, relative to major traded currencies, as well as improved trade relations with major importers, namely China.
- Weather conditions in California contributed to smaller almond, pistachio, and wine grape harvests year-on-year. However, strong consumer demand has kept prices high, which has supported overall profitability for growers and continued appreciation of land values more broadly.

Outlook

- According to the NOAA, a strong El Niño is on-going and has brought above average precipitation to the western U.S., and El Niño conditions are likely to last through at least the spring of 2016. Furthermore, expectations are that parts of northern and southern California, as well as the central/southern plains, will be drought free by spring, with drought conditions significantly reduced across the remainder of California.
- U.S. farmland markets remain competitive, particularly in the permanent crop space as investors hunt for higher returns. Softening land values in the primary U.S. grain and oilseeds regions may offer more compelling "buy" opportunities down the road. Currency depreciation in Australia and Brazil is expected to be supportive to values in local currency and may increase market interest.

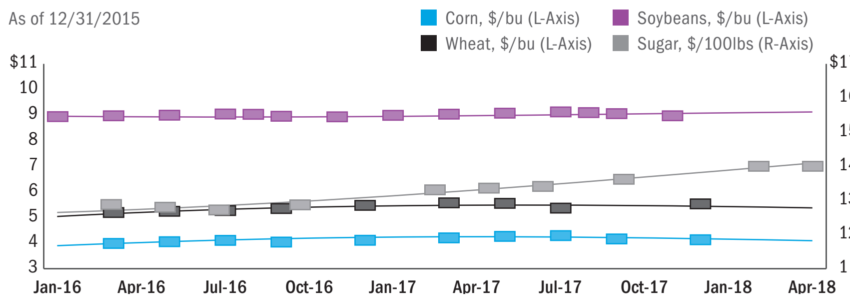
Key Market Metrics

	12/31/15	9/30/15	6/30/15	12/31/14	12/31/12	12/31/10
Corn ($/bu)	**$3.59**	$3.88	$4.14	$3.97	$6.98	$6.29
Soybeans ($/bu)	**$8.71**	$8.92	$10.56	$10.19	$14.19	$13.94
Wheat ($/bu)	**$4.70**	$5.13	$6.15	$5.90	$7.78	$7.94
Sugar ($/100 lbs)	**$15.24**	$12.17	$12.28	$14.52	$19.51	$32.12
Cotton ($/100 lbs)	**$63.28**	$59.49	$67.51	$60.27	$75.14	$144.81
Ethanol ($/gallon)	**$1.40**	$1.54	$1.61	$1.63	$2.19	$2.38
S&P GSCI Agri. Index	**288**	283	293	330	464	489
CRB Foodstuffs Index	**331**	364	378	372	426	439
FAO Food Price Index*	**154**	155	165	186	214	225
USDA Farmer Input Price Index*	**106**	107	110	111	105	93
Baltic Exchange Dry Index	**519**	889	699	910	856	2031

* Most recent value as of 11/30/2015

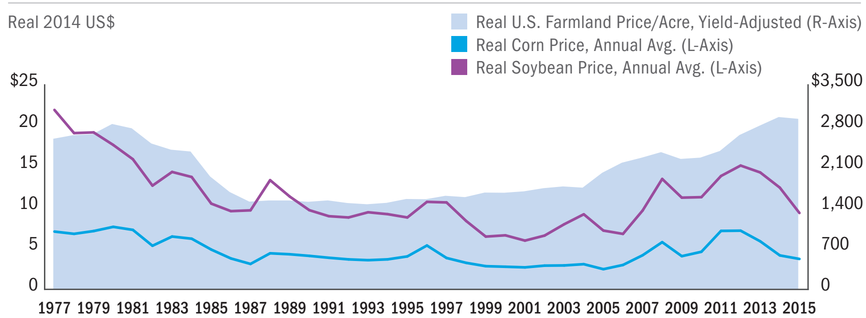
Source: Haver Analytics, Bloomberg

Futures Curve—Key Agricultural Commodities



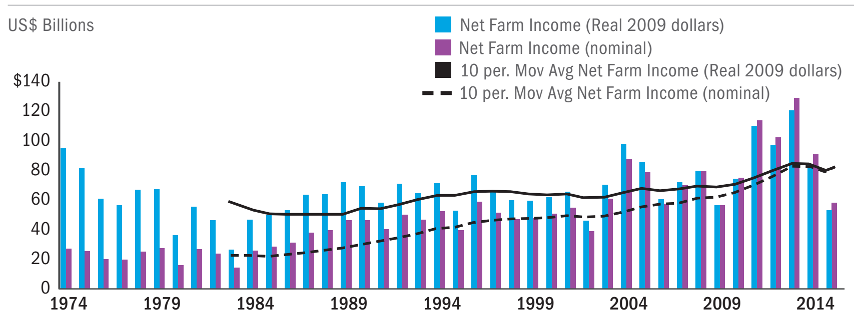
Source: Haver Analytics

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



Source: USDA, ERS, TIAA-CREF analysis

U.S. Annual Net Farm Income



Source: USDA, ERS, Haver Analytics, TIAA-CREF analysis

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