Third Quarter 2016

TIAA GLOBAL ASSET MANAGEMENT

Natural Resources & Infrastructure Quarterly

What's Inside?

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

Although growth continues across the global economy in 3Q16, it remains at an uneven and sluggish pace, continuing one of the defining features of the ongoing recovery.

The U.S. economy appears to have accelerated after meager growth in 2Q16. In the Eurozone and U.K., economic data was resilient, following the Brexit vote in June, the full effects of which remain uncertain and unpredictable. Elsewhere globally, interest rates are broadly following a gentle climb, though central bank activity combined with lackluster growth should prevent rates from rising significantly in the near term.

U.S. growth likely accelerated in 3Q16, supported by a more balanced mix of growth. While 2Q16 growth was largely consumption driven offset by a sharp inventory decline, the 3Q16 economic indicators have indicated more even economic growth. Not all indicators are positive. Manufacturing and service sector activity weakened, although it remains in expansion territory. Industrial production also appears to be recovering. Amid the continuing expansion and tight labor markets, the Fed is considering a rate hike in December.

Outside the U.S., the Eurozone and U.K.'s economy has remained resilient in spite of the Brexit vote. Business sentiment initially declined, but corrected noticeably a month later. Any true impact of the Brexit negotiations and fallout remain unknown and the impact unrevealed. Prime Minister Teresa May has revealed her intention to negotiate a complete exit, setting the stage for tough negotiations across Europe. Even the most pertinent near term issues have yet to be made clear. The ECB provided no guidance in September on whether its asset purchase program will extend beyond March 2017. Meanwhile, the banking sector is battling headwinds, while consumption remains tepid.

In China, economic activity was weak, driven by fiscal stimulus. Fiscal policy has become less effective, outpacing private investment. The RMB has maintained a stable trajectory, however, and joined the IMF's reserve currency basket. The government is running a 6.7% deficit, nearly twice that number when accounting for state and local activities. Despite this, the PBOC sits on $3.17 trillion in reserves and has many tools to deal with any surprises that may arise. In the near term, economic activity is stabilized by the size of fiscal stimulus, as well as the commodity-linked and trade-driven capital spending.

In Japan, where negative long term interest rates are a market reality, the central bank announced a target of a steeper yield curve by rearranging its long-standing asset purchase program. Underlying this announcement, policymakers are assessing the declining inventory for asset purchases and trying to understand how a flat yield curve and negative rate environment impacts the health of bank balance sheets.

As the global economy nears yearend, growth remains bumpy, driven by policy and political concerns. While the upcoming U.S. presidential election dominates headlines, Federal Reserve policy and company earnings data continue to be critical elements outside of the spotlight.

Key market metrics, as of September 30, 2016

	9/30/16	6/30/16	12/31/15	12/31/14	12/31/13	12/31/12
Key market prices						
U.S. 10 Year Treasury	**1.60%**	1.49%	2.27%	2.25%	3.04%	1.78%
U.S. 30 Year Treasury	**2.32%**	2.30%	3.01%	2.75%	3.96%	2.95%
Initial Unemployment Claims	**260k**	270k	285k	293k	337k	363k
Unemployment Rate	**4.9%**	4.9%	5.0%	5.6%	6.7%	7.9%
CB Consumer Confidence	**104.1**	97.4	96.3	93.1	77.5	66.7
S&P 500®	**2,168**	2,099	2,044	2,059	1,848	1,426
FX markets*						
USD-CAD	**1.31**	1.30	1.38	1.16	1.06	1.00
Euro-USD	**1.12**	1.10	1.09	1.21	1.38	1.32
USD-BRL	**3.24**	3.20	3.96	2.66	2.36	2.05
AUD-USD	**0.77**	0.74	0.73	0.82	0.89	1.04

* FX table displays 1 unit of first currency in terms of second currency (e.g. 1 USD is currently equivalent to 1.31 CAD)

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

Bonds

The Brexit sent global government bond yields tumbling and shook equity markets at the start of 3Q16. In the aftermath, equity markets quieted and recovered, while yields on U.S. Treasures rose back to mid-June levels. The 10-year Treasury yield traded mainly between 1.5% and 1.65%. Spreads between the 10 and 30 year Treasuries have flattened from the tightest levels of the year. With improving economic data, the 10-year Treasury is tracking closer to 1.8% into year-end.

FX Markets

Aggressive, easy monetary policy across Europe and Japan has led to a sustained differential between the U.S. Dollar and other major currencies. Year-to-date, the USD weakened against the Euro, however, during 3Q16 the trend flattened following the Brexit. Meanwhile, major emerging-market currencies rebounded as business activity improved.

Employment and Earnings

With labor participation rates at the lowest since the late 1970s and unemployment at 4.9%, wage growth continues to fail to show consistent increases. Although wages improved slightly and consumption is improving, not enough data exists to support a confirming trend. Employment numbers and wages are both important indicators of economic health for the Fed, where members are closely watching to determine the timing and magnitude of a rate hike.

Energy

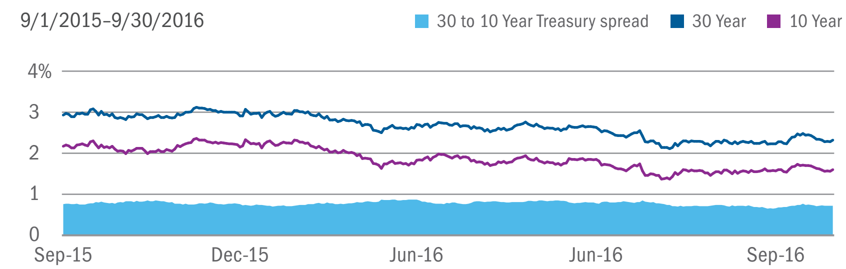
The energy market recovered following earlier declines in the quarter and ended at price levels close to those seen at the end of the second quarter. The crude oil markets are expected to remain oversupplied through at least the first half of 2017 due to the continued resilience of producers. As expected, until the supply glut is resolved through production cuts, the oil markets will face challenges.

Agriculture

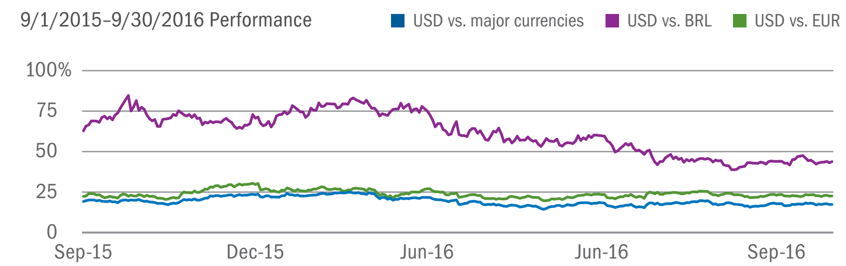
Corn and soybean prices continued to soften to perceived floors in 3Q16 on forecasted U.S. production and inventories at or near record highs, placing further pressure on farmers' already thin margins. Although row crop land price declines have been more muted to-date, a lagged response is beginning to play out. In the nut complex, prices firmed to near their 5-year averages and strong yields are expected to maintain grower profitability. In Brazil and Australia, currency weakness against the U.S. dollar continued to fuel increases in export demand, which, in turn, supported strong local pricing and producer profitability.

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

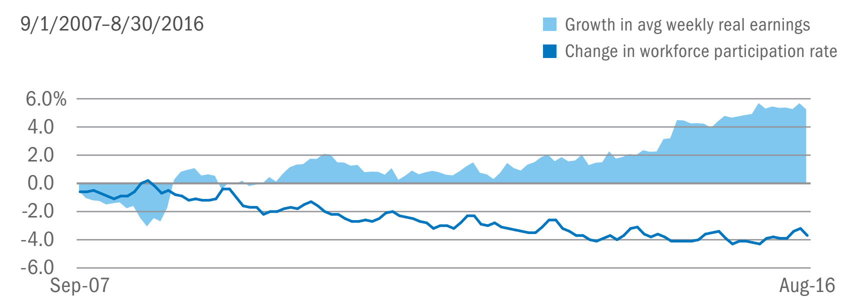
10 & 30 Year U.S. Treasury Bond yields



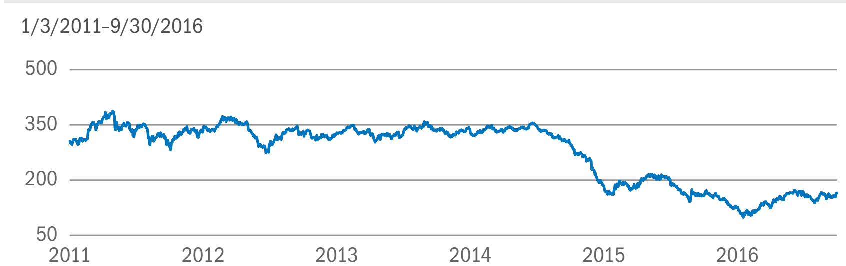
U.S. dollar vs. major currencies, BRL, & EUR



Economic laggards—participation and earnings



S&P GSCI Energy Spot Index



CRB Foodstuffs Index

Market Review

- Crude oil prices dropped as low as $40 during the quarter before recovering. WTI and Brent reached $48 and $49, respectively, at the end of September.
- Demand for natural gas remained steady with prices ending at $2.91 due to warm weather and significant natural gas-fired generation. Low natural gas prices along with a shift in the power generation mix to natural gas and renewables have contributed to low power prices globally.
- Total U.S. crude oil production declined from its April 2015 peak of 9.7 million bbl/d to 8.7 million bbl/d in July 2016. The decline reflects reduced capital investment by operators which is supported by U.S. rig counts which are down 71.2% since the year-end 2014 according to Baker Hughes.
- OPEC tentatively agreed to cut crude output from 33.2 million bbl/d to between 32.5 and 33.0 million bbl/d., representing the first coordinated production cut since 2008.
- Large banks continue to cut their lending and exposure to the energy sector, creating an opportunity for alternative lenders and institutional investors.
- U.S. shale producers have signaled to investors that they will begin drilling new wells after the price of U.S. crude rallies to the $50/bbl territory, which may cap a potential oil recovery.
- Private equity firms with nearly $1 tn of dry powder are beginning to invest capital into the global oil and gas sector in select basins that have attractive well economics, including the Permian Basin in West Texas.
- Enbridge's $28B purchase of Spectra Energy underlines the trend of consolidation the MLP industry. Large MLPs with well-located, critical infrastructure continue to act as the industry's natural consolidators.

Outlook

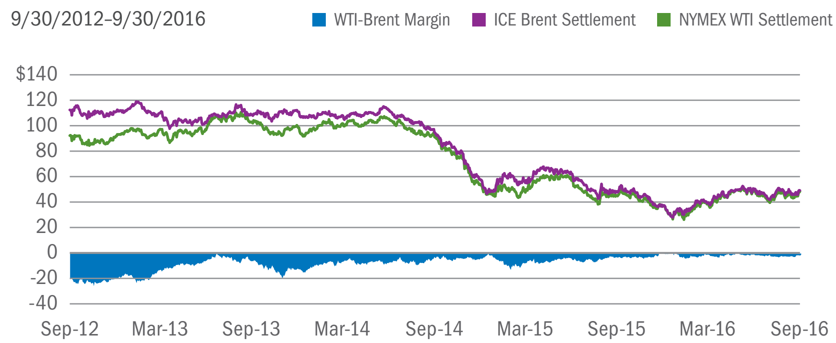
- EIA's September 2016 report forecasts Brent crude oil prices to average $52/bbl in 2017. The forecast for WTI is $1/bbl lower than Brent's in 2017. EIA's average price forecast for Henry Hub in 2017 is $2.87/MMBtu.
- The EIA forecasts U.S. crude oil production to decline to an average of 8.5 million bbl/d in 2017. This is an upward revision of approximately 0.2 million bbl/d in the 2017 outlook reflecting higher drilling activity, rig efficiency, and well-level productivity.

[1] Item as of 8/31/16, [2] item as of 7/30/16. Sources: Haver Analytics, TIAA-CREF analysis, Energy Information Administration, CME.

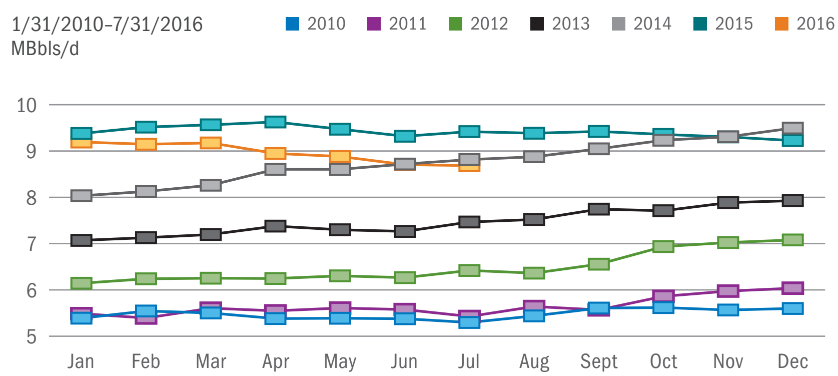
Key market metrics

	9/30/16	6/30/16	3/31/16	9/30/15	9/30/13	9/30/11
NYMEX WTI Crude Oil	**$48.24**	$48.33	$38.34	$45.09	$102.33	$79.20
ICE Brent Crude Oil	**$49.06**	$49.68	$39.60	$48.37	$108.37	$102.76
WCS Crude Oil	**$34.24**	$34.53	$25.19	$31.04	$70.43	$68.70
Henry Hub Nat. Gas	**$2.91**	$2.92	$1.96	$2.52	$3.56	$3.67
Alberta Nat. Gas	**$2.10**	$1.88	$0.71	$2.10	$1.86	$3.46
Wtd. Avg. Ct/kWh in U.S.	**N/A**	10.53	10.01	10.80	10.43	10.29
OPEC Prod. (Mbbls/d)	**N/A**	33.0M	32.4M	31.8M	30.0M	29.4M
U.S. Oil Imports (Mbbls/d)	**8.3M[1]**	7.6M	8.0M	7.2M	7.9M	8.9M
U.S. Gas Output (Bcf/d)	**87.4B[2]**	87.8B	91.1B	90.9B	80.5B	78.6B

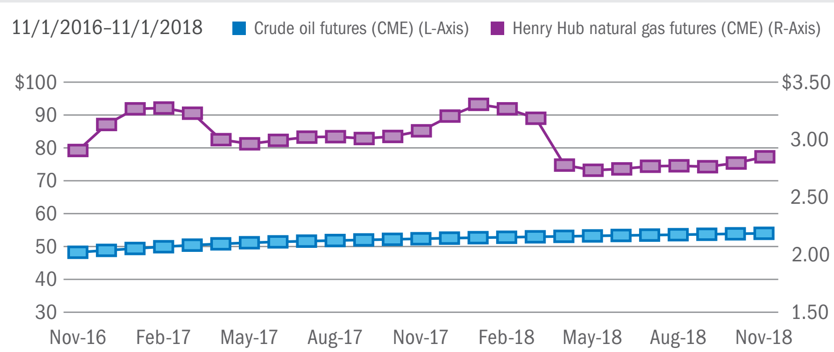
Crude oil exchange prices



U.S. crude oil production



Futures curve—crude oil and natural gas



Market Review

- Demand for the infrastructure asset class remains strong with high levels of interest from existing and new investors looking for diversification and yield and a robust global pipeline of primary and secondary opportunities.
- Sustained North American P3 activity with notable transactions in the market including LaGuardia Terminal, LA Metro (five unsolicited bids), Ontario's Highway 427, Toronto Courthouse, Los Angeles International Airport's people mover and rental car projects, and Fargo-Moorhead flood diversion.
- Contracted renewables and transportation assets with demand risk dominate deal flow in North America. These assets continue to enjoy strong investor demand, commanding higher valuations (e.g. EV/EBITDA multiples of ~22x and ~19x for Nice and Lyon Airports, respectively; valuations of over $600 mm for Pocahontas Parkway; and CAD $196 mm for a 33% stake in K2 Wind Farm). Renewable infrastructure investments' further growth is supported by extension of wind and solar energy tax credits in the United States.
- The United Kingdom's exit from the European Union may limit commitments from public and private capital due to increased uncertainties; however, investors have been drawn to infrastructure investments as a safe harbor investment as UK-listed infrastructure funds (e.g. 3i Infrastructure, BBGI, and John Laing Infrastructure Fund) reached record levels post-referendum.
- Infrastructure investment initiatives in Australia remain strong (e.g. South Australia's AUD 12.1B four-year infrastructure stimulus program, state-backed QIC and AGL Energy's AUD 3B renewables initiative, State of Victoria's expected approval of an AUD 6.2B road upgrade P3) despite political debate on the role of P3 and restrictions on foreign investment (e.g. Chinese investment in Ausgrid).
- Growing, capital-intensive sectors such as telecommunications provide further opportunities (e.g. broadband and fiber network opportunities in Canada and the U.K.).
- According to Preqin, 3Q16 fundraising included eight funds closing $4B in capital compared to two funds closing $1B in capital in 3Q15.

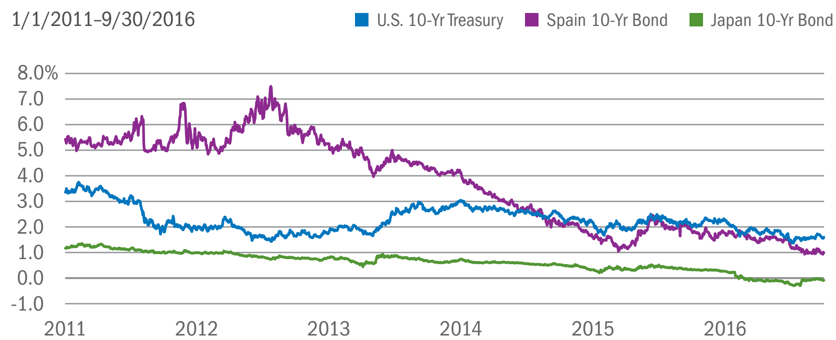
Outlook

- Governmental support, asset recycling, and strong investor demand continue to drive marketplace dynamics.
- Expansion into new asset classes provides pockets of opportunity.

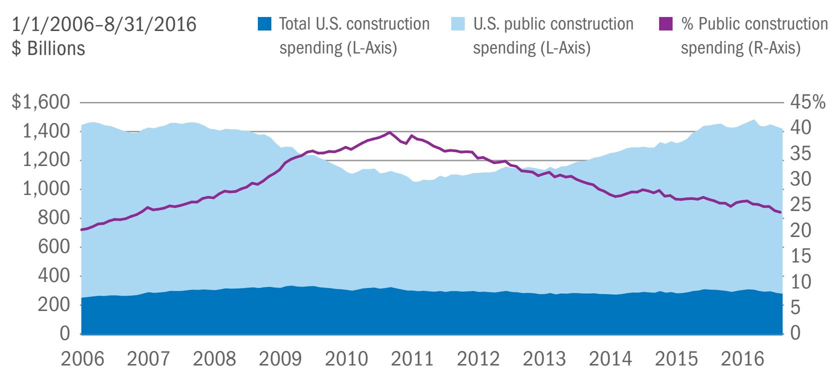
Key market metrics

	9/30/16	6/30/16	3/31/16	9/30/15	9/30/13	9/30/11
U.S. Pop. Growth from '00	**14.4%**	14.2%	14.0%	13.5%	11.8%	10.1%
U.S. Inflation Rate (Y-o-Y)	**1.1%[1]**	1.0%	0.9%	0.0%	1.2%	3.9%
Y-o-Y U.S. Real GDP Grow.	**1.3%[2]**	1.3%	1.6%	2.2%	1.7%	1.2%
U.S. Deficit as % of GDP	**3.1%[2]**	3.1%	1.8%	3.0%	4.3%	9.2%
U.K. Deficit as % of GDP	**1.4%[2]**	1.4%	1.6%	2.4%	3.6%	3.5%
FTSE Utilities*	**488.6**	488.1	473.9	429.9	407.9	353.8
FTSE Constru./Manufact.*	**701.6**	637.4	645.3	587.0	597.7	421.4
U.S. Inv. Priv. Structures**	**$487B[2]**	$487B	$486B	$509B	$476B	$397B
Freight Transport Index	**124.6[3]**	122.6	119.8	122.2	116.6	111.4

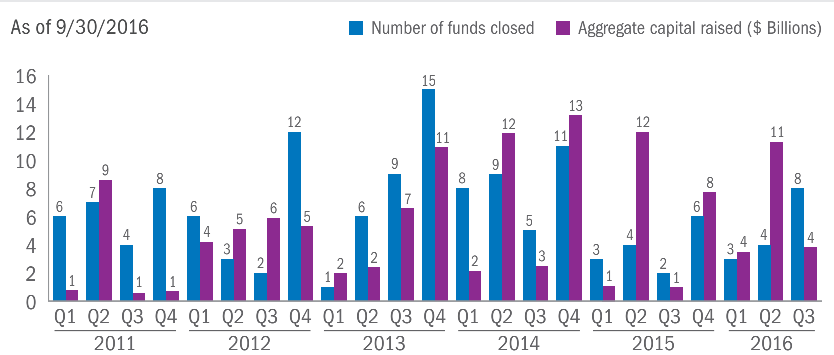
10-year benchmark government bond yields by country



10-year U.S. construction spending



Unlisted infrastructure fundraising by year



* Global, Total Return Index; ** Total investment ($) in non-residential structures in the U.S.; [1] Items are as of 8/31/16; [2] Items are as of 6/30/16; [3] Items are as of 7/31/16. Sources: U.S. Treasury, Banco de España, Ministry of Finance Japan, Haver Analytics, U.S. Census Bureau, TIAA-CREF analysis, Preqin Infrastructure Spotlight..

Market Review

- U.S. housing recovery continues its gradual trend upwards. Improving domestic demand and log exports have buoyed prices in the Pacific Northwest (PNW). Despite improvements in lumber markets, sawtimber prices in the U.S. South remain stubbornly flat at current levels. Principal factor cited by market analysts is millennials postponing homeownership due to social and economic factors such as later marriage, credit availability, and legacy student loans.
- Despite macroeconomic weakness in emerging economies, certain regions offer fundamentally resilient timber markets. Brazil and Chile are offering market diversification and better cost competitiveness. Along with New Zealand, these countries continue to grow market share in global wood trade. In biomass, policy remains a critical driver of demand. Headwinds include low energy prices and warmer winters in key European countries.
- In the largest transaction during 3Q16, Hancock's partial Timberstar sale, roughly 300,000 acres in the U.S. South, is now under contract with Molpus and FIA. Pinnacle's sizable (290,000 acres), but low-value sale in Maine went to a private investor. Other substantial transactions are yet to close while new offerings appear to be slowing as buyers sort through existing auctions.

Outlook

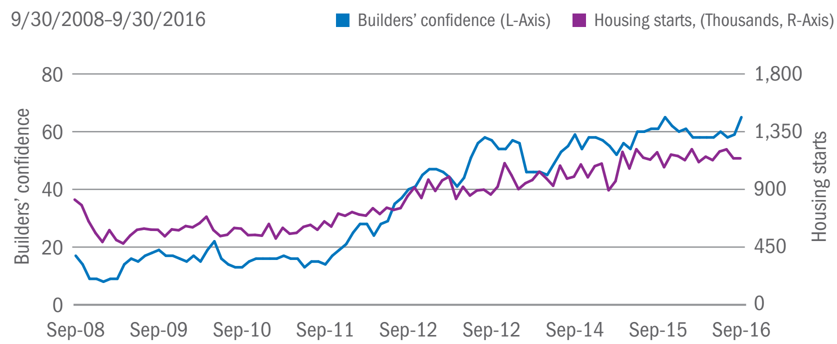
- Domestic demand and China's timber deficit will play a central role in the PNW. In the U.S. South, prices are expected to rebound moderately, aligned with U.S. housing demand and available supply. Millennials offer upside to the current housing market in coming years. International markets will continue to institutionalize and consolidate as timber strategies and investors seek international exposure for higher returns.
- Pricing expectations remain high with discount rates at or near historic lows in developed markets. While some investors are becoming reluctant to bid at current levels, institutional interest in the asset class remains high in today's low interest rate environment.

Key market metrics

	9/30/16	6/30/16	3/31/16	9/30/15	9/30/14	9/30/13
Total Res. Construction	**$456B[1]**	$454B	$475B	$457B	$375B	$338B
Housing Starts, SA (Vol)	**1,142k[1]**	1,195k	1,113k	1,189k	999k	860k
Building Permits (Vol)	**1,152k[1]**	1,153k	1,077k	1,129k	1,062k	1,015k
US S. Sawtimber Index	**$24.3**	$24.9	$25.6	$25.5	$25.1	$24.0
CME Lumber ($/1,000BF)	**$336**	$304	$311	$229	$333	$344
NBSK US Pulp Index	**$999**	$991	$954	$959	$1,027	$948
Paper&Paperboard Prod.*	**6,503k[1]**	6,393k	6,460k	6,598k	6,705k	6,658k
Industry Capacity Use (%)	**64%[1]**	65%	67%	68%	71%	72%
World Timber Index	**$968**	$903	$979	$916	$979	$993

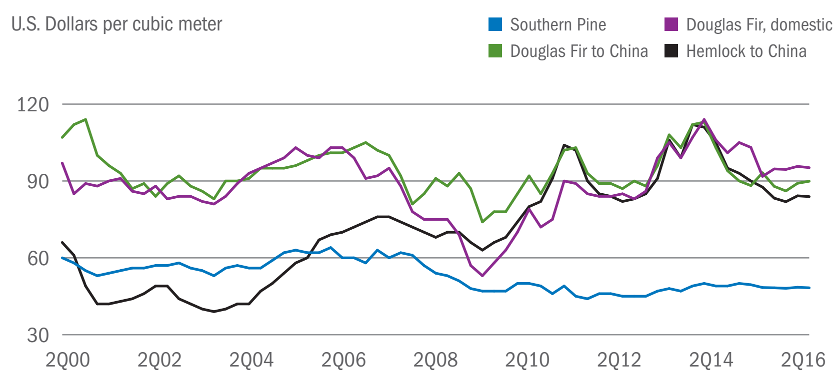
Builder confidence vs. housing starts

9/30/2008–9/30/2016



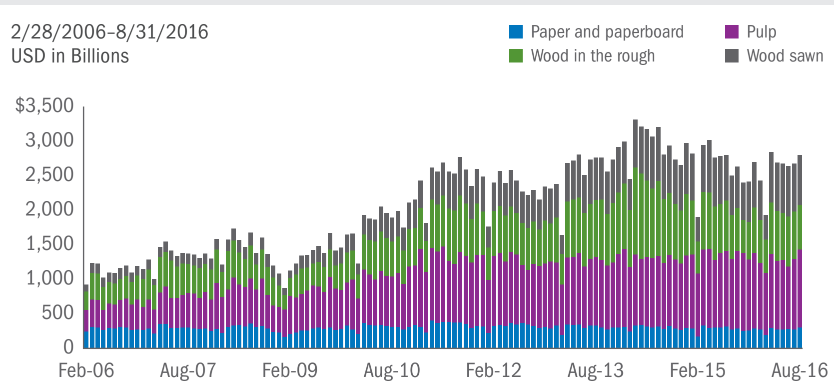
U.S. sawlog prices

U.S. Dollars per cubic meter



China—imports of select major forest products

2/28/2006–8/31/2016
USD in Billions



* U.S. Total Production, in Tons; [1] 8/31/2016.
Sources: Haver Analytics, RISI.

Market Review

- Agri-commodity price movements continued to be mixed in 3Q16. Soybean and corn prices softened on forecasted U.S. production and inventories at or near record highs, while sugar prices stabilized at a multi-year high due to growing global deficits and lagging supply. Barring any major deviations from current U.S. production and Brazilian planting expectations, respectively, corn and soybean price volatility is expected to moderate in 4Q16.
- Despite record yields and lower input costs, U.S. net farm income is still expected to slide 11.5% in 2016, which, if realized, would be the third consecutive year of declines following record income in 2013. Although income declines have decelerated as commodity prices have found floors, row crop land price declines have been more muted to-date; yet, a lagged response is beginning to play out.
- In Brazil and Australia, currency weakness against the U.S. dollar continued to fuel increases in export demand, which, in turn, supported strong local pricing and producer profitability. On the back of lower soybean (-1%) and corn (-21%) production in 2015/16, drought persists in Brazil's northeast, which could lead to a second year of declining production. La Niña, which is associated with higher rainfall in Brazil's northeast, is now predicted as unlikely to occur in 2017. In Australia, strong winter crop production, above-average winter rainfall and continued interest rate cuts are contributing to positive income growth and prospect for modest capital appreciation in many areas.
- After prices across the nut complex softened significantly in 2H15 and 1H16, buyers made a strong reentrance into the market in 3Q16, resulting in prices firming to near their 5-year averages. Although early season price declines are expected to impact negatively tree-nut land values and grower returns, anticipated yields should maintain good grower profitability. Consumer demand for premium North and Central Coast wines remained strong, supporting grape prices and continued appreciation of vineyards in these regions. With roughly half of the 2015/16 harvest completed, expectations are that production will be closer to average as compared to last year's short crop.

Outlook

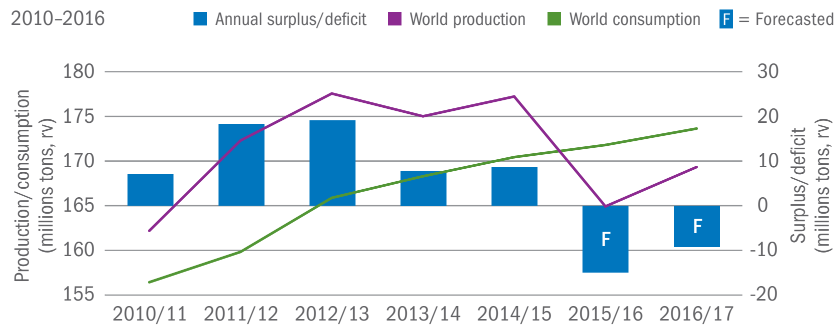
- Current grower profitability and market dynamics favor international markets at the moment. Meanwhile, continued weakness in corn and soybean prices in the U.S. may result in more attractive opportunities in certain regions as land prices and market rents adjust.

Key market metrics

	9/30/16	6/30/16	3/31/16	9/30/15	3/28/13	9/30/11
Corn ($/bu)	**$3.36**	$3.59	$3.51	$3.88	$6.95	$5.92
Soybeans ($/bu)	**$11.06**	$11.75	$9.11	$8.92	$14.05	$11.79
Wheat ($/bu)	**$4.16**	$4.31	$4.73	$5.13	$6.88	$6.09
Sugar ($/100 lbs)	**$20.57**	$20.15	$15.35	$12.17	$17.66	$26.34
Cotton ($/100 lbs)	**$63.78**	$62.82	$58.44	$59.49	$88.46	$98.71
Ethanol ($/gallon)	**$1.58**	$1.62	$1.44	$1.54	$2.45	$2.49
S&P GSCI Agri. Index	**292**	323	284	283	448	479
CRB Foodstuffs Index	**333**	364	352	364	410	469
FAO Food Price Index*	**171**	164	151	155	213	228
USDA Farmer input Price Index*	**106**	108	107	109	106	101
Baltic Exchange Dry Index	**828**	608	383	889	745	1840

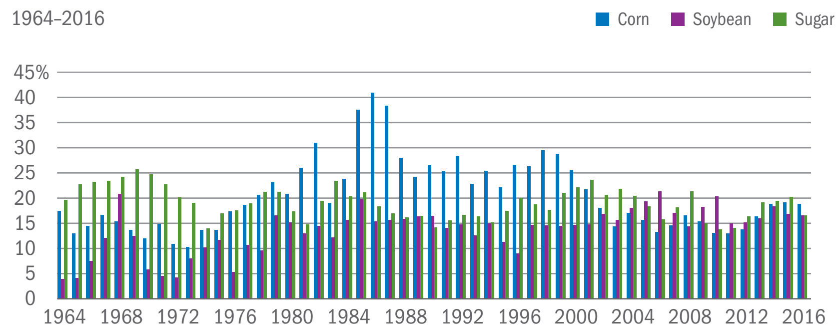
Global sugar supply/demand balance

2010–2016



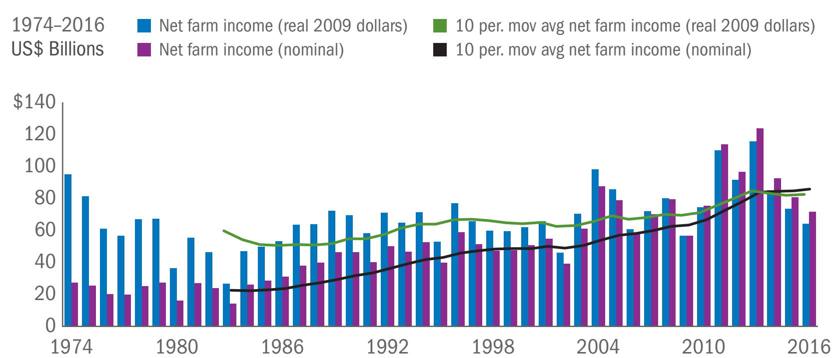
Global stocks-to-use for key agricultural commodities

1964–2016



U.S. annual net farm income

1974–2016
US$ Billions



* Most recent value as of 8/31/2016. Sources: Haver Analytics, USDA ERS PSD, TIAA-CREF analysis.

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