



Crude Correlations and MLPs

The Biggest Frustration of 2017

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// Introduction

As predominately fee-based businesses, MLPs were supposed to be a relative safe-haven for energy investors in the oil price decline that began in 2014. Compared to exploration and production (E&P) and oilfield service (OFS) companies, MLPs have had lower historical correlations with oil, and MLPs' profitability is less dependent on the absolute price of oil. During the period from June 2004 to June 2014, MLPs, as represented by the Alerian MLP Index (AMZ), had a weekly correlation of 0.39 with WTI crude¹. That long-term correlation is fairly meaningless now for those investors who experienced the decline in MLPs firsthand during oil's meltdown. Instead of providing insulation from the volatility in crude, MLPs ultimately traded like E&P and OFS stocks. In the oil downturn, which we define as the time period from the relative peak on June 20, 2014 to oil's bottom on February 11, 2016, the AMZ had a correlation with WTI crude of 0.63. For the same timeframe, the S&P Oil & Gas Exploration & Production Select Industry Index (SPSIOP) had a correlation of 0.69, and the PHLX Oil Service Sector Index (OSX) had a correlation of 0.71.

In this analysis, we look at why MLPs exhibited a higher correlation with WTI as oil fell and why MLPs have had a lower correlation with WTI as oil prices have improved since bottoming in February 2016. We look at MLPs' correlation with WTI using the AMZ and Alerian MLP Infrastructure Index (AMZI). Though the correlations were nearly identical for the AMZ and AMZI, we included both due to AMZ's

familiarity as the leading gauge of energy MLPs and due to the significant investment in funds and other products directly tied to the AMZI. For comparison, we also look at the correlations with WTI for the SPSIOP Index as a proxy for E&P companies and the OSX as a proxy for OFS companies. We look at the 39 constituents of the AMZ as of November 30, 2017 for our company-level analysis of crude correlations. The AMZI is a subset of the AMZ, so its constituents are necessarily included. Individual company correlations are grouped into ranges and designated by classification. Throughout, we use the [Energy MLP Classification Standard \(EMCSSM\)](#) to categorize MLPs.

We primarily look at correlations and price performance over a five-year period, broken up into distinct intervals. We look at correlations during WTI's decline from a relative peak of \$107/bbl to its bottom at \$26/bbl (June 2014 to February 2016), as well as correlations from the bottom to the end of November (February 2016 to November 2017). This year has been particularly frustrating for MLP investors who have seen WTI prices improve and no uplift in MLPs. As such, we look at weekly correlations for year-to-date 2017 and daily correlations since WTI has traded above \$45 per barrel (July 11, 2017 to November 30, 2017) for the indices only. The five-year correlation provides the base comparison for the other periods. See Exhibit A.

Exhibit A — MLPs Had a Heightened Correlation with Oil as WTI Fell and a Lower Correlation as WTI Improved

	Correlation with WTI				Price Performance				
	AMZ	AMZI	SPSIOP	OSX	AMZ	AMZI	SPSIOP	OSX	WTI
Downturn: June 2014 to February 2016	0.63	0.62	0.69	0.71	-59.9%	-59.7%	-71.3%	-57.8%	-75.6%
Upturn: February 2016 to November 2017	0.41	0.41	0.68	0.61	29.2%	32.7%	49.4%	3.1%	119.0%
Year-to-Date November 30, 2017	0.39	0.39	0.65	0.55	-16.9%	-18.6%	-13.9%	-27.3%	6.9%
Since WTI has traded above \$45	0.35	0.35	0.63	0.62	-11.2%	-12.6%	13.6%	2.7%	27.4%
Five Years	0.52	0.51	0.66	0.63	-33.9%	-31.2%	-31.9%	-38.9%	-35.4%

Source: Bloomberg

Data Note: All correlation data was sourced from Bloomberg. The five-year correlation is based on weekly correlations from November 30, 2012 to November 30, 2017. The correlation during the oil downturn is based on weekly correlations from June 20, 2014 to February 11, 2016. The correlation during the oil upturn is based on weekly correlations from February 12, 2016 to November 30, 2017. Correlations for year-to-date 2017 were based on weekly correlations through November 30, 2017. The correlations for the indices since WTI has traded consistently above \$45 per barrel were based on daily correlations from July 11, 2017 to November 30, 2017. These parameters are also true for the individual MLP correlations shown on page 9. Price performance corresponds to the dates listed, except for the oil upturn which uses the closing price on February 11, 2016 as the base.

1// We use WTI for our analysis because it is the domestic crude benchmark and arguably the most meaningful crude marker for MLPs. Brent pricing may be more relevant worldwide, but as it is priced in Northwest Europe, it has less direct application to MLPs. WTI is also important as the reference price most likely used by E&P companies in investment decisions in the US, which has implications for future production growth and therefore MLP growth opportunities.

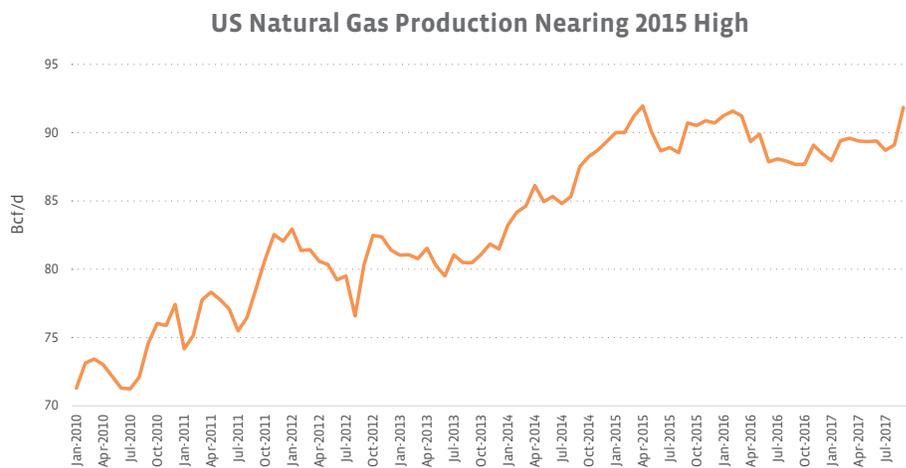
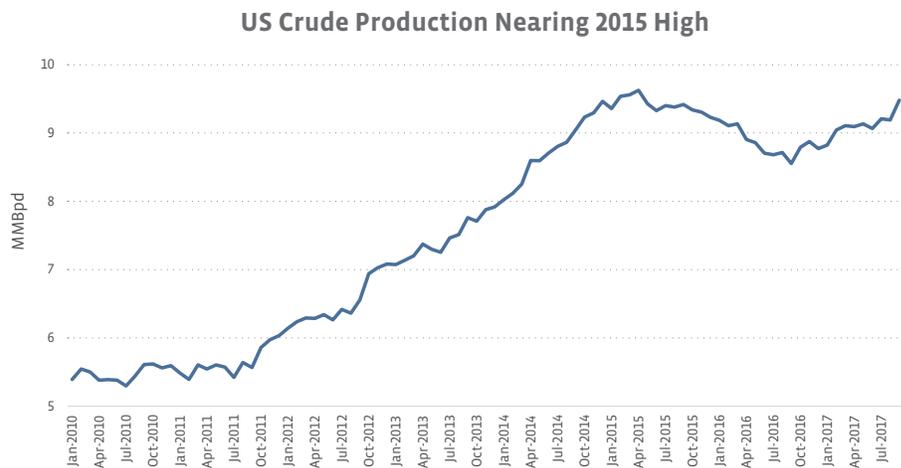
// Heightened Crude Correlation at the Worst Time

Per Exhibit A, MLPs' correlation to WTI crude oil was heightened during oil's decline from June 2014 to February 2016 and was well above the five-year correlation. The correlation to WTI and price performance for MLPs was generally in line with the SPSIOP and OSX, even though the profitability of the companies in those indices is much more dependent on the absolute crude price. Why did MLPs experience a similar fate as E&Ps and oilfield service companies, despite the differences in business models? A few of the many potential explanations are outlined below, including MLP-specific issues and E&P struggles that had repercussions for MLPs. It is important to keep in mind that MLPs depend on E&Ps to provide oil and natural gas to move and process and often have E&P customers. As such, it is not unreasonable to believe that when E&Ps sneezed, MLPs caught a cold.

As oil fell below \$50 per barrel, economics for shale producers looked increasingly bleak, and the rig count, and eventually production, fell. Given that midstream MLPs rely on producers to fill pipelines and processing plants, there

was a concern that lower production of oil and gas would harm existing businesses and limit future growth. While US production of oil and natural gas fell in 2016 relative to 2015, annual 2016 production was still greater than in 2014. As you can see in Exhibit B below, recent production levels for both commodities are close to previous highs². Additional pipeline capacity is still very much needed in areas like the Permian, where natural gas (priced at the Waha hub in the western part of Texas) and crude (priced at Midland, Texas) have recently traded at discounts to prices on the Gulf Coast due to takeaway constraints. As another example, pipeline capacity out of the Marcellus/Utica remains limited. While basin-level production and specific company impacts are more nuanced, the overall production picture for the US was likely not as bleak as one would have expected given the low commodity price environment, thanks in part to improved drilling efficiencies and well productivity.

Exhibit B



Source: EIA

2 // In September 2017, crude production was 9.5 MMBpd, compared to the monthly record since the 1970's of 9.6 MMBpd in April 2015. Natural gas production was 91.9 Bcf/d in September 2017, compared to the April 2015 high of 92.0 Bcf/d. Source: EIA.

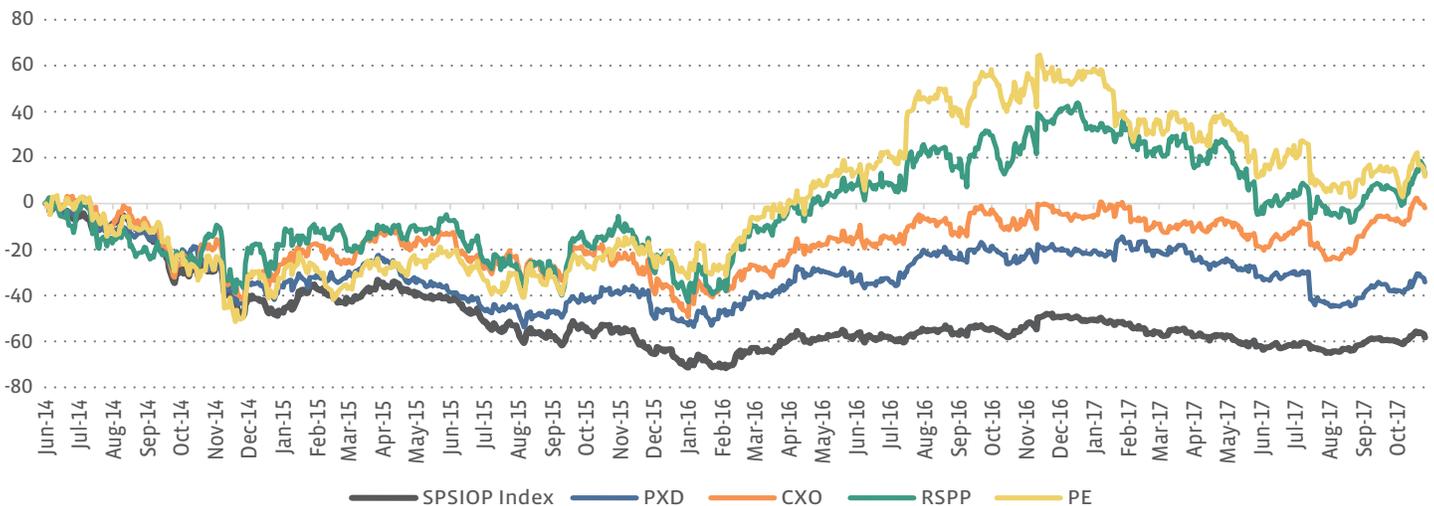
// Heightened Crude Correlation at the Worst Time (cont.)

With oil prices depressed, there were also reasonable concerns about E&Ps' abilities to make payments under take-or-pay and minimum volume commitment contracts. Some MLPs worked with their E&P customers to renegotiate contracts. Williams Partners (WPZ) and its customer Chesapeake Energy (CHK) restructured contracts in several basins in September 2015 and August 2016. For example, in the Barnett, CHK's minimum volume commitment was eliminated and monthly gathering rates were adjusted through the end of 2029 as announced in August 2016³. In exchange, WPZ received \$754 million in up-front cash. WPZ indicated that the changes resulted in an equivalent net present value of cash flows compared to what had been expected under the prior agreement.

Some MLPs and their customers turned to the legal system to settle contract issues. One example is Crestwood Equity Partners (CEQP) and Quicksilver Resources, which filed for bankruptcy protection in March 2015 and was purchased by BlueStone Natural Resources II in a bankruptcy auction in January 2016. In February 2016, before the closing of the transaction, Quicksilver filed a motion to reject CEQP's gathering agreements, and CEQP filed an objection to the motion in response. The motion was ultimately withdrawn, and BlueStone entered a ten-year agreement with CEQP for gas gathering and processing in the Barnett Shale in April 2016. However, not all contract disputes resulted in happy endings. In the bankruptcy of Sabine Oil & Gas, a judge ruled that gathering contracts between Sabine and a subsidiary of Cheniere Energy (LNG) could be rejected. The March 2016 decision was upheld by a New York Court in March 2017. Concerns about MLPs' contracts and MLPs' exposure to struggling E&Ps was not without merit and could explain part of MLPs' higher crude correlation in the downturn.

With oil below \$50 per barrel, only select regions of select basins made economic sense for drilling. Producers allocated their rigs to the most competitive basin or the best region of a basin. Similarly, investors allocated their resources to the companies operating in the most cost-competitive basins and as a result, became hyper-focused on the Permian. The clear preference for Permian operators is evident in the E&P space per Exhibit C. Permian-focused operators Pioneer Natural Resources (PXD), Concho Resources (CXO), RSP Permian (RSP) and Parsley Energy (PE) have outperformed the SPSIOP Index since oil's peak in June 2014. In the MLP space the relationship is less clear given other company-specific factors, but it's possible that MLPs without a footprint in the Permian may have been subject to increased selling pressure. The Permian preference in the MLP space may be more clearly evidenced by recent acquisitions and project announcements. In April 2017, NuStar Energy (NS) announced that it was spending \$1.5 billion to acquire Navigator Energy Services' logistics assets in the Permian's Midland Basin, marking NS' entry into the Permian. Also without a previous Permian footprint, Summit Midstream (SMLP) announced its entry into the Permian's Delaware Basin with a greenfield gas gathering and processing system in July 2017, and Buckeye Partners (BPL) announced plans for a new Permian to Corpus Christi crude pipeline in March 2017, which would mark its entry into the basin. With midstream companies focused on gaining Permian exposure, it's feasible that investors preferred Permian exposure in their MLP portfolios or possibly in some cases, preferred direct leverage to the Permian through E&Ps, instead of investing in MLPs.

Exhibit C — Permian Preference Clear in E&P Performance Since June 2014



Source: Bloomberg

3// The new agreement for gas gathering through 2029 was with Chesapeake's successor in the Barnett, which ended up being Total (TOT).

// Heightened Crude Correlation at the Worst Time (cont.)

Some MLPs in hindsight were arguably too aggressive in growing their distribution or were not properly positioned for the changing macro environment, as evidenced by the number of distribution cuts by AMZ constituents shown in Exhibit D⁴. To be clear, the distribution cuts below relate to the constituents in the index during that time period (not the current constituents). It bears noting that there were seven⁵ upstream MLPs in the AMZ at the end of 2014, and there were none in the index as of November 30, 2017. The prevalence of distribution cuts during the quarters spanning oil's drastic fall from the OPEC meeting in late November 2014 to its bottoming at \$26/bbl in February 2016 (circled in Exhibit D) may in part explain the AMZ's higher correlation with WTI as oil was falling. While we don't have the real estate to delve into each MLP's distribution cut, the first MLPs to cut were those closest to the wellhead, namely upstream MLPs, some of which had also recently levered up the balance sheet for acquisitions⁶. The more robust midstream names were able to maintain their distributions for longer or continue to grow their distributions. That said, the cuts likely weighed on sentiment for the individual MLP and the broader MLP space.

Exhibit D — Distribution Cuts by AMZ Constituents More Frequent During Oil's Downturn

	Increase	Maintain	Cut
1Q14	31	18	1
2Q14	35	15	0
3Q14	30	20	0
4Q14	28	19	3
1Q15	28	19	3
2Q15	34	14	2
3Q15	31	19	0
4Q15	18	27	5
1Q16	20	18	5
2Q16	21	22	1
3Q16	18	24	2
4Q16	18	24	1
1Q17	21	20	2
2Q17	22	19	0
3Q17	20	17	3

Source: Alerian

Lastly, in a sector that is largely biased towards retail ownership, there may have been confusion in how MLPs generate money and their sensitivity to the absolute price of oil.

Clearly, the profitability of Production & Mining | Petroleum MLPs is highly levered to oil prices, but most MLPs don't fit that characterization. It's possible that investors bought MLPs screening only for yield and then sold when they realized they had an energy-related investment. Perhaps investors saw "energy" in an MLP's name and wanted out of the position thinking they had bought an oil producer. MLPs could have been included in a broader energy portfolio, and the entire position in energy was eliminated, with no differentiation for MLPs. There likely was some misunderstanding of MLPs, whether that was a result of individual investor confusion or MLPs being lumped in with energy more broadly.

While the price performance for the AMZ, AMZI, SPSIOP and OSX was relatively in line as WTI fell, it bears mentioning that MLP investors' losses were not as dire when looking at total returns⁷, as shown in Exhibit E. On a total return basis, the AMZ and AMZI were both down nearly 55%, only slightly better than the OSX. It is worth noting that constituents in the AMZ and AMZI must have declared a distribution for at least the trailing two quarters, so the methodology used to construct the indices introduces a small bias. The smallest MLPs or those MLPs that suspended their distribution would not be captured by the AMZ or AMZI.

Exhibit E — MLPs Outperformed OSX and SPSIOP on Total Return Basis During Oil's Downturn (June 2014 to February 2016)

	AMZ	AMZI	SPSIOP	OSX	WTI
Price Return	-59.9%	-59.7%	-71.3%	-57.8%	-75.6%
Total Return	-54.9%	-54.8%	-70.8%	-56.3%	—

Source: Bloomberg, Alerian

In case you are wondering whether natural gas MLPs held up better as oil fell, they did not. The Alerian Natural Gas Index (ANGI) requires that constituents earn a majority of their cash flows from qualifying midstream activities involving natural gas and natural gas liquids (NGLs), but even the ANGI had a correlation of 0.62 with WTI and fell by 57.5% on a total-return basis during the oil downturn, underperforming the OSX. It is important to note that the ANGI includes Gathering & Processing MLPs, whose correlation with WTI can tend to be higher as discussed in more detail later. ANGI's behavior in the downturn may be further evidence that MLPs broadly were not immune to the struggles of oil-sensitive, cash-strapped E&Ps, including concerns around E&P companies' abilities to grow production of oil and gas and fulfill minimum volume contract obligations.

4 // The quarters correspond to the quarter of the financial performance underlying the distribution announcement, not the quarter the distribution was paid. For example, the 3Q 2017 distribution represents the distribution that will be paid in 4Q 2017 related to the performance in 3Q 2017.

5 // Atlas Resource Partners (ARP), Breitburn Energy Partners (BBEP), EV Energy Partners (EVEP), Linn Energy (LINE), Legacy Reserves (LGCY), Memorial Production Partners (MEMP), and Vanguard Natural Resources (VNR).

6 // Examples include LINN Energy (LINE) and LinnCo's (LNCO) purchase of Berry Petroleum in 2013 and Breitburn Energy Partners (BBEP) acquisition of QR Energy in 2014.

7 // Total return assumes dividends are reinvested in specific index.

// Lower Correlation with Crude in Upturn

While the heightened correlation with crude was frustrating for investors in the oil downturn, the lower correlation in the upturn from February 2016 to November 2017 has added insult to injury. The correlation of the AMZ with WTI crude year-to-date and since oil's rally in July has been well below the five-year average. WTI crude is up 27.4% since crossing the \$45 level on July 11th to November 30, 2017, while the AMZ is down 11.2% over the same period. Did crude go from being at the forefront of investors' minds in the downturn to an afterthought in the upturn? Probably not. Setting crude aside, there have been sector-specific issues that are likely weighing on MLP performance, including potential tax-loss selling as year-end approaches, concerns around tax reform and implications for MLPs, negative company-specific headlines weighing on the entire space, and multi-faceted distribution growth concerns. Additionally, distribution cuts have weighed on performance this year, most recently with three AMZ constituents cutting their distributions for 3Q 2017.

While negative company headlines should primarily impact the MLP which announced the bad news, the repercussions have been broader in the MLP space. When Plains All American (PAA) cut its 2017 financial guidance and indicated that it would reset its distribution on August 7, 2017, PAA was down 19.4% the following trading day. The other AMZ constituents (as of November 30, 2017) were down 1.7% that day based on the median performance, and the best performer among the AMZ constituents was up only 0.1%. For broader context, WTI was down 0.4% that day, and natural gas was up 0.7%. As another recent example, Energy Transfer Partners' (ETP) announcement of a common unit offering on the evening of August 14th caused its units to fall by 5.1% the following day, and the median performance of other AMZ constituents was down 1.6%. Only two of the other 38 MLPs had a positive performance that day, and the best performer was up just 0.5%. Negative MLP headlines in an already jittery market are like a passenger with a cold on an airplane — highly contagious even for the healthy.

Another potential reason for the underperformance in MLPs is multi-faceted investor concern around distribution growth. Volatility in oil prices raises questions around infrastructure needs and future growth drivers. That said, project-level competition has also increased as many of the projects that were "low-hanging fruit" in the shale revolution have already been completed. As a result, MLPs are competing for a smaller opportunity set. In addition to investments from MLPs, private equity money is also being put to work in the midstream sector, which adds another layer of competition with a low cost of capital. Given more players fighting for fewer opportunities, it's not surprising to see more joint ventures, which spread both risks and costs, but also lower the rewards (cash flow) from projects.

As strange as it may sound, capital discipline could potentially lower future distribution growth. Both Enterprise Product Partners (EPD) and BPL recently indicated that the market is not properly rewarding distribution growth, with EPD slowing its distribution growth and BPL keeping its distribution flat. SMLP management acknowledged on their third quarter 2017 earnings call investors' desire for them to shift capital focus toward strengthening the balance sheet, and as a result, management indicated that they would focus on utilizing excess coverage for internal capital needs versus growing the distribution. While a focus on capital discipline and returns is healthy, investors may not have the patience to realize the long-term benefits of this, resulting in near-term volatility and potentially selling pressure. In addition, capital discipline by E&Ps, which were historically somewhat notorious for outspending cash flow, could have implications for oil and gas production growth and thus infrastructure opportunities in the future.

Perhaps, the lower correlation with crude this year is only temporary and just reflects a lag. As you can see in Exhibit F, MLPs, represented here by the AMZ, held up fairly well for the first several months while oil plummeted. Recall, oil's decline accelerated after the OPEC meeting in late November 2014, when OPEC decided not to cut production.

Exhibit F — The Decline in MLPs Lagged Crude's Initial Decline



// Lower Correlation with Crude in Upturn (Cont.)

Since MLPs were somewhat slow to react to oil's crash, perhaps, they will also be slower to react to oil's recovery. It may simply take more time for MLP investors to get comfortable with oil prices after the volatility of the last three years. Alternatively, investors may have taken tax

losses in MLP investments to offset other gains in 2017 and may be waiting for the new year (and the alleviation of selling pressure from tax-loss selling) to put money back to work in the space.

// MLPs Not Alone in Underperforming the Commodity

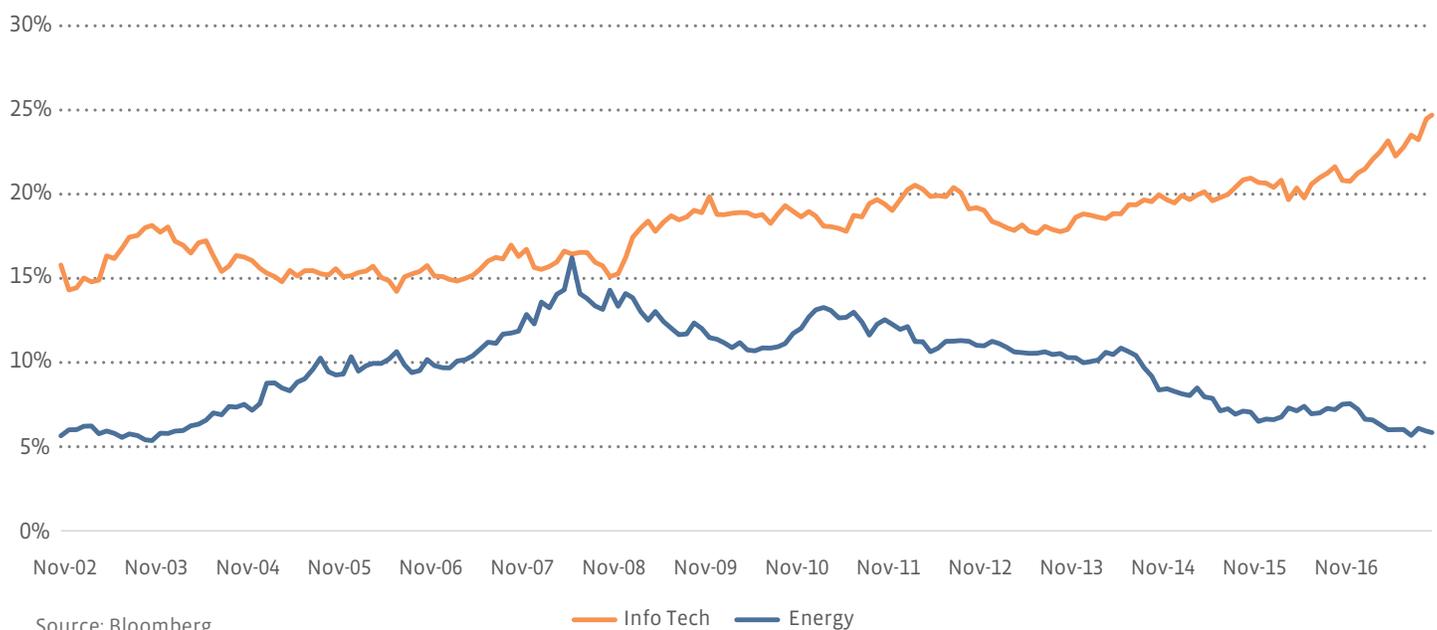
While MLPs, as represented by the AMZ and AMZI, have traded down this year despite the improvement in oil prices, it's important to note that other energy companies are also underperforming the commodity. While the AMZ and AMZI are down 16.9% and 18.6% year-to-date through November 30th, respectively, the SPSIOP is down 13.9% and the OSX is down 27.3%. All are down year-to-date, despite WTI being up 6.9% over the same timeframe and touching two-year highs in late November. To put it another way, energy companies outperformed WTI during its decline but have underperformed the commodity in oil's recovery. There are a few conclusions that can be drawn from this.

First, there may be reasonable skepticism about the sustainability of oil's recovery and lingering fears of a retracement to the \$40-per-barrel range. There have been multiple examples in this price cycle of WTI breaking above \$50 per barrel for a period only to retrace back to the low \$40's, as seen as recently as late May through June of this year. The November 30, 2017 decision by OPEC and non-OPEC countries, led by Russia, to extend production cuts by nine months to the end of 2018 should be supportive for oil prices. It's important to remember that MLPs' profitability is largely driven by volumes, and oil stabilizing around \$60 per barrel or higher should give US producers more comfort around growing production. Clearly, stability and a

sustained improvement in oil prices would be constructive for MLPs but may take time to be reflected in unit prices.

Second, the underperformance of energy stocks may be indicative of a general disinterest in energy. A broad underinvestment in energy is evidenced by energy as a percentage of the S&P 500 sitting at its lowest levels in more than a decade per Exhibit G. To be clear, MLPs are not eligible for inclusion in the S&P 500 Index; however, MLPs are not immune to the general malaise in energy as evidenced by the S&P 500 energy weighting⁸. If a portfolio or fund reduces its energy allocation and owns MLPs within that allocation, then MLPs will be negatively impacted, even if the manager has no specific opinion on the MLP space. For a generalist portfolio manager or an individual investor, other sectors like tech, which continues to see its weighting in the S&P 500 increase, may be much more attractive these days than any energy company. Investors fatigued by the uncertainty in oil may be on the sidelines or investing elsewhere until oil stabilizes. Some money may be permanently sidelined when it comes to conventional energy investment, as exemplified by the fossil fuel divestment campaigns that have spread across universities in recent years. If funds don't flow into the energy space, the improvement in oil is like a tree falling in a forest with no one there to hear it.

Exhibit G — Energy's Weighting in the S&P 500 at Decade Lows as Tech's Weighting Continues to Climb



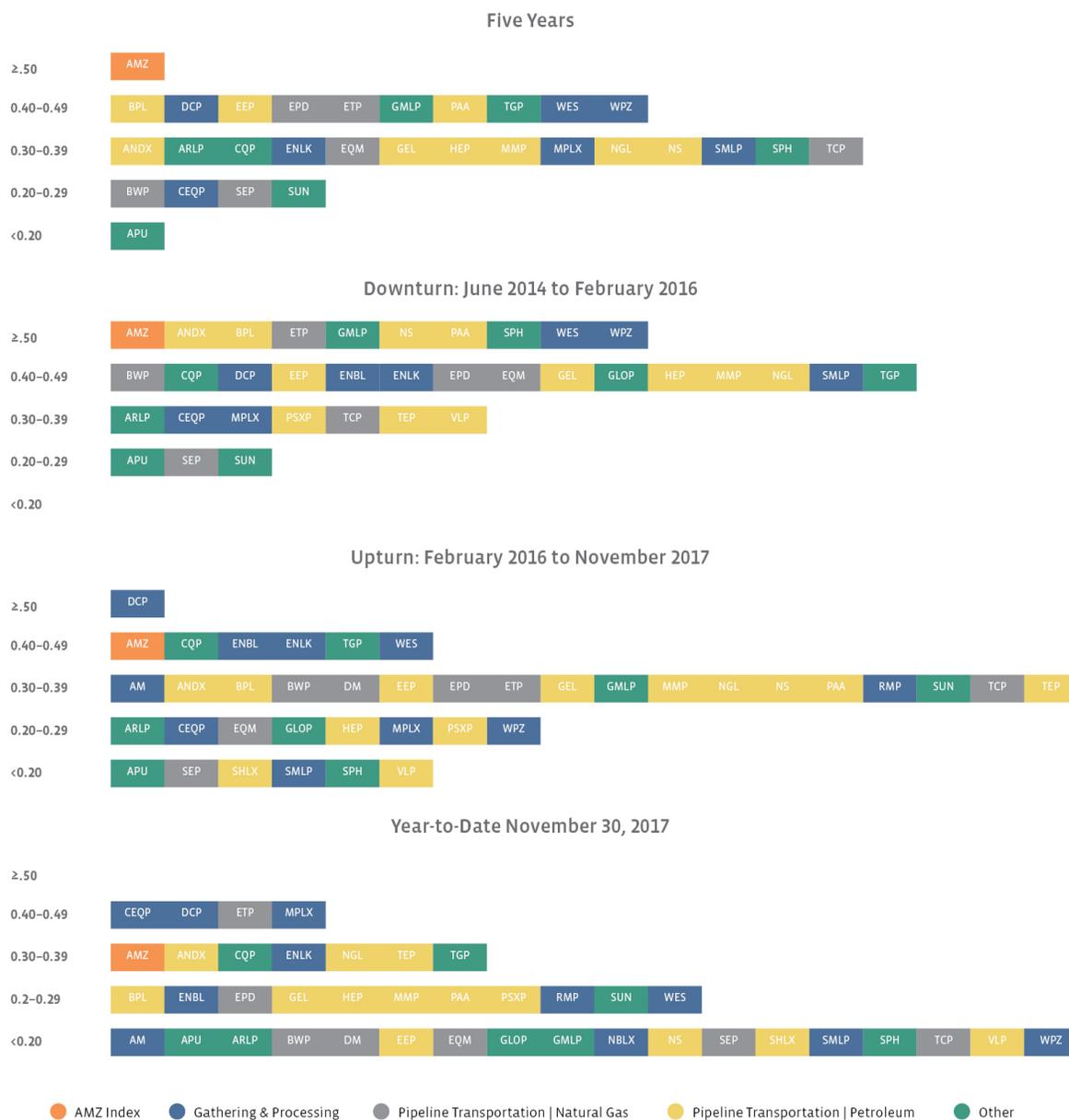
⁸ // For additional context, the AMZ's correlation with each of the SPSIOP Index and OSX Index has been 0.55 since February 2016. The AMZ's five-year correlation with the SPSIOP and OSX was 0.66 and 0.60, respectively.

// Which Individual MLPs are More Correlated with Crude?

Before delving into individual MLP correlations with WTI, keep in mind that correlations can be fickle, and data can vary with small changes to the parameters (changing dates, analyzing data on a weekly or daily basis, etc.). For this reason, we have grouped MLP correlations with WTI into ranges and have only analyzed the longer-term periods as calculations involving too few data points are often unreliable. We aren't trying to split hairs between companies with a correlation of 0.45 and 0.42. Rather, we look for broader takeaways related to WTI correlations for individual MLPs and classifications of MLPs. For this analysis, we focused solely on the 39 constituents of the

AMZ Index as of November 30, 2017. Companies that were not public at the start of each period were excluded. For example, while there are 39 constituents in the AMZ under consideration, 10 have not been trading for the full five-year period and were excluded from the five-year correlation, thus introducing some bias. There is also survivorship bias in the sense that there were 50 constituents in the AMZ five years ago. Additionally, the AMZ does not currently include any Production & Mining | Petroleum MLPs, which were likely to be most correlated with WTI.

Exhibit H — Individual MLPs' Correlation with WTI Crude Also Heightened in Oil Downturn and Lower in Oil Upturn⁹



Source: Bloomberg

⁹ // Sunoco Logistics Partners (SXL) acquired Energy Transfer Partners (ETP) on April 28, 2017. Upon closing, Sunoco Logistics Partners changed its name to Energy Transfer Partners. On May 1, 2017, SXL units began trading under the new symbol ETP. Thus, the correlation data for ETP largely reflects SXL's history.

// Which Individual MLPs are More Correlated with Crude? (cont.)

Across the four different time periods analyzed, an individual MLP's correlation with crude did not exceed 0.61, even in the oil downturn. Out of the surviving 29 constituents that have been publicly traded long enough for the analysis, five-year correlations were all below 0.50. However, individual MLPs generally had a higher correlation with WTI during the oil downturn from June 2014 to February 2016 and have had a more subdued correlation with WTI since oil bottomed in February 2016.

At first blush, one may expect Pipeline Transportation | Petroleum MLPs (yellow boxes) to have the highest correlation with crude across the board, but that simply isn't the case. Looking at five-year correlations, only three of the ten companies with a correlation at or above 0.40 are classified as Pipeline Transportation | Petroleum MLPs. There are just as many Gathering & Processing MLPs (blue boxes) in the grouping, which makes sense given that Gathering & Processing is driven by NGL processing economics and actual production, which can be sensitive to crude prices¹⁰. There are two Pipeline Transportation | Natural Gas MLPs (gray boxes) with five-year WTI correlations at or above 0.40 – ETP and EPD¹¹. Given EPD's size and its ownership of crude and NGL assets, it isn't particularly surprising to see the higher crude correlation for EPD. ETP is a special case given the merger with Sunoco Logistics Partners.

When looking at the oil downturn from June 2014 to February 2016, the correlations with WTI for Pipeline Transportation | Petroleum MLPs were more pronounced. Four Pipeline Transportation | Petroleum MLPs had correlations at or above 0.50, and nine Pipeline Transportation | Petroleum MLPs had correlations at or above 0.40. In the upturn since February 2016 and on a year-to-date basis, no Pipeline Transportation | Petroleum MLP has a correlation at or above 0.40. This further underscores the lack of MLP participation in crude's rally.

The other category of MLPs consistently represented among the highest correlations with WTI was Gathering & Processing. In the upturn, four Gathering & Processing MLPs had correlations at or above 0.40. On a year-to-date basis, three of the four MLPs with WTI correlations at or above 0.40 are Gathering & Processing MLPs. The profitability of processing is largely dependent on prices for NGLs, which fell alongside crude in 2014. More recently, NGL processing economics have improved, perhaps explaining the higher correlation with WTI on a year-to-date basis. Even fee-based processing contracts can benefit from improved processing economics, as producers are incentivized to increase volumes.

Of the four timeframes we analyzed, a few companies consistently exhibited strong WTI correlations, and interestingly, only one was a Pipeline Transportation | Petroleum MLP. DCP Midstream (DCP), a Gathering & Processing MLP, had a correlation with WTI at or above 0.40 for every period. DCP explains in its annual report that results from its natural gas services segment are impacted by variability in natural gas, crude and NGL prices and provides commodity sensitivities in its investor presentation. Thus, the high correlation makes sense for DCP. Another Gathering & Processing MLP, Western Gas Partners (WES) had a correlation at or above 0.40 in each scenario, except year-to-date 2017. WES' operations are focused largely on liquids-rich basins, specifically the DJ Basin and the Delaware Basin of the Permian.

Though it's classified as Pipeline Transportation | Natural Gas, ETP had among the highest WTI correlations in each scenario, likely due to its correlation data reflecting Sunoco Logistics' historical performance, as explained in the footnote on the prior page. Sunoco Logistics was classified as a Pipeline Transportation | Petroleum MLP. Pipeline Transportation | Petroleum MLP PAA exhibited a strong WTI correlation in the five-year period and oil downturn but has had a noticeably lower correlation year-to-date 2017. The stronger correlation over five years and in the oil downturn makes sense given PAA's liquids-focused asset base. While PAA does have a significant Permian presence, it also has assets in producing regions that are less cost competitive and with regional crude prices that have often traded at a discount to WTI, such as the Bakken and Canada.

At the other end of the scale, there were also a few MLPs that had low WTI correlations in almost every scenario. AmeriGas Partners (APU), which is the largest retail propane marketer in the US, had the lowest five-year correlation with WTI and was consistently at the low end of WTI correlations, as one would expect for a business unrelated to crude. Spectra Energy Partners (SEP), which is classified as a Pipeline Transportation | Natural Gas MLP, had among the lowest WTI correlations in each scenario. SEP highlights that all of its business is fee-based and that greater than 90% of the revenues generated by its asset base come from fees reserving space on pipelines and in storage capacity, which makes its cash flows less sensitive to commodity price changes.

10// Even natural gas production can be impacted by oil prices given associated gas (gas production from oil wells). Prices for natural gas liquids tend to be correlated with crude. NGL economics have recently improved as crude prices have improved and as exports have supported prices for NGLs like butane and propane.

11// Investors tend to trade these names as proxies for the entire space, which may result in a higher correlation with crude prices.

// Limitations to this Analysis

As exemplified by MLP performance in the oil downturn, historical correlations should be taken with a grain of salt because they are inherently backwards-looking. Correlations are also dynamic, making them somewhat of a moving target. Data can change noticeably with seemingly small changes to the parameters. It would also be remiss to not mention that correlations do not imply causation. While these are important points to keep in mind, there is still value to the exercise of looking at correlations and possible reasons for increases or decreases in correlations.

In this analysis, we examined the correlation with WTI, which is only one piece of the puzzle. We ignored company-specific items and financial metrics. We ignored other potentially meaningful macro data points like rig counts, oil and gas production forecasts, and demand estimates for petroleum products and natural gas. All of these can be indicators of future infrastructure needs and thus have some read-through to the MLP space.

// Conclusion

While correlations are backward-looking and thus somewhat limited in their usefulness, it is worthwhile to examine how correlations have changed over time and the potential reasons for those changes. As largely fee-based businesses, MLPs in theory should not be particularly sensitive to the absolute price of crude and should certainly not be as sensitive as exploration and production and oilfield service stocks. However, MLPs aren't insulated from broader pain in energy and hardships for producers, as producers are paramount for getting hydrocarbons into pipelines or into processing facilities.

We also ignored natural gas prices (much like the market and investors seem to have), but it is important to note that natural gas is a significant part of the growth story in MLPs given rising global demand, rising US production and opportunities to export liquified natural gas and NGLs. In general, Henry Hub natural gas correlations tended to be lower than WTI correlations for the indices and the individual MLPs. The seasonality of natural gas prices (often higher in the winter) may explain the lower correlations with natural gas.

Unfortunately, MLPs ultimately behaved like E&P and OFS stocks as oil prices plummeted, and MLPs have had a lower correlation with WTI during oil's recovery. This behavior can be explained by various factors specific to MLPs and broader trends within energy — only a portion of which we have room to discuss here. In the MLP space, it's oversimplifying to only look at the relationship with WTI crude, but crude has seemingly been at the forefront of investors' minds since its initial plunge in 2014. Of course, now that oil prices are improving, MLP investors seem to be focusing on anything but crude prices.