

The Price of Oil is Now a Key Driver of Business Investment

By Alexander Arnon

US production of crude oil has more than doubled since 2008.¹ Starting in the mid-2000s, the application of horizontal drilling and hydraulic fracturing to tight oil formations led to a surge in US supply known as the shale boom. In this post, I discuss the shale boom’s impact on the relationship between business investment and the price of oil.² I then estimate the effect of the recent rise in oil prices on investment in 2018. I find that oil prices might even account for most of the increase in the growth rate of investment in 2018.

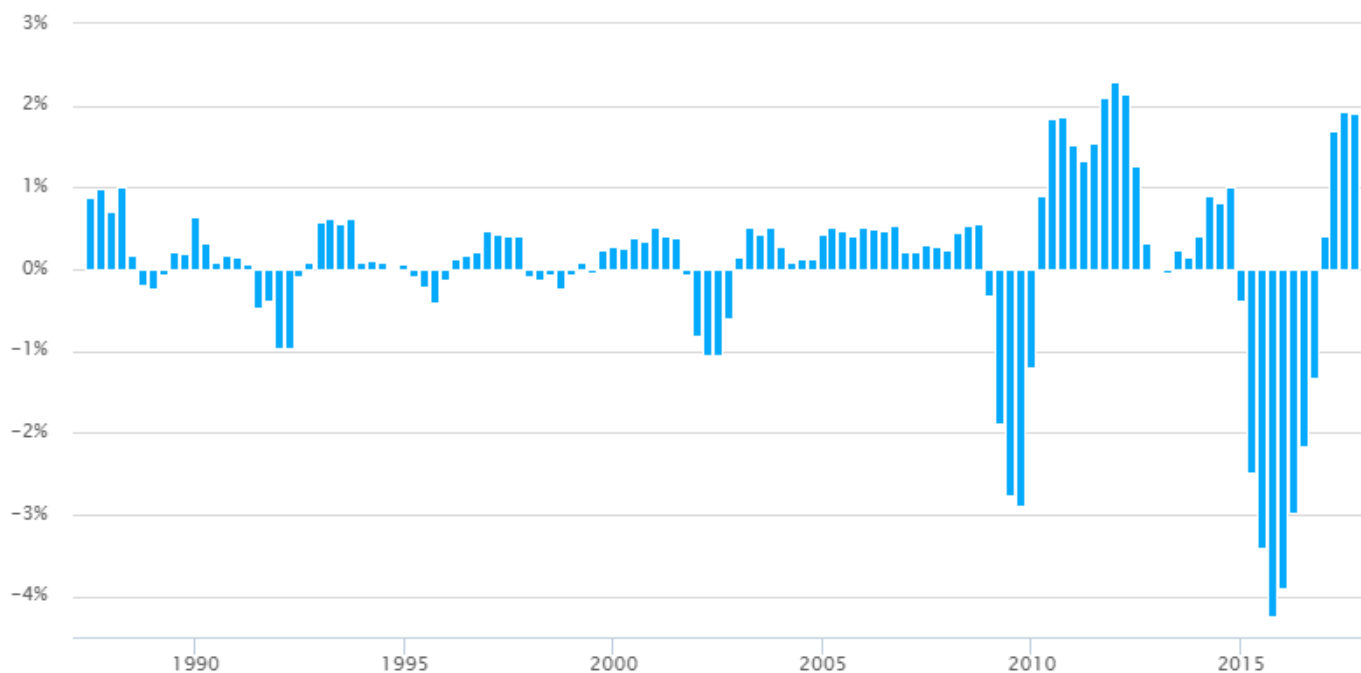
Business Investment After the Shale Boom

Oil production is capital-intensive. As US production expanded rapidly over the last decade, the oil sector’s importance as a driver of business investment grew in tandem. Figure 1 shows the contribution of oil-related assets to growth in private nonresidential fixed investment. Oil’s direct impact on investment increased sharply around the beginning of the shale boom and has remained significant, though not always positive, since then.

Figure 1. Contribution of oil-related assets to growth in nonresidential investment

Contribution to percent change year-over-year

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Note: Oil-related assets consist of petroleum and natural gas structures and exploration, mining and oilfield machinery, and railroad equipment.

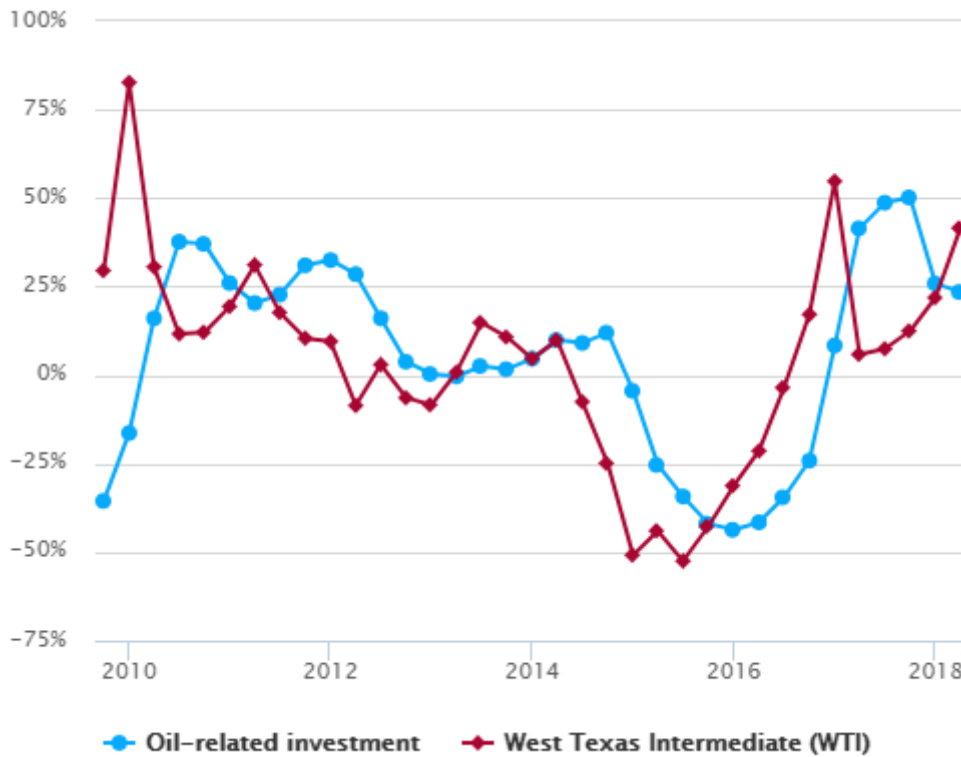
Sources: PWBM, BEA.

One implication of the oil sector’s increased importance is a change in the relationship between the price of crude oil and US business investment. Figure 2 shows that growth in oil-related investment generally tracks changes in the price of oil with a one- or two- quarter lag. After the price of oil collapsed in 2014, oil-related investment dropped sharply, subtracting nearly three percentage points from growth in total business investment in both 2015 and 2016. When the price rebounded in 2017, so did the oil sector, adding 1.5 percentage points to growth in investment. While oil-related investment is naturally tied to the price of oil, the magnitude of these impacts is much larger than was typical before the shale boom. As a result, changes in the price of oil are now an important driver of changes in overall business investment.

Figure 2. Oil-related investment and the price of oil

Percent change year-over-year

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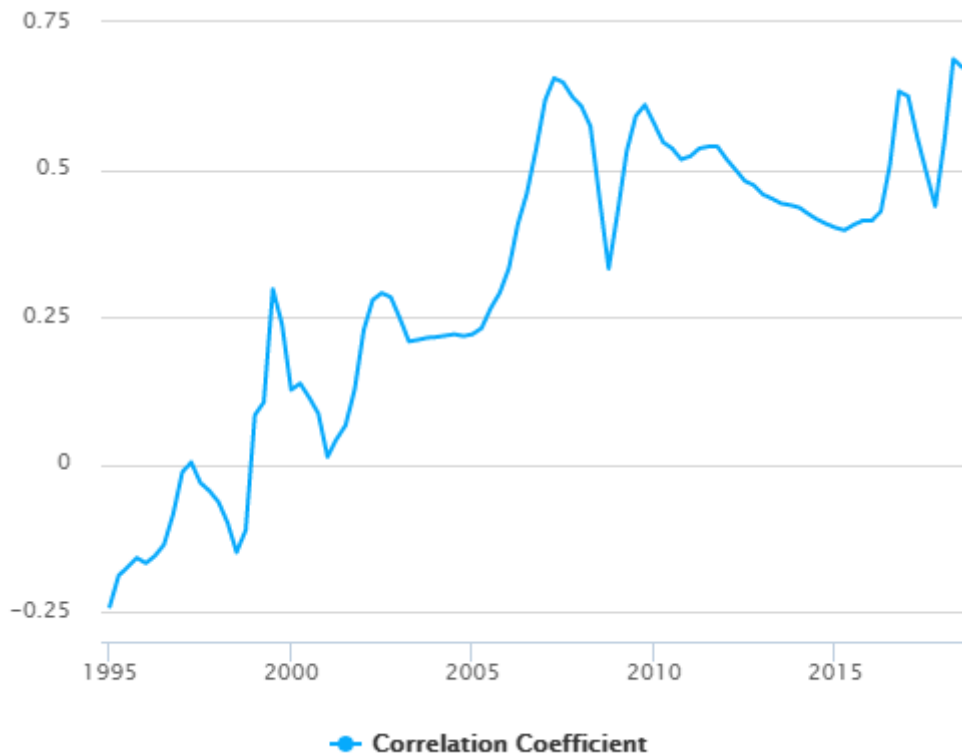


Sources: PWBM, BEA, FRED.

Figure 3. Nonresidential investment and the price of oil

Rolling 32-quarter correlation coefficient

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Note: Rolling correlation between year-over-year changes in nonresidential investment and lagged year-over-year changes in the price of WTI.

Sources: PWBM, BEA, FRED.

Figure 3 provides further suggestive evidence of the increased sensitivity of investment to oil prices. The figure shows the time-varying correlation between business investment and the price of oil over the last three decades. Prior to the shale boom, there was no consistent relationship: rising oil prices sometimes coincided with increases in investment, and other times with decreases. As the boom unfolded over the course of the 2000s, however, a substantial positive correlation emerged.

The Impact of Rising Oil Prices on Investment in 2018

The price of West Texas Intermediate (WTI), a medium crude oil used as a benchmark for US production, rose from less than \$50 per barrel in the third quarter of 2017 to roughly \$70 per barrel in the third quarter of 2018.³ Over the same period, growth in business investment picked up. Nonresidential investment grew seven percent year-over-year in the third quarter of 2018, up from five percent over the same period in 2017 and less than one percent in 2016.

To get a sense of how much the 40 percent rise in the price of oil may have contributed to the increase in investment, I estimate a simple statistical model of the determinants of investment and use it to simulate what would have happened if the price of WTI had been stable.

Oil production is the most direct channel through which the price of oil affects investment, but not the only one. Oil is an important input in some industries, and higher prices mean higher costs. Rising prices also crowd out consumer demand for non-energy goods and services, which reduces businesses' need to invest. To account for

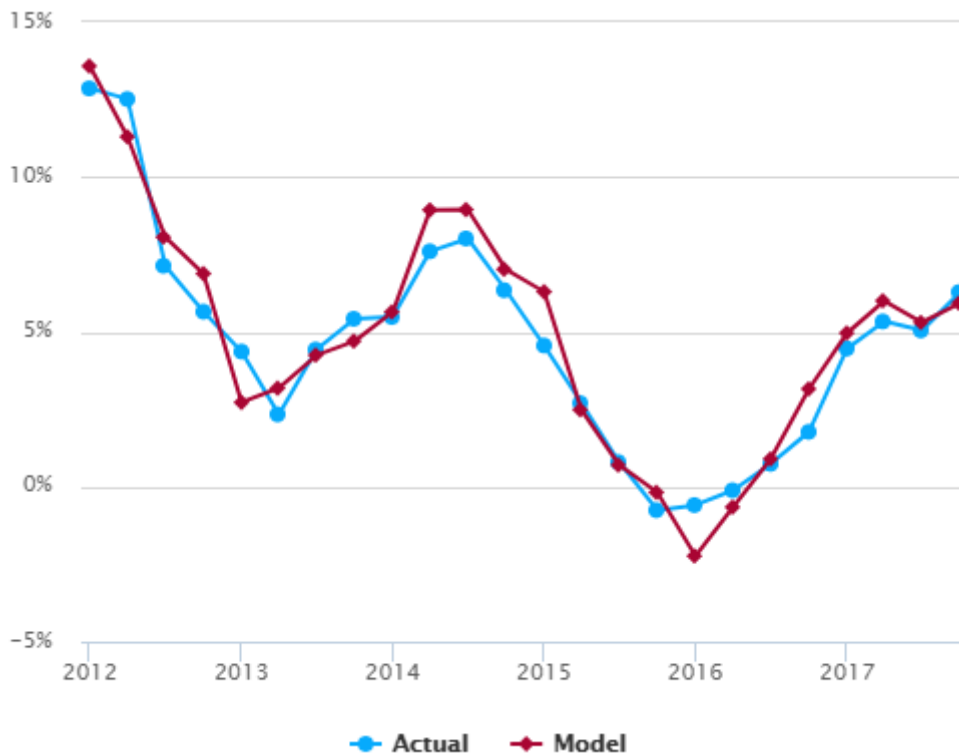
these various channels, the model differentiates across ten different types of equipment and structures investment and allows the effect of oil prices to vary for each.

For simplicity, I assume that the only source of investment other than oil-related activities is industrial demand, captured by industrial production in the manufacturing sector.⁴ Its effect also varies by type of asset. Changes in the price of WTI and in manufacturing production can affect investment contemporaneously or with a lag. I also include year-fixed effects.

Figure 4. Nonresidential investment: actual vs. model

Percent change year-over-year

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Sources: PWBM, BEA.

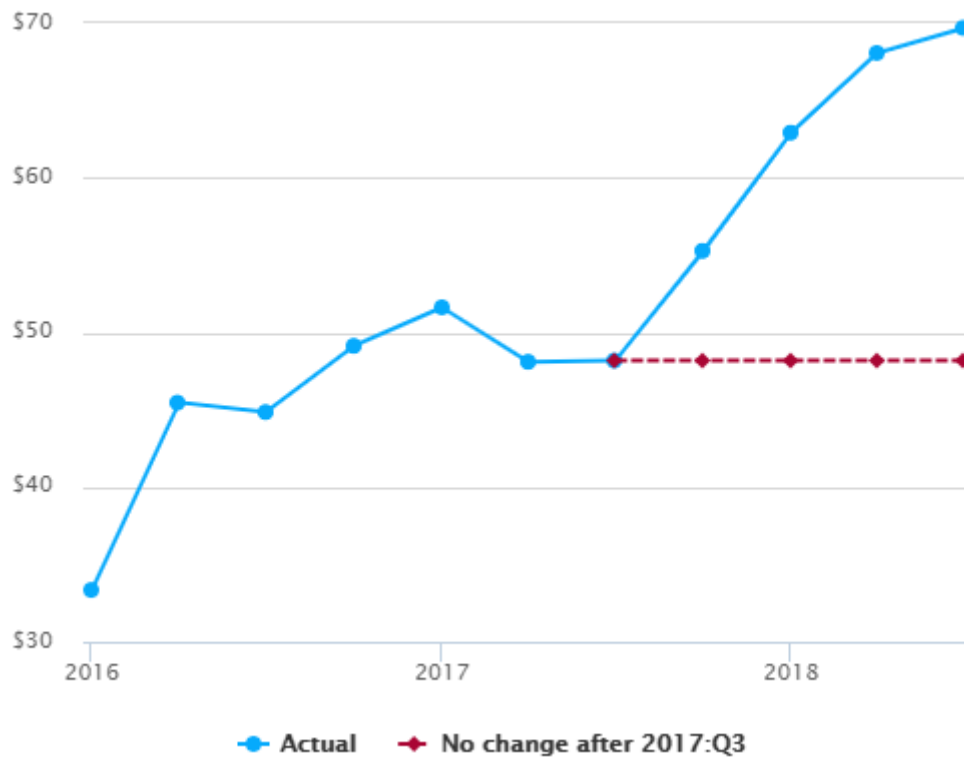
I estimate the model over the period since 2012 using the ten categories of equipment and structures available at quarterly frequency in the *National Income and Product Accounts*.⁵ Figure 4 shows how the model matches the data in the estimation sample. Though far from perfect, this simple specification accounts for much of the variation in the growth rate of investment over the last five years.⁶

To determine the impact of the increase in oil prices over the last four quarters, I use the estimated coefficients to simulate a counterfactual in which WTI remains fixed at its third-quarter average of \$48 per barrel, shown by the dashed line in Figure 5.

Figure 5. Price of WTI: actual vs. counterfactual

Dollars per barrel, quarterly average

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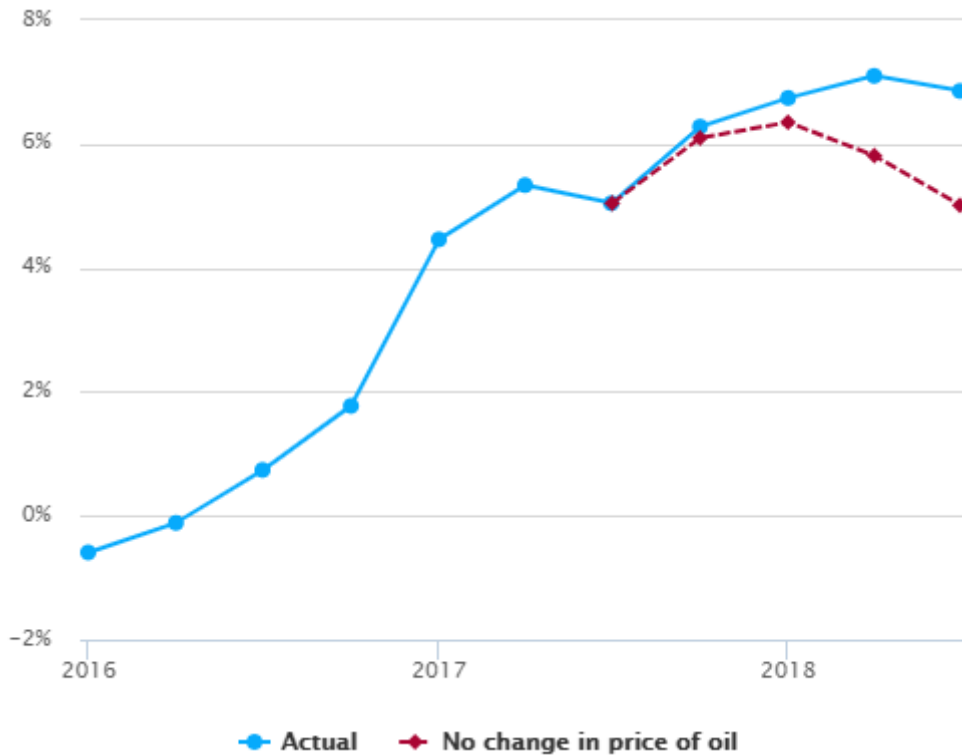


Source: FRED.

Figure 6. Nonresidential investment: actual vs. counterfactual

Percent change year-over-year

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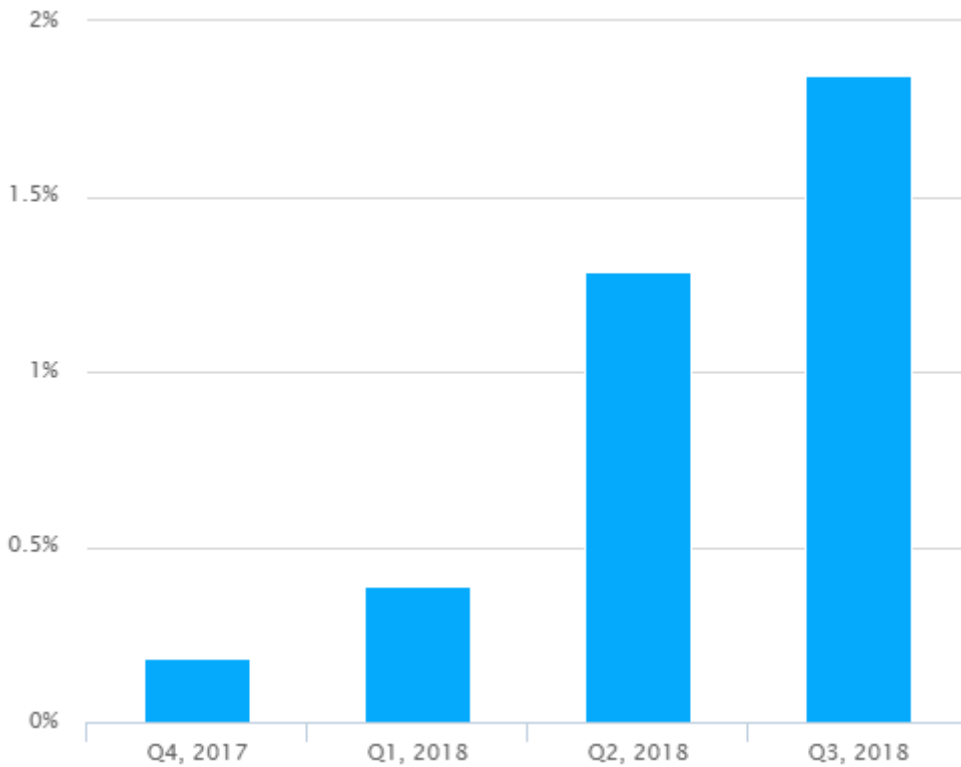
Sources: PWBM, BEA.

Figures 6 and 7 show the results. I estimate that the increase in oil prices added about 1¾ percentage points to growth in business investment over the last four quarters. Without it, investment would have grown 5 percent year-over-year in the third quarter, the same rate as in 2017. The response to the rise in oil prices explains the entire increase in the growth rate of investment in 2018.

Figure 7. Estimated effect of oil price rise on investment

Difference in percent change year-over-year

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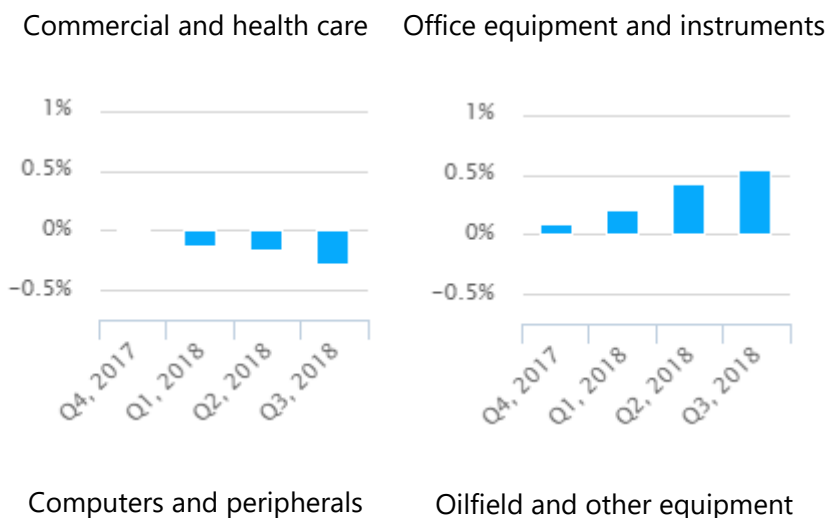
Source: PWBM.

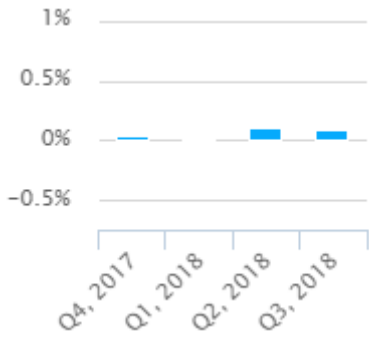
Figure 8 shows the estimated effect of the rise in oil prices on the different types of assets. As expected, oil-related equipment and structures account for most of the increase, with some positive spillovers to other assets. However, these gains are partially offset by declining investment in manufacturing, transportation, and commercial structures.

Figure 8. Estimated effect of oil price rise on investment by type of asset

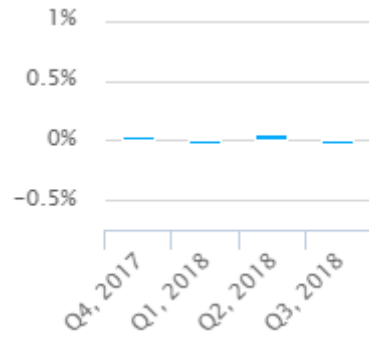
Difference in contribution to percent change year-over-year

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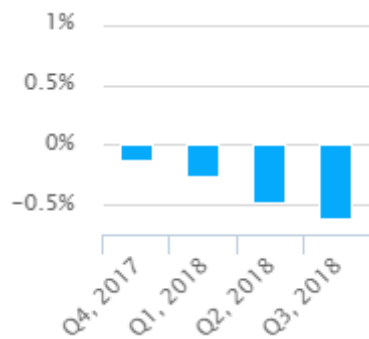




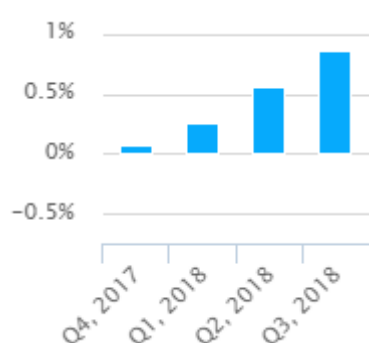
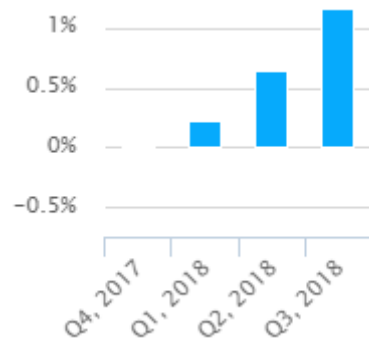
Industrial equipment



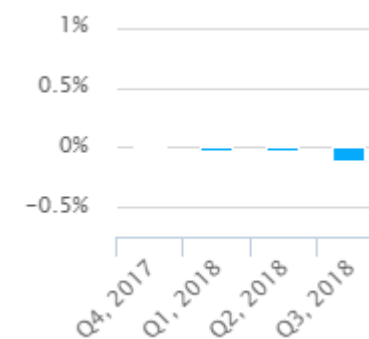
Manufacturing structures



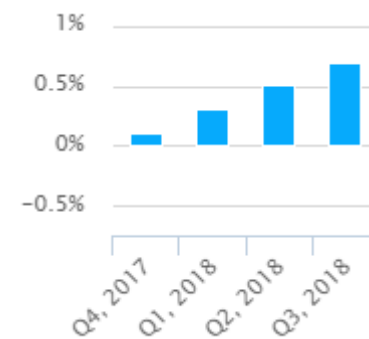
Mining, petroleum, gas structures



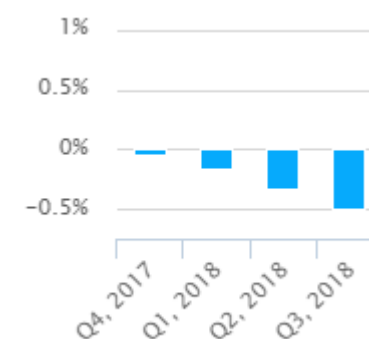
Other structures



Power and communication



Transportation equipment



Source: PWBM.

2. For a more complete discussion of the effects of oil on the US economy, see Baumeister and Kilian (2016), <https://www.brookings.edu/bpea-articles/lower-oil-prices-and-the-u-s-economy-is-this-time-different> ↩
3. Most of this increase has since been reversed. On December 17, the price of WTI fell below \$50. ↩
4. Including a more detailed breakdown of industrial production or proxies for non-industrial demand (such as personal consumption expenditures for services or the ISM non-manufacturing index) does not meaningfully affect the results. ↩
5. See section 5.3 of the NIPAs. ↩
6. Fitted values for total nonresidential investment include actual rather than predicted values for intellectual property products, which are not modeled. ↩