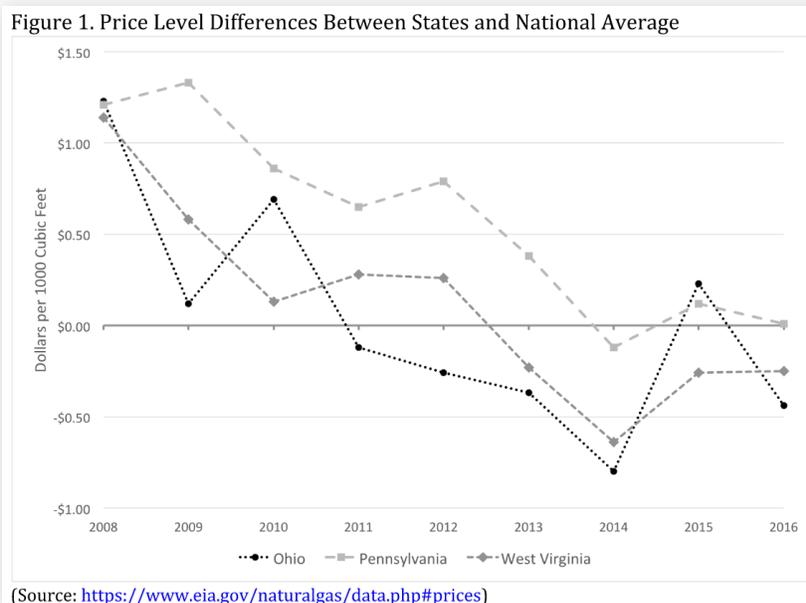# PIPELINE CAPACITY AND SHALE GAS PRICING IN THE APPALACHIAN BASIN

EXECUTIVE SUMMARY

In 2008, the U.S. national average natural gas price was $9.18 per thousand cubic feet (mcf), but the shale development revolution around 2011 led to a precipitous fall in the national average price down to $3.71/mcf by 2016. Over the same period, as Figure 1 demonstrates, the relative price of natural gas in Ohio declined compared to the national average. Specifically, the gas price in Ohio was 13.4 percent higher than the national average in 2008, but by 2016, Ohio's price was 11.9 percent lower, and thus constitutes a 25 percent relative price swing. Relative price changes are similar for Pennsylvania and West Virginia which span the Marcellus and Utica shale formations (i.e., the Appalachian Basin). Over the same period in Ohio, natural gas production has increased rapidly in the region, while pipeline capacity has risen only slightly by comparison. We build an economic model to explain the relative price change in these states taking into account production and pipeline capacity.

Figure 1. Price Level Differences Between States and National Average

(Source: https://www.eia.gov/naturalgas/data.php#prices)

Our model has three main findings. First, due to pipeline capacity constraints the regional price, such as the Ohio price, will be lower than the outside (i.e., "world") price. Furthermore, this gap would be larger than the transportation cost alone. Second, as exports grow with pipeline capacity, the regional consumers get priced out of the market and the local quantity consumed falls. This occurs because increased pipeline infrastructure increases connectivity with the world and exposure to the export market that is willing to pay a higher price, and therefore increases the opportunity cost of selling to regional consumers. In turn, producers rationally sell into the export market, but doing so also requires raising the relative price for local consumers. Third, since the regional supply is relatively small compared to global consumption, we show that increased exposure to the export market does not increase total regional production. Rather, exporting natural gas simply changes whether regional consumers or the export market receives the regionally-produced gas.