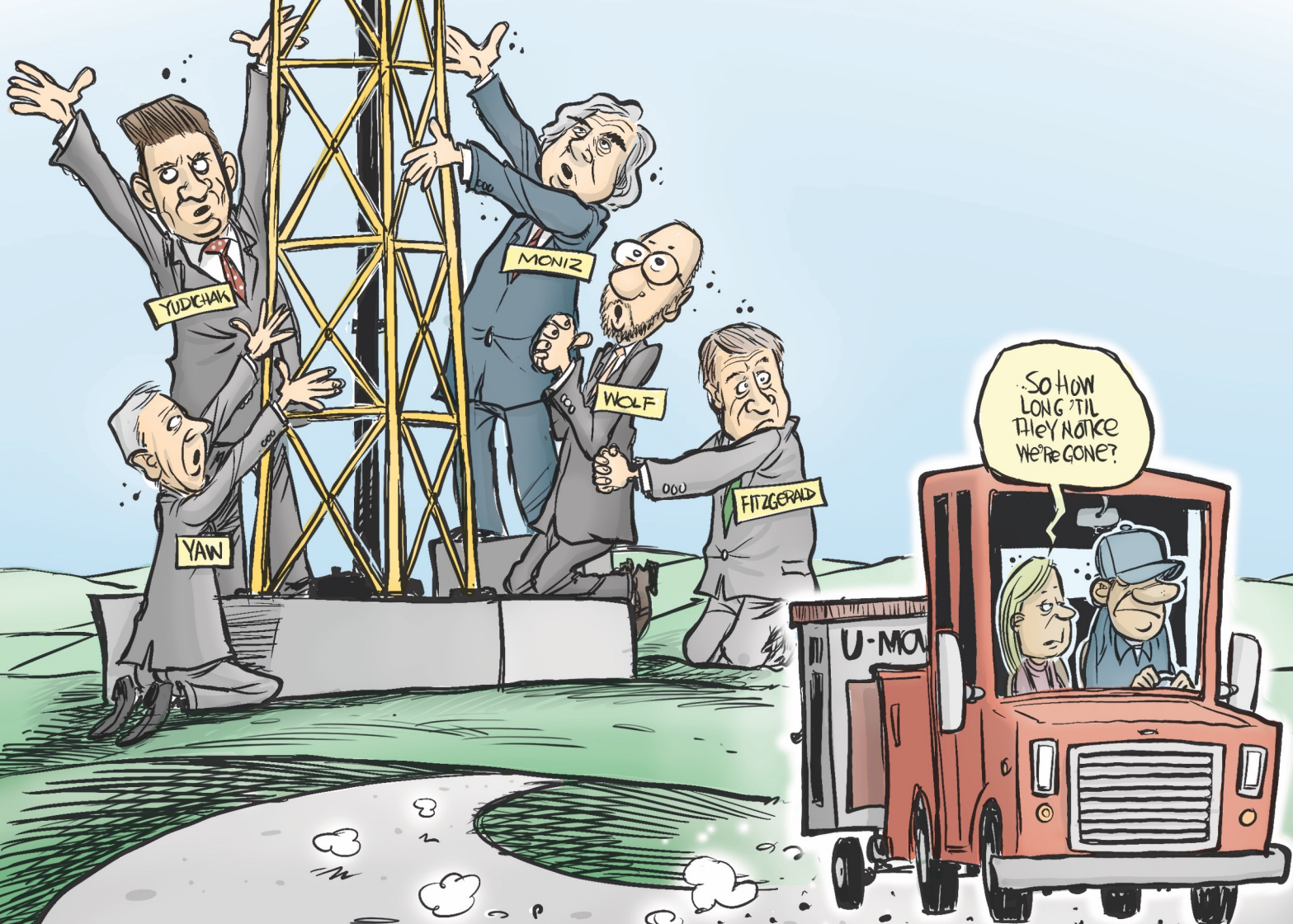


MISPLACED FAITH

*How Policymakers' Belief
in Natural Gas is Driving
Rural Pennsylvania Into
an Economic Dead End*

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The Ohio River Valley Institute is an independent, nonprofit research and communications center founded in 2020. We equip the region’s residents and decision-makers with the policy research and practical tools they need to advance long-term solutions to some of Appalachia’s most significant challenges. Our work includes in-depth research, commentary, and analysis, delivered online, by email, and in-person to policy champions, emerging leaders, and a range of community partners.

INTRODUCTION

It is nearly an article of faith in Pennsylvania politics that the Appalachian natural gas boom has been at best an economic miracle and at worst a fortuitous backstop that stemmed the losses of jobs and population that have plagued the region over the past two decades. This belief has led local and state policymakers to confer on the natural gas industry and related industries a remarkable array of subsidies¹ and forms of regulatory relief designed to encourage greater development, more production, and, the sponsors hope, growth in employment and income.

It's a belief that strongly influences political candidates' platforms and policy proposals in anticipation of upcoming midterm elections. And it has given rise to support for a natural gas-based regional "hydrogen and carbon capture hub", a subject which dominates contemporary economic development and energy transition conversations in Ohio,² Pennsylvania,³ and West Virginia.⁴ The proposed hub would enhance markets for hydrogen made from natural gas while also introducing carbon capture and sequestration technology that would also be used to partially decarbonize fossil fuel power generation, steel making, and other industries that are prevalent in the region.

Pennsylvania Governor Tom Wolf's administration and Senate Republicans, who are usually at odds, are united in their hopes of landing federal funds to facilitate creation of a regional hydrogen hub, with the governor going so far as to suggest he would consider allocating a portion of

funds from Pennsylvania's pending participation in the Regional Greenhouse Gas Initiative (RGGI) to advance the hub. Meanwhile, both the Democratic and Republican nominees for governor have come out in favor of the hub as well.

A corollary to this almost unanimous belief in the economic urgency of natural gas development is an avoidance or outright denial of federal government economic data that run counter to the belief. In February 2021, the Ohio River Valley Institute released a report documenting the natural gas industry's meager effects on job, income, and population growth in the twenty-two Ohio, Pennsylvania, and West Virginia counties that produce over 90% of the region's output.⁵ Reaction to the report was immediate and intense from organizations such as the Ohio Oil and Gas Association⁶ and Pittsburgh Works Together,⁷ which circulated to Pennsylvania state legislators comments purporting to debunk the ORVI report. State legislators⁸ and members of congress⁹ also criticized the report.

Despite these objections, the numbers contained in the report held up and it is now generally acknowledged that Appalachia's natural gas production boom failed to deliver significant job growth. However, some of the report's critics have taken refuge in a watered down claim that, although jobs may not have proliferated to the degree anyone would like, economic conditions in the region would have been much worse had it not been for the natural gas industry's growth.

But, is even that true? Would employment and population performance have been worse had it not been for the natural gas boom?

As it happens, Pennsylvania offers a unique set of circumstances that make it possible to test the proposition. This report compares the economic evolution of two sets of counties in Pennsylvania whose economic trajectories prior to the natural gas boom were almost indistinguishable. In one of the county groupings, the natural gas industry grew from having a negligible presence prior to the boom to become the leading source of economic output (GDP). While, in the other set of counties, the industry's presence remained negligible. That these counties happen to be rural is also significant in that nationally rural areas of the country have struggled economically and suffered from population loss.

VOTING WITH THEIR FEET: RURAL PENNSYLVANIANS PASS JUDGEMENT ON THE NATURAL GAS BOOM

Indicators such as gross domestic product (GDP), unemployment rates, and stock market indices are often cited as measures not just of economic output, jobs, and wealth, but also of societal health and the general wellbeing of communities. Such measures are ultimately inadequate to the task, principally because human wellbeing is too complex to be captured by a simple economic or financial metric. They also fail as measures of wellbeing because they fluctuate in response to random events and short-term dynamics that may not fundamentally alter conditions in which people live or their major life choices.

Population change is different. Decisions about where we choose to live are nearly always the result of careful self-assessments: they take into consideration personal resources, prospects, and relationships, and they are accompanied by careful examinations of the comparative ability of the places we contemplate as prospective homes to help us realize the aspirations we hold for ourselves and for those who depend on us. When people choose where they're going to live, they are in effect "voting" on which locations provide the best combination of economic opportunity and quality-of-life compared to other alternatives. Population change is, in a sense, a peoples' referendum on the ability of towns, cities, counties, states, and regions to help us achieve fulfillment and wellbeing in all its complexity.

So it's worrying that, by the measure of population change, rural America is struggling. A recent analysis by the Pew Foundation found that, while the populations of US cities and suburbs grew by 8% over the past decade, they fell by half of a percent in rural counties. In some states, rural population decline was much deeper. Pennsylvania's rural counties lost 4.7% of their residents, tying New York for the sixth greatest rate of rural population loss in the US (Figure 1).¹⁰

Figure 1: Change in Rural Population by State, 2010-2020

State	Rural Change
Illinois	-6.2%
West Virginia	-5.8%
Connecticut	-5.3%
Kansas	-5.1%
Louisiana	-4.8%
New York	-4.7%
Pennsylvania	-4.7%
Mississippi	-3.9%
Arkansas	-3.6%
Virginia	-3.5%

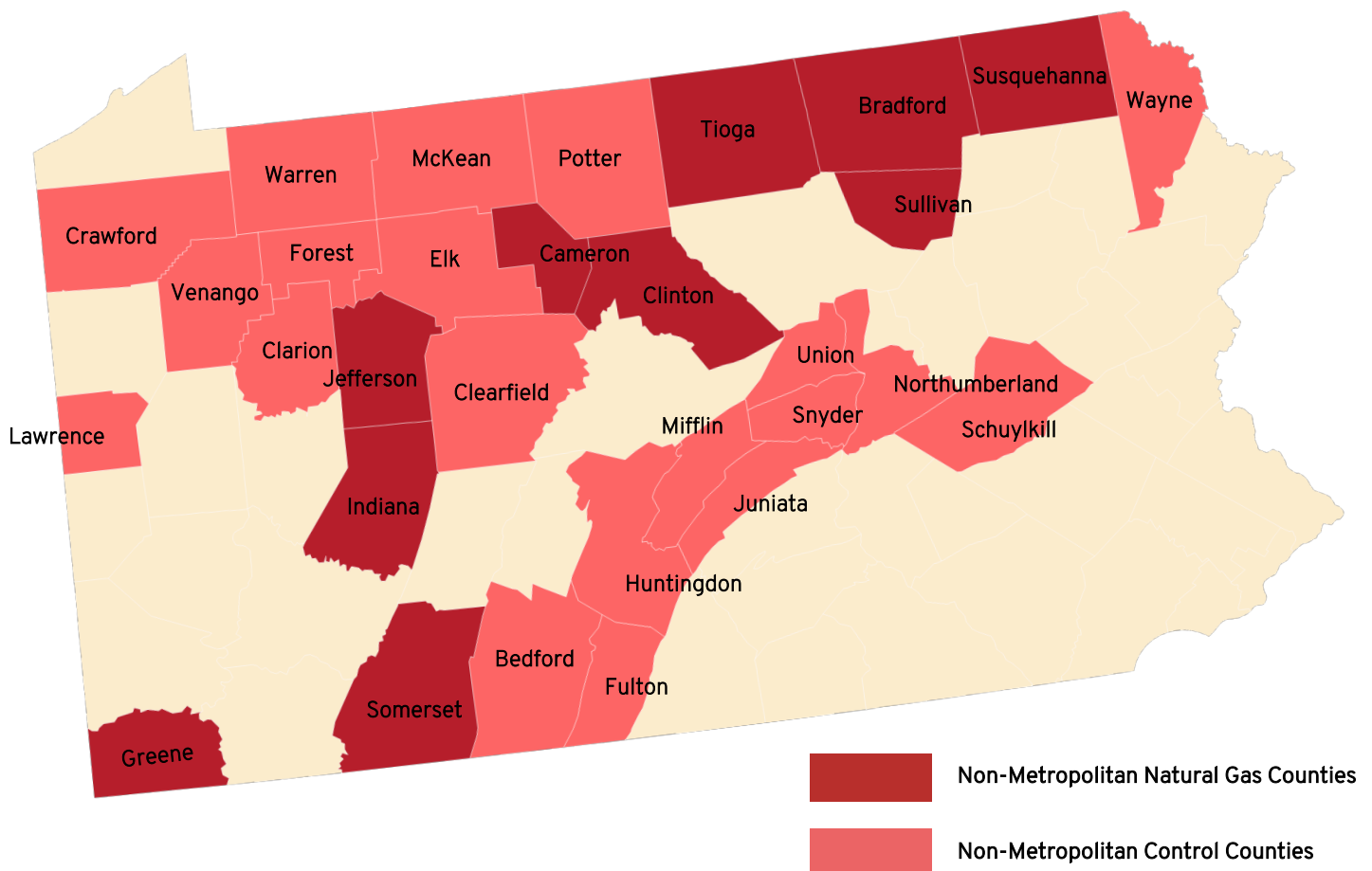
Source: Pew Charitable Foundation

Deeper still is population loss in Pennsylvania's rural counties that participated heavily in the natural gas boom. Those ten counties lost a combined 25,000 people, over 6% of their population during the decade—an outcome that would normally not be expected in places which, as a group, saw GDP grow by 29% from 2008 to 2020, three times the national rate.

PENNSYLVANIA'S “NATURAL EXPERIMENT”

Pennsylvania includes thirty rural counties which are not part of any metropolitan area. Of those thirty counties, ten participated heavily in the natural gas boom of the 2010s, which saw the Mining sector of GDP, which includes natural gas extraction, grow from \$3.1 billion in 2008 to \$8.4 billion in 2020, an increase of more than \$5 billion per year (Figure 2). That \$5 billion change is greater than the total GDP change in the natural gas counties, indicating that the non-Mining sectors of the ten counties' economy contracted during the natural gas boom, a phenomenon that has been long recognized by economists studying the tradeoffs of natural resource booms.

Figure 2: Pennsylvania's Non-Metropolitan Counties



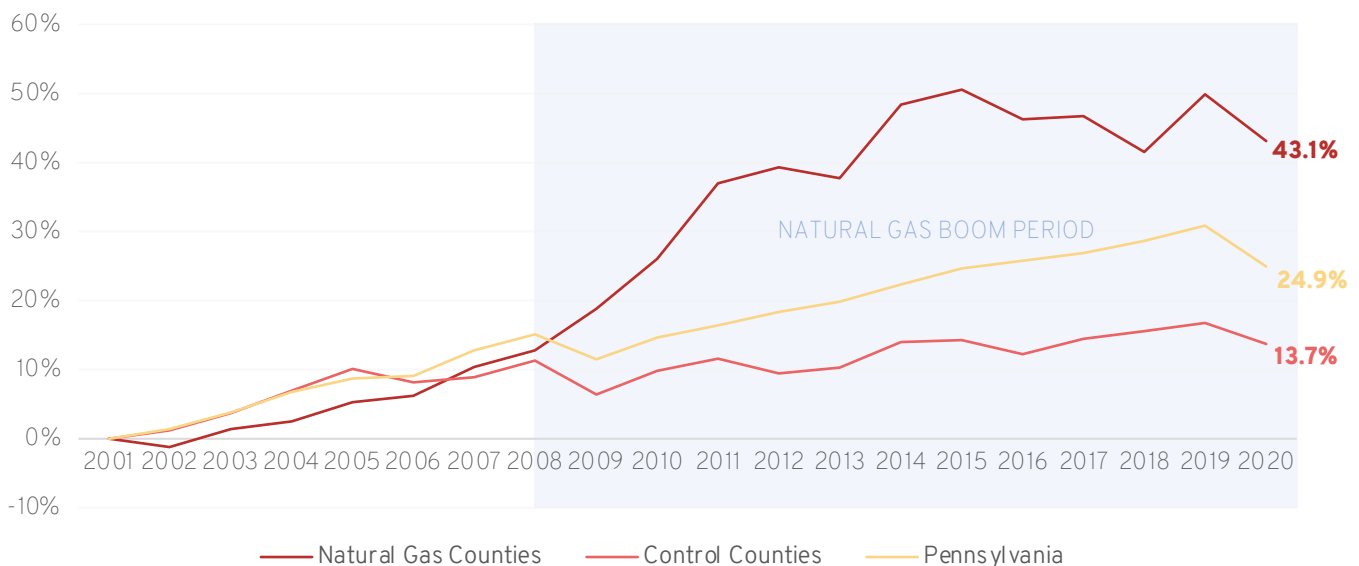
Source: Pew Charitable Foundation

From one perspective, this outcome indicates that natural gas growth has limited if any trickle-down effect on the rest of the economy. But, others who look at these figures and who support natural gas expansion have argued that, while these counties may not be thriving economically, their situation would be much worse without natural gas development.

That is a testable proposition. Pennsylvania's major rural natural gas-producing counties stretch in a long arc from the southwest corner of the

state to the northeast corner. In 2020, more than a third of the combined GDP of these counties was attributable to the Mining sector, which is primarily comprised of natural gas. Similarly geographically distributed are twenty other rural counties in which less than 4% of combined GDP is attributable to the Mining sector. And prior to 2008, when the Appalachian natural gas boom began in earnest, the economies of the natural gas counties and what we'll call the "control" counties were on much the same trajectory and similar to the state as a whole (Figure 3).

Figure 3: Change in Real GDP, 2001-2020



Source: Author's calculations using Bureau of Economic Analysis data

Both the natural gas and control counties experienced GDP growth in the 10%-11% range between 2001 and 2008, somewhat trailing the state. Then, between 2008 and 2009, GDP rose rapidly in the natural gas counties even as the housing crisis and

ultimately the Great Recession began descending on America. So, while the nation, the Commonwealth, and the Control counties experienced initial economic contraction followed by a decade of steady but gradual GDP growth, growth in the natural gas

counties accelerated rapidly until, by 2015, the economies of the natural gas counties were fully 50% larger than they had been in 2001. Over that period Pennsylvania's GDP grew only half as much and, in the control counties it only grew by a little more than a quarter as much.

It was a run that prominent people inside and outside the natural gas industry labeled an economic miracle.¹¹ But the effects on more direct measures of the wellbeing of local residents—jobs, and especially population—were noticeably non-miraculous.

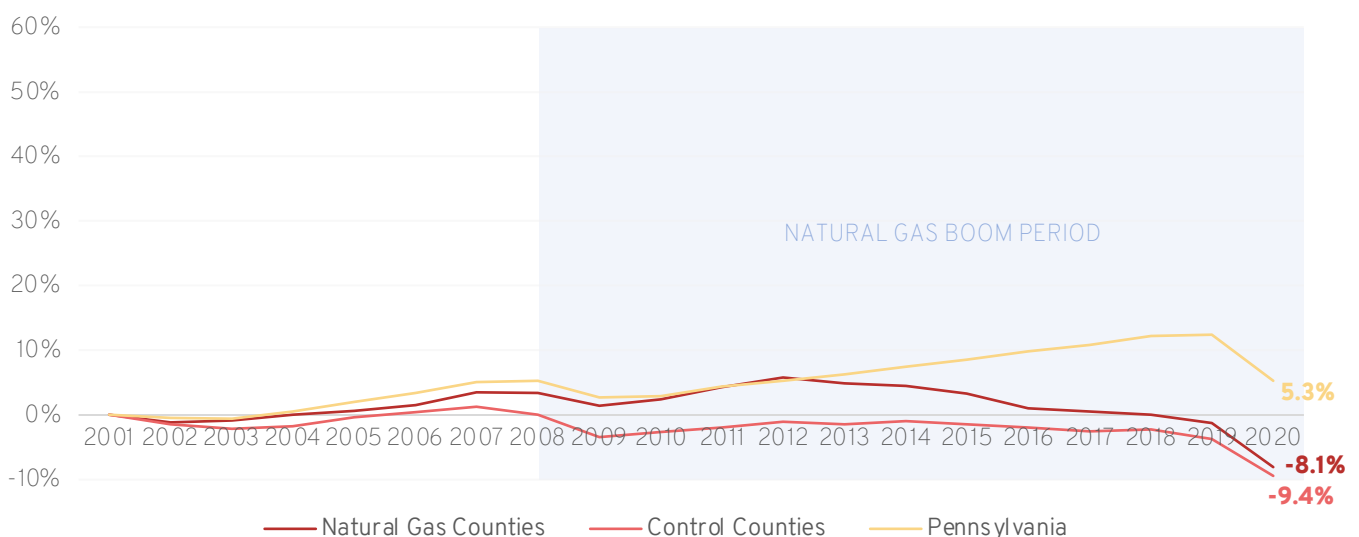
NATURAL GAS-DRIVEN GDP GROWTH FAILED TO PRODUCE SIGNIFICANT JOB GROWTH

Prior to 2009, the natural gas and

control counties also tracked one another closely for total employment and population change and both trailed the state, particularly for population growth. But unlike GDP, employment did not significantly rise. Initially the natural gas counties managed to keep pace with the state, while the control counties fell slightly behind. But by 2013 the natural gas counties saw employment continuously decline until by 2018 all gains achieved during the natural gas boom had been wiped out resulting in employment levels that were only slightly better than those in the control counties (Figure 4).

Unlike the natural gas counties, the control counties joined the rest of the nation in experiencing an employment decline in association with the Great Recession. But they stabilized and mostly avoided the post-2012 decline that afflicted the natural gas counties until the Covid epidemic took everyone down in 2020. Though they got there by different routes, after 19 years,

Figure 4: Change in Total Employment, 2001-2020



Source: Author's calculations using Bureau of Economic Analysis data

total employment change in the natural gas and control counties is almost identical, with losses of 3.3% and 4.2%, respectively. And, if the analysis is confined just to the period of the natural gas boom, from 2008 to 2020, the natural gas counties experienced a decline in employment of 11.1% compared to only a 9.4% decline in the control counties.

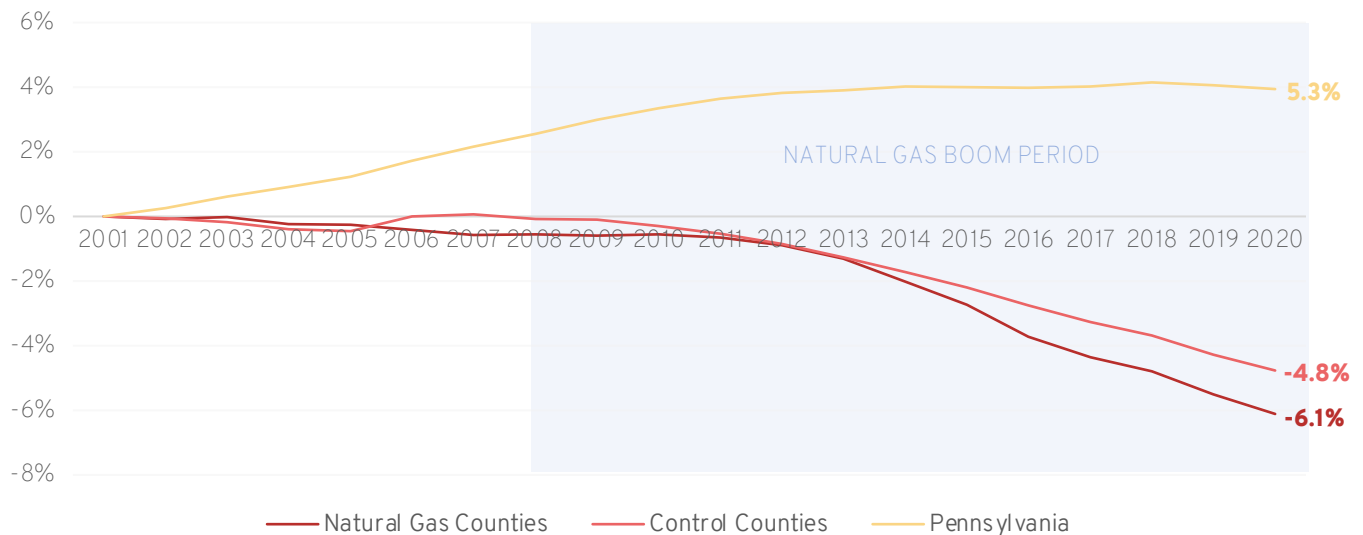
POPULATION CHANGE WAS ALSO NOT SIGNIFICANTLY AFFECTED

The results for population change in the natural gas and control counties are also similar and similarly depressing. After holding essentially steady for the first decade of this century, population started going into decline at the beginning of this past decade, with the descent accelerating

more rapidly in the natural gas counties. In fact, if Pennsylvania's rural natural gas counties were included in the Pew rankings of rural population loss, they would come in at a very close second to Illinois for the steepest losses in the nation.

As noted above, prior to the post-2008 natural gas boom, rural counties nationally were trailing the nation in population growth. In fact, Pennsylvania's rural counties, both natural gas and control, experienced no growth between 2001 and 2008. Unfortunately, the natural gas boom had no discernible effect on that trend. And, after 2010, population in both the rural natural gas and control counties went into sustained decline, which by 2020 left the control counties with a population that was 4.9% smaller than it had been in 2001. Meanwhile, population loss in the natural gas counties topped 6% (Figure 5).

Figure 5: Change in Population, 2001-2020



Source: Author's calculations using Bureau of Economic Analysis data

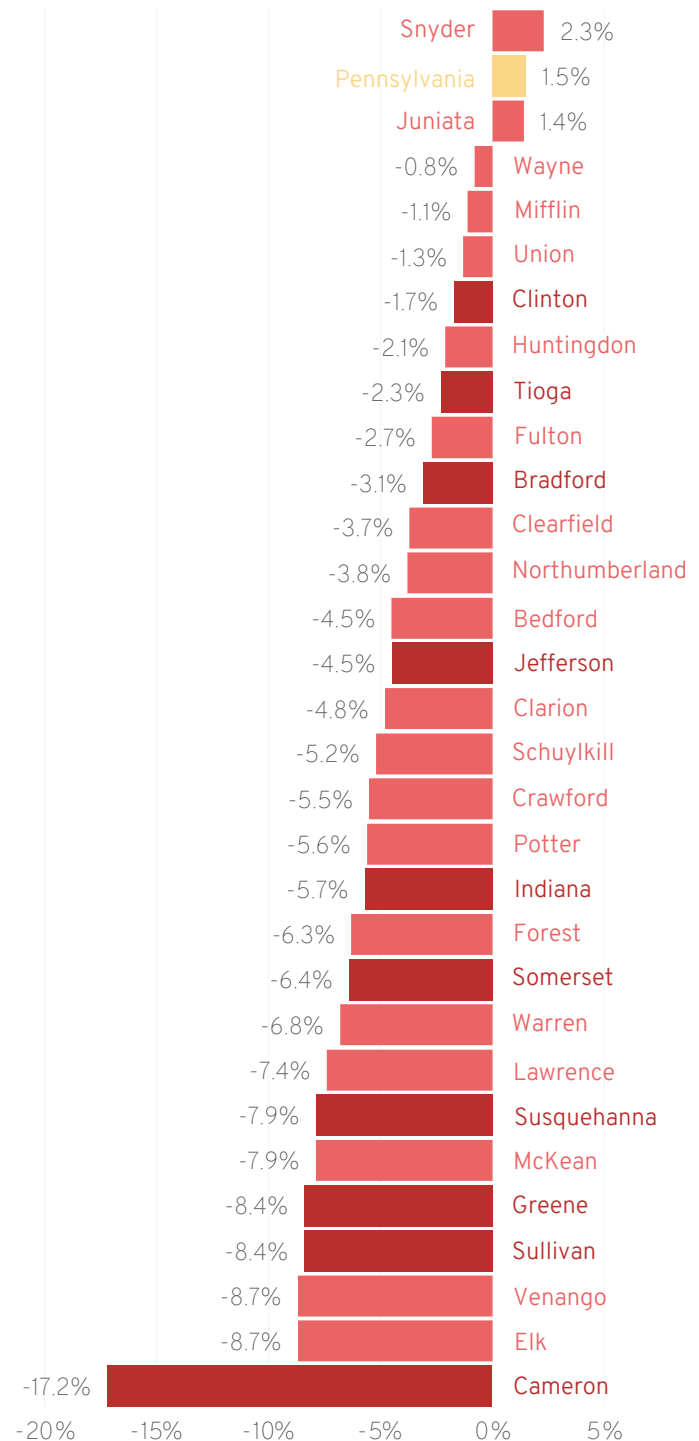
The similarity in population change between the natural gas counties and control counties may best be seen in a county-by-county breakdown, which shows natural gas and control counties to be equally dispersed across the continuum (Figure 6).

THE NATURAL GAS BOOM HAD FEW BENEFICIAL RIPPLE EFFECTS

Perhaps the clearest indication of the natural gas boom’s failure to significantly alter or contribute to economic prospects in the counties where it was most prevalent can be found in its impact on the remainder of those counties’ economies. Many of the expectations for increased employment from the natural gas boom were associated with the boom’s presumed “multiplier effects” – the belief that demand for added goods and services by the natural gas industry combined with increased spending by natural gas workers and the recipients of lease and royalty payments would increase commerce and drive downstream hiring in other economic sectors.

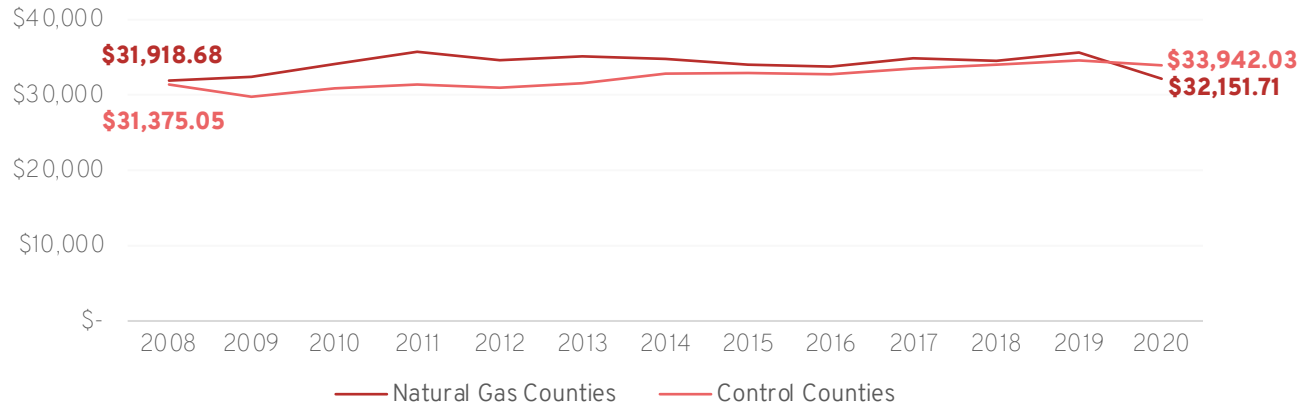
While there is some evidence for downstream impacts, particularly in the transportation sector, overall the boom’s ripple effects were modest at best (Figure 7).

Figure 6: Pennsylvania Rural Counties Population Change Breakdown, 2008-2019



Source: Author’s calculations using Bureau of Economic Analysis data

Figure 7: Per Capita GDP Excluding the Mining Sector, 2008-2020



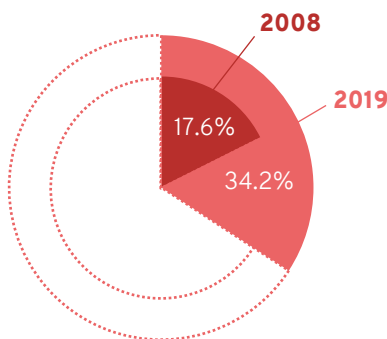
Source: Author's calculations using Bureau of Economic Analysis data

When we exclude the Mining sector, which includes natural gas, and compare changes in per capita GDP in the natural gas and control counties, we find that the previously observed yawning gap in GDP performance is not at all replicated. After somewhat better performance by the natural gas counties in the first few years of the boom, by 2016 the relationship between the natural gas and control counties was about the same as it had been before the start of the boom and

in 2020 the natural gas counties for the first time plunged below the control counties in per capita GDP.

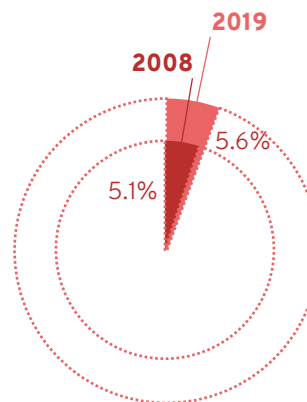
In the absence of a ripple effect in other sectors of the economy, and given the natural gas industry's feeble performance in direct hiring even as production skyrocketed, the resulting impacts on employment and population were understandably meager (Figure 8, Figure 9).

Figure 8: Mining Share of GDP, 2008 and 2019



Source: Author's calculations using Bureau of Economic Analysis data

Figure 9: Mining Share of Employment, 2008 and 2019



Source: Author's calculations using Bureau of Economic Analysis data

DOMINANT INDUSTRIES TEND TO PRODUCE THE ECONOMIES THEY WANT

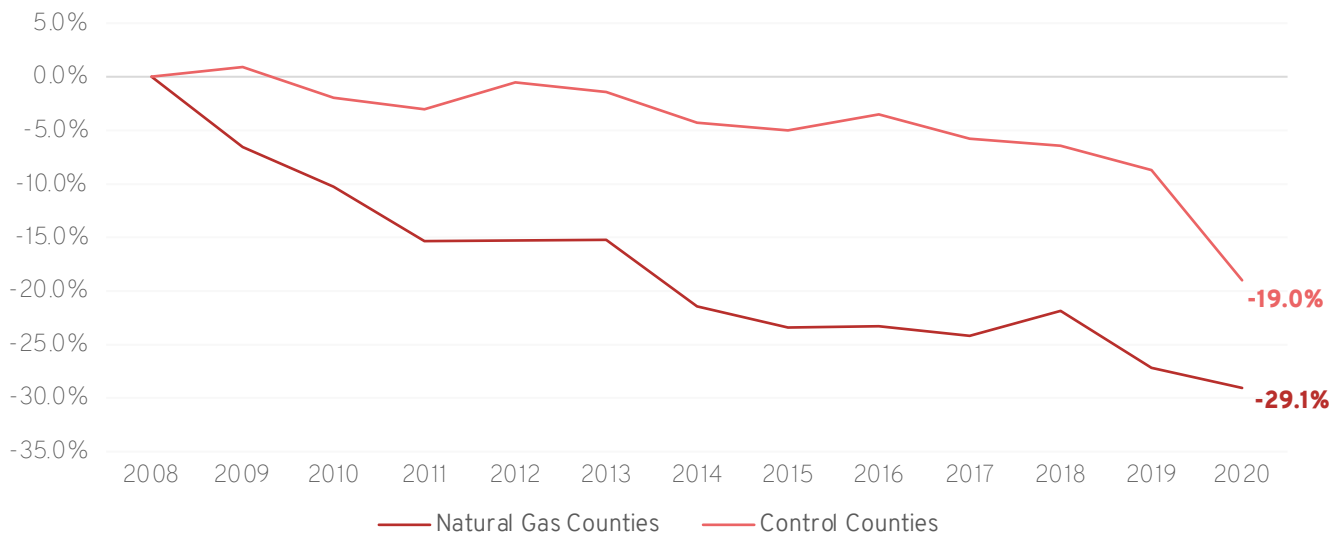
In a way, the declines in employment and population that we see in Pennsylvania's rural natural gas counties are understandable precisely because they are beneficial to an industry which is unlike most others.

Most businesses prosper when the communities around them thrive. Growing population, increased commerce, and an expanding labor pool are generally good for sales, profits, and for being able to recruit and retain talented employees.¹² But natural gas extraction is different. Growing population and increased

commerce create challenges for gas exploration and production companies because they make property values rise and they lead to population increases, which produce heightened demands for clean air, clean water, and improved quality of life.

For gas producers, these trends translate into higher costs, and they may help explain why rural Pennsylvania counties that participated heavily in the natural gas boom did almost as badly or worse for key indicators of social progress, including population and job growth, than did rural counties that were largely untouched by the boom. If that is the case, then the economic prognosis for rural natural gas counties is dire.

Figure 10: Change in Employment per \$1 Million in GDP, 2008-2019



Source: Author's calculations using Bureau of Economic Analysis data

One inescapable conclusion from the employment and population numbers is that, as the natural gas industry matures, whatever meager economic benefits it confers early in its life cycle diminish over time.¹³ An industry that was very capital-intensive and not very labor-intensive at the outset becomes more so, a fact reflected in a nearly 30% plunge in the number of people employed per million dollars in GDP in natural gas counties during the boom.

This should not only be a warning sign to state and local policymakers who are contemplating how and to what degree to encourage natural gas development. It should bring consideration of additional industry incentives and encouragement to a stop, at least until these facts have been digested and a new case can be made for additional development, if such a case can be made. That is particularly true of efforts by the Biden administration and states in the region to facilitate development of a hydrogen and carbon capture hub supplied by the region's natural gas production.

If natural gas development is ineffective at best, and, at worst, positively destructive to job creation and economic prosperity in the region, and if this region, like other regions, could realize significant job growth and reduced energy costs in association with transitioning to renewable resources, enhanced energy efficiency, and implementation of smart grid technology, then a powerful case can be made to refocus much of our economic development and environmental on facilitating that outcome rather than pouring more resources into a model that after more than a decade of immense investment both by industry and the government has demonstrably failed to deliver prosperity and faces possibly insurmountable structural barriers to ever being able to do so.

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