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# The impact of environmental regulations on the West Virginia coal economy: assessing the “coal means jobs” mantra and the prospect of deregulation

Richard G. Bryenton  
*Vassar College*

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# **The Impact of Environmental Regulations on the West Virginia Coal Economy**

**Assessing the “Coal Means Jobs” Mantra and the Prospect of Deregulation**

Richard G. Bryenton  
May 2017  
Senior Thesis

Submitted in partial fulfillment of the requirements  
for the Bachelor of Arts degree in Geography

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Adviser, Professor Yu Zhou

## Table of Contents

Chapter 1: Introduction.....	2
Chapter 2: The Historical Geography of West Virginia .....	8
Chapter 3: Trends in the West Virginia Economy .....	12
Chapter 4: Influential Coal Regulations in the United States.....	29
Chapter 5: Assessing Coal Jobs and Environmental Regulations .....	40
References Cited.....	55

# The Impact of Environmental Regulations on the West Virginia Coal Economy

## Chapter 1: Introduction

### **Abstract:**

During the 2016 Presidential Election, Donald Trump mobilized support from coal and extractive industry workers by promising to remove “job-killing regulations” enacted during the Obama Administration. The number of coal-related employees in the United States has declined significantly over the past half century, so by identifying regulations as a culprit, Trump produced a tangible obstacle that he could potentially remove if he were elected. Additionally, Trump’s support of deregulation assumes that the success of coal companies will lead to more jobs. Prior to World War II it was fair to say that the success of coal led to the creation of jobs because it was a labor-intensive industry and highly profitable. But coal extraction is no longer labor-intensive because of improvements in extraction technology. The result is that far fewer workers produce the same amount of coal that was produced in previous decades. However, President Trump and a relatively small political elite continue to reiterate the “coal means jobs” mantra, appealing to a sentiment of a previous era even though it is outdated. Ultimately, I argue that regulations affecting coal employment are not fully responsible for the decline in employment, that the presence of a thriving coal economy does not necessarily provide many jobs, and that West Virginia would be better off pursuing the development of new industries.

### **Introduction**

During the 2016 Presidential Election, Donald Trump rallied West Virginia voters by promising to return coal jobs to the state. This was especially appealing to coal country due to the significant decline in coal employment over the past decade and half century (Arena 2015; Woods 2011, 806). During the campaign, he identified environmental regulations as a major culprit for job losses and has repeated this claim since taking office. Most recently, he signed an executive order repealing international commitments made by the Obama administration regarding carbon admissions, and removing restrictions surrounding a “stream protection rule” limited expansion of coal extraction projects. At the signing, while he was flanked by coal miners and company executives, he said, “C’mon, fellas. You know what this is? You know

what this says? You're going back to work" (Davenport & Rubin 2017). In essence, Trump is saying that coal means jobs, and that deregulation will solve the problem of jobs declining.

However, experts argue that regulations are not the sole cause of coal's decline. For example, coal has experienced tougher competition from other energy sources like, natural gas, oil, and solar. Competition from these sources was influenced by government incentives and taxes such as a carbon tax, but they were not the only cause of coal's decline. Declining costs in shale oil extraction allowed for significant operational expansion. Also, improvements to mining technology, particularly after World War II and the 1980s, have enabled relatively few workers to extract vast amounts of coal, reducing the demand for coal labor. The combined force of these factors, among many others, shows that deregulation will not be enough to return coal jobs.

In addition to various causes for coal's decline, there have been studies questioning the notion of coal providing many jobs. Research by Woods & Gordon suggests that there is not sufficient evidence to indicate that employment rate and number of employees correlates with the presence of coal in West Virginia. Woods' conclusion has important political implications for West Virginia and other regions of the world that are economically dependent on coal. Woods & Gordon assert that the "coal means jobs" mantra is "of vital importance for justifying the initiation and maintenance of extraction activities in coal-dependent communities" (Woods & Gordon 2011, 807). Recently, and over the past half century, a relatively small political elite including coal company executives and political figures, have utilized this mantra to appeal to workers' historical, intergenerational ties to coal.

The following sections will outline the different chapters of the thesis and their central ideas. I begin with a historical background of West Virginia regarding the development of the coal industry and other important historical influences that contribute to current conditions.

Second, I will provide an economic background of West Virginia and of the coal industry in West Virginia that will inform my assessment of Trump's claims. In Chapter 3, I examine several important regulations and laws that have influenced the coal industry because a deeper understanding of environmental regulations will provide context for assessing their impacts on the economy and other spheres of life. In the final chapter, I will challenge the notion that coal means jobs and Trump's claim that deregulation will return jobs. Ultimately, I conclude that coal no longer strongly correlates with job provision, and that deregulation will not provide coal jobs at the scale that Trump and other coal advocates describe.

### **The Historical Geography of Coal**

In this chapter I will provide a historical account of West Virginia's coal industry. I will discuss the origins of coal mining and some of the important politics that inform other portions of the thesis. These political origins are useful in understanding recent economic and political circumstances in West Virginia, and connect with Trump's rhetoric. There are deeply historical and cultural ties to coal that complicate West Virginia's ability to adapt to the changing coal and energy markets. This chapter contextualizes the "coal means jobs" mantra with its socio-political origins.

Particularly after World War II, coal executives shifted the industry towards mechanization. The invention of the "continuous miner" streamlined the coal extraction process. A continuous miner is a machine with a large rotating steel drum and teeth that scrape coal from seams (Lewis 2016; Miller & Zégre 2016). This pattern continued over the next 50 years as companies shifted towards surface mining for various reasons. As a result, it seems that there are few coal jobs available than ever before.

### **Trends in the West Virginia Economy**

In Chapter 3 I will examine the economic background of the state of the West Virginia. I will accomplish this by examining revenue associated with coal and comparing it to West Virginia's GSP. Formulated as a proportion, this statistic will represent coal's role in the West Virginia economy over time. I will also discuss the changes to coal employment and coal production over time. Between these variables and other ways of measuring economic growth, I will provide a basic economic background for West Virginia that will allow for a critical assessment of Trump's claims that coal creates jobs, and that deregulation will allow for more jobs. Overall, this chapter contains the bulk of the economic research that will be useful in assessing Trump's claim in the following chapter. I conclude that coal's sharply declining role in the West Virginia economy shows that the economy is moving forward without coal. Thus, the rhetoric expressed by coal industry advocates does not match up with West Virginia's economic conditions.

### **Influential Coal Regulations in the United States**

In Chapter 4 I will discuss the goals and effects of several environmental regulations in the past half century. The Clean Air Act (CAA) was created due to public demand for improvement to public health by reducing smog and other industry pollutants. For example, the CAA and its Amendments (CAA[A]) aimed to expand control over damaging substances in the atmosphere. This led to the EPA implementing stricter standards for the amount of SO<sub>2</sub> emitted by power plants in the United States, among many other toxins deemed hazardous (Hays 1998, 252).

I will examine other regulations, but a more recent government policy regarding the environment is the Obama Administration's Clean Power Plan. The implementation of this plan was delayed indefinitely towards the end of Obama's tenure, but the plan, which was to be carried out by the EPA, aimed to significantly reduce emissions by power plants in the United States which are responsible for the highest portion of American greenhouse gases (GHGs) (EPA 2016). However, Trump has announced he will make efforts to scrap this plan, among other acts of deregulation. Furthermore, Trump has appointed Scott Pruitt to head the EPA, who was previously a legal opponent of the agency being an advocate for the expansion of the energy sector (Lipton 2016).

### **Assessing Trump's Claims on Coal Jobs and Environmental Regulations**

Advocates for coal and economic growth blame environment regulation point for the decline in coal employment and the coal sector. I reject this because the decline in coal mining mainly pre-dates the laws that Trump criticizes, such as Obama's Clean Power Plan.

Environmental regulations have primarily affected the coal industry by changing the demand for coal, but regulations do not seem to directly affect coal production or coal employment. Rather, industry responses to these conditions changes employment and production.

Using historical data regarding employment and production I will compare changes over time in relation to enactments of the environmental laws. Of course, regulations have impacted the economy in various ways and it would be unfair to say that the regulations had no impact on the coal industry. In the case of the Clean Air Act, limits were placed on sulfur emission by power plants, so coal from Wyoming became significantly more viable than coal from West Virginia. Additionally, this led to a shift toward MTR in southern West Virginia. In contrast, the

northern regions continued to produce less pure coal because power plants in the region installed scrubbing devices to smokestacks, reducing emission.

So, regulations shaped the *demand* for coal, but this is merely one component of the coal economy. And, if regulations have primarily influenced demand, meaning that deregulation may increase demand, this would not mean that coal jobs will return to West Virginia. Total coal employment in West Virginia clearly declined significantly over the past half century, but productivity has increased fivefold in this period. So, even if demand increases, production would shift to meet this demand, but that would not mean more jobs are necessary for that additional production. Thus, deregulation will not bring back coal jobs, and coal does not equate to more jobs.

I will end the chapter by looking towards the future of West Virginia's economy. Data regarding coal production and coal employment highlights a broad decline in coal employment over the past half century. Even though coal is in decline, the portion of West Virginia's GSP related to coal has also decreased significantly over the past 50 years. This means that the West Virginia economy is less dependent on the success of coal, contrary to popular belief and Donald Trump's descriptions of the industry. Still, the state should pursue new ways to stimulate its economy.

## Chapter 2: The Historical Geography of West Virginia

### **The History of Mining in West Virginia**

Coal was discovered in West Virginia in the 1740s, but large-scale coal operations first developed after the American Civil War. Minerals like coal and iron fueled the ensuing industrial revolution, and it was not long before the coal and iron deposits in the Appalachian region and West Virginia drew large numbers of workers and speculators. In the period after the civil war the speculators bought large swaths of land from West Virginians who had been subsistent farmers up this point. According to Bell, farmers sold their land for very cheap, from “50 cents to 1 dollar per acre” (Bell 2010, 117). The local residents likely had no knowledge of the mineral wealth in the surrounding area, but the consolidation of landholdings into private and powerful investors paved way for the mass extraction of coal from the region over the next hundred years.

Despite the shady practices of speculators and mining company leaders, coal provided West Virginians with mass employment for generations. Historical data regarding production represents the scale of the coal boom. In 1867, only 490,000 tons of coal were produced in West Virginia, but by 1887 that figure had grown to 4.9 million tons, and by 1917 it had increased to 89.4 million tons. The number of miners kept pace with production, growing from 3,701 in 1880 to nearly 90,000 in 1917 (Lewis 2016). For a long period, the number of employees correlated strongly with the success of coal. But after World War II, mechanization began to replace laborers in the fields.

Particularly after World War II, coal executives began imagining a future for coal extraction involving a shift towards mechanization. The invention of the “continuous miner” streamlined the coal extraction process. A continuous miner is a machine with a large rotating

steel drum and teeth that scrape coal from seams (Lewis 2016; Miller & Zégre 2016). Miners resisted the mechanization but unions compromised with businesses by demanding higher pay for the remaining workers. This pattern continued over the next 50 years as companies shifted towards surface mining for various reasons. For example, the continuous miner was eventually replaced by the bucket wheel extractor (BWE), a massive machine used in surface mining that can move huge quantities of earth in a short period of time (Miller & Zégre 2016).

But for a long time, the success of coal provided many jobs for West Virginians. The boomtown enthusiasm surrounding the transformation of central Appalachia from small farm communities to an industrial society in the early and mid-20<sup>th</sup> century contributed to the notion that “coal means jobs.” Residents and mine operators, regardless of social class, believed that they stood an equal chance to lose or gain in the endeavor to industrialize, and the mutual needs of miners and operators meant dedication to the mine was vital to societal advancement (Woods & Gordon 2011, 809). Also, coal companies brought amenities like electricity, education, and minimal healthcare that were seen as highly progressive at the time. The provision of otherwise unavailable amenities, combined with “coal enthusiasm,” compounded over several generations, has resulted in the ossification of the notion that coal means jobs in West Virginia.

Even if there was a convincing illusion that miners and operators stood an equal chance to industrialize, the operators and executives were the real winners. The coal industry’s control and domination of the region was facilitated by a powerful elite class, achieved through corporate ownership of much of the land (Bell & York 2010, 118). Historically, coal sector supporters emphasize mining’s role as a primary economic engine and source of jobs in the central Appalachian region. Indeed, the coal industry contributes significantly to regional economies; in West Virginia, severance taxes on coal in West Virginia provided the third largest

source of income for the state's general fund (Bozzi 2015, 145). Productivity in tons per worker, has stayed high and increased over time. In 1973, coal mines employed 124,000 workers in the Appalachian region (West Virginia, Virginia, Eastern Ohio, Tennessee, Kentucky); in 2003 there were 46,507 miners; meanwhile production during that period stayed nearly constant at about 380,000 short tons coal) (Bozzi, 2015, 148). I will explore the West Virginia coal economy in detail in a later chapter, but even at first glance, statistics surrounding productivity question the notion that coal means jobs.

Regarding the workers, coal miners have a particularly intimate relationship with their work. For many families living in West Virginia and other coal producing areas in Appalachia, miners have an intergenerational relationship with the coal industry. Many workers have parents, grandparents, and relatives that are also involved with the industry, so there are familial and cultural ties to coal that are beyond economics (Scott 2015, 42). For many people coal is a way of life, whether it be the dominant employer for the town or the local high school's mascot (Kranitz 2015).

Identifying regulations as the culprit of job losses displaces blame on coal companies and redirects the anger of coal miners towards the government. Dissatisfaction with regulations and government policy has, in many ways, mobilized the coal worker politics. Most recently, Donald Trump swayed coal miners in West Virginia by echoing the sentiment that coal means jobs. According to Culver, "Political figures who promote less regulation or who represent areas dependent on coal mining often characterize the decline in coal as a result of "Obama's war on coal," effected through stricter EPA smokestack emissions rules. But today's clean-air rules date to 1990, years after coal began declining, and adding little cost (Culver 2016, 51). Thus,

criticisms of “modern” regulations are misguided and do not fully encompass the history of environmental regulations.

Also, the Governor of West Virginia, Jim Justice, ran his 2016 campaign on the promise that he would bring back coal jobs and develop the state’s economy. He and his rival candidate were competitive throughout the campaign until Justice, who has ties to the coal and timber industries, announced plans to reopen several mines in southern West Virginia, providing over 200 jobs (Mufsen 2016). The announcement swung the election in his favor. Since the election, he has continued to support measures allowing for West Virginia coal companies to expand operations.

Justice very likely won the political support from the 200 employees he accommodated, but opening the mines reached a larger audience because of its symbolic importance. Given West Virginia’s historical dependence on the industry, creating coal jobs was deeply appealing to voters (Lawrence 2015; Mufsen 2016). Similarly, one of Donald Trump’s clearest political stances during his campaign was a promise to return coal jobs. Despite the political appeal, Jim Justice and Donald Trump echo a deeply historical sentiment about coal that is no longer true.

Political rhetoric continues to echo the “coal means job” mantra though it does not provide the jobs it once did. The repetition of “coal means jobs” is an example of how politics do not always keep up to date with statistics, economics, and even regional material conditions. The identification of these claims as false serves as a reminder that we should continue to be critical of political promises. The next chapter will discuss the coal economy in West Virginia by examining various statistics such as historical employment and coal production.

## Chapter 3: Trends in the West Virginia Economy

### **Introduction**

This chapter aims to outline the conditions of the West Virginia economy as they relate to the coal industry. This information will be useful in assessing Trump's claim that regulations have played a large role in the decline in the coal industry. I compiled data from the U.S. Bureau of Labor Statistics, the U.S. Energy Information Administration, the National Mining Association (NMA), and the West Virginia Office of Miners' Health, Safety and Training, regarding annual GDP, unemployment, and coal-specific data for total employment and production.

I will evaluate the state economy by examining the annual growth rate of gross state product (GSP) and unemployment rate. As a reference, West Virginia's state economy ranks 40<sup>th</sup> when compared to the rest of the country (Trading Economics). Economists consider a healthy GDP growth rate to be between 2 and 4 percent. Although GSP and GDP represent different scales, if GDP is the sum of each state's GSP and a "healthy" GDP growth rate is between 2 and 4 percent, then it follows that a healthy rate for GSP growth rate is also between 2 and 4 percent. Given my ad hoc healthy range, I will not be utilizing it to make any absolute decisions.

Unemployment is another common metric for evaluating the efficiency of a market, which is calculated as a percentage by dividing the number of unemployed individuals seeking work by the number of individuals currently in the labor force or capable of being in the workforce. It is important to note unemployment does not always fully account for unemployed workers. For example, unemployment rate becomes inaccurate when many people have attempted to join or rejoin the workforce but eventually, for various reasons, abandon this pursuit. By ending their pursuit of employment, they are effectively left unaccounted for in the

category of those “seeking work.” But for the most part, unemployment helps us better understand the condition of an economy.

Lastly, because West Virginia is a major producer of coal in the United States, a comparison of West Virginia’s coal economy to the national will help disentangle patterns on the national versus state scale. For example, if patterns in the national and state coal industry diverge, then perhaps there are other variables and factors worth investigating.

## U.S. and West Virginia Coal Graphs

### Coal Production

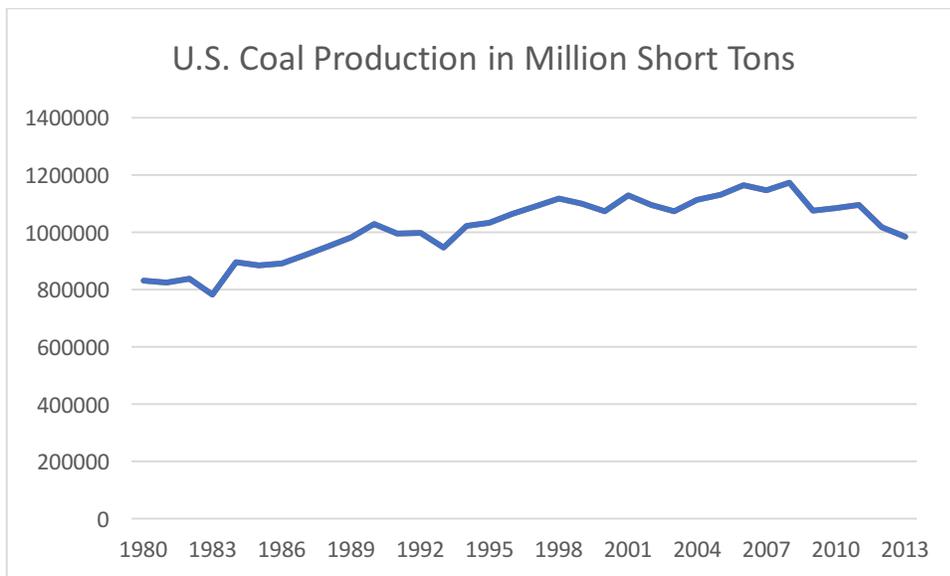


Figure 1A: U.S. Coal Production (The National Mining Association). Coal production increased somewhat steadily from the 1980s to the late 2000s. Production has decreased since 2010, and current production levels are similar to those of the early 1990s.

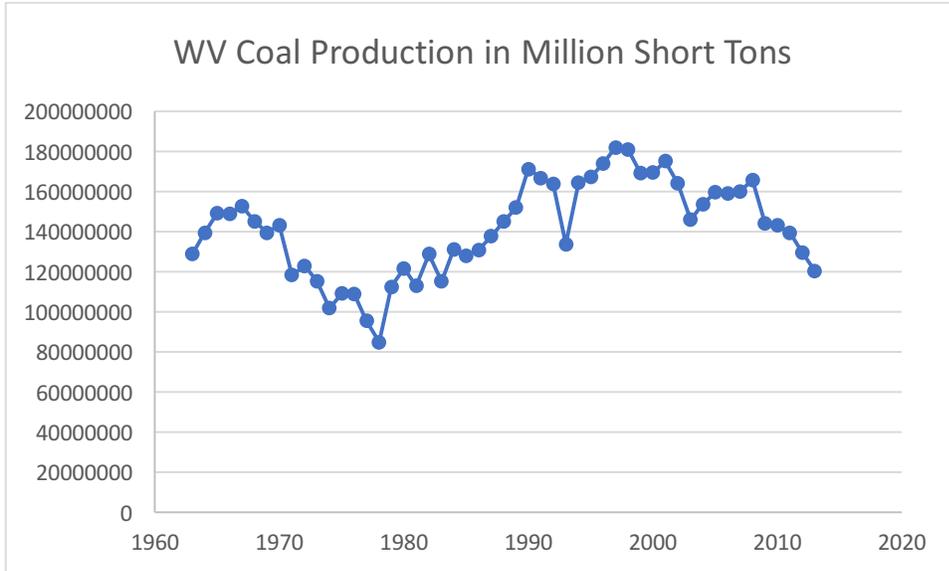


Figure 2A: West Virginia Coal Production (West Virginia Office of Miners' Health, Safety, and Training). Coal production levels in West Virginia are noticeably less steady than coal production at the national scale. For example, production declined significantly in the late 1970s and 1990s.

### West Virginia Coal Employment

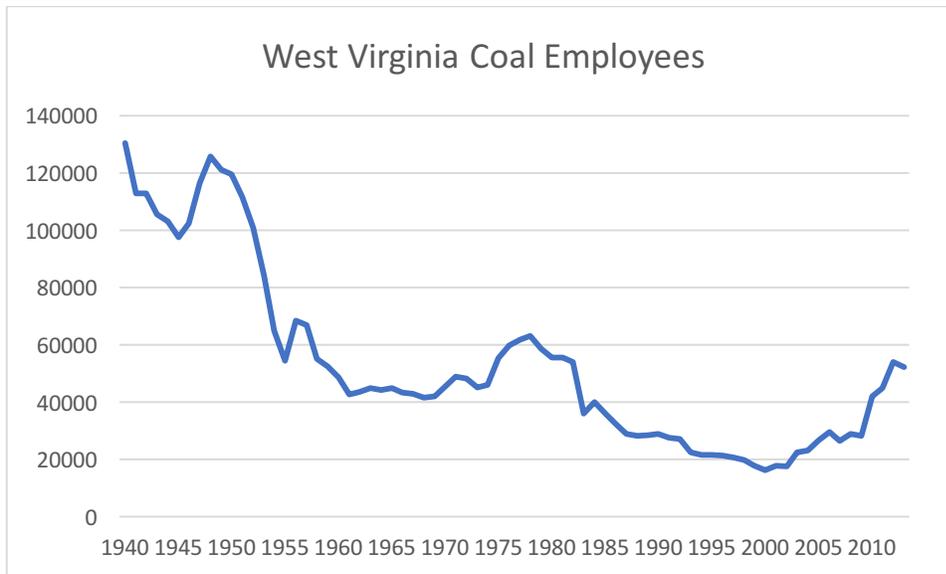


Figure 3A: West Virginia Coal Employees (West Virginia Office of Miners' Health, Safety, and Training; U.S. Bureau of Labor Statistics). This graph shows how coal employment declined drastically in the 1950s. Then, following a rise in the 1970s, coal employment decreased through the 1990s and into the 2000s. Most recently though, during the George W. Bush Administration and the Obama Administration, coal employment has risen significantly.

## Coal Revenue

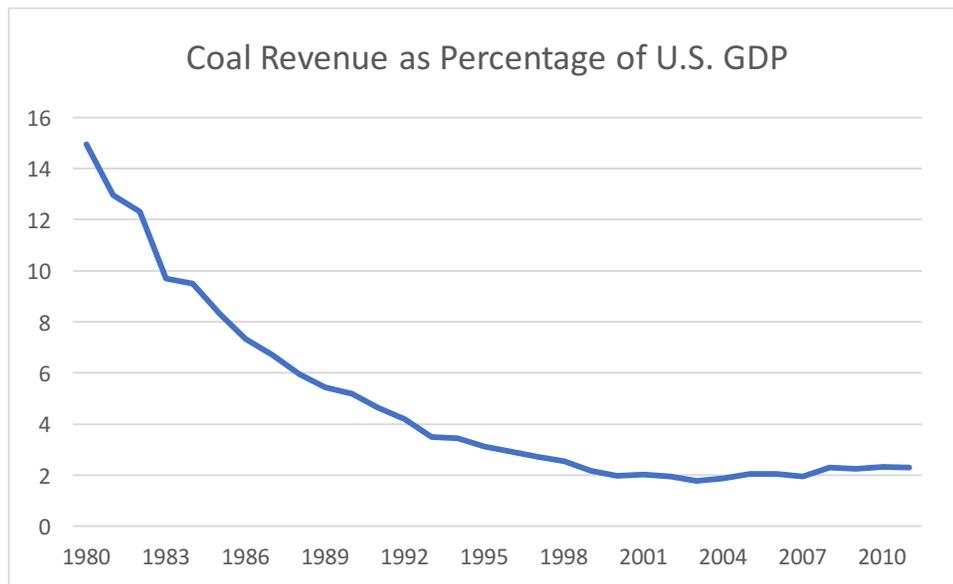


Figure 4A: Coal Revenue as Percentage of U.S. GDP (Trading Economics; U.S. Energy Information Administration). This graph indicates that coal has taken a decreasingly smaller role in the U.S. economy in terms of dollars. Since 2000, it has steadily remained around 2% of U.S. GDP.

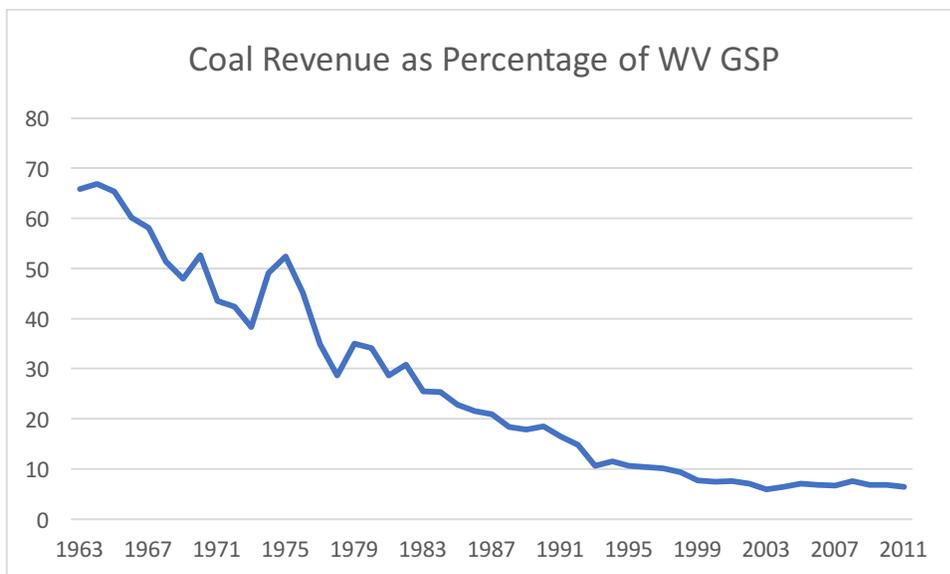


Figure 5A: Coal Revenue as a Percentage of West Virginia GSP (West Virginia Office of Miners' Health, Safety, and Training). Coal once represented the majority of West Virginia's state revenue, but its role has decreased significantly over the past 50 years. Presently, coal represents about 7-8% of West Virginia's state product. This suggests that other industries have filled the gaps left by coal revenue.

## Coal Consumption

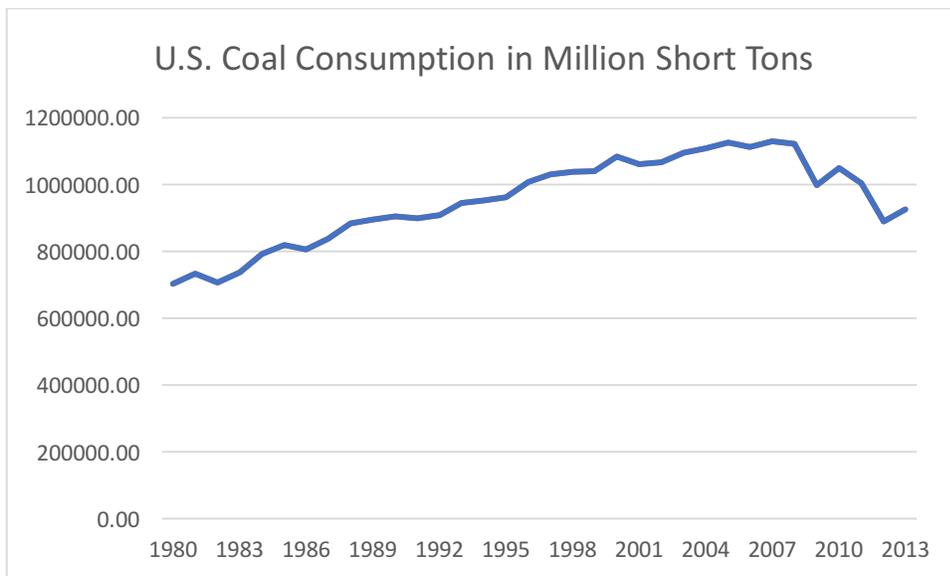
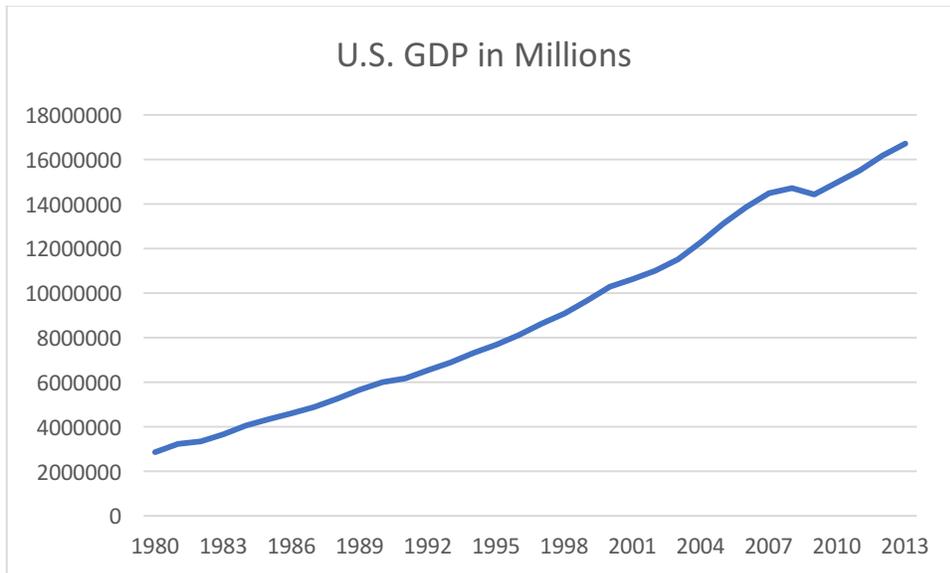


Figure 6A: U.S. Coal Consumption (U.S. Energy Information Administration). National coal consumption attempts to address national demand for coal assuming an elastic market. Generally, coal consumption increased until the late 2000s. In the 2010s, coal consumption has decreased, although consumption may shift now that Donald Trump is President.

## West Virginia Economic Graphs

### Gross Domestic (State) Product



Figures 7A: U.S. GDP (Trading Economics). The United States have demonstrated an impressive annual growth rate in GDP, allowing for consistent growth over the past 40 years. The obvious exception is the Great Recession of the late 2000s.

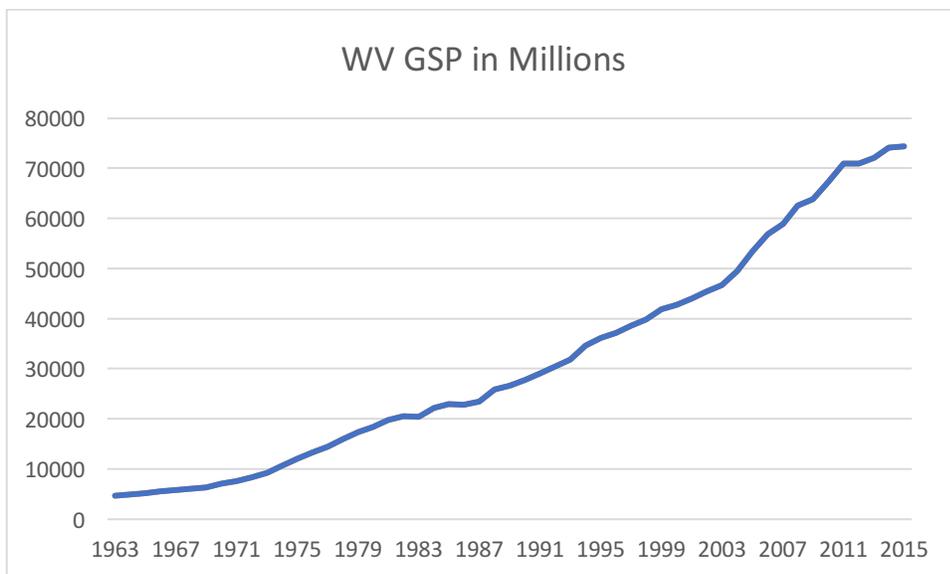


Figure 8A: West Virginia GSP (West Virginia Office of Miners' Health, Safety, and Training). Not unlike the national GDP, West Virginia has demonstrated consistent growth. Still, GSP has grown quite consistently over the past 50 years regardless of regulations.

## Unemployment Rate

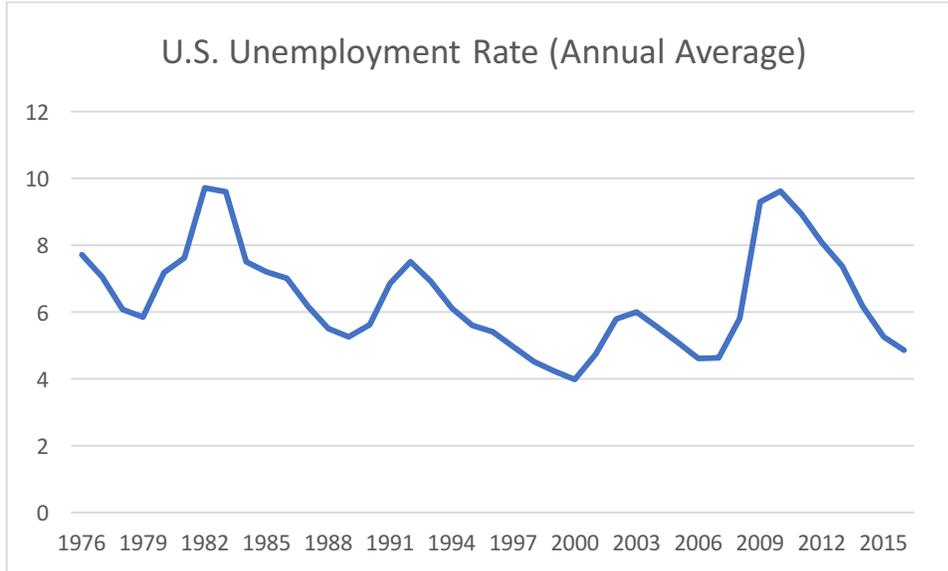


Figure 9A: U.S. Unemployment Rate (U.S. Bureau of Labor Statistics). Unemployment rate in the United States has fluctuated over time, but rarely exceeding 8%, and falling below 5%.

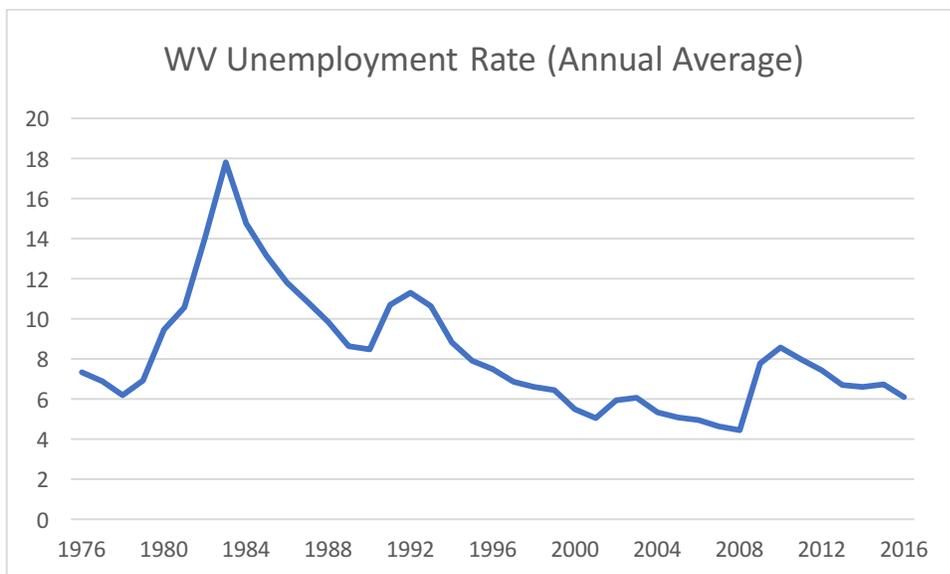


Figure 10A: West Virginia Unemployment Rate (U.S. Bureau of Labor Statistics). West Virginia, at times, has experienced significant rates of unemployment, particularly in the 1980s. Also, West Virginia suffered a higher than average rate of unemployment in the Great Recession of the late 2000s.

### **The United States Coal Economy**

From 1963-1969, U.S. Coal production grew by an average of 3% annually. In the 1970s it grew by 3.4% annually, and in the 1980s the decade average growth was 2.4%. In the 1990s the growth rate shrank to 1.2% and in the 2000s it has barely grown at all, with an annual growth rate of 0.01%. In other words, U.S. coal production levels in 2000 is nearly the same as in 2011. Although coal production growth slowed in the 1990s and 2000s, it is clear that coal production has mostly increased in the past half century. Even though coal production declined in West Virginia, it increased or remained strong in other regions of the United States, particularly when compared with the state of Wyoming (Godby 2015, 15; Gordon & Woods 2011, 814).

Another important consideration is the demand for coal in the United States, measured in terms of coal consumption. In the 1980s, coal consumption grew 2% annually. In the 1990s increase in consumption continued but at a rate of 1.5%. In the 2000s, coal consumption shrank by an average of 0.7% annually. Although these rates do not seem to be obviously correlated with different enactments of environmental regulation, it is fair to say that consumption declined between 1980-2010. It would be unfair to say that West Virginia's decline in production correlated with a decline in U.S. consumption because overall U.S. production did not decline during this period.

Because the United States economy is highly diversified, I would not expect coal to play a leading role. Still, revenue associated with coal production as a proportion of U.S. GDP is another way of comparing West Virginia with the rest of the country. Coal revenue represented 14% of the U.S. economy in 1980, but then declined steadily downward until it reached 3.5% in 1993. Since then, it has fluctuated between 1 and 2%. Of course, the U.S. economy has many other sources of revenue, whereas West Virginia is a specialized and dependent on coal because of its mineral deposits. Still, the decrease in these portions indicates that coal's role in the U.S. economy is declining broadly.

### **The Coal Economy in West Virginia**

Over the past century, the coal industry has played a large role in the West Virginia economy. This is seen through the large revenues of West Virginia coal companies, the number of coal-related West Virginia employees, the amount of coal production, and the proportion of West Virginia's GSP that is based in coal. In terms of number of coal-related employees, total coal mining employment in West Virginia peaked in the first half of the 20th century. In 1948,

there were approximately 125,000 coal miners working in West Virginia. In the 1950s, before any serious regulation was passed concerning mining, the number of coal employees declined by each year by an average of 7%. In the 1960s, each year declined by an average of 2%. Then, in the 1970s, coal jobs grew by an average of 3% per year, and in 1975, it grew by 20%. However, it is important to note that the number of employees was significantly lower than it was in the pre-World War II era. The annual declines, for example 7%, were compounded over a long period of time in comparison to later years where employment grew.

Later, in the 1980s, the number of coal employees declined by 6.2% each year, and was marked by an astonishing decline of 33% in 1983. Experts believe that the layoffs were caused by the recent improvements to coal extraction that reduced the demand for coal labor (Stevens 1986). In the 1990s, the number of coal employees declined by 4.4% each year, but in the 2000s, through 2013, coal employment grew by an average of 9%. Again, the time context for these statistics are crucial. A 30% increase from about 15,000 employees to 20,000 is on an entirely different scale from employment levels in 1948, when there were 125,000 workers. Overall, there have been small periods of growth since World War II, but the number of coal employees has vastly declined over the past half century (West Virginia Office of Miners' Health, Safety, and Training). More recently, coal employment increased over the past decade but has declined in the past 3-4 years.

Coal production in West Virginia is another important metric. For the most part, changes in production somewhat steady, unlike the relatively drastic shifts seen in employment and other metrics. In the 1960s, coal production grew by an average of 1.4% annually. In the 1970s, production declined by an average of 1.2%, but in 1979, following two years of significant

decline, production increased by 32%. In the 1980s production grew by 3.3% on average, and in the 1990s it grew by 1.6% annually.

Lastly, in the 2000s, production declined by 2.2% annually, but the level of production was similar to production levels of 1963. In 2013, which is the most recent data available, West Virginia's coal production in million short tons was 98,484,200, which matches production levels of the late 90s and 1980s. Overall, certain years had especially large changes and stand out from the other broad trends. Some of the highest levels of coal production were in the 1990s, as well as the 1960s. The years with the lowest amounts of production were 1977-78.

Historically speaking, West Virginia is economically dependent on coal for its state economy. In 1963 coal production revenue represented 65% of West Virginia's GSP. In contrast, economic data from 2011 shows that coal revenue makes up only 6.3% of GSP. However, this drastic change in coal's contribution to the economy is not reflected in historical GSP growth rate, because GSP has, for the most part, grown steadily over the past half century, with a few exceptions. This information should be considered when claiming that coal means jobs in the context of West Virginia, because it seems that the role of coal in West Virginia has decreased significantly.

### **Trends in the United States Economy**

In terms of the state of the national market, GDP growth for the United States was very strong in the 1980s, with an annual average of 7.9%. In the 1990s the decade average GDP growth rate was 5.5%, while in the 2000s it was 4%. Of course, there are the notable exceptions of growth in 2008 and 2009, during the Great Recession, where the United States GDP was 1.6%

and -2% respectively. West Virginia experienced corresponding declines in its GSP during these years.

### **Trends in the West Virginia Economy**

West Virginia's annual GSP growth rate was strong in the 1960s, averaging 6.3%, and in the 1970s it averaged an astonishing 10%. However, it dropped significantly over the next 40 years. In the 1980s and 1990s it was 4.2% and 4.4% respectively. In the 2000s, through 2014, the average GSP growth rate was 3.7%. Thus, the rate of growth for GDP has fallen since regulations were implemented in 1970 and 1990, but this is within the range that I have identified as healthy.

West Virginia currently has an unemployment rate of 6%, which is about 1 percentage point higher than the national average. Of course, during periods of recession, an economy usually experiences a relatively high unemployment rate. West Virginia recorded its highest unemployment rate in the early and mid 80s, reaching over 18% in some months of 1983, because of industry layoffs associated with changes in productivity (Stevens 1986).

Upon further investigation, increases in unemployment rate and decreases of coal employment reflected the national recession felt in the 1980s. Economists describe how the entire coal industry went through a "bust" period in the early 1980s, following a decade of economic success. During this time that improvements in mechanization of coal extraction seemed to catch up with demands for coal labor (Stevens 1986). West Virginia was heavily dependent on the coal industry, so it was hit proportionally harder regions with diversified economies.

At first glance, there seems to be a correlation between unemployment and enactment of new environmental regulations. The time between 1981-83 was especially interesting, because, as I will demonstrate later, coal employment dropped by only 2,000, but then 20,000 respectively, and the unemployment rate went from 11% to 14% in 1982, and then to 17% in 1983. Unemployment rate increased by 3% in 1982 and in 1982, but in 1982 coal jobs decreased by 2,000 while in 1983 there was a loss of 20,000 coal jobs. Given such a large difference between employment numbers and unemployment rate, there must be other factors contributing to these metrics. Or simply put, this discrepancy may suggest that the correlation between coal and jobs is not as strong as some believe.

## Chapter 4: Influential Coal Regulations in the United States

### **Introduction**

This chapter will describe various environmental regulations and policies established in the past half century in the United States. A deeper understanding of these policies combined with my economic research will allow me to assess Trump's claim that deregulation will return jobs to the coal industry in West Virginia. I will preface some of the regulations I present by describing some of the public concerns associated with coal and pollution that pressured politicians into passing legislation to protect the environment and other public goods.

The intentions of environmental regulations are to protect public health, but, as previously emphasized, Donald Trump and other conservative critics typically point towards these government regulation as a major source of economic decline. The regulations accomplish their goals by limiting emissions of harmful chemicals, requiring companies to apply for operation permits, protecting certain areas such as national parks from extraction, accounting for environmental externalities, and providing inspection of work sites to maintain health and safety of mining workers (EPA 2015). Yet, according to industry and conservative voices, regulations are so economically harmful to the coal sector that they should be removed.

This chapter will also examine The Clean Air Act (CAA) and its amendments (CAAA), the Surface Mining Control and Reclamations Act (SMCRA) in conjunction with the Clean Water Act (CWA), and also the Clean Power Plan (CPP), which was developed by the Obama Administration. In general, these laws and plans were created because unregulated development can allow for negative environmental externalities like pollution which can worsen over time, producing consequences such as acid rain. Therefore, it is in the interest of the state to create laws that monitor and accompany factories and industries, limiting their ability to pollute the

environment. Inevitably, these laws hinder the growth of coal companies, but this must be weighed against the value of having a safe environment for everyone.

### **Burning Coal**

After extraction, coal is transported to coal-power plants for burning. For over two centuries, coal has been an extremely popular commodity because of its abundance globally and its combustible properties. It is easily converted to electrical energy through a relatively straight forward process. First, coal is burned, producing heat. This heat converts water to steam, which turns a turbine. The turbine operates a generator which produces the electricity that is sent out through various wires by the power plant and utility companies (Bell & York 2010, 111).

At a cost, various stages in this process, particularly the burning process, can be enhanced to reduce the amount of pollution that coal generates. For example, the smoke created in the burning process can be filtered and collected, and the burnt coal material can also be collected, and usually stored in huge vats or dikes (EPA 2016, Ruhl et al 2010, 9275). Various environmental regulations were created to reduce the release of waste in the combustion process. For example, the smoke contains compounds such as sulfur dioxide (SO<sub>2</sub>), Nitrous Oxide (NO<sub>x</sub>), and fly ash, which is physical coal material leftover after combustion. These compounds have been shown to produce adverse environmental effects such as smog, acid rain (Culver et al 2016, 52; Lobao et al 2016, 342). In recent years, demand for cleaner coal has led to the development of “scrubbing” technology, which filters out unwanted products associated with burning coal. For example, many power plants have installed scrubbers in their smokestacks that reduce the amount of sulfur that is released into the atmosphere (Hays 1998, 243).

Legislation attempting to improve coal burning represents a broad attempt to create “clean coal” methods. Clean coal methods have unfortunately led to some questionable practices in the industry. For example, most coal-power plants collect the fly ash after combustion and create a viscous “slurry,” called coal combustion waste (CCW), and is stored in dikes. These storage units are good in the sense that companies are attempting to be cleaner but they pose serious risks to the local environment in the instance of spillage (Ruhl et al 2010, 927).

There have been several coal ash spills, with the largest one occurring in 2008 at the TVA Kingston Fossil Plant in Kingston, Tennessee. The Kingston Fossil Spill released 1.1 billion U.S. gallons of CCW into the surrounding area, including the Roane River and its tributaries. In West Virginia, there have also been spills such as the one at Patriot Coal’s Kanawha Eagle operation, which is located near Fields Creek. These spills represent the broad danger of burning coal that seems to go beyond attempts to decrease risk of pollution through regulations (Manuel 2011, A499; Ruhl et al 2010, 9272).

### **The Clean Air Act and its Amendments**

The Clean Air Act was originally passed in 1963, but it is more useful to view it as a series of Acts that progressively became more adept at maintaining air quality in the United States. Because the Clean Air Act is iterative, a chronological account will provide the clearest summary. A major cause for public support of these laws in the 1970s had to do with emerging evidence linking health issues like cancer and asthma with environmental causes (Hays 1998, 238). Burning coal, for example, puts sulfur dioxide and nitrous oxide into the atmosphere. The Clean Air Act created health standards, and these were based on information about health effects, to determine the precise level of pollution beyond which adverse effects on human health occur.

The Clean Air Act amendments of 1977 added provisions addressing “prevention of significant deterioration, non-attainment, and delayed compliance penalties,” each of which relates to an extractive industry’s concerns, such as coal, about the potential for new operations (Hays 233). Prevention of significant deterioration (PSD) allow for the protection public health and welfare while non-attainment refers to the designation of certain areas having air quality above the National Ambient Air Quality Standards, such as national parks. More importantly, delayed compliance policies address the issue of energy facilities delaying punishment through the means of litigation. In short, the EPA could litigate polluters if they did not clean up by a specific compliance date and impose fees or taxes (Hays 230-231). With these protections in place government officials are better equipped to pursue coal companies that are behaving poorly.

By the late 1980s, concern for environmental damage to ecosystems, forests, and buildings in the northeastern United States and southeastern Canada had continued to grow. This led to the passing of the 1990 Clean Air Act Amendments. A particularly relevant section of the CAAA is Title IV, sometimes referred to as simply the Acid Rain Program (ARP), which aimed to reduce total annual SO<sub>2</sub> emissions in the United States by 10 million tons (Chan 2011, 422). “Acid rain is the result of SO<sub>2</sub>, and to a lesser extent, nitrogen oxides (NO<sub>x</sub>) reacting in the atmosphere to form sulfuric and nitric acids, which are deposited on the Earth’s surface through either precipitation or dry processes” (Chan 2011, 421). The primary source of SO<sub>2</sub> and NO<sub>x</sub> comes from flue gas from coal-fired, electric-power plants. By placing restrictions on sulfur dioxide emissions, the 1990 Amendments (CAAA) increased the demand for low-sulfur coal. Thus, the coal-power industry was forced to pursue new options.

The limitation of sulfur dioxide emissions was accomplished by implementing a cap-and-trade system. In this system firms may buy allowances on the market to meet their compliance obligations, or they may choose to reduce their emissions. “By establishing legally enforceable emission limits to be met at a certain date, the law created a market. Investors, inventors, engineers, marketing specialists, and entrepreneurs were alerted that if they use their ingenuity and talents a market beckons them to profitable business” (Hays 1988, 252). It leads to something of an “environmental economy” within the energy industry itself. Thus, the 1990 Amendments represented a wide-ranging attempt to foster technological innovation while reducing sulfur dioxide emissions and other harmful substances.

The 1990 CAAA achieved the reduction of emissions by power plants through two phases. Phase I of Title IV (1995-1999) required significant emissions reductions from the 263 most polluting coal-fired electric generating units, almost all located east of the Mississippi River. Phase II began in 2000 and placed an aggregate national emissions cap of 8.95 million tons per year on approximately 3,200 electric generating units — nearly the entire fleet of coal-fired plants in the continental United States (Chan 2011, 422). As a result, sulfur dioxide emissions originating in the United States decreased broadly.

### **Mountaintop Removal (MTR)**

By increasing demand for low-sulfur coal, the CAAA resulted in the increased practice of mountaintop removal mining. Coal that is closer to surface typically has a lower amount of sulfur. Surface mining, strip mining, or mountain-top removal mining (MTR) are terms that I will use interchangeably throughout the thesis. Surface mining is utilized when coal seams are near the surface, just beneath mountaintops. First you remove the mountaintop soil overlying the

coal seam. Then, explosives are used to break up the rock layers above the seam, which are then removed and excess mining waste or "overburden" is dumped by large trucks into fills in nearby hollow or valley fills. MTR produces vast amounts of fill material during extraction that occupy large volumes of space and land upon mining.

The strip-mining process is sometimes performed by vehicles called Bucket Wheel Extractors (BWEs) which are some of the largest machines ever constructed. They can move 12,000 meters of earth per hour (Miller & Zégre 2016). Large machines such as BWEs have reduced the demand for coal labor (Bell & York 2010, 130; Bozzi 2015, 149). Surface mining has resulted in significant alterations to the West Virginia landscape and contributed heavily to environmental issues such as erosion and water quality.

A description of surface mining is important because it has become a staple practice in coal mining extraction in West Virginia over the past 30 years. An important aspect of surface mining is its reliance on mechanized work. Thus, fewer people are needed to operate a surface coal mine. Another reason for its increase in popularity is because the workers are exposed to less serious risks. For example, underground miners must wear masks to filter out the dust that goes into air as you mine.

### **The Surface Mining Control and Reclamation Act of 1977 (SMCRA) and the Clean Water Act of 1972 (CWA)**

Because MTR has increased in popularity in West Virginia in the past 30 years, I chose to include the Surface Mining Control and Reclamation Act of 1977 (SMCRA) in my research. SMCRA establishes the criteria for permitting, regulating, and reclaiming surface mines, under the Office of Surface Mining Reclamation and Enforcement (OSM). The Clean Water Act has

also influenced MTR by regulating “the discharge of pollutants into the waters of the United States” (Montrie 2011, 29). As previously mentioned, both surface and underground mining have been shown to affect nearby water sources. Historically, industry leaders have criticized these laws for unfairly limiting expansion of operations. Requirements for permits are particularly frustrating for them, and in some cases permits have been revoked after their approval (Kirschner 2013, 54).

SMCRA requires mining companies to restore mined land to a condition that matches land value prior to its mining. This can be accomplished by (1) removal, segregation, and protection of topsoil, (2) recontouring the land to its “approximate” original contour (AOC), and (3) revegetation of the land with a plant cover native to the area (Beck 1995, 24). SMCRA also created the Office of Surface Mining and Reclamation Enforcement, which is within the Department of the Interior.

Through this body, SMCRA requires permits for all surface coal mining operations (Beck 1995, 26). Voices in the industry often criticize permit requirements for being stringent and unfair and point towards the economic costs of these policies. In discussing SMCRA, Montrie argues that “when Congress passed SMCRA, most of its supporters had assumed that mountaintop removal would occur only infrequently, in rare circumstances,” and perhaps this explains why the law is occasionally vague (Montrie 2011, 93). Because of its vagueness, there have been several legal battles surrounding SMCRA.

For example, in establishing the criterion of AOC, SMCRA states that the land must “closely resemble the general surface configuration of the land prior to mining.” However, people interpret the notion of AOC differently, leading to disagreement between government officials, legal experts, and the private sector. In effect, SMCRA limited the practicality of MTR

practices in areas such as eastern Kentucky, southern West Virginia, and Virginia, where grades are steep for surface mining, and often exceed twenty degrees.

In response, West Virginia made amendments to SMCRA when they ratified it in their state government. West Virginia's amendments claimed that, because of "a great diversity in terrain, climate, biological, chemical and other physical conditions in parts of this nation where mining is conducted; that the State of West Virginia in particular needs an environmentally sound and economically healthy mining industry." As such, they concluded it would be necessary to allow mining in areas that had been deemed prohibitively steep (Beck 1995, 25). Thus, this amendment allows for exceptions to the slope rules implemented by SMCRA. This seems to be a rather generous amendment which favors the expansion of coal operations.

Turning to the Clean Water Act, public demand for water regulation emerged after it was discovered that unregulated mining can result in the filling of streams and creeks and wetlands near the vicinity of the mine (Ray 1987, 22). This is particularly damaging to sensitive ecosystems such as wetlands which are valuable public goods because they contribute to purifying water that flows through them. They also help mitigate flood protection and function as a habitat for various wildlife. Besides functionality, there is an aesthetic value to wetlands (Ray 1987, 20).

The CWA established a basic structure for regulating pollutant discharges into the waters of the United States and gave the EPA the authority to implement pollution control programs such as setting wastewater standards for industry. Moreover, it maintained existing requirements to set water quality standards for all contaminants in surface waters and made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions. Lastly, it funded the construction of sewage treatment plants under

the construction grants program and, more broadly, it recognized the need for planning to address the critical problems posed by nonpoint source pollution (EPA 2015).

Two sections of the CWA, Section 402 and 404, are especially relevant to the thesis because they affect coal and mountaintop-removal mining. Section 402 regulates pollutants or waste and allows the EPA to issue permits while Section 404 regulates fill material in waterways. Their principal focus is to protect wetland habitat. The basic premise of the program is that no discharge of dredged or fill material may be permitted if: a practicable alternative exists that is less damaging to the aquatic environment; or, the nation's waters would be significantly degraded. In other words, when you apply for a permit, you must first show that steps have been taken to avoid impacts to wetlands, streams and other aquatic resources; that potential impacts have been minimized; and that compensation will be provided for all remaining unavoidable impacts (EPA 2015). Without this law, mining companies would put minimal effort in mitigating their damage because without a punishment they do not have a significant reason for doing so.

A 1999 District Court decision affirmed that waste generated from MTR violated the Clean Water Act (Woods & Gordon 2011, 808). Coal politicians, operators, and considered this an economic setback. MTR supporters argued the policy would stifle economic development and emphasized the potential loss of jobs resulting from a heavy-handed regulatory approach. But after fierce lobbying to have this decision reversed, the Environmental Protection Agency redefined the meaning of "fill material" in Section 404 of the Clean Water Act. As a result, there was a dramatic increase in the number of MTR projects. The EPA revisited the issue in 2009, threatening to use its veto authority under the Clean Water Act to reverse permits issued by the

ACOE (U.S. EPA 2015) Again, MTR advocates argued that vetoes would compromise the region's economic stability, including jobs.

### **The Clean Power Plan (CPP)**

In August 2015 President Obama announced the Clean Power Plan (CPP) as a way of reducing GHG emissions across the United States. According to an EPA fact sheet, “the Clean Power Plan cuts significant amounts of power plant carbon pollution and the pollutants that cause the soot and smog that harm health, while advancing clean energy innovation, development and deployment, and laying the foundation for the long-term strategy needed to tackle the threat of climate change” (EPA 2015). This is somewhat of a positive spin on the plan but it explains the basic goals. The plan accomplishes these goals by creating stricter standards on carbon emissions for coal, oil, and natural gas power plants. The EPA imposes these restrictions at the state level, requiring that states develop and implement plans to ensure that the power plants in their state achieve the interim CO<sub>2</sub> emissions performance rates over the period of 2022 to 2029.

The plan was heavily contested by state politicians. Not long after its announcements, more than two dozen states filed against the plan in court. Eventually, in 2016, the Supreme Court placed the plan on hold until legal battles could settle disputes. However, the death of Antonin Scalia left a vacant seat in the Supreme Court, which, to many, signaled the beginning of the end of the plan. Donald Trump is an outspoken critic of the CPP because he believes it will unjustly raise energy costs across the country. He also blames policies implemented by the Obama Administration for the decline in coal jobs, even though the declines occurred far earlier. The fact that regulations affecting the coal industry, for the most part, pre-date the Obama

administration, should lead the reader to question Trump's motivation for attacking Obama. It seems that his false criticism was more about swaying voters than telling the truth.

### **Conclusion**

The laws I have identified are highly influential in the American coal market and West Virginia. More broadly they represent the different interests of state and federal players in the coal economy. The next chapter will examine the economic periods following the enactments of these laws in the hope of illuminating their effects on the coal economy. This comparison will allow for an assessment of Trump's claim that coal means jobs and that deregulation kills coal jobs.

## Chapter 5: Assessing Coal Jobs and Environmental Regulations

### **Introduction**

This chapter will synthesize research on West Virginia's coal economy and environmental regulations to evaluate two claims made by President Trump. First, he has argued that environmental regulations have decreased the amount of available coal jobs. Second, he believes that the success of coal companies will lead to an increase in employment. Ultimately, I conclude that regulation alone does not account for the decreases in coal employment in West Virginia over the past 50 years, and that more coal does not necessarily mean more jobs. This is seen in the massive decrease in coal employment in West Virginia over the past half century and the relatively steady levels of coal production and productivity.

I will begin by presenting figures that include important dates associated with environmental regulations. Using this information, I will evaluate the claim that coal means jobs, and afterwards I will discuss the impact of environmental regulations. I conclude the chapter by turning towards the future of the West Virginia economy.

### **U.S. and West Virginia Coal Production with Regulation Enactment Timeline**

The lines on the graphs below correspond with the following Environmental Regulations: Clean Air Act (1970 in orange, 1977 in black, 1990 in red, 1995 in dark blue, 2000 in green); Clean Water Act (1972 in purple); and the Surface Mining Control and Reclamations Act (1977 in brown). Not all the graphs include information in the full breadth of time that these regulations encompass. For example, several graphs of national data date back to 1980. I will consider this disparity during my investigation.

<b>Law</b>	<b>Year</b>	<b>Color</b>
Clean Air Act (CAA)	1970	Orange
Clean Water Act (CWA)	1972	Purple
Surface Mining and Reclamations Act (SMCRA)	1977	Black
Clean Air Act (further legislation)	1977	Black
Clean Air Act Amendments (CAAA)	1990	Red
CAAA Phase I	1995	Dark Blue
CAAA Phase II	2000	Green

Table 1: Legend for Coal Production Graphs and Environmental Regulations

## Coal Production

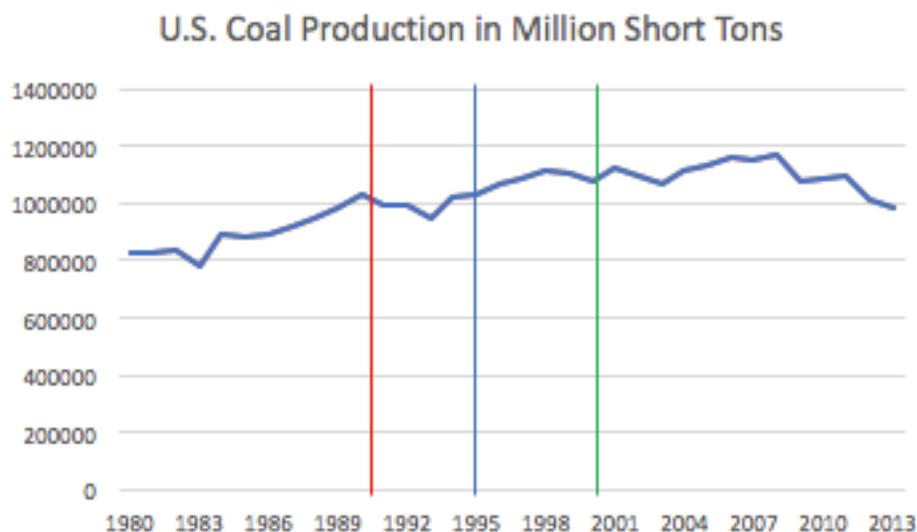


Figure 1B: U.S. Coal Production (U.S. Energy Information Administration; The National Mining Association). Following the 1990 Clean Air Act Amendments there was a small decline in coal production. But following the initiation of Phase I in 1995 and Phase II in 2000, when the law actually took action, there were not obvious declines in production.

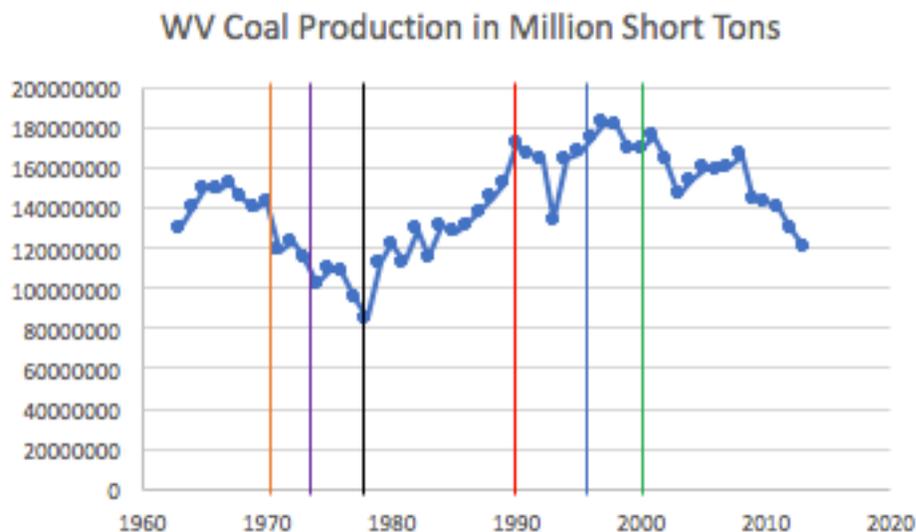


Figure 2B: West Virginia Coal Production (West Virginia Office of Miners' Health, Safety, and Training). Here there seem to be significant decreases in production following the enactment of several environmental regulations. However, the CWA in 1972 and the SMCRA in 1977 likely did not have immediate impact on coal because they addressed MTR, which was not nearly as common practice in the 1970s as it is today. However, decreases in production between 1990, 1995, and 2000 seem to correlate with the different phases of the CAAA.

## Coal Employment in West Virginia

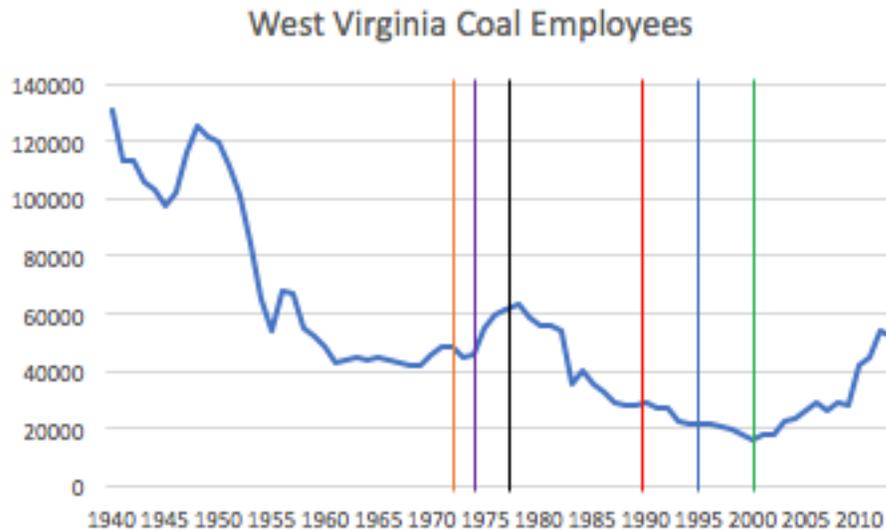
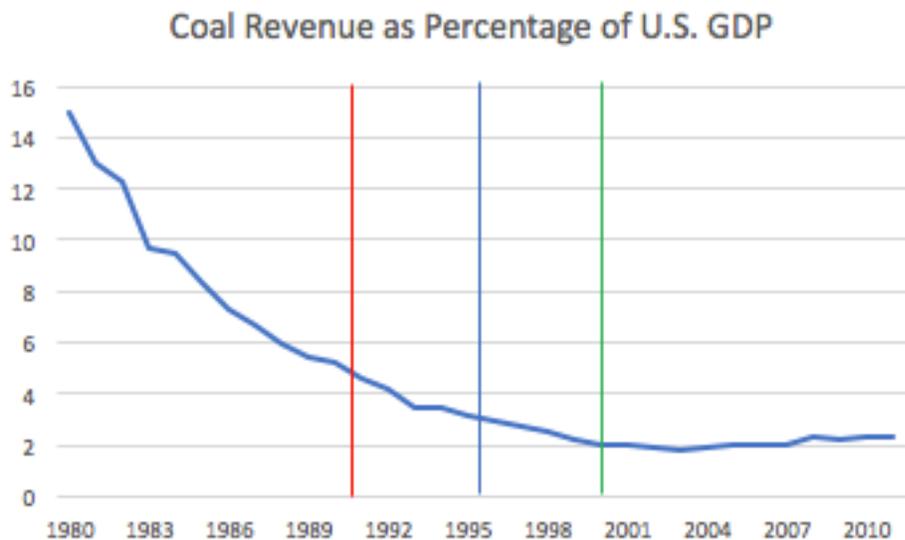


Figure 3B: West Virginia Coal Employees (West Virginia Office of Miners' Health, Safety, and Training; U.S. Bureau of Labor Statistics). Legislation in the 1970s did not have an immediate effect on coal employment but perhaps they contributed to the sharp decline in coal employment in the 1980s. Coal employment declined slightly during the phases of the CAAA in the 1990s, but the decline is not particularly striking when compared with other periods of decline in coal employment.

## Coal Revenue



Figures 4B: Coal Revenue as a Percentage of U.S. GDP (Trading Economics; U.S. Energy Information Administration). Here the Clean Air Act Phases outline a period where coal revenue was declining as a proportion of U.S. GDP. However, the decline in these two windows does not seem to contrast coal's already declining role in the U.S. market.

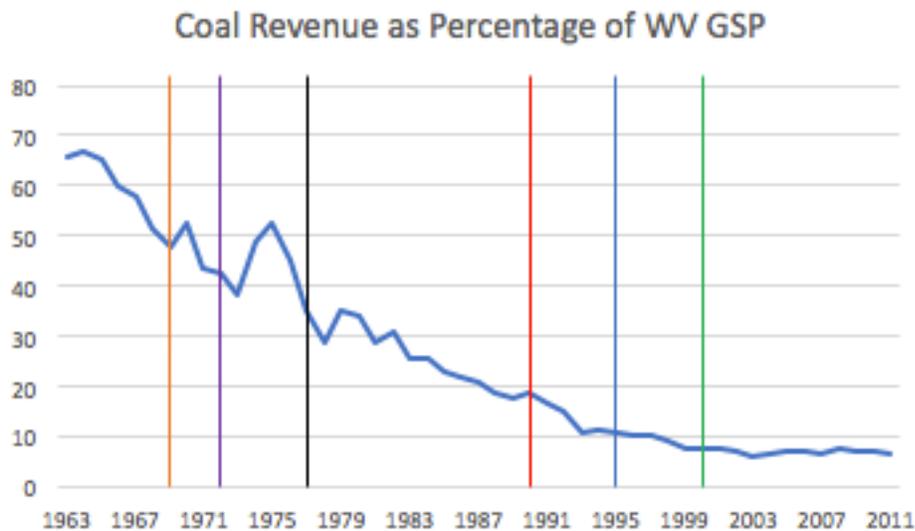


Figure 5B: Coal Revenue as a Percentage of West Virginia GSP (West Virginia Office of Miners' Health, Safety, and Training). Unexpectedly, coal's role in West Virginia's economy seemed to increase following legislation in the 1970s. However, this is likely a coincidence because these laws did not have immediate effects on the economy. In the 1990s, the role of coal seemed to decline slightly as Phases of the CAAA were initiated.

## Coal Consumption

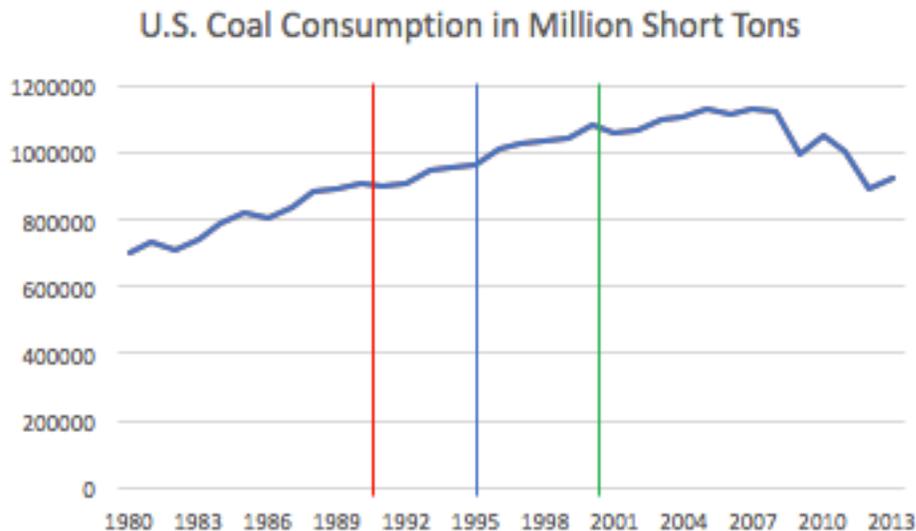


Figure 6B: U.S. Coal Consumption (U.S. Energy Information Administration).

Surprisingly, coal consumption in the United States increased following the CAAA and its two phases.

## U.S. and West Virginia Economy Graphs with Regulation Enactment Timeline

### Gross Domestic (State) Product

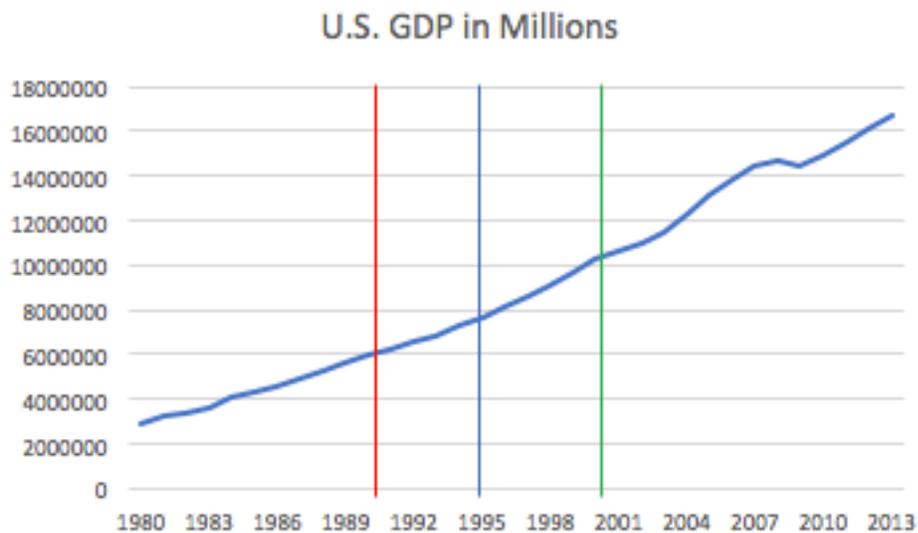
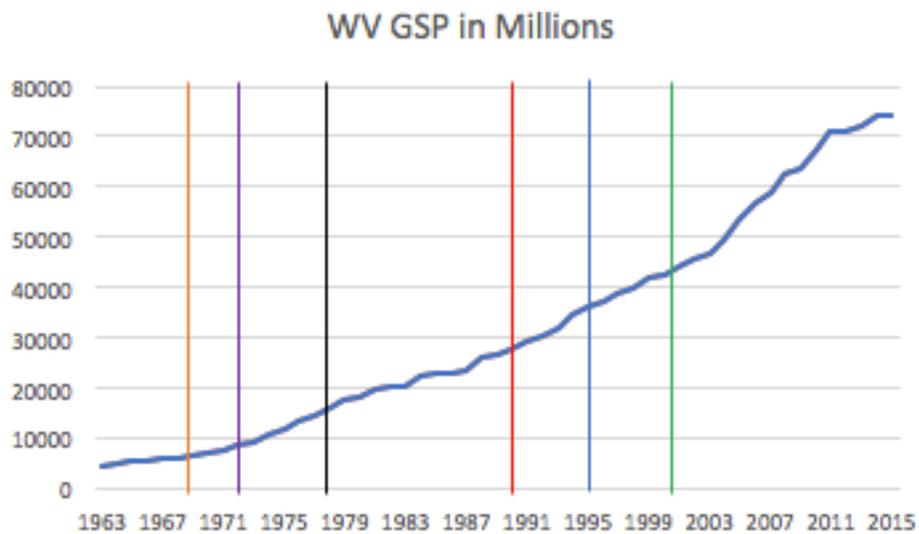


Figure 7B: U.S. GDP (Trading Economics). Based on this graph it does not appear that CAAA affected U.S. GDP.



Figures 8B: West Virginia GSP (West Virginia Office of Miners' Health, Safety, and Training). Similarly, environmental regulations passed in the 1970s and 1990s did not seem to have any significant impact on West Virginia's gross state product.

## Unemployment Rate



Figure 9B: U.S. Unemployment Rate (U.S. Bureau of Labor Statistics). Unemployment rate declined following the Phases of the CAAA, so it would be odd to say that it contributed to unemployment.

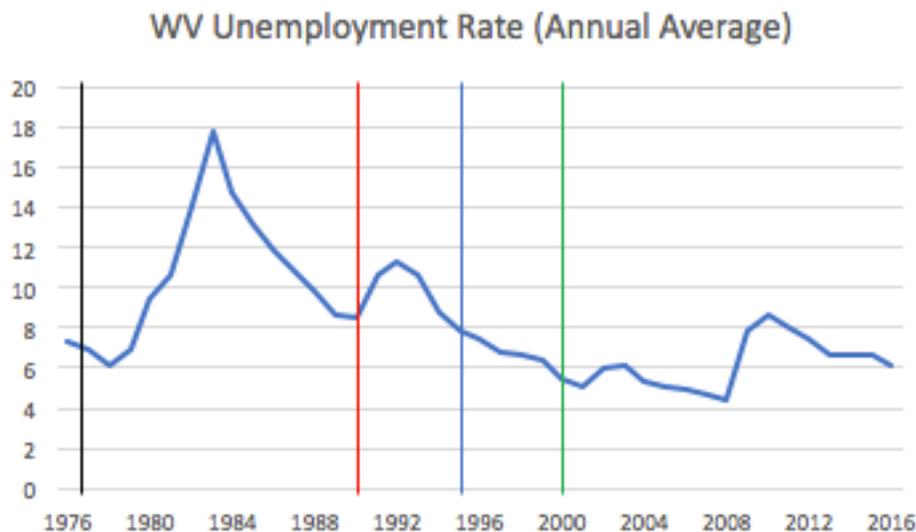


Figure 10B: West Virginia Unemployment Rate (U.S. Bureau of Labor Statistics).

Although the unemployment rate declined following the Phases of the CAAA, it is unclear if this was a direct result of the legislation. But interestingly, the massive increase in unemployment in West Virginia in the 1980s may have been a result of legislation in the 1970s. As previously mentioned, the CWA was enacted in 1972 and SMCRA in 1977, but their impacts were not immediate because surface mining was not a popular method. However, part of the CWA called for stricter regulation surrounding coal extraction and stream protection. As a result, coal companies found themselves being limited in their ability to initiate new projects. This limitation combined with decades of improvements to technology are responsible for the massive layoffs between 1982-1983 (Lobao et al 2016, 355; Stevens 1986).

### **Does Coal Mean Jobs?**

Today, coal does not mean jobs. Coal mining, particularly MTR mining, is a highly-mechanized process requiring mining “technicians” rather than traditional coal laborers. Coal does not mean jobs because mining productivity has increased fivefold since World War II

(Brisbin 2008, 25; West Virginia Office of Miners' Health, Safety, and Training). In other words, each modern coal worker five times more coal than a coal worker would in 1948. But if coal does not mean jobs, then why do political figures continue to act otherwise? Trump and Justice, among many others, come from an older generation of Americans. When they were growing up coal *did* mean jobs, and coal meant jobs for their parents too. As I have previously emphasized, the coal means job is very powerful because it permeated multiple generations, creating an illusion that it would hold true forever.

The mismatch between political rhetoric and reality demonstrates how politics do not always keep up to date. By continuing to emphasize the mantra, it seems that coal advocates could be denying the truth (or ignoring it), or they have ulterior motives. For example, promising to return jobs is politically useful especially when considering West Virginia's intergenerational ties to coal. Former coal miners, or any industry worker, would leap out of their seats at the mention of getting their jobs back, as would most laid-off workers. In other words, echoing coal means jobs is politically advantageous even if the mantra is not true.

### **Did Environmental Regulations Kill Jobs?**

At first glance, the enactment of SMCRA and CWA correlates with high unemployment rates in the 1980s in West Virginia. Upon closer examination, there were other factors contributing to the decline in coal jobs such as a rise in productivity allowing for fewer workers to accomplish the same levels of production (Lobao et al 2016, 355; Stevens 1986). However, regulations clearly shaped demand for coal, particularly through the 1990 Clean Air Act Amendments passed under the Reagan Administration. But shaping the demand for coal is not

the same as killing jobs. Ultimately, coal companies are responsible for jobs, so blaming the regulations is merely a way to obscure the companies' agency in their relationship with workers.

Also, I have concluded that "coal does not mean jobs," so it is difficult to argue that regulations are responsible for killing jobs if there are far fewer of them regardless of legislation. But at the same time, the regulations were not completely neutral. For example, one could argue that regulations hurt jobs by limiting the expansion of coal extraction. SMCRA and CWA prohibited MTR in areas close to wetlands, streams, or high mountaintops. But when the coal is extracted the jobs dry up with it, and the same holds true for any extractive industry.

Yes, the regulations prevented extraction of coal from areas where it is known to exist, but we must keep in mind why the laws came to be in the first place. SMCRA, CWA, and CAA(A) aim to protect sensitive ecosystems that are often overlooked by the public. Wetlands help filter drinking water and erosion poses risks to communities living near mountains or below them. The CAA(A) poses restrictions on the toxins released during coal extraction and coal combustion. These toxins, such as sulfur dioxide, have real consequences that cannot be ignored (Hays 1998, 222; Manuel 2009, A498).

### **Conclusion**

There are important implications to Trump's false claims that environmental regulations have hurt American coal jobs. Mainly, it suggests that he does not fully understand the American coal economy. Or, if he disregards this reality, then his appeals to West Virginia voters and other coal-mining regions in the 2016 Presidential Election are highly questionable. Perhaps, his rhetoric was a thinly-veiled appeal to workers of a previous generation, one in which coal did mean jobs. However, my research indicates that coal has been declining for several decades,

regardless of any regulations. Given that Justice and Trump are repeating a false claim, it is important for workers to question the political motivations behind their promises because workers who are desperate for work can easily succumb to demagoguery.

At a certain point in the debate, your political ideology will steer you towards your conclusion on the debate about coal, jobs, and the West Virginia economy. If you are a pro-growth economist that is not fazed by externalities associated with coal extraction, you will oppose the regulations I have identified. However, if you understand the importance of protecting sensitive ecosystems, drinking water, and clean air, you will likely prefer to keep the legislation. I believe the regulations are so crucial to protecting the environment that limiting coal expansion is worth the potential job creation that would emerge from expansion.

Lastly, despite the economic hardships, West Virginians should be hopeful about their future. Coal once represented over 65% of West Virginia's revenue, but as of 2011 it represents less than 7%. This shows that West Virginia has already been pursuing new avenues in development and relies far less heavily on one industry than ever before. West Virginia also possesses an extensive and diversified offering of natural and manmade attractions. This is seen in its beautiful mountain ranges, unique ecosystems, and the many towns that capture the state's Appalachian culture. Clearly, West Virginia hosts a wealth of other resources that can be used to foster an economy that departs from coal (Means 2012, 3). The declining role of coal in West Virginia combined with the development of new industries will allow the economy in West Virginia to flourish once more.

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