

2016

# WEST VIRGINIA ECONOMIC OUTLOOK

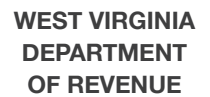
## ON THE COVER

The town of Harpers Ferry, long considered a historic community and a driver of tourism in West Virginia, sustained a fire in July that destroyed 30 percent of its business district. West Virginia University has since committed to help rebuild the damaged areas and lifting the small town back on its feet through its support and expertise.

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# WEST VIRGINIA ECONOMIC OUTLOOK

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## Greetings!

I am happy to present the *2016 West Virginia Economic Outlook* to you. My intent is for this document to serve as a thorough and rigorous reference for where our state's economy is today and where it is likely heading in coming years. And my sincere hope is that you will find this document useful as you lead your business, government agency, or community organization through the economic opportunities and challenges we face in West Virginia.

Since the 1940s, our mission here at the Bureau of Business & Economic Research, a unit within WVU's College of Business & Economics, has been to serve the people of West Virginia by providing you, the state's business, policymaking, and advocacy communities, with reliable and timely data as well as rigorous applied economic analysis. We hope that the data and analysis we provide ultimately enables you to design and implement better business practices and public policies.

Our research is sponsored by public- and private-sector clients throughout West Virginia and nationally. For instance, our recent public-sector clients include the West Virginia Legislature, the West Virginia Department of Revenue, the West Virginia Higher Education Policy Commission, the American Cancer Society, and the Appalachian Regional Commission. We have also been engaged by several private-sector companies in the state.

Please feel free to call on me personally anytime concerning your economic research needs. We are always interested in pursuing new opportunities to provide research and data in areas such as public policy analysis, health economics, energy economics, economic development, economic impact analysis, economic forecasting, tourism and leisure economics, and education policy, among others.

To learn more about our research, to find contact information for myself or any of our staff, or to find an electronic version of this document, please visit our website at <http://be.wvu.edu/bber>.

Sincerely,

**John Deskins**

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## Executive Summary

West Virginia's economy has struggled over the past year, primarily driven by the state's energy sector, where continued losses in coal jobs have been coupled with what we believe is a temporary slowdown in natural gas. In this report we present a detailed discussion of the current state of the West Virginia economy along with our forecast for the likely path of economic activity over the next five years. Overall, this report provides a broad and detailed foundation to help you understand the long-run economic challenges and opportunities facing West Virginia.

### Highlights related to West Virginia's recent economic performance are as follows:

- After consistent and healthy job growth between 2010 and mid-2012, **the state has seen employment decline for much of the last three years, with a cumulative loss of nearly 8,000 jobs.** On a positive note, payrolls have increased on a year-over-year basis in the past two quarters, pointing to some stabilization.
- **A significant portion of the state's job losses can be traced to the downturn in the coal industry, as well as weak levels of construction activity.** Over this period, job gains have been recorded in the state's oil and gas industry, as well as a handful of service-providing industries, but these gains fail to offset the losses in coal.
- **After falling steadily over the course of 2014, the state's unemployment rate has spiked in the past two quarters.** West Virginia's jobless rate is at its highest level in more than two years.
- **Only 53 percent of West Virginia's adult population is either working or looking for work.** This is the lowest rate of labor force participation among all 50 states. This problem represents a significant hurdle for long-run economic prosperity.
- **Per capita personal income in West Virginia grew at a stronger pace in 2014, rising 3.1 percent to approximately \$36,600.** The state has recorded a measurably faster average annual rate of per capita income growth compared to the nation since 2008. Despite this growth, however, per capita personal income in West Virginia stands at only 79 percent of the national average.
- **West Virginia's real GDP expanded 2.4 percent during 2014.** Changes in total state economic output have fluctuated significantly in recent years, due primarily to diverging performances in the state's linchpin energy industries.
- Export activity from West Virginia has been quite volatile over the past decade. **Promoting the state's export potential is of vital importance to economic development in West Virginia in the long run.**

FIGURE ES.1: West Virginia and US Forecast Summary

	West Virginia		United States	
	2004-2014	2015-2020	2004-2014	2015-2020
Population (average annual growth, %)	0.2	-0.1	0.8	0.8
Employment (average annual growth, %)	0.2	0.5	0.5	1.2
Real GDP (average annual growth, %)	1.0	1.5	1.6	2.7
Unemployment Rate (annual average at end of time period, %)	6.5	5.8	6.2	5.0
Real Per Capita Personal Income (average annual growth, %)	1.7	1.8	1.1	2.3

Sources: US Census Bureau; Workforce WV; US Bureau of Labor Statistics; US Bureau of Economic Analysis; WVU BBER Econometric Model; IHS Economics

### The energy sector is an important driver of economic activity in the state:

- **Coal output has fallen by around one-third since 2008, with the losses occurring in the state's southern coalfields.**
- **Natural gas output has grown by at least 35 percent per year for each of the past four years.**
- **Total GDP from natural gas is expected to equal that of coal in the near future. GDP from natural gas was equivalent to around 12 percent of that of coal less than a decade ago.**

### Highlights related to West Virginia's economic outlook are as follows:

- **Employment in West Virginia is estimated to increase 0.5 percent per year on average through 2020, compared to an expectation of 1.2 percent for the nation as a whole.**
- **Our baseline forecast calls for job losses in coal to subside within the next two years; however, the outlook is subject to considerable downside risk depending on the environmental regulatory climate and conditions in the global coal market.**

- **Low prices and regional infrastructure bottlenecks will weigh on the natural gas industry over the next year or so. We anticipate conditions will improve considerably in 2017 thanks to new pipeline capacity and expanded natural gas use in electricity generation.** Overall, production and employment are expected to increase at an average annual rate of around 10 percent and 3 percent, respectively, through 2020.
- Construction is expected to add jobs at the fastest rate going forward, but **the service-providing segment will tend to pace the state's overall performance during the next five years**, led by professional and business services and healthcare.
- **The state's unemployment rate is expected to remain at or above 7 percent through early-2016**, but will fall over much of the outlook period, declining to the upper-5-percent range by 2019.
- **Per capita personal income is expected to grow at an annual average rate of 1.8 percent over the next five years**, below the national rate of 2.3 percent. Growth will be driven largely by non-wage income, such as Social Security benefits.

**A key concern for The Mountain State moving forward relates to its underlying demographics. Consider the following:**

- **West Virginia's population has declined over the past two years, and we project the state to lose around 23,000 residents over the next 20 years.**
- **A positive shock to encourage in-migration is essential to lessen the severity of natural population decline.**
- The state's population is significantly older than the nation as a whole, and will continue to age in coming years.
- The state's population is relatively unhealthy and ranks at or near the bottom among the 50 states along many basic health outcome measures.
- **Economic development strategies should focus on ways to improve health and education outcomes in the state to make West Virginia's workforce more attractive to potential businesses.**

**Economic performance is expected to remain extremely variable across West Virginia's counties. Consider the following:**

- While the state overall is expected to lose population in coming years, **18 counties are expected to add residents.** Population gains will be heavily concentrated in North-Central West Virginia and the Eastern Panhandle.
- Six counties are expected to lose jobs in coming years and expected growth rates among the remaining counties vary widely. **The highest rates of job growth tend to be in the northern half of the state.**
- **Policymakers should be keenly aware of significant economic differences across West Virginia and ensure that economic development strategies consider each region's specific strengths and weaknesses.**

**While the US economy has still not achieved its full potential after the Great Recession, numerous economic indicators have improved substantially over the past two years and several signs provide hope for a sustained US economic expansion:**

- **US real GDP growth is expected to improve to a rate of around 2.7 percent annually over the coming years**, which will be more consistent with long-run patterns.
- **Employment growth has improved considerably over the past year or so.** Overall the US has added between 200 thousand and 250 thousand jobs during the typical month over the past two years, representing a significant improvement over growth observed through most of 2009 through 2013. **However, total employment remains below the economy's full-employment level.**
- **The US unemployment rate has continued to improve steadily over the past year and stands at its lowest level in over 6 years.** The rate is expected to continue to fall slightly over the near term and then stabilize.
- **Threats to our generally positive outlook for the US economy should be considered.** These include the following: weaker economic outcomes in the economies of major US trading partners – particularly China and Europe – could threaten exports and global economic stability; the question of long-run sustainability of the US federal budget; and the coming rise in interest rates.

## CHAPTER 1: The United States Economy

### OVERVIEW

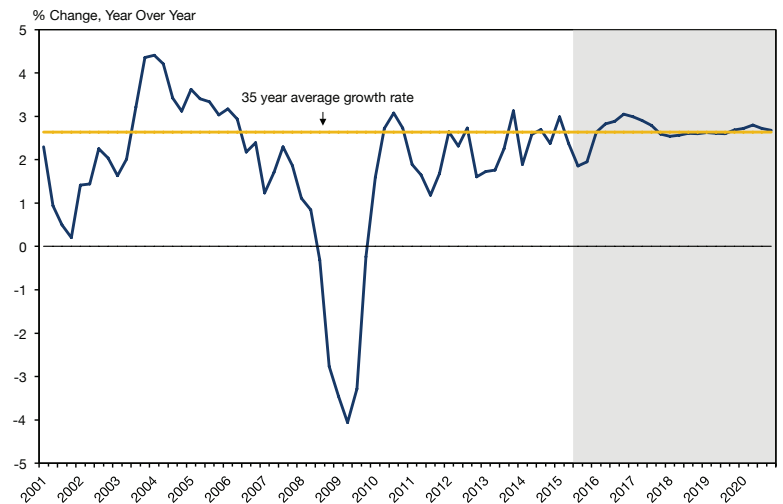
The United States economy remains below its full economic potential despite five years of growth after the Great Recession.<sup>1</sup> This recovery, which began in mid-2009, has proven to be the most lethargic, by most measures, of any economic recovery in the post-World War II era in the United States. However, several fundamental encouraging signs of economic growth are apparent—such as a significant rise in employment growth in recent months—that provide hope for a stronger economy moving forward. In this chapter we a) explore recent trends in the United States economy, b) provide a forecast of how the US economy is likely to evolve over the near-term, and c) explore several major challenges that have the potential to threaten the US economic recovery.

### RECENT TRENDS AND SHORT-TERM ECONOMIC OUTLOOK

**GDP** After the United States' total economic output fell by more than 4 percent over the course of the 2007 to 2009 recession, growth has generally stayed below the nation's long-run average during the six years of economic recovery we have experienced to date. As illustrated in Figure 1.1, economic growth, as measured by Real Gross Domestic Product (GDP), has grown at an average annual rate of around 2.3 percent in the recovery period, noticeably below the economy's long-run average over the past 35 years. This growth has been slow enough such that, after five years, economic output, and correspondingly employment, still fall somewhat short of what is considered to be the economy's sustainable long-run potential. After a sluggish first quarter to start 2015, real GDP growth accelerated to a healthy 3.7 percent increase during the second quarter. Given generally stronger growth over the past year, combined with signals gleaned from many leading indicators, the economy should see growth tend toward an annualized rate of around 2.7 over the next five years, which is much more consistent with long-run national economic trends.

**CONSUMPTION** Spending on consumer goods and services, which is by far the largest component of GDP, has shown a great deal of relative stability over recent years, as is typically the case. While growth in consumer spending has fallen short of the rate that prevailed before the recession, growth is expected to gradually return to a pre-recession norm over the coming few years. Several factors that have suppressed consumer spending in recent years - such as reduction in household debt levels (which leaves less room for consumer goods), weak housing prices, and low consumer confidence - seem to be abating. Despite this

**FIGURE 1.1: United States Real GDP Growth**



Source: US Bureau of Economic Analysis and IHS Economics

Note: Based on quarterly data; figure is adjusted for inflation.

expected gradual improvement, however, consumer spending will buoy the economy but will not likely enhance the overall pace of economic expansion.

**INVESTMENT** Spending on investment goods—capital goods that will enhance future productivity, such as industrial facilities and equipment—has been far more volatile over the recent business cycle. Total investment spending collapsed at an annualized rate of more than 20 percent at the nadir of the recent recession, then recovered rapidly, growing at a rate of between 5 percent and 8 percent over much of 2010 through 2012. Growth in investment spending diminished somewhat in 2013, perhaps due in part to the expiration of federal tax investment incentives, which likely shifted investment to the prior year. Investment growth was stable for 2014, but is expected to be somewhat lower for 2015 due in large part to pullbacks in capital spending by energy companies in the face of low crude oil and natural gas prices. Investment activity is expected to return to a growth rate of approximately 6 percent over the coming two years and is looked to as a modest potential source of future economic growth. However, consistent with its volatile nature, capital investment activity is uncertain, and there are potential challenges that raise doubt about whether businesses will enhance their investment activities as expected. We discuss several of these major concerns below.

**EXPORTS** US exports, while a relatively small share of total output, were nonetheless an important contributor to the volatility in GDP over the recent business cycle, and are also viewed as a potentially important

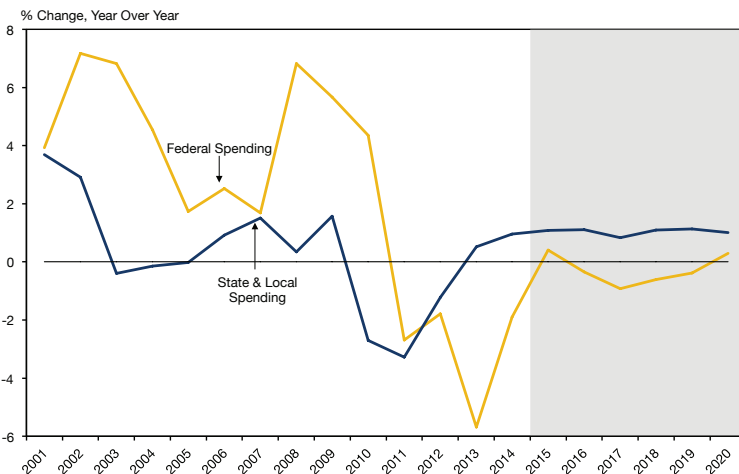
1. This section represents the authors' review, analysis, interpretation, and summary of information presented in the International Monetary Fund's World Economic Outlook (2015) and IHS Economics' US Economic Outlook (2015).

source of future economic growth. Exports have shown extreme volatility over the past several years. The value of total US exports collapsed at an annualized rate of nearly 30 percent during the pit of the recent recession, exploded at an annual rate of more than 15 percent in early-2010, fell through much of 2011 through 2013, and net exports grew at a healthier rate in 2014. Much of this volatility in exports is driven by fluctuations in economic growth rates in important US export markets, such as China and the European Union. Net export growth is expected to be noticeably stronger over the next two years, due in part to low oil prices, which lower the U.S. import bill, and a weaker dollar. Unfortunately, in the same vein as investment activity, the health of US exports is uncertain given the myriad sources of potential economic pressure across the world, such as the ongoing economic struggles in

Europe, a potential economic slowdown in China, sluggish economic growth in Japan, and political unrest in many other parts of the world.

**GOVERNMENT SPENDING** The recent evolution of government spending in the US is represented in Figure 1.2. Total federal, state, and local government spending, which amounts to around one-third of US GDP, increased substantially during the recent recession in 2008 and 2009. This rise was driven by a concerted economic stimulus effort that actively increased government spending and as safety net expenditures rose naturally as the economy went into recession. After the economic recovery started to become relatively more consistent by 2010, inflation-adjusted government spending decelerated rapidly and started to decline outright, reaching an annualized rate of decline of around 3 percent by 2011 for both federal and state and local government spending.

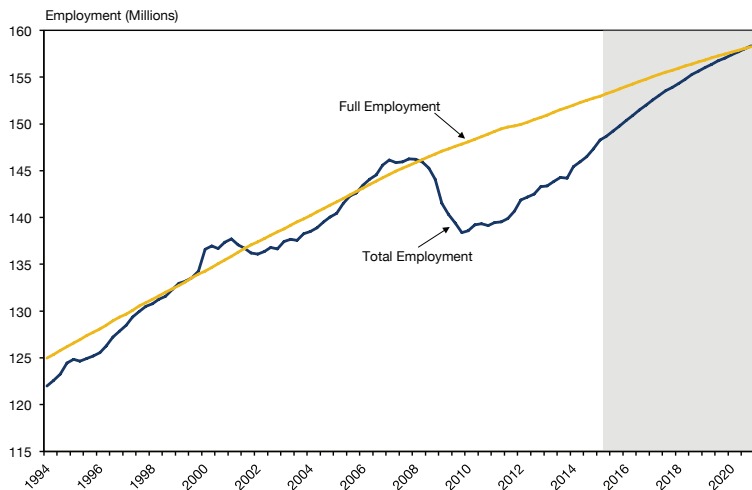
**FIGURE 1.2: Growth in the United States Government Spending**



Sources: US Bureau of Economic Analysis; IHS Economics.  
 Note: Figure is adjusted for inflation.

Federal government spending continued to decline further, reaching an annual rate of decline of nearly 6 percent in 2013, and a decline of around 2 percent in 2014. This removal of government spending held down broader economic growth in a direct sense to some degree, since much government spending is itself part of economic output. Federal government spending is expected to increase slightly in 2015, but will likely exhibit modest declines for a couple years thereafter. State and local government spending began rising in 2013 and is expected to continue to grow at a rate of around 1 percent annually – a modest pace, but noticeably faster pace than that at the federal level. A continued decline in transfer payments from the government, as unemployment has continued to fall, is a major contributing factor to the recent reduction in federal government spending; the expected flatness for 2015 is driven largely by the return of unemployment to a point close to its long-run level.

**FIGURE 1.3: United States Total Employment**



Sources: US Bureau of Labor Statistics and IHS Economics

**EMPLOYMENT** Job growth was sluggish through much of this economic recovery since 2009. It is not uncommon for employment to recover more slowly than output, as businesses typically increase output through eliminating excess capacity, through capital investment, and through increasing worker hours, before adding new workers. But employment has become increasingly slow to recover: employment growth in each recession of the past two decades—in the early-1990s, the early-2000s, and through the recent cycle—has progressively slowed compared to earlier recessions of the modern era. As depicted in Figure 1.3, total US employment fell substantially during the recent recession, with an overall loss in excess of 7 million jobs. Employment growth since early-2010 has been slow such that, the US reached its previous employment high of approximately 146 million,

set in 2007 in the fall of 2014.<sup>2</sup> Further, the degree to which the US economy fell below its full sustainable level of employment (termed “full employment” in Figure 1.3) was the most severe of any recession in the modern era. The US economy remains below what is considered to be its sustainable level of employment. Employment growth has been consistently stronger over the past two years with the addition of around 250 thousand jobs in a typical month. We expect this accelerated rate of employment growth to continue through at least the coming year. Despite these anticipated gains, however, we expect the US economy will remain below full employment nearly until the end of the decade.

**UNEMPLOYMENT** Turning to the unemployment situation, as noted in Figure 1.4, the national unemployment rate peaked at 10 percent during October 2009. This was the second-highest rate experienced during the post-World War II era, exceeded only by the 1982/1983 recession (a peak of 10.8 percent in late-1982). Unemployment has improved substantially over the past four years and the pace of improvement has picked up in the past year. Currently, the US unemployment rate is at its lowest level in seven years. Unemployment is forecast to continue to improve slightly over the year or so, after which it will likely remain at a relatively stable level. The US economy is now very close to what is believed to be its lowest sustainable rate of unemployment - a rate in the 5 to 5.5 percent range.

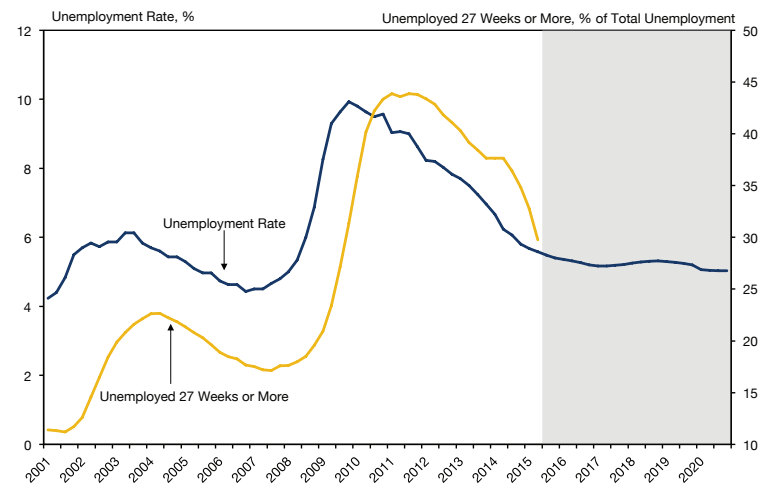
It is worth noting that the share of all unemployed persons who have endured long unemployment spells (typically defined as 27 weeks or more) rose substantially during the recent recession, and remains at a level that is still well above the historic average. As illustrated, the share of all unemployed persons who have been unemployed for the long term rose from 17 percent of unemployed persons in 2007 to around 44 percent by 2010, and remains at around 30 percent. However, as illustrated, the figure has improved dramatically in the last year.

There are two common criticisms associated with the conventional unemployment rate, as reported in Figure 1.4. The first is that the figure does not account for workers who are only able to find part-time work, but who would prefer full-time work. The second relates to discouraged workers. The idea is that if one is looking for work for an extended period of time and is unsuccessful at landing a job, the individual may become discouraged and quit looking for work altogether. When this happens, the person is no longer counted as

“unemployed” by the conventional measure, since the conventional measure only considers people who are actively looking for work. For both of these reasons, the conventional unemployment rate provides an underestimate of the severity of the unemployment situation.

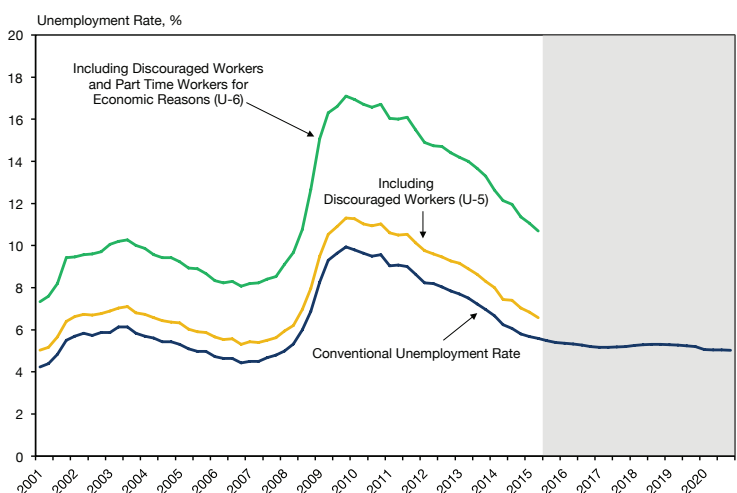
In Figure 1.5 we report the conventional unemployment rate, as reported in the previous figure, along with a measure that also includes discouraged workers (U-5), as well as a measure that includes workers who are only able to find part-time work for economic reasons (U-6). It is important to note that these criticisms are legitimate and that “true” unemployment is substantially higher than the conventional statistic indicates. However, it is also important to note that the movement of the three figures over time is quite consistent. Ultimately, despite the level differences in the figures, it

**FIGURE 1.4: United States Unemployment Statistics**



Sources: US Bureau of Labor Statistics and IHS Economics  
 Note: Based on quarterly data.

**FIGURE 1.5: United States Unemployment Statistics**



Source: US Bureau of Labor Statistics and IHS Economics  
 Note: Based on quarterly data.

2. The statement that employment in the US economy is approximately equal to its 2007 high does not account for population growth over the period; doing so would darken the employment growth figure.

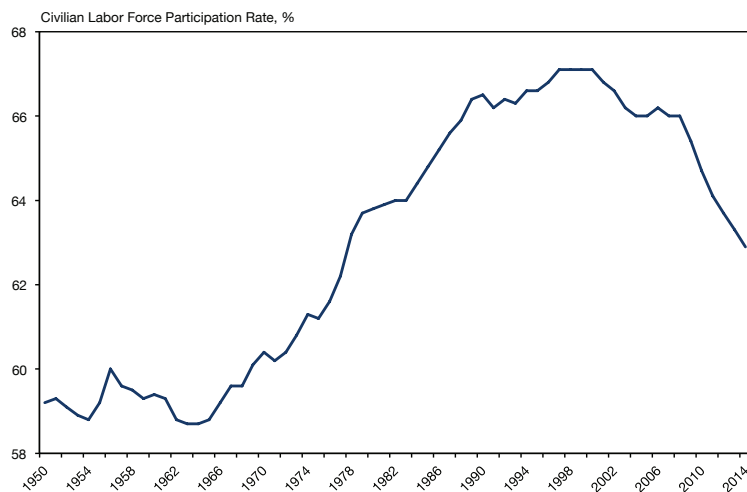
is clear that the unemployment situation has improved substantially since 2010 regardless of which particular measure is considered.

**LABOR FORCE PARTICIPATION** The labor force participation rate is a complementary measure to the unemployment rate. The labor force participation rate captures the share of the adult population that would like to work - termed “in the labor force” - while the unemployment rate captures the share of the labor force that is unable to find employment at any given month. Ultimately, the labor force participation rate is a more fundamental descriptor of an economy’s long-run employment situation.

In Figure 1.6 we report labor force participation for the US since 1950. As illustrated, the figure peaked

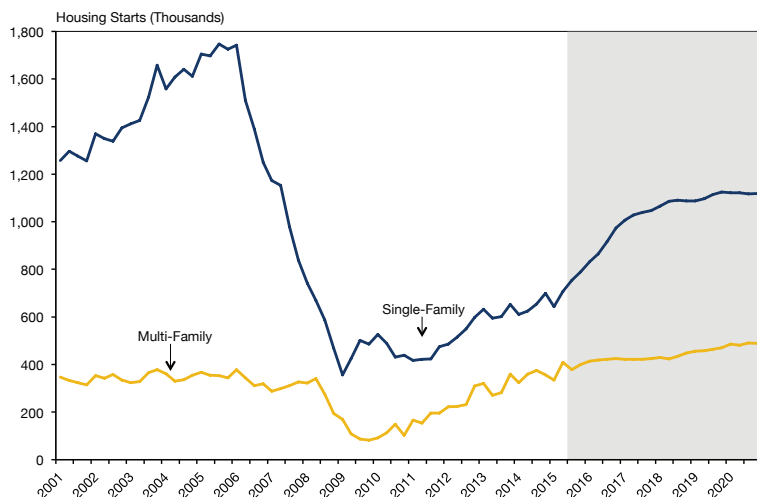
around 2002 at 67 percent and has fallen substantially since 2008 now standing at nearly 63 percent. The broad evolution of this figure is largely driven by demographic processes, namely the emergence and aging of “Baby Boomer” population. Notice that the figure began to rise substantially around 1965, when the first of the “Baby Boomers” turned 20 years old. The figure continued to rise through around 1998, when the first of this group turned 55 years old. Then the figure began to decline substantially around 2008, when the first “Baby Boomers” were approaching 65 years old and leaving the labor force for retirement. The increase was also largely driven by a substantial rise in female labor force participation that occurred from after World War II through the mid-1990s. The recent decline in labor force participation is an important consideration to the nation’s long-run economic growth potential as the nation is faced with fewer workers to support more retirees. Many of the economic challenges below interact with a lower rate of labor force participation in the long run.

**FIGURE 1.6: United States Labor Force Participation Rate**



Source: St. Louis Federal Reserve

**FIGURE 1.7: United States Housing Starts**



Sources: US Census Bureau and IHS Economics  
Note: Based on quarterly data.

**HOUSING** As is well known, the catalyst for the recent financial crisis and economic recession was the dramatic decline that was suffered in the housing market from 2007 to 2009. Single-family housing starts have shown notable improvement over the past three years, rising from 475 thousand in early-2012 to 755 thousand by mid-2015. As illustrated in Figure 1.7, the forecast shows continued optimism in calling for rapid improvement over the next two years or so before construction activity begins to stabilize around 2017. Multi-family housing starts returned to their pre-recession level around early-2013, and are expected to hold within a fairly small range over the forecast horizon.

**CONSUMER CONFIDENCE** While recessions typically have a catalyst in some exogenous shock (such as the bursting of a housing bubble), falling consumer sentiment is often the key driver of demand during recessions. Typically, the initial recession catalyst reduces demand directly, and thereby output. This drop in output reduces confidence, which reduces demand further, and a vicious cycle ensues. On the upswing of the business cycle, an economic system is unlikely to ever achieve its full potential until confidence is restored.

As reported in Figure 1.8, US consumer confidence was in free fall in 2007 and 2008, and hit its all-time low in 2009.<sup>3</sup> However, despite a brief setback during the summer of 2011 when fears of a double-dip US recession emerged, consumer confidence has generally moved higher, although in a jagged manner, since

<sup>3</sup> Economists have tracked consumer confidence since 1968.

2009. The overall upward trend accelerated in the second half of 2014, and now stands roughly on par with pre-recession levels.

**CHALLENGES FACING THE US ECONOMY**

**GLOBAL ECONOMIC SLOWDOWN** While the US economic outlook is improving, the recovery remains fragile as numerous potential threats to sustained growth exist. Prominent on this list is the possibility of an economic slowdown among the nation’s primary trading partners, which could threaten US exports and could create instability along other dimensions. In Figure 1.9 we illustrate the country of origin for world economic output in 2000 and preliminary estimates for 2015. Overall, economic output in China has risen by a factor of around 4.5 over this period, and as such, Chinese output has expanded to where it now constitutes 15 percent of world output, up from just 4 percent 15 year ago. This growth corresponds to a substantial shrinkage in the relative roles of the US and Europe in producing world economic output.

Economic growth is expected to be relatively slow in China, Japan, the Euro zone, and for the world as a whole in coming years. Economic output in the European Union (EU), which receives nearly one-fifth of total US exports, is less than it was in 2007, after experiencing two recessions in the interim. There growth is expected to be weak for some time.

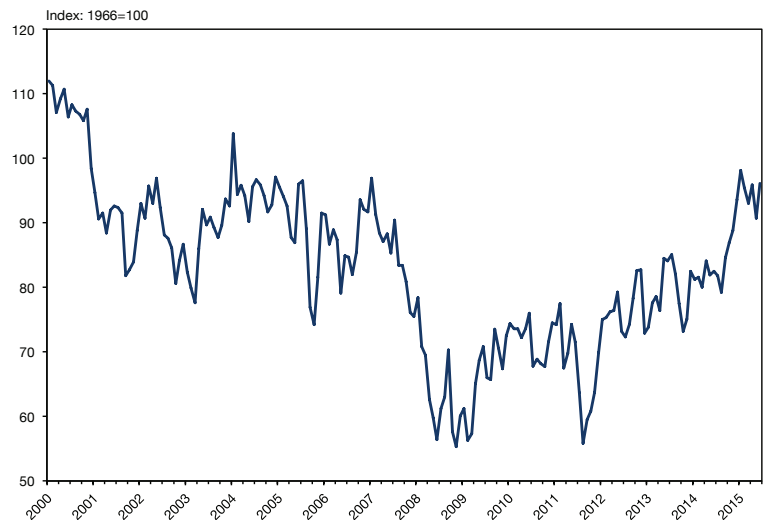
**CHINA** While GDP in China has grown by an average annual rate of around 10 percent for more than a decade, growth in coming years is expected to slow down to around 6 percent annually. While this expected rate of growth still well exceeds the global average, it is lower than what the country has experienced over most of the past two decades and is dangerously low compared to growth in the country’s labor force. If Chinese growth continues to slow, it could impact the US economy, especially given that China accounts for over 7 percent of US exports. In addition, there remains much uncertainty regarding the stability of the Chinese economy, as reflected in recent turmoil in global equity markets during the summer of 2015. Furthermore, Japan’s economy has remained sluggish for two decades and this trend will likely continue going forward as real GDP growth in Japan is expected to be in the one-percent-range in coming years.

Although the situation has improved markedly in recent years, issues related to the long-run sustainability of the US federal government budget remain a potential concern for long-run economic growth. As such, we explore US federal government budgetary issues through figures 1.10 through 1.12.

**FEDERAL GOVERNMENT DEBT** As depicted in Figure 1.10, federal debt held by the public, which hovered between 31 percent and 35 percent of GDP between 2000 and 2007, began rising dramatically in 2008 as tax revenues plunged and the federal government ramped up spending in part to stimulate the weakening economy. As of mid-2015, the figure was around 73 percent of GDP, a rate that is far above the post-World War II average of around 44 percent. The figure is forecast to remain relatively stable over the next five years. However, in the long-run (not shown) the figure is forecast to explode given the aging of the US population and the additional public benefits that an older population receives, barring any change in public policy.

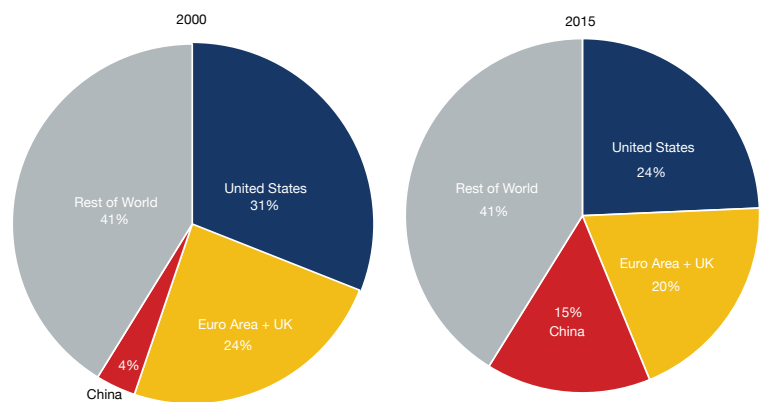
A public debt level that surpasses a critical level can be detrimental to long-run economic prosperity if the

**FIGURE 1.8: Index of Consumer Sentiment**



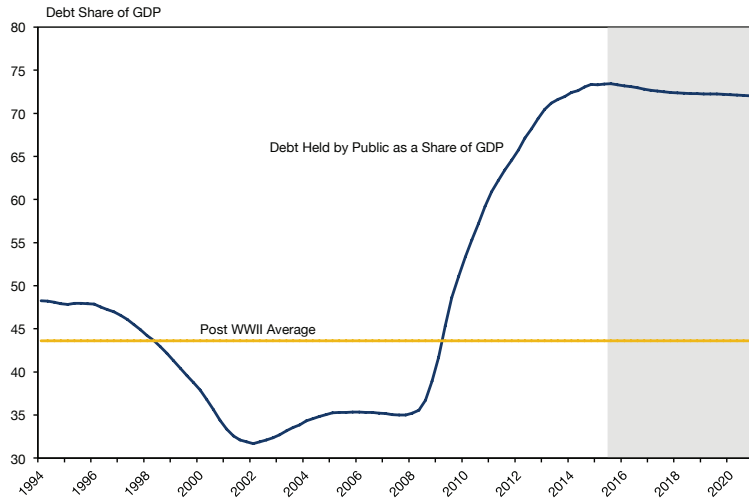
Source: Thomson Reuters and University of Michigan Surveys of Consumers.

**FIGURE 1.9: World GDP by Country**



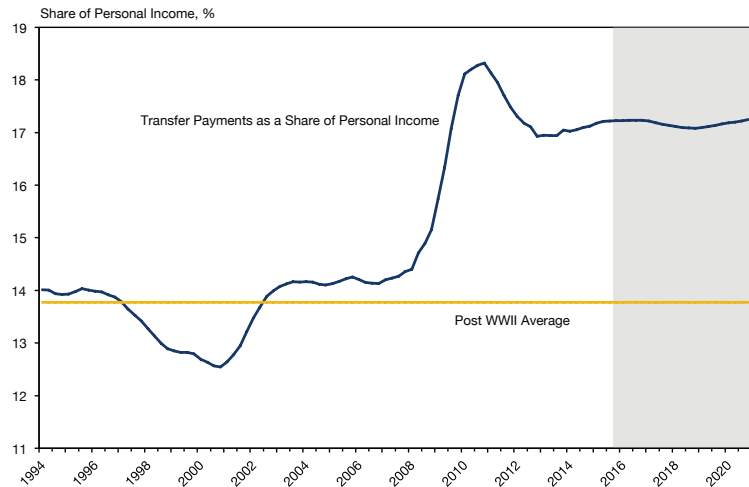
Source: International Monetary Fund World Economic Outlook

**FIGURE 1.10: US Federal Debt Held by the Public as a Share of GDP**



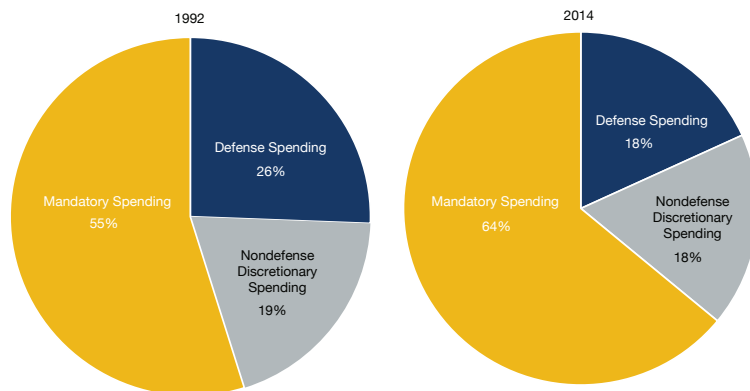
Sources: US Bureau of Economic Analysis; IHS Economics

**FIGURE 1.11: US Transfer Payments as a Share of Personal Income**



Sources: US Bureau of Economic Analysis; IHS Economics

**FIGURE 1.12: Components of US Federal Government Spending**



Source: International Monetary Fund World Economic Outlook

public debt becomes large enough that it crowds out private-sector savings and investment activity—a key driver of productivity growth in the long-run. In a similar vein, while the historical average deficit/GDP ratio is around 2 percent, the ratio surged to nearly 10 percent in 2009—its highest level since the World War II-era. After remaining at an exceptionally high level through 2012, the ratio has fallen substantially as the US economy has improved and federal spending has fallen in response to the winding down of military operations and sequestration. The deficit for 2015 is expected to be around 2.7 percent of GDP, and is predicted to fall through 2016 and remain relatively stable through the short-term. However, the deficit is expected to rise substantially over the longer-term (not shown in the figure) due to the reasons described above.

**TRANSFER PAYMENTS** The recent dynamic involving US federal government debt is closely related to the increase in transfer payments from the US federal government. Examples of transfer payments include Social Security, unemployment benefits, welfare benefits, Medicare, and Medicaid. As illustrated in Figure 1.11, transfer payments increased substantially in 2008, reaching a high of more than 18 percent of personal income, compared to a post-World War II average of just under 14 percent. This increase is attributable to two major factors: a) falling income and rising unemployment during the recession, and b) more generous public policy, such as the extension of unemployment benefits. Since recovery began, the share has fallen to just over 17 percent of GDP and is expected to remain stable for the near term. In the long-run, the figure is expected to rise again substantially with the aging of the US population, barring any policy changes, such as a reduction in benefits and/or an increase in the social security retirement age.

In Figure 1.12 we report the composition of US federal government spending for 1992 and 2014. As illustrated, mandatory spending, which is primarily composed of transfer payment spending such as Social Security, Medicare, Medicaid, unemployment insurance, and the like, rose to 64 percent of all federal spending in 2014, up from 55 percent in 1992, largely the result of an aging population. At the same time, defense spending fell to 18 percent of total spending, down from 26 percent in 1992. Nondefense discretionary spending has remained relatively constant as a share of total spending. If the long-term debt burden is to be reduced, it will have to be accomplished through either higher taxes, or a reduction in one of these areas of spending, each of which carries along with it a set of concerns and difficult political realities.

**SAVINGS** Savings is another potential factor that can affect the US economy in coming years. The rate of



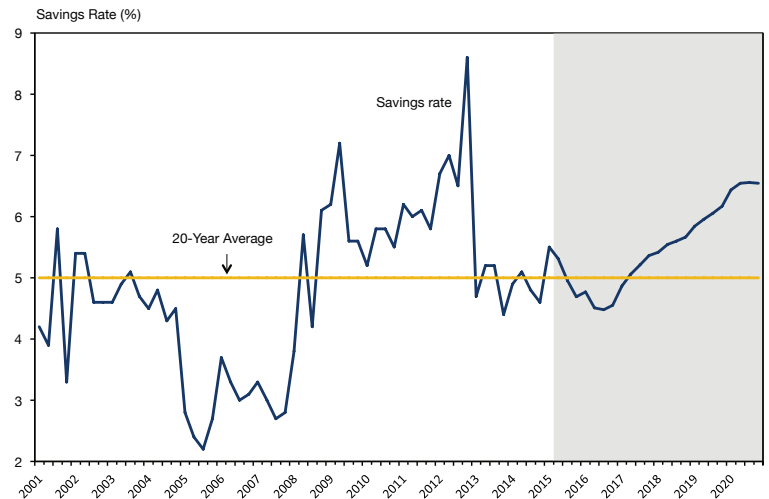
national savings, as reported in Figure 1.13, has fluctuated fairly widely over the past decade or so. It fell to a low of around 2.5 percent in the mid-2000s, and then rose to a high of more than 8 percent during the recent recession. Savings has since fallen back to around 5 percent, which is slightly above the 20-year average for the figure. However, savings is expected to increase substantially over the coming five years, mainly driven by changing demographics in the economy. This projected, short-term rise in savings has the potential to harm consumption spending, and thereby overall demand in the economy. However, the expected rise in savings will likely be an overall positive in the economy over the long-run, as a higher savings rate enables a higher level of capital investment.

**INFLATION** As reported in Figure 1.14, inflation has been stable by historic standards in the US since the mid-1980s, rarely moving outside of the 1 to 3 percent range. While overall inflation did reach a slight spike of close to 4 percent for a brief period in 2008 due to surging oil prices during the first half of that year, inflation has been modest for the past few years. When food and energy prices are excluded from consideration (yellow line in figure), inflation has been below the range of approximately 1.5-2 percent that monetary policymakers have targeted for much of the past five years. Inflation is expected to remain stable in coming years.

However, there is a chance that the threat of inflation could reemerge. The US Federal Reserve (Fed) has taken unprecedented steps to stabilize the economy since 2008, and in doing so has increased the monetary base—primarily the volume of reserves held by banks—dramatically through its purchase of US Treasury Securities and other assets, such as private-sector mortgage-backed-securities. Thus far, this monetary stimulus has not translated into higher inflation due to continued modest demand and banks’ continued reluctance to lend. However, inflationary pressures have the potential to build as lending and the broader economy improve. As that happens, the Fed will be required to remove liquidity from the monetary system to avoid rising inflation. The uncertainty stems from the fact that monetary policy is in uncharted territory given the volume of the recent monetary stimulus and the nature of the asset purchases.

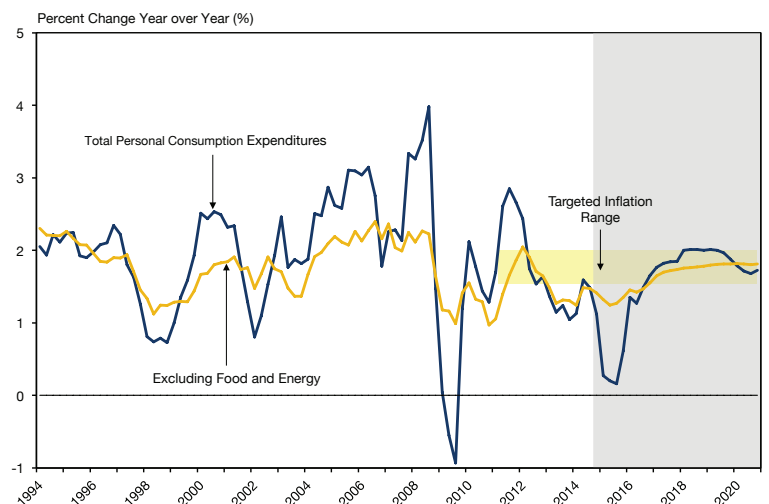
**INTEREST RATES** A related concern is the inevitable rise in interest rates in coming years. This rise will, in part, stem from the Fed’s actions to reverse the monetary stimulus discussed above. While interest rates have been at or near historic lows in the past year or so, their coming rise is inevitable. If the rise is too sudden, it could weaken investment and consumer spending growth in the US considerably. On the other hand, if the Fed waits until too late to allow rates to rise,

**FIGURE 1.13: US Personal Savings as Share of Disposable Income**



Sources: US Bureau of Economic Analysis; IHS Economics

**FIGURE 1.14: United States Inflation Rates**



Sources: US Bureau of Economic Analysis; IHS Economics  
Note: Quarterly data used.

## BUREAU OF BUSINESS & ECONOMIC RESEARCH



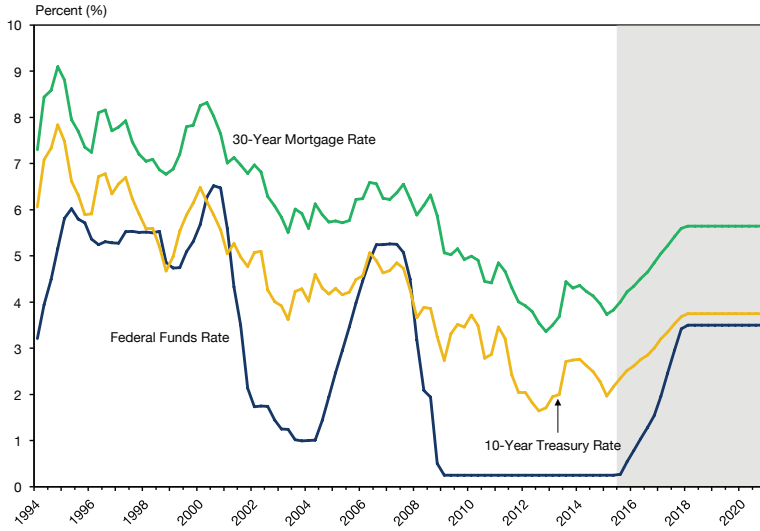
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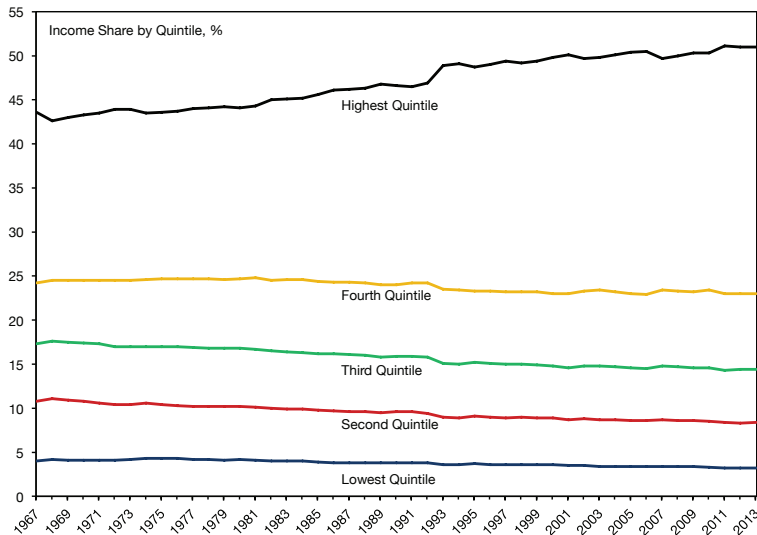
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**FIGURE 1.15: Select United States Interest Rates**



Sources: Federal Reserve Board of Governors; Freddie Mac; IHS Economics

**FIGURE 1.16: Share of Aggregate Income by Quintile**



Sources: US Census Bureau

inflation would be a concern. Given the anticipation surrounding the rise in interest rates, financial markets can move very quickly, as evidenced by this summer’s brief and sudden rise in interest rates in response to Fed commentary. Figure 1.15 reports the forecast for three key US interest rates, although much debate and uncertainty remains surrounding the exact timeframe of this coming increase.

**INCOME INEQUALITY** The final concern that we consider relates to rising income inequality in the US. In Figure 1.16 we illustrate the share of aggregate income in the US that is earned by households divided into quintiles. As illustrated, the lowest-income quintile, while representing 20 percent of households, earned around 3 percent of the total income in the nation in 2013. The second lowest-income fifth of households earned around 8 percent of the total income in the nation in 2013, and so on. The highest-income quintile earned 51 percent of the nation’s total income in 2013. Further, as illustrated, the income share for the highest quintile has risen by around 7 percentage points over the period illustrated, corresponding to a decline in the share earned by the other quintiles. Overall, many individuals are concerned about the growing income concentration among higher income households and these individuals often call for public policies that may reverse this trend. Finding an appropriate balance within public policy between promoting economic growth overall and achieving a publicly acceptable income distribution can prove to be challenging in many cases.

## CHAPTER 2: The West Virginia Economy

### RECENT ECONOMIC PERFORMANCE

West Virginia has struggled to gain any economic momentum over the past few years due in large part to a steep multi-year decline in the state’s coal industry. Even as payroll employment nationally has expanded at an average annual rate of 1.8 percent during the past two years, total employment within the state<sup>4</sup> has declined at an average annual rate of nearly 0.6 percent—or a cumulative loss of more than 8,000 jobs over that same time period. More recently, the state has seen employment trend higher over the past two quarters, but the gains have been very moderate at approximately 0.3 percent on a year-over-year basis.<sup>5</sup>

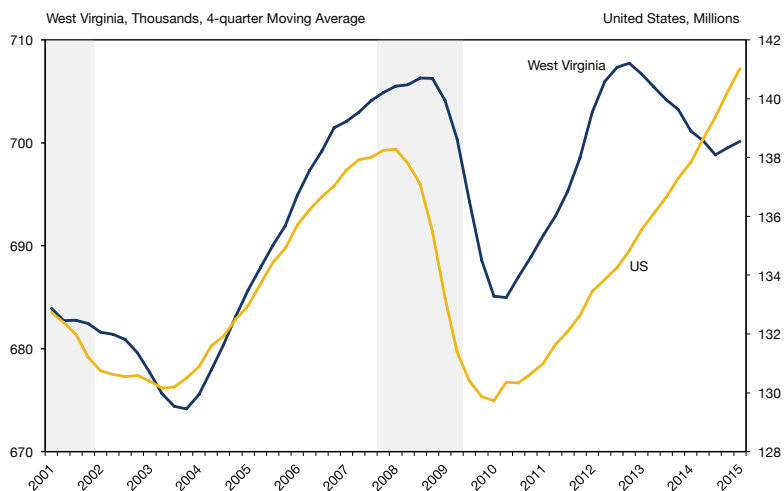
**ENERGY SECTOR** Natural resources and mining experienced the largest job losses both in absolute and percentage terms among all of the state’s sectors during 2014. Overall, employment within the sector contracted by approximately 1,800 workers (5.6 percent) for the year as a whole. Unfortunately, these declines picked up during the first quarter of 2015 and preliminary data suggest the second quarter was equally as difficult. West Virginia’s coal producers have endured dramatic declines in production over the past several years. Since reaching nearly 158 million tons in 2008, coal production has plunged sharply and reached a seasonally-adjusted annualized average of 104 million tons during the first half of this year. If this average is realized for the full calendar year, it would mark the state’s lowest coal output since strikes in 1977 and 1978 pushed production below 100 million tons.

Initially, the downturn in production was largely concentrated in the state’s southern coalfields due to the combined effects of increasingly challenging geological conditions, low world prices, the onset of new compliance rules for mercury and other emissions and competition with shale gas for electricity production. Northern West Virginia, which enjoyed strong growth in coal production during 2014, has seen output decline in recent months as several major mines have partially idled or scaled back operations in response to weak demand from utilities. Overall, coal industry employment has plunged 35 percent between the fourth quarter of 2011 and the second quarter of 2015, falling from

<sup>4</sup> Data sources are noted in each figure. All historic and forecast employment data for West Virginia come from the U.S. Bureau of Labor Statistics Quarterly Census of Employment & Wages program. For an explanation of these data, including comparisons to the monthly CES payroll employment data, see <http://www.bls.gov/cew/cewfaq.htm>.

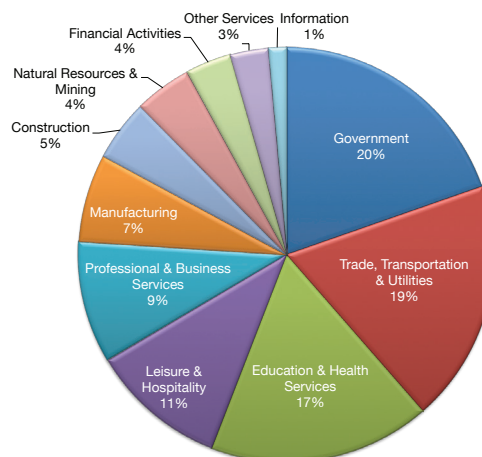
<sup>5</sup> Due to difficulties in seasonally adjusting data for local government and the transportation and warehousing sectors, figure 2.1 presents statewide total employment as a 4-quarter moving average to smooth out potential quarter-to-quarter volatility.

FIGURE 2.1: Total Employment



Source: US Bureau of Labor Statistics  
\*Shaded regions indicate recessions

FIGURE 2.2: West Virginia Employment Distribution by Sector (2014)



Source: US Bureau of Labor Statistics

nearly 26,000 down to 16,900 over that time period. In addition, this marks the lowest level and share of total payrolls for coal industry jobs since 2004.

By comparison, the state’s oil and natural gas industries have enjoyed robust growth over the past several years, particularly in terms of production. Since 2010, marketed natural gas production has skyrocketed at an average annual rate of 41 percent thanks to highly productive wells in the Marcellus Shale play, and more recently Utica Shale. To attest to the industry’s productivity, payrolls in the oil and gas industries have increased at an appreciably smaller rate of 8.6 percent per year over this same time period.

Unfortunately, the industry is also experiencing some turbulence at the moment. Low market prices for natural gas and by-products have caused most major drillers operating in the region to delay well completions as well as scale back and/or cancel exploration and capital investment plans as far ahead as 2016. Despite these low prices and fewer new wells entering production, natural gas output has still continued to rise at a moderate pace in 2015 as a result of enhanced productivity gains. Payrolls within the industry fell nearly 4 percent during the first quarter and preliminary estimates suggest a somewhat smaller decline for the second quarter.

**CONSTRUCTION AND MANUFACTURING** Following a surge in projects related to developing upstream and midstream infrastructure for the natural gas industry and a handful of other commercial projects during 2012, the construction sector has experienced job losses in each of the last two calendar years. In

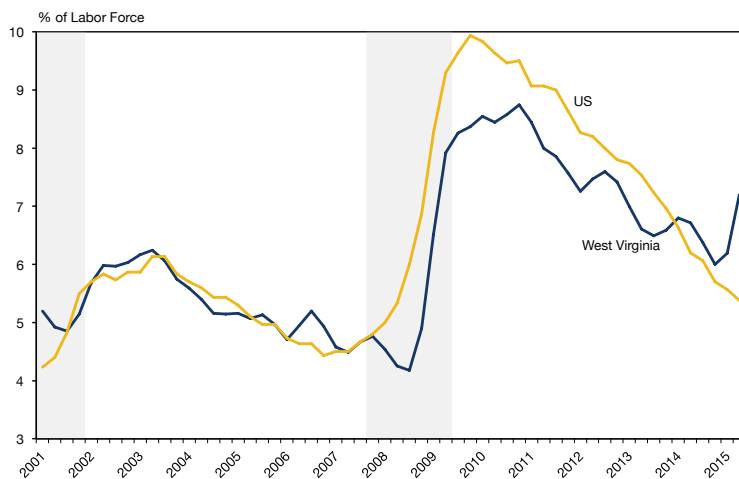
addition, two consecutive years of colder-than-normal weather during the first quarter have affected the sector's recovery to some extent by causing significant disruptions or delays to residential and nonresidential construction projects throughout the state. Manufacturers shed approximately 600 jobs in 2014, but the majority of these losses were concentrated within the fabricated metals industry, whose performance is often closely linked with the coal industry, and miscellaneous durable and nondurable goods producing industries that have faced declines for nearly two decades.

**SERVICE SECTORS** While most of the state's goods-producing industries have generally lost jobs over the past two years, the major service-providing sectors in the state have either been stable or added jobs at a solid pace. Transportation and warehousing has posted the strongest rate of employment growth during 2013 and 2014 largely as a result of the Macy's fulfillment center in Martinsburg and firms providing hauling and field services to oil and natural gas well pad operations.

The professional and business services sector notched a 3 percent gain in employment during 2014 after a strong increase in hiring by several back-office operations in several of the state's metropolitan areas. These increases, along with modest increases at research, legal and other technical business support services firms offset cuts at core business headquarter locations within the state. Retail activity was generally stable in 2013. Education and health services recorded its 24th consecutive year of payroll growth during 2014, but saw its smallest percentage gain of any year over that time period as some private hospitals around the state faced funding issues and a shrinking base of population.

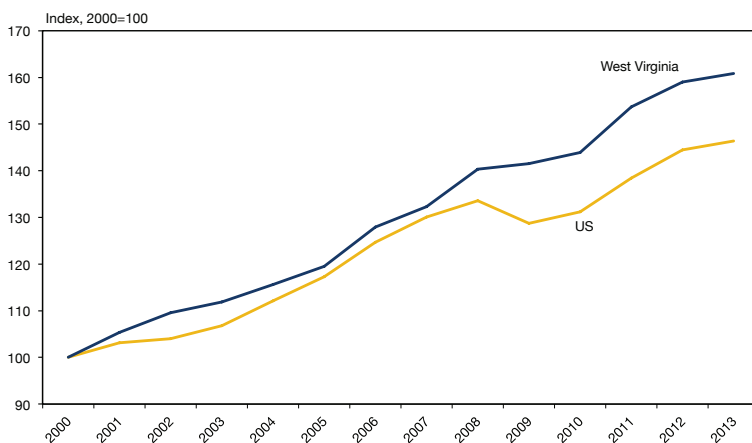
West Virginia's retail trade sector struggled somewhat in 2014 as an appreciably weaker labor market in several parts of the state caused retailers to cut jobs for the calendar year as a whole for the first time since 2010. Similar results were observed within the state's leisure and hospitality sector. Although businesses connected more broadly to travel and tourism activity were generally stable, the state's gaming industry has faced significant, and growing, pressure from competing venues in Pennsylvania, Maryland and Ohio. Financial services employment fell for the 8th consecutive year in the state as the sector continues to downsize in the aftermath of the housing market bust and stricter regulatory oversight. Finally, the public sector, which accounts for one in five of all jobs in West Virginia, declined for the third consecutive year as continued weakness in revenue collections prompted additional staffing cuts by state- and local-government agencies.

**FIGURE 2.3: Unemployment Rate**



Source: US Bureau of Labor Statistics  
\*Shaded regions indicate recessions

**FIGURE 2.4: Per Capita Personal Income Growth**



Source: Bureau of Economic Analysis

**UNEMPLOYMENT** After generally trending lower between 2010 and 2014, the state's unemployment rate has surged over the first half of 2015 and stood at 7.5 percent as of July. While some of this increase in the state's unemployment rate is connected to a modest uptick in labor force participation, most of the increase appears to stem largely from actual job losses. Initial and continuing claims for unemployment insurance have both increased since the beginning of the year due to layoffs in coal, natural gas and other key high-wage industries.

**INCOME** Per capita personal income in West Virginia reached approximately \$36,600 in 2014, which represented a 3.1 percent gain over the previous calendar year. This represents a marked improvement from the 1.1 percent increase recorded in 2013 and was slightly ahead of the growth rate recorded for the nation as a whole. After significantly outpacing the rest of the nation in terms of per capita income growth during and after the Great Recession, gains have generally been in line with or slightly behind the national average the past several years.

Although these recorded gains in per capita income have outpaced inflation in all but one year, West Virginia continues to possess one of the lowest per capita income levels in the U.S. Currently, the state's per capita income is more than 79 percent of the national average and although this ratio is only slightly below the all-time high observed in 2011, average income levels within the state still rank low from a broader national perspective, as per capita income in West Virginia exceeds that of just Mississippi and is slightly below that of South Carolina.

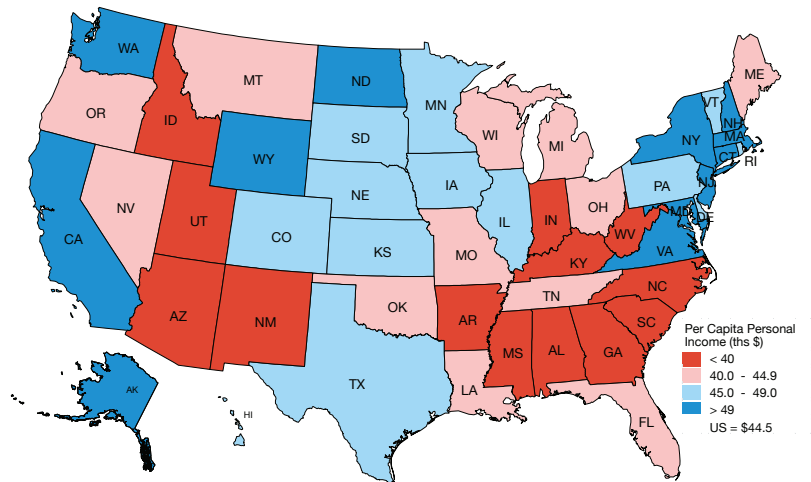
**WAGES** Slumping demand for labor in certain sectors had a noticeable impact on wage growth in West Virginia during 2014. Average annual pay increased 2.2 percent to approximately \$41,100 during 2014. While this represents a doubling in statewide wage growth from the previous year, it still trailed nationwide wage growth by nearly a full percentage point. Workers in the utilities sector received the highest average annual wage at nearly \$85,000 – more than double the statewide average. Wage growth within the natural resources and mining sector failed to keep pace with inflation during each of the last three years, but remains the sector with the second highest average annual wage at approximately \$78,000.

Overall, the fact that changes in wage income differ from growth in per capita personal income can be explained by faster growth in transfer payments from the US federal government. Transfer payments to individuals, such as Social Security benefits, are counted as part of personal income but are not part

of wage income. In addition to government transfer payments, other forms of non-wage income, such as investment returns, pensions and earnings from the self-employed can affect year-to-year changes in personal income as can adjustments to tax withholdings by state or federal governments.

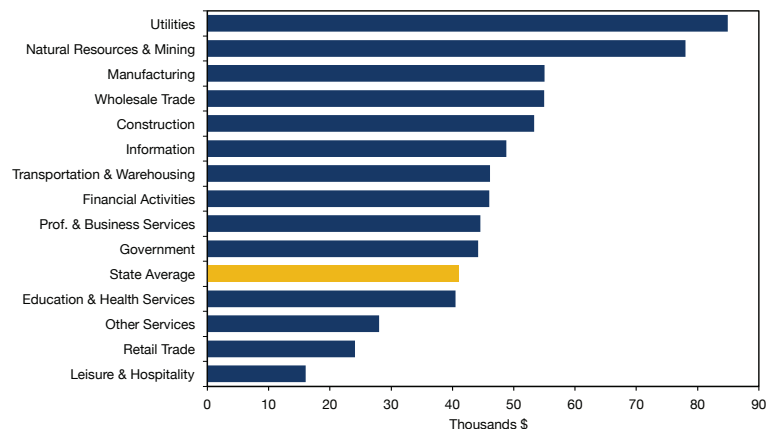
**GDP** After experiencing a steep decline of 3.4 percent during 2012, real GDP in West Virginia has expanded at rates of 0.3 and 2.4 percent during the past two years. Statewide output growth did lag the national average during 2012 and 2013, but West Virginia has seen real GDP growth outpace the rest of the nation five of the last seven years overall. With real value added for the industry nearly doubling between 2013 and 2014, the oil and gas industry made the largest contribution to real GDP growth in 2014. Other sectors that provided a measurable positive contribution to output growth in 2014 were professional and business services and education and health services. With a 7.5 percent

**FIGURE 2.5: Per Capita Personal Income (2014)**



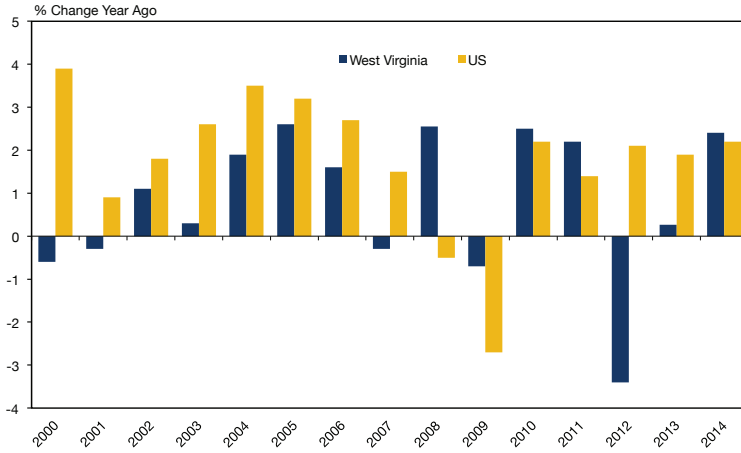
Source: US Bureau of Economic Analysis

**FIGURE 2.6: Average Annual Salary by Sector (2014)**



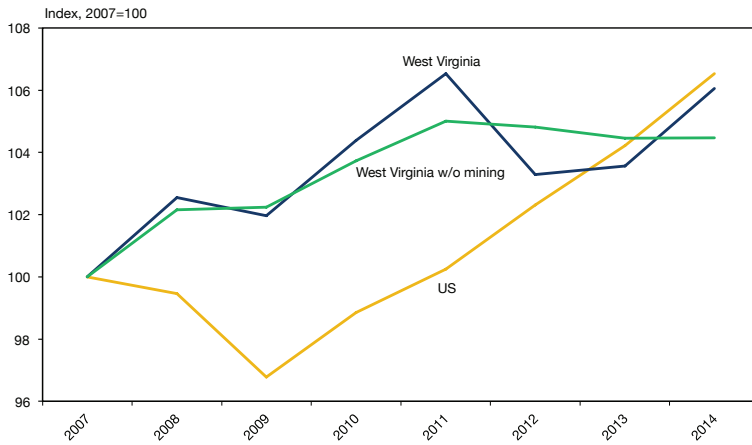
Source: US Bureau of Labor Statistics

**FIGURE 2.7: Real Gross Domestic Product Growth**



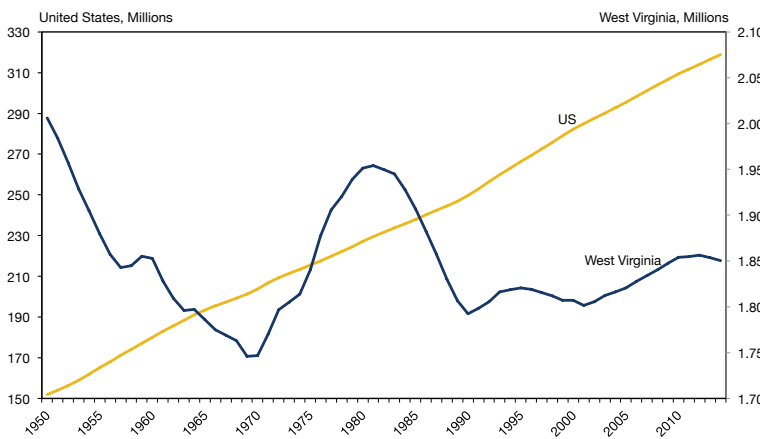
Sources: Bureau of Economic Analysis; WVU Bureau of Business & Economic Research  
 \*Note: Figures for WV in 2013 and 2014 are estimated by WVU BBER

**FIGURE 2.8: Real GDP Growth**



Sources: Bureau of Economic Analysis; WVU Bureau of Business & Economic Research

**FIGURE 2.9: Total Population**



Source: US Census Bureau

decline, the construction sector posted the largest decline in real output, while leisure and hospitality and other services recorded declines of just above 1 percent. The other remaining sectors registered moderate positive or negative changes in output between 2013 and 2014.

Although they account for just four percent of employment, West Virginia's coal and oil and gas industries have a disproportionate impact on changes in output as they account for nearly 14 percent of state GDP. Indeed, statewide output has remained largely unchanged over the past few years when excluding the mining sector.

**RECENT DEMOGRAPHIC TRENDS**

**POPULATION** West Virginia's population declined in 2014 and has seen a cumulative loss of nearly 6,000 residents over the past two years. The consecutive losses in population were the first to occur since the late 1990s and also erased nearly three-fourths of the population growth from the 2010-2012 time period. Due to the state's age distribution as well as its higher-than-normal death rates among many age groups and low birth rates, West Virginia experiences a natural decline in residents each year as deaths outnumber births. As a result, changes in the state's population are driven almost entirely by domestic migration flows. According to the Census Bureau, the state experienced a net outflow of migrants totaling nearly 4,600 residents, likely due in part to weakening economic conditions in the state's coal industry.

Overall, 39 counties experienced a decline in population during 2014. As would be expected, Kanawha County registered the largest absolute decline in population, but a total of six saw the number of residents contract by at least 1 percent from the previous year. Berkeley, Jefferson and Monongalia accounted for a significant proportion of the population gained in the state between 2002 and 2012, but these three counties have become even more crucial in recent years as their gains have prevented even more dramatic losses in population from occurring. In fact, of the 16 counties that saw the number of residents living there rise between 2013 and 2014, Berkeley, Jefferson and Monongalia combined to account for 82 percent of this gross increase.

**AGE DISTRIBUTION** One of the defining demographic characteristics of the state's population is its age structure. West Virginia's median age increased slightly in 2014 and now stands at 42 years, placing it as the second oldest state in the US and more than 4 years older than the corresponding national figure. Nearly one-fourth of the state's residents were 60 years old or older, near or past the traditional retirement age, compared to 20 percent for the nation as a whole.

**HEALTH** In addition to containing a higher-than-average share of elderly residents, West Virginia's population also tends to be less healthy than other states in the US. According to the Centers for Disease Control, the overall mortality rate, even after adjusting for age, in West Virginia is the second highest in the nation. High incidences of heart disease, cancer and diabetes have been key contributors to the state's comparatively high mortality rate, as well as behavioral or lifestyle factors such as relatively little physical activity during leisure time.

**WEST VIRGINIA OUTLOOK**

**EMPLOYMENT GROWTH** Expectations for the US and broader global economy during the forecast horizon will have a significant impact on West Virginia's performance in coming years.<sup>6</sup> The forecast calls for the economic recovery to continue over the next five years with a rate of job growth of 0.5 percent per year through 2020. This pace of growth will cause the state to lag the 1.2 percent average annual rate of growth anticipated for total US employment over the next five years.

**NATURAL RESOURCE AND MINING EMPLOYMENT**

The natural resources and mining sector as a whole is expected to see jobs increase at an average annual rate of 0.6 percent over the next five years. As has been the case in recent history, the sector's projected performance will be driven by the continued diverging performances between the coal and natural gas industries as well as the geographic shift in the state's coal production to mines in Northern West Virginia. Overall, coal industry employment is expected to fall at a rate of approximately 1 percent per year through 2020.

This does not represent a large decline when viewed within the context of the industry's significant struggles over the past few years. Nonetheless, it tends to largely reflect the fact that West Virginia's coal industry has already undergone a shift to a lower level of production (and by consequence, employment) and the mines that are expected to remain in operation going forward will likely be, on average, more productive and competitive on price in domestic and global thermal and metallurgical coal markets.

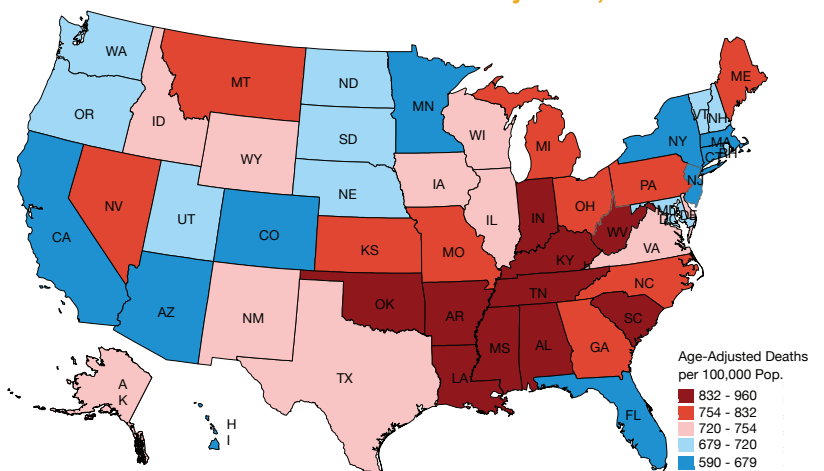
Over the near term, large stockpiles of coal at coal-fired power plants will continue to weigh on demand for coal from both of the state's producing regions. The combined effect of market forces and previous regulatory changes likely will cause West Virginia coal to struggle to re-gain lost market share in domestic

**FIGURE 2.10: Summary Population Profiles**

	West Virginia	United States
Total Population (2014)	1,850,326	318,857,056
% Population Under 18 (2014)	20.5%	23.1%
% Population 65 Years + (2014)	17.8%	14.5%
Population with Less than High School Diploma (2013, % of pop. 25 yrs. +)	15.4%	13.4%
Population with High School Diploma, No College (2013, % of pop. 25 yrs. +)	40.2%	27.8%
Population with Some College, No Degree (2013, % of pop. 25 yrs. +)	25.4%	29.2%
Population with Bachelor's Degree or Higher (2013, % of pop. 25 yrs.+)	18.9%	29.6%
Median Age (2014)	42.0	37.7
Mean Household Income (2013)	\$55,787	\$73,767
Average Household Size (2013)	2.44	2.65
Labor Force Participation Rate (2014)	53.2%	62.9%

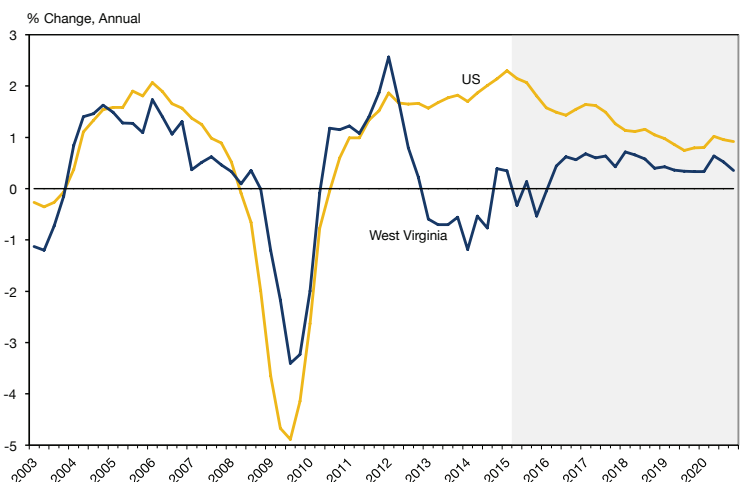
Sources: US Census Bureau; Bureau of Labor Statistics

**FIGURE 2.11: All-Cause Mortality Rates, 2013**



Source: US Centers for Disease Control

**FIGURE 2.12: Employment Growth Forecast**



Sources: Bureau of Labor Statistics; WVU BBER Econometric Model; IHS Economics  
\*Note: Shaded region represents the forecast period

<sup>6</sup> All forecast estimates for this document are derived from the West Virginia University Bureau of Business & Economic Research Econometric Model, unless otherwise noted. The model is based on an analysis of dozens of variables that characterize the West Virginia economy.

electricity generation to natural gas. Export demand for coal mined in West Virginia is also expected to remain weak well into 2016 (at least) as high extraction costs make coal from the state less competitive given world prices and intense competition from Australia, Indonesia, Colombia and other major global producers. Furthermore, sluggish global economic growth and a strong US dollar are likely to hamper demand for coal from West Virginia.

Production and employment are expected to stabilize by 2017 and see modest gains over the latter half of the forecast horizon. The majority of this improvement will be concentrated in the state's northern mines, but an anticipated turnaround in overseas demand for metallurgical and low- to medium-sulfur thermal coal should help some mines operating in Southern West Virginia.

Unfortunately, the legal and regulatory environment presents some significant downward risks to the state's coal industry going forward. The bankruptcy sale of Patriot Coal has not yet been finalized and still faces some hurdles that could affect its completion. Should the sale fail gain approval or hit some other roadblock, it could lead to a much less orderly process that could force a liquidation of assets and the possible closure of some mining operations.

On the regulatory front, the Environmental Protection Agency released the Obama Administration's final version of the Clean Power Plan, which targets a significant reduction of carbon dioxide emissions from the nation's power plants. We do not include the Clean Power Plan into the underlying assumptions of this year's West Virginia Economic Outlook, since the rule will likely be subjected to significant legal challenges and congressional inquiries and its implementation could also be affected by the outcome of the 2016

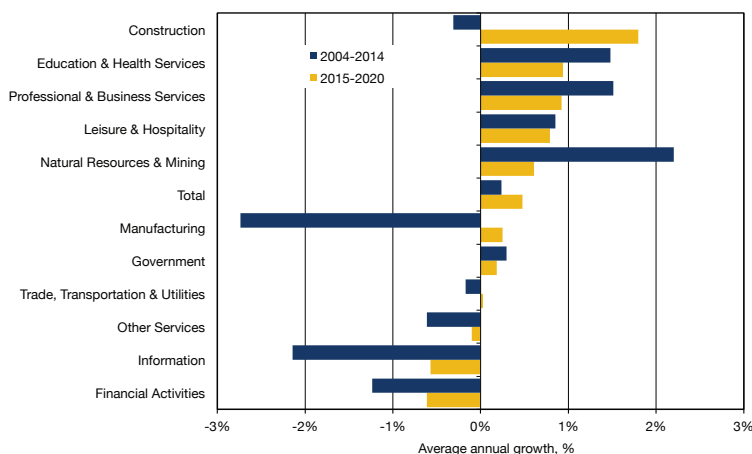
presidential election. For a complete discussion of the rule and its possible impacts, see the Energy section in Chapter 3 of this publication and *West Virginia Coal Production 2015-2035*, published earlier this year.

The state's oil and natural gas industry is expected to add jobs at a 3.1 percent average annual rate, while natural gas production will likely rise at more than 10 percent per year. However, growth will likely be heavily concentrated in the 2017-2020 time frame. The low price environment that is plaguing oil and natural gas markets is expected to persist at least through the first half of 2016. Many drillers plan to or have already scaled back capital spending and exploration plans for new wells in the Marcellus and Utica Shale plays into next year. Although we anticipate overall production for calendar year 2015 will be approximately 21 percent higher compared to 2014, production will likely begin to decline on a quarter-to-quarter basis by the fourth quarter of 2015 and continue through mid-2016 as legacy production declines slowly begin to outweigh gains from newer wells. As a result, production growth will likely be minimal in 2016, while employment is projected to decline by more than 4 percent in 2015 and remain flat in 2016.

Several medium- to large-scale pipeline projects in the Mid-Atlantic region and a few relatively large natural gas-fired power plants are expected to come on line over 2017 and 2018, which should help to alleviate downward pressure on natural gas prices. Also, firming prices should create stronger incentives to bolster investment in downstream processing of rich gas deposits in the Marcellus and Utica shale formations in and around the state's Northern Panhandle, as evidenced by the recently announced ethane cracker plant in Belmont County, Ohio.. In addition, the LNG export terminal at Cove Point, Maryland, is expected to enter service by late 2017-early 2018. This project will enable the export of more than 5 million metric tons of liquefied natural gas each year and could also help to raise natural gas prices somewhat and ultimately spur additional development of gas resources in West Virginia.

**CONSTRUCTION EMPLOYMENT** While the construction sector's performance has been uneven over the past two years, we anticipate a steadier pace of recovery going forward. Overall we expect construction employment to grow at a rate of 1.8 percent per year during the outlook period. Housing starts should continue to recover, particularly in higher-growth areas such as the Eastern Panhandle, and large-scale projects related to the natural gas industry's development will also provide a boost to the industry. In addition, large scale non-residential projects in Morgantown and Martinsburg will support new job growth in the construction sector over the next few years.

**FIGURE 2.13: West Virginia Employment Growth Forecast by Sector**





**MANUFACTURING EMPLOYMENT** The manufacturing sector is expected to grow moderately over the next five years, adding jobs at a 0.3 percent rate per year—representing a significant divergence from the sector’s performance over the past decade or so. Healthy auto demand and a firming recovery in the US housing market will likely account for most of the sector’s anticipated improvements. Portions of the state’s chemicals industry face improved prospects as abundant supplies of natural gas offer not only a low-priced feedstock, but new capacity linked to fractionation and the processing of natural gas liquids. In addition, projects such as the new Procter & Gamble facility slated for completion in Martinsburg by 2017, which will add up to 700 production jobs, and the \$35 million expansion plan for Constellium’s Ravenswood plant all point to the possibility for upside potential for the state’s manufacturing sector.

**SERVICE SECTOR GROWTH** In terms of the state’s private service-providing sectors, the forecast calls for the strongest rates of growth to come from the professional and business services and education and health services sectors, which are expected to record average annual growth rates of nearly 1 percent per year, respectively. A continued national economic recovery is expected to yield greater demand for a range of business support services that include legal services, management consulting and IT support. Gains in education and health services will largely come from steady increases in demand for health care services coming from the state’s growing share of elderly residents.

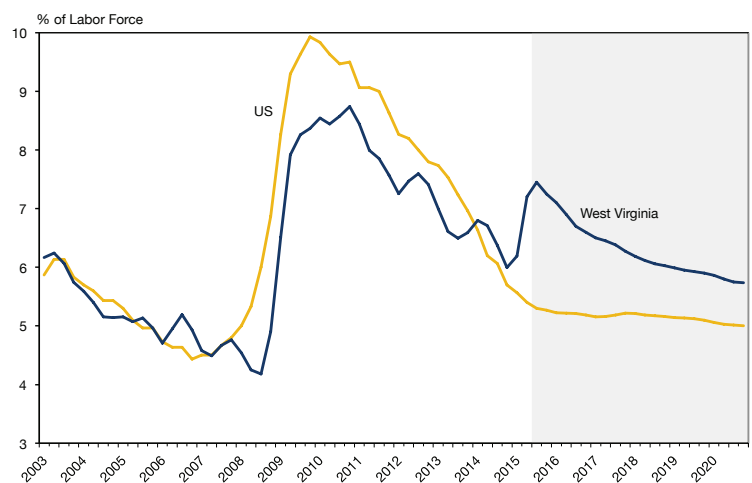
Retail will likely remain generally stable over the course of the forecast horizon. Although gains in real per capita income and expanding retail opportunities in the state’s growing regions will help, broader industry trends as well as declining customer bases and slow growth in other parts of the state will offset these positive factors. Leisure and hospitality is expected to enjoy job gains of nearly 0.7 percent per year through 2020. Competition from gaming venues in neighboring states will certainly hurt the sector’s overall prospects, but the state’s status as a regional tourism destination will remain a key driver going forward. Also, the International Boy Scout Jamboree in 2019 should bolster the sector’s prospects primarily in the New River Gorge area.

Wholesale trade and transportation and warehousing sectors are expected to see similar rates of job growth over the next five years, due in part to continued development along major transportation corridors, such as the Eastern Panhandle. In addition, projected growth in the state’s oil and gas industries will bolster demand for transportation companies providing materials hauling and distribution services. Public sector employment is projected to rise slowly at an average

annual rate of 0.2 percent as a steady downward trend in federal employment partially offsets modest growth in state and local government hiring.

**UNEMPLOYMENT** Following the steep increase in West Virginia’s unemployment rate during the first half of 2015, the forecast calls for the statewide jobless rate to remain at or above 7 percent through mid-2016. Longer term, the forecast calls for the unemployment rate to fall slowly to an annual average of nearly 5.8 percent by 2020 as broader demographic trends and sustained job growth in other segments of the economy combine to push the rate closer to normal.

**FIGURE 2.14: Unemployment Rate Forecast**



Sources: Bureau of Labor Statistics; WVU BBER Econometric Model; IHS Economics  
Note: Shaded region represents the forecast period

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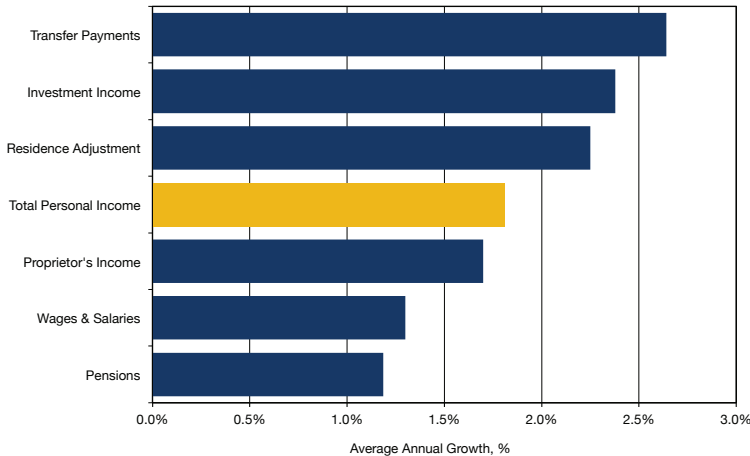
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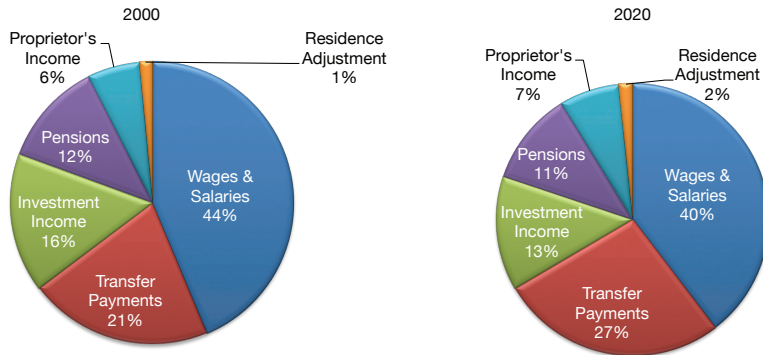
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**FIGURE 2.15: Forecast Growth by Source of Real Personal Income, 2015-2020**



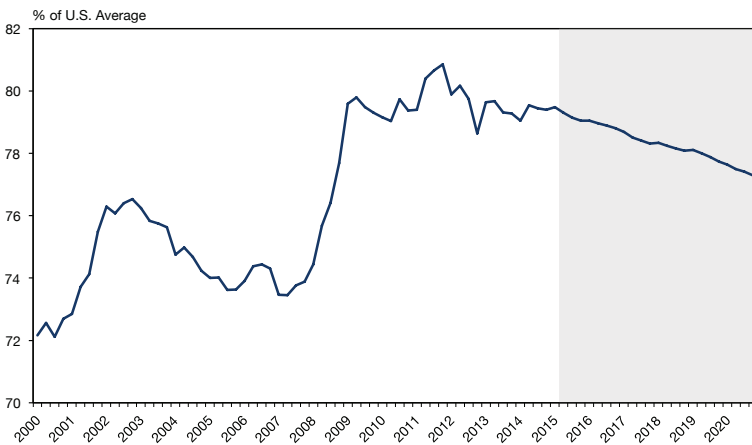
Sources: Bureau of Economic Analysis; WVU BBER Econometric Model; IHS Economics

**FIGURE 2.16: Share of Total Personal Income by Source**



Source: BBER Econometric Model

**FIGURE 2.17: Per Capita Personal Income Relative to National Average**



Source: Bureau of Economic Analysis; WVU BBER Econometric Model

**INCOME** Following a 1.7 percent gain in 2014, real per capita income growth is expected to accelerate to 2.8 percent in 2015. For the outlook period as a whole, the projected moderate gains in employment will translate into real wages and salaries rising approximately 1.3 percent annually. By contrast, non-wage forms of income, such as government transfer payments and various forms of investment income will increase at rates much faster than gains in overall personal income due to the state’s underlying demographic patterns.

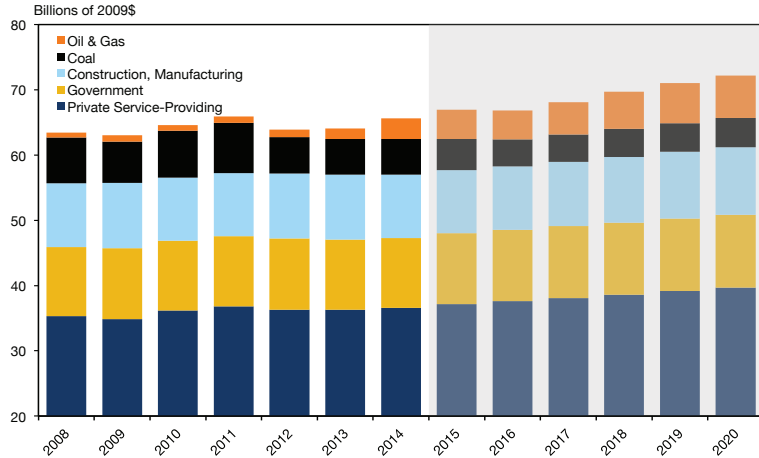
Overall, our forecast calls for real per capita income in West Virginia to rise at an annual average rate of nearly 1.9 percent, thereby lagging the 2.3 percent annual rate expected for the rest of the nation. This slower pace of income growth will cause the state’s per capita income levels to fall to just above 77 percent of the national average by 2020.

**GDP** Real GDP for West Virginia is expected to rise at an average annual rate of more than 1.5 percent through 2020. The oil and gas industry will likely pace broader output growth, with an expected gain of nearly 8 percent per year during the forecast horizon. Construction, manufacturing, private services and the public sector are projected to realize much more moderate rates of growth going forward. Given the industry’s underlying expectations, inflation-adjusted output for coal is expected to decline at an average annual rate of 1.1 percent—with most of these losses occurring during in 2015 and 2016. Even with the coal industry expected to account for a smaller economic footprint, the healthy output gains anticipated for the oil and gas industry point to an actual increase in the state’s share of GDP coming from energy extraction.

**POPULATION** Since economic growth is expected to lag the national average during the outlook period, many regions in West Virginia will likely find it difficult to attract new residents via net in-migration. This factor, when combined with the fact that the number of deaths will exceed births in most counties over the next five years, should cause the state’s population to decline slightly over the next five years.

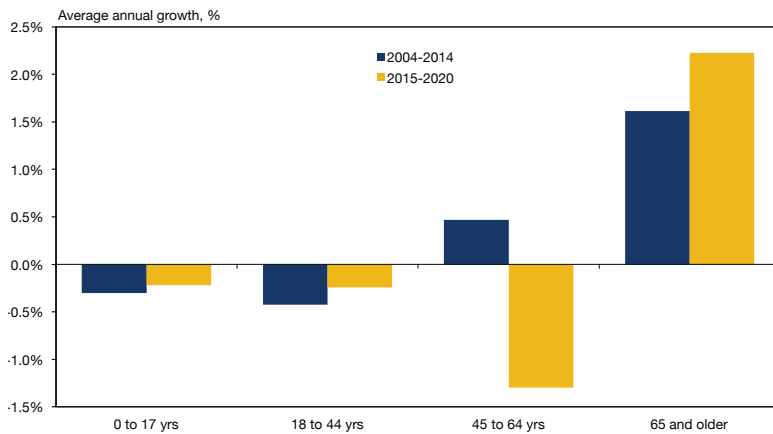
**AGE DISTRIBUTION** In addition, aging-in-place of the population will accelerate, wherein the state’s under-65 age groups shrink and the 65-and-over cohort swells. This generally mirrors the broader national trend, where more members of the baby boom generation will likely move into the 65 and older age group. However, since West Virginia contains a higher-than-average share of residents close to the age of 65, the aging-in-place process will occur more rapidly within the state. Over the longer term, this process will eventually lead to nearly one in four residents to be at least 65 years of age.

**FIGURE 2.18: Real GDP Forecast by Sector**



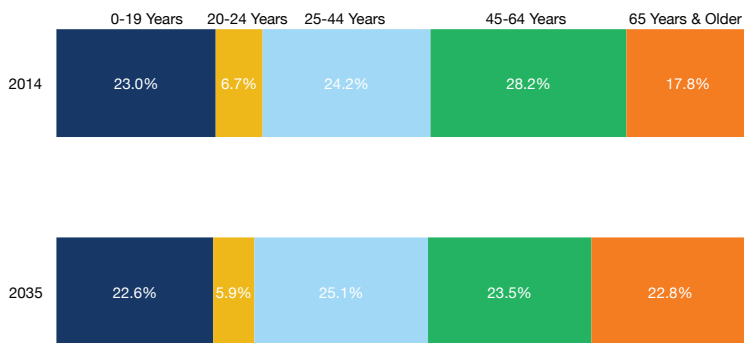
Sources: Bureau of Economic Analysis; WVU BBER Econometric Model

**FIGURE 2.19: West Virginia Population Growth by Age**



Sources: US Census Bureau; WVU BBER Econometric Model

**FIGURE 2.20: Share of West Virginia Population by Age**



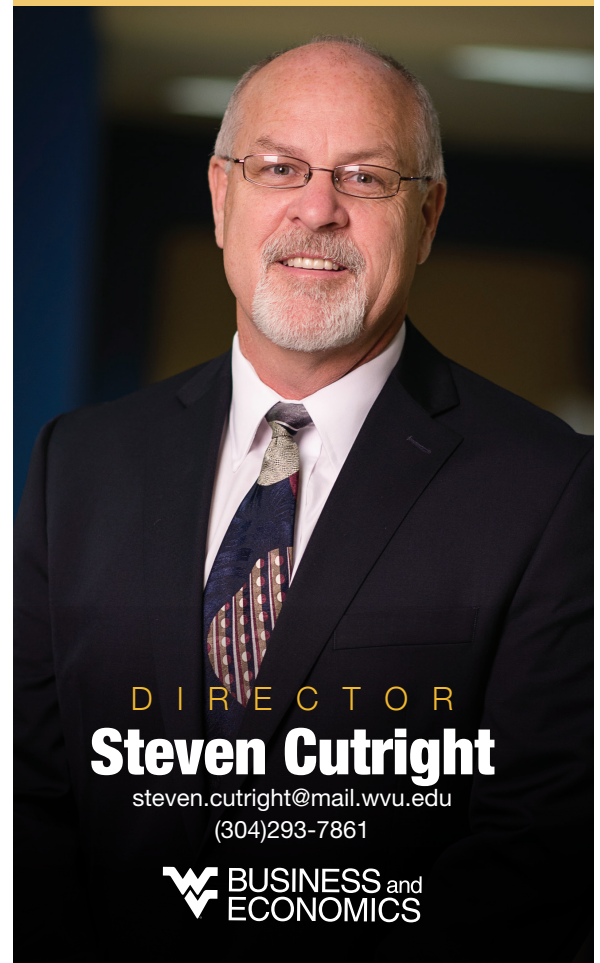
Source: US Census Bureau; WVU BBER Econometric Model

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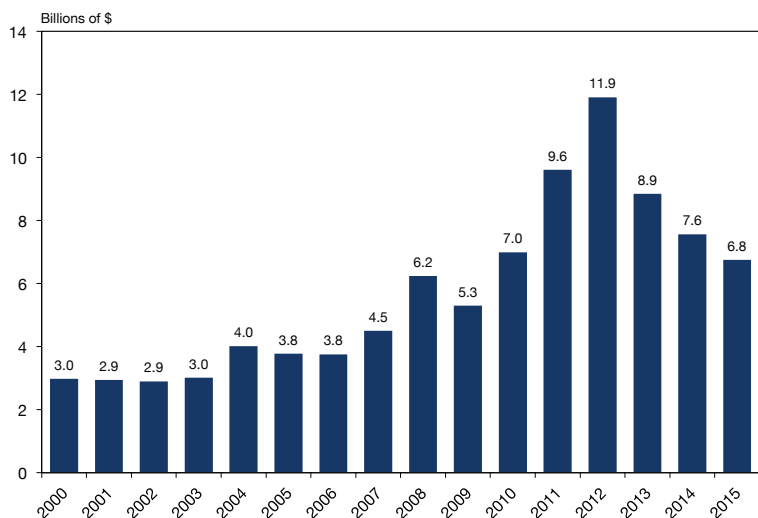
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## WEST VIRGINIA'S EXPORTS

Given the state's large share of production of globally-traded goods and commodities, export markets have always been an important source of demand for West Virginia. However, they have accounted for a growing share of the state's economic output over the past decade or so and also served to buoy the state's economy during the Great Recession. In 2000, the total value of goods exported from West Virginia equaled just over 5 percent of the state's GDP. This share exploded to more than 16 percent in 2012 as coal export shipments skyrocketed to temporarily replace supplies lost to substantial floods in Queensland, Australia.

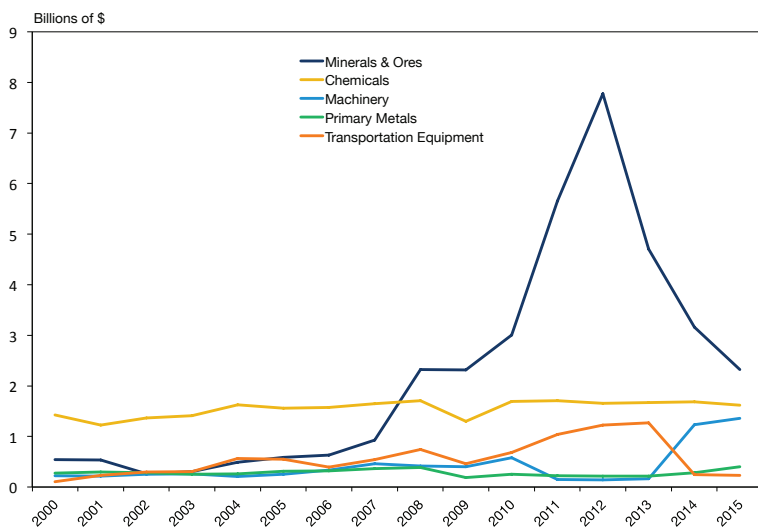
FIGURE 2.21: West Virginia Exports



Source: International Trade Administration

\*Note: Data are adjusted for inflation and expressed in 2015 dollars; 2015 is a projection

FIGURE 2.22: West Virginia Top Five Exporting Industries



Source: International Trade Administration

\*Note: Data are adjusted for inflation and expressed in 2015 dollars

Export activity has deteriorated over the past few years, falling 36 percent from their 2012 peak to 2014. Even with this decline, the dollar value of exports still represented the equivalent of 10 percent of state economic output in 2014. In addition, even with the decline in export activity that occurred in 2014, the inflation-adjusted value of goods and commodities shipped to other countries from West Virginia businesses has increased at a pace of nearly 7 percent per year in the past decade.

Exports have continued to weaken through the first half of 2015. During the first two quarters of 2015, West Virginia businesses have exported roughly \$3.2 billion to the rest of the world, representing a 21 percent fall from the first half of 2014.

**COAL EXPORTS** Most of the state's fortunes in export markets, on both the upside and downside, have been driven primarily by foreign coal demand. In 2003, exports of minerals and ores, which in West Virginia's case, are made up largely by bituminous coal, totaled \$300 million in inflation-adjusted dollars, accounting for 10 percent of all exports. By 2012, this share increased to two-thirds percent, as the real value of exports reached \$7.8 billion. International coal shipments from West Virginia have been falling sharply over the past two years, reaching just below \$3.2 billion in 2014—or 41 percent of state export activity. Through the first half of 2014, exports of coal fell to \$1.1 billion, a decline of roughly 40 percent from the same period a year ago. However, coal still represents the state's single-largest globally exported commodity at 34 percent of total exports.

**CHEMICAL EXPORTS** Coal is not the only good or commodity exported from the state, and fortunately some of these manufacturers have enjoyed increased demand from overseas as of late. The chemicals industry is the second largest source of exports from West Virginia, representing nearly a quarter of the value of goods shipped internationally in 2014. Much of this can attributed to the healthy concentration of chemicals manufacturers throughout the Ohio and Kanawha Valleys. During 2014, approximately \$1.7 billion in products from the chemicals industry were exported from West Virginia to other countries. This marked a 2 percent gain from the previous, but in general the inflation-adjusted value of chemicals exports from the state has been relatively stable since the mid-2000s.

Through the first half of 2015, exports of chemicals have totaled approximately \$750 million. Although they will likely be close to their relatively stable trend, chemicals exports are expected to fall slightly for the year as a whole as a strong US dollar and weak global economic growth hamper export activity for most goods and commodities.

**MANUFACTURING EXPORTS** Aside from coal and chemicals, industrial machinery and transportation equipment are also industries that produce a significant amount of exported goods in West Virginia. Combined, these two industries shipped \$1.5 billion various components for auto engines, machinery and civilian aircraft parts in 2014, a 5 percent gain from the previous year. Primary metals notched a 32 percent increase in exports during 2014, with a majority of this increase coming from aluminum alloy plates. This trend has carried over into the first half of 2015 and should yield another solid gain for the full calendar year.

**NATURAL GAS EXPORTS** One commodity export that could see increased attention over the long term is liquefied natural gas (LNG). While export opportunities are very limited at present, federal approval of a major LNG export terminal on the East Coast could yield significant increases in gas exports as prices for natural gas tend to be much higher in Europe and other likely destinations, thereby providing these countries an incentive to import Marcellus and Utica Shale gas. Expanded midstream and downstream natural gas infrastructure in the Mid-Atlantic region will also provide additional opportunities for export growth as these resources are developed further.

### Where do West Virginia Exports go?

Exports connect West Virginia's economy to countries around the world. West Virginia businesses exported to 147 countries during 2014, with most of the state's exports going to familiar destination countries in North America, Europe, and Asia. Canada was easily the largest destination market for goods and commodities produced in the state, as our northern neighbor received nearly \$1.9 billion in exports, or 26 percent of all West Virginia exports. Through the first half of 2015, Canada has received \$931 million in exports from the state, which represents a slight increase over the same period a year ago.

China rose up to the state's second-largest destination market in 2014 and has retained that position so far through the first half of this year. The Netherlands ranks as the third leading export destination country, but just like China and other leading markets such as Brazil and Italy, overseas shipments from the state have fallen dramatically. In addition, the primary source of this decline for practically every one of these countries has been due to the steep decline in coal exports. Overall, despite the weakening of exports from the state in recent years, international demand for commodities and manufactured goods produced in West Virginia will play a major role in supporting the state's economy going forward. We anticipate export demand will remain weak through 2016 due to extremely unfavorable conditions for global coal markets and the

combination of a strong US dollar and growing concerns over Chinese economic growth. Nonetheless, the longer term picture for export demand of West Virginia coal and other goods generally remains positive as countries such as China and India will continue to grow at rates fast enough that they cannot meet their needs with what they produce domestically.

**FIGURE 2.23: Top West Virginia Exports, 2014**

Export Commodity	Export Value (millions of \$)	Share of Total West Virginia Exports (%)
Bituminous Coal	3,109	41.1%
Flywheels and Pulleys	563	7.4%
Gears and Related Parts	515	6.8%
Nylon Polymers	247	3.3%
Civilian Aircraft, Engines and Parts	162	2.2%
Artificial Joints, Parts and Accessories	127	2.1%
Polysulfides	142	1.8%
Aluminum Alloy Plates	138	1.8%
Polyethers	119	1.6%
Polyester Resins	109	1.4%
All Exports	7,560	-

Source: US Census Bureau

**FIGURE 2.24: Top Destination Countries for West Virginia Exports, 2014**

Exports Destination Country	Export Value (millions)	Percent Change 2012-2014
Canada	\$1,971	10%
China	\$549	- 38%
Netherlands	\$548	- 43%
Brazil	\$473	- 31%
Italy	\$424	- 42%
United Kingdom	\$327	- 42%
Ukraine	\$276	- 23%
Japan	\$268	- 65%
Germany	\$259	- 25%
Mexico	\$238	0%

Source: US International Trade Administration

## CHAPTER 3: West Virginia's Economy, Industry Focus

### ENERGY

West Virginia's energy sector has faced a severe downturn recently. While gains in natural gas employment have partially offset losses in coal employment through much of the last four years, since early-2015, continued layoffs in coal have been coupled with a pause in natural gas job growth.

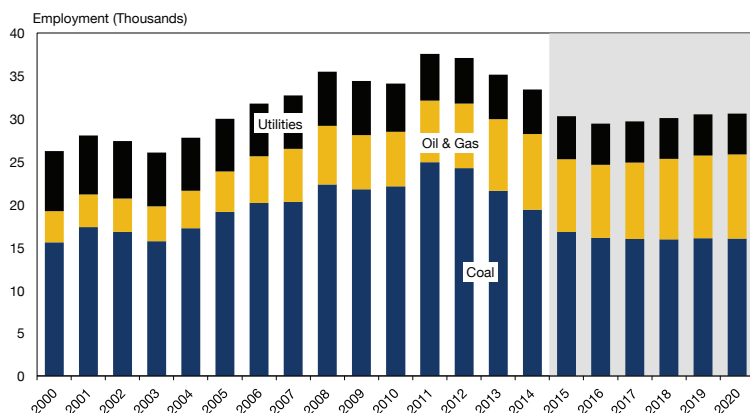
Total employment in the sector, which includes coal mining, natural gas production, and utilities, declined by more than 4 thousand jobs, or 11 percent, since the peak in late-2011, including 1,700 jobs lost in 2014 alone (Figure 3.1). We expect the sector to lose an additional 9.4 percent of its employment in 2015. We expect employment to level off in 2016 and then return to slow growth over the following four years. Overall, we forecast employment to be essentially flat in the

state's energy sector from 2015 through 2020, with an average annual growth rate of less than 1 percent.

Given significant movements in both production and price, inflation-adjusted GDP in the energy sector has been volatile over the past several years. Total GDP in the sector fell dramatically between 2011 and 2012, driven by losses in coal, but rebounded somewhat during 2014 with improvements in natural gas (Figure 3.2). GDP in the sector is expected to rise slightly for 2015, as gains in natural gas GDP are expected to outweigh further losses in coal. After a small expected decline in 2016, we forecast positive GDP growth over the following four years. Overall, we expect GDP in energy to rise by nearly 3 percent on an annual average basis between 2015 and 2020.

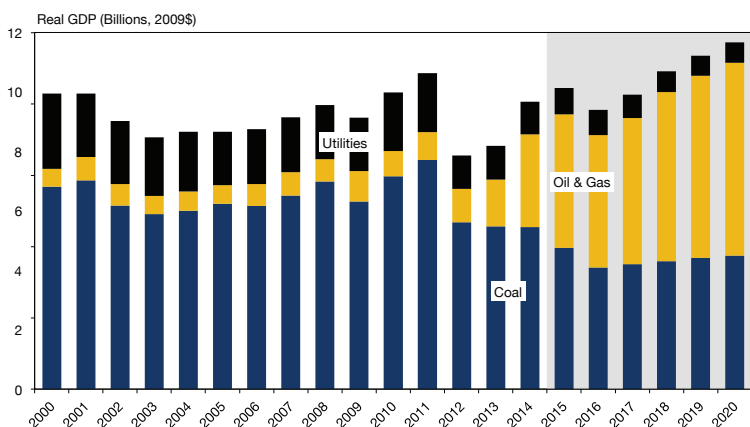
The relative share of energy-sector GDP is expected to shift dramatically to natural gas from coal: In 2011, natural gas GDP was merely 12 percent of coal GDP, yet by 2016, natural gas GDP is expected to surpass coal.

**FIGURE 3.1: West Virginia Energy Sector Employment**



Sources: US Bureau of Labor Statistics; WVU BBER Econometric Model

**FIGURE 3.2: West Virginia Energy Sector GDP**



Sources: US Bureau of Economic Analysis; WVU BBER Econometric Model

### Coal

The coal mining industry's severe downturn continued into its fourth year in 2015, with widespread job losses and production declines through the beginning of the year. Alpha Natural Resources, the state's second-largest coal producer, filed for bankruptcy in July of 2015 and the New York Stock Exchange began the process of delisting the company's stock as a result. Meanwhile, the state's other major coal producers have routinely announced plans to close mines and lay off workers.

**COAL EMPLOYMENT** Altogether, the coal industry shed more than 2,200 jobs in 2014 (see Figure 3.1). From the recent peak in late-2011 through the first quarter of 2015, coal mining employment has fallen by nearly 7,600 jobs, a drop of more than 31 percent. Employment in the coal industry is forecast to decline by around 2,600 over the course of 2015, with a drop of about 13 percent for the year altogether. However, most of those job losses are expected for early in the year. Employment is expected to stabilize in 2016.

**COAL GDP** Total GDP in the coal industry fell slightly in 2014 to \$5.4 billion. However, this figure was more than 29 percent below its recent peak in 2011, when GDP was more than \$7.7 billion. GDP in the coal industry is forecast to experience an additional decline for 2016, and will be roughly stable through the rest of the forecast period.

**COAL PRODUCTION** As illustrated in Figure 3.3, coal production in the state was largely unchanged in 2014 from the previous year, down about 400 thousand tons, or less than 1 percent. This hiatus came after

several years of steep production declines. However, we expect output to fall further in 2015, to around 104 million tons. Altogether, coal output in West Virginia has fallen by around 34 percent since 2008. This compares to a drop in coal production in the rest of the US of around 16 percent over the same time period. Overall, recent years have affected coal production in Southern West Virginia and Eastern Kentucky much more harshly compared to production from Northern West Virginia, and other coal-producing states such as Ohio, Pennsylvania, Illinois, and Wyoming.

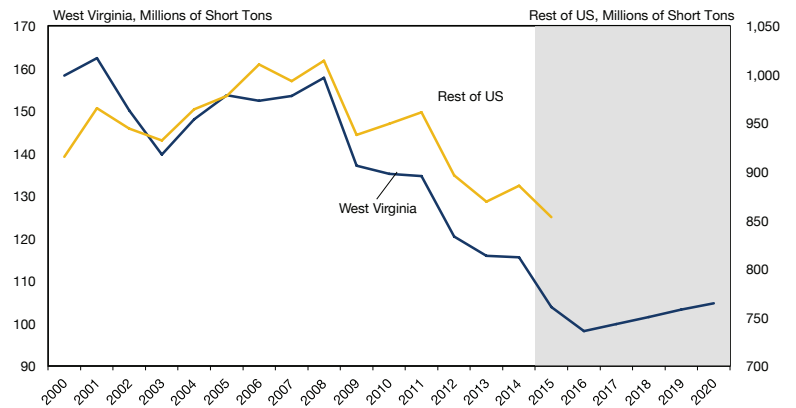
**REGIONAL PRODUCTION DIFFERENCES** The overall decline in coal production depicted above has not affected the various coal-producing regions in West Virginia evenly. Production in Southern West Virginia, those counties that are part of the central Appalachian coal region, has fallen starkly, dropping by more than 50 percent between 2008 and 2015. In the state's northern coal counties, however, production has been generally stable, with a slight rise in 2014. As illustrated in Figure 3.4, production from Northern West Virginia is now close to that of Southern West Virginia, even though Southern West Virginia production was roughly three times that of Northern West Virginia only a few years ago.

**PRODUCTIVITY** One reason for the relative decline in Southern West Virginia coal production is depicted in Figure 3.5. Here we illustrate coal mine productivity for the two regions of West Virginia and for the nation as a whole. As illustrated, since around 2003, productivity numbers have fallen substantially in Southern West Virginia compared to that of the state's northern counties. Overall, this has made many of the mines in the southern part of the state less competitive in the market.

**COAL FORECAST** The next few years are shaping up to bring continued difficulty for coal production. In 2015, we forecast total statewide production will decline by more than 10 percent to around 104 million tons. Production is forecast to continue to fall through 2016 before bottoming out and beginning to rise again in the latter part of the forecast. The state's southern coal fields will see the greatest losses.

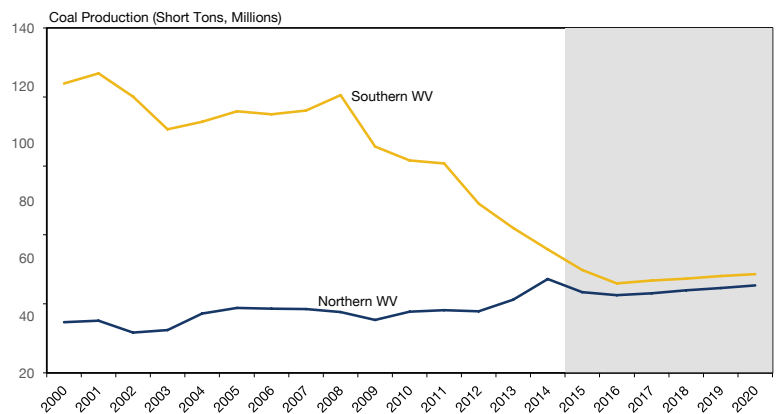
**PRESSURE ON COAL DEMAND** This forecast reflects continuing market pressures in the thermal coal sector from competition with natural gas. The coal industry also will continue to be affected by the regulatory environment in the utility sector, the largest purchaser of West Virginia coal. New rules from the US Environmental Protection Agency (EPA) designed to limit emissions of mercury and carbon are set to come into effect over the forecast period that have the potential to further reduce output. See later sections for more information on these developments.

**FIGURE 3.3: Annual Coal Production**



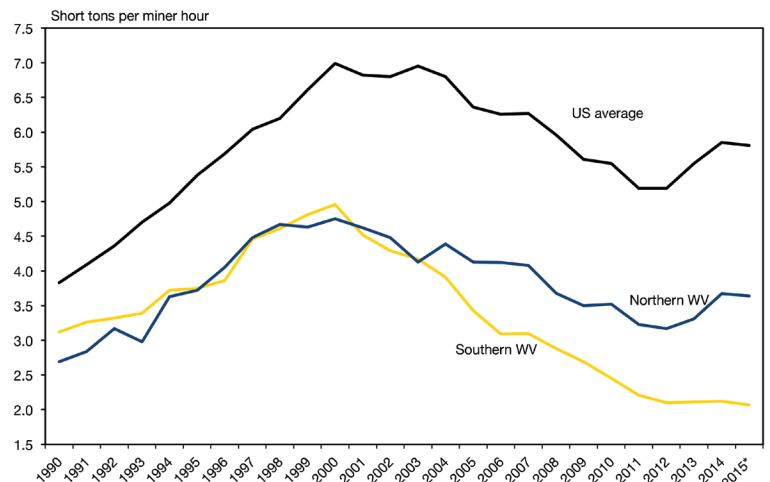
Sources: US Energy Information Administration, WVU BBER Econometric Model

**FIGURE 3.4: West Virginia Coal Production by Region**



Source: US Energy Information Administration, WVU BBER Econometric Model

**FIGURE 3.5: Coal Mine Worker Productivity**



Source: Energy Information Administration, Mine Safety & Health Administration

\* Note: Figure for 2015 is based on data from January-May

Another factor playing into the decline in demand for coal is a falloff in coal exports. After rising for much of the last decade, the value of West Virginia’s foreign exports of minerals and ores fell to \$3.1 billion in 2014 from \$4.6 billion in 2013, a loss of 32 percent. Year-to-date exports through June of 2015 were down nearly 40 percent compared with the same period a year ago. West Virginia’s high export numbers to Asia in 2011 and 2012 appear now to have been short-lived, likely a result of supply disruptions in Australia, the region’s traditional source of coal, that have since subsided. Exports to South Korea and China, both of which had been among West Virginia’s largest purchasers of coal as recently as 2012, fell by more than 80 percent in 2014. The largest purchaser of West Virginia coal remains the Netherlands, which represented more than \$405 million of the state’s coal export volume. Italy and Brazil each purchased more than \$300 million in coal

exports from the state. Exports increased at triple-digit rates to Poland, but the country is still a fairly small buyer of the state’s coal at \$14 million.

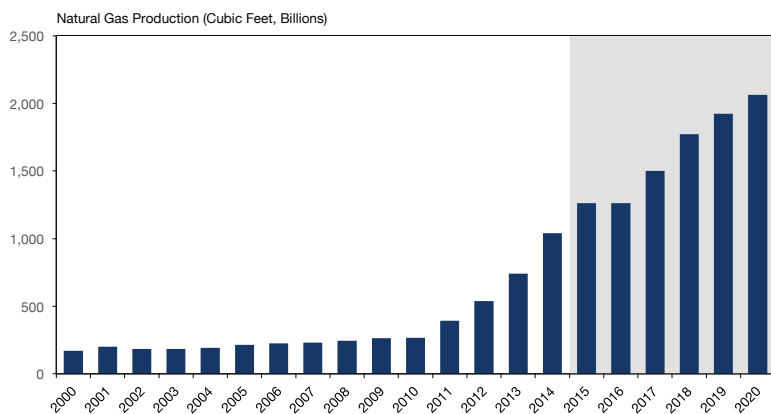
**Natural Gas**

West Virginia’s natural gas industry again showed rapid gains in 2014, but there are signs that the industry could be entering a sluggish period over the next year before continuing its rise toward the latter part of our forecast period. Natural gas production in West Virginia rose to more than 1 trillion cubic feet in 2014, a gain of more than 40 percent from the previous year (Figure 3.6), the fourth year of annual growth rates above 35 percent. Data from the first five months of 2015 show that gas production is still growing rapidly, with a year-to-date growth rate of about 45 percent through May.

**FORECAST** Despite rapid production gains in the first half of 2015, we forecast a slowdown of natural gas production in the latter part of the year and continuing into 2016. We attribute the production slowdown to low prices brought on by a glut in the local natural gas market. Spot prices at the Tennessee’s Zone 4 hub, which is the primary hub for Marcellus gas, have been between one-quarter to one-third of those at the Henry Hub in 2015. However, this price disparity should begin to abate as new planned pipelines are brought online in the next few years. As of July 2015, pipeline companies have announced capacity additions lying at least partially within West Virginia totaling 18.5 billion cubic feet (Bcf) per day to be built by 2018. While not all of this capacity would be available to West Virginia, the planned additions are nearly double the current outflow capacity in the state of 10.4 Bcf per day. Increased capacity for liquefied natural gas exports out of the United States may also increase gas prices. Because of these trends, we predict production in 2016 will be essentially the same as 2015 at about 1.2 trillion cubic feet, before starting to rise again through 2020 for an overall average annual growth rate of 10.3 percent through our forecast horizon (Figure 3.6). While this increase is slower than what has been observed over the last few, it will generate an overall production increase of nearly two-thirds during the forecast period.

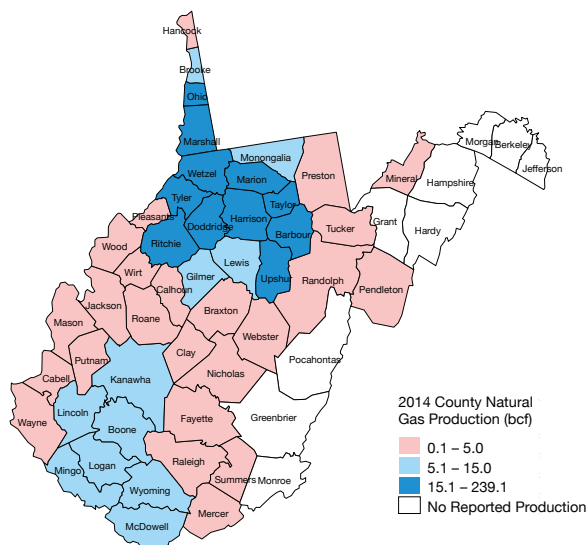
**PRODUCTION BY COUNTY** With the opening up of the Marcellus and Utica shale formations to hydraulic fracturing and horizontal drilling, natural gas production has moved from the southern counties to the northwest part of the state and the Northern Panhandle (see Figure 3.7). Many of the older gas producing counties in southern West Virginia continue to produce, but the bulk of the state’s production is now largely to the north and west of the Clarksburg area. Doddridge County became the largest producer of natural gas in the state in 2014 after production there more than

**FIGURE 3.6: West Virginia Natural Gas Production**



Sources: US Energy Information Administration; WVU BBER Econometric Model

**FIGURE 3.7: Natural Gas Production by County, 2014**



Source: West Virginia Department of Environmental Protection



doubled to 239 Bcf. Harrison and Wetzel counties are the next highest producers with more than 150 Bcf of production each. Of the counties with more than 1 Bcf of gas production, Doddridge was the fastest-growing, followed by Barbour, Tyler, and Ritchie counties, each of which experienced production gains of more than 50 percent year-over-year. Ohio County has moved from having virtually no production in 2011 to the sixth-largest producer in 2014 with more than 33 Bcf.

**EMPLOYMENT** Employment in the industry as a whole rose by almost 500 jobs in 2014, a gain of nearly 6 percent. However, employment in oil and gas extraction

and support activities<sup>7</sup> fell by approximately 4 percent in the first quarter of 2015 when compared with first quarter of 2014, signaling a slowdown in production and employment growth. We forecast that employment in the natural gas sector will rise at a moderate pace through 2020, increasing by about 1,400 jobs between 2015 and 2020. This increase represents an average annual job growth rate of about 3.1 percent. These gains will further cement the natural gas industry's importance to West Virginia's energy economy. We expect natural gas's share of energy sector employment to reach 32 percent by 2020, up from 26 percent in 2014.

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<sup>7</sup> Data are not available for well drilling due to BLS disclosure rules.

## INDUSTRY INSIGHT:

# An All of the Above and All of the Below Energy Strategy

A true paradigm shift has occurred in the United States in recent years, moving our economy from energy scarcity to energy abundance. This shift has been fostered by innovation, entrepreneurship and available capital, and it leaves us awash in energy for at least the foreseeable future. Prices of coal, oil, natural gas, and several renewables have all dropped sharply, and huge productivity gains remain to be realized in almost every energy sub-sector, especially in the unconventional shale plays, such as the Marcellus Shale and Utica Shale, and in some renewable forms of energy.

This new paradigm of energy abundance has dramatically altered the national energy landscape. In August of 2015, oil prices dropped to their lowest levels since February of 2009. Coal prices were strong in 2011, but the domestic industry has recently experienced around 50 bankruptcies - an important barometer of market conditions. Coal prices are now generally 60 to 70 percent of those only four years ago. Natural gas closed at \$2.65 on the NYMEX in August 2015, which is dramatically lower than when it broke through \$13 at the Henry Hub in 2008, after which it plummeted,

followed by many smaller price rises and retreats, then rising above \$6 briefly in 2014. Both coal and natural gas have been over supplied and now may face the dual shock of shrinking demand in the near term, especially with economic woes in China and emerging markets.

It has become a fossil energy sector standard to describe some large geographic areas as "Stacked Plays", with coal seams stacked above enormous hydrocarbons in various overlain and underlain seams of the Marcellus and Utica Shale. The natural gas liquids (NGLs), associated with wet gas (rich gas) sections of the Marcellus and Utica Shales, as well as other shales to be developed, can be further processed into the feedstock for value added manufacturing.

West Virginia must do everything possible, as quickly as possible, to diversify its economy, while seeking to preserve our core energy industries. I believe that the best way to accomplish this goal on diversification through energy, is by looking at energy resources through an **All of the Above and All of the Below Energy Strategy**. Energy prices are generally very low now, as is the case with most commodities except gold, at least in the short

term. While there are more productivity gains to come in several energy sectors, the planet is heading towards 9 billion inhabitants. Therefore, while we should strive to use less energy per unit of output, while diversifying our economy, absolute energy use will increase worldwide in the long run.

The private sector, even with decreased resources during tough market conditions, needs to remain consistently engaged with communities and other stakeholders to maintain support for their operations, whereas the lack of, or inefficacy in execution of such an approach, may help produce situations such as New York being essentially closed as to shale development. The modern US Coal Industry and the Conventional and pioneering Unconventional Natural Gas & Oil (Shale Plays) sectors, nationally and definitely in West Virginia, are by many metrics, literally the best in the world at their business. **The ability of private citizens and companies to own minerals** in the United States, which is almost singularly unique in the world, has helped maintained the necessary support for domestic



**SCOTT ROTRUCK**  
 Director of Energy and Transportation Services,  
 Spilman Thomas & Battle, PLLC

energy development. This unique mineral ownership coupled with entrepreneurship, plentiful capital and private and public research development driving perpetual innovation and continuous improvement, combined to help produce the paradigm shift from scarcity to abundance in the US.

I am very appreciative of West Virginia's efforts in energy planning, beginning in 2007, and updated to the current 2013-2017 West Virginia Energy Plan. The plan is definitely worth the read and I encourage your participation when it is next revised, as states are indeed the experimental laboratories that will find what works best. The public, private, academic and non-profit sectors have worked very hard together since the West Virginia Division of Energy was created in 2007 by the state's Legislature, to leverage and optimize the value added activities for West Virginia's natural resource sector.

I strongly believe a **Comprehensive National Energy Strategy** would be enormously helpful for the long term understanding, planning and execution of state-level energy strategies, especially for states such as West Virginia, which have a large sector of their economies directly reliant on direct energy production and its supply chain. This is especially compelling, considering all the volatility which surrounds and permeates commodity markets generally, especially when subjected to the cruel rigor of algorithm augmented trading and the histori-

cally attendant fear present when the market bears begin to chase off the bulls. I also believe that history has taught us repeatedly to not prematurely write off energy sources. Rather, we should be open to **An All of the Above and All of the Below Energy Strategy**. I have added the additional qualifier **All of the Below** to the standard phraseology, to emphasize that we need to do all possible to create an environment conducive to energy development across all sources, both fossil and renewable, as it is in great part all about sunshine, either direct, or buried in the form of fossil fuels. A comprehensive national energy strategy has huge geopolitical and national security implications.

It would prove immediately beneficial to both coal and natural gas, to expedite the approval processes for exporting Liquefied Natural Gas (LNG). LNG dramatically increases the density of natural gas, so that there is significantly more energy in the same volumetric space. The opportunity to export may be secured quickly by other competitors around the world, so the window of opportunity suggests accelerating necessary federal agency approvals is critical. LNG allows natural gas to be traded in world markets, where there is significant demand and positive geopolitical value. Exporting LNG would allow the more versatile natural gas resource to make money in the international markets, just as coal has done historically. It may also

allow more opportunity for coal to compete in the electric generating sector, where for many decades coal has often found a home for approximately 90 percent of its output.

In conclusion, **Public Policy Matters** tremendously in the energy sector and its sub-sectors, including through the massive supply chain, so even if not done through a coherent national energy strategy, West Virginia needs to continue to pursue the basic benefits that a national energy strategy would bring in terms of additional stability, predictability and collaboration. This would help with other initiatives to create and make the best "Business Case" for capital investment and the location, retention and expansion of technology driven employers from the private and public sectors. The public, private, academic and non-profit sectors need to continue working together, as permissible and possible across all fuel sources, yet with competition always a healthy and necessary factor. While focusing on diversifying West Virginia's economy to have a lessened reliance on coal, oil and natural gas for jobs and revenues, West Virginia needs to develop its workforce with serially transferable skills, especially Science, Technology, Engineering & Math (STEM) skills, while seeking to stimulate demand for West Virginia's valued added natural resources and the location of technology based companies.

## Utilities

The utilities industry in West Virginia was little changed between 2013 and 2014. Employment in the state's utilities rose slightly over the year before, and GDP in the utilities industry fell by \$34 million, a reduction of 3 percent.

Despite the small change in the industry in 2014, West Virginia's utilities industry continues to face headwinds from unfavorable market conditions and federal regulatory requirements. Coal-fired power plants represented more than 95 percent of the state's

power generation capacity in 2014. However, nationally natural gas continued to take market share away from coal-fired power plants. As Figure 3.8 shows, natural gas has made significant gains over the last several years, rising from as low as 13 percent of electric power generation nationally in 2001 to a high of 33 percent in 2012. In the same time period, coal's share of US power generation fell from 53 percent in 2001 to as low as 31 percent in 2015. In April 2015, generation from natural gas exceeded that of coal for the first time in the nation's history.

The prospect for coal-fired generation in the longer-term remains unfavorable. Capital costs for new coal-fired power plants remain high in comparison to natural gas combined cycle plants. The EIA predicts that for plants entering service in 2020, costs for natural gas will be almost 24 percent lower than for coal on a per MWh basis. Of the 89 GW of new capacity proposed to be built in the next 10 years, essentially none of it will be powered by coal, but about 60 percent to be powered by natural gas. These trends were evident in the decision by American Electric Power to close three power plants in West Virginia in 2015. The closures of the Kanawha River, Philip Sporn, and Kammer plants reduced the state's generating capacity by around 10 percent.

We forecast that the utilities industry will continue to decline over the next five years. GDP in the utilities industry is expected to fall by more than \$200 million between 2015 and 2020, a drop of 5 percent per year on an average annual basis. We forecast utilities industry employment to be less volatile; however, the industry is expected to lose more than 250 jobs, a loss of 1 percent per year on average, during the forecast window.

Though West Virginia's coal-fired power plants are likely to continue to decline, there are signs that a shift to natural gas power plants may be beneficial in the long-run for the state. Natural gas prices remain historically low in comparison to coal prices (see Figure 3.9), providing incentives to build new natural gas power plants. In 2014, developers received approval to build the state's first large-scale natural gas plant in Moundsville. The plant is expected to have approximately 550 MW of capacity, and employ 30 people. Two additional natural gas plants have also been discussed in Brooke and Harrison counties.

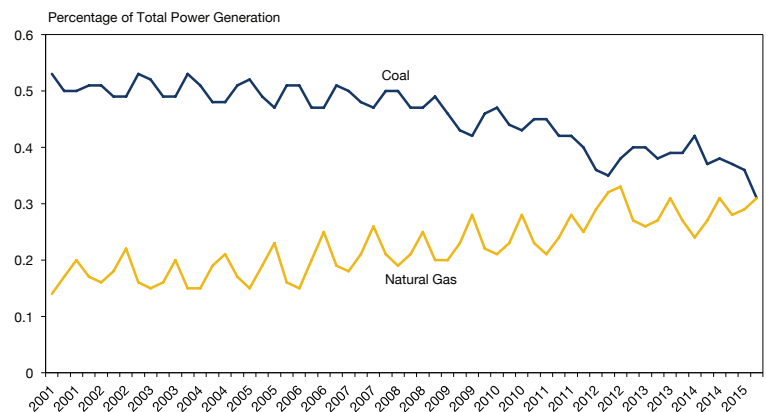
### Air Pollution and Carbon Regulations

The US Environmental Protection Agency finalized two rules in August of 2015 that could have widespread impacts on the energy industries in West Virginia. The EPA's Clean Power Plan sets limits on carbon emissions from the nation's existing power plants, requiring a 32 percent reduction in carbon emissions by 2030. Because coal produces about three-quarters of the carbon emissions in the power generation sector, these rules will have a larger impact on coal-fired power plants than those using other fuel sources. Each state has its own emissions requirement, with West Virginia required to reduce carbon intensity of its power plants by between 29 and 36 percent, depending on the compliance strategy the state chooses. The rules give states wide flexibility in determining how to meet the standard, ranging from efficiency improvements at power plants, to increasing renewable power generation and encouraging consumers to reduce electricity usage. Since these carbon rules were recently finalized, and they

take effect over a long period of time and will likely be legally challenged and possibly at risk to changes in the national political landscape, the BBER has not considered their effects in our baseline forecast. Because of this, the outlook for the utility and coal industries is subject to considerable downside risk. The BBER did examine the potential impacts of an earlier version of the EPA Clean Power Plan specifically on the state's future coal production. For discussion of these impacts, see *Coal Production in West Virginia: 2015-2035*.

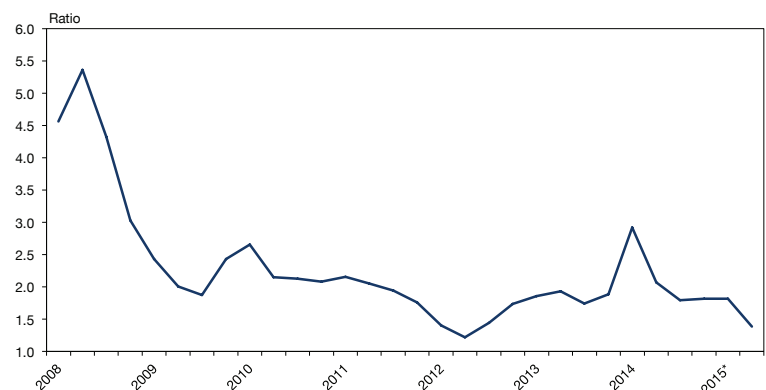
**NEW SOURCE REGULATIONS** The EPA also released a final rule to regulate carbon emissions in new power plants. This rule was first proposed in 2012, but was substantially revised after the rule's comment period and was released at the same time as the Clean Power Plan rules. The new source carbon rules apply only to newly constructed power plants, and limit carbon emissions at the nation's coal plants to 1,400 pounds of CO<sub>2</sub> per megawatt hour of generation. For coal-fired power plants, this emissions level would be difficult to achieve except through the use of carbon capture

**FIGURE 3.8: US Electric Power Generation by Fuel Type**



Source: US Energy Information Administration

**FIGURE 3.9: Ratio of Natural Gas to Coal Price Per BTU Paid by Utilities**



\* Second Quarter 2015 based on data from April-May  
Source: US Energy Information Administration

and storage technologies, thus making it unlikely that new coal-fired generating plants will be built in the near term. However, the EPA's economic impact study of these rules indicates that it is unlikely to have a significant impact in the short-term as the large majority of new proposed power generation plants in the country use natural gas as a fuel instead of coal.

**OTHER POLLUTION REGULATIONS** The EPA's Mercury and Air Toxics Standards (MATS), which were set to go into full effect in 2015, were delayed following a US Supreme Court ruling in June. The Court ruling required the EPA to consider the economic cost of the MATS rule in the agency's determination of its necessity. EPA leadership has indicated that the EPA is committed to the MATS rule, and thus it is likely that the rule will return once the EPA performs the cost consideration. Much of the impact of the MATS rule has already been felt as utilities either shut down non-compliant plants or constructed scrubbers to remove mercury from the stacks. The EPA also received autho-

rization to reinstate the Cross-State Air Pollution Rule (CSAPR) following a 2014 US Supreme Court ruling that upheld the EPA's regulatory power. The CSAPR rule places limits on power plant emissions that cross state borders.

**MANUFACTURING IN WEST VIRGINIA**

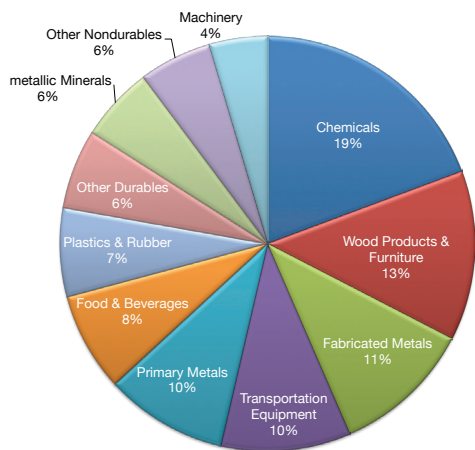
Although its footprint in West Virginia's economy has diminished in comparison to previous decades, West Virginia's manufacturing sector continues to play an important role in shaping the state's economic fortunes. Overall, the manufacturing sector accounts for 7 percent of all jobs and roughly 10 percent of total economic output in West Virginia, but several regions within the state remain quite dependent upon manufacturing activity as certain industries have retained their historical relevance.

**CHEMICALS** The chemicals industry accounts for one-fifth and nearly 40 percent of the manufacturing sector's job and total output, respectively. Most of the state's chemical manufacturers lie along the Kanawha and Ohio River valleys and produce a range of organic and inorganic compounds used in industrial applications, but also manufacture composite materials such as resins and synthetic fibers. In addition to these companies, Monongalia County contains a relatively large pharmaceutical manufacturing and research operation. Aside from jobs and output, the chemicals industry heavily factors into West Virginia's global economic reach, representing the state's second-largest exporting industry at nearly \$1.7 billion in 2014.

**OTHER MANUFACTURED PRODUCTS** Other than the chemicals industry, other key segments of the state's manufacturing sector include wood products, fabricated metals, transportation equipment (auto parts as well as defense and non-defense aerospace) and primary metals, i.e. steel and aluminum. Combined, these industries accounted for three-fourths of the sector's output and 60 percent of all manufacturing jobs found in the state during 2014.

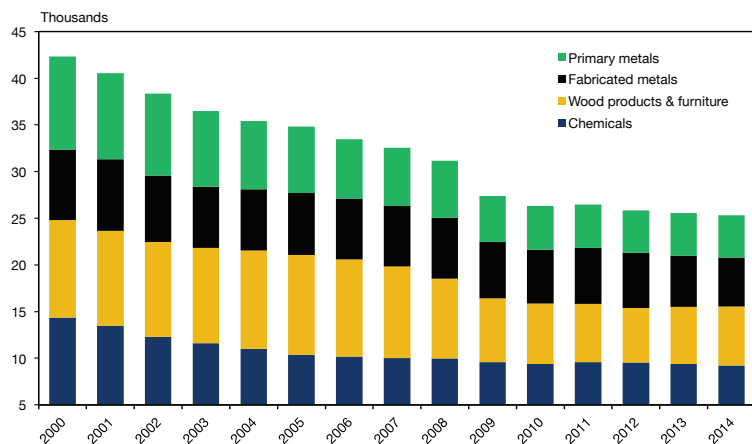
Most of the state's manufacturers are highly sensitive to broader macroeconomic trends and, as a result, have experienced turbulent times over the past decade, but the downturns and recoveries for these industries have been far from uniform. West Virginia's wood products and furniture industry was easily the hardest hit segment in the aftermath of the recent US housing market bust, with employment and output at the state's sawmills, furniture, flooring and other building materials manufacturers falling by roughly 50 percent. Conditions have improved measurably thanks to a recovery in single- and multifamily housing starts, lifting the industry's output 75 percent from its 2009 nadir. The industry is also far more productive than it

**FIGURE 3.10: Share of Total Manufacturing Employment (2014)**



Source: Workforce WV

**FIGURE 3.11: West Virginia Manufacturing Employment by Industry**



Source: Workforce WV

was prior to the recession, generating approximately 20 percent more inflation-adjusted output on a per-worker basis in 2014 compared to 2007. While this has helped to lift real wage rates, it also implies the recovery in employment for the industry has been less robust at cumulative increase of 8 percent since 2012.

The downturn was less severe for the state's chemicals manufacturers as aggregate industry output declined less than 15 percent and employment levels fell by approximately 7 percent. Unfortunately, payroll levels in the state's chemicals industry have been on a downward trend due to a combination of increased technological innovation and greater competition from lower-cost producers overseas. This trend remained in place during 2014 as overall chemicals industry employment declined 2 percent for the year.

Fabricated metals tends to follow broader US manufacturing activity. However, with a significant percentage of the industry coming from machine shops, turned product and screw/nut/bolt manufacturers that directly supply or are closely tied to the coal industry, conditions for the fabricated metals industry have deteriorated as coal production in Southern West Virginia has fallen sharply in recent years. Indeed, industry output and employment have contracted at double-digit rates cumulatively since 2011.

**TRANSPORTATION EQUIPMENT** The state's transportation equipment industry, which is made up of both auto parts production and civilian and defense aerospace, shed nearly 1,000 workers over a period that stretched from before the recession's onset on through the earliest stages of the US economic recovery. While conditions have become somewhat more challenging for the commercial and defense aerospace segments operating in the state, West Virginia's auto parts manufacturing industry has managed to recover nearly all of the jobs lost during the economic downturn. Rising consumer auto demand in the US has played a key role in this rebound, but so too have expansions at plants for companies such as Toyota and NGK Spark Plugs as well as European auto parts manufacturing and supply chain companies Sogefi and Gestamp.

### Sector Outlook

When compared to the past 10 years, the forecast calls for West Virginia's manufacturing sector as a whole to face appreciably better conditions for the next five years. Overall, manufacturing employment is expected to rise moderately at a pace of nearly 0.3 percent per year. Wood products and furniture is expected to enjoy the fastest rate of growth overall as the continued recovery in home construction and remodeling at the national level boosts demand for framing lumber, flooring, cabinetry and other products. The state's plastics

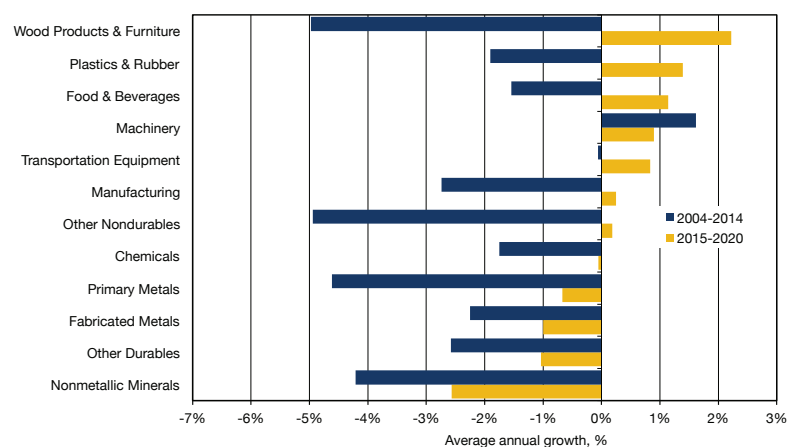
industry should also enjoy growth due to the housing market's recovery, but should also continue to benefit from rising demand for plastic products.

Expectations have been lowered somewhat for the transportation equipment industry, with projected gains of 0.8 percent year through the end of 2020. The auto parts supply chain will continue to contribute steady job gains thanks to strong consumer auto demand and recent expansion activity by auto manufacturers operating in and around the Kanawha Valley. Unfortunately, the aerospace segment of the industry faces some uncertainty going forward, particularly in the defense realm as federal spending priorities become realigned and policymakers look for ways to trim the deficit further.

Payrolls have already begun to increase at the state's food and beverage processing plants, and we anticipate this growth to continue going forward at a pace of 1.1 percent per year during the outlook period. We anticipate continued job losses in the state's fabricated and primary metals industries, but the rates of decline are expected to be measurably slower in comparison to the past ten years. "Other" nondurables, which has seen significant job losses over the past decade is expected to post a modest gain in employment over the five-year forecast horizon. The primary reason for this marked improvement is the construction of Procter & Gamble's new manufacturing facility in Martinsburg, which is slated to employ several hundred workers once it enters operation in 2017.

The forecast calls for West Virginia's chemicals manufacturing industry to remain relatively stable in terms of employment and output, but there are upside risks that could improve the industry's prospects going forward. First of all, the abundant availability of low-cost shale

**FIGURE 3.12: West Virginia Manufacturing Industry Employment Growth Forecast**



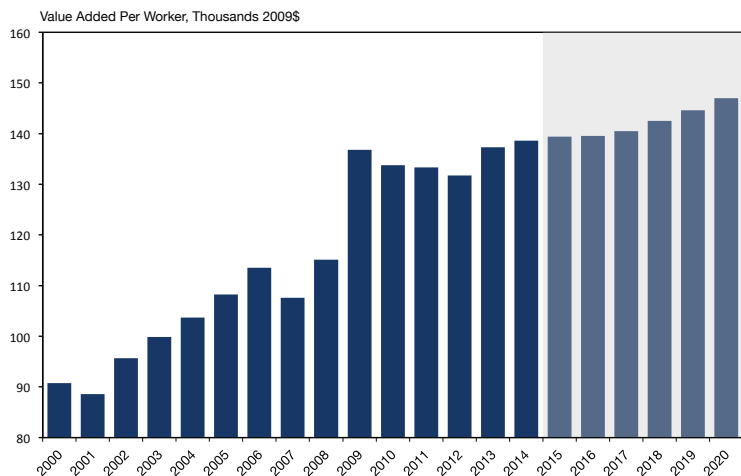
Sources: Workforce WV; WVU BBER Econometric Model

gas has already enabled chemicals to lower input costs significantly and begin the process of investing in their aging domestic facilities.

Beyond the impact to industry profitability and capacity expansion of existing facilities, the strong production growth in Marcellus and Utica shale gas from recent years offers other incentives. Specifically, companies are considering whether to build higher-margin downstream facilities in the Mid-Atlantic region, including West Virginia, in order to process the natural gas co-products extracted from the area and utilize them here rather than extracting and transporting them to the Gulf Coast. The current low price environment for crude oil and natural gas have caused companies to delay any decisions on building facilities for the time being. However, the sheer quantities of these resources that are available in West Virginia's two shale plays and the rising demand for these resources point to the strong likelihood of development in the state.

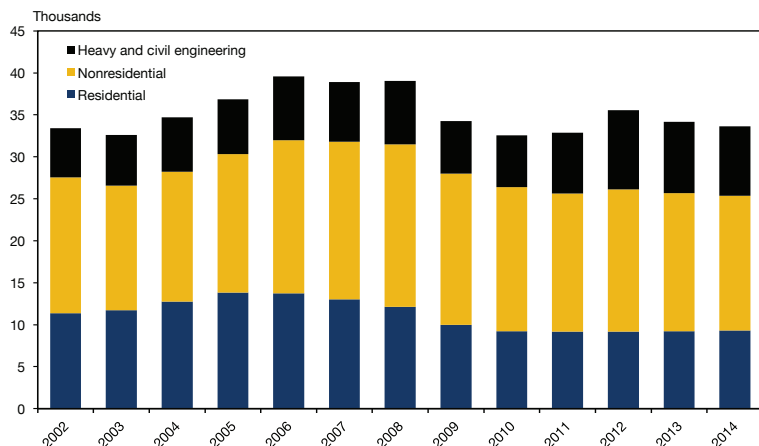
**PRODUCTIVITY** While job growth will likely remain moderate for the manufacturing sector as a whole, real output is expected to rise at an average annual rate of 1.3 percent during the outlook period. As a result, worker productivity is expected to rise further, but will lag the rapid rate of productivity growth that occurred during 2000s. A couple of industry segments should enjoy measurably stronger increases in productivity going forward, but particularly primary metals. Industry employment will likely drift lower over the next five years, but growth in natural gas exploration, production and distribution have bolstered demand for steel. Furthermore, Constellium's decision to add a new state of the art 800-Kt furnace in Ravenswood for manufacturing aluminum alloys that will be used in defense aerospace applications will offset the output the state has lost in previous plant closings. Overall, the real value of steel and aluminum output from West Virginia is expected to rise 2.5 percent between 2015 and 2020.

**FIGURE 3.13: West Virginia Manufacturing Sector Productivity**



Sources: US Bureau of Labor Statistics; Bureau of Economic Analysis; WVU BBER Econometric Model

**FIGURE 3.14: West Virginia Construction Employment by Type**



Source: Workforce WV

## CONSTRUCTION IN WEST VIRGINIA

Employment and output in West Virginia's construction sector declined slightly during 2014. Residential construction (including contractors) registered a small increase in activity for the third consecutive year, while the state's nonresidential and heavy/civil engineering segments have lost jobs in each of the last two years. After gaining more than 3,200 jobs between 2010 and 2012, the heavy and civil engineering construction industry has contracted by nearly 1,200 since then as fewer energy sector projects are underway and public spending on infrastructure has weakened further. Even with this decline, however, payroll levels in this industry segment remain at least 10 percent larger than any year during the 2000s simply due to size and scope of work now being performed that is associated with development in the Marcellus and Utica Shale plays.

### Residential Construction

According to data from McGraw-Hill, just below 2,000 single-family homes were started during 2014, marking a 12 percent decline versus 2013. Homebuilding activity has been somewhat erratic during the first half of this year to difficult weather conditions during much of the first quarter and portions of the second quarter. Regardless, the average rate observed through the first two quarters of 2015 is 2 percent ahead of a year ago and building permits point to a steady increase in new single-family housing starts for the remainder of the year.

Multifamily construction activity is generally a smaller share of the overall residential market, primarily due to the state's low population density and high homeownership rate. Apartment construction peaked in 2007 and has been relatively limited in recent years. Monongalia County has seen the most notable mul-

tifamily construction activity over the past two years as a direct result of the new University Place and University Park developments.

### Nonbuilding and Nonresidential Construction

Although the residential construction segment has experienced a relatively mild recovery, nonbuilding activity in the state has remained weak for the past couple of years. Nonbuilding typically consists of infrastructure projects such as highways, bridges and water/sewer systems, as well as utility distribution systems. Generally, these projects are backed by federal, state and/or local governments' capital funding sources and often have long lead times between approval and the physical construction occurring. With tax collections in West Virginia struggling to grow as the coal industry's downturn has affected both income and severance tax revenue and ongoing congressional gridlock in approving a multi-year transportation funding bill, infrastructure spending has been put under significant stress in recent years.

Spending on new nonbuilding projects totaled just below \$500 million in West Virginia during the 2014 calendar year, representing a 35 percent drop from the previous year and is one-fourth of the spending that took place for new projects started in 2009. After surpassing \$2.2 billion in 2013, spending on new nonresidential construction projects fell to approximately \$750 million and once again the growth was concentrated in Monongalia County where projects such as the construction of the baseball stadium, new outpatient center for WVU Hospitals and other projects totaled more \$420 million.

### House Prices

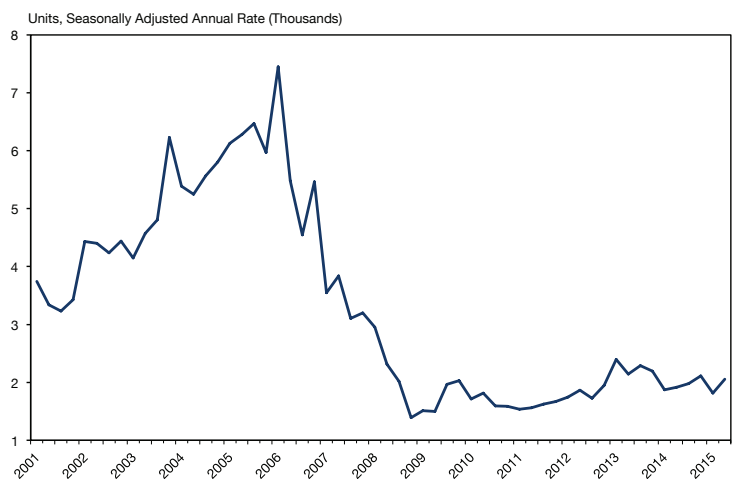
Although West Virginia experienced a downturn in house prices after the housing bubble burst, the rate of house price deflation was much smaller compared to the majority of other states in the US. Indeed, the overall peak-to-trough decline in home prices in the state was approximately 6.8, compared to an 18 percent decline for the US.<sup>8</sup> Since bottoming out in the second quarter of 2011, prices for single-family homes in West Virginia have rebounded by less than 10 percent compared to a 16 percent gain for the nation as a whole over that same time period.

<sup>8</sup> The measure for house prices used in this section is the Federal Housing Finance Agency's All-Transactions Index, which is available at the state level and for all metropolitan statistical areas. In articles concerning housing prices, readers often find references to a 35 percent decline between the peak of the housing market and the trough. The source for this statistic, the Case-Shiller House Price Index, is not available at the state level and is only provided for a sub-set of metro areas. For additional information between the two indexes, readers can visit <http://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index-Datasets.aspx#qpo>.

Of course, reflecting the local nature of forces that affect house prices, changes in house prices have varied quite dramatically in recent years throughout the state. After experiencing a dramatic run-up in prices during the bubble years, West Virginia counties that were part of the Hagerstown (Berkeley and Morgan counties), Winchester (Hampshire County) and Washington, DC (which includes Jefferson County) metros saw prices plunge by as much as 36 percent. The rate of price declines registered in the state's other counties located within metro areas was significantly smaller, ranging from a 2 percent drop in Morgantown (Monongalia and Preston) to a 10 percent loss in Weirton-Steubenville (Brooke and Hancock counties).

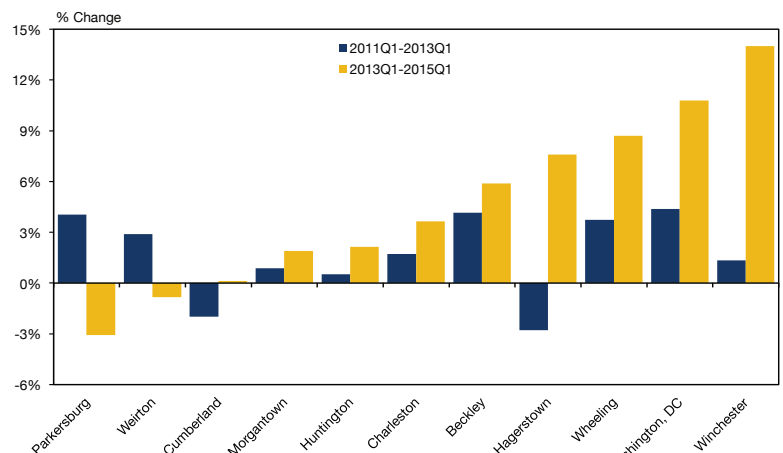
As house prices have started to recover nationally, prices within many of the state's largest markets have also shown signs of improvement. According to Federal Housing Finance Agency data, the Parkersburg

**FIGURE 3.15: West Virginia Single Family Housing Starts**



Source: McGraw-Hill Construction

**FIGURE 3.16: Single Family House Price Growth by Metro Area**



Source: Federal Housing Finance Agency – All Transactions House Price Index

and Weirton metro areas have seen price declines in the past two years while the Cumberland MSA has only registered the slightest of gains in the past two years. Not surprisingly, the strongest growth in house prices since mid-2013 has generally taken place in those parts of the state that are connected to rapidly-growing areas in the Greater Washington DC area or those experiencing growth associated with the natural gas industry.

### Sector Outlook

After an up-and-down performance over the past few years, the forecast calls for the construction sector to see average annual growth of 1.8 percent through the end of 2020. However, growth will not be spread evenly across the sector and much of the growth will occur in the 2016 to 2018 time frame as the energy industry will see several key projects proceed. Barring legal setbacks, several mid- to large-scale pipeline projects are slated for construction within the next two to three years that will alleviate the supply glut of natural gas in the Mid-Atlantic. In addition, the \$500-million combined cycle natural gas power plant in Moundsville is expected to employ more than 500 construction workers in its multi-year construction process projected for completion in 2018.

At the same time, commercial projects outside the energy sector will support the construction sector. First, Procter & Gamble's new \$500 million manufacturing facility in Martinsburg will require several hundred construction workers through its completion in 2017. Ongoing expansion of Ruby Memorial Hospital, new academic buildings and athletic facilities upgrades on the West Virginia University campus in Morgantown will bolster activity as well.

In terms of the residential construction activity, the

forecast calls for single family housing starts in West Virginia to rise at a rate between 5 and 10 percent per year during the outlook period. For the state as a whole, the baseline forecast assumes existing single-family house prices will rise approximately 1 percent per year. Healthy rates of in-migration and rising per capita incomes will support housing demand and put upward pressure on prices in the state's higher growth areas. By comparison, portions of the state where prospects for economic growth are much more limited and/or the population is expected to decline, supply and demand conditions will be such that house prices will remain stable at best.

Publicly-funded infrastructure spending in West Virginia, as well as other states, will remain under pressure during the forecast horizon. Funding sources, namely the state and federal highway trust funds, have and will likely remain strained by weak gasoline excise tax collections and other forms of lackluster revenue growth. In addition, planning for some long-term projects is expected to be disrupted by U.S. congressional gridlock in reauthorizing a multi-year federal transportation bill, known as the DRIVE Act, and the upcoming federal primary and general election campaigns. Finally, attempts at broader federal tax reform and other plans connected to reducing the federal debt could have a significant effect on the availability of funding for future highway construction and other infrastructure development in the state.

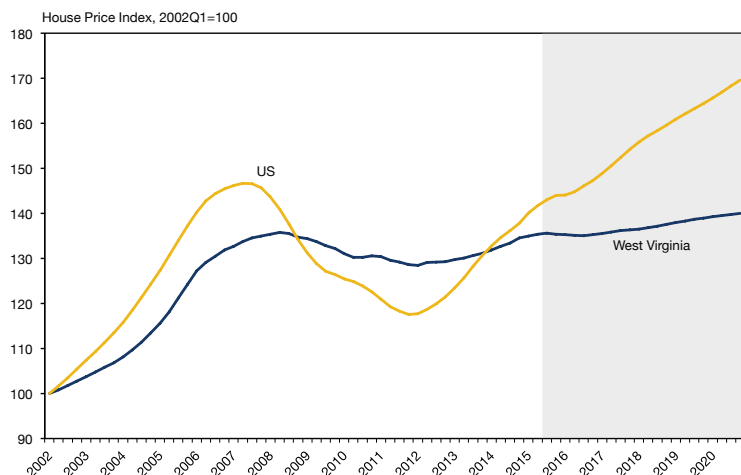
### HEALTH AND HEALTH CARE IN WEST VIRGINIA

West Virginia is often described as the second most rural state in the nation. More than 60 percent of the population lives in counties that the Census Bureau defines as rural. Rugged terrain and long travel times have limited many West Virginians' access to health-care services. More recently construction of new roads and the expansion of health care services have made access easier. The following section details the status of health and healthcare in West Virginia and discusses the future of the health care industry in West Virginia.

#### Healthcare Sector Trends and Outlook

Figure 3.18 shows healthcare sector employment growth in West Virginia and the United States over the past decade and forecast growth over the coming 5 years. Employment in West Virginia's healthcare sector has grown at a fairly volatile pace over the past years, experiencing lows in 2006 and 2014 and a relatively rapidly growing period from 2008 through 2012. In 2006, the average annualized growth rate was only 0.3 percent. It reached a peak at 2.7 percent in 2008. In 2014, the average annualized growth rate in employment dropped back to 0.1 percent, and growth for 2015 is expected to be 0.8 percent. The general trend in growth

**FIGURE 3.17: West Virginia Single Family Housing Starts**



Sources: Federal Housing Finance Agency; WVU BBER Econometric Model



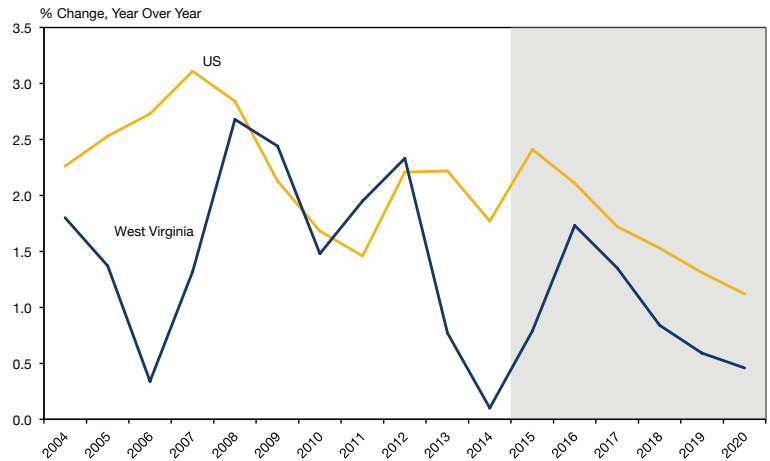
since 2006 may be attributed to a number of factors including the poor overall health status of West Virginians; challenges in accessing health care, particularly in rural areas; and an older than average population. The smaller rate of growth in 2013 and 2014 appears to be the start of a trend of persistently slower growth in healthcare sector employment with forecasted growth rates of less than 2 percent from 2016 to 2020. The healthcare sector is forecast to grow at a faster pace in 2016 and 2017, and then to experience slow growth again in the later years of our forecast period.

The West Virginia Healthcare sector provided a total of 115,700 jobs in 2014 while paying out roughly \$4.7 billion in wages to its employees. Figure 3.19 provides a breakdown of the types of employment captured under the umbrella of the Healthcare and Social Assistance sector. Approximately 80 thousand individuals were employed in hospitals and ambulatory healthcare services sub-sectors in 2014, accounting for 69 percent of the overall sector's workers. The average annual wages of workers in these segments were \$51,300 and \$46,500 at hospitals and ambulatory care centers, respectively. The remaining 31 percent of employees worked in the nursing and residential care facilities sector (18,599 employees) and social assistance sector (17,336 employees). The average annual wage was \$27,651 for those working in nursing and residential care facilities. Employees in the social assistance sector earned the lowest average annual wage (\$17,383) in the overall healthcare sector. Inflation-adjusted wages in healthcare services are expected to increase at an average rate of 0.4 percent from 2016 to 2020.

### Health Determinants and Outcomes for West Virginia

America's Health Rankings® Annual Report provides a detailed assessment of the nation's health on a state-by-state basis.<sup>9</sup> The overall health score reflects each state's performance on 27 health indicators relative to the national average. The indicators fall into two categories: determinants of health, accounting for 75 percent of the overall score and health outcomes, accounting for 25 percent of the overall score. The determinants of health are further categorized into behaviors (e.g. smoking, physical inactivity, high school graduation); community and environment (e.g. violent crime, infectious disease); policy (e.g. lack of health insurance, public health funding); and clinical care (e.g. preventable hospitalizations, low birthweight). The health outcomes include measures of chronic disease, like diabetes and cardiovascular deaths as well as measures of health status, like poor

**FIGURE 3.18: West Virginia Healthcare Sector Employment**



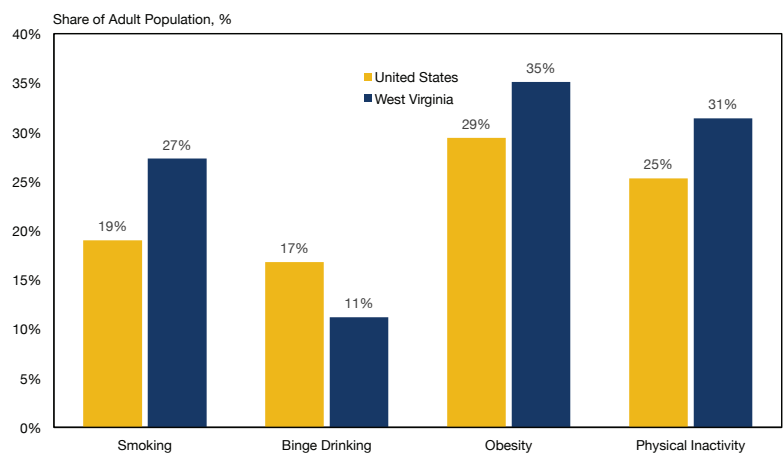
Sources: US Bureau of Labor Statistics; WVU BBER Econometric Model; IHS Economics

**FIGURE 3.19: West Virginia Single-Family Housing Starts**

Sector	Total Employment	Total Wages (ths \$)	Average Annual Wage
Ambulatory Healthcare Services	40,154	\$1,865,725	\$46,464
Hospitals	39,567	\$2,027,863	\$51,251
Nursing and Residential Care Facilities	18,599	\$514,278	\$27,651
Social Assistance	17,336	\$301,349	\$17,383
<b>Total</b>	<b>115,656</b>	<b>\$4,709,215</b>	<b>\$40,717</b>

Source: Workforce WV

**FIGURE 3.20: Health Behavior Statistics, 2014**



Source: America's Health Rankings®

<sup>9</sup> <http://cdnfiles.americashealthrankings.org/SiteFiles/Reports/Americas%20Health%20Rankings%202014%20Edition.pdf>, accessed August 25, 2015.

physical health days and disparity in health status. Each measure is assigned a weight and the weights across all measures total to 100 percent. For example, the weight on smoking is 7.5 while the weight on public health funding is 2.5. The overall score is calculated by adding the scores of each measure multiplied by its percentage of total overall ranking and the effect it has on health.<sup>10</sup> In 2014, West Virginia's overall health score was -0.71 for a rank of 44th out of 50 states.<sup>11</sup> West Virginia's ranking has improved from its rank of 46th in 2013 and 47th in 2012.

A major contributor to West Virginia's poor overall health is obesity.<sup>12</sup> Obesity is a major risk factor for many diseases and chronic conditions including heart disease, cancer, Type 2 diabetes and stroke. In 1990, West Virginia and Mississippi had the highest rate of obesity in the nation with 15 percent of the adult population classified as obese and the prevalence of obesity in West Virginia has increased dramatically since then. In 2014, more than 35 percent of West Virginia's adult population was classified as obese, compared to a national average of just above 29 percent. West Virginia is tied with Mississippi as having the highest prevalence of obesity in the nation.

A key factor to reducing and preventing obesity and other related chronic conditions is getting regular exercise. Unfortunately, West Virginia ranks low in this important lifestyle behavior. West Virginia improved its ranking in physical inactivity to 46th from 49th, among 50 states. The 2014 America's Health Ranking report shows nearly 31 percent of West Virginia's adult population was physically inactive. West Virginia continues to have a high rate of smoking and moved into last position in 2014 with the highest rate of smoking in the country at 27.3 percent of the adult population. Although ranked last on this measure, it does represent a slight improvement over 2013 when 28.2 percent of the adult population indicated that they currently smoke daily. A bright spot in the health behaviors statistics for West Virginia is binge drinking. West Virginia ranks second (tied with Kentucky) on this measure with a prevalence of binge drinking in the country at 11 percent of the adult population.

West Virginia has the second highest prevalence of diabetes in the country at 13 percent of the adult population. West Virginia ranks 45th in cardiovascular deaths (303.7 deaths per 100,000 population), 48th in cancer deaths (221 per 100,000 population), and 49th in premature deaths (10,159 years lost per 100,000 population). West Virginia also ranks last in drug deaths in the country (31.3 deaths per 100,000 population compared to 13 per 100,000 population in the United States).

**FIGURE 3.21: Health Outcomes Statistics, 2014**

	West Virginia	United States	WV Rank
Diabetes (% of adult population)	13%	9.6%	49
Poor Mental Health Days (days in previous 30 days)	4.4	3.7	47
Poor Physical Health Days (days in previous 30 days)	5.3	3.9	50
Disparity in Health Status (by educational attainment)	23.4	31.4	6
Infant Mortality per 1,000 Live Births	7.0	6.0	38
Cardiovascular Deaths per 100,000	303.7	288.2	45
Cancer Deaths per 100,000	220.5	201.4	48
Premature Deaths per 100,000	10,159	6,976	49

Source: America's Health Rankings®

<sup>10</sup> <http://cdnfiles.americashealthrankings.org/SiteFiles/Reports/Americas%20Health%20Rankings%202014%20Edition.pdf>, accessed August 25, 2015. The data for each of the 27 measures are obtained from a various sources and for various years. The data for most of the measures are for 2012 or 2013.

<sup>11</sup> The score is a Z-score indicating the number of weighted standard deviations WV is below the national norm. The calculation is: SCORE = (State Value - National Mean) / Standard Deviation of All State Values. (America's Health Rankings Annual Report, 2013, p. 32).

<sup>12</sup> Obesity is defined by the Center for Disease Control (CDC) as having a body mass index (BMI) of 30.0 or higher. BMI, as defined by the CDC, is equal to weight in pounds divided by height in inches squared multiplied by 703.

**INDUSTRY INSIGHT:**

## A Different Way to Think About Economic Development in West Virginia

Over the last few years, West Virginia has had the dubious distinction of being last in the nation in a few important economic indicators. These indicators are reflective of what may be some of the worst economic times the state has ever seen. For example, in January of 2015, West Virginia was recognized as having the lowest employment-to-population ratio, 49.1 percent, in the history of this measurement. This metric indicates that less than half of the adult population living in West Virginia is not employed. By comparison, Pennsylvania's rate is 59.1 percent; Ohio's rate is 59.8 percent; Virginia's rate is 62.4 percent; Maryland's rate is 62.5 percent; and Kentucky's rate is 54.5 percent. Of course, some people are not employed because they are retired or unable to work. In fact, West Virginia has the highest percentage of citizens who receive personal income from transfer payments at 27 percent. West Virginia also has the highest percentage of citizens on disability benefits at 17.6 percent. This seems to infer West Virginia has an older population which is consistent with the fact that West Virginia has the fourth oldest average age in the nation at 41.6 years. Maine has the oldest average age at 43.6 years, Vermont is second at 42.2 years, New Hampshire is third at 41.9 years and Florida is fifth at 41.2 years. For additional comparison, Virginia's average age is 37.5 years, Maryland is 38 years, Pennsylvania is 40.4 years, Ohio is 39 years, and Kentucky is 38.2 years. These statistics hint that our surrounding states have done a better job of retaining and recruiting young people than we have in West Virginia. The ranking as fourth oldest average age may also contribute to West Virginia's undesirable designa-

tion as having the highest rates of obesity, cancer and diabetes.

There must be more than the age factor contributing to West Virginia's economic woes because there are other states with older populations that have more desirable economic outcomes. Actually, West Virginia's economic rankings are at the very bottom. The Tax Foundation recently ranked West Virginia's "labor supply" at 50th and the state's "future growth prospects" as 50th.

We should also provide context by comparing the population of West Virginia with its neighboring states. West Virginia's population is 1.9 million, Virginia's population is 8.3 million, Maryland's population is 5.9 million, Pennsylvania's population is 12.8 million, Ohio's population is 11.6 million, and Kentucky's population is 4.4 million. Unfortunately, this context highlights yet another economic indicator in which West Virginia is dead last: the US Census bureau reported that, between 2010 and 2014, West Virginia was the only state to lose population. More people left West Virginia than moved into the state, and the numbers of deaths surpassed the number of births. As if that were not bad enough, another study based on US Census Bureau data found that West Virginia was the least educated state in the country.

What might be inferred from these metrics? Basically, we have a record number of people leaving and our average age is increasing. This implies that our young people—especially those who are educated—are going elsewhere to live. Why? West Virginia is a beautiful place to live and raise a family. It has a low cost of living. It is not a stretch to conclude that the answer must be somehow tied to job availability.

In July 2015, the seasonally adjusted unemployment rate in West Virginia increased to 7.5 percent,

the highest rate in the nation. Unemployment had declined since June 2009 when it was 8.3 percent, eventually reaching 5.4 percent in December 2014. Unfortunately, there were substantial layoffs in the mining industry in early-2015 that caused unemployment to surge again. A particularly interesting fact about this unemployment rate is that total employment actually increased in West Virginia by 2,000 jobs from May 2015 to June 2015, yet the overall rate still increased. For me, this observation, along with all of the statistics I have noted, calls into question the fundamental structure of West Virginia's economy as a reason for its negative position.

I have long been an outspoken advocate for greater economic diversity in West Virginia. By economic diversity I do not mean creating new economic sectors to replace the coal industry, or retraining unemployed coal miners to be unemployed machinists. I mean the creation of new economic sectors that make the state's economy larger overall. Diversity implies several different sectors that provide a variety of occupations. It is an economic principle that a diversified economy is a healthy economy. It is also an economic principle that a diversified economy should provide for a diversified workforce demographic – in other words – a healthy mix of white collar, blue collar, pink collar and various vocational workers. I do not believe that West Virginia's economic profile adequately adheres to these principles of industrial or workforce diversity.

The unemployment data I refer to provide a strong indication that we are too dependent on a single sector. The designation as having the least educated population combined with



**JAMES ESTEP**, *President and CEO, West Virginia High Technology Foundation*

the growing average age indicates that we are not providing jobs for those who do not wish to work in the state's classic industries of coal, gas, and manufacturing. This is especially true of the younger generations. They have more of an interest in the emerging economic sectors, such as, the "knowledge sector." Data from the US Bureau of Labor Statistics predict that two out of every three jobs in the next decade will be in the "knowledge sector." West Virginia has done very little to establish a knowledge sector base.

If West Virginia were to mount an effort to recruit more "knowledge sector" employers to West Virginia, how could it proceed? Could the government write a big check? No. Could we offer free taxes for the next decade? Sure, but everyone else is already doing so. Can we hold out our workforce as an enticement? No, we have already discussed that issue. Fundamentally, West Virginia will

need to create a "business case" that would justify and entice these companies to come to the state. Generally speaking, a business case is based upon selling goods and services to a "customer base." How could West Virginia enable the establishment of a customer base that would contribute to a business case that would, in turn, attract knowledge sector companies?

To answer that question, the state should look at the economic progress in North-Central West Virginia. The 2015 West Virginia Economic Outlook observed that the "highest rates of job growth tend to be in the North-Central and Northwestern parts of the state." A tangible portion of this growth can be traced to the recruitment and retention of several federal operations along the I-79 Corridor between Morgantown and Clarksburg. These federal operations have had an economic impact in a variety of ways. For example, they have funded significant construction efforts, and they also

hire thousands of people. But perhaps the most significant impact has come from the enormous amount of contracting. For example, Lockheed Martin was awarded a \$1 Billion contract a few years ago to support the Federal Bureau of Investigation (FBI), Criminal Justice Information System (CJIS) in Clarksburg. This level of opportunity will get the attention of an entire sector. The availability of such lucrative contracting opportunities serves to attract "knowledge" sector companies to the state. In effect, these various federal operations create the "customer base" that defines the "business case" that forms the basis of a knowledge sector in West Virginia. This "federal anchor" model of economic diversity represents the best strategy for West Virginia to strengthen its economic structure without expended substantial funding and will sure up the foundations of its economic system.

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**WV BUSINESS and  
ECONOMICS**

## CHAPTER 4: Government in West Virginia

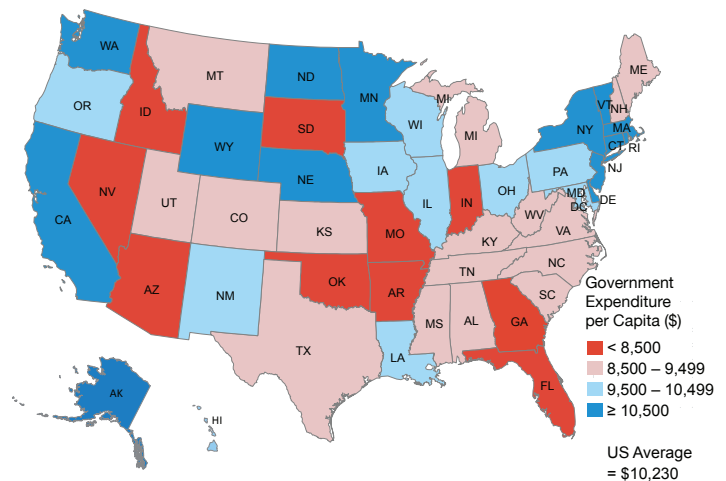
As reported in previous sections, government is the largest employer in West Virginia, accounting for one-fifth of all jobs in the state.<sup>13</sup> Further, total state and local government spending in the state is equivalent to around 25 percent of West Virginia’s total personal income, and the US federal government transfers a significant amount of income into the state. Taken together, it is clear that government has a significant economic influence in the state, and as such, in this section we explore the role of government in West Virginia in two ways. First, we detail the size and composition of state and local government activity in the state. Second, we consider public assistance in West Virginia that is provided by the US federal government in conjunction with the State of West Virginia.

### WEST VIRGINIA GOVERNMENT

As illustrated in Figure 4.1, West Virginia ranks in the lower half of US states in terms of the size of overall state and local government when measured as total spending on a per capita basis. Indeed only 17 states have smaller state and local governments when measured by this metric.<sup>14</sup> However, it is important to also consider government spending measured relative to state personal income, especially since personal income per person in West Virginia falls below the national average. As reported in Figure 4.2, West Virginia’s state and local governments are larger than average when total spending is measured relative to personal income. Total state and local government spending in West Virginia equals 25.3 percent of state personal income, compared to the US average of 23.2 percent; indeed, only 8 states have larger governments by this metric. Overall, the answer to the question “How large is state and local government in West Virginia?” is mixed depending on the metric used: The absolute size of the government is relatively small, but a relatively large portion of the state’s resources are devoted to government activities.

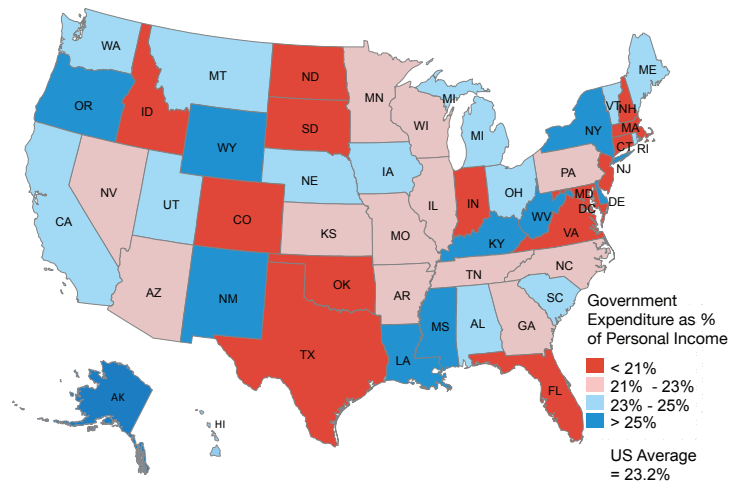
In Figure 4.3 we report the composition of state and local government spending in West Virginia. As illustrated, West Virginia devotes 34 percent of its overall government resources to education and libraries. This compares to a national average of just under 28 percent. West Virginia also devotes a relatively large share of its government resources to public welfare: West Virginia governments devote 20 percent of their

**FIGURE 4.1: State and Local Government Expenditure per Capita, 2012**



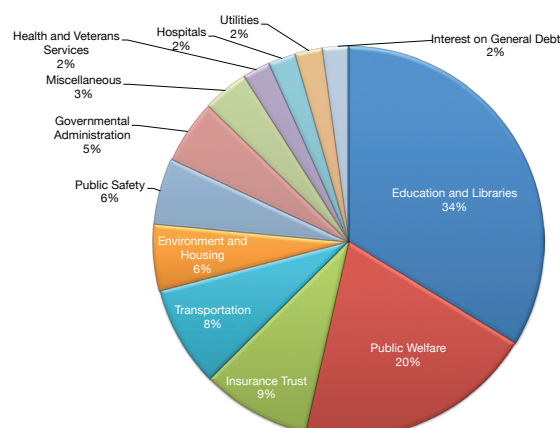
Source: US Census Bureau

**FIGURE 4.2: State and Local Government Expenditure as Share of Personal Income, 2012**



Source: US Census Bureau

**FIGURE 4.3: West Virginia State and Local Government Expenditure Composition, 2012**

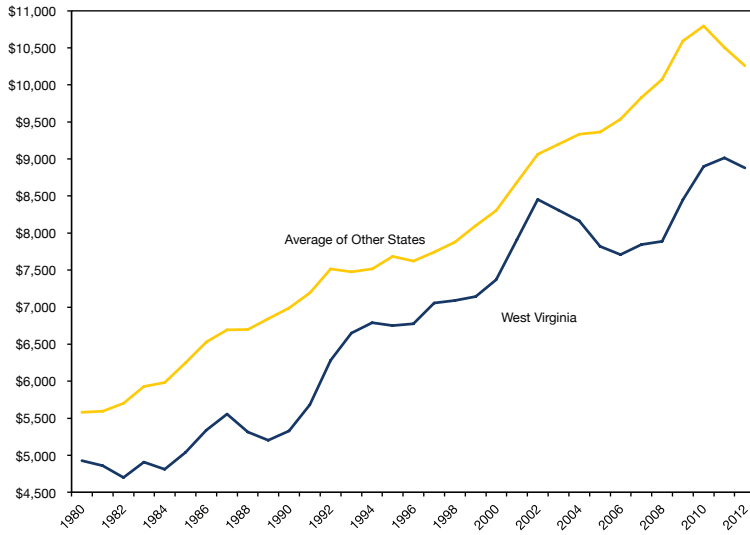


Source: US Census Bureau; Total 2012 Expenditures = \$16.5 billion

<sup>13</sup> This figure includes federal government employment in West Virginia, in addition to state and local government employment.

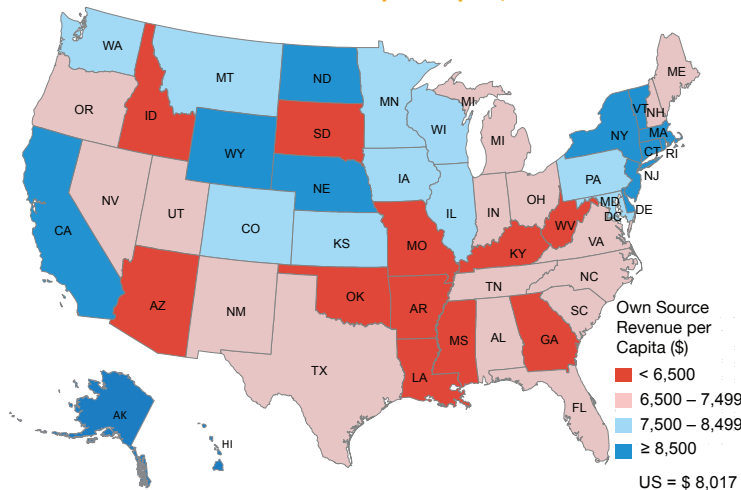
<sup>14</sup> Data are for the 2012 fiscal year. Data for the 2013 fiscal year are not scheduled for release by the US Census Bureau until December of 2015.

**FIGURE 4.4: West Virginia Real State and Local Government Expenditures per Capita**



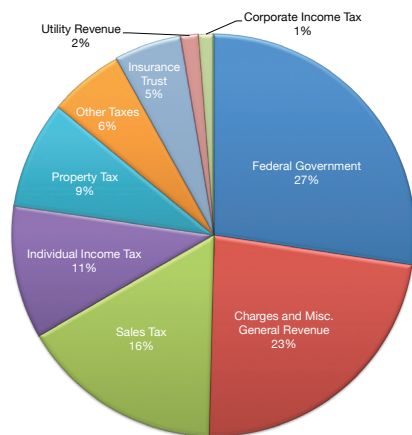
Source: US Census Bureau; US Bureau of Economic Analysis.  
 Note: Figure is adjusted for inflation, presented here in 2012\$.

**FIGURE 4.5: State and Local Government Own Source Revenue per Capita, 2012**



Source: US Census Bureau

**FIGURE 4.6: West Virginia State and Local Government Revenue Composition, 2012**



Source: US Census Bureau;  
 Total 2012 Revenue = \$16.6 billion

overall spending to this category - programs such as Medicare and the State Children's Health Insurance Program - compared to a national average of just over 15 percent. West Virginia governments direct 9 percent of its expenditures to insurance trust expenditures for public employees, which is less than the national average of 11 percent. Further, governments in the state focus relatively heavily on transportation spending: in West Virginia 8 percent of total spending goes to transportation-related projects, compared to a national average of just under 6 percent.

In Figure 4.4 we report the growth in state and local government expenditures per person in West Virginia over the past three decades. As illustrated, West Virginia governments have increased their aggregate size from around \$4,900 in total spending per capita in 1980 to nearly \$8,900 by 2012, in inflation adjusted terms. However, over the entire period West Virginia governments have remained below the national average in terms of spending per capita. Further, the degree to which West Virginia state and local government spending falls short of the national average has widened over the period.

In Figure 4.5 we report state and local government own-source revenue per capita across the US states. Here West Virginia falls in the lowest grouping among the states based on this metric. The fact that West Virginia is so low in terms of own-source revenue, compared to total expenditures per capita, is driven by the fact that West Virginia receives an above-average share of its revenues from the US Federal Government.

Figure 4.6 illustrates the sources of West Virginia state and local government revenue. West Virginia receives the largest share of its total revenue from the US Federal Government. Overall, 27 percent of total revenue received by West Virginia governments is a federal transfer, which is significantly higher than the national average of 19 percent. West Virginia governments are in alignment with most states in terms of their reliance on sales taxation: West Virginia governments derive 16 percent of their total revenues from sales taxation, which is almost exactly equal to the national average. Similarly, West Virginia governments derive 11 percent of their total revenues from individual income taxation, compared to a national average of 10 percent. In slight contrast, the reliance on the property tax in West Virginia - 9 percent of total revenues - falls short of the national average of nearly 15 percent.

**PUBLIC ASSISTANCE IN WEST VIRGINIA**

Total transfer payments made in West Virginia in 2013 amounted to around 27 percent of personal income in the state, as depicted in Figure 4.7. That figure is lower than what was observed in 2010, given economic

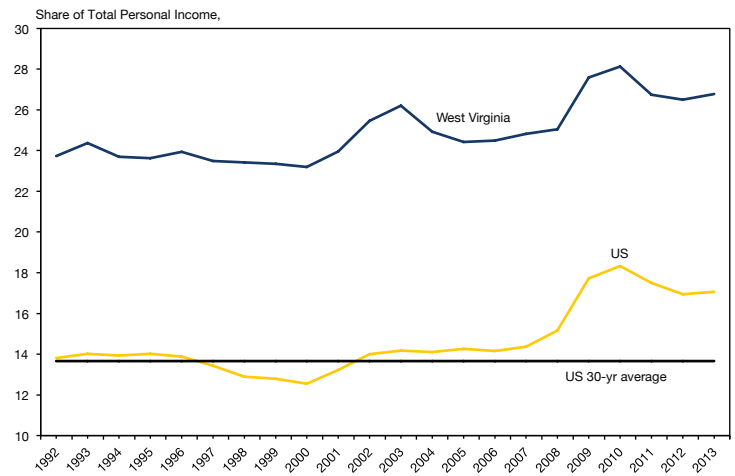
improvement over time, but the 2013 level remains higher than was typically observed over the past two decades. Further, transfer payments in West Virginia are substantially higher when measured against personal income when compared to the national average; for the nation as a whole, transfer payments were equivalent to around 17 percent of personal income in 2013. Indeed, the 27 percent figure placed West Virginia highest among the 50 states in 2013 in terms of reliance on transfer payments.

In Figure 4.8 we disaggregate transfer payments into various broader categories. As illustrated, social security is by far the largest individual program, accounting for more than 36 percent of total transfer payments made in West Virginia in 2013. Medicare and Medicaid came in second and third, accounting for around 23 and 17 percent of total transfer payments, respectively. All other transfer programs pale in comparison to these three when represented as a share of total expenditures in the category. The Supplement Nutrition Assistance Program (SNAP) in the state comes in at a distance fourth in terms of its spending share, accounting for less than 3 percent of total transfers. It is interesting to note how the composition of transfer payments has evolved over the past two decades. Spending on Medicare and Medicaid has increased substantially since 1990 as a share of total transfer payments. Social Security spending has fallen in relative terms, along with various government retirement and disability programs, worker’s compensation, family assistance programs, and to a lesser degree, SNAP spending. Supplemental Security Income (SSI) and state unemployment insurance spending have remained relatively constant over the period as a share of total transfer payments.

In Figure 4.9 we illustrate the composition of transfer payments nationally. The figure illustrates a significant degree of similarity to the pattern observed in West Virginia in terms of the size of relative programs and in terms of the evolution of spending patterns over time.

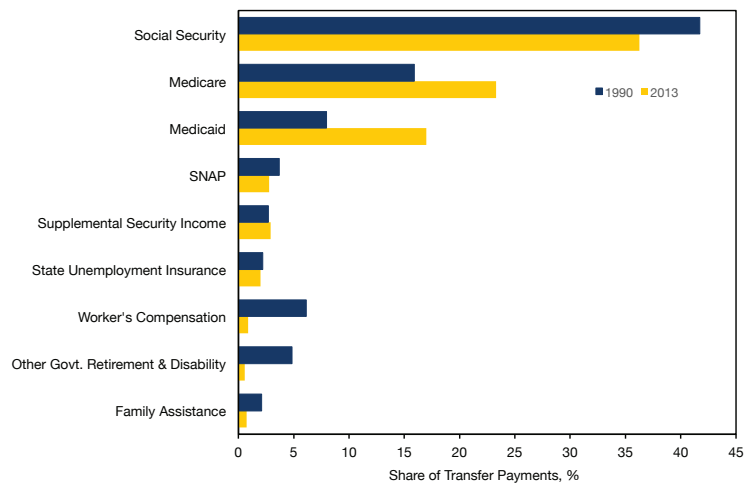
Figures 4.10 and 4.11 illustrate the size of specific public assistance programs in West Virginia. In Figure 4.10, we report the number of individuals who receive benefits from specific public assistance programs in West Virginia. In Figure 4.11 we report the share of the population receiving benefits from each program, and we offer a comparison to the national share. With 465 thousand recipients, social security benefits are enjoyed by the largest number of West Virginians, representing just over one-fourth of the state’s population. This figure is substantially higher than the corresponding figure at the national level of 19 percent, largely due to the state’s older population.

**FIGURE 4.7: Transfer Payments as a Share of Personal Income**



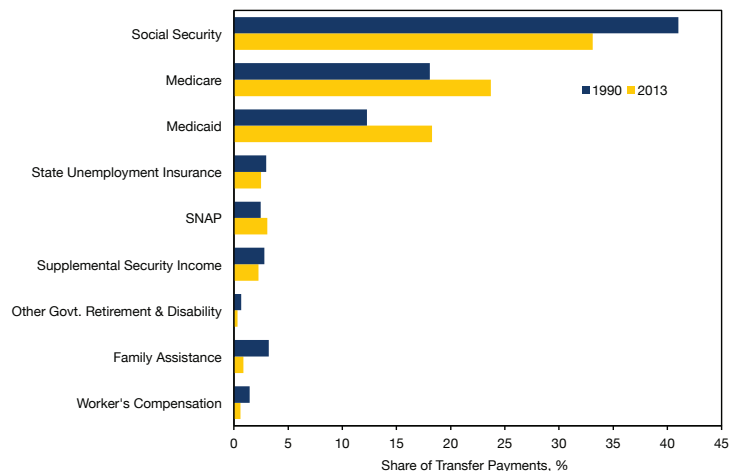
Source: US Bureau of Economic Analysis

**FIGURE 4.8: Distribution of Transfer Payments by Program, WV**



Source: US Bureau of Economic Analysis.  
Note: Select programs are reported in chart.

**FIGURE 4.9: Distribution of Transfer of Payments by Program, US**



Source: US Bureau of Economic Analysis.  
Note: Select programs are reported in chart.

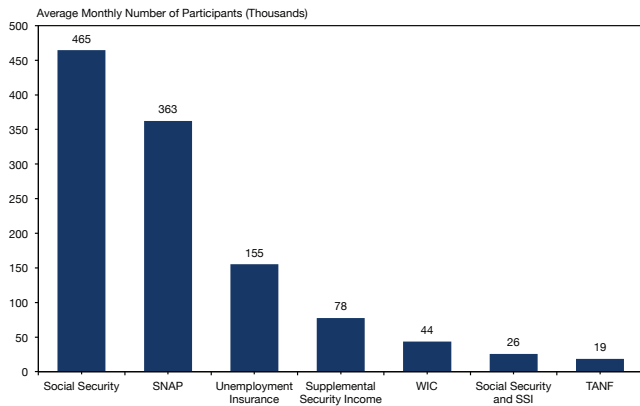
The SNAP program has the second highest number of recipients at nearly 363 thousand, or 20 percent of the state’s population. This figure is also higher than the national figure of 15 percent. Unemployment insurance benefits were received by 155 thousand individuals in the typical month in West Virginia in 2014, representing more than 8 percent of the state’s population, which is slightly higher than the national figure. SSI and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) were received by 78 thousand and 46 thousand West Virginians during the typical month in 2014.

SSI is received by a larger share of West Virginians compared to the nation, whereas WIC is received by a smaller population share in West Virginia. Temporary Assistance to Needy Families (TANF), was received by 19 thousand West Virginians during the typical month in 2014, which represents one percent of the state’s population. TANF is received by approximately 1.1 percent of the population nationally.

With Figures 4.12 and 4.13 examine the receipt of unemployment insurance benefits in West Virginia. As illustrated, the duration of unemployment insurance benefits fell significantly between 2010 and 2012, both nationally and in West Virginia. However, the figure rose again in West Virginia through 2013 and 2014 in the state, due to worsening employment conditions in the state. By the first part of 2015, the average unemployment insurance recipient received benefits for around 15.5 weeks, shorter than the comparable figure for the US.

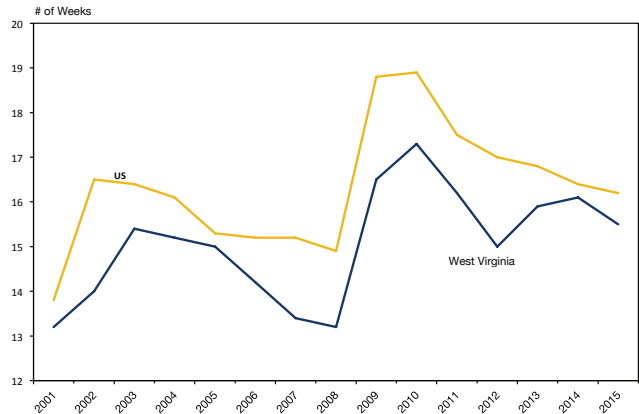
In Figure 4.13 we illustrate the average weekly unemployment insurance benefit amount. As illustrated, benefits have risen in nominal terms since 2001, except for a sharp spike during 2010-2011. Overall, the typical West Virginian who received unemployment insurance benefits during the first part of 2015 received around \$296 per week, compared to around \$318 per week nationally.

**FIGURE 4.10: Participation in Transfer Programs in West Virginia, 2014**



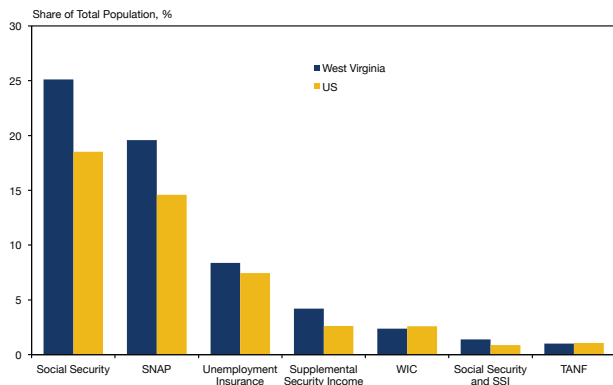
Sources: US Department of Labor; US Social Security Administration; US Department of Agriculture; US Department of Health and Human Services.

**FIGURE 4.12: Average Weekly Duration Collecting Unemployment Insurance**



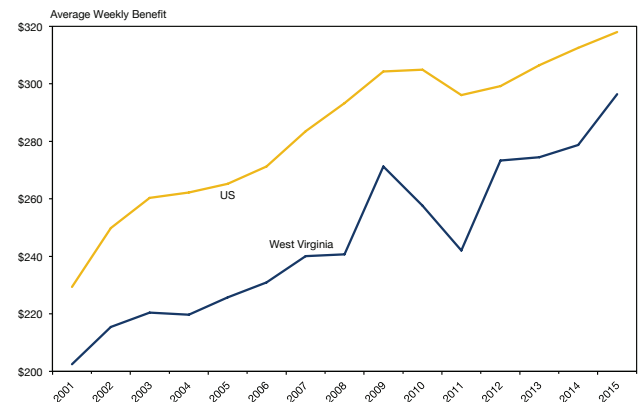
Sources: US Department of Labor

**FIGURE 4.11: Participation Share in Transfer Programs, 2014**



Source: US Department of Labor; US Social Security Administration; US Department of Agriculture; US Department of Health and Human Services.

**FIGURE 4.13: Average Weekly Unemployment Insurance Benefits**



Source: US Department of Labor



## INDUSTRY INSIGHT: West Virginia Fiscal Forecast

Over a period of several decades, West Virginia government finances greatly benefited from industries that export goods and services from our State (e.g., mining, manufacturing, racetrack gambling and tourism). At the state level, significant taxes were imposed on such goods and services to effectively export a portion of the cost of government services to nonresidents. At the local level, voters frequently approved excess property tax levies with a double weighted burden on business property, particularly in counties with significant shares of export industry activity. In addition, the federal government provided significant funding for highway infrastructure needs. The exportation of costs effectively lowered the cost of state and local government services and stimulated resident demand for greater levels of those services. As a result, West Virginia allocates a higher than average share of funding for major key programs such as elementary and secondary education, higher education and highways. According to the latest available data, West Virginia ranked 6th highest among all 50 states and the District of Columbia in share of state personal income dedicated to government funding of elementary and secondary education in Fiscal Year 2013.<sup>15</sup> Similarly, West Virginia ranked 10th highest in share of state personal income dedicated to the funding of higher education in Fiscal Year 2013<sup>16</sup> and 7th highest in share of state personal income dedicated to the funding of highways in Fiscal Year 2012.<sup>17</sup>

However, in recent years, West Virginia export activity (i.e., exportation of the costs of government to sources outside of West Virginia) has slowed due to increased competition in the global economy; increased gaming competition from neighboring states; weaker than normal global economic growth combined with

unfavorable currency exchange rates; and cumulative federal regulatory policies that effectively reduced demand for certain West Virginia export products such as coal and electricity. In addition, technological advancement resulted in a surge in oil and natural gas production from shale formations. The surges in energy output during a period of weakening global economic growth resulted in significantly lower energy prices to the disadvantage of both the coal industry and the growing natural gas industry. The value of West Virginia non-manufacturing good exports (mainly coal exports) fell by two-thirds from a high of roughly \$7.5 billion in 2012 to just \$2.5 billion in the 12-month period ending June 2015.<sup>18</sup> Coal shipments to other US states fell by nearly half, from 101 million tons in 2006 to slightly more than 51 million tons in 2013.<sup>19</sup> West Virginia electric power generation exports to other states fell by roughly 20 percent over the past decade.<sup>20</sup> In the gaming sector, total lottery sales fell approximately 26 percent from their 2007 peak.<sup>21</sup> These trends resulted in slower economic growth and in significant decreases in key state revenues from exports. The state is now exporting less tax liability to nonresidents, and a multi-year reconciliation process is underway to adjust the level of State expenditures to resident willingness to pay due to the significant shift away from export tax collections.

Despite significant headwinds from export industries, state General Revenue Fund collections grew by an adjusted 3.6 percent in Fiscal Year 2015, following consecutive prior years of revenue decline. Personal income tax collections rose by an adjusted 9.1 percent, and consumer sales tax collections rose by an adjusted 3.8 percent during the year.<sup>22</sup> The gains in income tax revenue were largely attributable to a rebound in income realization levels in 2014, following a prior year decline attributable to taxpayer behavior in response to federal tax increases and other uncertainties.<sup>23</sup> In addition, the state treasury reaped a sizeable dividend from the mid-2013 expiration of an

alternative fuel automobile tax credit on purchases of flex fuel vehicles and other hybrids. Collections were also helped by an improving growth trend in wage and salary income during the full year period ending with the first quarter of calendar year 2015. Fiscal year 2015 revenues would have met original estimate if not for a significant decline in energy prices that fully hit the state treasury by the fourth quarter.

Absent supplemental appropriation from reserve funds, final Fiscal Year 2015 general revenue fund collections were \$60.6 million below estimate. Severance tax collections alone fell \$60.4 million below estimate and an adjusted 9.2 percent below prior year receipts. The revenue decline was sharpest in the fourth quarter of Fiscal Year 2015, when Severance Tax collections fell nearly 33 percent below prior year receipts - largely due to lower energy prices. Average price for natural gas and coal declined by roughly 37 percent and 10 percent, respectively, in the past fiscal year. During the final three months of the year, average price for natural gas and coal declined by 57 percent and 22 percent, respectively. In response to rapidly declining prices associated with oversupply, the coal industry began trimming its production levels during the final quarter of Fiscal Year 2014. Coal sales were relatively flat during the entire year, but down 4.3 percent in the last three months of the year.

The Fiscal Year 2015 budget was balanced with the aid of \$100 million from the State's Rainy Day Fund, \$38.9 million in mid-year budget spending authority reductions, the use of \$12.6 million in unappropriated balances, a supplemental reserve revenue appropriation by the Legislature and the use of \$3 million from the Income Tax Refund Reserve Account. Due to year-end agency expenditure authority expirations, the State ended Fiscal Year 2015 with a modest budget surplus of roughly \$12.8 million.

The Fiscal Year 2016 base budget



**MARK MUCHOW,**  
Deputy Cabinet Secretary,  
WV Department of Revenue

<sup>15</sup> U.S. Census Bureau, *Public Education Finances 2013*, Table 12.

<sup>16</sup> SHEF FY2014: *Higher Education Finance*, State Higher Education Executive Officers Association, page 46.

<sup>17</sup> U.S. Census Bureau, *State & Local Government Finance 2012*.

<sup>18</sup> U.S. Census Bureau

<sup>19</sup> Energy Information Administration, U.S. Department of Energy

<sup>20</sup> Energy Information Administration, U.S. Department of Energy

<sup>21</sup> West Virginia Lottery Commission

<sup>22</sup> Growth rates reflect adjustments related to timing changes for revenue transfers and a new program accelerating certain income and sales tax collections.

<sup>23</sup> The "Federal Fiscal Cliff" at the end of 2012 led taxpayers to accelerate significant income from 2013 back to 2012 to avoid possible federal tax increases. Federal policy related to 2012 was not settled by Congress until after the year had expired.

totals \$4.7 billion and is roughly \$87 million lower than the Fiscal Year 2015 base budget. State savings in the School Aid Formula and lower required contributions to the State's pension system account for a significant share of the budget savings. Due to better than expected returns on State investments, catch-up contributions to the Teachers' Retirement Fund drop to 6.9 percent (i.e., nearly \$298.6 million) of the State budget for Fiscal Year 2016. Catch-up contributions to the Teachers' Retirement Fund are designed to extinguish debt over a 40 year period. Fiscal year 2016 is the 22nd year of this plan. This budget depends on a \$14.8 million transfer from the State's Rainy Day Fund and roughly \$15 million in additional one-time funds. Due to the expectation of further decline in coal mining activity, the official General Revenue Fund estimate is just 2.7 percent ahead of actual Fiscal Year 2015 collections. The Fiscal Year 2016 estimates were derived from economic forecasts as of November 2014. In their November 2014 forecast, IHS Economics projected the average quarterly Henry Hub cash market price for natural gas would range between \$3.66 per million British Thermal Units (BTU) and \$3.95 per million BTU between 2015 and 2016. In their July 2015 forecast, IHS Economics projected the average quarterly Henry Hub cash market price for natural gas would range between \$2.71 per million BTU and \$3.05 per million BTU over the same period between 2015 and 2016. This represents a decline of roughly 25 percent from the prior forecast. Significantly lower energy prices will have a negative impact on the Fiscal Year 2016 revenue outlook, particularly for severance taxes. Lower prices will likely result in greater downward pressure on coal production and coal employment in the coming year. Given these factors, additional adjustments to bring the current year budget in balance with available revenues will likely be necessary this year.

Current projected Fiscal Year 2017 revenues are not appreciably greater than the official forecast for Fiscal Year

2016. However, projected expenditures are forecast to increase by nearly 4.5 percent with roughly three quarters of the projected increase tied to possible funding increases for Medicaid, PEIA and salary enhancements.<sup>24</sup> Given the imbalance between projected revenue growth and projected expenditure growth, budgetary adjustments necessary to balance the current year budget would also need to remain in place next fiscal year, along with some additional adjustments. The projected payoff of the old Workers' Compensation debt sometime this fiscal year should help partially ease financial concerns for next year and provide some tax relief to the coal and natural gas industries at the same time. When this debt is determined to be fully paid, based on an actuarial report, current law provides for the repeal of special severance taxes on coal, natural gas and timber. These special taxes include a 56 cent per ton tax on coal sales, a 4.7 cent per thousand cubic feet (Mcf) tax on natural gas sales and a 2.78 percent gross receipts tax on timber. These taxes collectively generated more than \$125 million for the old Workers' Compensation Debt Fund in Fiscal Year 2015. Under current law, \$60.4 million in annually allocated personal income tax collections currently dedicated to the Workers' Compensation Debt would once again be deposited in the General Revenue Fund. In addition, proceeds from a reallocated reduced timber severance tax rate would be dedicated to the general funding of State Division of Forestry, and \$11 million in annual lottery proceeds currently dedicated to the Workers' Compensation Debt Fund would become available for general appropriation by the Legislature.

Projected non-federal revenues for the State Road Fund are likely to decrease from a Fiscal Year 2015 peak of nearly \$770 million to approximately \$750 million or less by Fiscal Year 2017. The anticipated decrease in available funds would be associated with decreases in the Motor Fuel Excise Tax rate from 35.7 cents per gallon in 2014 to 34.6 cents per gallon in 2015 and 33.2 cents per gallon in 2016. The tax rate decreases

are attributable to declining motor fuel prices and the resulting deflationary impact on the variable 5 percent sales tax component. The variable component was added in 1983 and modified in later years to provide the Road Fund with inflationary revenue increases tied to rising fuel prices. The expected loss of roughly \$35 million in Motor Fuel Tax collections over the next two years would be partially offset by some growth in Motor Vehicle Sales Tax collections. Due to strong vehicle sales, Motor Vehicle Sales Tax collections grew by 5.9 percent in Fiscal Year 2015.

Overall revenue growth over the next few years will be heavily dependent upon the performance of the natural gas industry. Due to significantly lower prices, State and local natural gas Severance Tax collections fell by more than 15 percent between Fiscal Year 2014 and Fiscal Year 2015. Natural gas Severance Tax collections are currently projected to decrease at a smaller rate of closer to 2 percent in Fiscal Year 2016 before rising by an average annual rate of more than 16 percent between Fiscal Year 2016 and Fiscal Year 2020. The anticipated increase in revenues would be attributable to the combination of rising production, a gradual firming of prices and the development of new markets upon the completion of various pipeline projects over the near term. Increasing revenues from natural gas production will at least partially offset an anticipated decrease in coal Severance Tax revenues over the forecast period. In addition to Severance Tax collection growth, both Personal Income Tax revenues and Consumer Sales Tax revenues are anticipated to grow modestly after Fiscal Year 2016 in response to a trend toward higher employment and to greater growth in wage and salary income over the longer-term forecast period. However, the glory days of significant government revenues from export activities may not fully return in coming years. There will likely need to be some additional reconciliation between tax revenues provided by residents and the level of government services received.

<sup>24</sup> See page 9 of *State of West Virginia Executive Budget Fiscal Year 2016 Volume I Budget Report* at <http://www.budget.wv.gov/executivebudget/Documents/VIBR2016.pdf> for more details.

## CHAPTER 5: West Virginia's Counties

While West Virginia's economy as a whole has struggled in recent years, we have seen fairly significant variation across a host of economic indicators for the state's 55 counties. The shale gas boom has fueled strong growth in many portions of Northern West Virginia and solid improvements in the North-Central and Eastern Panhandle economies have buoyed the state's overall performance. Unfortunately, these gains have been offset by losses in Southern West Virginia counties that have endured substantial drop-offs in coal production and employment over the past few years.

### POPULATION

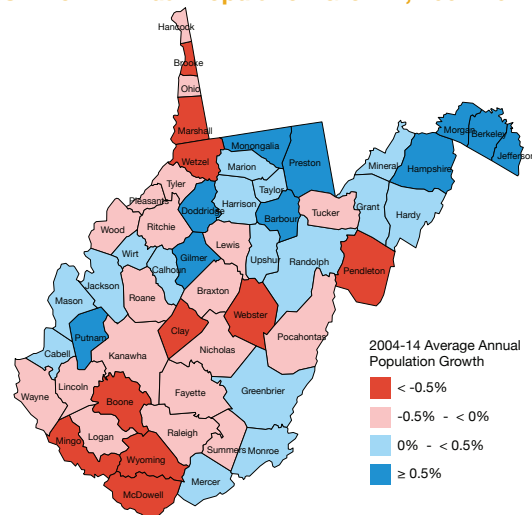
Between 2004 and 2014, 29 of the state's 55 counties registered outright declines in population. Kanawha County experienced the largest absolute population decline but five of the 10 counties saw percentage losses of at least 0.5 percent per year were found in Southern West Virginia. Counties that have lost population have typically done so due to two reasons. First, they have suffered from a natural population decline as the disproportionately larger shares of elderly residents and higher death rates among younger age groups have caused deaths to outnumber births on an annual basis. Second, these counties also generally have net out-flows of migrants as people moving out of the county outnumber those who are moving into the area.

Slightly fewer than half of the state's counties lost population over the past decade, but only a handful of counties made a significant contribution to the cumulative gain of 34,000 residents recorded statewide since 2004. For example, Berkeley and Jefferson counties in the Eastern Panhandle were ranked first and third, respectively, in terms of seeing the fastest rates of population growth over the past decade. Indeed, these two counties alone gained nearly 31,000 people during this time period, nearly accounting for the overall net gain in West Virginia's population. In addition to these counties, Monongalia County, notched an average annual increase of 1.7 percent per year up to nearly 103,500 residents—making it one of only three counties in the state with 100,000+ residents.

Twenty counties are expected to see their population numbers remain stable or increase during the outlook period, but as has been the case over the past decade, we anticipate the majority of that growth to be heavily concentrated in a handful of counties. Berkeley County is expected to expand at an average annual rate of 1.3 percent through 2019, followed by gains of 1.1 and nearly 1 percent per year for Jefferson and Monongalia counties, respectively. Of the 37 counties expected to see some degree of population losses over the next

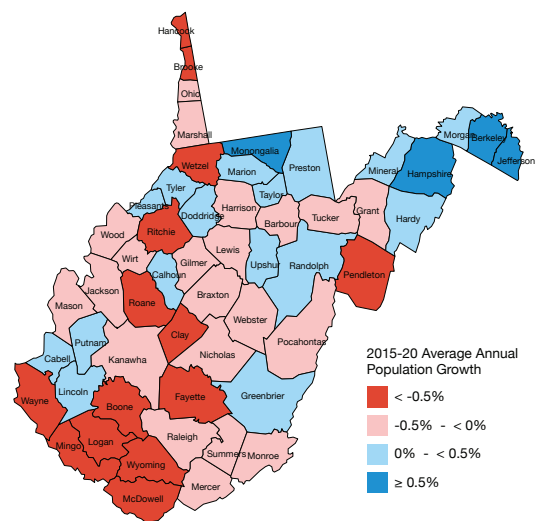
five years, most will see only modest declines as the rate of natural decline offsets any anticipated improvements in migration flows that might be connected to expanding job and income growth. However, the forecast does call for significant declines in population during the forecast horizon throughout much of the state's southern coalfields region. Boone, Logan, McDowell, Clay and Wyoming counties are expected to lose residents at a rate of at least 1 percent per year.

FIGURE 5.1: Annual Population Growth, 2004-2014



Source: US Census Bureau

FIGURE 5.2: Forecast Annual Population Growth, 2015-2020



Source: WVU BBER County Econometric Model

### EMPLOYMENT

Doddridge County saw the fastest rate of job creation (2.1 percent per year) between 2004 and 2014. Lewis, Monongalia, Gilmer and Berkeley counties rounded out the top five and registered growth of at least 1.2 percent over this period. In addition, several counties in the North-Central and Northern Panhandle regions, such as Barbour, Ritchie, Tyler, Harrison and Marshall counties, have benefited over the past 10 years from the natural gas boom and/or re-emergent production in parts of the Northern Appalachian Coal Basin.

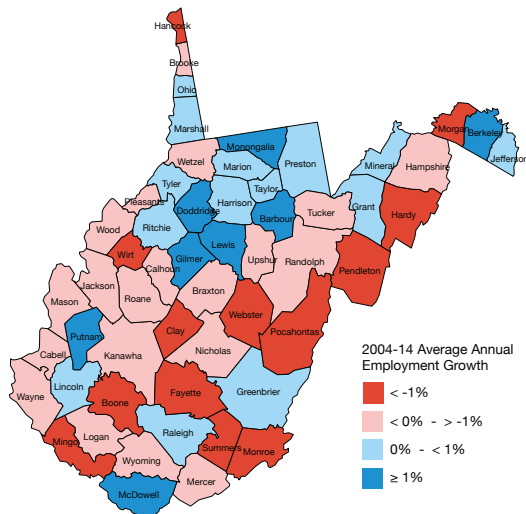
McDowell County's employment levels during 2014 remain nearly 12 percent above 2004 levels (1.1 percent average annual increase), but payrolls have declined rapidly in recent years in response to plung-

ing coal production. Other counties in the region have experienced significantly larger losses overall and now have seen the gains recorded during the 2005 to 2011 time period erased. Other counties in the state that experienced substantial declines suffered steep losses in wood products and metals manufacturing activity during the housing market bust and Great Recession.

During the 2015 to 2020 outlook period, Marshall County is expected to see the fastest rate of job growth at just above 2 percent per year. In fact, the strongest job growth among the state's counties will generally be concentrated in portions of Northern West Virginia tied to the boom in natural gas production. These areas are expected to endure somewhat tougher times during the early part of the forecast horizon as exceedingly-low natural gas prices curtail new exploration and capital spending activity in the Marcellus and Utica plays. However, growth should rebound rapidly as new pipeline capacity eases bottlenecks and new gas-fired power plants absorb more supply. Additionally, prospects for further mid- and downstream processing remain a key source of upside potential for these areas as does the likelihood of liquefied natural gas exports creating another boost to end-market demand.

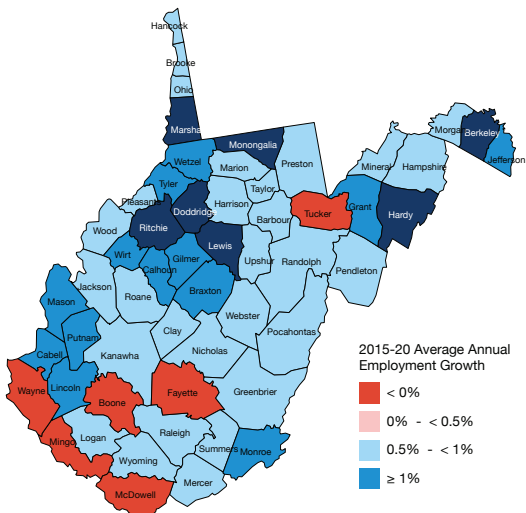
Monongalia, Hardy and Berkeley counties should also enjoy growth that exceed the statewide average by at least a factor of two. A total of six counties are expected to lose jobs during the outlook period and most are traditionally reliant upon coal production. Several other counties are expected to see very limited growth over the next five years and would likely experience outright job losses without the anticipated addition of census enumerators for the 2020 Census. By contrast, counties in the state's southern coalfields are expected to register job losses during the forecast horizon as a host of market- and regulatory-related issues continue to weigh on the region's coal mining industry for the next several years.

FIGURE 5.3: Annual Employment Growth, 2004-2014



Source: US Bureau of Labor

FIGURE 5.4: Forecast Annual Employment Growth, 2015-2020



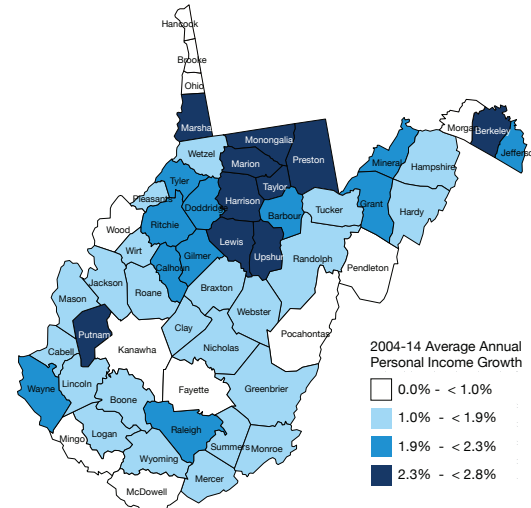
Source: WVU BBER County Econometric Model

### INCOME

Inflation-adjusted personal income increased in all 55 counties during the 2004 to 2014 time period. A total of 20 counties registered growth in real income above the statewide average of 1.9 percent during the last decade, with the largest percentage gains largely occurring in North-Central West Virginia. Since personal income is a broad category that includes both wage and non-wage income sources, the overall performance of counties in personal income growth during the past 10 years can be attributed to different factors. However, among those counties recording the fastest rate of income growth, all experienced real wage gains of at least 2 percent per year.

Over the next five years, three counties are expected to tally outright losses in personal income, due entirely to a decline in real wages and weak growth in investment income. Several counties that are expected to register above-average gains in real personal income will likely see growth occur directly as a result of non-wage sources of income. Indeed, transfer payments (namely Social Security/Medicare), pensions and DIR (dividends, interest and rent) income will grow to account for well over 50 percent of personal income due to these areas' underlying demographic characteristics. Overall, the geographic concentration apparent in job growth during the outlook period will tend to be reflected in real personal income growth as the regions tied to expansion in the natural gas industry, as well as the fast-growing economies in Monongalia County and the Eastern Panhandle experience the strongest gains in income.

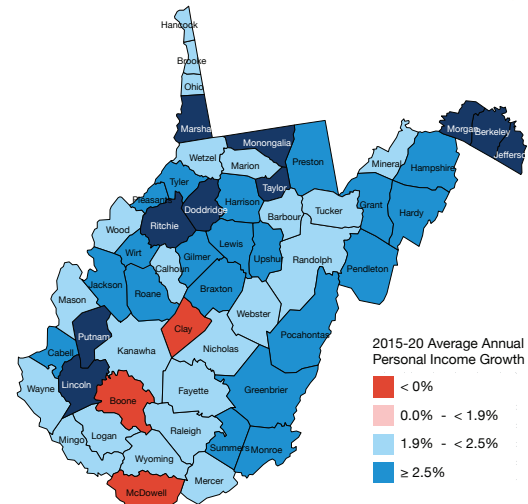
**FIGURE 5.5: Annual Real Personal Income Growth, 2004-2014**



Sources: Bureau of Economic Analysis; WVU BBER County Econometric Model

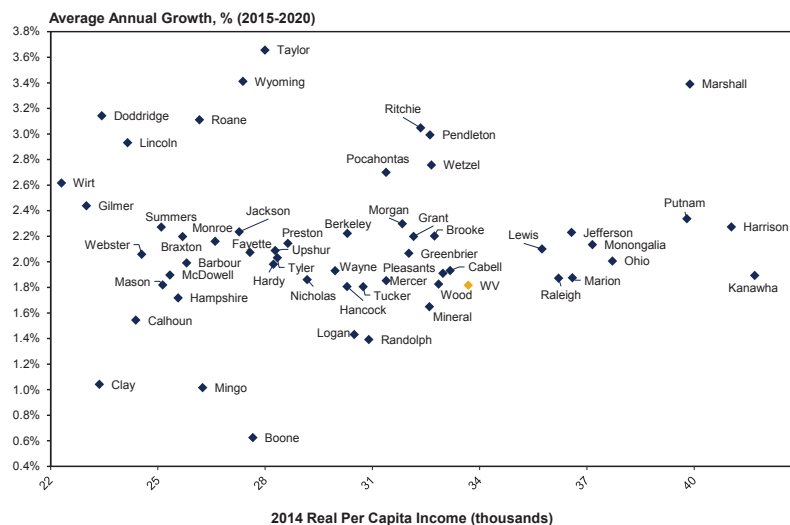
Finally, we examine how growth in real personal income on a per capita basis over the next five years will be distributed across the state's 55 counties relative to average income levels in 2014. Several counties that were projected to experience below-average growth (or even declines) in total real personal income through 2020 are expected to post much faster growth, in some cases exceeding the state average, when real income is expressed on a per capita basis. This shift is a direct result from these counties being expected to suffer declines in population during the outlook period. By contrast, several counties expected to achieve high rates of inflation-adjusted personal income growth will likely see per capita income levels increase at measurably slower rates due to strong population growth. However, several of these counties, including Jefferson and Monongalia, already have per capita incomes that exceed the statewide average.

**FIGURE 5.6: Forecast Real Personal Income Growth, 2015-2020**



Source: WVU BBER County Econometric Model

**FIGURE 5.7: West Virginia County Real Per Capita Income**



Source: WVU BBER County Econometric Model

**CHAPTER 6:****How much do West Virginia college graduates add to the state's economy?**

In this chapter we present an abridged version of a report we at the West Virginia University Bureau of Business & Economic Research published in October of 2014. The report, which was commissioned by the West Virginia Higher Education Policy Commission, examines the economic impact of graduates of the state's public colleges and universities on the state's economy. Please visit <http://be.wvu.edu/bber/pdfs/BBER-2014-07.pdf> for a PDF version of the full report.

**INTRODUCTION AND OVERVIEW**

Today it is standard practice for US states to provide hundreds of millions of dollars or more in support of institutions of higher education. For instance, total spending at public colleges and universities in West Virginia was \$1.6 billion in fiscal year 2011,<sup>25</sup> which included approximately \$404 million in direct state appropriations to the colleges and universities and approximately \$92 million in various state-supported scholarship programs for college students.<sup>26</sup> Overall this \$1.6 billion expenditure represented 9.7 percent of total state and local government spending in West Virginia in 2011, making higher education one of the largest expenditure categories for state and local government in the state, surpassing highways, public safety, and housing.<sup>27</sup> Furthermore, direct government support provides a significant share of total revenues at the state's public higher education institutions. For instance, consider the state's three largest public universities: direct state support provided nearly 22 percent of the total revenues at West Virginia University, nearly 31 percent of total revenues at Marshall University, and nearly 28 percent of total revenues at Fairmont State University.<sup>28</sup> The public higher educational system in West Virginia produced nearly 17 thousand graduates in 2012.<sup>29</sup>

There are various channels through which higher education can benefit a state's economy. Most fundamentally, higher education, to the extent that it leads to increased levels of higher educational attainment, can produce workers who enjoy increased skill levels. Greater skills for workers will, in turn, lead to an overall economic system with higher levels of productivity, or output per hour worked. A higher level of productivity will ultimately lead to a higher standard of living. In short, increased levels of educational attainment, supported by public spending on higher education, have the potential to enhance an economy's productive capacity – or supply side – and ultimately standard of living.

In addition to higher levels of productivity, higher levels of educational attainment may also generate demand-side benefits for an economy. Since college graduates usually possess higher skill levels, correspondingly they typically receive higher wages and salaries. For instance, research has found that in West Virginia, the average bachelor's degree recipient who graduated between 2002 and 2012 from a public institution of higher education in the state earned \$36,499 per year while working in the state in 2012.<sup>30</sup> This compares to a typical income in the low-to-mid-\$20 thousand range for the average West Virginia worker who holds only a high school diploma. Income differentials become significantly more pronounced for more experienced workers and for those with advanced degrees. While higher wages provide a private benefit for individuals, they can also generate additional spillover benefits for society at large. The spending that results from these higher incomes creates additional income for business owners and employees, which can lead to a virtuous demand cycle creating even more economic activity in the broader economy.<sup>31</sup>

Despite the sizeable amount of public spending in support of higher education in West Virginia, the large number of graduates produced by the state's public higher educational system, and the potential economic benefits that these graduates bring to the state's economy, no research has been identified that rigorously examines the extent to which these graduates affect the state's economy. As such, in this report we estimate the overall economic benefits that West Virginia public college and university graduates generate for the state's economy. We account for the likely productivity increase associated with the attainment of higher education as well as the additional spending in

<sup>25</sup> Spending data come from the US Census Bureau Survey of State and Local Government Finances. <http://www.census.gov/govs/local/>

<sup>26</sup> <http://www.wvhepc.com/wp-content/uploads/2014/01/2013-Report-card-LR.pdf>

<sup>27</sup> Total State and Local Government Expenditure for 2011 was \$16.4 billion. <http://www.census.gov/govs/local/>

<sup>28</sup> Data are for 2014 for WVU and 2013 for Fairmont State and Marshall. Revenue numbers come from the publicly available budgets produced by each University. [http://planning.wvu.edu/budget\\_planning/budget\\_reports](http://planning.wvu.edu/budget_planning/budget_reports) <http://www.marshall.edu/finance/files/2012/07/Approved-FY13-Budget.pdf> [https://www.wvhepc.org/finance/fs2013FSU\\_fs.pdf](https://www.wvhepc.org/finance/fs2013FSU_fs.pdf)

<sup>29</sup> <http://www.wvhepc.com/wp-content/uploads/2014/01/2013-Report-card-LR.pdf>

<sup>30</sup> Bowen, Eric, and John Deskins. "From Higher Education to Work in West Virginia, 2012." Morgantown, WV: West Virginia University Bureau of Business & Economic Research.

<sup>31</sup> Additional non-monetary benefits that may be generated by higher education – such as a greater appreciation for the arts or an enhanced level of civic engagement – are beyond the scope of this research.

West Virginia that results from higher wages and salaries associated with college graduates.

In our analysis we consider the 2009-2010 class of graduates of West Virginia's public colleges and universities who worked in the state in 2012 – a cohort of just over 6,300 men and women. Based on work and income patterns from 2012 and prior years, we begin by projecting the additional income that these graduates will earn in the state over the coming decades above what they likely would have earned absent the attainment of higher education. We then use a sophisticated economic modeling system to estimate the additional economic activity expected to occur in West Virginia due to the graduates' income premiums and likely productivity increases generated by their attainment of higher education. Finally, we compare our estimated increase in economic activity to the public spending associated with their college education. We incorporate graduates of all of the public colleges and universities in West Virginia and we do not differentiate among graduates from the various institutions.

Overall, we estimate that the total economic benefits to the West Virginia economy associated with increased productivity and spending resulting from the 2010 public college and university graduating class is nearly \$6 billion over the period of our analysis, 2013-2032. By comparison, we estimate that \$1.4 billion was spent to educate these men and women beyond high school, of which approximately \$404 million was derived from direct state appropriations to colleges and universities, \$92 million from state-supported scholarship programs, with the remainder originating from tuition, gifts, and other sources.

**BACKGROUND ON WEST VIRGINIA HIGHER EDUCATION SYSTEM**

In this section we review recent trends in higher education in West Virginia with regards to the number of graduates of public colleges and universities and spending patterns. In Figure 6.1 we depict the number of graduates for each West Virginia public college and university over the past decade or so. As illustrated, the total number of graduates annually in the state rose from just over 11,000 in 2002 to 16,000 by 2011, an increase of approximately 45 percent over the decade. Of the 16,000 who graduated in 2011, approximately 85 percent graduated from a four-year college or university, with the remainder graduating from a community or technical college. West Virginia University is the largest of the various institutions by a significant margin, accounting for 46 percent of the total graduates and approximately 55 percent of the graduates of the four-year colleges and universities in 2011. Marshall University was second largest in 2011, with 16 percent of total graduates, followed by Fairmont State

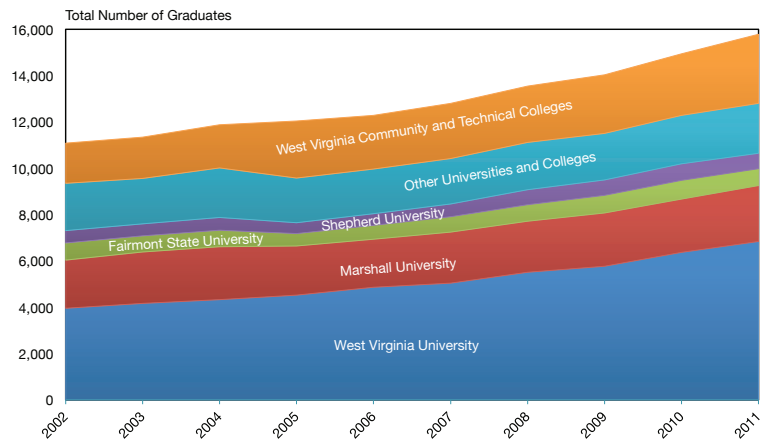
University, Shepherd University and West Liberty State College with 5.0 percent, 4.4 percent, and 3.0 percent of total graduates respectively.

In Figure 6.2 we depict total higher education spending in West Virginia over the years 2000 through 2011. As illustrated by the blue line in the figure, total spending on higher education in the state stood at approximately \$1.6 billion in 2011,<sup>32</sup> which represents a rise of 51 percent over the level in 2000, after accounting for inflation. Higher education spending in the state as a share of total state and local government spending, as represented by the yellow line in the figure, was stable at around 8.4 percent of total spending from 2000 through 2004, but rose to 10.5 percent by 2007 and fell to 9.7 percent by 2011.

The Providing Real Opportunities to Maximize In-state Student Excellence (PROMISE) and Higher Education

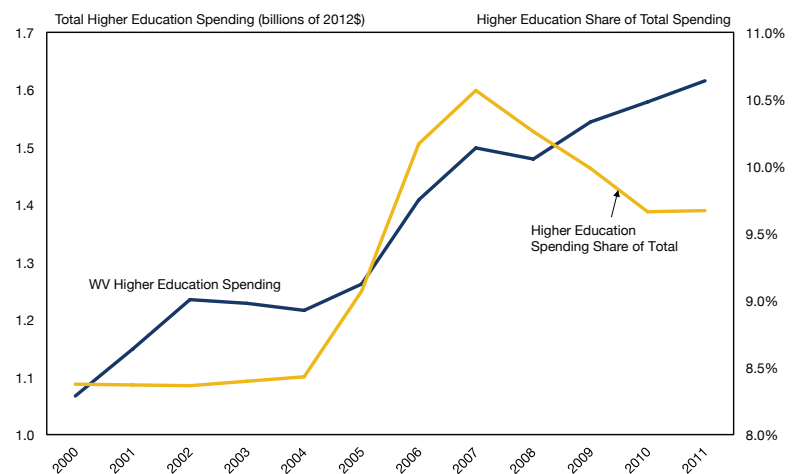
32. This total includes spending for the Providing Real Opportunities to Maximize In-state Student Excellence (PROMISE) scholarship program.

**FIGURE 6.1: West Virginia Public College and University Graduates by Institution**



Source: West Virginia Higher Education and Policy Commission

**FIGURE 6.2: West Virginia Higher Education Spending**



Grant Program (HEGP) scholarship programs are the two largest state financial aid programs in West Virginia. Total spending on the PROMISE scholarship was \$48.6 million in the 2012 academic year, a spending level that remained fairly steady between 2006 and 2012, after the programs phase-in period beginning in 2003. Inflation-adjusted spending on the HEGP rose from \$24.5 million in the 2003 academic year to \$40 million in the 2012 academic year, an increase of 63 percent.

Through the years 2006 to 2012, the number of PROMISE scholarships remained relatively steady, with an average of around 9,500 recipients per year. Between 16,000 and 19,500 HEGP scholarships were awarded annually during the years 2009 through 2012. The typical PROMISE scholarship award is around \$5,000 and the average HEGP grant is typically in the \$2,000 to \$2,500 range.

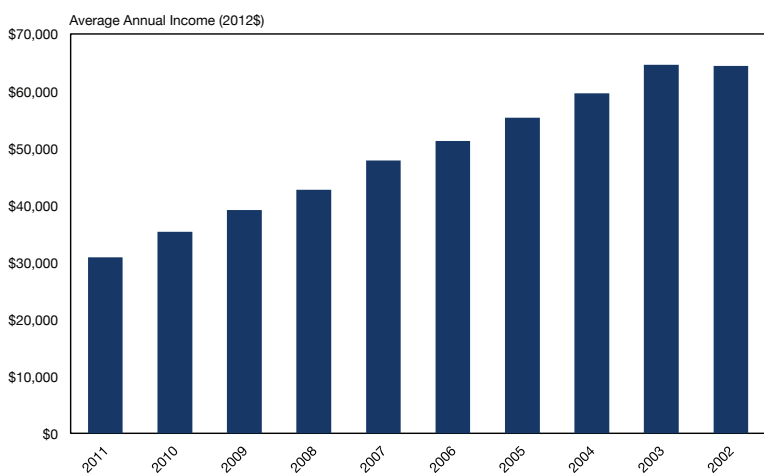
### PROFILE OF 2009-2010 GRADUATING CLASS

The economic impact estimates below are based on members of the 2009-2010 graduating class from West Virginia’s public colleges and universities who worked in the state in 2012. In the full report we provide a broad profile of these individuals, which include graduates from public two-year community and technical colleges, as well as four-year colleges and universities. Of the 13,821 members of the 2009-2010 graduating class in total, we consider 6,309 – those who worked in the state in 2012 and earned an income of more than \$10,000 that year.<sup>33</sup> These individuals received an average income for the year of \$38,276. In the abbreviated version of the report here we only consider a few key statistics.

Our approach below relies on projecting how income will change over time for our sample. As such, in Figure 6.3 we report average income in 2012 for every public college and university graduate in West Virginia, by graduating class, for those who graduated between the 2001-2002 academic year and the 2010-2011 academic year. As illustrated, income is substantially higher for those who graduated in earlier years, and presumably have greater work experience, compared to those who graduated in more recent years. Overall, 2012 average income rises from just over \$30,000 for members of the 2011 graduating class to around \$65,000 for members of the 2001 graduating class. Our income projections below will be based on this pattern of income growth over time.

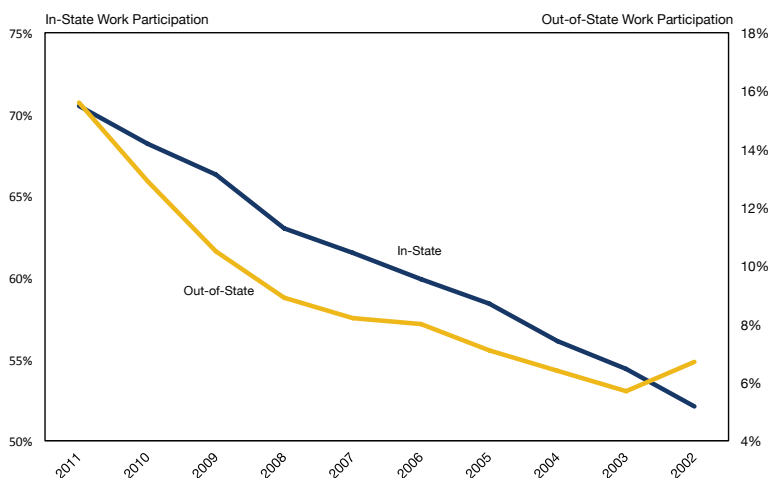
Our methodology also relies on how the proportion of graduates who work in the state changes as time from graduation increases. As such, in Figure 6.4 we depict the share of graduates from each graduating class between the 2001-2002 academic year through the 2010-2011 academic year who worked in the state in 2012. As illustrated, the work participation rate falls as the time from graduation increases. For in-state students, the 2012 work participation rate falls from around 70 percent for the 2011 graduating class to around 52 percent for the 2002 class. For out-of-state students, the rate diminishes from nearly 16 percent for the 2011 class to around 7 percent for the 2002 class. This labor force attrition occurs for various reasons: graduates may leave the state to work elsewhere; they may become homemakers; they may quit work because of health; etc. As with the income trends presented in Figure 6.3, we use this pattern of diminishing work participation in our economic impact estimates below.

**FIGURE 6.3: 2012 Income by Graduation Year**



Source: Author Calculations based on data from the West Virginia Higher Education Policy Commission

**FIGURE 6.4: 2012 Work Participation Rate by Graduation Year**



Source: Author Calculations based on data from the West Virginia Higher Education Policy Commission

<sup>33</sup> A total of 7,277 members of the 2010 graduating class worked in the state in 2010. We exclude those individuals from our analysis who earned less than \$10,000 for the year because those individuals were likely working part-time.



## ECONOMIC MODEL AND DATA

In estimating the economic impact that graduates of West Virginia's public higher educational institutions in the 2009-2010 academic year will generate in the state's economy over their careers, we consider two components of the graduates' overall impact. First, we consider the additional demand for goods and services in the state that result from the higher incomes that college graduates typically earn, compared to those with only high school diplomas. This effect is termed the "demand-side effect" below. Second, we consider increased levels of productivity that firms accrue as a result of having employees with higher levels of skill that result from higher education – termed "supply-side effect." We discuss these two components of the study in turn.

### Demand-Side Effect

It is well known that those with a college degree typically receive a higher income than those without such degrees, as discussed above. This additional income is a direct boost to the state's economy. However, the overall economic impact of this additional income does not end with this initial income premium, but instead will have broader economic benefits to the state's economy to the extent that the premium is spent in the state.

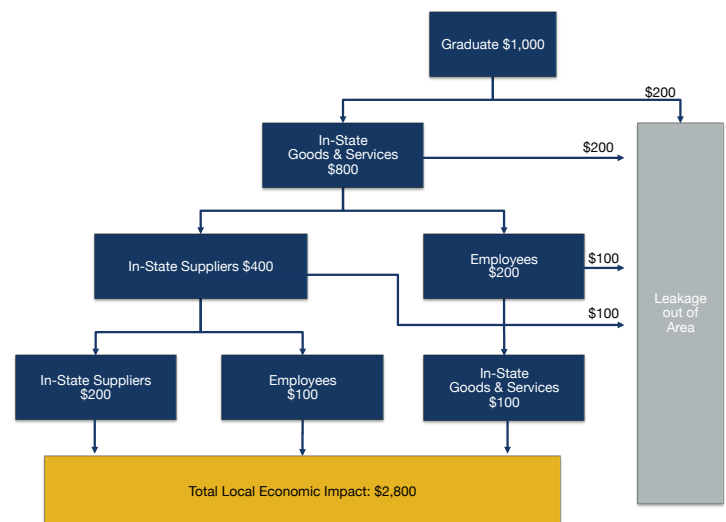
As illustrated in Figure 6.5, suppose that a representative college graduate spends \$1,000, of which \$800 is spent at businesses in the state and the rest out of the state. The money spent locally represents an additional economic benefit to the state. In the second round of spending, these businesses pay their suppliers and employees, who in turn purchase goods and services from local businesses. Lastly in the third round, the suppliers from the second round also pay their suppliers and employees. At each stage, some of the additional money will be spent outside of the state, and thus does not have impacts within West Virginia. Overall, if we combine these successive rounds of spending we arrive at the total economic impact of the initial income premium. In the example below we would sum the blue boxes to arrive at the total impact of \$2,800. This general idea that the overall economic impact of an economic event may be much larger than the event directly is termed the "multiplier effect."

The first step in our estimation process is to estimate the additional income that graduates of West Virginia's colleges and universities who work within the state receive, compared to those possessing only a high school diploma. We estimate this income premium over a 20-year period. Once we obtain this estimate, which will represent the direct economic impact of the graduates' income, we then use a sophisticated economic model to estimate the overall economic impact

in West Virginia of these graduates over a 20-year period, based on the multiplier effect theory discussed above. For our analysis we consider graduates of public colleges and universities for the 2009-2010 academic year, assuming that they are representative of typical graduating classes of recent years.<sup>34</sup> Our basic dataset includes information on all West Virginia public college and university graduates who worked in the state in 2012 and was provided by the West Virginia Higher Education Policy Commission. These data were then matched with records maintained by WorkForce West Virginia on earnings and the industry in which each graduate worked.

In order to estimate the income premium that college graduates receive, we begin with actual earnings for each graduate in our sample for 2012, a total of 6,309 men and women as discussed above. We then project earnings based on patterns reflected in a broader set of data that includes graduates from West Virginia public colleges and universities between the years 1996 and 2011, who were observed to be working in the state between 2003 and 2012. Our projections are based on three key individual characteristics, all of which were statistically determined to be important explanatory factors of income and the probability that a graduate works in West Virginia: the industry in which the graduate worked in 2012; the type of degree earned (Associate, Bachelor, Master, Doctoral); and age. See the full report for more detailed information on our data and on the statistical approach behind our income projections.

**FIGURE 6.5: Multiplier Effect**



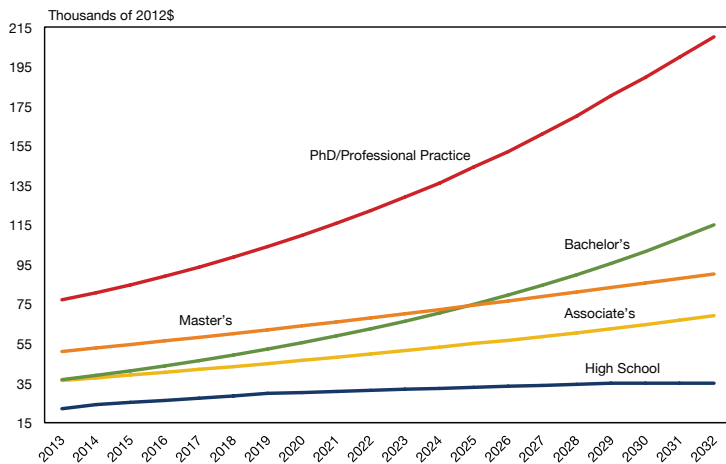
<sup>34</sup> A cursory examination of work participation, income, field of study, field of work, etc. of graduating classes over the past decade does not reveal any obvious indication that the 2010 class is atypical.

Once we project the income that each individual in our sample will receive over the 20-year period of analysis, we then estimate what they would have earned if they had only received a high school diploma.<sup>35</sup> Here we simply rely on the average wage earned statewide by those with only a high school diploma, accounting for age. In Figure 6.6 we report our projected average income levels over our 20-year period of analysis for each degree category. The figure also includes our projection for the average income for those with only a high school diploma over the period of analysis, which serves as the counterfactual in our analysis below. As illustrated, the projected premium associated with any college degree over a high school is substantial. Those with only a high school diploma are projected to earn around \$22,000 in the first year of our period of analysis,<sup>36</sup> which is around 40 percent lower than the beginning wages for those with a bachelor’s degree. Further, this income gap widens substantially over

time as estimated income for those with a high school diploma is projected to remain mostly flat, in contrast to healthier estimated growth for those with any college degree.

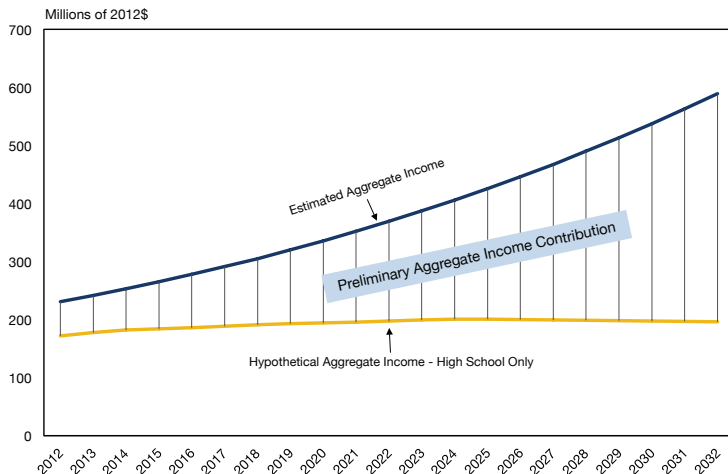
In addition, our estimates illustrate a sizeable variation among degree types. Those with a bachelor’s degree are projected to earn roughly the same as those with an associate’s degree during the first four years after graduation. However, after four years, those with a bachelor’s degree are projected to earn substantially more. Individuals with a master’s degree are projected to earn around \$14,000 more than those with a bachelor’s degree in the first year after graduation; however income for bachelor’s degree recipients is projected to rise faster than that of master’s degree recipients, such that by the 14th year after graduation, bachelor’s degree recipients are projected to earn more.<sup>37</sup> Those with doctoral or professional degrees are projected to earn substantially more than those with the next highest income throughout the period of analysis, and the doctoral-degree-premium is projected to increase over time.

**FIGURE 6.6: Projected Average Annual Income by Degree Type**



Source: Author calculations based on data from the West Virginia Higher Education Policy Commission. High School wages were calculated based on the 2012 American Community Survey PUMS.

**FIGURE 6.7: Preliminary Projected Gross Income Contribution, In-State Students**



Our next step is to aggregate the projected earnings of all of the individuals in the sample by year. As discussed above, for in-state students, we simply assume that these individuals would work in the state and earn an income based on that of the typical individual with only a high school diploma if they had not received higher levels of education. Therefore, in order to consider the economic impact of their earnings premium, we subtract their estimated aggregate earnings, based on the averages presented in Figure 6.6, and subtract from them their earnings that they would have likely earned in our counterfactual scenario – if they had only a high school diploma. Our approach is illustrated in Figure 6.7. For out-of-state students, however, we assume that they would not have migrated to West Virginia to work if not for first coming here for higher education. Therefore, for these individuals we consider their entire income as an addition to the state’s economy, not just the premium that they earn over their likely earnings with only a high school diploma.

After aggregating projected income across individuals, our next step is to account for the fact that individuals will likely leave the West Virginia work force over time due to various reasons, such as retirement, caring

<sup>35</sup> Data for earnings by those with only a high school diploma provided by US Census Bureau, American Community Survey.  
<sup>36</sup> For the sake of this analysis, we assume high school earnings begin at age 24.  
<sup>37</sup> The difference in growth rates is likely due to the fact that a large proportion of master’s degrees are awarded in education, indicating these workers are primary- and secondary-school teachers. Potential earnings growth is somewhat limited in this field.

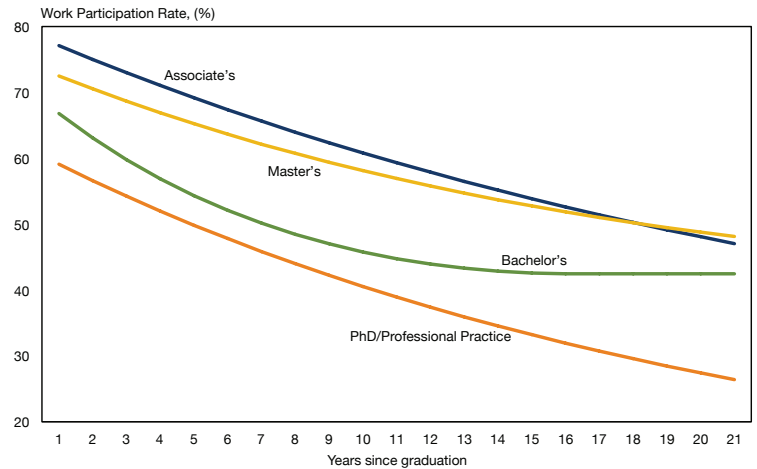
for family members, or leaving the state for economic opportunities elsewhere. These exits from the local labor force reduce the overall economic impact of the men and women who compose our sample. As such, we reduce our projected earnings over time based on work participation patterns observed over the past decade. Our work participation rate adjustments account for degree type and for whether each individual was an in-state or out-of-state student. In Figure 6.8 we forecast work participation rates for in-state students by degree type over the study period. Consistent with the above figures, the projected work participation rate falls substantially over the time-frame of this study. In-state bachelor’s degree holders, for example, start at a work participation rate of more than 67 percent, but that rate falls by more than one-third by the end of period. In Figure 6.9 we report a revised version of Figure 6.7, after accounting for projected labor force attrition.

Our final adjustment to the demand-side component of our analysis concerns what is commonly referred to as “ability bias.” This is based on the premise that individuals who choose to obtain a college degree tend to have a greater initial ability, compared to those who do not choose to do so. As a result, since a higher initial ability would tend to lead to a higher wage, part of the income premium that is observed for college graduates is a result of inherent ability, in addition to the enhanced skills and ability that result from higher education. To account for ability bias, we adjust our estimated aggregate income premium reported above down by 10 percent for both in-state and out-of-state students.<sup>38</sup> This results in final direct income contribution levels of \$2.6 billion for in-state students and \$257 million for out-of-state students for the overall forecast period.

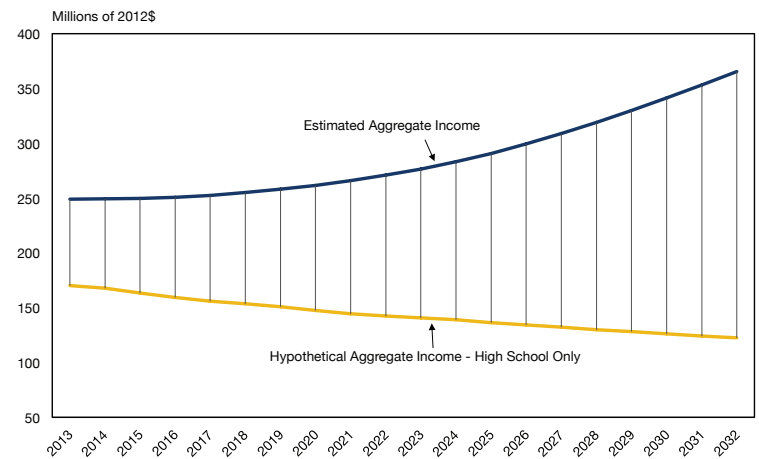
**Supply-Side Effect**

In the second part of our analysis we incorporate the way in which higher education enhances worker productivity in an economic system more broadly. Our general approach is illustrated in Figure 6.10. The higher level of skills that college graduates typically possess, relative to those with only a high school diploma, is illustrated in the figure by the line labeled “Additional Output Associated with BA versus High School Diploma.” We expect that the additional output associated with a college degree diminishes as labor increases, as illustrated by the downward sloping line. The area under that line, up to the level of labor employed, illustrates the total output gain resulting from the higher skill level enjoyed by college gradu-

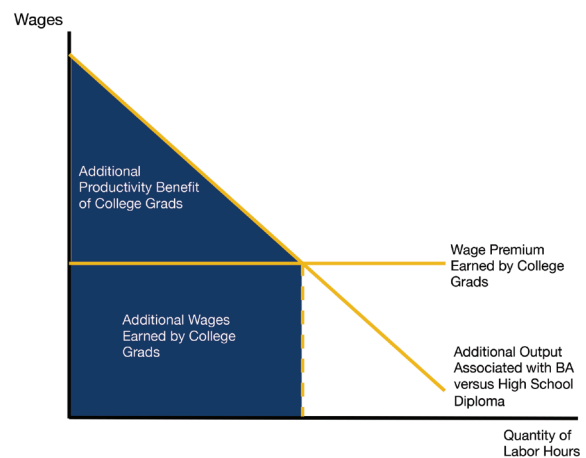
**FIGURE 6.8: Projected Work Participation Rate, In-State Graduates, by Degree Type**



**FIGURE 6.9: Projected Gross Income Contribution, In-State Students**



**FIGURE 6.10: Dual Effects That are Considered**



<sup>38</sup> Ability bias has been estimated at between 6 and 13 percent of wages, with a mean of approximately 10 percent. See McMahon, Walter W. “Higher Learning, Greater Good: The Private and Social Benefits of Higher Education.” Baltimore, MD: Johns Hopkins University Press, 2009.

ates. However, a portion of that productivity gain is transferred to the college graduates themselves in the form of wages and salaries, the economic impact of which is accounted for in our discussion above as a demand-side effect on the state's economy. This portion – labeled “Additional Wages Earned by College Grads” – is accounted for above. We use our economic modeling system to estimate the additional output gains that firms enjoy, net of the higher wages paid – labeled “Additional Productivity Benefit of College Grads.”

### The REMI Model

To estimate the impact of the West Virginia's college graduates, we apply the REMI PI+ model, a widely used structural economic forecasting and policy analysis model. This model integrates input-output, computable general equilibrium, econometric analysis, and economic geography methodologies. The input-output components define the inter-industry relationships, which specifies what and how many inputs are required to produce one unit of certain output. The model takes into account the feedback effects that come from the market once the initial impact runs through the goods-services market and resources (capital and labor) market. This dynamic aspect of the model allows the impact to evolve over time as it responds to market forces. The model also takes into account the agglomeration effect, which recognizes the effect of output or firm size on accessibility to resources. This will affect the average production costs, and in turn the amount of outputs produced. In short this model offers a more comprehensive, and accordingly more realistic, method of measuring an economic impact than the stand-alone model such as input-output, general equilibrium, or econometric model.<sup>39</sup>

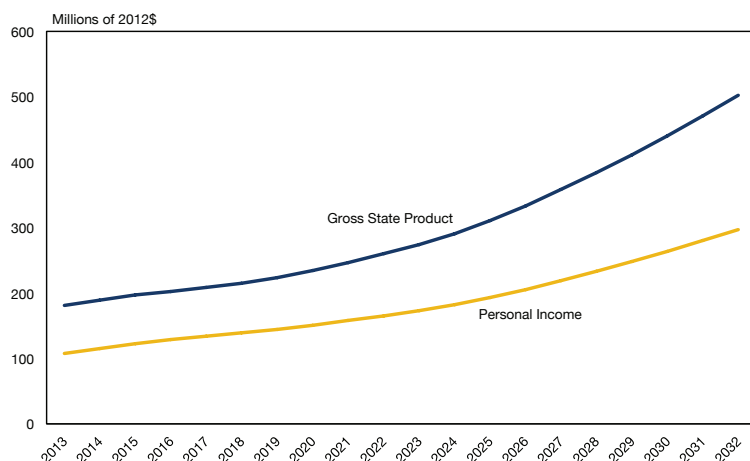
### ECONOMIC IMPACT ESTIMATES

In this section we present the results of our estimation process described above. In Figure 6.11 we report the estimated total economic impact of our sample of college graduates in terms of two alternate measures of economic activity: gross state product (GSP) and personal income. We consider these alternate measures for added robustness. GSP captures total economic output. Personal income captures all forms of household income. The two metrics differ to the extent that businesses retain earnings and capital assets depreciate. Our estimates are reported by year over our 20-year period of analysis. Our calculations account for inflation, but not for discounting future dollars to the present value.

As illustrated, we estimate that the state will enjoy a level of personal income that is around \$100 million higher in the first year of our analysis as a result of the college graduates in our sample than it would have if these men and women had only a high school diploma. That figure rises to nearly \$300 million for the 20th year of our period of analysis, as the individuals gain more experience, become more productive, and earn higher incomes. Overall, we estimate that personal income in the state will be approximately \$3.6 billion higher over the entire 20-year period analysis as a result of the men and women in the 2010 graduating class who compose our sample.

GSP is estimated to be approximately \$180 million higher in the first year of our analysis, rising to more than \$500 million by the final year. Overall, we estimate an addition to GSP of \$5.9 billion to the state's economy over the 20-year period as a result of the 2010 graduating class who compose our sample.

**FIGURE 6.11: Estimated Impact of 2010 Graduates, GSP and Personal Income**



In Figure 6.12 we present the estimated boost to statewide employment generated by our sample of graduates. To be clear, the jobs reported in this figure represent additional jobs that are supported as a result of the income and productivity gains associated with our sample of graduates, and this figure does not represent the jobs held by the graduates themselves. As illustrated, the number of jobs supported by this spending totals almost 1,300 jobs in the first year after graduation, rising to almost two thousand jobs in the 20th year. Thus the additional spending of this graduating class is projected to support nearly one-third of their numbers in additional jobs over the course of their working lives.

Over 20 years, these graduates are projected to generate \$184 million in taxes, an average of around \$9

million per year. These taxes include personal income taxes, and sales and use taxes that the individuals will pay, as well as additional corporate net income taxes generated from additional economic activity. This tax impact is estimated as a direct result of the additional economic activity reflected in the figures above and effectively assumes the same tax rates and tax base that were in effect in 2012.

**CONCLUSIONS AND CAVEATS**

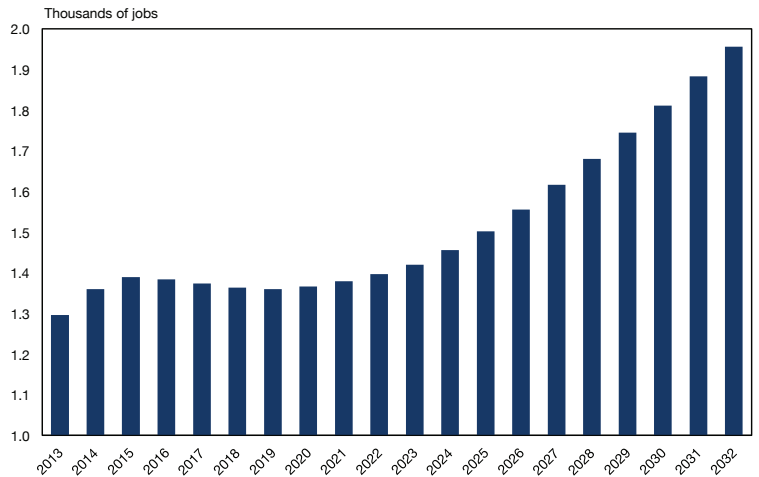
In this report we estimated the economic impact of 2009-2010 graduates of West Virginia’s public colleges and universities on the state’s economy. Overall, after accounting for likely labor force attrition, our research estimates that the men and women who compose this graduating class will likely lead to the addition of nearly \$6 billion in economic output to the state’s economy over our 20-year period of analysis.

In Figure 6.13 we illustrate the magnitude of the overall economic impact that we estimate. The yellow area represents our estimate of the resources devoted to educating the 2009-2010 public college and university graduating class, which amounts to \$1.4 billion.<sup>40</sup> Of this, \$400 million is derived from direct state appropriations, which are funded by taxpayer dollars, whereas the remainder is derived from college and university tuition, gifts to higher education institutions, etc. The blue portion of the figure represents our overall estimated GSP impact of our sample of graduates over their working career, which, as stated above, amounts to \$5.9 billion. Overall, with this approach we estimate that the economic benefits of our sample of graduates amounts to 4.3 times that of the resources devoted to educating these men and women beyond high school.

Throughout this research we made several simplifying assumptions that are important to consider in interpreting these findings. Some of the key assumptions are outlined as follows:

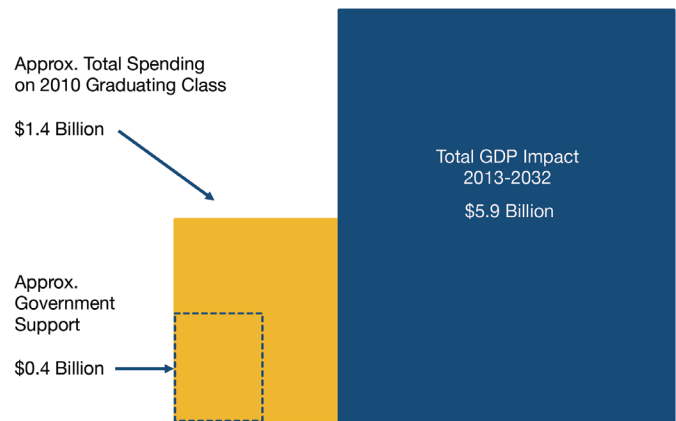
- We assume that the wage gains for college graduates can be entirely attributed to having gone to public colleges in West Virginia. In practice, in the absence of these public colleges, private colleges will likely replace some of these college graduates. For that reason, the economic impacts estimated in this study represents the economic impact of college education in general rather than the impact of college graduates of certain college institutions.
- We assume that none of the West Virginia public college graduates who were from out-of-state would have worked in the state after graduation if they had not come to West Virginia for higher education. This assumption implies that all of these graduates’ income can be counted as a net gain for the state’s economy.

**FIGURE 6.12: Estimated Impact of 2010 Graduates, Employment**



Source: Author calculations based on REMI model results.

**FIGURE 6.13: Estimated 20-Year GDP Impact versus Cost of Higher Education**



- Our economic impact estimates exclude nearly 1,000 public college and university graduates from 2010 who worked in the state but made less than \$10,000 because these individuals were likely working part-time. This omission places downward pressure on our economic impact estimates.

Although we do account for inflation in our economic impact estimates, we do not account for discounting future dollar amounts to the net present value today. That is, we consider a (inflation adjusted) dollar earned in 2032 as valuable as a (inflation adjusted) dollar earned in 2013. This omission places upward pressure on our economic impact estimates.

<sup>40</sup> For this figure we start simply with total public higher education spending in the state for one year (\$1.6 billion for 2011). We then subtract from that figure our estimate of spending that occurs at the state’s larger institutions that is easily identifiable as being related to research activities, leaving a total of \$1.4 billion.

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The **WVU BUREAU OF BUSINESS & ECONOMIC RESEARCH** is proud to produce the Mountain State Business Index, a monthly index of economic activity in West Virginia.

The index is motivated by the difficulty in processing the large and diverse volume of macroeconomic data that is produced regularly today. This monthly index serves as a single metric to consolidate the data that we read in the news into one simple and easy-to-follow statistic that communicates the likely growth path of the state's economy over the coming four to six months.

Signals of a contraction or expansion in the state's economy can be identified through the proper monitoring of changes in the index over time.

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The structure of the West Virginia Expected Business Conditions Index generally follows that of the US Conference Board, which publishes a similar index for the nation as a whole. The MSBI is tailored to specific economic conditions in West Virginia, however.

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