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Growth and Production

Government Spending and Employment in Recoveries

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by Daniel Carroll and Samuel Chapman

Federal spending and government employment have an intricate relationship to GDP growth. During a recession, government spending faces competing forces, as lower levels of economic activity result in lower revenues and, simultaneously, automatic stabilizers such as unemployment benefits begin to increase as the labor situation deteriorates. Government stimulus and bailouts may further accelerate spending, as the government tries to stimulate economic activity. A trend analysis of government spending and employment during past recessions shows how the most recent recession differs from others as well as how the government sector may evolve as the recovery continues.

Spending at all levels of government was steadily increasing between 2000 and 2010. Spending includes what is officially called “government consumption expenditures”—everything from salaries to bridges to social programs like Medicaid—and “gross investment”—which could be a new office building to house a government agency. Government spending reached its peak of about $2.8 trillion halfway through 2010, and then it started falling. By the fourth quarter of 2012, it had decreased to $2.6 trillion (measured in deflated 2005 dollars). Real GDP was also rising over much of this period until the recession hit in the first quarter of 2008. Since the third quarter of 2009 it has been slowly growing and recouping the losses of the recession.

Over this same period, government employment at the local, state, and federal levels followed a pattern similar to government spending. Government employment had been steadily increasing since 2000, reaching nearly 23 million in the second quarter of 2010. Since then, it has been decreasing and is now below 22 million.

Looking at government spending and employment as a share of the country’s total spending and employment provides additional insight into the government’s role over the years as the economy has
Government spending as a percentage of total GDP is currently below its historical average of 20.4 percent. As of the fourth quarter of 2012, it was 19.3 percent. Government employment as a percentage of total nonfarm payrolls is also currently below its historical average of 16.9 percent. As of the fourth quarter of 2012, it was 16.3 percent.

The chart below restricts our window of analysis to around the trough of each recession in order to more clearly compare government spending as a percentage of GDP. On average, a slight hump can be seen around the troughs, as the ratio increases up to the trough and then begins to decrease afterward. This is intuitive, as the denominator of the ratio—GDP—is naturally falling up to the trough of a recession. Furthermore, as the recession progresses, federal spending typically increases as the automatic stabilizers (unemployment insurance, progressive taxes) begin to kick in.

The clear trend in the government’s share of GDP is a decrease over time. Compare, for example, shares during the 1957 and 2001 recessions (top line from the left in the figure above and the bottom-most line, respectively). The most recent recession (2008) began to deviate from this trend eight quarters before the trough of the recession, when the government spending ratio jumped above the trend and even above the average. This sharp increase may imply a higher level of government spending—such as stimulus bailouts—as opposed to just lower GDP, compared to previous recessions.

We are now almost four years into the recovery, but government spending and employment have not returned to levels typical of past recoveries. The current shares for both are still very low. One reason for their low levels may be that the shares typically take months to respond to increases in GDP. We found about a six to eight quarter lag for government spending and employment when we investigated the issue with a statistical analysis.

The analysis consists of finding the trend in a variable, computing the deviation of the variable from its trend over time, and then analyzing the deviation in various ways. Comparing a variable’s deviations to deviations in GDP allows us to see the variable’s typical cyclical behavior and its responsiveness.
If a variable is very responsive to changes in GDP, then the deviations from its trend would show a strong correlation to the deviations of GDP from its trend. A large positive correlation indicates that, on average, when spending or employment is above its trend at that lag or lead date, GDP at the reference point was also above its trend.

Private employment has the strongest correlation with GDP, coming just shy of 0.9 at the one-quarter lag. This is intuitive as the private market is more flexible in its ability to immediately adjust to changing conditions. Government employment, on the other hand, responds less nimbly to changes in GDP. We would expect such sluggishness because government employment includes services that must operate regardless of market conditions, such as police or airport security. In fact, government employment lags the recovery in GDP by about six quarters. Total government spending and state and local spending have fairly similar lags of about six to eight quarters out from a recovery in GDP. Federal spending has a lag of about 10 quarters out.

These findings suggest that once GDP is above its trend, government employment and government spending will begin to see an increase around a year and a half and two years later, respectively. GDP went above its trend around the third quarter of 2011, which would imply that government em-

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**Notes:** Trends were calculated using an HP filter. Shaded bars indicate recession. Government spending includes government ("Federal" and "State and Local") consumption expenditures and gross investment. Sources: Bureau of Labor Statistics; Bureau of Economic Analysis; authors’ calculations.

**Notes:** Trends were calculated using an HP filter. Total government spending includes "federal" and "state and local" combined. Federal as well as state and local spending implies consumption expenditures and gross investment combined. Sources: Bureau of Economic Analysis; Bureau of Labor Statistics; authors’ calculations.

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Employment will rise above its trend about halfway through 2013. This also implies that government spending may not rise above its trend until toward the end of 2013.

This analysis estimates that GDP went above its trend around the third quarter of 2011. Historical norms then suggest that government employment will rise above its trend about halfway through 2013, and government spending will rise above its trend near the end of 2013. However, this may be optimistic, given that other measures of trends put current GDP and government spending and employment further below trend and continued downward pressures (such as federal sequestration) on government spending and employment are possible.
The Bureau of Economic Analysis recently released preliminary 2011 GDP data for all 366 metropolitan statistical areas (MSAs) in the nation. In general, these metropolitan areas account for 90 percent of the nation’s GDP. Metro-area real GDP increased 4.7 percent between 2009 and 2011—the first two years of the recovery. However, the growth of GDP during the recovery varies widely across metropolitan areas.

On one end of the distribution are MSAs that continued to struggle with the effects of the housing boom and the subsequent bust. Metropolitan areas in the “sand states” of Florida, Nevada, California, and Arizona populate this lower end of the growth distribution. The upper end of the GDP growth distribution tends toward MSAs associated with natural resource extraction or high-tech industries. In addition, several metros associated with automobile assembly also showed significant growth, as production of vehicles picked up markedly over this period.

One can disaggregate GDP growth at the metropolitan level into two components: the contribution due to changes in output-per-employee (labor productivity) and the contribution due to expansion in the number of employees. Both factors contribute to the changes that we observe in overall GDP growth. For the top 100 metros (by population), GDP grew on average by 4.4 percent from 2009 to 2011. About 43 percent of that growth was due to increases in GDP per employee and 57 percent was due to growth in employment. For the fastest-growing metros, output-per-employee accounts for the majority of GDP growth, with the exception of Austin, Texas, where employment growth exceeded output-per-employee growth. For slow-growing MSAs, there is actually a decline in output-per-employee over the 2009 to 2011 period. Combined with very slow (and sometimes negative)
employment growth, this yields a set of metro areas where real GDP contracted over the early phases of the recovery.

Fourth District metro areas also experienced considerable variation in real GDP growth between 2009 and 2011. Pittsburgh had the highest growth rate over period, experiencing both solid growth in employment and labor productivity. Pittsburgh was followed closely by Toledo and Youngstown in terms of growth during the recovery. However, it is important to note that Toledo and Youngstown suffered severe contractions during the Great Recession, while Pittsburgh had a much milder recession. The net result is that Pittsburgh’s real GDP in 2011 had risen above its pre-recession (2007) level, whereas Youngstown and Toledo’s economic activity remained well below their 2007 levels.

Over the 2009–2011 period, there was little correlation between employment growth and growth in output-per-employee at the metropolitan level. The correlation is weakly positive. Fourth District metros are generally in the middle of the scatterplot, showing that the District’s metros had pretty typical employment and labor productivity growth. The exception is Columbus, which experienced relatively high employment growth but negative productivity growth.

### MSA Productivity, Employment, and GDP Growth, 2009–2011: Fourth District Metro Areas

<table>
<thead>
<tr>
<th>Metro Area</th>
<th>Productivity</th>
<th>Employment</th>
<th>GDP</th>
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<td>3.1</td>
<td>6.8</td>
</tr>
<tr>
<td>Toledo, OH</td>
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<td>2.9</td>
<td>6.5</td>
</tr>
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<td>Youngstown, OH</td>
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<td>2.1</td>
<td>6.5</td>
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<td>2.0</td>
<td>3.9</td>
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<td>Lexington, KY</td>
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<td>3.3</td>
<td>3.9</td>
</tr>
<tr>
<td>Dayton, OH</td>
<td>1.3</td>
<td>2.3</td>
<td>3.6</td>
</tr>
<tr>
<td>Columbus, OH</td>
<td>-1.5</td>
<td>4.8</td>
<td>3.3</td>
</tr>
<tr>
<td>Cincinnati, OH</td>
<td>1.5</td>
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<td>3.1</td>
</tr>
<tr>
<td>Akron, OH</td>
<td>0.0</td>
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<td>2.3</td>
</tr>
</tbody>
</table>

Source: Bureau of Economic Analysis; Bureau of Labor Statistics.

### Employment Growth versus Productivity Growth

Over the 2009–2011 period, there was little correlation between employment growth and growth in output-per-employee at the metropolitan level. The correlation is weakly positive. Fourth District metros are generally in the middle of the scatterplot, showing that the District’s metros had pretty typical employment and labor productivity growth. The exception is Columbus, which experienced relatively high employment growth but negative productivity growth.

### Real GDP Growth and Real GDP

Source: Bureau of Economic Analysis; American Community Survey.
The growth in real GDP over 2009 to 2011 is related to a number of different attributes and measures of economic activity for metropolitan areas. Metropolitan areas that saw higher growth in real GDP over the period tended to be metropolitan areas that had higher GDP per capita prior to the recession (2007) and higher educational attainment. In the latter case, educational attainment is constructed as the share of the adult population with a four-year college degree (or college attainment). San Jose, California, and Portland, Oregon, are clearly outliers in the scatter diagrams with high growth, high per capita GDP, and high educational attainment. Even if such data points were omitted from the analysis, there would still remain a positive correlation between real GDP growth and per capita GDP and real GDP growth and college attainment.