



POLICY DISCUSSION PAPERS

Estimating GSP and Labor Productivity by State

by Paul W. Bauer and Yoonsoo Lee

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In gauging the health of state economies, arguably the two most important series to track are employment and output. While employment by state is available about three weeks after the end of a month, data on output, as measured by Gross State Product (GSP), are only available annually and with a significant lag. This *Policy Discussion Paper* details how more current estimates of GSP can be generated using U.S. Gross Domestic Product and personal income along with individual states' personal income. A straightforward share approach yields reasonable GSP estimates, but a more sophisticated econometric approach, at a cost of imposing more structure, yields even better ones. Both techniques are also applied to estimate nonfarm-business GSP in order to calculate a measure of labor productivity at the state level that follows as closely as possible the method used by the Bureau of Labor Statistics to calculate the national measure of labor productivity. We then briefly examine how labor productivity varies across states.

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Introduction

Data on the Gross State Product (GSP), the state counterpart of the U.S. Gross Domestic Product (GDP), for 2001 were released in May of 2003. Data for 2002 and a “prototype” estimate for 2003 were released in December of 2004. Important data required for policymakers? Definitely. But if this data were more timely, even with some error, they could be even more useful.

In gauging the health of the regional economy, arguably the two most important series to track are employment and output. Both series are of interest in themselves, but combined they form a measure of productivity that in the long run ultimately drives living standards. While employment by state is available approximately three weeks after the end of a given month, data on output—as measured by the Bureau of Economic Analysis’ (BEA) GSP—are only available annually and with a multi-year lag. Yet GSP is just as important an indicator of state economic performance as GDP is of national. GSP is the broadest measure of a state’s production of goods and services, and looking at GSP over time can help identify regional business cycles. Following GSP can also aid states in managing their finances, as a significant proportion of state tax revenue is tied to output rather than to employment. Of course, the more timely GSP data are, the more useful they become.

This *Policy Discussion Paper* details how more current estimates of GSP can be generated using U.S. GDP and personal income combined with individual states’ personal income. Two approaches are discussed and compared to actual GSP to determine how well they perform. A simple model that requires no parametric regression estimates provides fairly good GSP estimates for most states; however, a regression model performs even better, particularly for states that have a large share of GSP coming from natural resources, such as oil.

We also use these approaches to estimate nonfarm-business GSP. This series is useful for calculating estimates of labor productivity for states that follow as closely as possible the method used in calculating the most widely watched national measure. Explaining the variation in productivity growth across states has been an important topic among economists; for example, Beeson (1987), Beeson and Husted (1989), and Hulten and Schwab (1984) look at productivity and efficiency of manufacturing across states. Measuring labor productivity is important to economists and policymakers because, in the long run, labor-productivity growth is closely tied to gains in wages and living standards. At the state level, labor-productivity growth provides a measure of a state’s competitive position over time.

In constructing a measure of state-level productivity, we follow as closely as possible the method used by the Bureau of Labor Statistics to calculate output-per-worker-hour for the private nonfarm-business economy, perhaps the most watched measure of productivity at the national level. One unavoidable problem is that, at the national level, nonfarm-business labor productivity is calculated in terms of output per hour, but at the state level, only data on the number of workers are available. Consequently, we are forced to look at output per worker. In order to better understand the properties of this productivity measure, we compare output per hour and output per worker using data at the national level where both can be calculated to show how these two measures differ over the long run and over the business cycle. We then briefly examine how labor productivity varies across states.

Estimation Techniques

In this section we describe two techniques for estimating a given state's GSP. One approach, first used by the Federal Reserve Bank of San Francisco, involves no econometric estimation and can be obtained as follows:

$$(1) \text{GSP}_{it} = \text{GDP}_t^* \text{PI}_{it} / \text{PI}_t$$

where GSP_{it} is the estimate of GSP for state i in period t , GDP_t is U.S. GDP in period t , PI_{it} is the personal income of state i in period t , and PI_t is U.S. personal income in period t . This approach assumes that personal income's share of output is roughly constant over time and similar across all states. As we will see in the next section, this approach does a fairly good job for most states and has the advantage of having no econometric parameters that have to be re-estimated as time goes by. Unfortunately, we will also see that the assumption that personal income's share of output is constant across states does not hold very well, particularly for natural-resource-rich states.

Our other approach uses these same series but employs an econometric model with lags to develop a potentially better fit. We estimate the following equation for each state and the District of Columbia:

$$(2) \Delta \ln \text{GSP}_{it} = \alpha_i + \beta_{1i} \ln \text{GDP}_t + \beta_{2i} \ln \text{GDP}_{t-1} \\ + \eta_{1i} \ln \text{PI}_{it} + \eta_{2i} \ln \text{PI}_{i,t-1} + \lambda_{1i} \ln \text{PI}_t + \lambda_{2i} \ln \text{PI}_{t-1} + \varepsilon_{it}.$$

We use the growth rate of a state's GSP as the dependent variable because we want to fit growth rates as well as possible. Toward that end we also include lagged values of personal income and GDP.

Assuming that these parameter estimates are relatively stable over a one- to two-year horizon going forward, we can obtain estimates of a state's GSP for time periods in which the BEA has not yet released the official GSP figures, but for which GDP and personal income are available. In addition to comparing how well these techniques perform in sample, we also calculate GSP estimates for 2003 and 2004. But first it is useful to briefly review the definition and characteristics of the data we will be using.

Data

In both estimation techniques, we use the annual estimates of nominal GDP published by the BEA as the measure of national output. GDP measures total value of all goods and services produced by labor and property located in the United States.

As defined by the BEA, GSP is a value-added concept that is consistent with the nation's GDP.¹ For a given state, overall GSP is the sum of the GSP originating in all industries in the state. Specifically, an industry's GSP is equal to its gross output (defined as sales or receipts and other operating income, commodity taxes, and inventory change) minus its intermediate inputs (consumption of goods and services purchased).

Although GSP is related to GDP, the sum of states' GSP for a given year is not precisely equal to U.S. GDP for several reasons. First, GSP is measured as the sum of the distributions by industry of the components of gross domestic income, which differs from GDP by the statistical discrepancy; insufficient information is available to allocate the statistical discrepancy across states. Second, unlike GDP, GSP does not include the compensation and other expenses related to federal civilian and

1. For full details see, Bureau of Economic Analysis, "State Personal Income Methodology, 1998–2003," <http://www.bea.gov/bea/regional/articles/spi2003/>.

military personnel stationed abroad. Lastly, the sum of states' GSP and GDP can differ because they have different revision schedules.

In addition to GSP, the BEA also publishes personal income for the U.S. and for individual states. State personal income, published quarterly, is loosely defined as the income received by all the residents of the state from all sources. Personal income includes the sum of wages and salaries, proprietors' income, personal dividend, and interest income. Here, persons consist of nonprofit institutions that serve individuals, private non-insured welfare funds, private trust funds, and individuals. The state-level estimates of personal income are designed to be conceptually and statistically consistent with the national estimates of personal income.²

Our main goal is to obtain more current estimates of GSP, so we want to extend the data as far forward as can reasonably be done.³ When we collected the data for this paper, data for U.S. personal income and GDP were available through 2004 (in contrast to GSP data, which were only available for the years 1977–2002, although a “prototype” estimate for 2003 was first released in December 2004).

How Well Do These Approaches Perform?

Econometric results from equation 2 for each state are presented in table 1. For all but a handful of states, the R-square is fairly high, with a median of 0.831. This suggests that the model fits the data fairly well, but does it outperform equation 1, the personal-income-share approach? One way to compare the performance of these two techniques is to look at the mean absolute percentage deviations for each technique from the actual published data (see table 2).⁴ For every state except Tennessee, equation 2's estimates (the regression approach) outperformed equation 1's (the personal-income-share approach), so it is not surprising that both the mean and the median of the absolute percentage deviations are lower for the estimates from the regression approach than for those from the personal-income-share approach. The means for equation 1 and 2 are 0.0732 and 0.0140, while the medians are 0.0449 and 0.0109, respectively.

A closer look at these figures reveals that for most states, both techniques work fairly well; yet for states that have a large share of their GSP coming from mining (such as Alaska, Texas, Louisiana, and West Virginia), the regression approach (equation 2) performs far better than the personal-income-share approach (equation 1). This latter approach also appears to have trouble forecasting the GSP level for small states and the District of Columbia. For example, the mean absolute percentage deviation of heavily oil-dependant Alaska is 0.3242 for equation 1, yet only 0.0565 for equation 2.

Sometimes economic observers are more interested in growth rates than levels. This is a more challenging test because to get a good estimate of a growth rate, implicitly one needs to obtain good estimates of *two* levels. The results of looking at mean absolute deviations in growth rates are presented in table 3. Here, although the regression approach still outperforms the personal-income-share approach for every state but Washington, the advantage of the regression approach is much smaller. The means are 0.0156 and 0.0130, while the medians are 0.0114 and 0.0103, respectively.

A few figures can graphically illustrate the findings above. For some large diversified states such as California, New York, and even Kentucky, it is visually hard to discern much of a difference. Although

2. See BEA, “State Personal Income Methodology, 1997–2002” for details about the estimates and differences between state and national estimates.

3. For researchers interested in past economic performance, our techniques could also be applied to obtain GSP estimates prior to 1977. Although annual estimates of personal income extend back to 1929, it would not be reasonable to extend the estimates that far back because the parameter estimates are unlikely to be stable over very long periods of time. As we will see, the parameter estimates of state-level-GSP regression show large variation across states that seems to originate from differences in industry composition across states. In particular, these differences are most noticeable among states with a relatively large share of industries that have low shares of labor shares or volatile output over time, such as mining. Given that the U.S. economy has experienced significant restructuring across industries since 1929, while our estimates could reasonably be used to extend the GSP series back a few years, we certainly do not believe the parameter estimates obtained for the period from 1977 to 2001 should be employed to estimate the GSP back to 1929.

4. While the personal-income-share approach directly estimates GSP levels, the regression approach estimates percentage growth rates of GSP. GSP levels are calculated from the BEA estimates of 1977 GSP and estimated growth rates from the regression approach.

both approaches work well for fitting the level of GSP for certain states, the regression approach outperforms the personal-income-share approach for Ohio and Pennsylvania (see figure 1a–e). Similarly, for changes in GSP, it is easy to see that the fit is not quite as good when looking at growth rates (figure 2a–e).

For states such as Alaska, Texas, Louisiana, and West Virginia (see figure 3a–d for levels and figure 4a–d for growth rates) that have a significant share of GSP coming from mining, the personal-income-share approach clearly does not perform as well as the regression approach, visually confirming the results reported in table 2.

In summary, the regression approach (equation 1) fits the data better than the personal-income-share approach (equation 2). For most states, the actual and estimated levels and growth rates are very close using the latter approach. While we do not have enough observations to perform meaningful out-of-sample analysis of these two approaches, it appears that useful, more-timely estimates of GSP can be obtained for most states. We now demonstrate how estimates of state-level labor-productivity estimates can be obtained.

Constructing State Labor-Productivity Indices

To construct a measure of state productivity comparable to the most widely watched national productivity measure (output per hour for nonfarm business), an estimate of nonfarm business GSP is needed in addition to the more-timely estimates of overall GSP. To obtain this measure of state output, we follow the major sectors and subsectors of the U.S. economy included in the Bureau of Labor Statistics (BLS) measure for nonfarm business. Due to the differences in classification of sectors, some components of the data used in the BLS measures are not available at the state level.⁵ Real GSP in the nonfarm-business sector is constructed from the private-industry GSP from the BEA, excluding the outputs of private households and agricultural sectors (Agriculture Services, forestry and fishing as well as farms).⁶ For the years we are forced to estimate GSP, we estimate nonfarm-business GSP using equation 2, but instead of using all state personal income, we use state personal income in the nonfarm-business sector only. We then divide these GSP estimates by the BEA's GDP deflator to obtain real output estimates.⁷

For the denominator of our labor-productivity index, a measure of the quantity of labor inputs is required. At the national level, the BLS publishes series for both the number of workers and the hours worked, but unfortunately data on the number of hours are not available by state. As an alternative, we use the number of workers as our labor input measures. The BLS Current Employment Statistics program provides employment in non-agricultural establishments for states. Since the payroll employment does not include employees of private households, we just have to exclude government employment to get nonfarm-business-industry employment.

This difference in the measures calls for caution when comparing the state labor-productivity measures to the national labor-productivity measures. If all employees worked a standard 40-hour work week, then the two series would contain identical information, but this is not the case. Salaried workers, part timers, overtime workers, and workers with multiple jobs all loosen the link between hours and number of workers.

5. See Beemiller and Downey (2001) for more details on GSP estimates by industry.

6. The BEA has not published GSP for private households since 1998, when it switched from SIC to NAICS. Our nonfarm private GSP measures for years after 1998 thus include private households, which account for only less than 1 percent of total GSP.

7. Real business-sector output in the BLS measures excludes the following outputs from the gross domestic product: general government, nonprofit institutions, paid employees of private households, and the rental value of owner-occupied dwellings. The rental value of owner-occupied dwellings is not available at the state level and thus not subtracted from the output.

At the national level, where both measures of labor input are available, we can explore the differences in the labor-productivity measures based on hours and those based on workers. In figure 5a, we plot the standard measure of nonfarm private business-labor productivity (output per hour) with an alternative measure (output per worker). While the two series are clearly similar, they do differ in two significant ways. The most obvious way is how they move over the business cycle. In a downturn, employers tend to retain workers but reduce hours, thus lowering output per worker relative to output per hour. In a recovery, employers tend to be cautious in hiring as demand rebounds, and they tend to increase workers' hours more quickly than the number of workers, thus raising output per worker relative to output per hour. This phenomenon is clearly seen in the last peak as output per worker plunged in 2000 and 2001 only to sharply rebound in subsequent years. The other way the two measures of labor productivity differ is that there is a long-run trend toward fewer hours per worker, mainly because of the growth in the number of part-time workers. This phenomenon is only subtly manifest in figure 5a by the growth rate in output per worker tending to be below that of output per hour; it is more clearly seen in figure 5b, which directly plots hours per worker.

The bottom line is that when making longer-term comparisons, the two series will tend to yield similar results, especially if one adjusts for the trend toward fewer hours per worker. However, when considering year-to-year movements in productivity, this differing behavior over the business cycle must be kept in mind.

In comparing the state-level measures to the national labor-productivity measures, it is also important to remember that the definition of GSP is not the same as GDP. Figure 5c shows, at the national level, the relationship between the GDP per worker and GSP (nonfarm business summed over all of the states) per worker. Note that in the national comparisons, using GSP rather than GDP makes about the same amount of difference in the productivity figures as does using the number of workers rather than the number of hours.

A First Look at Labor Productivity across States

In figure 6a, we plot each state's average annual labor-productivity growth rate from 1977 to 2000. The first thing to notice is how remarkably wide the variation is across states. States averaged 1.1 percent growth over this period, from a low of -0.4 percent in Alaska to Connecticut's comparatively blistering 2.8 percent. In the Fourth District, Pennsylvania led with 1.3 percent, followed by Ohio (0.8 percent), Kentucky (0.4 percent), and West Virginia (-0.3 percent).

During the period since the last business-cycle peak (2000-04), states' average annual labor productivity grew 2.3 percent—an increase of 1.2 percentage points over the previous period—but again this gain was far from evenly distributed (see figure 6b). This is not entirely surprising, considering the differential impact of the economic downturn on the states and their industries during these years. Delaware led the nation with average annual labor-productivity growth that soared to 8.6 percent; eight states experienced declines, led by Alaska at -4.5 percent.

In the Fourth District, state labor-productivity growth exceeded that of the nation from 2000 to 2004. In particular, West Virginia rose from the second-slowest-growing state from 1977 to 2000 to the sixth-fastest-growing, at 4.4 percent. Kentucky, at 2.4 percent, went from sixth-slowest to midpack

performer. Ohio and Pennsylvania, at 3.7 percent and 3.2 percent respectively, also turned in solid numbers. Given that the current expansion has not been kind to the Fourth District, particularly Ohio, the region's strong relative labor-productivity growth comes as a bit of a surprise.

In figure 7a we plot the level of labor productivity for selected large states along with the national average of GSP per worker. The level of labor productivity for California and New York remain well above the national average over the whole period. Texas, buoyed by high real prices for petroleum products, performed as well or better in the late 1970s to mid-1980s but has since fallen off toward the national average. Florida's labor productivity, despite its rapid growth in GSP over this period, remains well below the national average. Figure 7b plots the growth rate of labor productivity for this group. The growth rates are quite volatile at the state level. The oil-price collapse in 1986 is clearly visible in Texas's series, as is the dot-com boom and bust around 2000 in California's.

Figure 8a plots the Fourth District states' levels of labor productivity along with the nation's. Note that all of the states trail the nation over this period. High real prices for coal helped Kentucky and West Virginia in the late 1970s but hurt them as its real price fell later. First Kentucky and then West Virginia have managed to boost their labor productivity. Ohio and Pennsylvania have largely moved together, although they have swapped places: in the late 1970s, Ohio's labor productivity was closer to the nation's, but in 1990, Pennsylvania's was closer. Looking at the growth rates in figure 8b, a great deal of volatility is again seen, particularly for Kentucky and West Virginia around 2000. Coal prices did slump for 1998 through 2000, but further investigation is required to explore what else may have contributed to the extremely sharp decline in those states' labor-productivity growth rates. Since 2002, all the Fourth District states have outperformed the nation, particularly Ohio.

Summary

Two approaches to speeding up the availability of GSP data are discussed and compared to actual GSP to determine how well each approach performs. The first model requires no estimation and provides fair estimates for most states. However, our regression model performs much better, particularly for states that have a large share of GSP coming from mining.

We also construct estimates of private nonfarm-labor productivity for states in as similar a way as possible to the way U.S. estimates are constructed. After discussing how the state measure differs conceptually from the national one, we provide a brief look at how labor productivity has varied across states, focusing on large states and Fourth District states. Perhaps the most interesting finding is how much variation there is across states; looking for the sources of this variation is an important project left to future research.

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Table 1: Regression Approach Estimates

State	Inpi	Inpi_lag	Inus_pi	Inus_pi_lag	Inus_gdp	Inus_gdp_lag	Constant	R-squared
Alabama	0.643 [0.368]	-0.525 [0.345]	-0.798* [0.302]	0.671* [0.281]	0.930** [0.303]	-0.931* [0.352]	0.735 [2.000]	0.821
Alaska	0.633 [0.881]	-1.497* [0.698]	-1.797 [2.984]	0.87 [2.886]	4.066 [2.674]	-2.366 [2.882]	8.199 [21.068]	0.518
Arizona	1.099** [0.277]	-1.311** [0.295]	-0.658 [0.398]	0.824 [0.418]	0.546 [0.412]	-0.432 [0.398]	-1.647 [3.094]	0.846
Arkansas	0.924** [0.192]	-1.005** [0.192]	-0.983** [0.273]	0.683* [0.247]	0.863** [0.294]	-0.484 [0.325]	2.19 [1.723]	0.870
California	1.268** [0.430]	-1.361** [0.430]	-0.762 [0.738]	1.291 [0.704]	0.296 [0.405]	-0.746 [0.467]	-2.885 [3.084]	0.788
Colorado	0.914** [0.147]	-0.897** [0.152]	-0.584 [0.365]	0.054 [0.373]	0.651* [0.259]	-0.125 [0.329]	3.313 [2.052]	0.901
Connecticut	0.811** [0.259]	-0.915** [0.266]	-0.842 [0.561]	0.929 [0.489]	0.524 [0.352]	-0.533 [0.387]	0.128 [2.434]	0.816
Delaware	0.612 [0.466]	-0.826 [0.452]	0.133 [0.749]	0.208 [0.644]	0.154 [0.586]	-0.266 [0.628]	-2.3 [3.657]	0.410
District of Columbia	0.614** [0.199]	-0.640* [0.228]	-0.848 [0.598]	0.737 [0.359]	0.844 [0.413]	-0.729 [0.384]	1.145 [3.265]	0.687
Florida	0.196 [0.176]	-0.390* [0.162]	0.028 [0.242]	0.398 [0.226]	0.532** [0.166]	-0.748** [0.195]	-2.346 [1.264]	0.947
Georgia	1.625** [0.261]	-1.744** [0.284]	-1.513** [0.330]	1.275** [0.268]	0.836** [0.254]	-0.44 [0.286]	1.373 [1.544]	0.900
Hawaii	0.903** [0.130]	-1.014** [0.128]	-0.789* [0.311]	0.736* [0.273]	0.434 [0.274]	-0.294 [0.333]	0.92 [1.916]	0.900
Idaho	1.102** [0.176]	-1.151** [0.176]	-1.682** [0.369]	1.291** [0.347]	1.562** [0.346]	-1.108* [0.391]	2.46 [2.273]	0.830
Illinois	1.208** [0.286]	-1.217** [0.224]	-1.212** [0.357]	1.271** [0.343]	1.004** [0.176]	-1.055** [0.225]	-0.325 [1.297]	0.900
Indiana	1.548** [0.330]	-1.613** [0.263]	-0.960** [0.306]	1.323** [0.359]	0.682 [0.333]	-0.982** [0.324]	-2.251 [2.145]	0.871
Iowa	0.504** [0.128]	-0.837** [0.114]	-0.713* [0.264]	0.132 [0.245]	1.515** [0.238]	-0.622* [0.265]	4.940** [1.546]	0.923
Kansas	1.004** [0.142]	-1.026** [0.137]	-0.938** [0.241]	0.684** [0.232]	0.993** [0.157]	-0.706** [0.189]	1.592 [1.361]	0.947
Kentucky	0.597 [0.355]	-0.705 [0.357]	-1.114 [0.536]	0.861 [0.540]	1.290** [0.432]	-0.932 [0.498]	2.012 [2.935]	0.600
Louisiana	1.287** [0.381]	-1.168** [0.368]	-1.024 [1.069]	-0.745 [1.062]	1.703 [0.906]	0.041 [1.106]	10.097 [6.826]	0.689
Maine	1.115** [0.171]	-1.184** [0.166]	-0.706* [0.292]	0.873** [0.253]	0.526* [0.224]	-0.632* [0.265]	-0.915 [1.571]	0.892
Maryland	1.329** [0.203]	-1.428** [0.196]	-1.473** [0.290]	1.459** [0.211]	1.108** [0.179]	-0.994** [0.207]	0.357 [1.352]	0.927
Massachusetts	1.339** [0.096]	-1.415** [0.095]	-1.536** [0.210]	1.376** [0.168]	1.153** [0.138]	-0.915** [0.153]	1.278 [1.015]	0.974
Michigan	1.194* [0.484]	-1.215** [0.366]	-0.691 [0.480]	1.602* [0.599]	0.979 [0.617]	-1.869* [0.660]	-6.095 [5.069]	0.705
Minnesota	1.006** [0.263]	-0.953** [0.232]	-0.852* [0.383]	0.774* [0.357]	1.049** [0.229]	-1.013** [0.271]	0.184 [1.654]	0.880
Mississippi	0.973** [0.196]	-0.941** [0.196]	-1.015** [0.255]	0.817** [0.257]	0.896** [0.253]	-0.736* [0.270]	1.393 [1.637]	0.878
Missouri	1.412** [0.437]	-0.798 [0.432]	-0.944* [0.399]	0.444 [0.388]	0.506 [0.355]	-0.573 [0.398]	0.938 [2.128]	0.744
Montana	0.895** [0.145]	-0.809** [0.149]	-1.038* [0.405]	0.213 [0.385]	1.306** [0.355]	-0.52 [0.426]	4.745 [2.511]	0.821
Nebraska	0.602** [0.165]	-1.039** [0.164]	-0.586 [0.345]	0.636 [0.310]	1.257** [0.296]	-0.886* [0.344]	0.605 [2.039]	0.865
Nevada	0.665** [0.119]	-0.707** [0.112]	-0.929** [0.155]	0.441 [0.237]	1.201** [0.161]	-0.644** [0.205]	2.923 [1.492]	0.964
New Hampshire	0.992** [0.216]	-1.046** [0.206]	-1.469** [0.494]	1.329** [0.454]	1.018* [0.401]	-0.835 [0.472]	1.224 [2.947]	0.822
New Jersey	0.932** [0.243]	-1.048** [0.254]	-1.121* [0.433]	1.649** [0.381]	0.865** [0.251]	-1.304** [0.268]	-2.702 [1.696]	0.874
New Mexico	1.034 [0.552]	-1.312* [0.532]	-1.897 [1.011]	0.937 [0.987]	1.838 [0.890]	-0.568 [1.037]	6.346 [6.238]	0.498
New York	0.972** [0.233]	-1.093** [0.243]	-0.891* [0.410]	1.071** [0.334]	0.772** [0.254]	-0.850** [0.263]	-0.403 [1.639]	0.881
North Carolina	0.897** [0.313]	-0.537 [0.400]	-0.414 [0.384]	0.836* [0.312]	0.556 [0.296]	-1.407** [0.398]	-2.846 [1.842]	0.823
North Dakota	0.561** [0.139]	-0.853** [0.131]	-0.452 [0.752]	-0.527 [0.760]	1.247 [0.691]	0 [0.879]	7.107 [4.958]	0.826
Ohio	1.781** [0.445]	-1.165* [0.422]	-1.053** [0.327]	1.223** [0.340]	0.61 [0.307]	-1.306** [0.370]	-4.766 [2.464]	0.847
Oklahoma	1.372** [0.230]	-1.360** [0.223]	-1.393 [0.776]	0.545 [0.800]	1.181 [0.584]	-0.316 [0.745]	5.201 [5.129]	0.844
Oregon	0.883* [0.349]	-1.030** [0.321]	-1.004* [0.460]	0.516 [0.580]	1.219* [0.480]	-0.552 [0.519]	3.09 [3.713]	0.742
Pennsylvania	0.167 [0.395]	-0.318 [0.370]	-0.369 [0.380]	0.409 [0.396]	0.901** [0.226]	-0.810* [0.289]	0.6 [1.663]	0.771
Rhode Island	0.912** [0.199]	-0.995** [0.194]	-0.931* [0.366]	0.961** [0.312]	0.917** [0.269]	-0.868* [0.319]	-0.045 [1.946]	0.831
South Carolina	1.117 [0.652]	-0.973 [0.702]	-0.883 [0.535]	0.946 [0.499]	0.72 [0.376]	-0.948 [0.493]	-0.398 [2.252]	0.817
South Dakota	0.633** [0.137]	-0.586** [0.135]	-0.879* [0.384]	0.485 [0.346]	1.089* [0.383]	-0.733 [0.438]	2.509 [2.426]	0.804
Tennessee	1.438** [0.296]	-1.241** [0.291]	-1.156** [0.268]	1.448** [0.279]	0.689* [0.285]	-1.206** [0.318]	-2.051 [1.799]	0.863
Texas	1.326** [0.259]	-1.432** [0.263]	-1.012 [0.663]	0.828 [0.662]	0.876 [0.439]	-0.556 [0.560]	1.171 [3.922]	0.852
Utah	0.846** [0.223]	-0.888** [0.236]	-0.384 [0.424]	0.015 [0.442]	0.799* [0.351]	-0.357 [0.436]	2.07 [2.748]	0.794
Vermont	1.435** [0.229]	-1.375** [0.221]	-1.370** [0.328]	1.393** [0.312]	0.821** [0.244]	-0.923** [0.290]	0.115 [1.799]	0.914
Virginia	0.863** [0.228]	-0.915** [0.201]	-0.283 [0.266]	0.808** [0.211]	0.386* [0.158]	-0.859** [0.192]	-3.338* [1.265]	0.924
Washington	1.033** [0.245]	-1.057** [0.244]	-0.828* [0.380]	1.080* [0.451]	0.765* [0.319]	-0.993* [0.405]	-1.606 [2.605]	0.803
West Virginia	0.730** [0.239]	-0.666* [0.245]	-0.749 [0.402]	0.071 [0.433]	0.815* [0.333]	-0.166 [0.416]	3.94 [2.346]	0.668
Wisconsin	0.641 [0.322]	-0.754* [0.307]	-0.509 [0.310]	0.7 [0.412]	0.879** [0.232]	-0.957** [0.295]	-0.96 [1.913]	0.787
Wyoming	1.469** [0.275]	-1.351** [0.305]	-0.974 [1.136]	0.594 [1.281]	1.455 [0.991]	-1.138 [1.285]	1.574 [8.347]	0.768

Standard errors in brackets

All regressions use 26 observations.

*significant at 5%; **significant at 1%

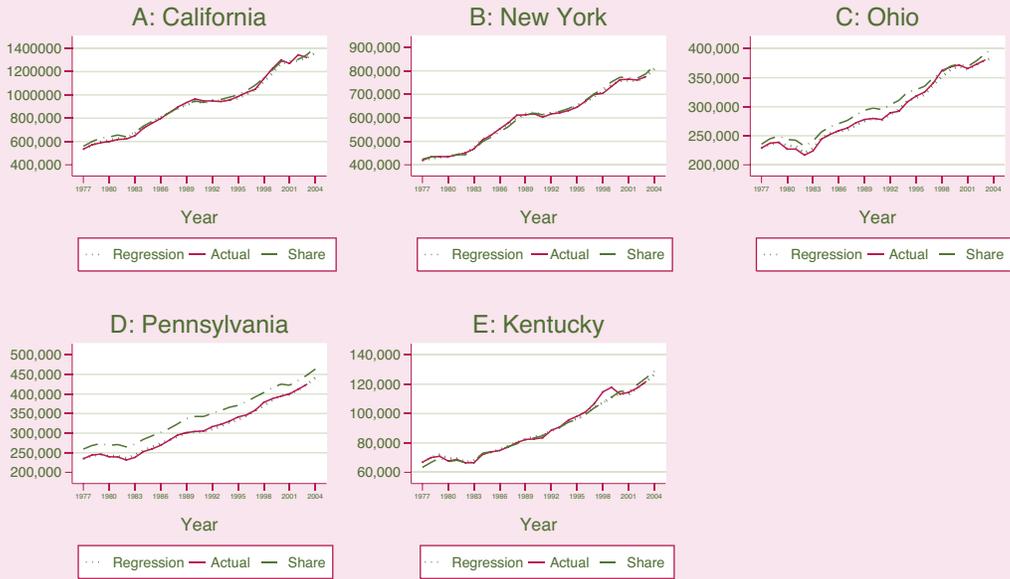
Table 2: Mean Absolute Deviations (levels)

State	Share Approach	Regression Approach	Difference
Alabama	0.0500	0.0089	0.0411
Alaska	0.3242	0.0565	0.2677
Arizona	0.0396	0.0111	0.0285
Arkansas	0.0472	0.0080	0.0392
California	0.0256	0.0135	0.0121
Colorado	0.0186	0.0081	0.0105
Connecticut	0.0735	0.0165	0.0570
Delaware	0.1664	0.0206	0.1458
District of Columbia	0.5190	0.0170	0.5021
Florida	0.1566	0.0056	0.1510
Georgia	0.0368	0.0135	0.0233
Hawaii	0.0261	0.0140	0.0121
Idaho	0.0475	0.0096	0.0379
Illinois	0.0241	0.0067	0.0173
Indiana	0.0342	0.0112	0.0230
Iowa	0.0295	0.0081	0.0214
Kansas	0.0404	0.0068	0.0337
Kentucky	0.0174	0.0133	0.0041
Louisiana	0.1482	0.0265	0.1217
Maine	0.1034	0.0090	0.0944
Maryland	0.1771	0.0085	0.1686
Massachusetts	0.0448	0.0056	0.0393
Michigan	0.0648	0.0196	0.0452
Minnesota	0.0217	0.0052	0.0165
Mississippi	0.0355	0.0078	0.0277
Missouri	0.0298	0.0161	0.0137
Montana	0.0810	0.0179	0.0631
Nebraska	0.0224	0.0097	0.0127
Nevada	0.0420	0.0054	0.0366
New Hampshire	0.1246	0.0145	0.1101
New Jersey	0.0872	0.0099	0.0773
New Mexico	0.0781	0.0367	0.0415
New York	0.0125	0.0068	0.0057
North Carolina	0.0331	0.0109	0.0222
North Dakota	0.0548	0.0468	0.0079
Ohio	0.0426	0.0100	0.0326
Oklahoma	0.0669	0.0181	0.0489
Oregon	0.0531	0.0150	0.0381
Pennsylvania	0.1030	0.0093	0.0937
Rhode Island	0.1106	0.0102	0.1004
South Carolina	0.0226	0.0110	0.0115
South Dakota	0.0249	0.0162	0.0088
Tennessee	0.0091	0.0103	-0.0012
Texas	0.0821	0.0185	0.0636
Utah	0.0284	0.0109	0.0175
Vermont	0.0736	0.0065	0.0670
Virginia	0.0449	0.0086	0.0363
Washington	0.0175	0.0111	0.0064
West Virginia	0.0695	0.0121	0.0573
Wisconsin	0.0438	0.0068	0.0370
Wyoming	0.2204	0.0352	0.1852
average	0.0732	0.0140	
min	0.0091	0.0052	
max	0.5190	0.0565	
median	0.0449	0.0109	

Table 3: Mean Absolute Deviations (growth rates)

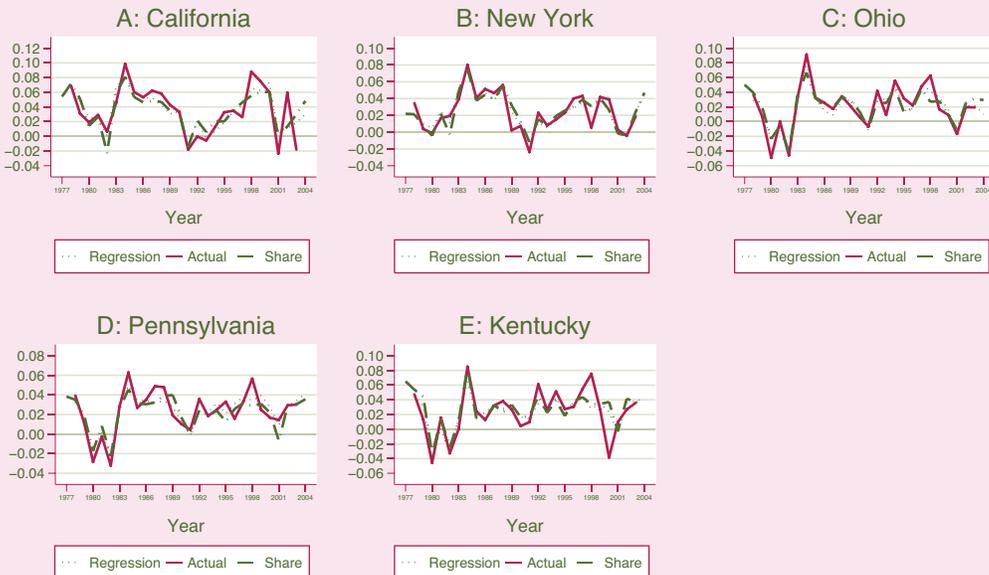
State	Share Approach	Regression Approach	Difference
Alabama	0.0097	0.0091	0.0006
Alaska	0.0994	0.0718	0.0276
Arizona	0.0128	0.0123	0.0005
Arkansas	0.0094	0.0083	0.0011
California	0.0151	0.0138	0.0013
Colorado	0.0106	0.0091	0.0014
Connecticut	0.0139	0.0120	0.0020
Delaware	0.0222	0.0178	0.0044
District of Columbia	0.0141	0.0104	0.0037
Florida	0.0091	0.0057	0.0034
Georgia	0.0093	0.0077	0.0016
Hawaii	0.0124	0.0096	0.0027
Idaho	0.0140	0.0123	0.0018
Illinois	0.0070	0.0068	0.0002
Indiana	0.0101	0.0096	0.0006
Iowa	0.0109	0.0076	0.0034
Kansas	0.0063	0.0054	0.0010
Kentucky	0.0133	0.0131	0.0002
Louisiana	0.0384	0.0310	0.0074
Maine	0.0100	0.0078	0.0021
Maryland	0.0083	0.0064	0.0019
Massachusetts	0.0082	0.0049	0.0033
Michigan	0.0170	0.0154	0.0016
Minnesota	0.0094	0.0084	0.0010
Mississippi	0.0094	0.0085	0.0009
Missouri	0.0134	0.0116	0.0017
Montana	0.0169	0.0126	0.0042
Nebraska	0.0148	0.0109	0.0039
Nevada	0.0057	0.0048	0.0008
New Hampshire	0.0170	0.0148	0.0021
New Jersey	0.0122	0.0088	0.0034
New Mexico	0.0344	0.0342	0.0001
New York	0.0082	0.0082	0.0000
North Carolina	0.0102	0.0089	0.0013
North Dakota	0.0316	0.0233	0.0083
Ohio	0.0095	0.0086	0.0009
Oklahoma	0.0197	0.0193	0.0003
Oregon	0.0140	0.0131	0.0008
Pennsylvania	0.0094	0.0087	0.0007
Rhode Island	0.0107	0.0103	0.0004
South Carolina	0.0114	0.0111	0.0002
South Dakota	0.0185	0.0138	0.0048
Tennessee	0.0092	0.0082	0.0010
Texas	0.0172	0.0141	0.0031
Utah	0.0150	0.0131	0.0020
Vermont	0.0112	0.0092	0.0020
Virginia	0.0089	0.0061	0.0028
Washington	0.0109	0.0110	-0.0001
West Virginia	0.0146	0.0118	0.0029
Wisconsin	0.0081	0.0077	0.0005
Wyoming	0.0408	0.0345	0.0063
average	0.0156	0.0130	
min	0.0057	0.0048	
max	0.0994	0.0718	
median	0.0114	0.0103	

FIGURE 1
GSP Actual and Estimates



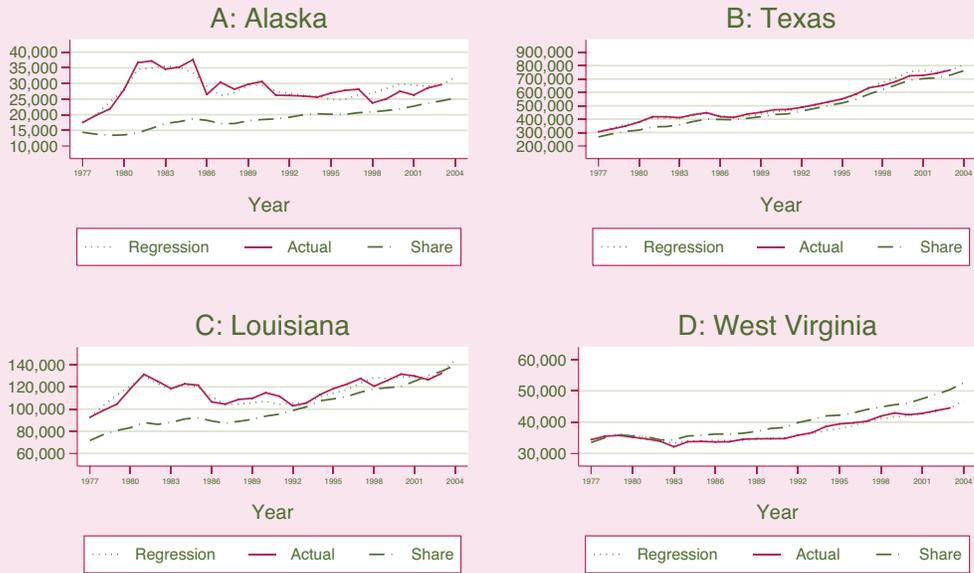
SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; and authors' calculations.

FIGURE 2
Changes in Real GSP and GSP Estimates



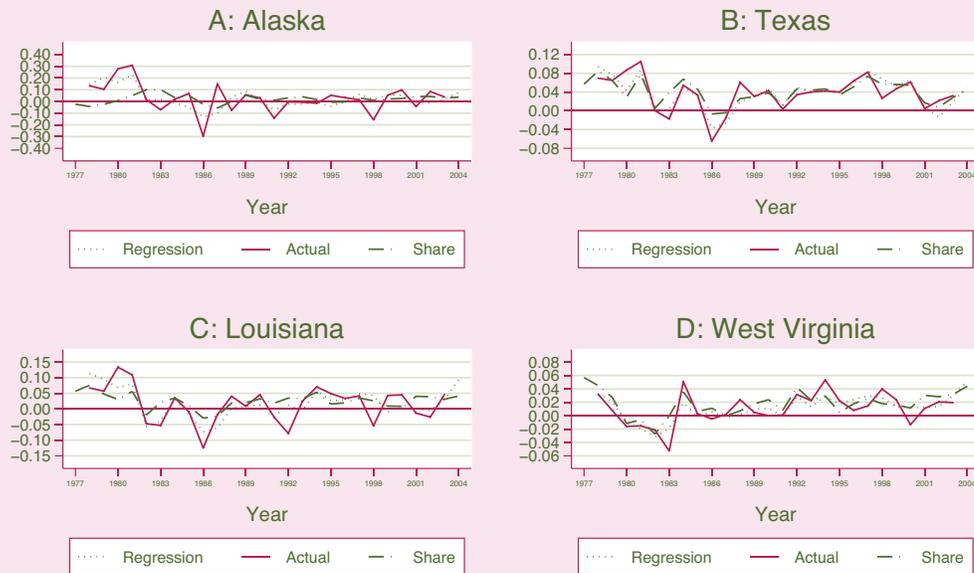
SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; and authors' calculations.

FIGURE 3
GSP Actual and Estimates



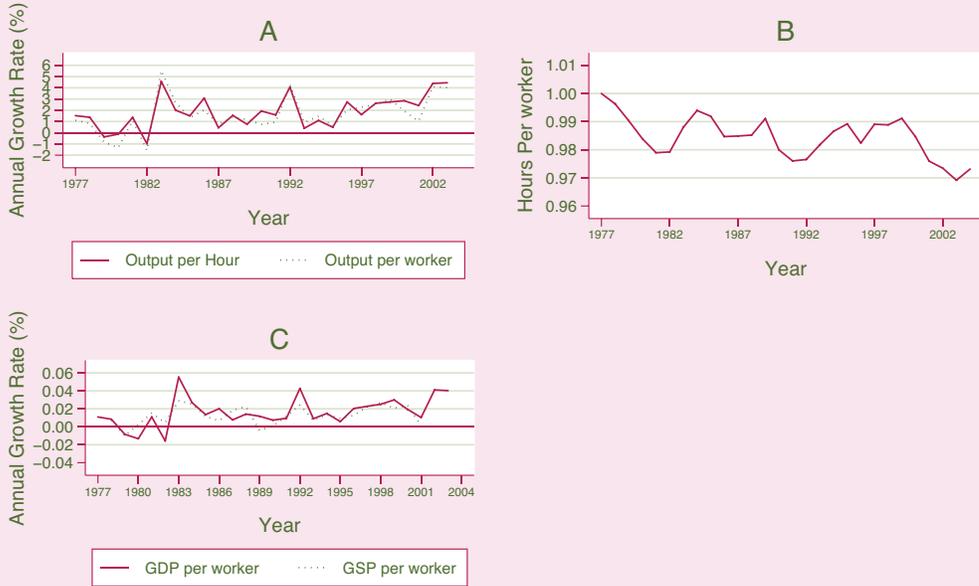
SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; and authors' calculations.

FIGURE 4
Changes in Real GSP and GSP Estimates



SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; and authors' calculations.

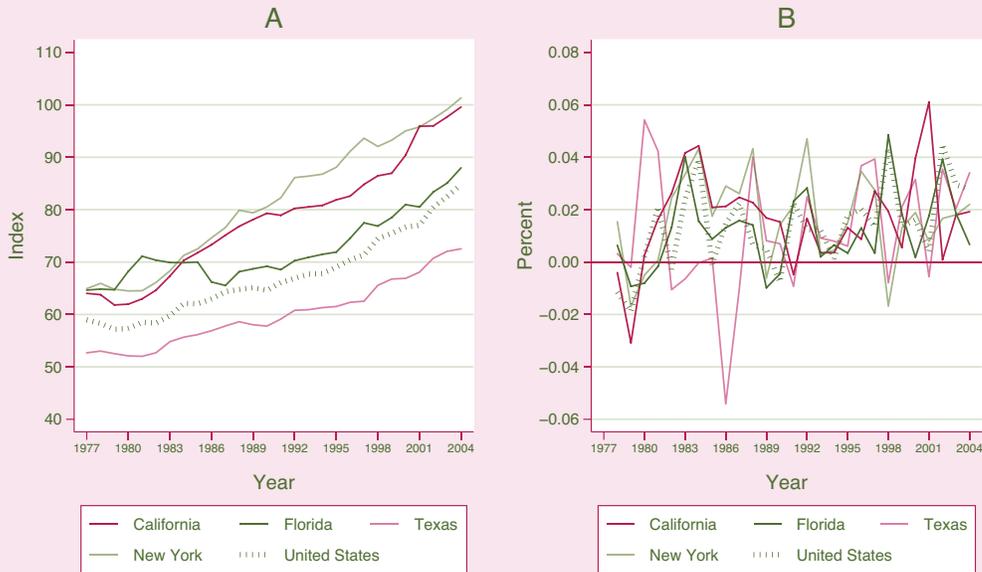
FIGURE 5
Measures of Labor Productivity



SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; U.S. Department of Labor, Bureau of Labor Statistics; and authors' calculations.

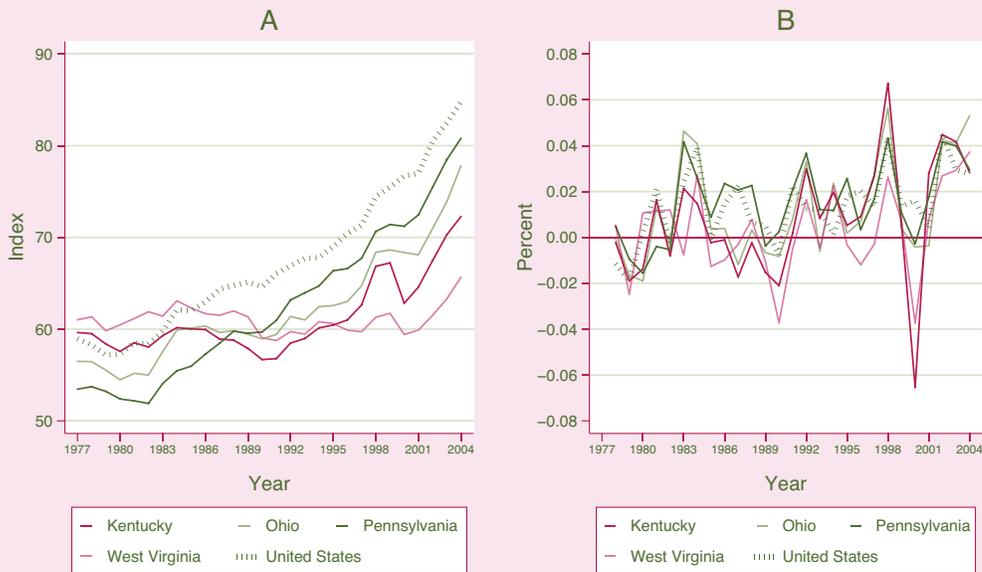


FIGURE 7
Labor Productivity in Large States



SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis;
U.S. Department of Labor, Bureau of Labor Statistics; and authors' calculations.

FIGURE 8
Labor Productivity in Fourth District States



SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis;
U.S. Department of Labor, Bureau of Labor Statistics; and authors' calculations.

Notes



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