Understanding State-Level Correlates to Economic Wellbeing

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April 29, 2022

Research Question

Growing inflation rates following the U.S. Government's robust fiscal policy response to COVID-19 have bolstered public skepticism over the net economic impact of progressive fiscal policies. To help mitigate speculation in the current discourse, I generate two multilinear regression models to determine how prices, government consumption, and other related market conditions correlate to overall economic prosperity between businesses (*Model 1*) and consumers (*Model 2*).

Data Sources

Considering the objective of providing a comprehensive assessment of economic welfare, I compile requisite data from two extensive sources. Information for individual consumption and cost of living is derived from the U.S. Department of Commerce's official Bureau of Economic Analysis website. The remaining data come from sources in the Correlates of State Policy Project – a compilation of over 3,000 policy, government, and demographic variables with observations from all 50 U.S. states and Washington, D.C. each coded by year for years spanning 1900 to 2019 (Grossmann et al., 2021). In recognizing the breadth of unique observations in the dataset, as well as the constraints imposed by variables with data for varying time periods, the data sample used in this analysis represents just a snapshot of observations from all states (excluding D.C.) for the year 2014 (the most recent year with information for all relevant variables).

Statistical Models

Although economic welfare may encompass a range of socioeconomic conditions, I evaluate economic wellbeing in the more traditional sense by estimating correlates to overall producer and consumer welfare in the following two models. The first model predicts changes in per capita Gross State Product (GSP), the state-level equivalent to per capita Gross Domestic Product (GDP) which measures the total annual economic output of all public and private industries within a state divided by the midyear population. The second model estimates changes in Real Per Capita Personal Consumption Expenditures (PCE)[1], the sum of individuals' consumption expenditures for one year divided by the population and adjusted for regional inflation.

***Model 1*:** Gross State Product per capita (natural log); $Y_1 = lgspt$

$$lgspt = \hat{\beta}_0 + \hat{\beta}_1 gcomp + \hat{\beta}_2 ppar + \hat{\beta}_3 unemp + \hat{\beta}_4 unemp^2 + \hat{\beta}_5 abovefed + \hat{\beta}_6 pov + \hat{\beta}_7 urb + \hat{\beta}_8 lgov + \hat{\beta}_9 ltax + \hat{\beta}_{10} inct + \hat{\beta}_{11} corpt + u$$

***Model 2*:** Personal Consumption per capita (natural log); $Y_2 = lpcon$

$$lpcon = \hat{\beta}_0 + \hat{\beta}_1 gcomp + \hat{\beta}_2 ppar + \hat{\beta}_3 unemp + \hat{\beta}_4 unemp^2 + \hat{\beta}_5 abovefed + \hat{\beta}_6 pov + \hat{\beta}_7 urb + \hat{\beta}_8 lgov + \hat{\beta}_9 ltax + \hat{\beta}_{10} inct + \hat{\beta}_{11} corpt + u$$

Variables

The independent variables described in the following table include several factors related to government economic welfare policy, including taxes, wages, and government consumption. All coefficients represent the estimated percent change in *Y* given a one percentage point increase in *X* unless otherwise specified.

[1] Regional inflation-adjusted values (rather than nominal values) are used so that *rpp* in *Model 2* captures indirect or reverberating effects of inflation on Personal Consumption Expenditures.

Table 1. **List of Variables**

Dependent Variables	
lgspt	Per capita Gross State Product (GSP) (natural log)
lrpcon	Real Per Capita Personal Consumption Expenditures (PCE) (natural log)

Independent Variables		**Coefficient Description**
jcomp	Avg. compensation paid per job in thousands of USD x (1/*rpp*)100	Coef. estimates % Δ in *Y* given a 1000 dollar increase in wages
rpp	Regional price parity (PCE inflation index); state equivalent to 100 USD	
unemp	Unemployment rate	Estimated marginal effect of 1 ppt increase in unemp = $\hat{\beta}_1 + 2\hat{\beta}_2(unemp)$
$unemp^2$	Unemployment rate squared	
abovefed	Indicator of states with minimum wages above the federal minimum 1 = states with min > \$7.25 0 = state with min ≤ \$7.25	Coef. estimates % Δ in *Y* for a change in value of *X* from 0 to 1
pov	Poverty rate	
urb	Percent of the population living in urban and suburban areas	
hhs	Average household size	Coef. estimates % Δ in *Y* given one additional household member
lgov	Government consumption and investment per capita (natural log)	Coef. estimates % Δ in *Y* given a 1 pct change in per capita gov consumption
ltax	Total government tax revenues per capita (natural log)	Coef. estimates % Δ in *Y* given a 1 pct change in per capita tax revenues
inct	Top marginal individual income tax rate	
corpt	Top marginal corporate income tax rate	

Tabular Results

Table 2 depicts the results of *Model 1* and *Model 2* before and after controlling for outliers.[2]

Table 2. **Results for Model 1 and Model 2**

VARIABLES[3]	(*1a*) GSP	(*1b*) GSP	(*2a*) PCE	(*2b*) PCE
jcomp	0.0205***	0.0201***	0.00614***	0.00529***
	(0.00250)	(0.00249)	(0.00169)	(0.00155)
rpp	-0.00331	-0.00543**	0.00657***	0.00712***
	(0.00311)	(0.00228)	(0.00190)	(0.00199)
unemp	-0.135**	-0.111**	-0.126***	-0.159***
	(0.0508)	(0.0439)	(0.0289)	(0.0266)
unemp2	0.00672*	0.00533*	0.00761***	0.0102***
	(0.00357)	(0.00311)	(0.00204)	(0.00193)
i.abovefedmin	0.0174	0.0311	0.0535***	0.0484***
	(0.0223)	(0.0205)	(0.0136)	(0.0137)
urb	0.00199**	0.00148*	-0.00184**	-0.000910
	(0.000955)	(0.000791)	(0.000684)	(0.000764)
pov	-0.00533	-0.0104***	-0.00417***	-0.00386***
	(0.00375)	(0.00325)	(0.00151)	(0.00131)
lgov	0.305***	0.263***	-0.0740*	-0.103**
	(0.0675)	(0.0688)	(0.0425)	(0.0453)
ltax	0.0781**	0.0997***	0.0439**	0.0486**
	(0.0374)	(0.0345)	(0.0202)	(0.0186)
inct	-0.00778**	-0.00817***	-0.00524**	-0.00347*
	(0.00308)	(0.00282)	(0.00196)	(0.00201)
corpt[4]	0.00627	0.00656	0.00516*	0.00646**
	(0.00458)	(0.00413)	(0.00264)	(0.00293)
hhs	0.00861	0.112	-0.186***	-0.290***
	(0.0769)	(0.0750)	(0.0371)	(0.0528)
Constant	10.84***	10.83***	10.49***	10.49***
	(0.0133)	(0.0111)	(0.0102)	(0.0106)
Observations	50	45	50	44
R-squared	0.930	0.954	0.903	0.923

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[2] Observations with a Cook's distance ≥ 4/*n*, or 0.08.

[3] All independent variables are scaled so that $x_n = 0$ represents the average value of x_n.

[4] Three out of five states coded as having a 0% corporate income tax rate levy corporate taxes through means not captured in the data set. As such, 0 values for Nevada, Ohio, and Texas have been recoded to reflect the average corporate tax rate of states with an official corporate income tax rate above 0%.

Findings

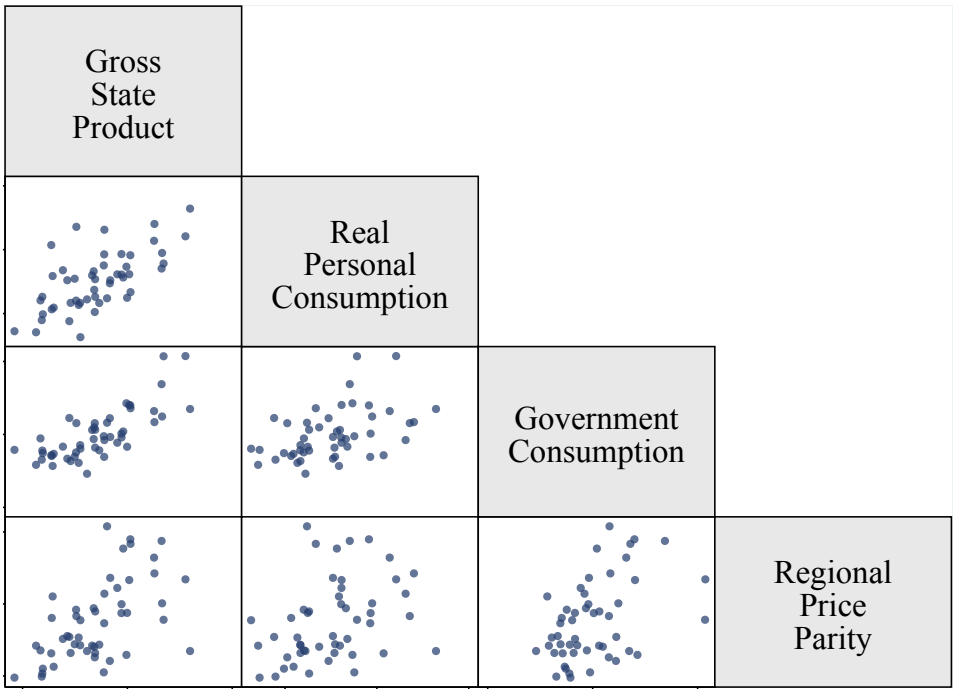
When comparing the original models (*a*) and the models controlled for outliers (*b*), aside from coefficients for urban living and the income tax rate, all estimated coefficients in the constrained models either retain or increase in significance. Nonetheless, there are noteworthy differences. Results suggest that average compensation has the largest impact on Gross State Product to which it is positively correlated all else constant (p = 0.000; *std.* $\hat{\beta}$ = 0.578). Conversely, average household size, which represents the least significant predictor of Gross State Product (std. $\hat{\beta}$ = 0.010; p = 0.911), has the greatest impact on Real Personal Consumption to which it is inversely related all else constant (p = 0.000; *std.* $\hat{\beta}$ = -0.440). Moreover,

Constrained models further demonstrate relatively stronger correlations between GSP and government revenue policies including significant positive relationships with government consumption and total tax revenues, and a negative association with individual income tax rates ceteras paribus. The opposite trend appears among correlates to Real Personal Consumption, which is better predicted by socioeconomic conditions including poverty, unemployment[5], regional price parity, and average and minimum wages. Opposite prices and wages, the former two measures maintain a significant negative relationship to personal consumption ceteras paribus. More curiously, increases in urban living, relative prices, and government consumption estimate a positive, negative, and positive change in Gross State Product, but contrary changes in Real Personal Consumption all else constant. However, unlike urban living, which has opposite effects on changes in GSP and PCE without additional controls, estimated inverse effects for prices and

[5] For *Model 2b*, $\hat{\beta}_1 + 2\hat{\beta}_2 unemp$ = -0.025 (*std. beta equivalent* = -0.374); p = 0.000.

government consumption are not representative of these variables' uncontrolled positive associations with both measures of economic welfare (as seen in *Figure 1*).

Figure 1. **Correlation Matrix**



Adjusting Model Parameters

To account for potential omitted variable bias in the estimated coefficients for regional price parity, I segment regional inflation into three variables – the relative price of goods (*gcost*), housing (*hcost*), and other services (*ocost*) not including utilities. Results in Tables 3 demonstrate that all subcategories of regional inflation excluding relative housing costs in *Model 1c* are statistically significant. More notably, the estimated direction of their effects on economic welfare are consistent between the two models. Granted, previous inconsistencies between urban living and government consumption remain along with now statistically significant contrary effects for average household size. All other variables generally follow similar patterns noted in *Model 2a*

and *Model 2b*, aside from urban living which loses significance in *Model 1c* but adopts it at p < 0.01 in *Model 2c*, and corporate tax rates, which lose significance in *Model 2c*.

Table 3. **Results with Adjusted Parameters**

VARIABLES	(*1c*) GSP	(*2c*) PCE
jcomp	0.0210***	0.00749***
	(0.00276)	(0.00141)
gcost	-0.0110**	-0.00771***
	(0.00530)	(0.00250)
hcost	0.000967	0.00274***
	(0.000656)	(0.000384)
ocost	-0.0130***	-0.00857***
	(0.00413)	(0.00273)
unemp[6]	-0.0423***	-0.0214***
	(0.00782)	(0.00395)
abovefed	0.0318	0.0506***
	(0.0210)	(0.0101)
urb	0.000983	-0.00244***
	(0.000807)	(0.000472)
pov	-0.00665**	-0.00373***
	(0.00290)	(0.000999)
lgov	0.247***	-0.0902**
	(0.0663)	(0.0437)
ltax	0.0925***	0.0445**
	(0.0288)	(0.0189)
inct	-0.00710**	-0.00449***
	(0.00297)	(0.00155)
corpt	0.00266	0.00389
	(0.00422)	(0.00315)
hhs	0.140*	-0.180***
	(0.0719)	(0.0203)
Constant	12.67***	12.42***
	(0.599)	(0.333)
Observations	43	43
R-squared	0.966	0.952

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[6] Unemployment is depicted in linear rather than quadratic form to mitigate multicollinearity.

Limitations

There are a couple limitations that are worth noting. First, data used in the analysis represents a one-year snapshot of state economic conditions and therefore does not account for lagged effects and cannot be used to make casual inferences. Additionally, high levels of multicollinearity in the models distorted the statistical significance of variables such as urban living, corporate tax rates, and housing costs. Lastly, the small sample size increased the risk of overcontrolling.

Conclusion and Recommendations

Results indicate that rising prices have a nuanced effect on the economy. A one percentage point increase in the relative cost of goods or other services predicts an approximate 0.01% decrease in GSP per capita, and a 0.008 – 0.009% decreases in Real per capita PCE. Conversely, increases in housing costs predict notable increases in GSP and PCE, although effects are only statistically significant for the latter. Moreover, given government consumption maintains a statistically significant negative association with one of two complementary measures of economic wellbeing, I find that results demonstrating how government consumption relates to overall economic health inconclusive. Further research should be done to estimate the aggregate net impact of the "crowding-out" of private consumption potentially driving this discrepancy.

Data Resources

US Department of Commerce Bureau of Economic Analysis. (2021). Regional Data. https://apps.bea.gov/iTable/iTable.cfm?reqid=70.

Grossmann, M., Jordan, M. P. and McCrain, J. (2021) "The Correlates of State Policy and the Structure of State Panel Data," State Politics & Policy Quarterly. Cambridge University Press, pp. 1–21. doi: 10.1017/spq.2021.17.