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Introduction

This project examines the relationship a state's teen birth rate has with its economy and political leaning. This has several clear connections to economics, from GDP per capita being a popular measure of a state's economy, to the economic policies dictated by the political party that a state supports. Even teen births have a variety of economic consequences, including medical, childcare, and childrearing costs, along with the potential long term economic effect of a teen birth preventing the mother from completing school. Going into this project, I hypothesized that a state's GDP per capita would have a negative relationship with teen birth rate, meaning states with high GDP per capitas would have low teen birth rates, and states with low GDP per capitas having high teen birth rates. Additionally, I predicted that, on average, Republican states would have higher teen birth rates than Democratic states.

Data

The first variable in my dataset is State. This was just used to identify each of the 50 states in the US with their 2 letter abbreviations. I originally considered including DC and US territories in the dataset, but teen birth rate data was not readily available for the territories, and DC's GDP Per Capita was more than 3 times the next highest GDP Per Capita, creating a giant outlier with very high leverage that would have made the model a very poor fit. The next variable was Teen Birth Rate. This was defined as the number of live births per 1,000 females aged 15-19. It is important to note that this does not include teen pregnancies that end in miscarriage or abortion. This data was obtained from the CDC's National Center for Health Statistics. Unfortunately, the most recent data was only from 2023, not 2024, however it does not appear that the data changes all that much year to year. Another variable is GDP Per Capita. I found this dataset on Statista, where its units were whole US dollars, and data from 2024. The data was sourced from the Bureau of Economic Analysis, the leading source for US GDP. I took this, converted it to thousands of US dollars, then rounded to one decimal (nearest hundred). This makes the data slightly nicer, and the coefficient in the model easier to interpret. I merged Teen Birth Rate and GDP Per Capita using state as the merge criteria. Finally, I coded the Republican variable, where a 0 represents the state voting Democratic in the 2024 US presidential election, and 1 represents the state voting Republican in the 2024 US presidential election. I considered using the political party of the state's

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governor, but determined that a political party's politics vary too much state, for example an Oregon Democrat is very different from a Louisiana Democrat, and that there were several outlier governors that I felt did not truly represent the state's political leaning, for example Kentucky is most definitely a Republican state, yet they have Andy Beshear, a Democratic governor. Election results are widely available, but I specifically used the Associated Press results.

Methodology

$$\text{Teen Birth Rate} = \beta_0 + \beta_1*(\text{GDP Per Capita}) + \beta_2*(\text{Republican}) + \varepsilon$$

Teen birth rate is the response variable, what is being predicted by the model. β_0 is the y-intercept, which is the expected teen birth rate of a Democratic state with a GDP Per Capita of $0. This result is somewhat nonsensical, as realistically you will not encounter a GDP Per Capita of $0, but that is what it represents. β_1 is the slope of the regression line, meaning it is the amount that the teen birth rate changes as GDP Per Capita increases by 1 unit, in this case $1000, while holding state political leaning constant. β_2 is the additional increase to teen birth rate that we expect to see in a Republican state over a Democratic state, while holding the GDP Per Capita constant. In other words, if a Democratic state and a Republican state had the exact same GDP Per Capita, and the Democratic state has a teen birth rate of k, then we would expect the Republican state to have a teen birth rate of $k + \beta_2$. Finally, there is ε, which is just the additional variability in the data that is not explained by the model.

Results

The first model that I ran included an interaction term, between GDP Per Capita and Republican, which would have told us if that rate of change of teen birth rate with GDP Per Capita differs depending on a state's political leaning. However, running this model returns a p-value of 0.498 for the coefficient for GDP, and 0.059 for the coefficient of the interaction term, neither of which are significant at the standard alpha of 0.05. So, my final model omitted the interaction term. This final model, outlined in the methodology section above, had a β_0 of 19.3933, with a p-value of 0.000; a β_1 of -0.1431, with a p-value of 0.012; and a β_2 of 4.6480, with a p-value of 0.001. When testing all 3 of these coefficients independently against the null that each coefficient is equal to 0, all coefficients are significant. The R^2 was 0.468.

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Analysis

The regression line starts at the y-intercept of 19.3933, representing the expected teen birth rate of a Democratic state with a GDP Per Capita of exactly $0. As GDP Per Capita increases by $1000, teen birth rate decreases by 0.1431 cases per 1,000 teenage females, while holding state politics constant. When GDP Per Capita is constant, Republican states have a teen birth rate 4.6480 cases higher than Democratic states. All 3 of these coefficients are significant (p-values less than 0.05), and are therefore meaningfully different from 0. The R^2 of 0.468 means that 46.8% of the variability in the data is explained by the model. This is associated with a moderate strength model. The residuals for the Republican variable are homoscedastic, as the residuals are evenly spread between -6 and 6 at both 0 (Democratic states) and 1 (Republican states). The residuals when plotted on the GDP Per Capita variable are slightly less homoscedastic. States with high GDP Per Capita don't have quite as large residuals as states with low GDP Per Capita. However, this could simply be explained by the low number of observations with high GDP Per Capitas, so there are not as many chances for extreme residuals. Overall, there is no clear pattern, and heteroscedasticity is not present enough to be a real concern.

Conclusion

Based on the results of the model, we have found that as GDP Per Capita increases by $1,000, teen birth rate drops by 0.1431. This shows the negative linear relationship between GDP Per Capita and teen birth rate. Furthermore, we found that Republican states have higher teen birth rates than Democratic states by 4.6480 cases, showing the relationship between a state's political leaning and their teen birth rate.

References

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"Live births per 1,000 females ages 15–19." *National Center for Health Statistics*, 20 Aug. 2025, www.cdc.gov/nchs/state-stats/births/teen-births.html#cdc_data_surveillance_section_2-sources.

"Real per capita gross domestic product of the United States in 2024, by state." *Statista*, 19 Nov. 2025, www.statista.com/statistics/248063/per-capita-us-real-gross-domestic-product-gdp-by-state/.

"2024 Presidential Election Results." *Associated Press News*, apnews.com/projects/election-results-2024/?office=P.