R assignment

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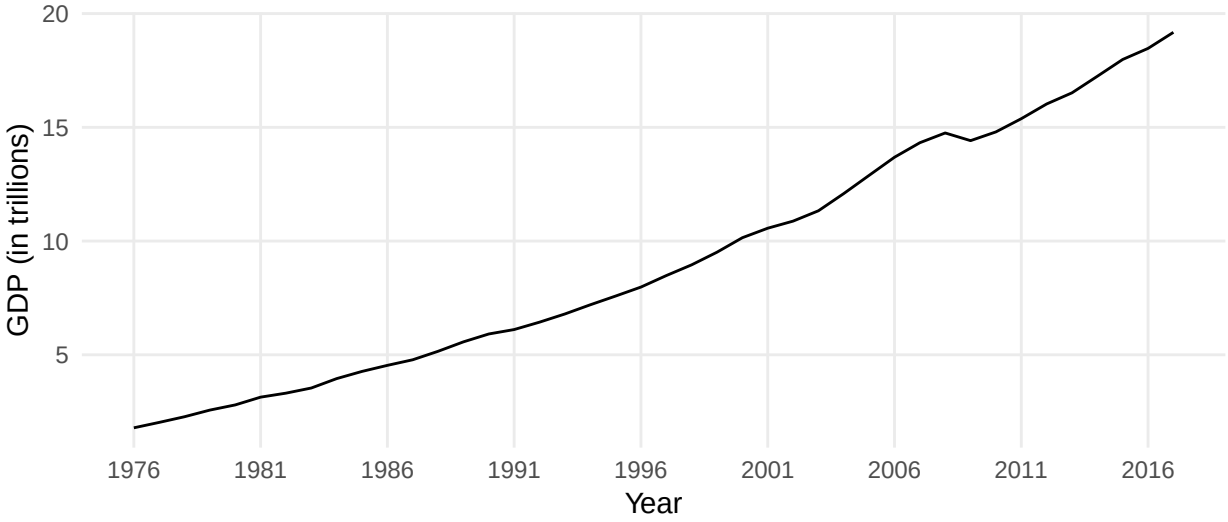
Descriptive

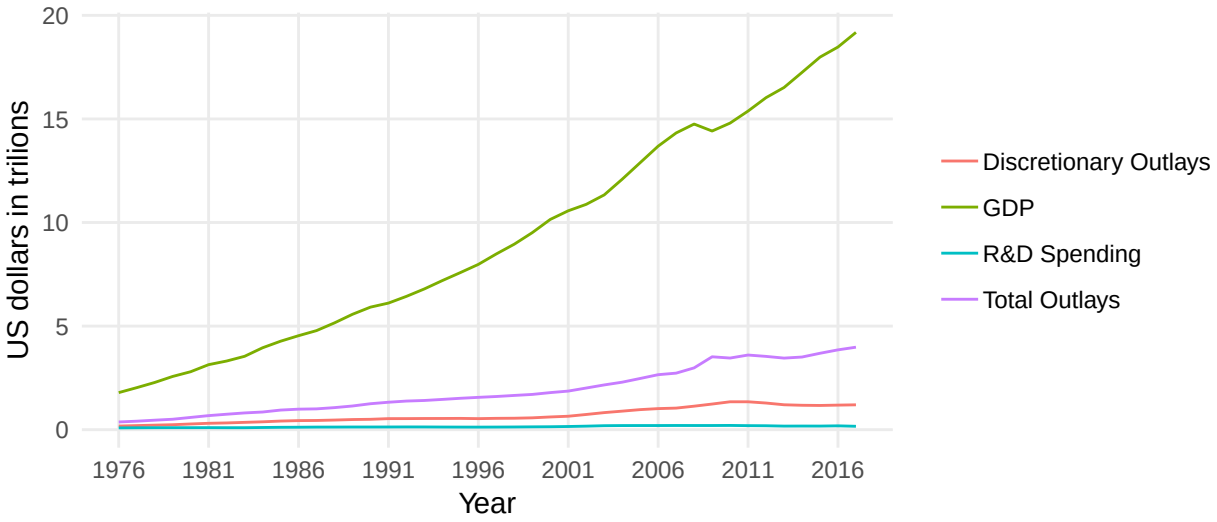
The datasets in these analyses contain information about the spending with research and development from federal agencies in the United States. In this report, I study the evolution of spending patterns from agencies related to climate, energy as well as the whole federal budget. The datasets come from the American Association for the Advancement of Science Historical Trends.

I start showing the evolution of Gross Domentic Product (GDP) in the US for the period covered in the subsequent analysis. Note how the GDP in the US has increased since 1976, with the exception of the period around the 2008 economic crisis.



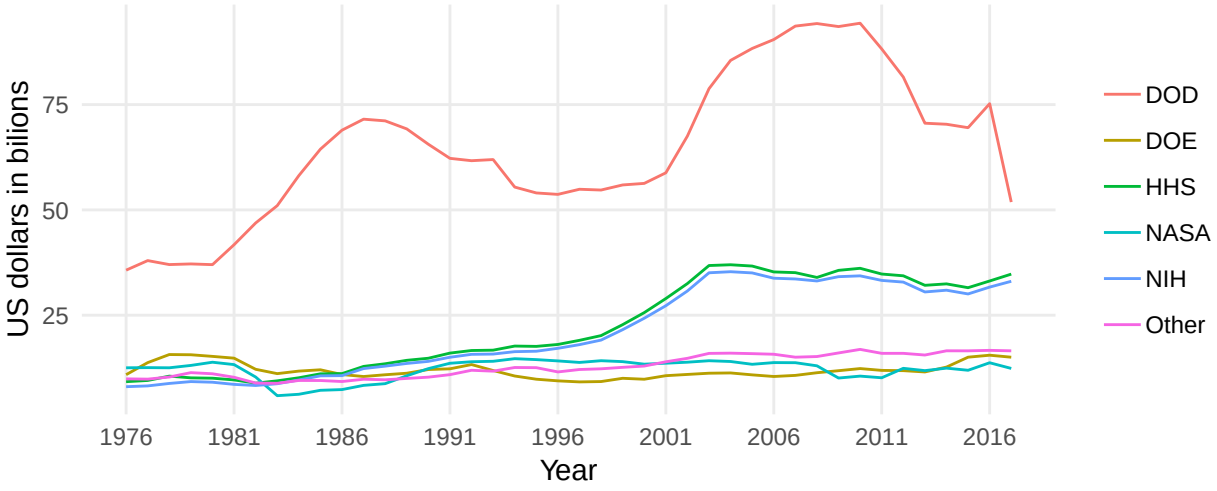
Total US Gross Domestic Product (GDP) in dollars per year (1976−2017)

During this time, spending with research in the US also increased, however, at a slower pace.



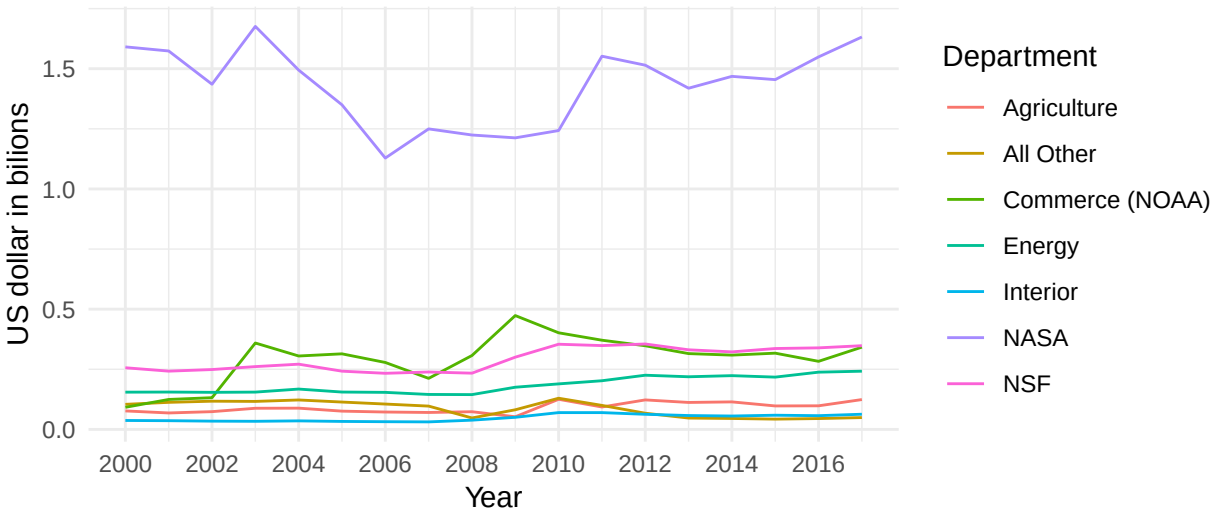
Evolution of GDP and spending in dollars per year (1976−2017)

Breaking down total outlays by the agencies of the federal government, one can see that most of the spending is concentrated on a few agencies, such as the Department of Defense (DOD), Department of Health and Human Services(HHS), and the National Institute of Health (NIH). It is interesting to note that after the September 11th attack , there was a significant increase in the spending with the DOD whereas the spending with the NIH and HHS, that was increasing 1996, plateaued. Ten years after the September 11th, the spending with DOD has decreased.



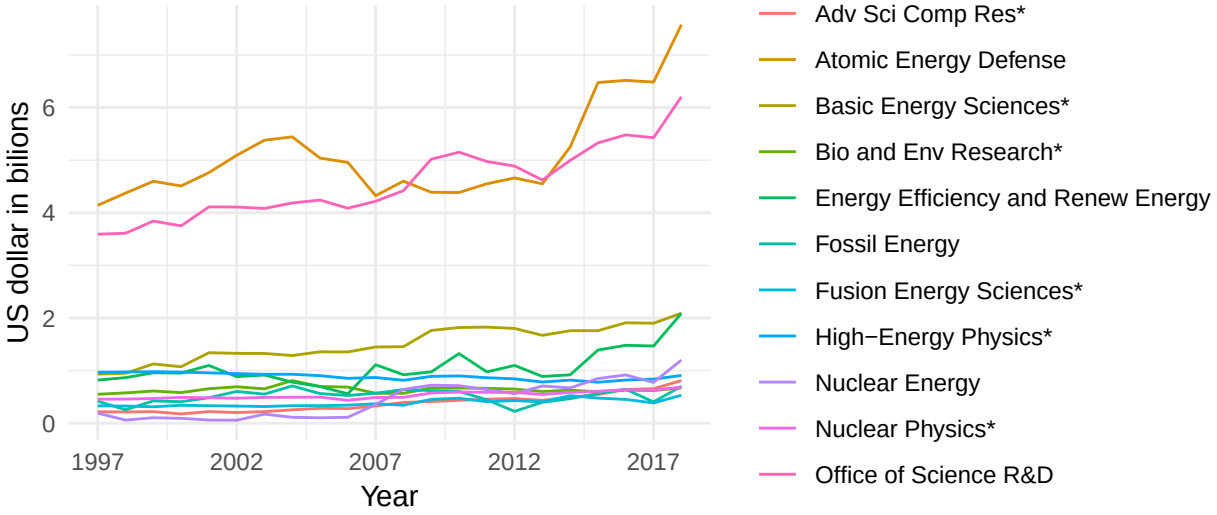
Evolution of department spending in dollars per year (1976−2017).
Other: DHS, DOC, DOT, EPA, Interior, NSF, USDA, VA, and Other

When observing the spending on climate-related research by federal agencies, one can see that the National Aeronautics and Space Administration (NASA) has the highest budget.



Evolution of department spending in dollars per year (2000−2016)

Finally, the spending on energy-related research by federal agencies, shows that Atomic Energy Defense and Office of Science Research and Development are the ones with largest budget. It is also possible to say that the spending with energy-related research, is higher than with climate-related research.

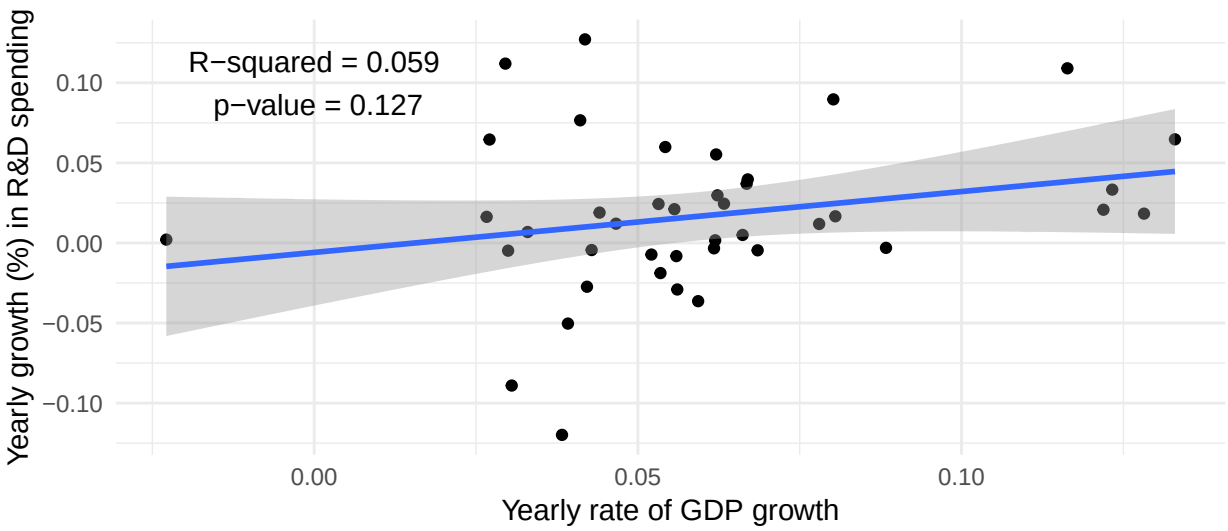


Evolution of department spending in dollars per year (1997−2018)

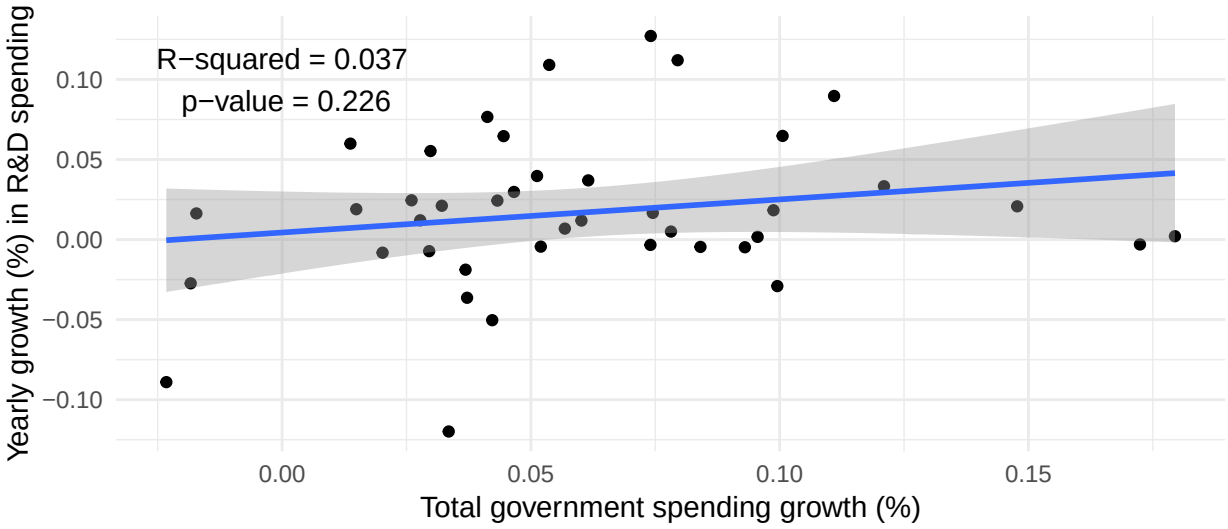
Statistical Analyses

In this section I study wheter changes in reseach and development spending are associated with changes in GDP, the total spending by the government, or just the discritionary portion of government spending. I find a positive and statisticaly significant association between R&D spending and the discritionary portion of gorvernment spending.

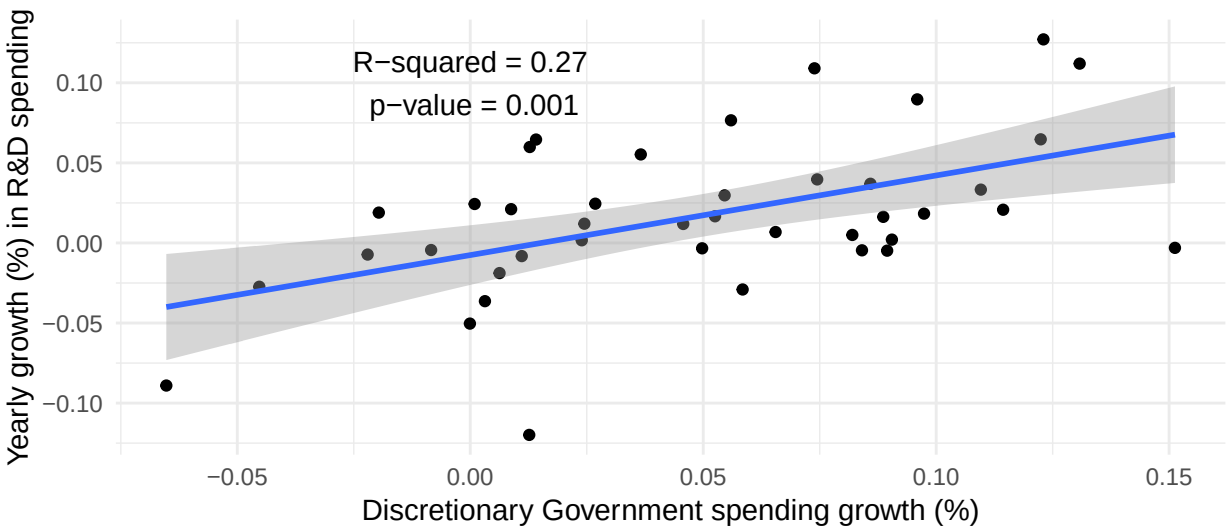
I ran three bivariate regressions studying the association between overall R&D spending, from the `fed_r_d_spending` dataset, and the independent variables. The next three figures describe the analyses.



Relationship between GDP growth and growth in R&D spending

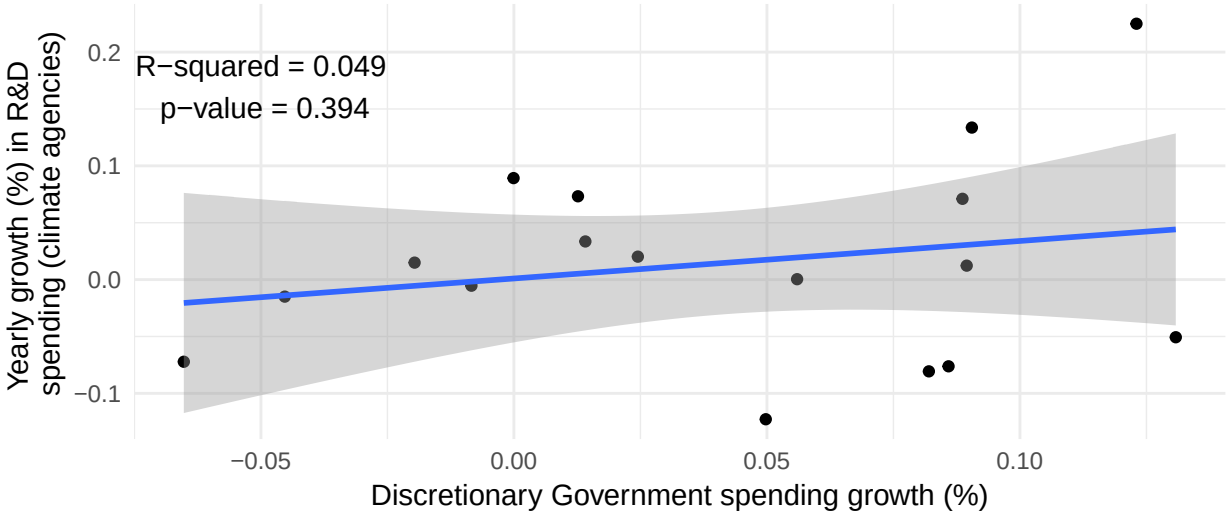


Relationship between total government spendnig growth and growth in R&D spending

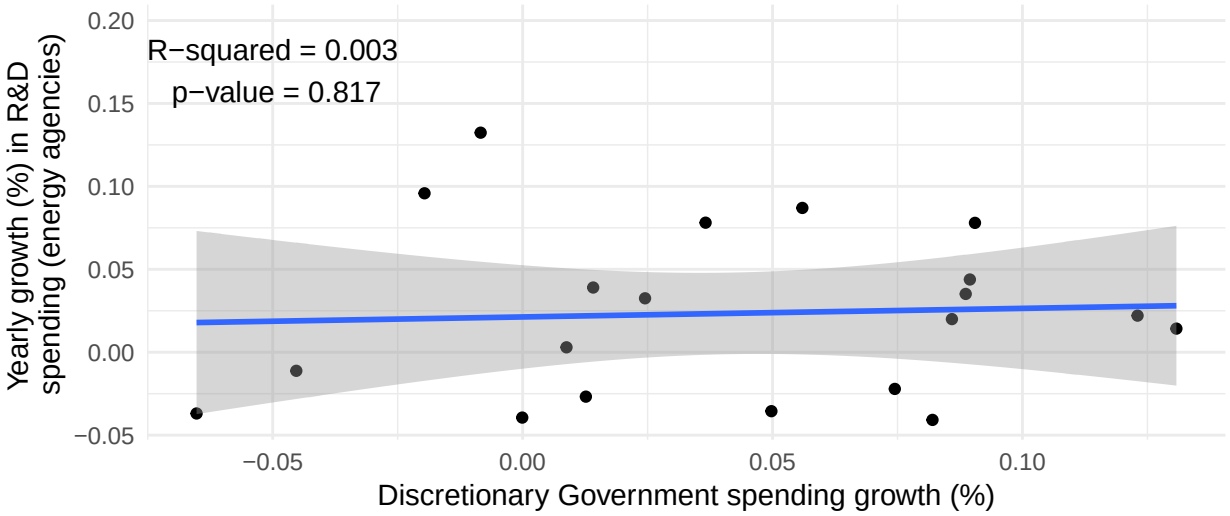


Relationship between discretionary government spendnig growth and growth in R&D spending

Because the only coefficient that is statiscally different from zero is the one for descritionary budget, I ran regrassions predicting wheter spending on climate and energy-related reaerch vary with descritionary spending.



Relationship between discretionary government spendnig growth and growth in R&D spending in climate agencies



Relationship between discretionary government spendnig growth and growth in R&D spending in energy agencies

Based on that analyses, I hypothesize that the government spent more money on other types of research, that are not climate or energy-related research.

Specifically, while I found that an unit increase in descritionary spend (i.e., if descritionary spending doubles whitin one year) leads to a 0.497 unit increase in R&D spending (a 49.7% increase), I found that the coefficients measuring the assotiation between increases in discritionary spending and climate and energy R&D spending (respectivelly, 0.33, 0.052) are not statistically different from zero (p-values = 0.394, 0.817). This results are shown in the table below.

Table 1: Regression Results

	Dependent variable:				
	rd_growth			gcc_growth	energy_growth
	(1)	(2)	(3)	(4)	(5)
gdp_growth	0.380				
	(0.244)				
total_growth		0.207			
		(0.168)			
discret_growth			0.497***	0.330	0.052
			(0.131)	(0.375)	(0.221)
Constant	−0.006	0.004	−0.008	0.001	0.021
	(0.016)	(0.013)	(0.009)	(0.026)	(0.015)
Observations	41	41	41	17	20
R^2	0.059	0.037	0.270	0.049	0.003
Note:					*p<0.1; **p<0.05; ***p<0.01