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How Democracy Matters: Evidence of Electoral
Incentives for Environmental Policy

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How Democracy Matters: Evidence of Electoral Incentives for Environmental Policy

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Abstract

I test the theoretical predictions from Park (2016) that the right-wing politicians will distort environmental policy to avoid losing the election. I study how the population environmental preferences, as measured by the LCV scores, influence state governors to become more concerned about the environment. From a U.S. panel data in the period of 1971-2007, I find that, in Democrat states where the median voters are Democrat, the Republican state governors increase the environmental expenditure per capita by approximately 27 percent as the Democrat LCV scores increase by 1 percent; and they increase the environmental expenditure per capita by 21 percent as the Republican LCV scores decrease by 1 percent. That is, in the Democrat states, the Republican governors respond positively to the environmental preferences of Democrats voters, but not to that of Republicans.

JEL Classification: Q48, Q54

Keywords: Democracy; Environmental Policy.

1 Introduction

Social choice theory tells us that the crucial necessary condition for democracy is simply a shared understanding that democracy will function in the society.[1] To avoid catastrophic climate change and other environmental disaster, it is crucial to implement environmental policies at a suitable time and place. Thus, it is important to understand how decision-making regarding climate change and environmental policies works in a democracy. List and Sturm (2006) presented a theoretical model and empirical evidence that show secondary policies, such as environmental policy, are affected by electoral incentives. The basic assumption behind their approach is that the majority of voters are not affected by environmental policy, however, a minor group of voters have strong preferences for environmental policy. The minority voters are likely to be "single-issue voters," who will vote for politicians considered most likely to implement their preferred environmental policy. Thus, there may be electoral incentives for politicians that they distort their policy choices in environmental policy to attract the single-issue voters. However, their empirical findings are difficult to reconcile with the median voter model. In my study, the basic assumption differs from them in a way that my empirical findings are consistent with the median voter model (see Congleton, 1992, and more). That is, politicians have electoral incentives for environmental policy to attract the median voters, not the minority voters.

According to a national poll on climate change conducted by Stanford University, Resource for the Future, and the *New York Times* in 2015, social concerns about climate change has been steadily high. As of 2015, 53% of U.S. citizens thought that the government *should* do more than a moderate amount about climate change, but only 15% of citizens thought that the government *was* currently doing more than a moderate amount to deal with climate change.[2] To explain the underlying disparity in the data about social concerns surrounding climate change, it is natural to consider a hypothesis that the government's preference for environmental policy may be different from that of the median voter. Let us consider two dimensions of economic policy regarding climate change: economic growth and the environment. I consider these two concerns to be on opposite

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[1] "Fundamentals of Social Choice Theory," Myerson (2013).

[2] Figures 1-2 show the results of Global Warming National Poll conducted by SSRS from January 7-22, 2015, organized by Resource For the Future, the *New York Times*, and Stanford University.

ends of a sliding scale, so that a policy which is more pro-growth ("right wing") will by nature be less pro-environment ("left wing"), and vice versa. I also assume that the right-wing politicians prefer pro-growth economic policies, while the left-wing politicians prefer pro-environment ones.

Park (2016) provides a game-theoretical model that shows how electoral incentives matter for environmental policies in a democracy. If median voters perceive an alarming message about the environment (climate change) from a scientist, then even a right-wing (pro-growth) politician will be forced to choose an aggressive environmental policy to avoid losing the election. This is in sharp contrast to the case where the politician has no election concerns and therefore can choose his unconstrained optimal response to the scientist's message. I test the theoretical predictions that the right-wing politicians distort environmental policy to avoid losing the election. That is, the right-wing politicians will implement stronger environmental policy to attract the median voters and win the election. I study how the population environmental preferences, as measured by the LCV scores, influence state governors to become more concerned about the environment in the U.S. This would be especially important for Republican governors, if we assume that Democrat voters are concerned about the environment while Republican voters are not. The voters who are not concerned about the environment are likely to be indifferent about environmental policy. However, an environmental policy is likely to be important for voters who are concerned about the environment.[3] I assume that Democrat voters (the left wing) are concerned about the environment and a politician's choice on environmental policy is important for them, while Republican voters (the right wing) are not concerned about the environment and they are indifferent about environmental policy (see Figure 3). In Democrat states where the median voters are Democrats, Democrat state governors may not distort environmental policy as their environmental preferences are closer to the median voters (see Park (2016) for further theoretical details). In Republican states where the median voters are Republicans, Democrat state governors may not distort environmental policy either because the Republican voters are indifferent about environmental policy. In this current study, the politicians of interest are the Republican governors in the Democrat states. Even though the Republican voters are not concerned about the environment and they are indifferent about environmental

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[3]List and Sturm (2006) argue that electoral incentives are important determinant of policy choice on "secondary" policy issues such as environmental policy.

policy, Republican governors may have an incentive to respond to the environmental preferences of Democrat voters to attract the median voters and win the elections. Therefore, I examine how state governors are sensitive to the environmental preferences of population. I analyze a U.S. panel data in the period of 1971-2007. I find that, in the Democrat states where the median voters are Democrat, the Republican state governors increase the environmental expenditure per capita by approximately 27 percent as the Democrat LCV scores increase by 1 percent; and they increase the environmental expenditure per capita by 21 percent as the Republican LCV scores decrease by 1 percent. That is, Republican governors respond positively to the environmental preferences of Democrats, but not to that of Republicans. This empirical finding is consistent with the theoretical prediction that the right-wing politicians will implement stronger environmental policy to attract the median voters and win the election.

There are several empirical research on the relationship between environmental policies and political systems. Hassler and Krusell (2012) construct a model to quantify how key features of heterogeneity between different regions of the world affect those regions' preferences for different climate change policies. They show that in the absence of international transfer mechanisms, Pareto-improving policies to curb climate change may not exist. Fredriksson and Neumayer (2013) study the relationship between countries' democratic capital stocks and climate change policies. Using data for 87 countries starting from as far back as the year 1800, they show that larger democratic capital stocks are associated with more stringent climate change polices. Congleton (1992) provides a simple model to show how different political institutions affect the enactment of environmental regulations. He finds empirical evidence that political institutions play a significant role to the pollution control policies. Winslow (2005) presents empirical evidence to support the existence of a relationship between democracy and one aspect of environmental quality, urban air pollution. The relationship between environmental quality and democracy is explored empirically using a regression analysis of urban air concentrations of three pollutants, sulfur dioxide ($SO2$), suspended particulate matter (SPM) and smoke, and two measures of democracy, the Freedom House Index and Polity III. The results suggest a significant and robust negative linear relationship between these pollutant concentrations and democracy level: the higher the level of democracy, the lower the ambient pollution level. My contribution to this literature is that I provided a rigorous

game-theoretic model to theoretically explain those empirical results, and another empirical result consistent with the previous literature.

2 State Preferences and Environmental Policy

I investigate how state governors are sensitive to the environmental preferences of population. Of special interest are Democratic states (where the median voters are democrats) with Republican governors, since these are hypothesized to be more pro-growth. I first describe the data, then the econometric methodology, and finally discuss the estimation results.

2.1 Data

I collect the state environmental expenditure data in 50 U.S. states in the period of 1971-2007. They are expenditure on "fish and game," "forestry," and "natural resources." "Fish and game" is expenditure for conservation and development of fish and game resources through regulation, protection, and propagation. "Forestry" is expenditure on conservation, development and promotion of forests and forest products. It includes forest fire prevention and forest fire-fighting activities. Lastly, "natural resources" is expenditure on conservation, promotion, and development of natural resources, such as soil, water, forests, minerals, and wildlife. It includes irrigation, drainage, flood control, forestry and fire protection, soil reclamation, soil and water conservation, fish and game programs, and agricultural fairs. These measures are deflated to 1982-1984 dollars. I use the sum of the three categories of expenditure in per capita amounts to measure each state government's environmental policy. The data is from the Census of State Governments reports.

As a proxy for the environmental preference of voters in each state, I use the League of Conservation Voters (LCV) scores. The LCV scores are the politicians' scores about the votes on the most important environmental issues of the year, such as global warming, environmental health and safety protections and etc. The LCV scores are the proportion of the time that the member of Congress voted with the LCVs position on legislation with environmental consequences (see Sigman, 2003). The League of Conservation Voters publishes an annual report on the LCV scores every year since 1971. The politicians scored by the LCV are the congressional delegation from each

state. Therefore, it is likely that politicians with high LCV scores are the delegation from states where voters have favorable environmental preferences. I collect the nominal LCV scores of each state from the website of the LCV and convert them to the real terms for a time consistent measure of environmental preferences.[4] The LCV score is the average score of senators and representatives in each year and state. The Republican LCV score is the average score of Republican senators and representatives in each year and state; and the Democrat LCV score is the average score of Democrat senators and representatives in each year and state.

Each state governor's party affiliation is equal to 1 if the governor is affiliated with Republican party, and 0 otherwise. I collect this data from the National Governors Association. To capture the theoretical argument that the Republican governors in Democrat states may have an incentive to respond to the environmental preferences of the Democrat voters, I extend the econometric model by interacting these variables with the LCV scores in each year and state. I use the Major Party Index (MPI) developed by Ceaser and Saldin (2005) to distinguish Democrat states with Republican states. The MPI index is based on a two-party (Democrat and Republican) evaluation. The MPI index takes all of the major elective offices into account such as presidential elections, Congressional elections, governorship elections, and the state legislature elections. As the numerical value of the MPI index increases, a state becomes more Republican. Democrat states, where the median voters are Democrat, are defined as those with the MPI index strictly less than 50.

As in the previous literature,[5] I control for total state population and state personal income per capita.

2.2   Econometric Methodology

I use linear panel-data models with state and year fixed effects to estimate the relationship between the state environmental expenditure and the state environmental preferences (LCV scores), and the LCV scores interacted with the state governor's party affiliation, the state personal income per

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[4]The scales underlying the nominal LCV scores can shift and stretch since the set of votes used to score is not constant over time and across chambers. Groseclose et al. (1999) provides a method to convert the scores.

[5]See List and Sturm (2006) and Besley and Case (1995, 2003)

capita, and the state population. The regression equation is the following:

$$ENV_{it} = \beta_0 + \beta_1 RLCV_{it} + \beta_2 DLCV_{it} + \beta_3 RLCV_{it} \times DSTA_{it} \times RGOV_{it}$$

$$+ \beta_4 DLCV_{it} \times DSTA_{it} \times RGOV_{it} + \beta_5 X_{it} + \delta_i + \gamma_t + \epsilon_{it}, \quad (1)$$

where ENV_{it} is the log of the environmental expenditure in each state (i) and year (t), $RLCV_{it}$ is the log of real LCV score of Republicans in each state and year, $DLCV_{it}$ is the log of real LCV score of Democrats in each state and year. The regressor of primary interest is the interaction term among the LCV scores, the governor's party affiliation, $RGOV_{it}$, which is equal to one if the governor is affiliated with Republican party, and zero otherwise, and Democrat states, DST_{it}, which is one if the MPI is strictly less than one, and zero otherwise. X_{it} is the vector of state population demographic characteristics: the state population and the state personal income per capita. δ_i and γ_t denote the state and year fixed effects, respectively, and ϵ_{it} is the error term.

I try six different specifications. Specifications (1) and (2) in Table 2 analyze the sample of the period 1971-2007. The early 1970s is considered to be when environmental concerns arise in the U.S., due to the fact that the Environmental Protection Agency was founded and the first Earth day (see List and Sturm, 2006) was designated. Figure 4 shows the LCV scores by party in four states, NJ, NM, NY, and NC. Compared to 1970s, it seems that each party' s political stance regarding the environmental issues becomes more distinct in 1980s: Democrats are more concerned about the environment than Republicans. Thus, specifications (3) and (4) analyze the reduced sample of the period 1985-2007. Specification (5) adds the interaction term among the LCV scores, the governor's party affiliation, and Democrat states to the sample of the period 1985-2007. Specification (6) analyzes the reduced sample of the period 1995-2007.

2.3   Empirical Results

In specification (4) where the sample period is 1985-2007, I estimate with the 10% significance level that, for a one percent increase in the Democrat LCV, we will see approximately 7.2 percent more environmental expenditure per capita in Republican governed states over and above any effect we see in Democrat governed states. In this case, a one percent increase in the Democrat LCV leads

to approximately 1.5 percent more expenditure in Republican governed states. At the same time, I estimate with the 5% significance level that, for a one percent decrease in the Republican LCV, we will see approximately 9.9 percent more environmental expenditure per capita in Republican governed states over and above any effect we see in Democrat governed states. In this case, a one percent decrease in the Republican LCV leads to approximately 4.8 percent more expenditure in Republican governed states.

In specifications (5) and (6), I add more interaction terms among LCV scores, Republican governed states, and Democrat states (where the median voters are Democrats: the MPI index strictly less than 50). In specification (6) where the sample period is 1995-2007, I estimate with the 5% significance level that, for a one percent increase in the Democrat LCV, we will see approximately 25 percent more environmental expenditure per capita in Republican-governed Democrat states over and above any effect we see in Republican-governed Republican states. In this case, a one percent increase in the Democrat LCV leads to approximately 27 percent more environmental expenditure in Republican-governed Democrat states. This is statistically significant at the level of 5%. At the same time, I estimate with 1% significance level that, for a one percent decrease in the Republican LCV, we will see approximately 32 percent more environmental expenditure per capita over and above any effect we see in Republican-governed Republican states. In this case, a one percent decrease in the Republican LCV leads to approximately 21 percent more environmental expenditure in Republican-governed Democrat states. This is statistically significant at the level of 10%.

Recall that I assume that Democrat voters (the left wing) are concerned about the environment and a politician's choice on environmental policy is important for them, while Republican voters (the right wing) are not concerned about the environment and they are indifferent about environmental policy (see Figure 3). In a full democracy such as the US where the median voters have power to replace to regime, politicians may have an incentive to respond to the median voters' preferences to win the elections. In this current study, the politicians of interest are Republicans. Even though the Republican voters are not concerned about the environment and they are indifferent about the environmental policy, Republican politicians may have an incentive to respond to the environmental preferences of the Democrats to attract the median voters and win the elections.

First, in Democrat states where the median voters are Democrats, Republican governors do significantly and positively respond to a change in the environmental preferences of Democrat voters. To be specific, the Republican governors increase the environmental expenditure per capita by approximately 15 percent as the Democrats LCV increases by 1 percent. Second, the Democrat governors do not significantly respond to a change in the environmental preferences of their residents. This empirical finding is consistent with our assumption that Republican voters are indifferent about environmental policy, so the Democrat governors do not significantly respond to the median voters' environmental preferences.

3   Concluding Remarks

The theoretical model shows that political institutions affect the government's climate change policies: In the case where the government has the fears of losing power (the median voter is closer to the alternative party), we achieve stronger environmental polices. Unlike empirical findings from List and Sturm (2006), my empirical results are reconciled with the median voter theory. I study how the population environmental preferences, as measured by the LCV scores, influence state governors to become more concerned about the environment in the U.S.

I analyze a U.S. panel data in the period of 1971-2007. I find that, in the Democrat states where the median voters are Democrat, the Republican state governors increase the environmental expenditure per capita by approximately 27 percent as the Democrat LCV scores increase by 1 percent; and they increase the environmental expenditure per capita by 21 percent as the Republican LCV scores decrease by 1 percent. That is, Republican governors respond positively to the environmental preferences of Democrats, but not to that of Republicans. This empirical finding is consistent with the theoretical prediction that the right-wing politicians will implement stronger environmental policy to attract the median voters and win the election.

One may extend this current study by examining other measurements for environmental policy and environmental preferences of voters of each state.
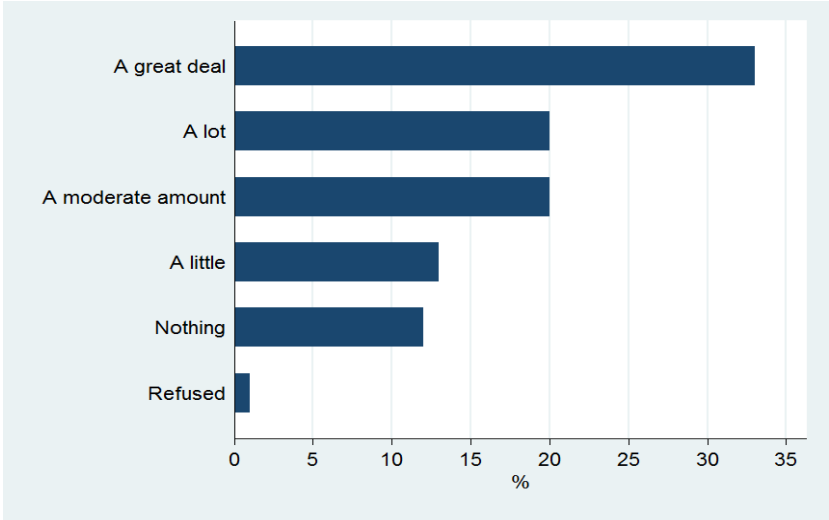
Appendix I – Figures

Figure 1: % of U.S. citizens who think that the government should do about global warming: a great deal, a lot, a moderate amount, a little, or nothing, *Global Warming National Poll conducted January 7-22, 2015.*
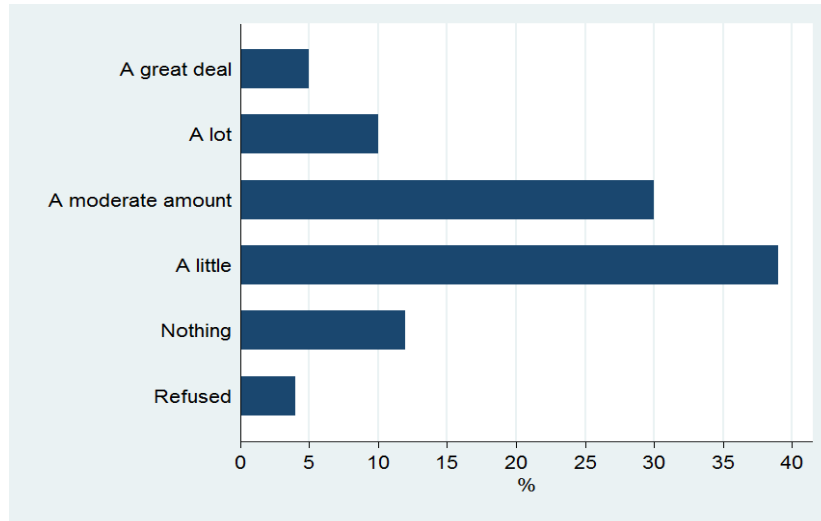
Figure 2: % of U.S. citizens who think that the government is currently doing: a great deal, a lot, a moderate amount, a little, or nothing to deal with global warming, *Global Warming National Poll conducted January 7-22, 2015.*
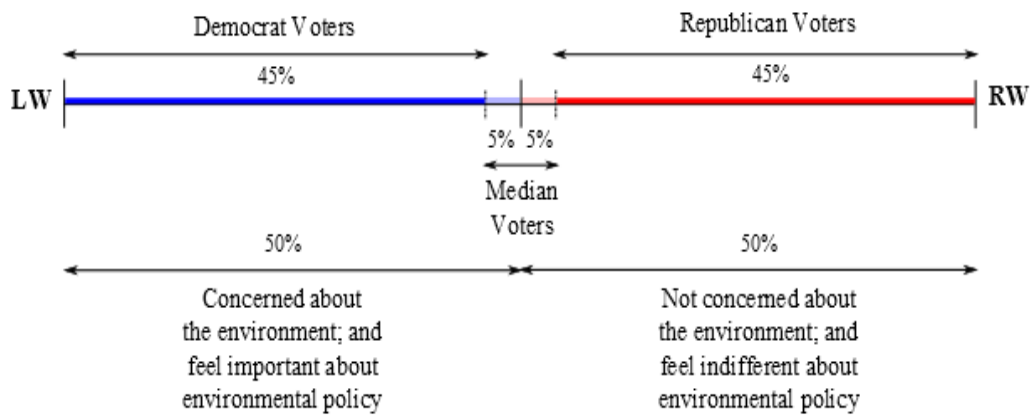
Figure 3: One-Dimensional Space of the Environmental Preferences of the Voters
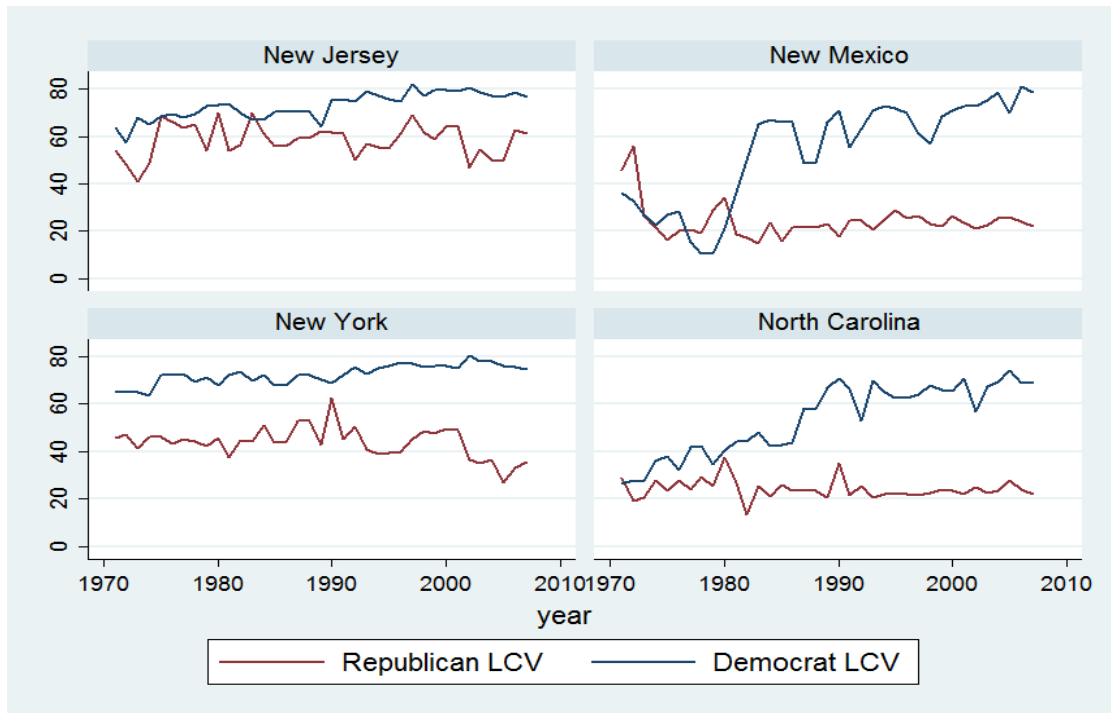
Figure 4: Real LCV Scores by Party

Appendix II − Tables

Table 1: Summary Statistics: US Panel

Variable	Mean	Std.	Min	Max	Obs.
Environmental Expenditure per capita	122.055	196.447	0.103	2016.337	1849
Personal Income per capita	14278	3341	7050	30914	1849
Population	9254.17	33311.6	316	303785	1849
LCV scores	46.2542	16.0205	8.6617	84.47318	1849
Republican LCV scores	32.5786	15.9661	-.80575	87.7306	1731
Democrat LCV scores	60.1736	15.8362	10.3163	96.4662	1727

Environmental expenditure per capita in US$ and state personal income per capita in US$;

Population in thousands.

Table 2: Environmental Preferences by Party on Environmental Expenditure per Capita

	(1) 1971-	(2) 1971-	(3) 1985-	(4) 1985-	(5) 1985-	(6) 1995-
RLCV	-0.0116	-0.0087	-0.0009	0.0512	0.0314	-0.0294
	(0.0370)	(0.0407)	(0.0386)	(0.0474)	(0.0457)	(0.0695)
DLCV	-0.0268	-0.0355	-0.0131	-0.0568	-0.0475	0.1224
	(0.0434)	(0.0505)	(0.0447)	(0.0538)	(0.0553)	(0.0769)
RLCV × RGov		-0.0123		-0.0994**	-0.0476	0.1357
		(0.0401)		(0.0451)	(0.0527)	(0.1002)
DLCV × RGov		0.0142		0.0715*	0.0386	-0.1015
		(0.0335)		(0.0383)	(0.0434)	(0.0807)
RLCV × RGov × DState					-0.0437	-0.31948***
					(0.0506)	(0.1198)
DLCV × RGov × DState					0.0141	0.24852**
			(0.0444)	(0.1017)	(0.0444)	(0.1017)
State Personal Income	0.0731	0.0742	0.0700	0.0648	0.0516	0.02948
	(0.0583)	(0.0586)	(0.0679)	(0.0656)	(0.0634)	(0.0839)
State Population	-0.993***	-0.993***	-1.008***	-1.006***	-1.006***	-1.003***
	(0.0085)	(0.0086)	(0.0080)	(0.0078)	(0.0074)	(0.0113)
Constant	11.29***	11.30***	11.35***	11.40***	11.55***	11.57***
	(0.582)	(0.585)	(0.634)	(0.621)	(0.602)	(0.861)
N	1606	1606	979	979	979	534
adj. R^2	0.970	0.970	0.980	0.980	0.982	0.967

Standard errors are clustered by state and in parentheses.

All columns include state and year fixed-effects.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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