Policy Opacity

William Cassidy [1]

[1]Booth School of Business

Motivation

1. Policy makers value opacity because of political constraints.
   - Opacity ⇒ harder learning problem for voters ⇒ policy makers delay or escape electoral punishment.
2. Policy makers understand and explicitly discuss these incentives. A quote from "Obama's Covert Plans for the Climate" from the news media company *Politico*:
   Don't expect a climate crusade. It's more like covert action... Obama has learned since then (2009), he can't exactly craft climate change policies that will produce results so easily seen. Politically, it makes what he's doing an easy target for opponents.
3. Uncertainty due to opaque policies affects asset markets and firms.
4. **What I find:** policy announcements of governments that are politically constrained are associated with higher uncertainty, as measured by at-the-money implied volatility and return volatility.

Model

The model consists of four players: utilities who produce electricity, final good producers that combine electricity and capital to produce the consumption good, households that consume the output of the final good producer and vote to keep or replace the incumbent government and an incumbent government that sets the prevailing policy g.

Higher g is associated with lower emissions, but also higher electricity costs and thus lower consumption in equilibrium. This is the key trade-off in the model.

Households

Households are risk-neutral:

$$U_{i,t} = \mathbb{E}_t \left[\sum_{t' \geq t} \beta^{t'-t} \left(C_{i,t'} - \theta_i \mathcal{E}_{t'} \right) \right]$$

Households have preferences over consumption $C_{i,t}$ and emissions $\mathcal{E}_t$. Households are heterogeneous in their disutility of emissions, with disutility given by θ_i. The median of this distribution is denoted θ_M. Households both invest and vote.

Utilities

Utilities sell electricity at a price $P_{t,e}$ using brown (B_t) and green (G_t) inputs with associated prices P_B and P_G. P_B and P_G are the technological cost to the utility of producing electricity with these inputs.

$$\max_{\{B_t, G_t\}} P_{t,E} \left((1-g) B_t \right)^{\alpha} G_t^{1-\alpha} - P_B B_t - P_G G_t$$

The price of electricity $P_{t,E}$ is increasing in g and emissions $\mathcal{E}_t$ are decreasing in g

$$\mathcal{E}_t = (1-g) B_t$$

Final Good Producers

This is an "E-K" economy where firms combine electricity (E_t) and capital (K_t) into the final consumption good:

$$Y_t = E_t^{\lambda} K_t^{1-\lambda} - P_{t,E} E_t$$

Output is firm production net of the cost of electricity generation. Emissions are generated as a by-product of final good production through E_t.

Model, continued

Incumbent Government's Problem

The incumbent government's (I) problem is

$$\max_{g, \sigma_s} \mathbb{E}_t \left[\sum_{t' \geq t} \beta^{t'-t} \left(\frac{1}{N} \sum_i C_{i,t'} - \theta_I \mathcal{E}_{t'} \right) \right] - \mathcal{C} \left(\sigma_s - \sigma_0 \right)^2 \quad \text{where} \quad s \sim N\left(g, \sigma_s^2 \right)$$

Governments are "Green" or "Brown" type. Conditional on the type, θ_I is drawn from one of two distributions. θ_I is private information known only to the incumbent government. s is a policy announcement made by the government. The announcement is unbiased by construction, but can be more or less informative depending on the value of σ_s.

$$\theta_I \sim \begin{cases} U\left[\underline{\theta}_G, \bar{\theta}_G\right] & \text{if "Green"} \\ U\left[\underline{\theta}_B, \bar{\theta}_B\right] & \text{if "Brown"} \end{cases} \quad \text{where} \quad \underline{\theta}_B \leq \bar{\theta}_B \leq \underline{\theta}_G \leq \bar{\theta}_G$$

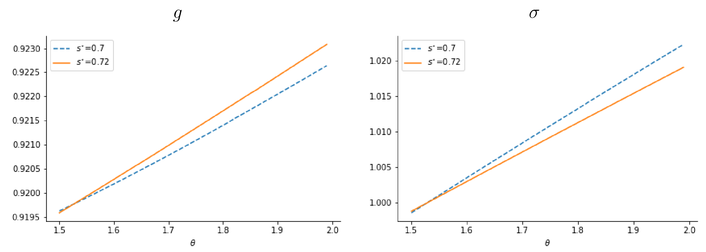
The government's type and the parameters of the type distributions are public information.

Voting

In the first period, voters vote to retain the incumbent government or replace the incumbent with a challenger (C). The type of the challenger and the incumbent are assumed to be different. Voters form an expectation over the prevailing policy based on the type distribution of the incumbent and a policy annnouncement made by the government, s. If the incumbent government is not re-elected, the challenger sets g.

Equilibrium

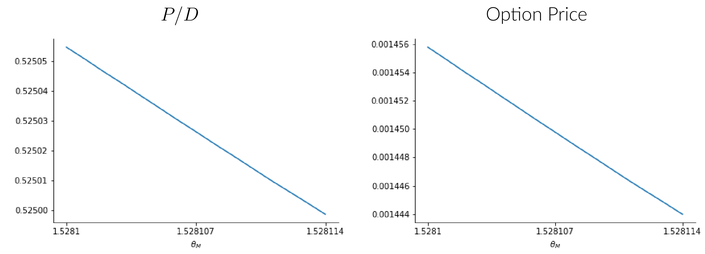
Equilibrium is characterized by the choice of the median voter. *Taking into account the equilibrium decision rule of the incumbent government*, the median voter will vote for incumbent government conditional on the value of the signal, so that the median voter is at least as well off as if the incumbent was re-elected.



These two panels show the policy rules of the incumbent government as a function of the (assumed to be Green) incumbent government's θ_I, given a particular θ_M. As θ_M decreases Green governments implement browner policies (*Partial Downisan Convergence*), but also make less informative policy announcements (*Policy Opacity*). These effects are pronounced for more extreme values of θ_G.

The left-hand panel of the next figure shows the model-implied price-dividend ratio of the aggregate claim, the right-hand panel shows the price of an at-the-money put option. As θ_M decreases and gets farther from $\mathbb{E}[\theta_I]$ both the price of the claim increases as does the price of option protection.

Equilibrium, continued



The implemented policy becomes browner in expectation and expected cash flows are higher. The signal becomes less informative, increasing uncertainty and the value of option protection.

Empirics

I use the following as empirical analogs for the objects in the model:

1. Implied volatility of industry options and return volatility as proxies for uncertainty about g.
2. Polling data from Pew and Gallup to quantify support for policies to address climate change.
3. Using articles on the Dow Jones Newswire, I record days on which there were climate change-related policy announcements.

I test the model using an event study and estimate regressions of the form:

$$\begin{aligned} \Delta Y_{i,t} \sim \beta_0 &+ \beta_1 \mathbb{I}\{\text{Announ.}\}_t + \beta_2 \mathbb{I}\{\text{Announ.}\}_t \times \text{Support for Environmentalism} \\ &+ \beta_3 \mathbb{I}\{\text{Announ.}\}_t \times \text{Support for Environmentalism} \\ &+ \beta_4 \mathbb{I}\{\text{Announ.}\}_t \times \text{Support for Environmentalism} \times \text{Green Party in Power} + \text{Controls} + \nu_t \end{aligned}$$

	$\text{ATM IV}_1 - \text{ATM IV}_0$			$\text{ATM IV}_2 - \text{ATM IV}_0$			$\text{ATM IV}_3 - \text{ATM IV}_0$		
Announcement	-0.0003	-0.000076	-0.0002	-0.035	-0.0353	-0.0353	-0.1164	-0.1173	-0.1179
	[-0.048]	[-0.013]	[-0.037]	[-5.203]	[-5.241]	[-5.243]	[-15.419]	[-15.531]	[-15.607]
Announce × Reg. Support	0.000004	0.000008	-0.000015	0.0006	0.0006	0.0006	0.0019	0.002	0.002
	[0.040]	[0.080]	[-0.143]	[4.493]	[4.612]	[4.596]	[14.046]	[14.546]	[14.584]
Announce × Dem	0.006	0.0046	-0.0002	0.0471	0.0484	0.0352	0.1078	0.1156	0.0845
	[0.805]	[0.622]	[-0.020]	[5.414]	[5.610]	[3.823]	[11.043]	[11.928]	[8.185]
Announce × Dem × Reg. Support	-0.0001	-0.000079	0.000022	-0.0009	-0.0009	-0.0006	-0.002	-0.0021	-0.0014
	[-0.738]	[-0.545]	[0.141]	[-5.189]	[-5.331]	[-3.360]	[-10.221]	[-10.984]	[-6.891]
Announce × Time til Pres Elec	-0.000001			0.000002			0.000007		
	[-1.025]			[2.352]			[7.213]		
Announce × Time til Any Elec		-0.000003			0.000003			0.000006	
		[-1.685]			[1.420]			[3.140]	
Announce × Single Party Control			0.0009			0.0029			0.0076
			[1.298]			[3.533]			[8.136]
Adj. R2	0.0066	0.0064	0.0063	0.0249	0.0248	0.0244	0.0432	0.0433	0.0437
N	180501	180501	180501	180459	180459	180459	180417	180417	180417
Year by Month FEs	Y	Y	Y	Y	Y	Y	Y	Y	Y

Conclusion

Political agency affects financial markets. The value of option protection and other proxies for uncertainty are higher after policy announcements from governments that have preferences different from that of their constituents. These results highlight the importance of political feasibility in policy responses to climate change.