The United States Government Shutdown:
A Game Theoretical Analysis

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- Introduction

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Introduction

The two chambers of Congress failed to reach an agreement over the government's debt ceiling

→ 1st of October 2013: government shutdown

Negotiations over the removal of the Affordable Care Act

16 days of shutdown

17rounds of votes

→Republicans compromised

The Framework

- Two players
  - The Democratic Party (Senate)
  - The Republican Party (House of Representatives)

- Assumption
  - Individual representatives will vote in accordance to the official party line

- Two-step analysis
  1. Before the shutdown (standard fixed payoffs)
  2. During the shutdown (dynamic payoffs)

1. One-Off Simultaneous Game

- Two possible simultaneous moves, for both players

  – Compromise

  – Refuse to compromise

  … A Prisoner's Dilemma

Players' Payoffs

	Republican payoff	Democrat payoff
λ	The Affordable Care Act is scrapped	Full funding for The Affordable Care Act
α	Reduced Affordable Care Act, retention of constituency support, and no 'loss of face'	-
β	-	Partial funding for The Affordable Care Act, but accompanying loss of public opinion (Failure to deliver fully on election promises)
ε	Government shutdown	Government shutdown
δ	Full funding for The Affordable Care Act	No funding for The Affordable Care Act

The Game Matrix

Utility values: $\lambda > \alpha > \beta > \varepsilon > \delta$

		Democrats	
		Compromise	Refuse
Republicans	Compromise	$\alpha \, , \, \beta$	$\delta \, , \, \lambda$
	Refuse	$\lambda \, , \, \delta$	$\varepsilon \, , \, \varepsilon$

2. Infinitely Repeated Game with Decreasing Payoffs

Deteriorating economic conditions

→Continously increasing pressure on players

→Dynamically decreasing payoffs

Assumptions (1)

- ε is now time-dependent

- BUT: its utility value diminishes at *different rates* for each player

- The decrease in utility is given by Φ for Republicans, and Ψ for Democrats

The factors Φ and Ψ are themselves functions of:

E: The negative externalities to the economy created by the shutdown

P_D : The negative public opinion directed at the Democrats

P_R : The negative public opinion directed at the Republicans

$$P_R > P_D$$
P_R increases faster than P_D
E is equal for both players

The Republican's rate of decrease Φ is then:

$$\Phi \; f(E, P_R)$$

E and P_R are negatively related with Φ

$$\Phi < 0$$

And the Democrats' rate of decrease Ψ is then:

$$\Psi \; f(E, P_D)$$

E and P_D are negatively related with Ψ

$$\Psi < 0$$

$\Phi < \Psi$ in each game (that is, Φ is more negative)

The Game Matrix

Utility values : $\lambda > \alpha > \beta > \varepsilon > \delta$

$$\varepsilon^{\Phi} = \varepsilon + n\Phi$$

$$\varepsilon^{\Psi} = \varepsilon + n\Psi$$

		Democrats	
		Compromise	Refuse
Republicans	Compromise	α , β	δ , λ
	Refuse	λ , δ	ε^{Φ} , ε^{Ψ}

A. The Short Run

As long as :

- $\lambda > \alpha > \delta > \varepsilon^{\Phi}$ for Republicans
- $\lambda > \beta > \delta > \varepsilon^{\Psi}$ for Democrats

We continue to have:

		Democrats	
		Compromise	Refuse
Republicans	Compromise	α , β	δ , λ
	Refuse	λ , δ	$\varepsilon^{\Phi} , \varepsilon^{\Psi}$

B. The Long Run

Because of our dynamic payoffs

There will come a game N at which:
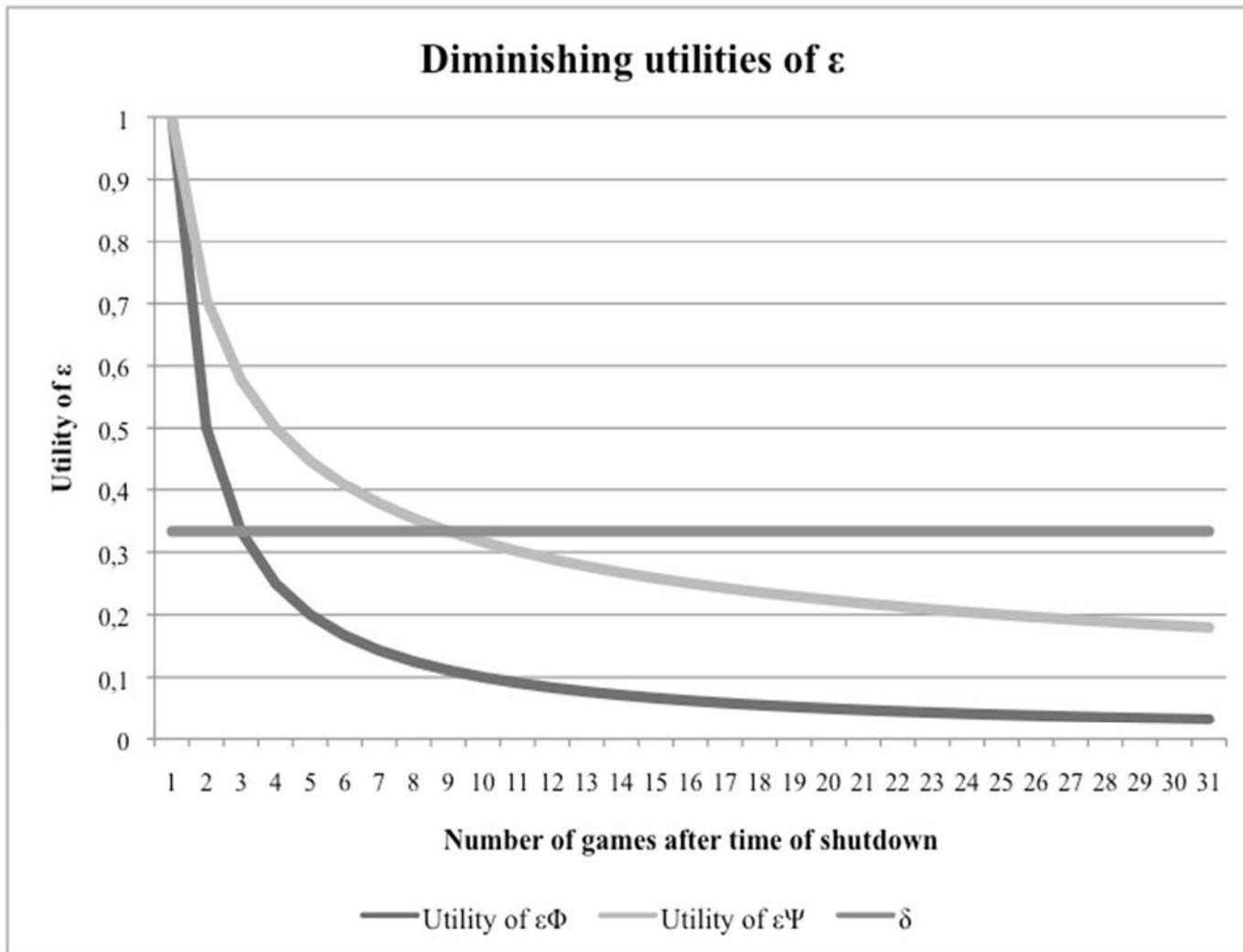- $\varepsilon^\Psi < \delta$ or $\varepsilon^\Phi < \delta$

But as $\Psi > \Phi$

$\rightarrow \varepsilon^\Psi < \varepsilon^\Phi$

Therefore: The republicans will be the first to reach

$$\varepsilon^\Phi < \delta$$

Diminishing utilities of ε

Utility of εΦ   Utility of εΨ   δ

Number of games after time of shutdown

	Democrats	
	Compromise	Refuse
Republicans Compromise	α , β	δ , λ
Refuse	λ , δ	ε^{Φ} , ε^{Ψ}

This brings an end to the shutdown

And a new Nash Equilibrium [Compromise, Refuse]

With payoffs : (δ , λ)

Conclusion

Predictions depict the actual unfolding of the US government shutdown crisis

Can it come as a lesson for political parties in the future?

QUESTIONS?

THANK YOU!