CSEC 491 Thesis Proposal: A Game-Theoretic Exploration of Conflict in Economic Relationships

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1. Introduction and Scope

Economic relationships often feature frictional behaviors that deviate from theoretically efficient outcomes, particularly in conflict-prone contexts like labor market separations. Despite the availability of more efficient alternatives, such as Separations by Mutual Agreement (SMAs), conflictual dismissals remain prevalent. This project seeks to explain why SMAs fail to replace dismissals by constructing a game-theoretic model that incorporates key frictions: **hostility**, **discipline incentives**, and **asymmetric beliefs about legal outcomes**.

This project builds on empirical findings, particularly the *Conflict in Dismissals (Carry and Schoefer 2024)* paper, which identifies drivers of conflict (such as hostility, punitive motivations, and court-related uncertainties) but lacks a unifying theoretical framework. Reinforcement learning (RL) and inverse reinforcement learning (IRL) methods will be used to test the model. Q-learning-based simulations will explore how strategic interactions evolve over time. IRL techniques will be used to infer unobserved preferences from observed behaviors to help address the question of understanding what preferences generate and drive dismissal conflicts. By combining insights from existing literature, experimental results, and a newly developed model, the project addresses both theoretical and empirical gaps in understanding conflict dynamics.

2. Literature Review

The model integrates insights from six core papers with each addressing different aspects of conflict in economic relationships. Additional research and papers will supplement these papers to explore why conflict in economic relationships occurs:

- **Conflict in Dismissals (Carry & Schoefer, 2024)**:
  - *Key Insight*: SMAs, which reduce costs and avoid litigation, are underutilized due to hostility, discipline motivations, and asymmetric beliefs.
  - *Limitation*: Empirical analysis lacks a cohesive theoretical framework. We can try to build one.
- **Relational Contracts and the Nature of Market Interactions (Brown et al., 2004)**:
  - *Key Insight*: Long-term relationships and fairness norms influence contract enforcement and conflict.
  - *Relevance*: Models the persistence of conflict even when efficient cooperation is feasible.
- **On the Determinants of Cooperation in Infinitely Repeated Games (Dal Bó & Fréchette, 2018)**:
  - *Key Insight*: Cooperation emerges when strategic uncertainty is minimized, and parameters support equilibrium.
  - *Relevance*: Highlights how asymmetric beliefs and monitoring imperfections can fuel conflict.
- **Worker Empowerment and Subjective Evaluation: On Building an Effective Conflict Culture (MacLeod et al., 2024)**:
  - *Key Insight*: Institutionalizing norms can make conflicts efficiency-enhancing but requires clear coordination mechanisms.

  - *Relevance*: Could suggest that failure to institutionalize norms might contribute to destructive conflict in SMAs.

- **Individual Q-Learning in Normal Form Games (Leslie & Collins, 2005)**:
  - *Key Insight*: Reinforcement learning agents adapt their strategies based on observed payoffs, but convergence to equilibrium depends on the structure of the game.
  - *Relevance*: Firms and workers may learn to escalate or avoid conflict based on past experiences.

- **IQ-Learn: Inverse soft-Q Learning for Imitation (Garg et al., 2022)**:
  - *Key Insight*: Given observed behavior, IRL infers the preferences driving those behaviors.
  - *Relevance*: Gives the foundation for this question: Can we infer what preferences firms and workers have based on observed behavior surrounding dismissal patterns?

3. Theoretical Model

The proposed model would formalize the decision-making process in labor market separations using a **single-period extensive-form game**. Here is a summary of the first version of the game:

A. Model Setup

- **Players**: Firm (F) and Worker (W).
- **Sequence of Moves**:
  - Firm chooses to Continue (C), propose SMA (S), or Dismiss (D).
  - If SMA is proposed, Worker chooses to Accept (A) or Reject (R).
  - If rejected, Firm can either Continue (C) or Dismiss (D).
  - If Dismissal occurs, Worker decides whether to Litigate (L) or Not Litigate (N).

B. Key Frictions

- **Hostility**: Players experience disutility from the opposing party's positive payoffs. Represented by parameters α_F (worker's hostility toward firm) and β_W (firm's hostility toward worker).
- **Asymmetric Beliefs**: Firm and Worker assign different probabilities (p_F and p_W) to the Worker winning in court, shrinking the bargaining set.
- **Discipline Incentives**: Firm derives additional utility (D) from taking a punitive stance, which influences its preference for dismissals over SMAs.

C. Subgame Perfect Equilibrium (SPE)

Derived using backward induction across four subgames:

- Worker's decision to litigate.
- Firm's choice after SMA rejection.
- Worker's decision to accept or reject SMA.
- Firm's initial choice between continuation, SMA, or dismissal.

D. Comparative Statics

- **Hostility**: Higher α_F or β_W reduces the bargaining space for SMAs, which can increase conflict.
- **Asymmetric Beliefs**: Diverging beliefs ($p_F \neq p_W$) lead to disagreement over severance, which could make conflict more likely.
- **Discipline Incentives**: Larger D tilts the firm's preference toward dismissals, even when SMAs are cost-saving.
- **Litigation Costs**: Higher costs (c_F, c_W) reduce the likelihood of litigation but do not eliminate conflict if hostility is high.

4. Computational Methods for Model Testing

A. Simulation and Parameter Sweeps

I will implement a computational framework to simulate the extensive-form game under various parameter configurations. By varying parameters like hostility (α_F, β_W), belief asymmetry (p_F, p_W), and discipline incentives (D), the project can identify regions in the parameter space where dismissals dominate SMAs or where conflict escalates. My approach will include:

- Showing how SMA adoption rates vary with hostility and belief asymmetry.
- Plots that quantify the marginal effects of each parameter on equilibrium outcomes.
- Illustrating how combinations of parameters drive the likelihood of litigation.

B. Agent-Based Modeling and Reinforcement Learning

Agent-based methods can be used to account for adaptive behaviors and dynamic interactions. Firms and workers act as agents with bounded rationality and learn optimal strategies over repeated interactions. Reinforcement learning algorithms (such as Q-learning) allow agents to explore and exploit strategies to maximize payoffs. Therefore, my approach could:

- Capture equilibria in multi-period settings.
- Test the theoretical model when players adapt or deviate from strict rationality.
- Incorporate organizational dynamics, such as how firms use punitive dismissals to signal discipline to other employees.

Additionally, using inverse reinforcement learning (IRL), the project can seek to infer firms' and workers' true preferences from observed dismissal behavior. Using the techniques from *IQ-Learn: Inverse soft-Q Learning for Imitation* as a foundation, my approach could:

- Infer the latent reward functions for the firm and the worker.
- Determine whether firms prioritize discipline, cost minimization, or litigation deterrence.
- Examine similar factors for the worker.

5. Deliverables

1. A written report that documents the question, methodology, and approach that will contain the following:

1. **Literature Review**: Synthesis of research on conflict in economic relationships.
2. **Game-Theoretic Model**: Full spec of the extensive-form game and equilibrium derivations.
3. **Computational Analysis**:
    - Parameter sweep simulations to verify analytical conclusions and explore conflict dynamics.
    - Agent-based modeling (using Q-learning and IRL) to test adaptive strategies in dynamic environments.
4. **Comparative Statics**: Exploration of how changes in parameters shift equilibria.
5. **Empirical Predictions and Policy Implications**: Hypotheses and recommendations for reducing conflict.
6. **Potential Extensions**: Multi-period models and applications to firm-worker negotiations or relational contracts.

2. All code files used for thesis research

6. Conclusion and Significance

This project provides a theoretical framework and computational methods to explain persistent conflict in labor markets and builds on the *Conflict in Dismissals* paper. By integrating hostility, discipline, and belief asymmetries, the model will move beyond simpler bargaining theories to reflect real-world frictions that exist in the labor market. Empirical predictions and computational insights through a series of machine-learning techniques will provide potential plans of action for policy interventions and organizational reforms.