Multidimensional Labor Conflict*

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Abstract

This paper studies labor conflict in collective bargaining when agreement clauses are multidimensional, and workers have heterogeneous preferences over wages and amenities. We develop a model of bargaining over bundles under two-sided incomplete information, where conflict arises as a war of attrition. The model predicts that conflict selects worker types whose preferences align with the disputed package. In the presence of internal uncertainty, unions choose packages that are robust to the distribution of preferences. Given the cost of a package, a symmetric distribution generally pushes toward balanced wage-amenity bundles. We study these predictions using administrative data from Chile. First, we leverage workers' votes on firms' offers to estimate how unions value wage and amenity clauses and document that, in feminized sectors, preferences are more symmetric across wage and amenity dimensions. Second, using an instrumental-variables research design and a revealed-preference approach to value collective bargaining agreements (CBAs), we show that conflict in feminized sectors shifts compensation toward amenities and raises the overall value of the CBA. In non-feminized sectors, by contrast, conflict primarily results in one-time resolution bonuses, with limited changes to the structure of the CBA.

Keywords: collective bargaining, labor conflict, amenities, gender.

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1 Introduction

Collective bargaining shapes employment relationships for a substantial share of the global workforce (Bhuller et al., 2022; Jäger et al., 2024). Yet most economic models of labor bargaining and conflict treat compensation as one-dimensional, focusing almost exclusively on wages (Kennan, 1986; Hart, 1989; Card, 1990b; Cramton and Tracy, 1992). This one-dimensional view is difficult to reconcile with two empirical regularities. First, collective bargaining agreements (CBAs) are multidimensional contracts that routinely combine wage terms with non-wage provisions that workers value (Freeman, 1981; Lagos, 2026; Arold et al., 2025). Second, there is growing evidence that workers have heterogeneous preferences over non-pecuniary job attributes and are willing to trade them off against pay (Mas and Pallais, 2017; Maestas et al., 2023; Humlum et al., 2025; Mas, 2025), with documented differences by gender (Wiswall and Zafar, 2017; Morchio and Moser, 2026).

In this paper, we study collective bargaining and labor conflict when negotiated CBAs are multidimensional, and workers have heterogeneous preferences over their components. We construct a model of multidimensional collective bargaining and empirically test its predictions. Collective bargaining is modeled as a menu-based negotiation that may escalate into a costly conflict: a war of attrition under two-sided incomplete information (Card, 1990a; Cramton and Tracy, 1992; Card and Olson, 1995). In this framework, we show that conflict not only changes compensation levels but also the composition of the bargained package across wages and non-wage amenities. In particular, conflict selects types whose preferences are aligned with the trade-offs of the package under dispute. Since the union chooses the package before knowing the type that will be pivotal in conflict, it chooses one that is robust to the distribution of possible preference types. When this distribution is symmetric, forces push toward a balanced package. To study these predictions, we turn to Chile, where linked administrative records on collective bargaining allow us to look into labor conflict, CBA composition, and worker voting behavior.

The empirical analysis has two parts. First, we use workers' voting behavior on firms' proposed CBAs to estimate a discrete-choice model of preferences over wage and non-wage amenity clauses, and document evidence of preference heterogeneity: unions in feminized sectors (e.g., health, education) place greater value on amenity provisions. Second, we estimate a 2SLS model that instruments labor conflict—strikes or Labor Directorate mediation—with the inflation accumulated between bargaining rounds of predetermined duration (Vroman, 1989; Card, 1990b; Cramton and Tracy, 1992; Biasi and Sarsons, 2022). In line with our theory, we find that conflict in feminized sectors shifts agreements toward amenity provisions and raises the overall value of CBAs, as measured by job-to-job transitions and clause content (Sorkin, 2018; Lagos, 2026). In contrast, conflict in non-feminized sectors only leads to end-of-conflict bonuses (i.e., one-time payments made upon resolution of the

dispute).

In the model, there is a firm and a continuum of workers represented by a single union. Bargaining occurs over a multidimensional CBA. Workers differ in their relative valuation of the agreement's components, and the union aggregates these heterogeneous preferences through an internal political process. We represent this process in reduced form by assuming that the union maximizes the utility of a worker type that becomes pivotal during conflict, which can be interpreted as the median member, the union leadership, or the outcome of internal participation and ratification procedures (Ross, 1948; Lipset et al., 1956; Farber, 1978; Levi et al., 2009). The firm offers a feasible menu of wage-amenity packages (i.e., an isocost), and the union proposes a single, alternative bundle. If the union rejects the firm's offer, a labor conflict follows, and conflict determines which of the two initial proposals is implemented.

A central insight of our theoretical framework is that conflict serves as a screening device over workers' preferences for wage-amenity trade-offs, a term we use throughout the rest of the paper to refer to trade-offs between the monetary and non-monetary clauses of collective bargaining agreements. The key observation is that, once conflict has begun, the gains from prevailing depend not only on the value of the package under dispute, but on how well its embedded wage-amenity trade-off aligns with the union's own preferences—as summarized by its marginal rate of substitution between the monetary and non-monetary components. This notion of alignment is compositional and relative to the contract under dispute: it captures whether the specific composition of a package resembles the workers' relative valuation of amenities. In particular, when the package is balanced, unions with stronger preferences for wages—whose preferences are less *aligned* with the package's trade-offs—are more likely to drop out earlier. The same occurs with unions that only care about amenities. Formally, union strength is generally non-monotone and single-peaked in workers' preferences, so conflict endogenously selects the types that prevail.

The package under dispute, which determines strength in the war-of-attrition phase, is chosen by the union before conflict unfolds. This choice is made under internal uncertainty: even though the union knows the distribution of workers' preferences, it does not know which type will be pivotal in labor conflict. The union, therefore, chooses a package that is robust across different realizations of the true pivotal type. More precisely, given a distribution of preference types, it selects the package that maximizes the expected alignment between the range of possible union types and the disputed package. If the distribution of preferences is symmetric and single-peaked, this implies choosing a package aligned with the center of the distribution or, in practice, a relatively balanced wage-amenity bundle.[1]

[1]These ideas extend naturally to single-peaked but asymmetric distributions of preferences. If the distribution of preferences is skewed toward stronger preferences for the monetary component of a compensation package, the union

Our model delivers direct empirical implications for bargaining outcomes. In a multidimensional setting, labor conflict does not operate solely through pressure generated by costly delay, but also by revealing which workers' preferences are willing to persist. Because bargaining strength depends on the alignment between workers' preferences and the disputed package, the model predicts that labor conflict can affect not only the level of compensation but also the composition of implemented CBAs. In particular, conflict should reallocate agreements toward the dimensions valued by the workers whose preferences are most likely to persist during the dispute.[2] The value of this reallocation should therefore be larger for unions that place greater weight on the dimensions expanded through conflict.

Our model adopts a partial-equilibrium perspective and studies collective bargaining and conflict taking outside options and labor market opportunities as given. From this perspective, we conceptualize labor conflict as a mechanism for adjusting compensation within continuing employment relationships. This interpretation aligns with the *exit versus voice* framework (Hirschman, 1972; Freeman and Medoff, 1984; Broccardo et al., 2022) and underscores that in the presence of mobility constraints, conflict may not only serve to exert pressure on firms but also to reallocate compensation across monetary and non-monetary dimensions, improving the value of ongoing employment relations; a mechanism that may be especially important for groups facing tighter mobility constraints, such as women (Robinson, 1933; Barth and Dale-Olsen, 2009; Webber, 2016; Sokolova and Sorensen, 2021; Sharma, 2023; Caldwell and Danieli, 2024).

We study the model's predictions in Chile, a middle-income OECD country with a decentralized system of labor relations and a well-regulated collective bargaining process. Bargaining in Chile occurs at the firm level, closely mirroring the decentralized structure of the United States, Canada, and several other countries (Bhuller et al., 2022; OECD, 2025). The process begins when the previous CBA expires and the firm presents its offer in response to the union's proposal. This offer initiates a 30-day direct bargaining period between the firm and the union. If no agreement has been reached by the end of this period, the employer submits a final offer that unionized workers vote to accept or reject. Rejection triggers *conflict*: mandatory mediation by the Labor Directorate and, if mediation fails, a strike. According to our records, roughly 83% of negotiations conclude without conflict.

To quantify workers' preferences for monetary and non-monetary clauses in the CBAs, we estimate a discrete-choice model leveraging voting records from the subset of bargaining episodes that

should choose a package that is relatively heavy on wage clauses and lighter on non-wage amenities.

[2] In the baseline model, workers only differ in their preferences over wage-amenity trade-offs. This contrasts with standard war of attrition models of strikes and conflict where heterogeneity comes from delay costs (Card and Olson, 1995; Alesina and Allan, 1991; Correa, 2025). Appendix B.1 extends our framework to allow for heterogeneity in workers' costs of sustaining conflict.

reach the ratification stage—that is, those in which no agreement was reached during the 30-day direct bargaining period. We model workers' votes in favor or against the firm's final offer using a logit specification which aggregates to the union level with a beta-binomial structure of approval counts that depend on the number of monetary and non-monetary clauses in the CBA.[3] We estimate the model via maximum likelihood and allow preferences to vary by whether the union operates in a feminized sector—those where the average female union membership exceeds the median. The estimated parameters reveal systematic preference heterogeneity, consistent with existing evidence on the differential trade-offs faced by men and women in the labor market (Goldin, 2021; Morchio and Moser, 2026; Corradini et al., 2025; Caldwell et al., 2025): unions operating in feminized sectors place significantly greater value on non-monetary clauses than their counterparts in male-dominated sectors. Since only around 20% of CBA clauses are non-monetary in our setting, we interpret the higher valuation of amenities as evidence of preferences for more balanced packages in feminized sectors.

With a characterization of workers' heterogeneous preferences in hand, we turn to the central question: how does conflict shape the collective bargaining agreement ultimately reached? A key empirical challenge is that conflict might be endogenous: unobserved union characteristics and local labor relations may jointly affect the propensity to enter conflict and the terms ultimately agreed upon. To address this, we implement an instrumental-variables strategy exploiting the timing of CBA expiration—as in Biasi and Sarsons (2022)—coupled with variation in the inflation accumulated over the life of the preceding collective agreement (Vroman, 1989; Card, 1990b; Cramton and Tracy, 1992). This interaction generates quasi-random variation in workers' exposure to real-wage erosion, and hence in pressure for labor conflict. Critically, once a contract is signed, its duration is predetermined, while inflation realized over that interval is outside the control of either party.[4]

We find that conflict significantly increases the total number of negotiated clauses and shifts their composition toward amenity provisions: the share of amenity clauses rises by roughly 22

[3] Following the literature on non-wage compensation (Akerlof and Kranton, 2005; Oyer and Schaefer, 2011; Lavetti, 2023; Arold et al., 2025), we group clauses into two categories. *Monetary clauses* comprise direct transfers of economic resources to the worker, including wage increases, allowances (meal, transport, seniority, school), production incentives, severance pay, health benefits, overtime pay. *Non-monetary clauses* capture improvements that do not involve direct payments but enhance working conditions, flexibility, or worker voice: work-life balance provisions (parental leave, special hours, work-family conciliation), worker protections (harassment, safety), human capital investments (training, performance evaluation), union rights and conflict resolution mechanisms, and gender equality measures (childcare, inequality correction plans).

[4] The identifying variation therefore stems from differences in the duration of CBAs interacted with aggregate price shocks (i.e., differences in macroeconomic luck across otherwise comparable bargaining episodes). The first stage confirms the relevance of the instrument: accumulated inflation is a strong and robust predictor of conflict. The first-stage estimates also reveal meaningful patterns in conflict propensity: unions with a higher female membership share and firms with greater unionization rates are more likely to escalate bargaining into conflict, while older unions are less likely to engage in conflict.

percentage points, nearly doubling the mean of 23%. These effects are mostly driven by unions in feminized sectors. To recover the value of the negotiated package, we adopt a revealed-preference approach based on job-to-job transitions to infer job values from mobility patterns (Sorkin, 2018); and following Lagos (2026), we project these onto indicators for negotiated clauses to recover the implied value of the final benefit package. We find that conflict in feminized sectors raises the overall value of the negotiated package by almost one standard deviation. In non-feminized sectors, by contrast, conflict leads to a significant increase in the likelihood of obtaining end-of-conflict bonuses but leaves the number of clauses, the amenity share, and the package value largely unchanged. Consistent with the model's predictions, these findings suggest that conflict reallocates compensation across different dimensions, depending on the workers' preferences. Finally, although the estimates are imprecise, we also document that conflict is associated with lower subsequent employment growth.

Our paper contributes to several strands of the literature. First, it enriches the literature on labor conflict and bargaining by introducing multidimensional payoffs. Since Hicks (1932), strikes have been modeled as inefficient holdouts generated by asymmetric information, with workers' gains typically summarized by potential wage increases (Ashenfelter and Johnson, 1969; Hayes, 1984; Fudenberg et al., 1984; Kennan, 1986; Hart, 1989; Card, 1990b). Dynamic signaling frameworks refine this view by emphasizing that unions reveal toughness through costly delay (Fudenberg and Tirole, 1986). More recent studies allow for richer bargaining protocols: using a mechanism design approach, Pęski (2022) shows that strike threats can replicate revelation mechanisms when direct communication is not feasible, while Pęski (2021) and Jackson et al. (2025) show how menus can improve efficiency by allowing players to screen private information. Recent empirical work on strike outcomes also largely focuses on wages (e.g., Massenkoff and Wilmers, 2024). Our work departs from the one-dimensional view of conflict by studying a contract space in which collective agreements bundle wages and amenities. To do this, we build on recent work on finite-horizon wars of attrition by Myatt (2025), and show that when the object is multidimensional, the mapping from workers' preferences into a one-dimensional notion of strength is non-monotone. In this framework, conflict affects not only the level of compensation but also its composition.

Second, our theory connects to classical questions in political economy about commitment and representation. The key forces driving our model (multidimensional platforms, internal heterogeneity, and commitment) are not exclusive to labor relations. They also arise in many political settings, where parties or interest groups commit to platforms before citizens' participation or fiscal conditions are observed, and such commitments are critical to the credibility of political parties and social movements (Alesina, 1988; Persson and Tabellini, 1994). In the presence of multidimensional policies, group strength depends not only on how intensely a group values a particular dimension,

but also on how robust the proposed package is to the heterogeneous preferences of group members. In this sense, conflict provides a channel through which some preferences become more represented in the resulting outcome: those that are more aligned with the package under dispute are the ones more willing to persist. This offers a rationale for representation in multidimensional environments, a logic that resonates with work on endogenous party moderation where commitment constraints shape policy outcomes (Levy, 2004). Our contribution is to apply this logic to a labor-bargaining environment and study the model's predictions empirically.

Third, we contribute to the literature studying the labor market effects of unions and collective bargaining institutions (Freeman and Medoff, 1984; Freeman and Katz, 1991; Farber et al., 2021; Martins, 2021; Card and Cardoso, 2022; Jäger et al., 2024), as well as their role in shaping the distribution of rents across workers, firms, and consumers (Lee and Mas, 2012; Dodini et al., 2023; Biasi and Sarsons, 2022; Angerhofer et al., 2026; Rubio, 2026; Green et al., 2026). Within this literature, a growing body of work highlights non-wage amenities as a distinct margin through which unions and bargaining shape worker welfare.[5] Close to our work, Lagos (2026) documents that stronger unions raise both wages and amenities and Corradini et al. (2025) show that female union leadership increases non-wage amenities without reducing wages or profits. We add to this literature by shifting attention from the direct effects of unions or bargaining institutions to the role of *labor conflict* within collective bargaining episodes, studying conflict as a practical mechanism through which bargaining power reshapes compensation bundles.

Finally, our paper contributes to a growing literature documenting systematic gender differences in the valuation of wage and non-wage job attributes (Mas and Pallais, 2017; Goldin, 2014; Goldin and Katz, 2011; Wiswall and Zafar, 2017; Burbano et al., 2024; Cullen et al., 2025; Caldwell et al., 2025; Campos et al., 2026). We add to this literature in two ways. First, we provide novel evidence on preference heterogeneity using union members' votes over firms' contract offers. Second, we show that these preferences matter for bargaining outcomes: labor conflict shifts wage-amenity bundles toward amenities and raises the value of agreements primarily in feminized sectors, where workers place greater weight on non-wage provisions.

The remainder of the paper is organized as follows. Section 2 develops the theoretical framework and derives its main empirical predictions. Section 3 describes the institutional setting, data, empirical strategy and results. Section 4 concludes.

[5] In line with the idea that compensation is not merely wages, Arold et al. (2025) use the text of collective bargaining agreements to measure worker rights and show that these rights behave like valuable non-wage amenities.

2 A Model of Multidimensional Labor Conflict

2.1 Environment and Information

A continuum of workers $i \in [0,1]$ is employed at firm f.[6] Each worker has smooth, strictly quasi-concave von Neumann-Morgenstern utility over a wage-amenity bundle (w, a), represented by $u(w, a; \gamma_i)$, increasing in both wages and amenities. Workers differ in their relative valuation of amenities, captured by a one-dimensional preference parameter $\gamma_i \in [\underline{\gamma}, \overline{\gamma}]$ that satisfies $\partial_\gamma\big(u_a/u_w\big) > 0$. That is, higher values of γ_i indicate a stronger preference for amenities relative to wages. Our leading example is the log-Cobb-Douglas utility,

$$u(w, a; \gamma_i) = (1 - \gamma_i)\log w + \gamma_i \log a; \qquad \gamma_i \in (0,1),$$

which is a common specification in models of amenities and compensating differentials (Rosen, 1986; Mas, 2025).

The distribution of preferences is given by $\gamma_i \sim F$, where F has full support on $[\underline{\gamma}, \overline{\gamma}]$ and is single-peaked with mode γ^*. We normalize the support of the preference distribution, so that we interpret the middle point, $\gamma_m = \frac{\underline{\gamma}+\overline{\gamma}}{2}$, as preferences for balanced bundles.

Workers are represented by a single union. The union's effective objective is represented by the utility of a worker type that is pivotal for sustaining conflict, $\gamma \sim F$. This summarizes internal preference aggregation within the union and can be interpreted as the preference of the union leadership, a median voter, or any other pivotal worker resulting from the aggregation of workers' preferences. Importantly, γ need not coincide with the mean or median of F, reflecting imperfect aggregation of heterogeneous worker preferences.[7]

The firm's rents are $r_f = \xi + \varepsilon_f$, where ξ is an industry component and ε_f is an idiosyncratic shock. Producing amenity level a costs $c(a)$ with $c' > 0$ and $c'' \geq 0$, and then total compensation costs are given by $C(w, a) = w + c(a)$. We define the operating surplus as $h_f(w, a; r_f) = r_f - C(w, a)$, with the firm's payoff represented by an increasing and weakly concave continuation-value $\pi_f(w, a; r_f)$. This concavity reflects financial and operational constraints, such as possible capacity

[6] In the baseline model, we hold employment fixed, so the bargaining object is the wage-amenity package workers receive rather than the number of workers employed.

[7] There is a long tradition of models that represent the union problem as the maximization of an objective function, usually a combination of wages and employment (Dunlop, 1944). A central issue is how to derive that objective from heterogeneous workers' preferences. One possible approach views the union as a political organization, with concerns for equity and fairness (Ross, 1948; Farber, 1986), and another one derives the objective from a median voter perspective (Blair and Crawford, 1984). We take a reduced-form approach, where the union maximizes the utility of a pivotal worker, which could be any type resulting from internal aggregation. Given that the object of conflict is multidimensional and workers' preferences are heterogeneous, the relevant aggregation problem concerns not only how much to demand, but how to trade off wages and amenities in this demand.

limits, commitments, etc.[8]

At the time of choosing offers, neither party knows their own payoff-relevant parameters fully. The union does not yet know with certainty the preference parameter γ that will be pivotal during conflict, reflecting imperfect internal aggregation. The firm is uncertain about its rents, and hence, about the opportunity cost of conceding to the union's proposal, as it depends on profitability shocks that are realized after bargaining begins. Moreover, even after these parameters are internally realized, each side remains only privately informed about its type, so bargaining takes place under two-sided incomplete information.[9]

A natural question is why the union does not simply disclose its preferences to the firm. The main caveat is that there may not be a single preference type to disclose before aggregation. Workers have heterogeneous preferences, and the payoff-relevant type is the type that becomes pivotal in conflict. It is, then, an outcome of preference aggregation. Moreover, even if the union could communicate its workers' preferences, this communication would affect the firm's beliefs about the union's preferences and its strength in conflict. Then, even if the union had the precise information, the decision to disclose it becomes strategic in its own right. For this reason, we model the union's preference type as privately realized before conflict, rather than fully disclosed.

2.2 Bargaining and Conflict

Bargaining takes place over the terms of a collective bargaining agreement (CBA), which is summarized in the model by a wage-amenity pair. The players make initial proposals that, if rejected, lead to costly conflict. In particular, the firm proposes a menu $M_f = \{(w, a) : w = f(a)\}$ representing a set of possible CBA terms, and the union proposes a single bundle $m_u = (w, a) \in \mathbb{R}^2_+$, which corresponds to its preferred CBA. The union decides whether to accept the firm's menu—in which case it chooses a feasible bundle, and the game ends—or to reject it, triggering labor conflict. Naturally, a necessary condition for conflict is that $m_u \notin M_f$, as otherwise the union would accept the firm's offer.

To study conflict, we take the firm's initial offer as given, and focus on how workers' heterogeneous preferences shape conflict outcomes. We assume the firm's menu corresponds to an isocost curve. This restriction captures the idea that the firm's standing menu is determined by the compensation budget it is willing to sustain, while bargaining remains multidimensional because the budget

[8]The concavity assumption captures the idea of higher marginal value of resources for firms closer to financial constraints. The corporate finance literature has supported this idea (Whited, 1992; Almeida et al., 2004).

[9]In the strike literature, private information about firm profitability or ability to endure conflict is the standard source of delay (Card, 1990a; Cramton and Tracy, 1992). This focus on the informational environment also connects to recent work showing that changes in what workers and firms know can reshape equilibrium bargaining power and compensation outcomes (Cullen and Pakzad-Hurson, 2023).

can be allocated across dimensions. Allowing fully arbitrary menus for the firm would introduce an additional menu-design problem, as the firm could shape the union's losing payoff differently across possible preference realizations. Assumption 1 formalizes this.

Assumption 1. *The firm chooses a compensation budget $\overline{C}$, which induces the feasible menu*

$$M_f(\overline{C}) = \left\{(w,a) \in \mathbb{R}^2_+ : C(w,a) = \overline{C}\right\}.$$

We model labor conflict as a continuous-time war of attrition with deadline $\overline{T}$. This structure follows a long tradition of modeling strikes as a costly delay generated by asymmetric information about each side's stakes or willingness to concede (Hayes, 1984; Card, 1990a; Cramton and Tracy, 1992; Card and Olson, 1995). Each side chooses a concession time $t \in [0, \overline{T}]$, possibly random. When a player concedes before $\overline{T}$, the opponent's standing offer is implemented; if the union concedes, it chooses its most preferred bundle in the set M_f, and if the firm concedes, m_u is implemented.[10] Thus, offers determine the set of feasible concessions during the war of attrition and, therefore, shape the continuation payoffs. If no side has conceded by $\overline{T}$, then there is an external resolution mechanism that selects the union proposal with probability λ, and the firm's proposal with probability $1-\lambda$. This parameter is exogenous, possibly capturing institutional resolution of conflict. While conflict continues, each player $j \in \{u, f\}$ incurs a flow cost $c_j > 0$, and then, when the game ends, players receive their payoffs net of accumulated delay costs.

We denote by F_j, $j \in \{f, u\}$, player $-j$'s beliefs about player j's type; i.e., the firm's beliefs about the union's preferences, and the union's beliefs about the firm's profits. Also, define $\mathcal{M}_u$ as the set of feasible packages for the union. In this game, a strategy for the union is composed of: (i) a bundle, $m_u \in \mathcal{M}_u$, (ii) a rejection decision, $\rho : [\underline{\gamma}, \overline{\gamma}] \to \{0, 1\}$, with $\rho(\gamma) = 1$ if the union type γ rejects the firm offer, and (iii) a distribution of stopping times, $G_u : [\underline{\gamma}, \overline{\gamma}] \times [0, \overline{T}] \to [0, 1]$, with $G_u(\gamma, t)$ continuously differentiable in both arguments, and weakly increasing in t. Analogously, a strategy for the firm is composed of a distribution of stopping times, $G_f : [\underline{r}, \overline{r}] \times [0, \overline{T}] \to [0, 1]$, with $G_f(r, t)$ continuously differentiable in both arguments, and weakly increasing in t.

The timing of the game is as follows:

1. The union and the firm make offers m_u, M_f, respectively, prior to observing their true types. We take the firm's menu as given in the main analysis.

2. The union and firm observe their own true types.

[10] Commitment is central to the mechanism of the model: it forces bargaining power to operate through persistence rather than by adjusting offers, allowing conflict to act as a selection device over types. This structure aligns naturally with the presence of institutional constraints or legal procedures that limit renegotiation once a conflict begins. In Appendix B.2 we show that allowing renegotiation gives the firm a greater opportunity to screen unions more effectively, but that, under some assumptions, our main selection mechanism still holds.

3. The union decides whether to accept the firm's offer; otherwise, labor conflict begins.

4. During conflict, players choose concession times under two-sided incomplete information.

We characterize equilibrium behavior conditional on the firm's menu, M_f. Allowing the firm to endogenously choose M_f requires solving a menu-design problem beyond the scope of the paper. Thus, given M_f, an equilibrium is given by a union proposal m_u, a rejection decision for the union, $\rho : [\underline{\gamma}, \overline{\gamma}] \to \{0, 1\}$, and concession strategies, G_u, G_f, such that:

(i) Given initial offers (m_u, M_f), the distributions of stopping times G_u, G_f are a Bayes-Nash equilibrium in the war of attrition.
(ii) For each γ, and given M_f, the union chooses $\rho(\gamma) = 1$ if expected payoff of labor conflict is weakly greater than $\max_{(w,a)\in M_f} u(w, a; \gamma)$.
(iii) The union's initial offer maximizes its payoffs given M_f.

We solve the game by backward induction. We begin by characterizing equilibrium behavior in the labor conflict stage, taking initial offers as given, and then analyze the choice of conflict and the union's initial offer.

2.3 Equilibrium in Labor Conflict

Given the initial offers and the realized types, we characterize equilibrium behavior during labor conflict. Conflict in our model is a war of attrition with two-sided private information, in which players' only decision is the concession time. However, unlike a one-dimensional model, in this multidimensional framework, it is not obvious how to rank preference types by their willingness to endure conflict. As workers' preferences change, both the value of the union's proposal and the firm's menu change, making it unclear which worker types should concede earlier. Despite this, we show that equilibrium behavior can be characterized by a one-dimensional notion of strength, capturing gains from winning conflict. This notion follows the logic of classic war of attrition models, where concession incentives depend on the payoff from winning versus conceding (Hendricks et al., 1988; Ponsati and Sákovics, 1995; Myatt, 2025). The novelty is that, on the union's side, strength is obtained from multidimensional preferences over wages and amenities.

2.3.1 Strength as Sufficient Statistic

Conditional on initial offers m_u and M_f, each player compares the payoff from winning conflict to the payoff of losing. For the union, the payoff of winning corresponds to the utility of the bundle m_u, and the payoff of losing corresponds to the utility of the most preferred bundle in the set M_f. Analogously, for the firm, winning and losing yield continuation payoffs conditional on (m_u, M_f).

Given that delay costs are additive, the payoff-relevant gain from waiting is the difference between the payoff from winning and the payoff from losing. Formally, we define a player's strength as the difference between their payoff from winning and losing,

$$s_j(\theta; m_u, M_f) = u^W_{j,\theta}(m_u, M_f) - u^L_{j,\theta}(m_u, M_f), \tag{1}$$

where $u^L_{j,\theta}(m_u, M_f)$ is the utility of player j with type θ—γ for the union and r for the firm—when losing, and $u^W_{j,\theta}(m_u, M_f)$ the payoff from winning. By Lemma 1, this measure encompasses all payoff-relevant information in the war of attrition.

Lemma 1. *In the war of attrition, given initial offers (m_u, M_f), a player's equilibrium strategy depends on its type only through its strength, $s_j(\theta; m_u, M_f)$.*

Lemma 1 shows that, conditional on (m_u, M_f), the conflict stage can be represented as a standard war of attrition with type indexed by strength. To ensure the existence of a unique equilibrium with monotone strategies, we impose a regularity condition on the distribution of strength. In particular, Assumption 2 requires the distribution of strength to be atomless and to place positive density in sufficiently high strength levels. This requirement, together with the finite deadline, ensures that sufficiently strong types will wait until the deadline, pinning down a unique equilibrium as in Myatt (2025).

Assumption 2. *Fix initial offers (m_u, M_f). For each player, $j \in \{u, f\}$, let H_j be the induced distribution of strength. We assume this distribution is atomless, has compact support, $[\underline{s}_j, \overline{s}_j]$, with $\underline{s}_j > 0$, and a continuous density strictly positive in the interior of the support. Moreover, the upper support is high relative to the deadline, i.e., $\overline{s}_j > \frac{\overline{T} c_j}{\lambda_j}$, where $\lambda_u = \lambda$ and $\lambda_f = 1 - \lambda$.*

Given Assumption 2, the war of attrition admits a unique equilibrium in monotone stopping strategies in which players with higher relative strength persist longer in conflict. In particular, for both the union and the firm, there is a positive probability that higher strength types do not concede before the deadline, and this pins down a unique equilibrium. In this equilibrium, at most one side concedes with some positive probability at time zero, and then both sides concede with probabilities that are monotone in their strengths, until a time when both of them stop simultaneously. For the ease of exposition, we omit the full equilibrium characterization in the main text. Proposition C.1 in Appendix C.3 formalizes these ideas. We now turn to our main question: how strength maps back to primitive types.

2.3.2 Mapping strength back to preferences

We now proceed to characterize equilibrium in terms of the model's primitive types: rents and preferences. For the firm, relative gains in conflict are monotone in its rents, and hence, the classic characterization of strategies monotone in primitive types holds. However, for the union, the mapping between preferences for wage-amenity trade-offs and relative gains from remaining in labor conflict is not trivial.

Given initial offers m_u and M_f, the union's winning payoff is given by $u(m_u;\gamma)$, i.e., its utility of implementing its proposed package. The losing payoff, on the other hand, is given by $u(m_L(\gamma);\gamma)$, where $m_L(\gamma)$ is the union's best choice from the set M_f, given its preferences γ, i.e.,

$$m_L(\gamma) = arg \max_{(w,a)\in M_f} u(w,a;\gamma).$$

Geometrically, given γ, the winning payoff is determined by the indifference curve that passes through the bundle m_u, and the losing payoff is given by the indifference curve tangent to the firm's menu, M_f. Then, the losing package is fully dependent on the union's preference parameter. If γ is smaller (and then the union puts a larger weight on wages), the losing package will be tilted toward higher wages and lower amenities. As γ grows larger, the optimal losing bundle moves along the menu frontier toward more amenity-intensive bundles.

We impose some additional structure on the payoff-relevant utility function. Since conflict is a war of attrition with additive costs, the difference between winning and losing payoffs matters, and then the scale matters. Then, we impose a single-crossing condition on the cardinal utility representation of the game. In particular, define the function

$$\psi(m,\gamma) = \frac{\partial u(m;\gamma)}{\partial \gamma},$$

which captures how sensitive utility is to changes in γ. We assume a single-crossing condition with respect to the preference parameter γ, which implies that changes in γ affect the utility of amenity-heavy bundles proportionally more.

Assumption 3. *For any two packages $m = (w,a)$ and $m' = (w',a')$ such that $\frac{a}{w} > \frac{a'}{w'}$, we have $\psi(m,\gamma) > \psi(m',\gamma)$ for all γ.*

Assumption 3 implies that worker types with higher γ value amenity-intensive packages more strongly in the payoff-relevant sense. This assumption is satisfied, for instance, by the log-Cobb-Douglas utility, as $\frac{\partial u(w,a;\gamma)}{\partial \gamma} = \log \frac{a}{w}$. In practice, it implies that an aggregate preference shift that increases the value of amenities (e.g., cultural or regulatory changes) benefits more those workers

whose job bundles contain more amenities relative to their wages.[11]

Given initial offers m_u and M_f, define the aligned type, $\hat{\gamma}(m_u)$ as the unique preference type such that $m_L(\hat{\gamma}(m_u))$ lies on the ray from the origin through m_u. Intuitively, this aligned type corresponds to the worker whose losing bundle has the same wage-amenity trade-off as the winning bundle. We show the union's strength is maximized exactly at $\hat{\gamma}(m_u)$.

Lemma 2. *Given initial offers, (m_u, M_f), the strength of a union $s_u(\gamma; m_u, M_f)$ is single-peaked in γ, and it attains its maximum at $\hat{\gamma}(m_u)$.*

Assumption 3 ensures a single-crossing ordering of utility differences across bundles as γ varies, which, in turn, implies single-peakedness of the union's relative strength.[12] Figure 1 illustrates this non-monotonicity. We illustrate the notion of strength by using the distance measured along the ray from the origin through the union's proposal m_u, between m_u and the point where this ray intersects the indifference curve tangent to the firm's menu. If the union's proposal m_u is balanced in terms of wages and amenities, types that prefer balanced menus—i.e., γ near $\hat{\gamma}(m_u)$—will be stronger in labor conflict (panel A). In contrast, types whose preferences are less aligned with the proposed package (panels B and C) derive smaller gains from enduring conflict.

Mapping these features back to our labor conflict game, the equilibrium leads to clear selection patterns. Types with relatively low strength concede early in conflict. That is, firms with higher profits and unions whose preference types are less aligned with the proposed menu concede early on. Conditional on remaining in conflict, both sides employ stopping times that are monotone in their strength. As conflict unfolds, the set of active union types becomes increasingly concentrated around the aligned type $\hat{\gamma}(m_u)$, which is therefore more likely to be decisive in determining the outcome of conflict.

2.4 Labor Conflict Decision

Given these equilibrium outcomes, when deciding whether to enter into conflict, the union compares the continuation value of conflict to immediate acceptance of the firm's menu. Let $V_u(\gamma; m_u, M_f)$ denote the union's equilibrium continuation payoff in the conflict stage for a union of type γ, given initial offers (m_u, M_f), net of expected delay costs and taking into account the terminal outcome if

[11] Examples include caregiving shocks that change the value of flexibility, health shocks that increase the value of workplace protections, or regulatory changes that possibly make amenities easier to enforce, such as more valuable and transparent complaint procedures.

[12] It is important to notice that Assumption 3 is a sufficient, but not necessary, condition for single-peakedness. In particular, the Cobb-Douglas utility function, in levels, does not satisfy the assumption, but it leads to single-peaked strength. However, the assumption allows us to characterize the aligned type geometrically, in terms of wage-amenity trade-offs, simplifying the package-choice characterization.

the deadline is reached. Also, let

$$\Delta_u(\gamma; m_u, M_f) := V_u(\gamma; m_u, M_f) - u(m_L(\gamma); \gamma)$$

be the union's net gain from entering conflict rather than immediately accepting the firm's menu. Then the union rejects the firm's offer if

$$\Delta_u(\gamma; m_u, M_f) \geq 0.$$

Lemma 3. *Fix initial offers (m_u, M_f), and suppose the conflict stage is played according to the equilibrium characterized by Proposition C.1. There exists a cutoff $\bar{s}(m_u, M_f)$ such that the union enters into conflict if and only if $s_u(\gamma; m_u, M_f) \geq \bar{s}(m_u, M_f)$.*

Package size and composition. Before moving to the union's package choice problem, it is important to distinguish between two margins of a union proposal. A package can be characterized by its overall size, or ambition level, and its composition. In particular, for a given package $m = (w, a)$, define $B(m) = C(w, a)$ as the size of the package, where $C(w, a) = w + c(a)$ is the cost of the package. Also, define $\alpha(m) = \frac{a}{w}$ as its amenity-intensity, capturing the composition.

Classic one-dimensional strike models focus on the first margin: how much rent is at stake. Our mechanism, instead, focuses on the composition. Holding fixed the overall ambition of a demand, changes in the package composition change the preference type that is most aligned with the package. As we show in the next section, internal uncertainty determines which composition is robust to the realized pivotal type.

2.5 Package Choice under Internal Uncertainty

In the previous section, we show conflict amplifies the influence of those types aligned with the proposed package. The union, then, will anticipate this selection, choosing a proposal that maximizes expected continuation value in conflict given the distribution of preference types, F.

Lemma 2, together with the fact that the continuation value is increasing in strength, implies that the union's expected payoff at the package choice stage depends on how the profile of strength induced by its offer aligns with the distribution of preferences.

Proposition 1. *Fix a firm menu M_f and suppose the conflict stage is played according to the equilibrium characterized above. For every feasible proposal m_u, $\Delta_u(\gamma; m_u, M_f)$ is single-peaked and attains a maximum at the aligned type $\hat{\gamma}(m_u)$. Therefore, under internal uncertainty, the union's*

ex-ante package-choice problem is

$$m_u^* \in \arg\max_{m_u \in \mathcal{M}_u} \int_{\underline{\gamma}}^{\overline{\gamma}} \max\{0, \Delta_u(\gamma; m_u, M_f)\}\, dF(\gamma).$$

This result implies that each feasible package induces a net-gain profile that centers around its aligned type. Then, the union prefers proposals for which the types for whom conflict yields the largest gains relative to acceptance are also the ones most likely to be realized.

Symmetric Benchmark. Proposition 1 implies that, holding fixed the cost of the union's proposal (i.e., the *ambition* level), a change in the composition of the package changes which worker types are most aligned with it. Internal uncertainty creates a force toward packages whose aligned type has more mass under the distribution F. When F is symmetric, this pushes toward packages that are balanced in their wage-amenity trade-offs, but the exact optimum depends on the full shape of the continuation-value profile.

To illustrate this, consider the log-Cobb-Douglas benchmark, with $u(w, a; \gamma) = (1-\gamma)\log w + \gamma \log a$, and suppose a linear cost function, $C(w, a) = w + c \cdot a$. For a union's proposal, $m_u = (w, a)$, fix $B_u = C(w, a)$, and let $x = \frac{c \cdot a}{B_u}$ be the share of the total cost that corresponds to amenities. Let $\overline{B}$ be the cost of the firm's menu M_f. Then, the strength of the union can be written as:

$$s_u(\gamma; x) = \log \frac{B_u}{\overline{B}} + \phi(\gamma, x), \tag{2}$$

where $\phi(\gamma, x) = \gamma \log \frac{x}{\gamma} + (1-\gamma)\log \frac{1-x}{1-\gamma}$. This means that strength can be decomposed into a size-advantage component and an alignment component. Fixing the first term (size or ambition of the package), it is direct to note that strength is maximized when $x = \gamma$. Hence, when F is symmetric, the alignment component favors packages whose wage-amenity trade-off is balanced around the center of the preference distribution.

2.6 Equilibrium: Conflict Selection and Package Choice

The following proposition characterizes equilibrium in the full game that occurs after the firm chooses the menu, summarizing the results from Lemmas 1-3 and Proposition 1.

Proposition 2. *Fix a menu for the firm, M_f, and suppose Assumptions 1-3 hold. Then:*

(i) For all m_u, the conflict stage admits a unique monotone equilibrium, in which each player's optimal strategies are monotone in strength: stronger types concede later.

(ii) For the union, strength is single-peaked and reaches its maximum at the aligned type $\hat{\gamma}(m_u)$.

(iii) The union chooses to enter conflict if and only if its strength satisfies $s_u(\gamma; m_u, M_f) \geq \bar{s}(m_u, M_f)$. *Then, conditional on conflict, relevant types' preferences are sufficiently aligned with the package under dispute.*

(iv) Anticipating this, the union chooses its proposal to maximize net gains from entering conflict under internal uncertainty:

$$m_u^* \in \arg\max_{m_u \in M_u} \int_{\underline{\gamma}}^{\overline{\gamma}} \max\{0, \Delta_u(\gamma; m_u, M_f)\}\, dF(\gamma).$$

A few remarks are in place. First, note that a package in our model combines two margins: the size of the package and its composition. We are isolating here the second one, but in practice, proposals could also be different in terms of generosity. Changing the composition changes the preference types for whom the proposal is most aligned, and internal uncertainty determines which composition is robust to the pivotal types. Modeling the choice of package size introduces an additional trade-off. Fixing a package's composition, increasing the size of the package creates a trade-off between the union's gain from winning and the firm's incentive to resist. This suggests a natural interaction between size and composition: packages that are aligned with the center of the distribution have broader support and may be able to sustain more ambitious packages. In contrast, packages that are more extreme in their composition attract a smaller mass of workers, lower support, and then could be more constrained in their demands.

Second, we take the firm's menu as given. This is consistent with the object of our empirical analysis, where we study how conflict selects among preference types conditional on the bargaining environment. If the firm chose its menu, it would face a trade-off between the likelihood of conflict and the costs of concessions. We abstract from this problem and, instead, study how, conditional on the firm's standing offer, workers' preferences shape conflict and the package choice.

2.7 Empirical Mapping and Model's Predictions

Preference Heterogeneity and Gender. Heterogeneity in preferences is a central primitive of the model. In our theoretical setting, workers differ in a preference parameter γ, and higher values of this parameter are associated with a greater valuation of amenities relative to wages.

In Section 3.3, we use data on workers' voting behavior on the firm's final offer to estimate a discrete-choice model of the valuation of monetary and non-monetary clauses in the CBAs. Our findings show substantive heterogeneity: unions in feminized sectors place greater value on amenity clauses relative to monetary clauses; a finding consistent with the existing literature documenting different trade-offs faced by men and women in the labor market (Goldin, 2021; Wiswall and Za-

far, 2017; Corradini et al., 2025; Morchio and Moser, 2026). Given that in our empirical setting, CBAs are intensive in monetary components, we interpret this evidence as indicating that unions in feminized sectors exhibit stronger preferences for more balanced compensation bundles.

The Composition of CBAs. Because of internal uncertainty and commitment, the union will choose a package that is *robust* to different possible realizations of the preference parameter. From Lemma 2, we know that the union's strength is single-peaked and attains its maximum when the type is aligned with the package. Then, as we show in Proposition 1, the union will choose a package that maximizes the likelihood that the pivotal type's preferences align with it. In other words, conflict moves CBAs toward the dimensions valued by the types selected through persistence. If the distribution of preferences is symmetric and centered around balanced CBAs, then this proposal is more likely to be balanced.

Prediction 1. *Labor conflict changes the composition of the final CBA toward the package valued by workers' types that are willing to persist. In the fixed-sized benchmark under symmetry, conflict moves the implemented CBA toward more balanced wage-amenity agreements.*

It is important to note that the symmetry of the distribution of preferences is a benchmark that we cannot identify with our data. However, it yields cleaner empirical predictions, enabling us to characterize the direction in which clauses should reallocate. The preference margin we can observe empirically, then, is not the shape of the preference distribution but the relative valuation between wage and amenity clauses.

In our data, negotiated CBAs are more intensive in monetary clauses (the amenity share is 23%), so when looking at movements toward balanced packages, we see an increase in the amenity share of the final agreement. We estimate the effect of labor conflict in the number of negotiated clauses and its composition in Section 3.4. Consistent with the model's predictions, our results show that conflict increases both the total number of clauses and the share of amenity clauses of the negotiated CBA in feminized sectors.

Heterogeneous Gains. Finally, welfare implications of labor conflict depend on the alignment between the reallocation of CBA components and the preference of relevant workers. In particular, gains arise when the clauses that increase with conflict align with the preferences selected through persistence. This follows from combining preference heterogeneity with the selection mechanism induced by labor conflict (Lemma 2) and the package-choice characterization (Proposition 1). Then, when conflict induces reallocations toward amenities, these should be more valued for unions that place greater value on them.

Prediction 2. *Gains from conflict should be higher when the induced reallocation moves CBAs closer to the package valued by the union. Then, unions that place greater value on amenities should*

benefit more from amenity-oriented reallocations, while those that place greater value on monetary components should benefit more from monetary clauses.

Empirically, we distinguish between unions operating in feminized and non-feminized sectors, which we define in terms of the share of female workers. In particular, we show in Section 3.4 that for unions operating in feminized sectors, labor conflict not only increases the number of clauses and the share of amenity clauses in the implemented CBAs, but also the value of these agreements. However, in non-feminized sectors, labor conflict affects only economic bonuses, and its effect on the value of CBAs is statistically insignificant. This suggests reallocations through conflict depend on workers' preferences, moving in different directions in feminized and non-feminized sectors.

3 Evidence of Chilean Collective Bargaining

3.1 Institutional Background

Labor relations in Chile are characterized as decentralized, aligning with countries such as the United States, Canada, Greece, Colombia and Mexico (Bhuller et al., 2022; OECD, 2025).[13] The Chilean system is built upon a set of rules and practices codified in national laws and based on longstanding traditions. From the early twentieth century to 1973, Chile progressively developed an institutional framework for collective bargaining. The Labor Code of 1931 and subsequent reforms during the 1940s and 1950s strengthened labor rights, including the extension of trade union jurisdiction in 1943 and the expansion of sectoral bargaining during the 1960s. This trajectory came to an abrupt halt in 1973, when the dictatorship imposed sweeping restrictions that fundamentally reshaped labor relations. Under a highly decentralized system called *Plan Laboral* (1979), collective bargaining was confined almost exclusively to the firm level, inter-firm coordination was largely prohibited, strike activity was tightly regulated, and union organization was fragmented, sharply reducing bargaining coverage. This transformation moved Chile away from a system that had resembled traditional European models and toward one closer to the United States. In the international context, where several European countries have been debating greater decentralization (Müller et al., 2020), Chile's experience may be particularly illustrative.

Following the return to democracy, successive reforms sought to partially rebalance bargaining power, most notably the 2015 labor reform (Ley N° 20.940). The reform strengthened unions by

[13] According to Ibsen and Keune (2018), collective bargaining systems can be classified into three types: centralized, decentralized organized, and decentralized disorganized. Centralized systems are characterized by negotiations at the national or sectoral level, covering large groups of workers. Decentralized organized systems allow business autonomy through a regulatory framework defined by sectoral agreements, while decentralized disorganized systems focus bargaining primarily at the firm level, with minimal higher-level coordination.

prohibiting the replacement of workers during strikes, regulating minimum services, modifying rules on union formation and dues, and expanding the scope for collective bargaining (including inter-firm unions under certain conditions). While these changes enhanced the effectiveness of strikes and the role of unions in negotiations, they did not alter the core architecture of the system: bargaining remains predominantly firm-level, coverage is limited, and higher-level coordination is minimal (Ahumada, 2023).

In Chile, collective bargaining is a well-structured process that begins with the union submitting a collective agreement proposal and the employer responding with its proposal within ten days. A 30-day direct bargaining period follows, during which the employer must present a final offer no later than seven days before its expiration. If no agreement has been reached, the firm's final offer is submitted to a vote by all unionized workers, who choose to accept or reject it. The voting process is overseen by the Labor Directorate and must be conducted before a minister of faith (Dirección del Trabajo, 2014), making clear that failed agreement leads to a formal, legally structured stage of "conflict" in the collective bargaining process. A key feature of the voting stage is that firms' final offers are typically anchored by the preceding collective agreement, because Chile's Labor Code makes the previous agreement the legally mandated bargaining floor. In practice, when direct bargaining fails, firms often revert to the attributes of the prior agreement, preserving room for concessions during mediation or strike resolution. Rejection of the firm's final offer—our proxy for labor conflict—triggers mandatory mediation by the Labor Directorate and, if mediation fails, workers may initiate a strike during which the employer is prohibited from replacing striking workers. According to our records, roughly 83% of negotiations conclude without conflict, and less than 5% involve a strike.

3.2 Data

Our analysis draws on a panel of collective bargaining episodes between 2017 and 2023, combining administrative records from multiple sources. The backbone is the universe of legal entities recorded by the Chilean Internal Revenue Service (SII), from which we retain firms with at least ten workers. These administrative records provide detailed information on firms' economic sector, location, number of workers, and sales brackets. Merged onto this firm-level panel are administrative records from the Dirección del Trabajo (DT), obtained via several Freedom of Information requests and covering the universe of active unions, collective bargaining processes, negotiated clauses, and final-offer ballots.[14] These records allow us to construct a panel of collective bargaining episodes for which we observe whether negotiations resulted in labor conflict—defined as the formal rejection of

[14]Labor Directorate records include union-firm links. When firm identifiers are missing, we recover matches through bargaining-process records that jointly identify unions and firms.

the firm's final offer—or were resolved without conflict.

We also observe the full benefits package negotiated in each collective agreement, characterized by 44 distinct contractual clauses. We group these clauses into two categories, following the literature on non-wage compensation (Akerlof and Kranton, 2005; Oyer and Schaefer, 2011; Lavetti, 2023) and recent work showing that worker-rights clauses in CBAs behave like economically valuable non-wage amenities (Arold et al., 2025). *Monetary clauses* comprise direct transfers of economic resources to the worker, including wage increases, allowances (meal, transport, seniority, school), production incentives, severance pay, health benefits, and overtime pay. *Non-monetary clauses* capture improvements that do not involve direct payments but enhance working conditions, flexibility, or worker voice: work-life balance provisions (parental leave, special hours, work-family conciliation), worker protections (harassment, safety), human capital investments (training, performance evaluation), union rights and conflict resolution mechanisms, and gender equality measures (childcare, inequality correction plans). Figure 2 characterizes the wage-amenity composition of CBAs by economic sector. In all sectors, we observe amenity clauses, representing around 23% of all CBA clauses. Some sectors—notably healthcare, education, and other service activities—display a relatively larger share of amenity clauses, consistent with the idea that non-pecuniary dimensions of compensation may be particularly salient in sectors with greater female union representation.[15] As an additional outcome, we also track *end-of-conflict bonuses*—one-time payments made to workers or distributed through the union upon resolution of a labor dispute—given their importance in the Chilean context where more than half of collective bargaining episodes involve these one-time payments.

To study the bargaining process within a well-defined organizational unit, we restrict the sample to firms with exactly one union, which account for 63% of all CBAs in our time frame (2017–2023). As shown in Appendix Table A1, single-union firms tend to be smaller (270 vs. 1,151 workers) and have less dense and younger unions (37% vs. 47% unionization rate; 14 vs. 28 years of seniority). At the same time, the two groups are broadly comparable along other dimensions: they are similarly distributed across economic sectors, have nearly identical shares of female union members (35% vs. 34%), and their CBAs do not differ significantly in the incidence of amenity clauses (0.23 vs. 0.24, $p = 0.11$) or conflict rates (27% vs. 25%, $p = 0.09$). By focusing on single-union firms, we abstract from potential strategic interactions across multiple unions within the same firm and can map observed voting and conflict outcomes directly to a single bargaining relationship, consistent with the bilateral firm-union structure of our theoretical model.

[15]Consistent with this pattern, Appendix Figure A1 presents a binscatter based on CBA-level data showing a positive relationship between the share of female union members and the share of amenity clauses in negotiated agreements.

To enrich our analysis, we draw on two additional data sources. First, we leverage an administrative employer-employee dataset known as REL (*Libro de Remuneraciones Electrónico*). This dataset has monthly observations between 2021 and 2025, and allows us to estimate the value of each job using workers' movements across firms, as in Sorkin (2018), which we then project onto the collective bargaining agreement clauses to derive the value of each CBA, following Lagos (2026). Second, we incorporate monthly inflation records from the Central Bank of Chile which help us to construct our instrumental variable for labor conflict.

3.3 Heterogeneous Preferences over CBA Clauses

To quantify whether unions value different components of the collective bargaining agreement differently, we estimate a discrete-choice model of workers' voting behavior. Our strategy exploits the subset of bargaining episodes that reach the ratification stage—that is, those in which direct bargaining fails and workers are called to vote on the firm's final offer. During each such episode, workers face a binary decision: approve or reject the firm's final offer.[16] Let θ_u denote the vector of wage and amenity clauses in the CBA offer proposed by the firm to the union u. For bargaining episodes that end in approval, θ_u corresponds to the attributes of the final package put to a vote. For episodes that escalate into conflict, θ_u corresponds to the attributes of the preceding collective agreement—the legally mandated bargaining floor in Chile, to which firms typically revert before entering mediation or a strike.[17] The latent utility of acceptance for worker i in union u is given by

$$U_{iu} = \theta_u'\beta + \varepsilon_{iu}, \tag{3}$$

where β is the utility impact of increasing the number of monetary and non-monetary clauses in θ_u. Assuming that unobserved preference heterogeneity ε_{iu} follows an Extreme Value Type-I distribution, the individual approval probability is given by

$$\Pr(V_{iu} = 1 \mid \theta_u) = \Lambda(\theta_u'\beta) = \frac{\exp(\theta_u'\beta)}{1 + \exp(\theta_u'\beta)}. \tag{4}$$

[16] Appendix Figure A2 presents the distribution of the share of votes in favor of approving the firm's final offer in feminized and non-feminized sectors. Consistent with the timing and nature of this voting instance, approval rates are low.

[17] This practice is consistent with the Chilean Labor Code, which establishes the previous collective agreement as the minimum offer the firm must guarantee during conflict. As confirmed in conversations with the Labor Directorate, human resources personnel, and union members, firms commonly revert to this floor when direct bargaining fails, preserving room to make concessions during subsequent mediation or strike resolution.

Since voting outcomes are observed only at the union level, we focus on the approval rate

$$\bar{V}_u = N_u^{-1} \sum_{i=1}^{N_u} V_{iu}, \tag{5}$$

where N_u denotes the number of votes cast in union u and V_{iu} is an indicator equal to one if worker i votes to approve the firm's offer. Conditional on the attributes of the offer, summarized by θ_u, individual approval decisions have mean probability $\Lambda(\theta_u'\beta)$. To allow for within-union dependence in approval decisions, we model the number of approvals using a beta-binomial specification. This specification accommodates over-dispersion relative to the binomial model, as may arise from common sentiments, peer effects, or other forms of correlated preferences among union members. Specifically,

$$N_u \bar{V}_u \sim \text{BetaBinomial}(N_u,\, p_u,\, \sigma)\,, \tag{6}$$

with

$$p_u = \Lambda\big(\theta_u'\beta\big)\,, \tag{7}$$

where p_u is the mean approval probability implied by the attributes of the firm's offer and σ is an over-dispersion parameter that allows approval decisions to be correlated within unions.[18] We estimate the model by maximum likelihood.

To characterize preference heterogeneity across sectors, we allow the coefficients on offer attributes to vary with whether the union belongs to a feminized sector. In practice, this amounts to interacting the attributes of the firm's offer with an indicator for feminized sectors to capture how the mapping between offer attributes and approval probabilities differs between feminized and non-feminized sectors. We classify a sector as feminized if the sector-level average share of female union members is above the median across sectors.

Table 1 reports beta-binomial estimates of the relationship between the attributes of the firm's offer and union approval decisions. The dependent variable is the number of votes in favor of the offer. The average approval rate is 0.2, reflecting that these votes occur only in bargaining episodes in which direct negotiations have broken down, and the firm's original offer has failed to secure agreement at the bargaining table. All specifications use a logit link and weight observations by union size. The bottom rows report the estimated over-dispersion parameter, σ, which is stable across panels and indicates meaningful over-dispersion in approval decisions relative to a binomial model. Because the model uses a logit link, the coefficients are interpreted as effects on the log-odds of approval in the mean equation; equivalently, $\exp(\hat{\beta}) - 1$ gives the proportional change in the odds

[18] As σ approaches zero, the model collapses to the binomial specification in which votes are conditionally independent within union.

of approval associated with a one-unit increase in the corresponding covariate.

Panel A presents pooled estimates. Both monetary and non-monetary clauses are positively associated with approval. When entered separately—columns (1) and (2)—the coefficient is 0.022 for monetary clauses and 0.032 for amenity clauses. As shown in column (3), when both types of clauses are included jointly, both remain positive and statistically significant, although the coefficients fall to 0.013 and 0.023, respectively. This pattern indicates that both dimensions of the package predict higher approval, with amenity clauses displaying a larger association with support for the firm's offer in the pooled sample. Column (4) shows that these patterns hold after controlling for union and firm seniority, as well as for indicators of the firm's sales bracket and province.

Panel B examines whether these preferences differ between feminized and non-feminized sectors. The estimates reveal substantial heterogeneity. In the fully interacted specification with controls presented in column (4), monetary clauses are positively associated with approval in non-feminized sectors, but this association is offset in feminized sectors. In contrast, amenity clauses are more positively associated with approval in feminized sectors. The baseline amenity coefficient is 0.019, and the interaction with feminized sectors is 0.024, implying a combined coefficient of 0.043 for unions in feminized sectors.[19]

In line with existing evidence on gender differences in the valuation of non-wage job attributes (Wiswall and Zafar, 2017; Morchio and Moser, 2026; Burbano et al., 2024; Caldwell et al., 2025; Campos et al., 2026), our results show that workers in feminized sectors place relatively greater weight on amenity provisions, while workers in non-feminized sectors respond more strongly to monetary clauses. Through the lens of our model, and given that Chilean CBAs are heavily weighted toward monetary components, this pattern can be interpreted as unions in feminized sectors facing a more symmetric distribution of preferences over the wage-amenity bundle.

3.4 The Impact of Conflict on Collective Bargaining Agreements

A key challenge in estimating the causal effect of labor conflict on bargaining outcomes is that conflict is endogenous: unobserved characteristics of the union or the firm-union relationship, such as the history of labor relations, may simultaneously influence the propensity to enter conflict and the content of the resulting collective bargaining agreement. To address this, we implement an instrumental-variables strategy that exploits quasi-experimental variation in the timing of CBA expiration—as in Biasi and Sarsons (2022)—interacted with the inflation accumulated over the life of the preceding collective agreement.

[19] Expressed on the probability scale, the corresponding average marginal effects from column (4) show that, in feminized sectors, an additional amenity clause increases the predicted approval probability by 0.72 percentage points, while the marginal effect of an additional economic clause is close to zero and statistically insignificant.

The intuition behind the instrument is that higher accumulated inflation erodes the real value of the package negotiated in the prior agreement, fueling worker dissatisfaction and raising the probability of escalation into conflict (Vroman, 1989; Card, 1990a; Cramton and Tracy, 1992). Critically, once a contract is signed its duration is predetermined, while the inflation realized over that interval is outside the control of either party. The identifying variation therefore stems from the interaction between predetermined contract timing and aggregate price dynamics—in other words, from differences in macroeconomic luck across otherwise comparable bargaining episodes. Appendix Figure A3 illustrates the source of identifying variation by plotting accumulated inflation against the number of months elapsed between bargaining episodes. Two features of the data are worth noting. First, accumulated inflation is relatively high on average, reflecting the macroeconomic environment of our sample period: Chile experienced record inflation in 2022–2023, which pushed accumulated price growth well above historical norms for many bargaining episodes. Second, there is substantial dispersion in accumulated inflation conditional on contract duration. This within-duration variation arises because unions bargain at different calendar times: two unions whose contracts span the same number of months may face very different inflation outcomes depending on when their agreement was signed.

Formally, we estimate the following two-stage least squares (2SLS) system:

$$\begin{aligned} Y_{it} &= \alpha + \beta\, \widehat{\text{Labor Conflict}}_{it} + \tau X_{it} + \nu_t + \varepsilon_{it} \\ \text{Labor Conflict}_{it} &= \pi_0 + \pi_1\, \text{Z}_{it} + \pi_2 X_{it} + \gamma_t + u_{it}, \end{aligned} \tag{8}$$

where Y_{it} is an outcome of the collective bargaining agreement negotiated by firm i in bargaining period t (e.g., share of amenity clauses), Z_{it} is the inflation accumulated since the signing of the firm's preceding collective agreement, and $\widehat{\text{Labor Conflict}}_{it}$ is the fitted value of the conflict indicator from the first stage. The vector of controls X_{it} includes the share of female workers in the union, the share of unionized workers in the firm, union seniority, and firm seniority. Importantly, all specifications include the lagged dependent variable. This helps address identification concerns by absorbing persistent differences across bargaining relationships in the generosity and composition of negotiated packages. It also ensures that our estimates capture the effect of conflict on changes relative to the prior agreement, rather than the mechanical persistence of package characteristics across bargaining rounds. We also include period, province, and sales bracket fixed effects in all specifications to absorb aggregate macroeconomic fluctuations, regional labor market conditions, and firm size heterogeneity respectively. The parameter of interest is β, which captures the impact of labor conflict—rejection of the firm's final offer that triggers mandatory mediation by the Labor Directorate or, if mediation fails, a strike—on the characteristics of the collective bargaining agreement.

Appendix Table A2 reports the first-stage estimates. Accumulated inflation is a strong and robust predictor of conflict across all specifications. Beyond the instrument relevance, the first-stage estimates also reveal meaningful patterns in conflict propensity more broadly: unions with a higher female membership share and firms with greater unionization rates are more likely to escalate bargaining into conflict, while older unions, which may have accumulated better knowledge of their workers' preferences and of firm behavior, are less likely to do so.[20]

Impact of Conflict on Bargaining Outcomes. Columns (1) to (3) of Table 2 present the 2SLS estimates of the effect of labor conflict on the total number of negotiated clauses, the share of amenity clauses, and an indicator for whether an end-of-conflict bargaining bonus was granted to the workers or to the union. The means of the dependent variables—8.5 total clauses, an amenity share of 23%, and a bonus incidence of around 52%—provide useful benchmark.[21]

Column (1) shows that labor conflict leads to a large and statistically significant expansion of the negotiated package: conflict increases the total number of clauses by 5.5, relative to a mean of 8.5, an increase of roughly 64%. Column (2) reveals that this expansion in contract provisions is strongly tilted toward amenity clauses. Labor conflict raises the amenity share by 21.9 percentage points, nearly doubling the sample mean of 23%. This compositional shift confirms that conflict reshapes the structure of compensation packages in ways that go beyond a simple scaling up of existing terms: it reallocates bargaining gains toward non-monetary provisions covering work-life balance, worker protections, human capital investments, and gender equality measures. Finally, column (3) shows that conflict also raises the probability of receiving an end-of-conflict bargaining bonus by 82.5 percentage points—a large and statistically significant effect that reflects the importance of one-time settlements after conflict in the Chilean context.

To quantify how the negotiated package translates into worker welfare, we employ a revealed-preference approach based on job-to-job transitions, following Sorkin (2018) and Lagos (2026). The core idea is that workers systematically sort toward firms offering higher utility, and thus the direction and magnitude of job flows embed information about the relative value workers assign to different employers. This approach adapts the *PageRank* algorithm to infer firm-specific attractiveness from observed mobility patterns within the strongly connected component of the mobility network.[22] We leverage employer-employee records from the labor directorate (REL, *Libro de Re-*

[20] For the interested reader, Appendix Table A3 characterizes the complier population (Abadie, 2002, 2003). Compliers—bargaining episodes whose conflict outcome is shifted by accumulated inflation—are associated with older firms and unions, lower female membership within the union, and a higher probability of operating in feminized sectors relative to the average episode in the sample. They also tend to have lower prior amenity shares and higher values of the previous CBA.

[21] As a reference, Appendix Table A4 reports the results obtained from an OLS approach.

[22] See Sorkin (2018) for identification and computational details, and Lagos (2026) for an application to CBA

muneraciones Electrónico), for the 2021-2025 period, to estimate firm-level job values ϕ_j, which we standardize and project onto the specific provisions of each CBA:

$$\phi_j = \alpha + \sum_{z=1}^{Z} \beta^z A_j^z + \mu_j, \tag{9}$$

where A_j^z is a vector of dummy variables indicating whether clause z was part of the CBA of firm j, and β^z captures the marginal contribution of each clause to job value.[23] This regression provides a direct utility measure of workers' revealed valuation for each type of clause, which we then aggregate as $\hat{\phi}_j = \sum_{z=1}^{Z} \hat{\beta}^z A_j^z$ to construct the "Value of CBA". [24] As shown by column (4) of Table 2, we find that conflict has no significant effect on the "Value of CBAs".

Finally, we study the impact of conflict on employment. Because firm-level employment records from the Chilean Internal Revenue Service are available only at the annual level, we estimate the effect of conflict on average log total employment after the bargaining episode, controlling for log employment in the year of bargaining. Column (5) of Table 2 shows that conflict is associated with a decline in employment, although the estimate is imprecise ($p = 0.2$).[25] Since the coefficient on baseline employment is close to one, this estimate suggests that firms experiencing labor conflict exhibit 8% lower employment *growth* after bargaining. The negative sign is consistent with the broader strike literature, which views strikes and holdouts as costly bargaining devices (Cramton and Tracy, 1992; Cramton et al., 1999), and with models in which higher negotiated compensation can lead firms to ration jobs (McDonald and Solow, 1981; Card, 1990c; Angerhofer et al., 2026). However, the lack of statistical significance is also consistent with conflict activating voice-type channels, such as improved workplace relations, lower turnover, or higher productivity (Freeman and Medoff, 1984), which may partly offset the negative employment effects of costly delay and higher negotiated compensation.

Heterogeneous Effects by Sector Feminization. Our theoretical framework (Prediction 2 in Section 2.7) predicts that the welfare gains from conflict should be largest among unions whose workers place greater value on amenity provisions relative to wages—precisely the unions in feminized sectors, as documented in subsection 3.3. Table 3 investigates this prediction by estimating

clauses. A good discussion of the limitations of this approach is presented in Mas (2025).

[23] Since CBAs in Chile cover only unionized workers and do not automatically extend to all employees, we restrict this sample to firms where the CBA was verifiably extended to all workers. We end up with 788 observations, representing 52% of the firms for which we have an estimated value of the job ϕ_j.

[24] Appendix Figure A4 plots the distribution of the "Value of CBAs" in bargaining episodes with and without conflict.

[25] Because this specification uses post-bargaining employment, we lose a small number of observations corresponding to bargaining episodes that occur near the end of our sample window.

the 2SLS model separately for firms in feminized and non-feminized sectors.[26]

The results in Panel (a) confirm that conflict in feminized sectors produces large and statistically significant gains across multiple dimensions. The total number of clauses increases by 7.6 (column 1), the amenity share rises by 36 percentage points (column 2), and the value of the negotiated package increases by almost 1 standard deviation (column 4)—a large, statistically significant effect. Together, these estimates indicate that, in feminized sectors, conflict not only expands the scope of bargaining and shifts its composition toward amenities, but also increases the value of the employment relationships. However, these gains appear to come with some adjustment along the employment margin: conflict in feminized sectors is associated with a 13% decline in employment growth, although the estimate is only marginally significant ($p = 0.10$).

Panel (b) presents a strikingly different picture for non-feminized sectors. None of the effects on total clauses, amenity share, or package value is statistically significant. The only precisely estimated effect is on bargaining bonuses (column 3), which increase significantly, suggesting that in non-feminized sectors conflict primarily operates through the channel of extracting one-time monetary transfers rather than reshaping the long-run clauses governing labor relationships. The point estimates on clause counts and amenity shares are small and close to zero, consistent with the view that conflict in these sectors is driven less by preferences for non-monetary compensation and more by disagreements over wages or one-time payments. The employment effect is also small and statistically insignificant: conflict is associated with a 5.6% decline in employment growth, but the estimate is imprecise and far from conventional significance levels.

This contrast between feminized and non-feminized sectors—large amenity and welfare gains in the former, concentrated bonus effects in the latter—aligns well with the predictions of our model. When the distribution of worker preferences is centered on more balanced wage-amenity trade-offs, conflict selects the preference types most aligned with a balanced wage-amenity bundle, and the resolution of conflict implements packages that are more valuable to those workers.

Taking stock. The empirical analysis provides evidence on three margins that speak to our theoretical model. First, consistent with the model's premise that unions differ in the relative weight they place on different components of compensation, the voting estimates indicate systematic heterogeneity in the valuation of contract attributes. In particular, amenity clauses are more strongly associated with approval of the firm's offer in feminized sectors, while monetary clauses play a comparatively larger role in non-feminized sectors.

Second, the IV estimates show that labor conflict affects not only the size of the negotiated package, but also its composition. Conflict increases the total number of clauses and raises the

[26] As a reference, Appendix Table A5 reports the results obtained from an OLS approach.

share of amenity provisions in the final agreement. Since collective agreements in the sample are, on average, more intensive in monetary than amenity clauses, this compositional change corresponds to a movement toward more balanced wage–amenity bundles. This result is consistent with Prediction 1, which suggests that, in a multidimensional setting, conflict can alter the composition of compensation rather than simply increasing transfers along a single dimension.

Third, the heterogeneous effects by sector feminization suggest that the consequences of conflict depend on the underlying distribution of preferences. In feminized sectors, where the voting estimates indicate a higher relative valuation of amenities, conflict increases the number of clauses, shifts agreements toward amenities, and raises the revealed value of the CBA. In non-feminized sectors, by contrast, the effects are concentrated on one-time bargaining bonuses, with limited evidence of changes in the long-run structure of compensation or revealed value of the agreement. These differences are consistent with Prediction 2 and the model's selection mechanism: when persistence in conflict depends on the alignment between preferences and the package under dispute, conflict should have larger effects on the value of the agreement when the negotiated dimensions correspond more closely to workers' preferences.

4 Conclusion

Labor conflict has traditionally been studied as a fight over a single dimension: wages or rents. This paper argues that this one-dimensional lens misses a central feature of modern collective bargaining—compensation is multidimensional, and workers hold heterogeneous preferences over wages and amenities. When conflict unfolds in this richer environment, it does more than shift the level of compensation: it reshapes its composition.

We develop a model of multidimensional bargaining in which conflict arises as a war of attrition under two-sided incomplete information. The model's main insight is that union strength in conflict is not monotone in preferences: unions whose wage-amenity preferences are aligned with the package under dispute are stronger and more likely to prevail. Since the union chooses its proposed package before knowing which worker type will be pivotal, it selects a package that is robust across preference realizations—one aligned with the center of the distribution. Fixing the cost of the package, a symmetric distribution of preferences implies a balanced wage-amenity bundle, and conflict selects the types most aligned with that balance.

We test these predictions using administrative records from Chile and an instrumental variables strategy that exploits quasi-exogenous variation in accumulated inflation over the life of preceding collective agreements. The empirical results are consistent with the theory. Conflict significantly expands the number of negotiated clauses and shifts their composition toward amenity

provisions. These effects are concentrated in feminized sectors, where unions place greater value on non-monetary compensation, as revealed by our discrete-choice estimates of preferences from voting behavior. In those sectors, conflict also raises the overall value of the negotiated package—as measured through a revealed-preference approach based on job-to-job transitions—by a large and statistically significant margin. These gains, however, appear to come with suggestive evidence of adjustment on the employment margin: in feminized sectors, conflict is associated with lower post-bargaining employment growth, although the estimate is imprecise. In non-feminized sectors, by contrast, conflict primarily extracts one-time monetary transfers without reshaping the long-run structure of compensation.

Taken together, our findings recast labor conflict as a preference-revealing and potentially welfare-improving mechanism, not merely a costly breakdown in negotiations. Viewed through the lens of *exit versus voice* (Freeman and Medoff, 1984), conflict provides workers—particularly those with limited mobility—a channel to improve their employment conditions without changing jobs. This may be especially consequential for women whose relatively stronger preferences for non-wage amenities are less likely to be satisfied through voluntary sorting alone insofar as they face tighter mobility constraints in the labor market (Robinson, 1933; Barth and Dale-Olsen, 2009; Sharma, 2023; Caldwell and Danieli, 2024). How conflict interacts with sorting mechanisms over longer time horizons—and whether voice and exit operate as complements or substitutes in shaping labor market outcomes—remains an important avenue for future research.

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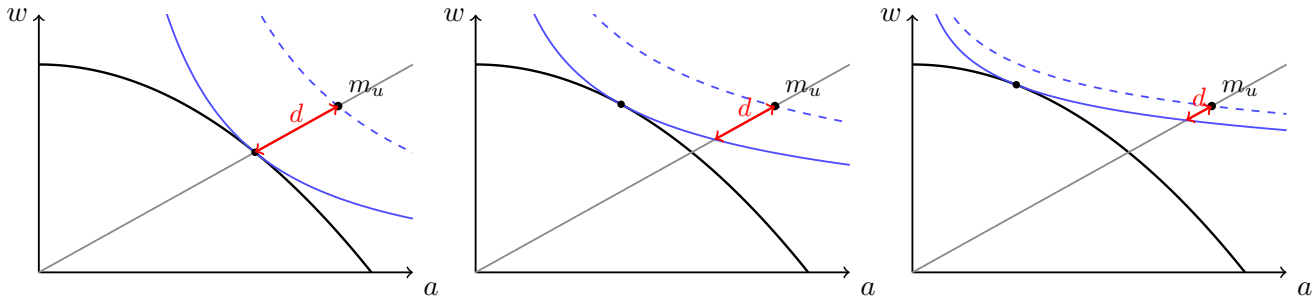
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5 Figures and Tables

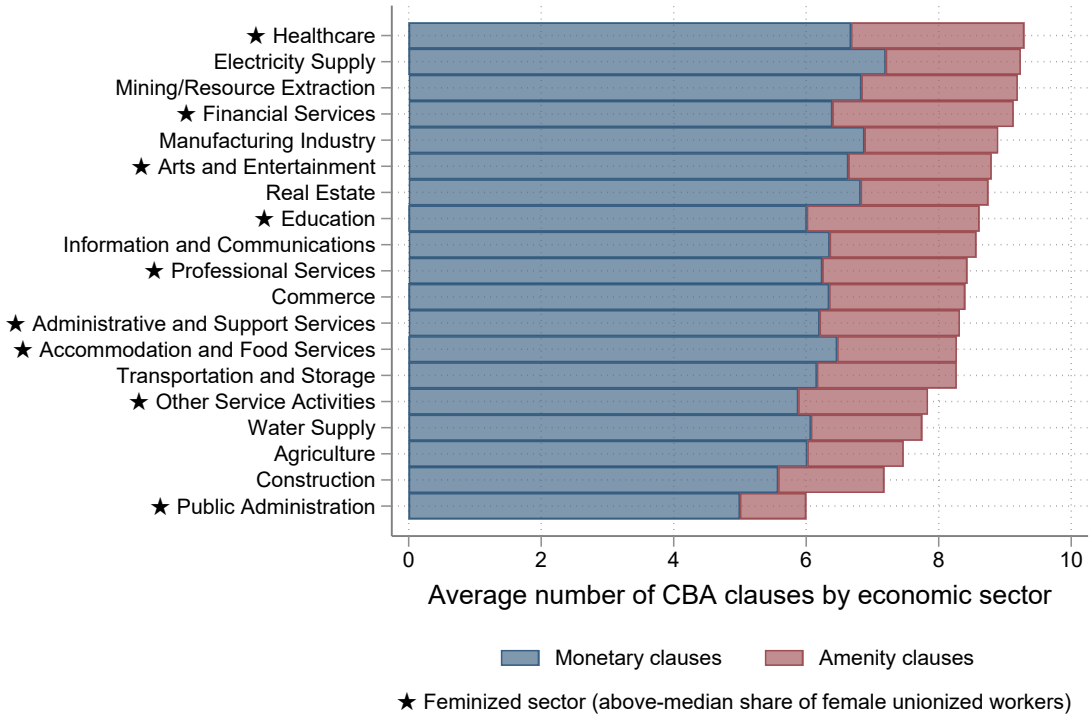
Figure 1: Illustration of the union's strength in a multidimensional contract space



Panel A: High strength Panel B: Intermediate strength Panel C: Low strength

Notes: Each panel shows the firm menu frontier M_f, the union proposal m_u, a tangent indifference line (solid), and a parallel indifference line through m_u (dashed). The distance d summarizes the union's relative gain from winning versus losing, which corresponds to the notion of strength. Indifference curves are drawn linear for simplicity.

Figure 2: Collective bargaining clauses by sector



Notes: This figure shows the average number of monetary and amenity clauses obtained per collective bargaining agreement (CBA) by industry, for the period 2017–2023. Monetary clauses include monetary transfers such as bonuses, allowances, and incentives. Amenity clauses include non-monetary benefits such as work-life balance arrangements, worker protections, human capital investment, and gender equality measures. Industries are sorted by total number of clauses. Star symbol denotes feminized sectors, defined as industries with an above-median share of female unionized workers.

Table 1: Predicted Package Approval

	Number of Approval Votes			
	(1)	(2)	(3)	(4)
	Panel A: Pooled Estimates			
N° Monetary Clauses	0.022***		0.013***	0.009***
	(0.002)		(0.002)	(0.003)
N° Amenity Clauses		0.032***	0.023***	0.045***
		(0.003)	(0.003)	(0.003)
	Panel B: Heterogeneity by Feminized Sector			
N° Monetary Clauses	0.022***		0.026***	0.035***
	(0.003)		(0.004)	(0.004)
N° Monetary Clauses × Feminized Sector	0.001		-0.020***	-0.035***
	(0.004)		(0.005)	(0.005)
N° Amenity Clauses		0.007*	-0.011**	0.019***
		(0.004)	(0.005)	(0.005)
N° Amenity Clauses × Feminized Sector		0.044***	0.057***	0.024***
		(0.006)	(0.007)	(0.007)
Feminized Sector	0.176***	0.064***	0.163***	0.433***
	(0.029)	(0.017)	(0.029)	(0.030)
Observations	631	631	631	631
Panel (a): Sigma	0.435	0.435	0.435	0.320
Panel (b): Sigma	0.434	0.434	0.434	0.316
Controls	No	No	No	Yes

Note: This table reports beta-binomial estimates of the relationship between the attributes of the firm's final offer (before conflict) and the number of votes in favor of approval. Panel A reports pooled estimates. Panel B allows the coefficients on monetary and amenity clauses to vary with whether the union operates in a feminized sector. A sector is classified as feminized if its average female union membership share exceeds the median. Controls include union and firm seniority as well as indicators for firm's sales bracket and province. All specifications use a logit link and are weighted by union size. Coefficients are expressed in log-odds units; equivalently, $\exp(\hat{\beta}) - 1$ gives the proportional change in the odds of approval associated with a one-unit increase in the corresponding covariate. The average approval rate is 0.2. Robust standard errors clustered at the firm level. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: Impact of Conflict

	Number of Clauses	% Amenity Clauses	Bargaining Bonus	Value of Package	Log Total Employment
	(1)	(2)	(3)	(4)	(5)
Conflict	5.451**	0.219**	0.825**	0.294	-0.082
	(2.463)	(0.111)	(0.411)	(0.195)	(0.066)
% Female workers in the union	-0.233	0.050**	-0.106	0.076**	0.021
	(0.394)	(0.019)	(0.075)	(0.034)	(0.019)
% Unionized workers in the firm	1.469**	0.008	0.035	-0.029	0.024
	(0.651)	(0.024)	(0.100)	(0.043)	(0.029)
Union Seniority	0.037***	0.001	0.002	0.002**	-0.000
	(0.013)	(0.000)	(0.002)	(0.001)	(0.000)
Firm Seniority	-0.003	-0.001	-0.003	-0.001	0.000
	(0.016)	(0.001)	(0.003)	(0.001)	(0.001)
Lagged Dep. Variable	0.442***	0.375***	0.326***	0.294***	1.006***
	(0.053)	(0.033)	(0.033)	(0.035)	(0.008)
Mean Dep. Var	8.508	0.232	0.518	0.120	4.930
F-stat	16.89	15.86	16.52	16.29	14.50
AR p-value	0.019	0.038	0.015	0.139	0.193
Observations	2,331	2,331	2,331	2,331	2,295

Note: This table reports two-stage least squares estimates of the effect of labor conflict on collective bargaining outcomes. The instrument is accumulated inflation over the life of the preceding collective agreement. The dependent variables are: the total number of negotiated clauses in column (1), the share of amenity clauses in the negotiated package in column (2), an indicator for whether an end-of-conflict bonus was granted in column (3), the value of the negotiated package recovered from a revealed-preference approach based on job-to-job transitions in column (4), and log total employment in column (5). All specifications control for the share of female workers in the union, the share of unionized workers in the firm, union and firm seniority, and the lagged dependent variable. Results are weighted by the share of unionized workers in the firm. All regressions include period, province, and sales bracket fixed effects. The F-statistic refers to the first-stage Cragg-Donald statistic. AR p-value refers to the Anderson-Rubin test of the null that the coefficient on the endogenous variable is zero, which is robust to weak instruments. Robust standard errors clustered at the firm level in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

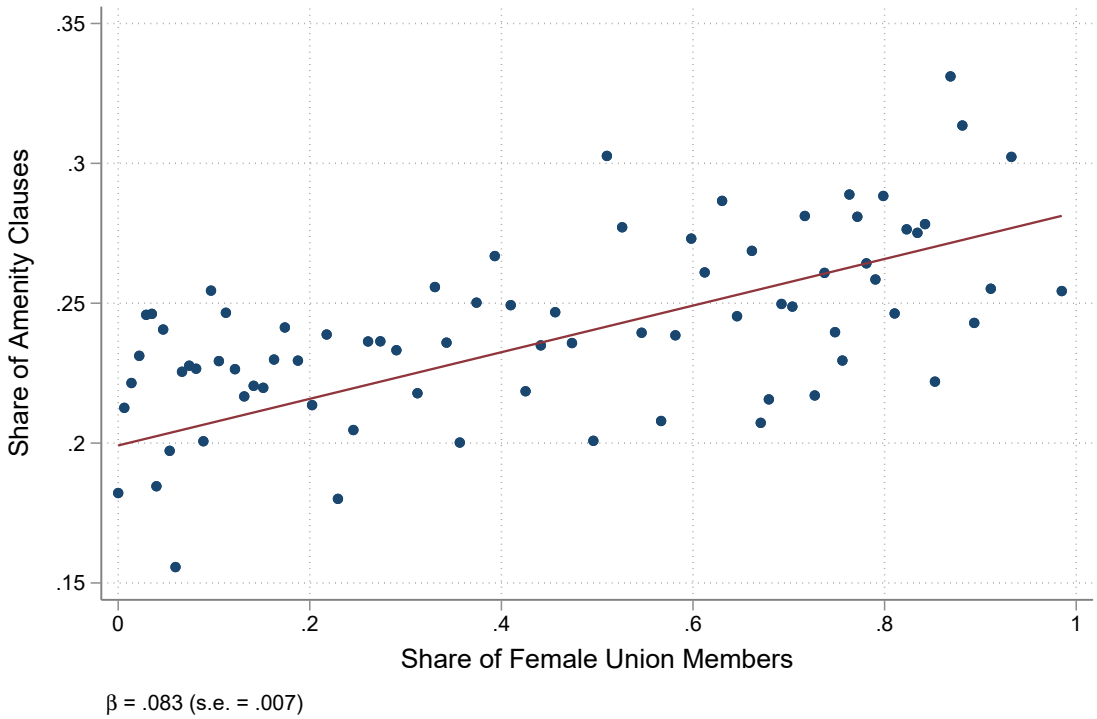
Table 3: Heterogeneous Impacts of Conflict

	Number of Clauses	% Amenity Clauses	Bargaining Bonus	Value of Package	Log Total Employment
	(1)	(2)	(3)	(4)	(5)
	Panel A: Firms in Feminized Sectors				
Conflict	7.644**	0.360**	0.675	0.923***	-0.137
	(3.016)	(0.162)	(0.499)	(0.332)	(0.084)
Mean Dep. Var	8.559	0.260	0.502	0.168	4.981
F-stat	7.066	6.682	7.573	6.684	6.062
AR p-value	0.001	0.013	0.083	0.001	0.064
Observations	961	961	961	961	945
	Panel B: Firms in Non-Feminized Sectors				
Conflict	1.707	0.0587	1.439***	-0.390	-0.056
	(3.407)	(0.141)	(0.532)	(0.327)	(0.115)
Mean Dep. Var	8.489	0.212	0.529	0.086	4.893
F-stat	9.231	9.429	9.390	9.742	8.264
AR p-value	0.618	0.680	0.002	0.170	0.616
Observations	1,360	1,360	1,360	1,360	1,341

Note: This table reports two-stage least squares estimates of the effect of labor conflict on collective bargaining outcomes, estimated separately for firms in feminized and non-feminized sectors. A sector is classified as feminized if the average female membership share across unions exceeds the median. The instrument is accumulated inflation over the life of the preceding collective agreement. The dependent variables are: the total number of negotiated clauses in column (1), the share of amenity clauses in the negotiated package in column (2), an indicator for whether an end-of-conflict bonus was granted in column (3), the value of the negotiated package recovered from a revealed-preference approach based on job-to-job transitions in column (4), and log total employment in column (5). All specifications control for the share of female workers in the union, the share of unionized workers in the firm, union and firm seniority, and the lagged dependent variable. Results are weighted by the share of unionized workers in the firm. All regressions include period, province, and sales bracket fixed effects. The F-statistic refers to the first-stage Cragg-Donald statistic. AR p-value refers to the Anderson-Rubin test of the null that the coefficient on the endogenous variable is zero, which is robust to weak instruments. Robust standard errors clustered at the firm level in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

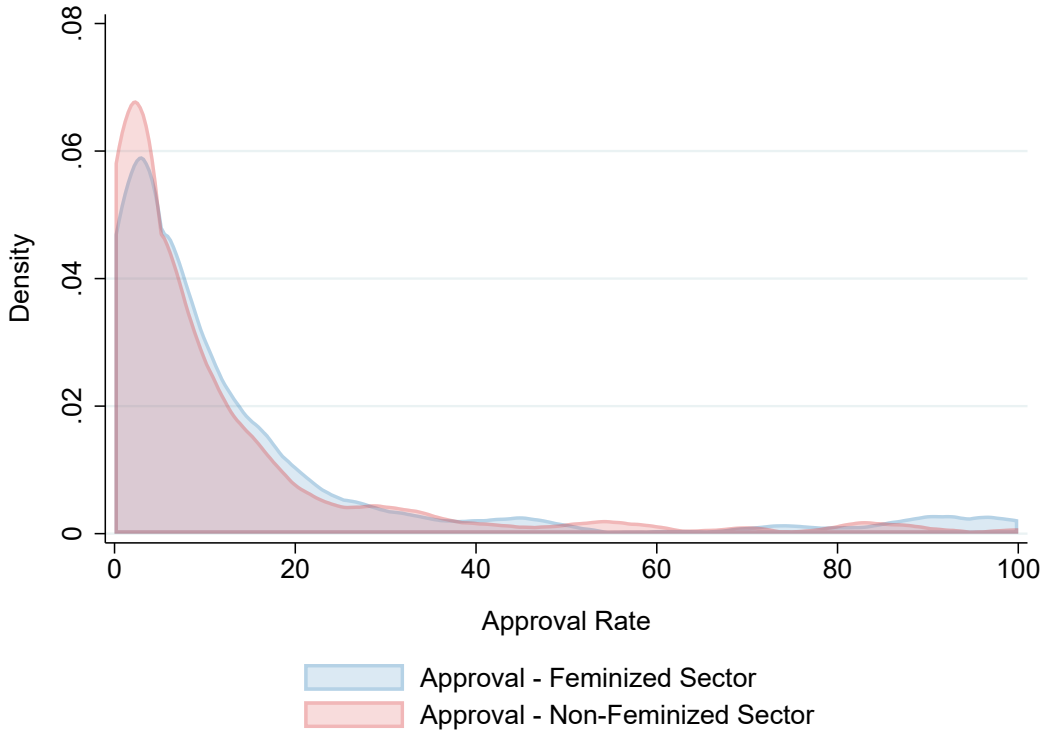
A Additional Figures and Tables

Figure A1: Share of Female Union Members and Amenity Clauses



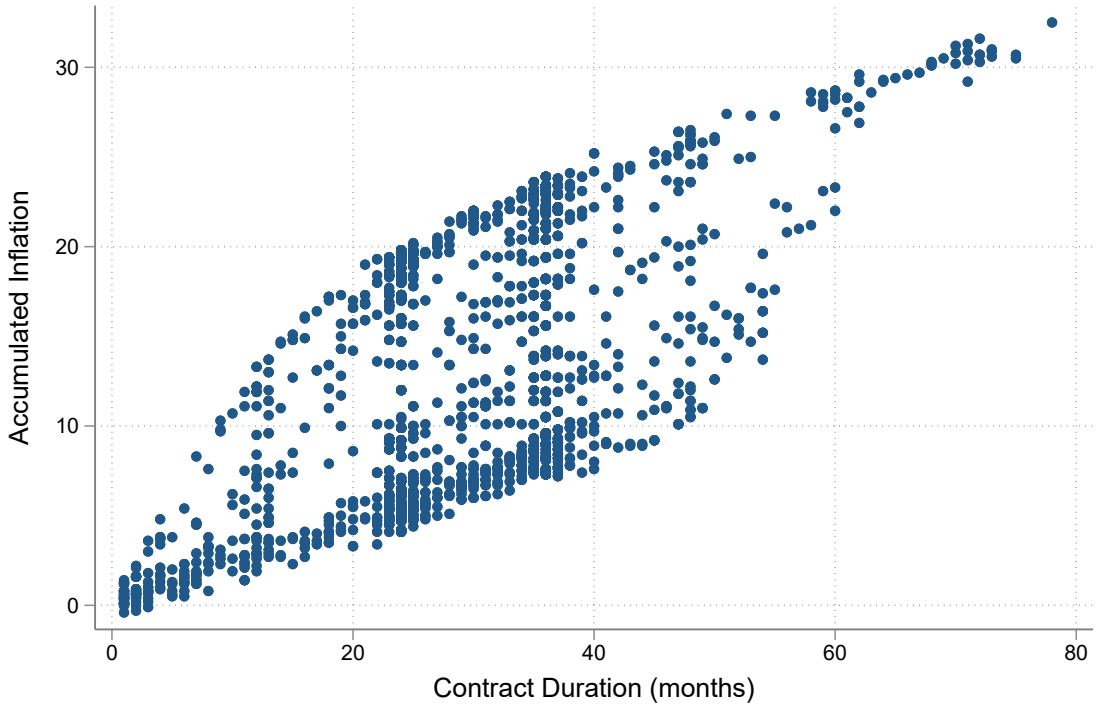
Notes: This figure shows a binscatter plot of the share of female union members and the share of amenity clauses in negotiated agreements. The coefficient from an OLS regression of the share of amenity clauses on the share of female union members is presented in the bottom left of the figure.

Figure A2: Vote Share Histogram



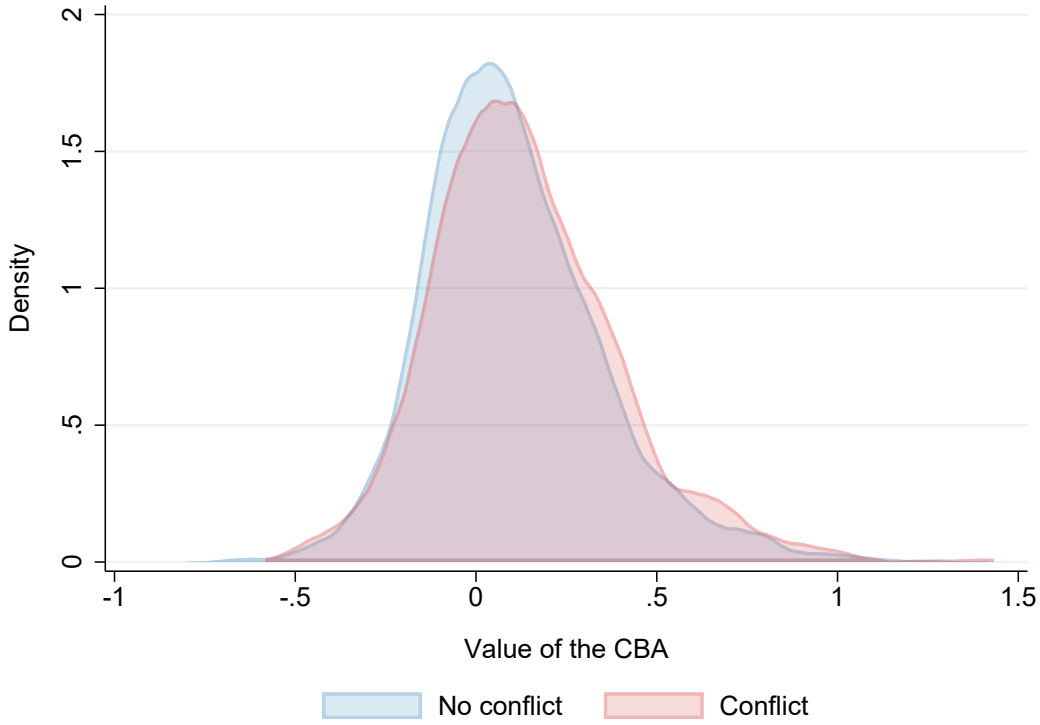
Notes: This figure shows the distribution of the share of votes in favor of approving the firm's final offer in feminized and non-feminized sectors. Voting records come from the subset of bargaining episodes that reach the ratification stage—that is, those in which direct bargaining failed and workers were called to vote on the firm's final offer. In the Chilean context, reaching this stage is an indication of a high probability of conflict.

Figure A3: Accumulated Inflation and Time to CBA Expiration



Notes: This figure shows a scatter plot of accumulated inflation between bargaining episodes and the duration of the collective bargaining contracts.

Figure A4: Value of Collective Bargaining Agreements



Notes: This figure shows the distribution of the value of collective bargaining agreements. We compute this value from Equation 9 (see Section 3 of the main text for details).

Table A1: Single-union vs. Multi-union Firms

	Multi-union		Single-union		Difference	
	Mean	SD	Mean	SD	Mean	p-value
Workers and Unionization						
Number of workers	1,151	(2013)	270	(478)	881	[0.000]
Number of union members	504	(1496)	68	(114)	436	[0.000]
Unionization rate	0.47	(0.23)	0.37	(0.23)	0.09	[0.000]
Share of female union members	0.34	(0.30)	0.35	(0.33)	-0.02	[0.015]
Collective Bargaining Agreements						
Union seniority (years)	28.12	(21.59)	13.87	(14.12)	14.25	[0.000]
Firm seniority (years)	21.49	(7.53)	19.41	(8.28)	2.08	[0.000]
Total number of CBA clauses	9.53	(3.70)	7.94	(3.35)	1.59	[0.000]
Number of monetary clauses	7.07	(2.49)	5.97	(2.39)	1.10	[0.000]
Number of amenity clauses	2.47	(1.99)	1.97	(1.67)	0.50	[0.000]
Share of amenity clauses	0.24	(0.15)	0.23	(0.17)	0.01	[0.106]
Conflict Indicator	0.25	(0.44)	0.27	(0.44)	-0.02	[0.090]
Benefits extension Indicator	0.54	(0.50)	0.51	(0.50)	0.04	[0.001]
Economic Sector						
Agriculture	0.048	(0.214)	0.048	(0.215)	-0.000	[0.949]
Arts and Entertainment	0.011	(0.103)	0.022	(0.147)	-0.011	[0.000]
Commerce	0.088	(0.283)	0.107	(0.309)	-0.019	[0.004]
Construction	0.019	(0.136)	0.032	(0.177)	-0.014	[0.000]
Education	0.171	(0.377)	0.168	(0.374)	0.003	[0.734]
Electricity Supply	0.015	(0.124)	0.011	(0.103)	0.005	[0.053]
Financial Services	0.006	(0.076)	0.015	(0.122)	-0.009	[0.000]
Healthcare	0.051	(0.221)	0.039	(0.193)	0.012	[0.007]
Manufacturing Industry	0.255	(0.436)	0.219	(0.414)	0.036	[0.000]
Other Service Activities	0.043	(0.203)	0.053	(0.225)	-0.010	[0.038]
Professional Services	0.023	(0.151)	0.033	(0.177)	-0.009	[0.015]
Public Administration	0.003	(0.051)	0.000	(0.019)	0.002	[0.004]
Real Estate	0.009	(0.096)	0.012	(0.109)	-0.003	[0.270]
Transportation and Storage	0.093	(0.290)	0.083	(0.276)	0.010	[0.128]
Water Supply	0.022	(0.148)	0.012	(0.110)	0.010	[0.000]

Note: This table reports average characteristics of single- and multi-unions firms. Standard deviations in parentheses and p-values from two-sided t-tests in brackets.

Table A2: Determinants of Labor Conflict

	Labor Conflict			
	(1)	(2)	(3)	(4)
Accumulated inflation since last bargaining episode	0.116***	0.115***	0.115***	0.111***
	(0.028)	(0.027)	(0.028)	(0.028)
% Female workers in the union		0.137***	0.129***	0.123***
		(0.043)	(0.043)	(0.044)
% Unionized workers in the firm		0.097	0.137**	0.144**
		(0.060)	(0.061)	(0.061)
Union seniority			-0.003***	-0.002***
			(0.001)	(0.001)
Firm seniority			0.000	0.000
			(0.002)	(0.002)
Nº Clauses in past bargained package				-0.002
				(0.004)
% Amenity clauses in past bargained package				0.117
				(0.092)
Observations	2,331	2,331	2,331	2,331
R-squared	0.160	0.171	0.177	0.178

Note: This table reports the results from the first stage in equation (8). Results are weighted by the % of unionized workers in each firm. All regressions include period, province, and sales brackets fixed effects. Robust standard errors clustered at the firm level in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Complier Characteristics

	Full sample	Compliers	Difference
Female share in union	0.409	0.263	-0.146
Unionization rate	0.469	0.449	-0.020
Union seniority	18.762	28.892	10.131
Firm seniority	22.215	28.272	6.058
Number of clauses in previous CBA	8.738	8.027	-0.711
Share of amenity clauses in previous CBA	0.227	0.174	-0.053
Value of previous CBA	0.172	0.370	0.198
Number of workers	5.803	6.027	0.224
Feminized sector	0.476	0.671	0.194

Note: This table compares the weighted sample means with estimates of mean characteristics for compliers induced into conflict by a modified binary instrument (Abadie, 2002, 2003). The modified instrument equals one when accumulated inflation since the previous bargaining episode is above the median. All estimates are weighted by union size and include bargaining-period, province, and sales-bracket fixed effects.

Table A4: Impact of Conflict (OLS)

	Number of Clauses	% Amenity Clauses	Bargaining Bonus	Value of Package	Log Total Employment
	(1)	(2)	(3)	(4)	(5)
Conflict	0.659***	0.027***	0.098***	0.075***	-0.008
	(0.248)	(0.010)	(0.032)	(0.023)	(0.010)
% Female workers in the union	0.375	0.073***	-0.013	0.101***	-0.041
	(0.339)	(0.013)	(0.050)	(0.026)	(0.020)
% Unionized workers in the firm	2.178***	0.037**	0.142**	0.002	0.012
	(0.441)	(0.018)	(0.069)	(0.036)	(0.026)
Union Seniority	0.023***	0.000	0.000	0.002**	-0.000
	(0.009)	(0.000)	(0.001)	(0.001)	(0.000)
Firm Seniority	0.002	-0.000	-0.003	-0.001	-0.000
	(0.015)	(0.001)	(0.002)	(0.001)	(0.001)
Lagged Dep. Variable	0.444***	0.401***	0.342***	0.312***	1.005***
	(0.052)	(0.030)	(0.029)	(0.038)	(0.008)
Mean Dep. Var	8.508	0.232	0.518	0.120	4.930
Observations	2,331	2,331	2,331	2,331	2,295

Note: This table reports ordinary least squares estimates of the effect of labor conflict on collective bargaining outcomes. The dependent variables are: the total number of negotiated clauses in column (1), the share of amenity clauses in the negotiated package in column (2), an indicator for whether an end-of-conflict bonus was granted in column (3), the value of the negotiated package recovered from a revealed-preference approach based on job-to-job transitions in column (4), and log total employment in column (5). All specifications control for the share of female workers in the union, the share of unionized workers in the firm, union and firm seniority, and the lagged dependent variable. Results are weighted by the share of unionized workers in the firm. All regressions include period, province, and sales bracket fixed effects. Robust standard errors clustered at the firm level in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: Heterogeneous Impacts of Conflict (OLS)

	Number of Clauses	% Amenity Clauses	Bargaining Bonus	Value of Package	Log Total Employment
	(1)	(2)	(3)	(4)	(5)
	Panel A: Firms in Feminized Sectors				
Conflict	1.278***	0.0370**	0.0815*	0.104***	-0.00875
	(0.328)	(0.0148)	(0.0454)	(0.0347)	(0.0116)
Mean Dep. Var	8.559	0.260	0.502	0.168	4.981
Observations	961	961	961	961	945
	Panel B: Firms in Non-Feminized Sectors				
Conflict	0.0770	0.0191	0.115***	0.0241	-0.0123
	(0.264)	(0.0127)	(0.0402)	(0.0238)	(0.0177)
Mean Dep. Var	8.489	0.212	0.529	0.0856	4.893
Observations	1,360	1,360	1,360	1,360	1,341

Note: This table reports ordinary least squares estimates of the effect of labor conflict on collective bargaining outcomes, estimated separately for firms in feminized and non-feminized sectors. A sector is classified as feminized if the average female membership share across unions exceeds the median. The dependent variables are: the total number of negotiated clauses in column (1), the share of amenity clauses in the negotiated package in column (2), an indicator for whether an end-of-conflict bonus was granted in column (3), the value of the negotiated package recovered from a revealed-preference approach based on job-to-job transitions in column (4), and log total employment in column (5). All specifications control for the share of female workers in the union, the share of unionized workers in the firm, union and firm seniority, and the lagged dependent variable. Results are weighted by the share of unionized workers in the firm. All regressions include period, province, and sales bracket fixed effects. Robust standard errors clustered at the firm level in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B Extensions

B.1 Two-Dimensional Heterogeneity

In this section, we introduce a second dimension of heterogeneity: a cost parameter that shifts strength in conflict monotonically. The aim is to mirror classic one-dimensional strike models and then compare the theoretical benchmarks. Suppose the union type has two dimensions (γ, κ), where γ indexes preferences over wages and amenities (as in our baseline model) and κ indexes the union's tolerance for delay during conflict. In particular, assume the union's flow cost of remaining in conflict is $c_u(\kappa)$, with $c_u'(\kappa) < 0$.

Let the union's gain from winning rather than losing be

$$s_u(\gamma \mid m_u, M_f) \equiv u_\gamma^W(m_u, M_f) - u_\gamma^L(m_u, M_f),$$

and define the cost-adjusted strength index by

$$\hat{s}_u(\gamma, \kappa \mid m_u, M_f) \equiv \frac{s_u(\gamma \mid m_u, M_f)}{c_u(\kappa)}.$$

We consider the case where κ is known at the offer stage, so that γ is the only source of internal uncertainty. Then, the package-choice result continues to hold pointwise in κ : even though tougher unions are more willing to enter into conflict, the composition of the optimal package is still disciplined by γ.

Proposition B.1. *Consider a setting where union types are characterized by two dimensions: (γ, κ), and $c_u'(\kappa) < 0$. Then, the following statements hold:*

(i) For fixed κ, the adjusted-strength index $\hat{s}_u(\gamma, \kappa \mid m_u, M_f)$ is single-peaked in γ and is maximized at the aligned type $\hat{\gamma}(m_u)$.

(ii) For fixed γ, the adjusted-strength index $\hat{s}_u(\gamma, \kappa \mid m_u, M_f)$ is strictly increasing in κ.

(iii) If γ is degenerate, then $\Delta_u(\gamma \mid m_u, M_f)$ is constant across union types, and the model collapses to a standard one-dimensional strike environment in which selection is monotone in the tolerance parameter κ alone.

Proof. Part (i) follows immediately from the baseline result that $s_u(\gamma \mid m_u, M_f)$ is single-peaked in γ and maximized at $\hat{\gamma}(m_u)$. Since $c_u(\kappa)$ is constant with respect to γ, dividing by $c_u(\kappa)$ preserves that ordering.

Part (ii) follows because $s_u(\gamma \mid m_u, M_f)$ is fixed with respect to κ, while $c'_u(\kappa) < 0$. Hence $\hat{s}_u(\gamma, \kappa \mid m_u, M_f)$ is strictly increasing in κ.

Part (iii) follows because when the negotiated object is one-dimensional, or when γ is degenerate, the gain from winning rather than losing no longer varies across union preference types. Therefore heterogeneity operates only through delay tolerance κ, which is the standard one-dimensional case. □

Note that in the presence of both costs and preference heterogeneity, these two forces may either complement or offset each other, depending on how they correlate.

B.2 Renegotiation

A critical feature of the baseline model is that, once conflict begins, offers are fixed and bargaining only operates through persistence. We model conflict in this way to isolate the mechanism of interest: the union chooses its initial package under internal uncertainty about which worker preference will be pivotal, and conflict then selects among realized types through costly delay. This section studies a simple relaxation of that assumption.

Suppose there exists $t_r \in (0, \overline{T})$ such that, if conflict survives until then, the firm is allowed to revise its menu once. The sequence of moves at t_r is as follows:

1. The firm chooses a revised feasible menu

$$M_f(t_r) \equiv \{(w, a) \in \mathbb{R}^2_+ : C(w, a) = \bar{C}^r(h_{t_r})\},$$

   where h_{t_r} denotes the public history reaching t_r and $\bar{C}^r(h_{t_r})$ is a revised compensation budget;

2. After observing $M_f(t_r)$, the union either:

   (a) accepts the revised menu, in which case conflict ends and the union selects its preferred bundle in $M_f(t_r)$; or

   (b) rejects the revised menu, in which case the war of attrition continues on $[t_r, \overline{T}]$.

If the union rejects the revised menu, we assume that the continuation game retains the same structure as in the baseline model except that the firm's concession set is now given by $M_f(t_r)$. Thus, after t_r, if the union concedes, it selects its preferred bundle in $M_f(t_r)$, while if the firm concedes, it accepts the union's original proposal m_u. The key effect of renegotiation is that survival until t_r is informative about the type of the union, inducing a posterior distribution $F_{t_r}(\gamma) \equiv F(\gamma \mid h_{t_r})$, and the firm may then redesign its menu against this posterior.

To formalize this, let $V_f(h_{t_r})$ denote the firm's continuation payoff at history h_{t_r} under the baseline model, without renegotiation, and let $V_f^R(h_{t_r})$ denote the firm's continuation payoff when it may choose a revised menu $M_f(t_r)$ at t_r.

Proposition B.2. *For every history h_{t_r} reaching t_r,*

$$V_f^R(h_{t_r}) \geq V_f(h_{t_r}).$$

The inequality is strict whenever there exists a revised menu $M_f(t_r)$ that yields a strictly higher posterior expected continuation payoff than the continuation induced by the baseline committed menu.

Proof. At t_r, the firm's feasible strategy set under renegotiation contains as a special case the strategy of choosing the same continuation menu implied by the baseline commitment model. Therefore the firm can always replicate the baseline continuation payoff, which implies

$$V_f^R(h_{t_r}) \geq V_f(h_{t_r}).$$

The inequality is strict whenever some revised menu generates a strictly higher posterior expected payoff under the posterior distribution $F_{t_r}(\gamma)$. □

Proposition B.2 clarifies the role of the commitment assumption in the baseline model. Once renegotiation is allowed, the firm can exploit the information conveyed by survival up to t_r to redesign its menu based on the posterior distribution of surviving types. Anticipated renegotiation, therefore, generally changes both initial offers and pre-t_r delay incentives. The sense in which the baseline logic survives is not that the equilibrium is unchanged, but that the same economic force remains central: delay endogenously selects a set of surviving types, and renegotiation allows the firm to screen that selected pool more effectively.

The balanced-type result of the baseline model need not survive unconditionally under renegotiation, because the firm's revised menu may tilt the relevant alignment point away from the original center. It is only when the firm's posterior screening problem is itself symmetric, and the revised menu preserves the same alignment point, that the union's types that persist longer are balanced types.

C Proofs and Additional Results

C.1 Proof of Lemma 1

Fix initial offers (m_u, M_f). While conflict continues, each player incurs a constant flow cost $c_j > 0$ per unit time. The game is such that, if player j concedes first at time t, then the opponent immediately implements its preferred outcome within the corresponding feasible menu. Thus, player j receives its losing payoff $u^L_{j,\theta}(m_u, M_f)$. If instead the opponent concedes first at time t, player j receives its winning payoff $u^W_{j,\theta}(m_u, M_f)$. If no player concedes before deadline, then player j receives:

$$u^{\overline{T}}_{j,\theta}(m_u, M_f) = \lambda_j u^W_{j,\theta}(m_u, M_f) + (1-\lambda_j) u^L_{j,\theta}(m_u, M_f),$$

where $\lambda_j = \lambda$ for the union, and $(1-\lambda)$ for the firm.

Let $G_{-j}(t)$ denote the cdf of the opponent's concession time, with density $g_{-j}(t)$. Define $G_{-j}(\overline{T}^-) = \lim_{t\to\overline{T}^-} G_{-j}(t)$

Fix a type θ of player j and suppose it chooses a pure concession time $t \in [0, T]$. We consider two different cases.

Case 1. $t < \overline{T}$. In this case, her payoffs are given by

$$V_j(t;\theta) = \int_0^t (u^W_{j,\theta}(m_u, M_f) - cs)\, dG_{-j}(s) + (u^L_{j,\theta}(m_u, M_f) - ct)(1 - G_{-j}(t)). \tag{10}$$

The first component is the payoff she would get if player $-j$ concedes before t, and the second one is the payoff she gets if player $-j$ has not conceded by t (which happens with probability $(1-G_{-j}(t))$. Rearranging, we get

$$V_j(t;\theta) = u^L_{j,\theta}(m_u, M_f) + s_j(\theta; m_u, M_f) G_{-j}(t) - c_j \left[\int_0^t s\, dG_{-j}(s) + t(1 - G_{-j}(t))\right] \tag{11}$$

Case 2. $t = \overline{T}$. In this case, payoffs are given by:

$$V_j(t;\theta) = \int_0^t (u^W_{j,\theta}(m_u, M_f) - cs)\, dG_{-j}(s) + (u^{\overline{T}}_{j,\theta}(m_u, M_f) - c_j\overline{T})(1 - G_{-j}(\overline{T}^-)). \tag{12}$$

Rearranging, we obtain

$$\begin{aligned} V_j(t;\theta) \;=\; & u^L_{j,\theta}(m_u, M_f) + s_j(\theta; m_u, M_f)\left[G_{-j}(\overline{T}^-) + \lambda_j(1 - G_{-j}(\overline{T}^-))\right] \\ & - c_j\left[\int_0^t s\, dG_{-j}(s) + \overline{T}(1 - G_{-j}(\overline{T}^-))\right] \end{aligned}$$

In both cases 1 and 2 payoffs can be written as:

$$V_j(t;\theta) = u^L_{j,\theta}(m_u, M_f) + s_j(\theta; m_u, M_f)A_j(G_{-j}) - B_j(G_{-j}) \tag{13}$$

where the only type-dependent term that changes over time is the measure of strength. Then, two types that have the same strength will have exactly the same preferences over concession times and the same best responses to any opponent's strategy. This proves the result. ■

C.2 Proof of Lemma 2

We show that $\gamma \mapsto s_u(\gamma; m_u, M_f)$ is single-peaked and uniquely maximized at the aligned type in two claims.

Claim 1. *$s_u(\gamma; m_u, M_f)$ is single-peaked.*

Proof. By the envelope theorem, the derivative of strength with respect to γ can be decomposed as:

$$\frac{\partial s_u(\gamma; m_u, M_f)}{\partial \gamma} = \frac{\partial u(m_u;\gamma)}{\partial \gamma} - \frac{\partial u(m^L(\gamma);\gamma)}{\partial \gamma} = \psi(m_u, \gamma) - \psi(m^L(\gamma), \gamma). \tag{14}$$

The function $\psi(m, \gamma)$, defined in the text, captures sensitivity of agents' utility to changes in the preference parameter γ.

Under Assumption 3, a higher γ increases the relative marginal utility of amenities. Then, as γ increases, the tangency defining $m_L(\gamma)$ moves weakly toward more amenity-intensive bundles. Since m_u is fixed, its wage-amenity ratio does not depend on γ.

Assumption 3 implies that for any γ such that $m^L(\gamma)$ is less intensive in amenities than m_u, it holds that $\psi(m_u, \gamma) > \psi(m^L(\gamma), \gamma)$, which by equation (14) implies $\frac{\partial s_u(\gamma)}{\partial \gamma} > 0$. Conversely, for any γ such that $m^L(\gamma)$ is more intensive in amenities than m_u, it holds that $\frac{\partial s_u(\gamma)}{\partial \gamma} < 0$. Since the amenity-intensity of $m_L(\gamma)$ moves monotonically in γ, the derivative changes sign at most once, from positive to negative. It follows that $s_u(\gamma; m_u, M_f)$ is single-peaked. □

Claim 2. *Given a package m_u, the strength maximizer $\hat{\gamma}$ is the unique type for which the worker's losing package satisfies $\alpha(m_L(\hat{\gamma})) = \alpha(m_u)$, where $\alpha(w, a) \equiv \frac{a}{w}$.*

Proof. From Claim 1 we know that,

$$\frac{\partial s_u(\gamma; m_u, M_f)}{\partial \gamma} = \psi(m_u, \gamma) - \psi(m^L(\gamma), \gamma).$$

By the single-crossing assumption, the sign of this derivative is determined by the relative amenity intensity of the winning and losing bundles $\alpha(m_u)$ and $\alpha(m^L(\gamma))$. The losing bundle becomes more

intensive in amenities as γ increases, while $\alpha(m_u)$ remains constant. Therefore, the derivative of $s_u(\gamma; m_u, M_f)$ is positive whenever the losing bundle is less amenity-intensive than m_u, and negative whenever the losing bundle is more amenity-intensive than m_u. The derivative can change sign only at the type for which $\alpha(m^L(\gamma)) = \alpha(m_u)$, which, by definition, is the aligned type $\widehat{\gamma}(m_u)$.

Since Claim 1 established that $s_u(\gamma; m_u, M_f)$ is single-peaked, this sign change identifies the unique maximizer. □

This proves the Lemma. ■

C.3 Equilibrium in the War of Attrition

The following proposition characterizes the unique equilibrium in the war of attrition in strength space. Both the characterization and the proof closely follow Myatt (2025).

Proposition C.1. *Fix initial offers (m_u, M_f) and suppose Assumptions 1 and 2 hold. Then the conflict stage admits a unique Bayesian Nash equilibrium in monotone stopping strategies. In that equilibrium, for each player $j \in \{u, f\}$:*
(i) there exists a lower cutoff $s_j^* \in [\underline{s}_j, \overline{s}_j)$ such that types with $s_j \leq s_j^*$ exit at time zero;
(ii) there exists an upper cutoff $s_j^{**} \in (s_j^*, \overline{s}_j)$ such that types with $s_j \geq s_j^{**}$ wait until the deadline $\overline{T}$;
(iii) there exists a time $\bar{t} \in (0, \overline{T})$ at or after which neither player exits;
(iv) each player's stopping time $t_j(s_j)$ is strictly increasing and continuous in strength on (s_j^*, s_j^{**}), from 0 to $\bar{t}$;
(v) the terminal cutoff satisfies

$$\lambda_j s_j^{**} = c_j(\overline{T} - \bar{t}), \qquad j \in \{u, f\}, \tag{15}$$

where $\lambda_u = \lambda$ and $\lambda_f = 1 - \lambda$;
(vi) for every $t < \overline{T}$, the set of types of player j still active at time t is an upper tail of the strength distribution.

Proof. Fix (m_u, M_f). Each primitive type, θ_j induces a strength, s_j. Given a cost of enduring labor conflict $c_j > 0$, we define a normalized strength measure, $z_j(\theta_j; m_u, M_f)$ as

$$z_j(\theta_j; m_u, M_f) \equiv \frac{s_j(\theta_j; m_u, M_f)}{c_j}, \tag{16}$$

with support $[\underline{z}_j, \overline{z}_j]$. Transforming the game into this form, player j acts as if it had a unit flow cost, and it obtains a prize z_j if it wins. If both players wait until the deadline, player j gets

$\lambda_j z_j$. Notice that under symmetric costs and a symmetric institutional resolution mechanism at the deadline—i.e., $\lambda_j = 1/2$—this game is analogous to Myatt (2025). Allowing some heterogeneity in costs and probabilities, the argument applies, given the normalization above, for some modified terminal conditions. We reproduce the proof here for completeness, but it follows Myatt (2025)'s paper closely.

Step 1. *Equilibrium strategies are monotone in strength.* By Lemma 1, once (m_u, M_f) is fixed, types enter only through strength s_j. Since flow costs are constant, we work with the normalized strength, z_j. Fix the strategy of player $-j$, $G_{-j}(t)$. Then, the normalized payoff of agent j of conceding at time t is given by:

$$\tilde{V}_j(t; z_j) = z_j(\theta; m_u, M_f)G_{-j}(t) - \left[\int_0^t \tau \, dG_{-j}(\tau) + t(1 - G_{-j}(t))\right] \tag{17}$$

where we have omitted $u^L_{j,\theta}$ since it drops out from the first-order condition. Differentiating with respect to t, and simplifying notation, we obtain

$$\frac{\partial \tilde{V}_j(t; z_j)}{\partial t} = g_{-j}(t)z_j - (1 - G_{-j}(t)),$$

which equals zero at an interior optimum. Hence, the gain from waiting is strictly increasing in z_j. If a type z_j weakly prefers to remain in conflict at time t, then every stronger type $z'_j > z_j$ does so as well. Then, it follows that best responses satisfy single crossing in (t, z_j), so any equilibrium must be monotone in strength. This implies that, for each player j, there exists an increasing cutoff path $v_j(t)$ such that, for any time t, types below $v_j(t)$ have conceded by that time, and types above the cutoff remain active.

Step 2. *Characterization of the indifference condition.* Let $v_j(t)$ denote the normalized strength of the marginal type at time t, and let H_j denote the distribution of normalized strength. Denote by $G_j(t)$ the induced concession distribution, given by

$$G_j(t) = H_j(v_j(t)).$$

In any interior mixing interval, the marginal type, $v_j(t)$, has to be indifferent between conceding immediately and waiting another instant. Using the first order condition above, the indifference condition can be written as

$$\frac{g_{-j}(t)}{1 - G_{-j}(t)} v_j(t) = 1,$$

where $\frac{g_{-j}(t)}{1-G_{-j}(t)}$ is the hazard rate at which the opponent concedes. This is, in equilibrium, the

opponent's hazard rate is such that the agent's payoff from waiting another instant equals the costs.

Using the induced distribution, the hazard rate of agent j can be written as:

$$\frac{g_j(t)}{1-G_j(t)} = \frac{h_j(v_j(t))v_j'(t)}{1-H_j(v_j(t))}.$$

Let $\bar{t}$ denote the time at which no further types concede before the deadline $\overline{T}$. Substituting the opponent's hazard formula into the indifference condition, we obtain for any $j \in \{u, f\}$,

$$v_j'(t) = \frac{1-H_j(v_j(t))}{h_j(v_j(t))}\frac{1}{v_{-j}(t)}, \tag{18}$$

which holds for any $t \in (0, \bar{t})$. Using the same argument, we can obtain a symmetric equation for player $-j$. Assumption 2 implies that the right-hand side is well-defined and strictly positive on the relevant interior of the support. This implies that the cutoffs are strictly increasing, and then they are solved by two ODEs.

Let $z_j^{**} = \lim_{t\to\bar{t}^-} v_j(t)$ be the terminal cutoff for each agent j. For any z, define

$$\Lambda_j(z; z_j^{**}) \equiv \int_z^{z_j^{**}} \frac{1}{x}\frac{h_j(x)}{1-H_j(x)}\,dx. \tag{19}$$

Evaluating in $z = v_j(t)$, and using the indifference condition, we obtain

$$\frac{\partial \Lambda_j(v(t); z_j^{**})}{\partial t} = -\frac{1}{v_j(t)}\frac{h_j(v_j(t))}{1-H_j(v_j(t))}v_j'(t) = -\frac{1}{v_j(t)v_{-j}(t)} \tag{20}$$

Then, we have that the following equality holds:

$$\frac{d}{dt}\left[\Lambda_j(v_j(t); z_j^{**})\right] = \frac{d}{dt}\left[\Lambda_{-j}(v_{-j}(t); z_{-j}^{**})\right]. \tag{21}$$

Since both sides have the same derivative at all $t \in (0, \bar{t})$, and at the terminal condition it must be that $\Lambda_j(v_j(\bar{t}); z_j^{**}) = 0$ for all j, then we have the following condition,

$$\Lambda_j(v_j(t); z_j^{**}) = \Lambda_{-j}(v_{-j}(t); z_{-j}^{**}), \qquad t \in (0, \bar{t}). \tag{22}$$

Step 3. *Boundary condition at time zero.* Let $z_j^* = \lim_{t\to 0^+} v_j(t)$ denote player j's initial cutoff in normalized strength. Thus, types with lower normalized strength concede at time zero, while types with $z_j > z_j^*$ enter the continuous-concession phase.

Since strengths are strictly positive, if one player concedes with positive probability at time $t = 0$, it is strictly beneficial for the opponent to wait before conceding: it pays an arbitrarily small cost, and it may win immediately with positive probability. Therefore, as in standard wars of attrition, it cannot be that both players concede with positive probability at time zero.

Then, for at least one player j, it must be that $z_j^* = \underline{z}_j$, and for the other $z_{-j}^* \geq \underline{z}_{-j}$ (if the inequality is strict, this implies player $-j$ has a positive probability of immediate exit).

Step 4. *Boundary condition at the terminal cutoff.* Let $\bar{t}$ be the final time at which any type of any player concedes. The marginal type z_j^{**} must be indifferent between conceding at $\bar{t}$ and waiting until the deadline (if it was not, this would contradict the definition of the upper cutoff z_j^{**}).

First, note that conditional on agent $-j$ not conceding in the interval $[\bar{t}, \overline{T}]$, it cannot be optimal for agent j to concede in the interior: she either concedes at $\bar{t}$ or waits until the deadline. Second, given this, the indifference condition at this cutoff is given by:

$$\lambda_j z_j^{**} = (\overline{T} - \bar{t}) \tag{23}$$

where the left-hand side is the gain from waiting until the deadline (i.e., the likelihood of winning the external resolution mechanism) and the right-hand side is the cost of waiting this extra interval.

Step 5. *Existence and uniqueness.* We now have a system of ODEs with two boundary conditions, one at time zero and the other at $\bar{t}$. For any interior $t \in (0, \bar{t})$, the type cutoffs solve equation (18), satisfy the boundary conditions at time 0, and the terminal condition.

It remains to show that these boundary conditions indeed select a unique solution. Note that the boundary condition in equation (23) defines z_j^{**} as a function of $\overline{T} - \bar{t}$, pinning down candidates for both players' terminal types as a function of $\bar{t}$ and the game parameters. For any such pair of terminal cutoffs, Assumption 2 implies that the right-hand side of 18 is continuous and locally Lipschitz. Hence, by the Picard-Lindelof theorem, there exists a unique solution to the ODE system. The argument then starts from a candidate of a terminal cutoff, $\{z_j^{**}(\overline{T} - \bar{t})\}_{j \in \{u,f\}}$, and integrates the ODE system backward until one of the paths first reaches the lower-bound of the support. Then, the active length of attrition implies a unique solution (Myatt, 2025). By Assumption 2, the terminal cutoffs are interior.

Note that $G_j(t)$ is given by $H_j(v_j(t))$ in the interval $(0, \bar{t})$, which is increasing. For any $t \in [\bar{t}, \overline{T})$, there are no exits and $G_j(t) = H_j(z_j^{**})$, which is constant. This concludes the equilibrium characterization.

Since

$$z_j(\theta_j; m_u, M_f) \equiv \frac{s_j(\theta_j; m_u, M_f)}{c_j}$$

and $c_j > 0$, the same ordering and cutoff characterization applies in the original strength variable. In particular, the corresponding cutoffs in original strength are $s_j^* = c_j z_j^*$ and $s_j^{**} = c_j z_j^{**}$, with terminal condition

$$\lambda_j s_j^{**} = c_j(\overline{T} - \bar{t}). \tag{24}$$

□

C.4 Proof of Proposition 1

We first prove the following auxiliary Lemma.

Lemma C.1 (Continuation value increasing in strength)**.** *In the unique monotone equilibrium of Proposition C.1, the net gains from conflict, defined by*

$$\Delta_j(\theta_j) = V_j(\theta_j) - u_{j,\theta}^L, \tag{25}$$

are weakly increasing in strength $s_j(\theta)$.

Proof of Lemma. Monotonicity of equilibrium strategies implies that $t_j(s_j)$ is weakly increasing in s_j. Thus, the probability of winning, defined as $\pi_j(s_j) = \Pr\left(t_j(s_j) > t_{-j}(s_{-j})\right)$, is weakly increasing in s_j. The net gains from conflict are given by

$$\Delta_j(\theta) = s_j(\theta)\pi_j(s_j(\theta)) - \mathbb{E}[\tau | s_j(\theta)].$$

Since $t_j(s)$ is an optimal stopping rule, the envelope theorem implies

$$\frac{d\Delta_j(s)}{ds} = \Pr\left(t_j(s) > t_{-j}(s_{-j})\right) = \pi_j(s) \geq 0.$$

Hence, it is weakly increasing in s. □

Proof of Proposition 1. Fix initial offers (m_u, M_f). By Lemma C.1, in the monotone equilibrium of the conflict stage, the union's net gain from conflict is weakly increasing in strength. Then, there exists a weakly increasing function $\hat{V}$, such that $\Delta_u(\gamma; m_u, M_f) = \hat{V}(s_u(\gamma; m_u, M_f))$ for all γ.

By Lemma 2, $s_u(\gamma; m_u, M_f)$ is single-peaked and reaches its maximum at the aligned type $\hat{\gamma}(m_u)$. It follows that $\Delta_u(\gamma; m_u, M_f)$ is also single-peaked in γ.

Since the union chooses its initial offer before γ is realized, the ex-ante value of package m_u is

$$W(m_u) = \int_{\underline{\gamma}}^{\overline{\gamma}} \max\{0, \Delta_u(\gamma; m_u, M_f)\}\, dF(\gamma).$$

Therefore, the optimal package solves

$$m_u^* \in \arg \max_{m_u \in M_u} W(m_u).$$

Since $m_L(\gamma)$ does not depend on m_u, this is analogous to the statement in the Proposition. □