Bargaining Power and Market Tightness: A Microfoundation for Generalised Nash Bargaining*

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Abstract

What determines workers' bargaining power in frictional labour markets? This paper argues that market tightness is a key determinant by developing non-cooperative framework that provides a microfoundation generalised Nash bargaining weights. I study an alternating-offers wage bargaining game in which agents continue searching while negotiating and endogenously choose whether to abandon ongoing negotiations when new partners arrive. In equilibrium, these choices generate breakdown risk that varies with market tightness, yielding bargaining weights as equilibrium objects rather than exogenous parameters. The main result is that tighter labour markets unambiguously increase workers' bargaining power under standard matching technologies. Unlike fixed-weight models, the framework can endogenously generate monopsony outcomes: workers' surplus share collapses to zero in slack markets when firms make initial offers.

Keywords: Bargaining power, labour share, non-cooperative bargaining, Nash bargaining, search and matching, monopsony

JEL Codes: C78, D83, J21, J31, J42, L13

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1 Introduction

In most markets characterised by matching frictions, terms of trade are set by bargaining. Examples include wage negotiations, trade along the supply chain, house sales and over-the-counter (OTC) assets trade. The outcomes of negotiations reflect the bargaining power of each party, often treated as an exogenous parameter. Given the prevalence of bargaining and the central role bargaining power plays in economic outcomes, it is natural to ask: What determines bargaining power? How does it depend on underlying market conditions?

This paper provides an answer. I study a non-cooperative model of bilateral wage negotiations in a frictional labour market in which firms and workers take turns in making offers. While negotiations are ongoing, agents can continue to be paired with new potential partners. If they are, they choose whether to abandon an ongoing negotiation to start bargaining with the newly arrived partner. I solve for the unique equilibrium of the game and explicitly derive expressions for bargaining power. The main result is that bargaining power is increasing in the market tightness, measured as the ratio of number of firms over number of job seekers, reflecting the relative abundance of one's outside options compared to one's trading partner.

This result reflects the common intuition that better market conditions for one side should translate into favourable terms of trade for them. The central challenge in formalising this intuition is explaining how outside options come into play during negotiations. Two forces work in opposite directions. On the one hand, the availability of alternative partners creates a potentially credible threat to walk away, strengthening one's bargaining position. On the other hand, better outside options raise the opportunity cost of delay, weakening the credibility of prolonged negotiation. The main novelty of the model I propose here is to integrate both forces by letting agents choose between incumbent and new partners instead of making assumptions on what players would do upon meeting a new partner. In equilibrium, players' preferences are driven by their role in each negotiation (proposer or responder) as well as their beliefs on whether their partners will abandon a negotiation. In this framework, rich dynamics emerge between bargaining power and market tightness.

I show that in a fully symmetric environment in which both parties are equally likely to make the first offer, the first force dominates for any matching technology: tighter markets unambiguously increase worker bargaining power and decrease that of the firms. I analyse the equilibrium surplus sharing under asymmetric first-mover probabilities, and show that elasticities of the pairing function govern the sign of the relationship. For empirically relevant matching functions, a positive relationship between worker bargaining power and market tightness emerges.

I then use the model to explore if bargaining outcome can converge to Walrasian competitive equilibrium allocation when matching frictions become increasingly small, a question studied by many with divergent answers (Rubinstein and Wolinsky, 1985; Kunimoto and Serrano, 2004; Lauermann, 2013). I find that the answer is yes, but that it depends on the first mover probability. Specifically, in an environment where there are less firms (buyers) than workers (sellers), and firms make the initial offer, the equilibrium outcome converges to the monopsony outcome. This limiting result which is absent from models with fixed bargaining weights suggests that the standard search-and-matching framework may understate employer wage-setting power in slack labor markets.

Related literature. The paper contributes to two related strands of literature: theoretical models of bargaining in frictional environments, and empirical and theoretical work on bargaining power in labour markets. Its primary contribution to bargaining theory is to microfound generalised Nash bargaining weights as equilibrium objects in a setting with rational beliefs and common knowledge. While the forces that can generate asymmetric surplus sharing are well understood, they have typically been imposed through exogenous parameters or beliefs rather than derived from strategic interaction.

In particular, breakdown risk in alternating-offers bargaining is formally isomorphic to discounting: just as asymmetric discount factors lead to unequal surplus shares, asymmetric perceptions of breakdown risk can do the same. Binmore et al. (1986) show that when players hold different beliefs about the likelihood of breakdown, equilibrium outcomes converge to the Nash solution with asymmetric weights. In their framework, however, beliefs are exogenous and need not be mutually consistent. In contrast, this paper endogenises breakdown risk through agents' equilibrium attendance decisions in a matching market, yielding asymmetric bargaining weights that are fully consistent with rational expectations.

The model is closely related to Rubinstein and Wolinsky (1985), who also study sequential bargaining in a matching environment. In their setting, agents are assumed to abandon an ongoing negotiation whenever a new partner arrives, implying a constant breakdown probability across bargaining rounds. As a result, surplus is shared equally despite search frictions. In the framework developed in Hall and Milgrom (2008) for wage negotiations, firms and workers engage in alternating-offers bargaining but are fully removed from the matching market during negotiations. By contrast, the present paper allows agents to choose whether to remain in an ongoing negotiation or switch to a new match. This endogenous attachment to the bargaining relationship generates role-dependent breakdown risk and potentially unequal surplus sharing in equilibrium.

This paper is connected to a rich literature on wage bargaining and firm competition.

Cahuc et al. (2006) show that direct competition between firms, through on-the-job search and poaching, explains a substantial share of worker bargaining power - yet a residual share of 0-20% for unskilled workers and 20-40% for skilled workers remains unexplained. Similarly, Mangin and Sedláček (2018) studies firm competition through auctions for unemployed workers, and Jarosch et al. (2024) examines how firm size affects outside options in Nash bargaining. In each case, some component of bargaining power is left exogenous. The present model complements these approaches by providing a microfoundation for this residual: market tightness alone generates asymmetric bargaining weights, without requiring heterogeneity in firm size or productivity.

The remainder of the paper is organised as follows. Section 2 presents the environment, pairing technology, and the bargaining protocol. Section 3 defines a semi-stationary equilibrium and characterises the unique equilibrium of this game in this class of equilibria. Section 4 studies equilibrium surplus sharing equations, deriving bargaining weights. Section 5 explores the relationship between bargaining power and market tightness, demonstrating the key results of the paper. Section 6 examines limiting behaviour as matching frictions vanish, showing that outcomes converge to monopsony (monopoly) when firms (workers) make first offers in markets with excess labour supply (demand). Section 7 concludes.

2 Model

Environment. The economy is composed of two types of agents, workers and firms. Firms in this economy are one-person jobs. If an agent is matched with an agent of another type, they are in an employment relationship and produce. If they are unmatched, they are in the labour market waiting to be paired with an agent of the other type. The two sides of the economy are connected to each other: agents leave the labour market if they are paired with an agent of the other type and if they agree on a wage to start producing, while agents in an employment relationship enter back to the labour market through an exogenous job destruction process.

Time in this economy is discrete, has infinite horizon, and both types of players discount the future with factor δ. Employed workers and firms produce an output in each period, which has market value y. For agents in the labour market, a period consists of two stages: pairing stage, and the bargaining stage. When an unemployed worker is paired with a potential employer, they enter an employment relationship and start producing only if they can agree on a wage w, which they decide by bargaining. The process takes place sequentially within a period which consists of two stages.

In **Stage 1**, workers and firms are paired through a pairing function. Being paired with a player of the other type implies having a meeting scheduled for **Stage 2** of that time period. If they have a meeting, they choose to attend this meeting or not. If both players attend the meeting, they bargain over a wage. Importantly, at every period, pairings happen only in **Stage 1**, and bargaining meetings happen always in **Stage 2**. We first present the pairing process of Stage 1, then turn our attention to production and characterise the surplus associated with production, so to finally explain the bargaining protocol by which the agents share this surplus.

Stage 1: Labour market and the pairing process. There are N_u unemployed workers and N_v vacancies or firms in the labour market. The labour market is frictional in the sense that at every period, there may be some workers and firms that are left unpaired. Market tightness, the ratio of the number of vacancies to the number of unemployed workers, denoted by $\theta \equiv \frac{N_v}{N_u}$ governs the probability of being paired.

An agent is considered unmatched unless she has agreed on a wage with a partner in the previous period. In each period, any unmatched worker is paired with a firm with probability $\lambda_w = \lambda_w(\theta)$ and any unmatched firm is paired with an unemployed workers with probability $\lambda_f = \lambda_f(\theta)$.

Assumption 1 (Pairing technology) *Conditional on θ, pairing draws are i.i.d. across agents and time, and each unmatched agent draws at most one new potential partner per period. The job-finding and vacancy-filling probabilities satisfy $\lambda_w(\theta), \lambda_f(\theta) \in (0, 1)$.*

Assumption 2 (Job finding and vacancy filling probabilities and market tightness) *Job finding probability of an unemployed worker is an increasing function of market tightness θ, whereas the vacancy filling probability is a decreasing function of θ.*

For any $N_u > 0, N_v > 0$,

$$\frac{\partial \lambda_w(\theta)}{\partial \theta} > 0, \quad \frac{\partial \lambda_f(\theta)}{\partial \theta} < 0 \tag{1}$$

N_u and N_v are large enough to ensure that the agents do not internalise their own effect on market tightness, and therefore on the pairing probabilities. Furthermore, we assume that when a pair agrees on terms of employment and leave the market, there is an exogenous supply of a new worker and a new firm from the production sector into the search market such that θ remains constant.

Production, value functions and the total surplus When a firm and a worker agree on a wage, they leave the labour market to produce a good which has a market value of y. Both the workers and the firms have linear preferences in the wage.

The value of being employed is given by

$$V_e(w) = w + \delta(1-s)V_e(w) + \delta s V_u$$

where s is the exogenous probability of job destruction, and V_u value of unemployment.

The value of a filled vacancy for the firm is given by

$$J(w) = y - w + \delta(1-s)J(w) + \delta s V$$

where V is the value of a vacant job.

Total surplus that players bargain over is the surplus created by their pairing and is defined by the total value of production $V_e(w) + J(w)$ net of the pair's outside options $V_u + V$, and is given by

$$S = \underbrace{V_e(w) - V_u}_{S_w(w)} + \underbrace{J(w) - V}_{S_f(w)} \tag{2}$$

The outside options can be written as

$$V_u = \delta[\lambda_w \mathbb{E}_w V_e(w) + (1-\lambda_w)V_u] \tag{3}$$

$$V = \delta[\lambda_f \mathbb{E}_w J(w) + (1-\lambda_f)V] \tag{4}$$

In both cases, the expectation is taken with respect to the distribution of future wage outcomes. In equilibrium there will be two possible wages, depending on which party makes the first offer. We will characterise these wages explicitly below.

The period utility of remaining unmatched is zero for both parties. This is without any loss of generality as long as the period utility does not change by being in the bargaining game. We abstract from these period utilities here so to make it clear that the asymmetry in bargaining positions do not stem from asymmetric period payoffs. The setting can be readily extended to a allow for unemployed workers receiving unemployment benefits and firms paying for vacancy costs without any changes in the bargaining weights.

Stage 2: Bargaining protocol. When a worker and a firm attend a meeting at Stage 2 of period t, they bargain over the wage using the Rubinstein alternating–offers protocol. The firm is the initial proposer with probability $\mu \in [0,1]$, and the worker with probability $1-\mu$. If an offer at t is accepted, the pair exits immediately and production begins at $t{+}1$. If the offer is rejected, the rejecting party becomes the next proposer, and a meeting between the same two parties is scheduled for Stage 2 of $t{+}1$.

Pairing during bargaining. As long as no wage is agreed upon, agents are considered unmatched and hence can be paired with new partners. Between consecutive offers, i.e. between Stage 2 at t and the next Stage 2 at $t{+}1$, Stage 1 of $t{+}1$ takes place and may generate a new pairing for each unmatched agent. Thus, at Stage 1 of $t{+}1$, an unmatched agent may have up to two meetings for Stage 2 of $t{+}1$: (i) an old meeting continued from t if the previous offer was rejected, and (ii) at most one newly arrived meeting drawn at $t{+}1$.

Players then have to simultaneously choose in Stage 1 whether they will attend a meeting in Stage 2, and which one. Any meeting not attended is permanently forfeited. Thus, a player can have at most two potential meetings.

Information and histories. At each stage, players make decisions: whether to attend a meeting and, if so, which one in Stage 1, and which wage to offer or whether to accept an offer in Stage 2. To make precise the information available at the time of each decision, we introduce stage-specific histories. Let h^1_{it} denote the history observed by player i at Stage 1 of period t, and let h^2_{it} denote the history observed by player i at Stage 2 of period t.

At Stage 1 of any period t, each agent observes the full history of any ongoing relationship with an incumbent partner, and observes Nature's draw of the initial proposer for any newly arrived pairing. Hence before making a decision, an agent knows the answers to the following questions: 1) Do they have scheduled meetings for Stage 2 of period t? 2) Do they have one or two? 3) Is one of them with a partner they previously met in $t-1$? 4) If so, who rejected the last offer and hence can make the new proposal? 5) Is one of the meetings with a new partner? 6) If so, who will propose first in that meeting?

Formally, let τ denote the period in which player i and partner j first meet. An ongoing relationship history between i and j observed at Stage 1 of period t can be represented by the sequence

$$h^o_{ijt} = \big(p_0,\ (w_\tau, r_\tau),\ (w_{\tau+1}, r_{\tau+1}),\ \ldots,\ (w_{t-1}, r_{t-1})\big),$$

where $p_0 \in \{w, f\}$ is Nature's initial proposer draw when the pair first met, w_s is the wage offered in period s, and $r_s \in \{A, R\}$ is the responder's action in that period, with A denoting acceptance and R rejection. The superscript o indicates that the relationship is ongoing. Conditional on the relationship continuing to period t, the alternating–offers protocol implies that p_{t-1} pins down the proposer in period t. By the same logic, knowing

p_0 is sufficient to know the proposer at any time period t. We denote the set of all possible ongoing-relationship histories by H^o.

A new relationship's history is simply the initial proposer draw, given by

$$h^n_{ijt} = (p_0),$$

and we denote the set of new-relationship histories by H^n.

At Stage 1, before making a decision, agent i observes the histories of both potential meetings, so that the private history observable to player i that consists of the history of an ongoing relationship with player j and with a new potential partner k is given by

$$h^1_{it} = \left(h^o_{ijt},\, h^n_{ikt}\right),$$

where h^o_{ijt} (h^n_{ikt}) is empty if no ongoing (new) meeting is available.

While making decisions in Stage 1, agents do not observe the counterpart's outside pairings, the counterpart's attendance decision, or whether the counterpart has other scheduled meetings [1]. In other words, a player does not observe the history of new pairings of their partner of an ongoing relationship, and for their newly paired partner, they do not observe the history of ongoing relationships. Furthermore, agents' memory on a relationship resets after a relationship breaks down. This implies that if a player re-meets a partner with whom they had unsuccessful negotiations, they do not remember it.

Therefore, in the Stage 2 bargaining game, an agent only knows the history of the specific relationship with the partner with whom they are bargaining: h^2_{it} is either h^o_{ijt} for an ongoing meeting or h^n_{ikt} for a newly formed meeting. This history is observed by both parties and is common knowledge. We can therefore simply denote it by h^2, dropping the subscripts for the players' identities.

Strategies. At the end of Stage 1, Players choose which bargaining meeting they will attend. At Stage 2, if both they and their partner arrived at the meeting, bargaining take place.

In the Stage 2 bargaining game, a strategy for player i consists of (i) an offer rule and (ii) a response rule.

Whenever the history of the relationship is such that i is the proposer, the offer rule specifies a wage $\omega_i(h^2_{it}) \in \mathbb{R}$. We denote this realised offer by $w_i = \omega_i(h^2_{it})$. Whenever i is the responder and faces an offer w_j, the response rule specifies an action $\rho_i(h^2_{it}, w_j) \in \{A, R\}$,

[1]This contrasts with settings such as Cahuc et al. (2006), where outside options are observable and verifiable, enabling direct competition between firms over workers upon new pairings.

where A denotes acceptance and R rejection.

For this stage, we restrict attention to semi-stationary strategies in the sense of Rubinstein and Wolinsky (1985): players employ the same Stage 2 bargaining strategies for any new partner they may meet. This restriction implies that a player's history with other partners, the number of failed negotiations or the length of time spent in the search market, is irrelevant for Stage 2 strategies with a new partner. In contrast, within an ongoing bargaining relationship, we allow Stage 2 strategies to depend on the past history of that specific relationship. This restriction of the strategy space allows us to treat Stage 2 as a complete information bargaining subgame.

In Stage 1, players choose which meeting to attend, observing which partners are available and the corresponding histories. We denote player i's attendance decision at period t by $a_i(h^1_{it}) \in \{o, n, \varnothing\}$.

Given the information structure and strategies, we can now define the equilibrium.

3 Equilibrium

3.1 Equilibrium definition

Definition 1 (Semi-stationary equilibrium) *Fix the pairing technology and a constant market tightness θ. A semi-stationary equilibrium consists of, for each $i \in \{w, f\}$:*

- *a Stage 1 attendance strategy $\alpha_i : H^1 \to \{o, n, \varnothing\}$, where H^1 is the set of all possible privately observed Stage 1 histories;*
- *Stage 2 bargaining strategies (ω_i, ρ_i) with*

$$\omega_i : H^2 \to \mathbb{R}, \qquad \rho_i : H^2 \times \mathbb{R} \to \{A, R\},$$

  where H^2 is the set of relationship histories for the meeting, which is common knowledge to the two parties in that meeting.

A semi-stationary equilibrium strategy profile $s = (\alpha_i, \omega_i, \rho_i)_{i\in\{w,f\}}$ satisfies:

1. ***(Semi-stationarity for new meetings).*** *For any newly formed meeting with history $h^n_t = (p_0)$, player i's Stage 2 strategies depend only on p_0 and not on their past market history or past relationships. In particular, for any two new meetings with the same initial proposer draw p_0, the offers and responses induced by the equilibrium strategy profile are the same.*

2. ***(Stage 2 optimality, conditional on attendance).*** *For every Stage 2 meeting history h:*

   - *If i is the implied proposer by h^2, then*

     $$\omega_i(h^2) \in \arg\max_{w \in \mathbb{R}} U_i\big(w \,\big|\, h^2, s\big),$$

     where $U_i(\cdot)$ denotes i's expected continuation payoff given the pairing process and Stage 1 attendance strategies.

   - *If i is the responder at h facing offer w, then*

     $$\rho_i(h^2, w) \in \arg\max_{r \in \{A,R\}} U_i\big(r \,\big|\, h^2, s\big).$$

3. ***(Stage 1 optimality).*** *For every Stage 1 history $h_i^1 \in H^1$,*

   $$\alpha_i(h_i^1) \in \arg\max_{a \in \{o,n,\varnothing\}} U_i\big(a \,\big|\, h_i^1,\, s\big).$$

4. ***(Consistency).*** *The beliefs embedded in $U_i(\cdot)$ about a counterpart's attendance are those induced by the i.i.d. pairing process and the attendance strategies (α_w, α_f).*

3.2 Equilibrium characterisation

Proposition 1 *Let $\lambda_w(\theta), \lambda_f(\theta) \in (0,1)$ satisfy Assumptions 1 and 2, and let θ be constant. For $N_v, N_u > 0$, $\mu \in (0,1)$, and $\delta \in (0,1)$, there exists a unique semi-stationary equilibrium $s = (\alpha_i, \omega_i, \rho_i)_{i \in \{w,f\}}$ such that:*

1. ***Stage 2 bargaining subgame.*** *Conditional on both parties attending a given meeting, the induced Stage 2 bargaining subgame has a unique equilibrium: only two offers are ever made on the equilibrium path, w_f^* when the firm proposes and w_w^* when the worker proposes, and each is accepted immediately. In particular, $w_f^* \leq w_w^*$, and for each role $i \in \{w, f\}$ the offer w_i^* makes the responder indifferent between accepting and rejecting.*

2. ***Stage 1 attendance.*** *In Stage 1, players attend any meeting if they have exactly one meeting scheduled. If they have two meetings scheduled, they attend the new meeting unless they are the proposer in the old meeting and the responder in the new meeting, in which case they attend the old meeting.*

3. ***Beliefs.*** *Beliefs about counterpart attendance are induced by the i.i.d. pairing process and the semi-stationary equilibrium strategy profile s described in parts 1 and 2.*

Moreover, the Stage 1 attendance choices described in part 2 are strictly dominant, ensuring uniqueness of the semi-stationary equilibrium.

Appendix A lays out the full proof of the equilibrium and its uniqueness. Here, I explain the main intuition.

Conditional on two parties showing up to a bargaining meeting, the two players play an alternating–offers bargaining game. Under the Stage 1 attendance behaviour characterised in part 2 of Proposition 1, the probability that the relationship survives to the next period after a rejection depends on the matching probabilities and on who is proposer or responder, but not on the precise wage offer made in that period. From the point of view of the proposer, the breakdown risk between successive offers is therefore an exogenous constant, so the Stage 2 subgame is isomorphic to the alternating–offers game with discounting and exogenous breakdown risk studied by Rubinstein (1982) and Binmore et al. (1986). In that subgame, the proposer makes the responder indifferent between accepting and rejecting, and the game ends with the proposer's equilibrium wage offer and immediate acceptance. Due to discounting and breakdown risk, the proposer can always secure a larger share of the surplus than they would obtain as a responder. Thus $w_w^* \geq w_f^*$: the worker obtains a higher wage if they are the proposer than if the firm is the proposer.

We are concerned with the states in which both players have two scheduled meetings, because these states determine the value of rejecting an offer. The attendance decisions in such states are obtained by iterated elimination of strictly dominated strategies, which yields a unique attendance pattern.

Suppose that a bargaining meeting takes place and the responder rejects the offer. In the next period, both players may be paired with new potential partners. In that case, each player compares two aspects of each possible meeting: (i) what they would obtain conditional on the partner showing up, and (ii) the probability that the partner shows up.

Since all equilibrium offers are immediately accepted once a meeting is attended, a player knows that a newly paired partner does not have an ongoing relationship. For that reason, a player who is the responder in the ongoing meeting and the proposer in the new meeting strictly prefers the new one. Anticipating this, the proposer in the old meeting prefers the new meeting whenever they are also the proposer there, since there is a non-zero probability that the ongoing partner leaves. This, in turn, implies that the responder in the ongoing meeting strictly prefers the new meeting even when they are also a responder there. Hence, if a player is the responder in the ongoing meeting, they always leave if paired with a new partner, and a proposer in the ongoing meeting leaves whenever they can also propose in the new meeting.

The only case in which the preference is not for the new meeting is when a player is the proposer in the old meeting and the responder in the new one. In this case, the difference in the surplus that can be secured by being the proposer rather than the responder outweighs the risk that the old partner may leave. In the next section, when we characterise the equilibrium values, we verify this condition explicitly. Furthermore, in Appendix A, I show that there cannot be an equilibrium in which proposers in an ongoing meeting choose the new meeting where they are the responder.

4 Equilibrium wage offers and surplus shares

This section explicitly characterises the equilibrium wage offers so that we can derive expressions of the equilibrium surplus shares.

In equilibrium, the wage that the firm offers w_f makes the worker indifferent between accepting and rejecting, and is characterised by the following indifference condition

$$V_e(w_f) = \delta\left[\lambda_w(1-\mu)V_e(w_w) + \Big(1-\lambda_w(1-\mu)\Big)[\lambda_f V_u + (1-\lambda_f)V_e(w_w)]\right] \tag{5}$$

The value of accepting w_f should be equal to the value of rejecting and waiting for one period to either find a new firm where the worker can make the offer with probability $\lambda_w(1-\mu)$, or attending the meeting with the old firm, which would result either in an agreement with wage offer w_w if the firm has not met anyone else in the meantime, with probability $(1-\lambda_f)$, or in unemployment if the firm met another worker and chose the latter, which happens with probability λ_f.

Taking out V_u from both sides so to obtain the surplus offered to the worker when the firm gets to make the offer, we get

$$S_w(w_f) = \delta\frac{(1-\lambda_f)(1-\lambda_w(1-\mu))}{1+\delta\lambda_w\mu}S_w(w_w) \tag{6}$$

The multiplicative term $\delta(1-\lambda_f)(1-\lambda_w(1-\mu))$ represents the discounted probability that the same pair continues to bargain in the next period. The denominator represents the foregone value of working at the wage that the firm offers w_f by not accepting at period t so to make a counteroffer, as well as not taking the offer w_f from another firm that the worker might period $t+1$.

Similarly, for the surplus that the worker proposes to the firm, we use the indifference condition to obtain

$$S_f(w_w) = \delta \frac{(1-\lambda_w)(1-\lambda_f \mu)}{1+\delta\lambda_f(1-\mu)} S_f(w_f) \tag{7}$$

We use the fact that the total surplus remains the same for any wage to express the worker surplus as a function of the firm surplus.

$$S_w(w_f) = \underbrace{\underbrace{\delta(\mathbf{1}-\boldsymbol{\lambda_f})}_{\text{survival prob.}} \underbrace{\frac{(1-\lambda_w(1-\mu))}{1+\delta\lambda_f(1-\mu)}}_{\text{outside option of counteroffer}} \underbrace{\frac{1-\delta\big(1-\lambda_f-\boldsymbol{\lambda_w}(\mathbf{1}-\boldsymbol{\lambda_f\mu})\big)}{1-\delta\big(1-\lambda_w-\boldsymbol{\lambda_f}(\mathbf{1}-\boldsymbol{\lambda_w}(\mathbf{1}-\boldsymbol{\mu}))\big)}}_{\text{cost of delaying}}}_{\frac{\beta_f}{1-\beta_f}} S_f(w_f). \tag{8}$$

and for the ratio of surpluses when $w = w_w$, we have

$$S_w(w_w) = \underbrace{\underbrace{\delta\frac{\mathbf{1}}{(\mathbf{1}-\boldsymbol{\lambda_w})}}_{\text{survival prob.}} \underbrace{\frac{\big(1+\delta\lambda_w\mu\big)}{(1-\lambda_f\mu)}}_{\text{outside option of counteroffer}} \underbrace{\frac{1-\delta\big(1-\lambda_f-\boldsymbol{\lambda_w}(\mathbf{1}-\boldsymbol{\lambda_f\mu})\big)}{1-\delta\big(1-\lambda_w-\boldsymbol{\lambda_f}(\mathbf{1}-\boldsymbol{\lambda_w}(\mathbf{1}-\boldsymbol{\mu}))\big)}}_{\text{cost of delaying}}}_{\frac{\beta_w}{1-\beta_w}} S_f(w_w). \tag{9}$$

where β_i reflects the worker surplus share or the worker bargaining power, when player i proposes the first price, and the firm's share is then $1-\beta_i$.

We can notice that the two surplus shares have a parallel structure. The shares reveal three ways in which market tightness determines bargaining power: discounted survival probability, opportunity cost of rejecting the deal for the responder, and the ratio of cost of bargaining for each party. The terms in bold are specific to our setting where players can be paired with other partners during negotiations, whereas the remaining terms appear in an alternating offers bargaining game where players are removed from the matching market while bargaining.

The first terms of Equation 8 and Equation 9 reflect the probabilities of the current proposer continuing to bargain after their offer has been rejected, respectively for w_f and w_w. When deciding whether to accept or reject, a responder takes into account that the current proposer might be unavailable in the next period. The discounting and the breakdown probability work in the favour of the party making the proposal, which is why it reduces the share of the worker in the first equation, and increases it in the second.

The second term represents the probability of finding the counteroffer in the matching market. When the worker rejects w_f to make the counteroffer w_w in the next period, each party forgoes the opportunity to secure the same deal with other players.

The third object is the ratio of costs of delaying the deal where the numerator reflects the cost for the firm, and the denominator for the worker. Higher the cost of delaying, lower is the bargaining power of that party.

The discounted term has two components. First, λ_f in the numerator and λ_w in the denominator reflect the foregone value of remaining a vacant job and unemployed worker respectively where the firm and the worker could have found another partner with whom they could start producing in the next period. Importantly, a player's cost of engaging in a bargaining game increases in own probability of meeting partners. This is the key mechanism of credible bargaining model of Hall and Milgrom (2008), in which players are completely removed from the labour market by assumption.

The second component of the third term, $\lambda_w(1-\lambda_f)$ in the numerator and $\lambda_f(1-\lambda_w(1-\mu))$ are the probabilities that when the player rejects, and wishes to make a counter offer, they are left without any parters because their current partner left and they did not find any new partner where they would make a proposal.

We observe that the relationship between market tightness and the bargaining power is rich and governed by several components that move in different directions as tightness increases. Prolonging bargaining when market conditions are favourable is a double-edged sword. The party with better outside options can credibly threaten to delay agreement because the opponent is unlikely to secure a replacement in the interim. At the same time, delaying agreement entails an opportunity cost: while bargaining continues, each party forgoes the possibility of immediately reaching an agreement with an alternative partner.

As a result, the effect of market tightness on equilibrium bargaining power is not straightforward. It depends on the relative strength of several channels—endogenous breakdown risk, the opportunity cost of delay, and the asymmetry between proposer and responder roles—which may reinforce or offset one another. In what follows, we study how these channels interact to determine the relationship between market tightness and bargaining power.

5 Bargaining Power and Market Tightness

This section studies how equilibrium bargaining power varies with market tightness. First, we analyse a symmetric benchmark in which firms and workers are equally likely to make the first offer. Doing so, we can isolate the role of market tightness as both types of agent are equal in all other aspects but the relative ease of finding a partner. This case also allows us to analytically derive the relationship between bargaining power and market tightness.

In the next step, I let the firms always make the first offer and show that the relative elasticities of pairing probabilities govern the sign of the relationship. Finally, we extend the analysis to general μ under standard pairing technologies and show numerically that the positive relationship between market tightness and worker bargaining power is persists under standard pairing functions and a realistic range of parameters.

In all three steps, I will let the discount factor approach one. We can thus abstract from bargaining frictions, and focus on the impact of labour market frictions and tightness.

5.1 Symmetric environment, $\mu = \frac{1}{2}$

The symmetric environment in which both players have the same probability of making the first offer serves as a natural benchmark. First, it demonstrates that asymmetric bargaining weights can emerge purely from market structure, without requiring any ex ante asymmetries between workers and firms. Second, it allows direct comparison with Rubinstein and Wolinsky (1985): while both models assume symmetric first-mover probabilities, allowing for endogenous meeting choices generates bargaining weights that depend on market structure and need not be equal. Third, the symmetric case yields tractable closed-form expressions that make it possible to characterise analytically how market tightness affects equilibrium bargaining power.

Plugging in $\mu = 1/2$, at the limit, the two surplus shares become:

$$lim_{\delta\to 1} \quad S_w(w_f) = \underbrace{\underbrace{(1-\lambda_f)}_{\text{survival prob.}} \quad \underbrace{\frac{1-\frac{\lambda_w}{2}}{1+\frac{\lambda_f}{2}}}_{\text{opp cost of rejection}} \quad \underbrace{\frac{\lambda_f+\lambda_w-\frac{\lambda_f\lambda_w}{2}}{\lambda_f+\lambda_w-\frac{\lambda_f\lambda_w}{2}}}_{\text{cost of delay}}}_{\frac{\beta_f}{1-\beta_f}} S_f(w_f), \tag{10}$$

$$S_w(w_w) = \underbrace{\underbrace{\frac{1}{(1-\lambda_w)}}_{\text{survival prob.}} \quad \underbrace{\frac{1+\frac{\lambda_w}{2}}{(1-\frac{\lambda_f}{2})}}_{\text{opp cost of rejection}} \quad \underbrace{\frac{\lambda_f+\lambda_w-\frac{\lambda_f\lambda_w}{2}}{\lambda_f+\lambda_w-\frac{\lambda_f\lambda_w}{2}}}_{\text{cost of delay}}}_{\frac{\beta_w}{1-\beta_w}} S_f(w_w) \tag{11}$$

Notice that the cost of delay terms is the same for both parties in this case, so that the last term is independent of market tightness and is equal to 1.

We can then derive the worker bargaining power as

$$lim_{\delta \to 1} \quad \beta_f = \frac{(2-\lambda_w)(1-\lambda_f)}{3+(1-\lambda_f)(1-\lambda_w)} \tag{12}$$

$$lim_{\delta \to 1} \quad \beta_w = \frac{2+\lambda_w}{3+(1-\lambda_f)(1-\lambda_w)} \tag{13}$$

The equilibrium object we are interested in is the expected or the average surplus share of each party. We let $\bar{\beta}$ be the average worker bargaining power given by

$$\bar{\beta} = \mu\beta_f + (1-\mu)\beta_w = \frac{1}{2}\left(1 + \frac{\lambda_w - \lambda_f}{3+(1-\lambda_f)(1-\lambda_w)}\right) \tag{14}$$

We can notice that the bargaining power of each party is equal to $\frac{1}{2}$ if and only if $\lambda_f = \lambda_w$. Since the denominator is a positive number, we can also see that when the probability for the worker to find other employers is higher than that of the firm, the bargaining power is higher for the worker and vice versa for the firm.

The denominator scales the extent to which differences in meeting probabilities translate into differences in bargaining power. The term $(1-\lambda_f)(1-\lambda_w)$ is the probability that neither party finds an alternative partner between bargaining rounds and therefore captures the degree of frictions in the labour market. In highly inefficient markets, even large asymmetries in market tightness translate into limited bargaining power differences. By contrast, when matching is sufficiently efficient so that at least one party is likely to find an alternative partner between rounds, the effect of market structure on bargaining outcomes becomes stronger.

As we have mentioned before, λ_w and λ_f are functions of market tightness, defined as $\theta = \frac{N_v}{N_u}$. Therefore, average worker share of the total surplus is a function of market tightness.

Corollary 1 *When $\mu = \frac{1}{2}$, the average worker bargaining power in the economy, $\bar{\beta}(\theta)$ is strictly increasing in market tightness θ.*

Proof. $\bar{\beta}$ is a monotonically increasing function of θ if and only if

$$\frac{\lambda'_w - \lambda'_f}{\lambda_w - \lambda_f} > \frac{-\lambda'_w - \lambda'_f + \lambda_f\lambda'_w + \lambda_w\lambda'_f}{4 - \lambda_f - \lambda_w + \lambda_f\lambda_w}$$

$$\lambda'_w(2-\lambda_f) > \lambda'_f(2-\lambda_w)$$

which is always true for any $\lambda'_w(\theta)$ positive, $\lambda'_f(\theta)$ negative, and $0 \leq \lambda_w(\theta), \lambda_f(\theta) \leq 1$.

■

We have shown that the average bargaining power in this economy increases with market tightness. In a tight labour market, a worker can more comfortably reject the first offer as they know that the firm is less likely to find another unemployed worker upon a rejection. Likewise, when they make an offer, they know that if the firm rejects, they can easily find a new firm. This mechanism pushes up not only the wage but also the overall surplus share of the worker.

5.2 Asymmetric environment: role of relative elasticities

Unlike the symmetric environment we studied, in the environment characterised by asymmetric first mover probabilities, cost of delaying the bargain is generally different for workers than it is for firms. The sign of the relationship ultimately depends on whether a tighter market decreases the risk of firm finding another partner at a higher rate than it increases the opportunity cost of delaying the agreement for the worker. In other terms, the relative elasticities of the pairing probabilities for the two parties govern sign of the relationship.

To illustrate this point analytically, let us focus on the case in which firms always make the first offer so that $\mu = 1$. The only wage in equilibrium is w_f, and it is characterised by the following surplus sharing equation:

$$lim_{\delta \to 1} \quad S_w(w_f) = (1 - \lambda_f) \frac{\lambda_f + \lambda_w (1 - \lambda_f)}{\lambda_f + \lambda_w} S_f(w_f). \tag{15}$$

Taking the derivative of the ratio of the surplus shares with respect to θ and rearranging to see the sign, we obtain

$$-\varepsilon_w \lambda_f - \varepsilon_f \lambda_w - \frac{\lambda_f'}{1 - \lambda_f} (\theta + 1)(\theta + 1 - \lambda_w) \overset{?}{\geq} 0$$

where ε_f and ε_w are respectively the elasticities of vacancy filling probability and job finding probability with respect to market tightness, and λ_f' the derivative of vacancy filling probability. When this expression is positive, worker's share of the surplus increases with market tightness. Essentially, the absolute value of the responsiveness of vacancy filling probability given by ε_f and the rate of change in firm leaving probability $1 - \lambda_f$ needs to be sufficiently high relative to the elasticity of job finding probability. In that case, the decrease in the breakdown risk due to firm leaving dominates the increase in the worker's cost of delaying the agreement.

A knife-edge case In the next section, I parametrise the pairing function and show that this relationship is positive under standard pairing functions and reasonable elasticities.

Before doing so, we study one case under which the relationship is negative to highlight the importance of relative elasticities.

Consider an inefficient Leontief matching technology,

$$M(u,v) = m \min(u,v),$$

where the parameter $m < 1$ reflects the level of frictions in the market.

This specification differs from the standard matching functions in that meeting probabilities may become locally insensitive to market tightness. For $\theta < 1$, the firm's meeting probability is constant at m, while the worker's meeting probability increases with tightness. For $\theta > 1$, the reverse holds: the worker's meeting probability is always m and does nor respond to tightness, while the firm's meeting probability declines.

Let us focus on the case where there are more workers than there are firms such that $\theta < 1$. Using Equation 8 and plugging in the pairing probabilities and letting the discount factor approach one, we can write the equilibrium surplus shares

$$S_w(w_f) = (1-m)\frac{\theta(1-m)+1}{\theta+1} S_f(w_f)$$

It can be easily verified that the coefficient is a decreasing function of market tightness. The reason is the following: Under a Leontief pairing function, when θ is smaller than 1, the firm's risk of walking away is locally flat in tightness, while the worker's opportunity cost of delay rises with tightness. The latter effect dominates, creating a negative relationship between worker bargaining power and market tightness.

Figure 1 shows how average bargaining power changes with market tightness for different values of μ. As we argued above, when firms always make the first offer, $\mu = 1$, the sign of the derivative is negative whenever θ is smaller than 1. By contrast, when workers make the first offer, the relationship is negative for θ larger than 1, since in this case, the relevant breakdown probability is the job finding probability and it is flat in this region. Finally, we confirm the result of Corollary 1 as the bargaining weight is monotonically increasing in market tightness for equal first mover probability, $\mu = 0.5$.

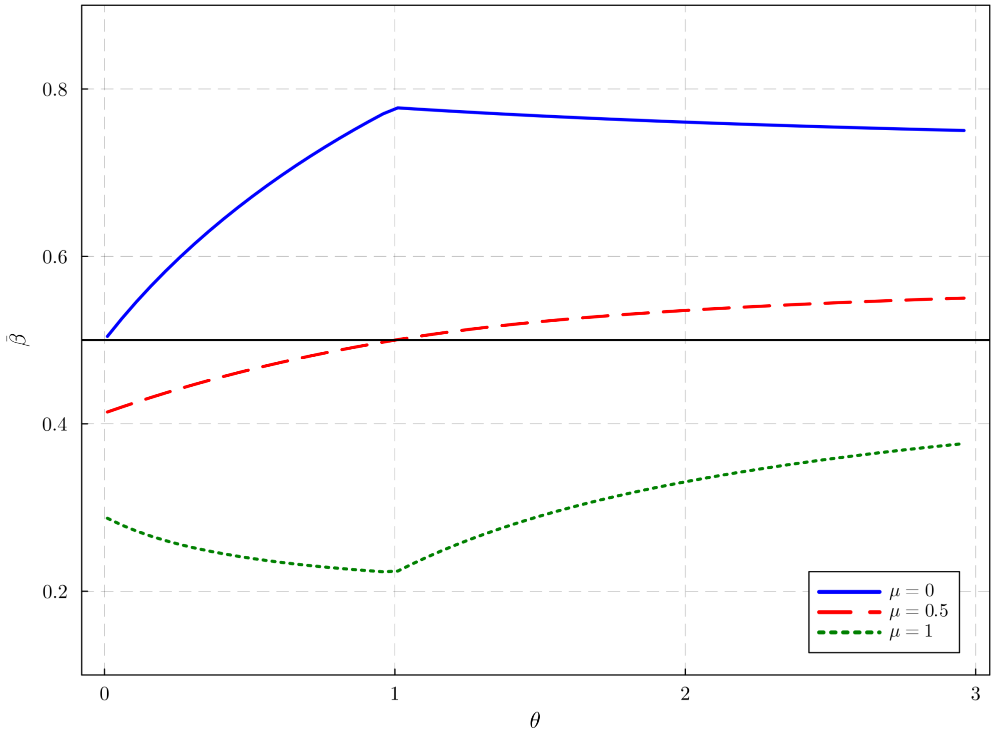

Figure 1: Average worker bargaining power $\bar{\beta}(\theta)$ as a function of market tightness $\theta = N_v/N_u$ for different values of the firm's first-mover probability μ under inefficient Leontief pairing technology.

5.3 Numerical analysis for any μ

We now extend the analysis to environments in which the probability of making the first offer is asymmetric, $\mu \in (0, 1)$. In this general case, equilibrium bargaining power reflects the interaction of several channels whose combined effect does not admit a tractable closed-form derivative with respect to market tightness. To study how market tightness affects bargaining power for different values of μ, we therefore analyse the weighted average of the surplus shares derived in Equations 8 and 9 numerically.

I parametrise the pairing technology using a Cobb–Douglas matching function, $M(u, v) = m\, u^{\alpha} v^{1-\alpha}$. In the baseline calibration, we set $m = 0.3$ and $\alpha = 0.5$, implying symmetric matching elasticities for workers and firms.

We now illustrate these results numerically. Figure 2 plots the average worker bargaining power $\bar{\beta}(\theta)$ as a function of market tightness $\theta = N_v/N_u$ for different values of the firm's first-mover probability μ.

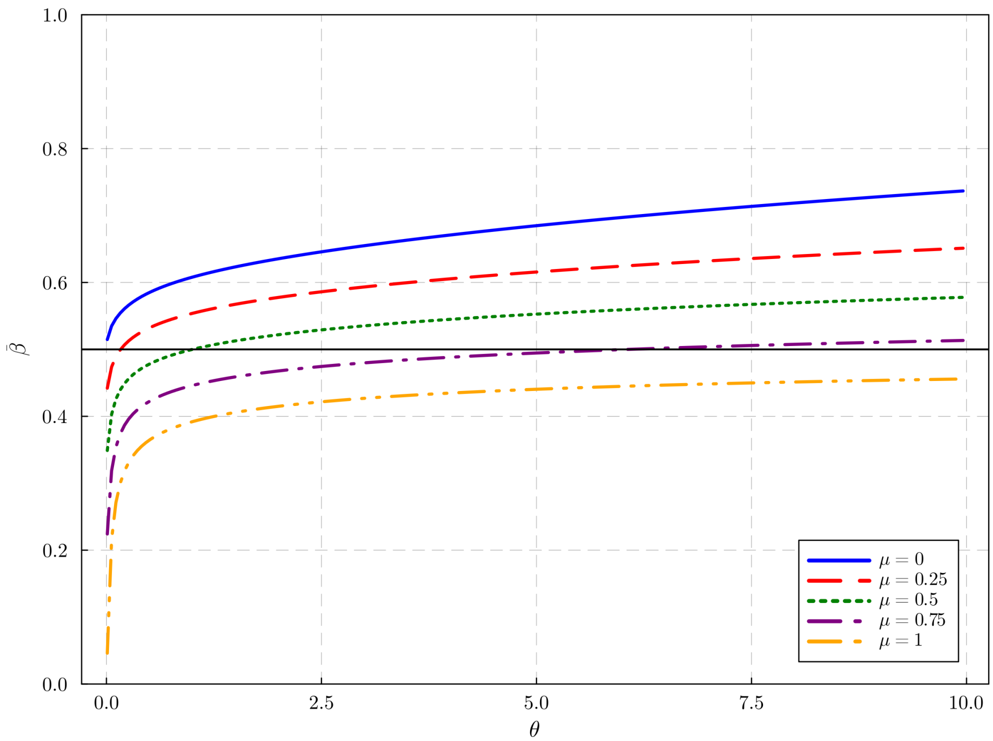

Figure 2: Average worker bargaining power $\bar{\beta}(\theta)$ as a function of market tightness $\theta = N_v/N_u$ for different values of the firm's first-mover probability μ.

Several patterns emerge. First, worker bargaining power is increasing in market tightness for all values of μ. This shows that the positive relationship established analytically in the symmetric benchmark extends to environments with asymmetric first-mover probabilities under standard Cob-Douglas pairing technology. Second, the relationship exhibits diminishing returns at high levels of tightness, reflecting the concavity of the matching function. Third, the first-mover probability μ primarily shifts the level of bargaining power: as firms become more likely to propose first, worker bargaining power declines uniformly across all levels of tightness.

Finally, μ determines the asymptotic bounds of surplus sharing. When firms always make the first offer, worker bargaining power approaches zero in very slack labour markets and converges to one half as markets become sufficiently tight. When workers are more likely to propose, the opposite holds. Importantly, while first mover probabilities shape bounds, market tightness determines the bargaining power within those bounds.

Robustness. The qualitative patterns in Figure 2 are robust to a range of alternative parameterisations of the pairing technology. Increasing matching efficiency m primarily affects the speed at which $\bar{\beta}'(\theta)$ approaches its limiting values: higher m steepens the relationship but does not alter monotonicity or the asymptotic bounds.

As we explored above, the elasticity parameter α plays an important role. For empirically standard values of α under Cobb–Douglas matching, $\bar{\beta}(\theta)$ is increasing in market tightness for all μ. When α becomes very small, however, meeting probabilities become almost unresponsive to tightness for one side of the market. In this region, the comparative statics can flip sign for extreme proposer asymmetries (notably μ close to one), but the implied slope is quantitatively negligible, as $\bar{\beta}'(\theta)$ is effectively flat-[2] Overall, a monotonically positive relationship between market tightness and worker bargaining power emerges as the generic prediction under standard pairing technologies and empirically plausible elasticities.

6 Bargaining Power and Frictionless Economy

A natural question is how the equilibrium outcome changes as frictions associated with pairing technology and bargaining protocol approach to zero, and if it approaches the competitive equilibrium outcome. Unlike existing bargaining frameworks, equilibrium outcomes of this model can replicate competitive market allocations as frictions vanish. In models with fixed bargaining weights—including both exogenously imposed weights and those microfounded by Rubinstein and Wolinsky (1985)— workers always capture a positive share of surplus regardless of market conditions. Our model shows this need not hold when attendance decisions are endogenous.

The friction in the bargaining protocol comes from the time cost associated with it, which is why it is common to analyse the equilibrium with discount factor approaching one, i.e. with time intervals between bargaining rounds becoming infinitely small.

The second friction is related to pairing technology. In a frictionless economy where buyers can purchase at maximum one indivisible good, the entire surplus is appropriated by sellers if there are more buyers than sellers, and by buyers otherwise. Rubinstein and Wolinsky (1985) show that their equilibrium outcome is quite different as both sides always share surplus equally. This result is partially due to the fact that both sides have equal probabilities of making an offer. Indeed, also in the present setting, when probability of making the first offer is $\frac{1}{2}$ for both parties, no one party can appropriate the entire surplus.

However, as we have discussed in the previous section, the first mover probability plays a key role in defining the bounds of surplus shares. Particularly for labour markets, it is natural to think of firms as those that make the first offer. As we will show, when this probability approaches one such that firms almost always make the first offer, the equilibrium wage reflects monopsony outcome whenever there are less firms than unemployed workers at the

[2]Appendix B reports these results and shows that the same conclusion obtains under CES pairing functions.

limit of the frictionless economy.

We will first define a pairing function that defines the frictionless economy which will be an efficient Leontief function. We then will analyse the worker bargaining power when μ approaches one, to show that these limiting case can accommodate for monopsony. This result is intuitive but it would not occur in a bargaining game where the players cannot continue their search. In that case, even if one party is sure to make the first offer, the equilibrium outcome does not reflect the competitive equilibrium.

Definition 2 (Frictionless economy) *A frictionless economy is characterised by the pairing function $M(N_u, N_v) = min(N_u, N_v)$, as well as the length of a time period approaching 0.*

This pairing function characterises the frictionless economy as one cannot improve upon the number of pairings that take place. If there are less unemployed workers than vacant jobs, the number of pairings is equal to the number of workers and all workers are paired with a vacant job. The situation cannot be improved upon. Converse is true when there are less jobs than there are workers. Finally, in the frictionless economy, the transition from the labour market to the production should not take time. We can model this by taking the discount factor to 1, which we had been doing.

When the probability that the firm moves first approaches one, the equilibrium wage will approach w_f^* and yield the following surplus for the worker

$$S_w(w_f) = \underbrace{\big(1 - \lambda_f(\theta)\big)}_{\text{breakdown probability}} \underbrace{\frac{\lambda_f(\theta) + \lambda_w(\theta)(1 - \lambda_f(\theta))}{\lambda_w(\theta) + \lambda_f(\theta)}}_{\text{ratio of costs of delay}} S_f(w_f) \tag{16}$$

$$= \left(1 - \lambda_f(\theta) - \frac{\lambda_w(\theta)\lambda_f(\theta)(1 - \lambda_f(\theta))}{\lambda_w(\theta) + \lambda_f(\theta)}\right) S_f(w_f) \tag{17}$$

In the frictionless economy, whenever there are less firms than workers, we would have that $\lambda_f(\theta) = 1$. When firms almost certainly make the first offer, the surplus of the worker collapses to zero, and the entire surplus is appropriated by the firm. This is the monopsony outcome.

It can be easily shown that whenever workers, i.e. buyers make the first offer, the inverse is true, and the bargaining outcome approaches the monopoly wage where the workers earn their full productivity.

7 Conclusion

This paper establishes that bargaining power in frictional markets is determined by market tightness. When markets are slack, firms can credibly threaten to find replacement workers while negotiations are ongoing, and when markets are tight, workers hold this advantage. The equilibrium relationship is unambiguously positive under standard matching technologies: tighter markets increase workers' share of the surplus. As frictions vanish, the model approaches the monopsony outcome when firms make initial offers in slack markets and workers' surplus share collapses to zero. Models that impose fixed bargaining weights cannot generate this limit.

The main result suggests that a decline in market tightness as well as an increase in market concentration could be the driver of the decline in worker bargaining power observed in the recent decades in Western economies. This hypothesis is in line with recent work looking at the determinants of decline in worker surplus share, finding that increased market power, offshoring and automation are the key determinants (Elsby et al., 2013; Bergholt et al., 2022). This paper provides an explanation for this relationship as these developments are associated with a decline in labour demand, and hence market tightness.

The model yields predictions that can be taken to data. Workers' share of match surplus should covary positively with the vacancy-unemployment ratio across local labour markets and over time. In ongoing work, I test this relationship empirically, using a shift-share instrument for market tightness to address the endogeneity between labour market conditions and bargaining outcomes.

Several theoretical extensions merit investigation. As we have seen, first mover probability can play an important role in shaping bargaining outcomes. We have treated this probability as exogenous, as commonly done in the literature. The interaction between first mover advantage itself with the market tightness is certainly an important and promising question. Secondly, in this paper, we focused on a stationary environment in which market tightness is kept constant through inflows to the matching market that offset the outflows. Integrating the present setting into a general equilibrium environment with endogenous entry decisions would be an interesting avenue for future research.

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A Appendix: Equilibrium existence and uniqueness

This appendix establishes existence and uniqueness of the symmetric stationary sequential equilibrium in Proposition 1. The argument has two parts. First, I argue that the Stage 2 bargaining subgame is equivalent to an alternating–offers game with exogenous breakdown risk and hence admits the same equilibrium as in Rubinstein (1982); Binmore et al. (1986) (Lemma 1). Second, I characterise Stage 1 attendance decisions by iterated elimination of strictly dominated strategies (Lemmas 2–4), which pins down a unique stationary attendance rule.

We restrict attention to stationary equilibria in which Stage 2 wage offers and acceptance rules do not on past wage offers. This leads to Stage 1 attendance rules to depend only on the probability of the partner showing up and whether the player proposes or responds in a given relationship. This is the class of strategies described in Proposition 1.

Stage 2: Rubinstein subgame

Lemma 1 (Stage 2 bargaining) *Let θ be constant and fix a stationary attendance strategy in Stage 1. Conditional on both parties attending a given meeting, the Stage 2 subgame is isomorphic to the alternating–offers bargaining game of Rubinstein (1982) with discounting and exogenous breakdown risk. It admits a unique subgame perfect equilibrium in which only two wages are offered, w_f^* when the firm is the first mover and w_w^* when the worker moves first, and each is accepted immediately. The proposer's wage makes the responder indifferent between accepting and rejectig.*

Proof. Given a stationary attendance rule that depends only on the state, the probability that a relationship survives upon a rejection does not depend on the current wage offer. From the standpoint of Stage 2, breakdown risk is thus exogenous.

The Stage 2 subgame is the Rubinstein alternating offers bargaining game with discounting and an exogenous probability of breakdown between rounds. By Rubinstein (1982) and Binmore et al. (1986), there is a unique subgame perfect equilibrium with immediate agreement. The proposer's surplus is larger than the responder's, implying that the wage that the firm proposes is smaller than the worker's proposal, i.e. $w_f^* \leq w_w^*$. ■

Let $S_w(w) := V_e(w) - V_u$ and $S_f(w) := J(w) - V$ denote worker and firm surplus from an accepted wage w. Lemma 1 implies $S_w(w_w^*) > S_w(w_f^*)$ and $S_f(w_f^*) > S_f(w_w^*)$ whenever production generates strictly positive surplus.

Stage 1: attendance decisions

When at most one meeting is scheduled, the attendance decision is trivial. When two meetings are scheduled, the player must choose between old and new. Given that they can be proposer or responder in each, there are four payoff relevant states.

Lemma 2 (Single meeting states) *In any stationary equilibrium, a player with exactly one scheduled meeting in Stage 2 attends that meeting with probability one.*

Proof. Conditional on attendance by both parties, Lemma 1 implies that bargaining yields a positive surplus to each side, while not attending leaves the player with the value of unemployment or a vacancy so zero surplus. Attending dominates not attending, so the unique best response is to attend with probability one. ■

By Lemma 2, a newly paired partner who has only one meeting always attends the new meeting in equilibrium.

We now consider the four two–meeting states:

(S2) receiver in old, proposer in new;

(S3) proposer in both;

(S4) receiver in both;

(S5) proposer in old, receiver in new.

Lemma 3 (States (S2)–(S4)) *In any symmetric stationary equilibrium, attendance in two meeting states (S2)–(S4) is uniquely determined as follows:*

(S2) receiver in old, proposer in new: attend the new meeting;

(S3) proposer in both: attend the new meeting;

(S4) receiver in both: attend the new meeting.

Proof. (S2). As responder in the old meeting the player receives the responder surplus, while as proposer in the new meeting they receive the proposer surplus. By Lemma 1, the latter is strictly larger. Moreover, by Lemma 2 the new partner attends with probability one. Hence the new meeting strictly dominates the old one.

(S3). In this case the player is proposer in both meetings. By Lemma 2, the new partner attends with probability one. The old partner may leave if they are in state (S2) and obtain a new pairing. Thus the probability that the counterpart attends is strictly larger in the new meeting, so the new meeting strictly dominates.

(S4). In this case the player is responder in both meetings. Again, the new partner attends with probability one, while the old partner may leave for a new meeting if they are in state (S3). The new meeting strictly dominates the old one. ■

Lemmas 2–3 imply that a player always leaves an old meeting if they are responder there and obtain a new match, and also leaves if they are proposer in both old and new. The only remaining state is (S5): proposer in the old meeting and responder in the new.

State (S5): proposer in old, responder in new

In state (S5) the player compares being proposer in an old meeting, which may break down if the partner leaves with being responder in a new meeting whose partner always attends.

A worker in state (S5) weakly prefers the old meeting if

$$(1-\lambda_f)V_e(w_w^*) + \lambda_f V_u \;\geq\; V_e(w_f^*), \tag{18}$$

or equivalently, substracting V_u from both sides

$$(1-\lambda_f)S_w(w_w^*) \;\geq\; S_w(w_f^*), \tag{19}$$

and a firm weakly prefers the old meeting if

$$(1-\lambda_w)S_f(w_f^*) \;\geq\; S_f(w_w^*). \tag{20}$$

In Equations 6 and 7 in the main text, we see that these conditions hold, hence attending the old meeting is optimal in (S5).

The following lemma shows that the opposite inequalities cannot hold in any symmetric stationary equilibrium.

Lemma 4 (State (S5)) *No symmetric stationary equilibrium can feature a strategy in which a player in state (S5) attends the new meeting. In the symmetric stationary equilibrium of Proposition 1, players in (S5) attend the old meeting.*

Proof. *Worker.* Suppose, towards contradiction, that the worker strictly prefers the new meeting in (S5), so

$$(1-\lambda_f)S_w(w_w^*) \;<\; S_w(w_f^*). \tag{21}$$

Under this attendance rule, the worker's indifference condition when receiving w_f^* becomes

$$V_e(w_f^*) \;=\; \delta(\lambda_w \mu V_e(w_f^*) + \lambda_w(1-\mu)V_e(w_w^*) + (1-\lambda_w)(\lambda_f V_u + (1-\lambda_f)V_e(w_w^*))) \tag{22}$$

which can be written as

$$S_w(w_f^*) \;=\; \delta(1-\lambda_w)(1-\lambda_f)\, S_w(w_w^*), \tag{23}$$

where $\delta \in (0,1)$ is the discount factor. Combining (21) and (23) gives

$$(1-\lambda_f)S_w(w_w^*) \;<\; \delta(1-\lambda_w)(1-\lambda_f)\, S_w(w_w^*),$$

which simplifies to

$$1 \;<\; \delta(1-\lambda_w),$$

a contradiction for any $\delta \in (0,1)$ and $\lambda_w \in [0,1)$. Hence the worker cannot strictly prefer the new meeting in (S5) in any symmetric stationary equilibrium.

Firm. An analogous argument applies to the firm. Suppose that the firm strictly prefers the new meeting in (S5), so

$$(1-\lambda_w)S_f(w_f^*) \;<\; S_f(w_w^*). \tag{24}$$

The firm's indifference condition when receiving w_w^* then implies

$$S_f(w_w^*) \;=\; \delta(1-\lambda_f)(1-\lambda_w)\, S_f(w_f^*), \tag{25}$$

so that

$$(1-\lambda_w)S_f(w_f^*) \;<\; \delta(1-\lambda_f)(1-\lambda_w)\, S_f(w_f^*),$$

which simplifies to $1 < \delta(1-\lambda_f)$, again impossible for $\delta \in (0,1)$ and $\lambda_f \in [0,1)$. Thus the firm cannot strictly prefer the new meeting in (S5) either.

Both cases rule out attendance at the new meeting in (S5). Together with (19)–(20), this implies that in the symmetric stationary equilibrium players in (S5) attend the old meeting. ∎

B Additional robustness: low matching elasticity

Figure 3 illustrates the case of a very low matching elasticity, $\alpha = 0.05$. In this region, tightness has limited effect on meeting probabilities for one side of the market, which compresses the magnitude of the bargaining-power comparative statics. Consistent with the discussion in the main text, $\bar{\beta}(\theta)$ can exhibit a slightly negative slope when firms are almost surely the initial proposer (μ close to one). Importantly, this negative relationship is quantitatively small: the variation in $\bar{\beta}(\theta)$ over the full range of θ is minor, and the derivative $\partial\bar{\beta}(\theta)/\partial\theta$ is much smaller than under standard elasticities. Hence the economically relevant conclusion is not that tightness reverses bargaining power, but that tightness becomes largely *irrelevant* for bargaining outcomes when α is near zero.

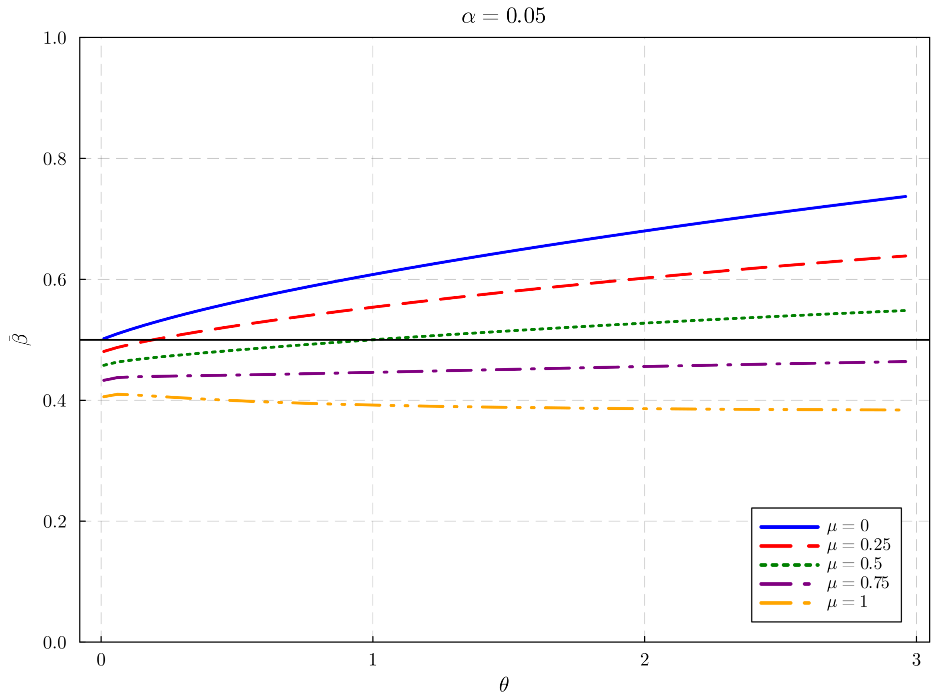

Figure 3: Average worker bargaining power $\bar{\beta}(\theta)$ as a function of market tightness θ for different values of the firm's first-mover probability μ, under a Cobb–Douglas pairing technology with low matching elasticity $\alpha = 0.05$.