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Polarization, Purpose and Profit

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Keywords: Labor Markets, Job Design, Compensating Differentials, Socially Responsible Investment, Polarization

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1 Introduction

Many workers want their jobs to have a higher purpose (e.g., "changing the world," "saving the planet," "helping people," "promoting diversity and inclusion," etc). Some also care about what the job does and how it is done (e.g., how sustainable their jobs are, how socially responsible the company is, how it stands on controversial political issues, etc.). Purpose, sustainability, social responsibility, political stances, and working conditions in general (e.g., flexible working arrangements, health and safety, etc.) are all examples of nonpecuniary job attributes that may be valuable to workers.

An empirical literature shows that workers are willing to pay for desirable job attributes. Sorkin (2018) shows that *compensating differentials* (i.e., wage premiums or discounts that compensate workers for negative or positive nonpecuniary job attributes) account for two-thirds of the firm component of the variance of earnings.[1] Some of these desirable attributes result from firms' social and environmental decisions or, more generally, their social responsibility stances. Krueger, Metzger, and Wu (2023) find that workers earn nine percent lower wages in firms that operate in more sustainable sectors. In a field experiment, Colonnelli et al. (2023) find that job applicants value ESG characteristics at about ten percent of average wages, which is more than what applicants value most other nonwage amenities.[2] There is also significant heterogeneity in workers' preferences for nonpecuniary job attributes. In a review article, Cassar and Meier (2018) conclude that "*not everyone cares about having a meaningful job (...) heterogeneity in preferences for meaning is substantial.*"[3]

[1]Further evidence of compensating differentials can be found in Stern (2004), Mas and Pallais (2017), Focke, Maug, and Niessen-Ruenzi (2017), Wiswall and Zafar (2018), Sockin (2022), and Ouimet and Tate (2022), among others.

[2]Hedblom, Hickman, and List (2019) find that advertising as a CSR firm increases job application rates by 24%. Similarly, Cen, Qiu, and Wang (2022) find that CSR investments improve employee retention.

[3]Krueger et al. (2023) find that about half of survey participants are willing to accept a wage cut to work for a more environmentally sustainable firm. Colonnelli et al. (2023) document that job applicants' ESG preferences vary with education, ethnic background, and political leanings. Hedblom et al. (2019) find that heterogeneous preferences for CSR cause workers to vary by their propensity to select different jobs.

We present a model in which firms choose the characteristics of their jobs. Firms compete for workers who have a taste for a nonpecuniary job attribute. We call this attribute *s-quality*. *S*-quality may refer to job purpose or meaning, job sustainability, the ES/CSR attributes of the job, a firm's political stance, working conditions, or any other positive job attribute with the following two features. First, workers vary in their willingness to pay for *s*-quality. Second, some investors (e.g., socially responsible investors) may also have preferences over *s*-quality levels in their portfolio firms.

Our model is based on Rosen's (1986) "equalizing differences" framework. The model has no frictions: competition is perfect, information is symmetric, capital is plentiful, risk sharing is perfect, and there are no agency problems, incentive issues, or financial constraints. We make these assumptions not for realism but to show that the results are theoretically robust. Thus, the model can be used as a benchmark to assess whether frictions are needed to explain existing or future evidence. Similar to models of the assignment of heterogeneous workers to firms, jobs, or tasks (see, e.g., Tinbergen (1956), Sattinger (1993), and Garicano and Rossi-Hansberg (2006)), our model considers the efficient allocation of workers to (endogenously) different firms. Similar to models of sustainable investment in which investors have preferences for some nonpecuniary characteristics of their portfolio firms (see, e.g., Heinkel, Kraus, and Zechner (2001), Pástor, Stambaugh, and Taylor (2021), and Pedersen, Fitzgibbons, and Pomorski (2021)), our model also considers the efficient allocation of heterogeneous investors to firms. Thus, our model integrates firms' real and financial sides in a simple competitive assignment framework.

The model is as follows. Entrepreneurs develop or acquire technologies that allow them to create firms that offer jobs of varying *s*-quality levels. Technologies differ in *flexibility*: Entrepreneurs who adopt more flexible technologies can offer jobs with a broader range of *s*-quality than those adopting less flexible technologies. That is, more flexible technologies are more valuable. Firms compete for workers by offering contracts specifying a wage and an *s*-quality level. A high-quality job is expensive for the firm. For example, if workers prefer environmentally sustainable jobs, the firm may choose lowemission technologies even when they are not cost-efficient.

Technological flexibility allows a firm to tailor its job characteristics to the preferences of its workers. Thus, flexibility is a lever that a firm can use to increase the surplus from a match. In Rosen's model, flexible technologies are available to all firms at no cost. In contrast, we consider the case in which flexible technologies are costly to develop or acquire. Thus, it is not profitable for firms to cater to all types of workers. While some workers are willing to accept significant wage cuts in exchange for better levels of s-quality, others may not be willing to make wage concessions for s-quality. The question is then: Which workers will work for more flexible firms?

We show that if flexible technologies are scarce (i.e., costly to develop), firms cater to workers with extreme preferences. Our main result is that, in equilibrium, more flexible firms are more polarized than less flexible ones. That is, more flexible firms hire workers with either strong or weak preferences for s-quality. Because flexibility is scarce, it should be allocated to those who value it the most: Workers with the most extreme types. We also show that firms become more polarized when flexible technologies are costlier to develop. More polarized sectors are more concentrated and have higher profits, lower average wages, and a reduced labor share of value added.

Our model predicts firm polarization as an equilibrium outcome. Polarization may occur for any characteristic that employees value. An emerging empirical literature studies firm polarization in social and political stances. Di Giuli and Kostovetsky (2014) find an association between stakeholders' political views and firms' CSR policies. Conway and Boxell (2023) show that firms' public stances on controversial social issues align with the preferences of their consumers and employees. Giannetti and Wang (2023) show that heterogeneity in corporate cultures explains differences in corporate reactions to heightened public attention to gender equality. Colonnelli, Pinho Neto, and Teso (2022), Fos, Kempf, and Tsoutsoura (2023), and Duchin et al. (2023) analyze some of the economic consequences of firm political polarization. Steel (2024) provides evidence of growing polarization in the political preferences of companies and their executives. Our model implies that firms not only reflect but also *amplify* the already polarized political preferences of the general population.

The model delivers several additional empirical predictions. It predicts that firms should be more valuable in sectors with high cross-sectional polarization in s-quality levels. More polarized sectors should also have lower average wages and labor shares of value added. Within a sector, all else held constant, wages decrease with s-quality. Thus, polarization in s-quality should be positively related to wage polarization.

After modeling the labor market, we introduce financial markets. Entrepreneurs can sell shares of their firms to outside investors. There are two types of investors: profit-driven investors and socially responsible investors. Profit-driven investors care only about the financial return on their shares. Socially responsible investors are willing to sacrifice some financial gains to invest in companies with positive job attributes. Socially responsible investors may directly care about job quality because they prefer investing in companies offering better job conditions. They may also care about job quality indirectly if they share some of their employees' values, such as a concern for sustainability, environmental responsibility, or political activism.

We show that financial markets and labor markets interact. Introducing socially responsible investors increases firms' investment in flexible technologies, expanding labor demand and benefiting workers. Socially responsible investors also impact the s-quality levels of their portfolio firms.

The model generates cross-section relationships between employee satisfaction, firm value, and stock returns. While the link between employee satisfaction and stock returns does not need to be monotonic, the model implies that firms with the highest levels of employee satisfaction also deliver the highest returns. Similarly, firms with the lowest levels of employee satisfaction have the lowest returns. Edmans (2011) shows evidence that employee satisfaction is positively related to stock returns. His explanation is that the market does not fully recognize the value of intangibles. Our model provides an alternative explanation that does not require any friction or mispricing. This is not to say that frictions cannot explain some (or even all) of the evidence. Instead, the model illustrates that a link between employee satisfaction and stock returns can arise even without frictions. Edmans, Pu, Zhang, and Li (2024) show that the positive link between employee satisfaction and stock returns is stronger in countries with flexible labor markets. This finding is also consistent with our model of competition in a frictionless labor market.

In Section 2, we present our setup and the efficient benchmark. We present our main analysis of the equilibrium in Section 3. In Section 4, we present additional empirical predictions by solving a parameterized version of the model. Section 5 introduces outside investors. We briefly review the related theoretical literature in Section 6. Section 7 concludes. All proofs not in the text are in the Appendix. The Internet Appendix presents several extensions and generalizations.

2 Model

2.1 Preferences

We consider an economy with a continuum of agents of two types: *entrepreneurs* and *workers*, with masses $F > L$, respectively.[4] Entrepreneurs are pure profit maximizers.

Workers care about two attributes of their jobs: the wage (w) and the job's *s-quality* (or *s-attribute*, s). A worker of type $i \in \{1, ..., n\}$ has utility $u^i(s, w)$ over wages and the s-attribute. For simplicity of exposition, we assume a linear function: $u^i(s, w) = \varepsilon_i + \alpha_i s + (1 - \alpha_i)w$, where $\alpha_i \in (0, 1)$ measures the worker's relative taste for the s-attribute and $\varepsilon_i > 0$ is an exogenous (monetary) endowment.[5] To save on notation, we let the utility function "absorb" the endowment parameter, which is equivalent to setting $\varepsilon_i = 0$.

The linearity of preferences simplifies the analysis but is not necessary for the results. In the Internet Appendix, we show that our results hold for quasi-concave differentiable

[4] In the Internet Appendix, we solve the case where $F < L$.

[5] The results are similar if we use the alternative utility $u^i(s, w) = \varepsilon_i + \alpha_i s + w$.

utility functions of the form $u^i(s,w) = f(g_1(\alpha_i)h_1(s,w) + g_2(1-\alpha_i)h_2(s,w))$, provided some conditions on the curvature of $g_1(.)$ and $g_2(.)$ hold. This family of functions includes most of the commonly used utility functions, such as Cobb-Douglas, CES, quasi-linear utilities, and many others.

Workers are heterogeneous in their preferences for the s-attribute. There are $n \geq 3$ types of workers, with $\alpha \in \{\alpha_1, ..., \alpha_n\}$, with $\alpha_i < \alpha_{i+1}$. Let p_i denote the proportion of type i in the population. That is, $p_i L$ is the mass of workers of type i. We initially work with a finite number of types to keep the equilibrium conditions simple and intuitive. Later, we extend the analysis to a continuum of worker types.

2.2 Technology

Each entrepreneur owns one firm. Firms can choose from a set of technologies $\iota \in \{0, ..., m\}$. A firm of type ι chooses its s-quality level, $s \in [\underline{s}_\iota, \overline{s}_\iota]$, at cost $c_\iota(s)$. We assume $c'_\iota(s) > 0$ and $c''_\iota(s) > 0$ for $s > 0$, and $c_\iota(0) = c'_\iota(0) = 0$, the latter being an Inada condition to avoid corner solutions. Technologies are indexed by their *degree of flexibility*: $\iota > \iota' \Rightarrow [\underline{s}_{\iota'}, \overline{s}_{\iota'}] \subset (\underline{s}_\iota, \overline{s}_\iota)$, that is ι is more flexible than ι'. A firm with a more flexible technology can design jobs with a broader range of s-qualities. For example, flexible technology may allow a firm to produce goods with more or less emissions. Similarly, some flexible organizational forms make it possible for workers to work either at home or at the office. Because a more flexible technology can deliver anything that a less flexible one can, more flexible technologies are (weakly) more valuable. Our key assumption is that technological flexibility is costly to develop or acquire. Specifically, let K_ι denote the cost of acquiring technology ι. Then, $\iota > \iota' \Rightarrow K_\iota > K_{\iota'}$. Without loss of generality, we set $K_0 = 0$.

To simplify the analysis, we assume that there are only two types of technologies for the remainder of the paper. Technology 0 is completely inflexible: $\underline{s}_0 = \overline{s}_0 =: s_0$. Technology 1 is perfectly flexible, that is, $\underline{s}_1 = 0$ and $\overline{s}_1 = \infty$. In the Internet Appendix, we consider the more general case in which both types have some (but incomplete) flexibility and the case in which there are more than two technologies.

At Date 0, each entrepreneur simultaneously chooses a technology $\iota \in \{0, 1\}$ for their firm. At Date 1, if a firm hires one worker by offering contract (s, w), it generates revenue $y_\iota > 0$.[6] The net profit of a type-ι firm that offers contract (s, w) is $\Pi_\iota(s, w) = y_\iota - c_\iota(s) - w - K_\iota$. For simplicity, we impose no constraints on w; the qualitative results are unchanged if w is constrained to be non-negative (alternatively, we can interpret our analysis as the case in which non-negative wage constraints do not bind). Although we assume that all workers are equally productive, a natural extension—not pursued here—is to consider different correlation structures between α_i and worker productivity.[7]

We refer to the set of firms adopting technology ι as *Sector* ι. We call Sector 1 the *flexible sector* and Sector 0 the *inflexible sector*. We assume that $y_0 \geq c_0(s_0)$ to ensure that inflexible firms always prefer to operate. From now on, we set $y_0 = y_1 =: y$ and $c_0(s) = c_1(s) =: c(s)$, unless explicitly noted otherwise. This assumption is inconsequential for our core results, but it simplifies the notation and helps with the intuition by eliminating most of the heterogeneity across sectors; the only remaining difference between the two sectors is the flexibility of their production technologies. In particular, our results remain unchanged if we assume that costs differ across firms. This includes the case in which $c_0(s_0) = 0$.

2.3 Benchmark: Efficient Contracts

In this subsection, we characterize the set of efficient contracts between a worker and a flexible firm. Such contracts serve as a benchmark for assessing the efficiency properties of the equilibrium contracts, which we will describe in the next section.

Suppose a flexible firm matches with a worker of type i. Suppose the firm (i.e., the entrepreneur) offers contract (s, w) to the worker. Let $\pi(s, w) := y - w - c(s)$ denote

[6] In the Internet Appendix, we consider an extension in which the firm hires multiple workers.

[7] For example, Colonnelli et al. (2023) find that workers with stronger preferences for ESG tend also to be more qualified.

the firm's gross profit (i.e., ignoring the entry cost K_1, which is sunk at this stage) under this contract. If the worker accepts to work for the flexible firm, her utility is $u^i(s,w) = \alpha_i s + (1-\alpha_i)w$. We use $\underline{u} \geq 0$ to denote the worker's outside utility if she does not accept the contract (she either works for another firm or stays unemployed). Similarly, let $\underline{\pi}$ denote the firm's outside profit (the firm either hires another worker or shuts down; K_1 does not matter here because it is a sunk cost).

To characterize the efficient contract set, we solve:

$$\begin{aligned} &\max_{s,w} \omega f(u^i(s,w)) + (1-\omega)\pi(s,w) \\ &\text{s.t. } u^i(s,w) \geq \underline{u} \text{ and } \pi(s,w) \geq \underline{\pi} \end{aligned} \tag{1}$$

where $\omega \in [0,1]$ and $f(.)$ is some strictly increasing and strictly concave function. Any Pareto-efficient contract (s,w) is a solution to (1) for some ω. Thus, changing ω allows us to trace the Pareto set of all efficient contracts.[8] The first-order conditions for solving (1) imply:

$$\frac{\alpha_i}{1-\alpha_i} = c'(s_i^*). \tag{2}$$

The left-hand side of (2) is the worker's marginal rate of substitution between s and w. In an efficient allocation, this rate must equal the marginal cost of producing s, which is the right-hand side of (2). Thus, the efficient quantity of s is at a tangency between a given indifference curve and an isoprofit, and is unique for a given worker type: $s_i^* = h(\alpha_i) := c'^{-1}\left(\frac{\alpha_i}{1-\alpha_i}\right)$. The uniqueness of s_i^* results from two properties of technology and preferences: (i) the profit function is quasi-linear, and (ii) the worker's utility is linear. While this uniqueness is convenient, it does not drive our main results. In the Internet Appendix, we show how to solve the model with preferences that do not imply a unique s for each α_i.

A flexible firm can always offer the same contract as that of an inflexible firm, but

[8]The reason for using a strictly concave transformation of $u^i(s,w)$ is to allow for interior solutions. If we don't transform $u^i(s,w)$, for any given ω, w will adjust to make at least one constraint bind, and the solution to (1) would not trace the whole Pareto frontier as we change ω.

the converse is not true. Let F_1 denote the mass of firms that have acquired the flexible technology. If $F_1 < L$, it is socially optimal for all flexible firms to operate and produce s_i^*. Pareto efficiency alone does not impose further conditions. Therefore, there are multiple efficient allocations. In general, at Date 1, an allocation is efficient if and only if (i) the mass of workers employed by flexible firms is $\min\{L, F_1\}$ and (ii) a flexible firm that employs a type-i worker offers s_i^*.

In (1), suppose that the firm has all the bargaining power, and the worker's outside option is to work for an inflexible firm under contract (s_0, w_0). That is, assume that $\omega = 0$ and $\underline{u} = \alpha_i s_0 + (1 - \alpha_i) w_0 \geq 0$. Then, the problem reduces to

$$v(\alpha_i) := \max_{s,w} \pi(s, w) \quad \text{s.t. } u^i(s, w) \geq u^i(s_0, w_0). \tag{3}$$

The value function $v(\alpha_i)$ is the maximum profit a flexible firm could extract from a worker of type α_i, whose outside option is to work for an inflexible firm. We call $v(\alpha_i)$ the *profit potential*. The profit potential is the actual profit a monopolist firm would enjoy if matched with a worker of type α_i. We then have the following result:

Proposition 1 (Profit Potential). *The profit potential $v(\alpha_i)$ is strictly U-shaped in α_i and reaches its minimum value at α_k, such that $s_0 = h(\alpha_k)$.*

This result is economically meaningful. It implies that flexible firms create more surplus when they match with workers with extreme preferences. To understand the intuition, note that the flexible technology is a real option: it allows firms to create value by adapting to the preferences of their workers. The option's value increases with the distance between the default position (i.e., the inflexible-sector contract) and the flexible contract. Workers with intermediate preferences for the s-attribute have the lowest surplus because the flexible sector cannot improve much upon the inflexible contract. The extreme types, on the other hand, value flexibility more. Thus, the flexible sector creates more value by catering to the preferences of the extreme types.

The shape of the profit potential function is the main force behind our results. Because

s_i^* increases in α_i in an efficient allocation, Proposition 1 implies that the profit potential is also U-shaped in "purpose," i.e., s_i^*. Intuitively, by offering jobs with higher s-quality, the firm pays higher direct costs but can also pay lower wages. We observe a U-shaped pattern because the firm can create (and thus extract) more surplus when matched with workers with extreme preferences. We note that this result is robust to different assumptions on preferences and technology. In particular, preferences do not need to be linear in (s, w). As we elaborate in the Internet Appendix, under some conditions on how α_i affects utility, any quasi-concave utility over (s, w) implies that $v(\alpha_i)$ is U-shaped. For some non-linear preferences, we also do not need $c(s)$ to be strictly convex.

3 Equilibrium

There are two dates. At Date 0, entrepreneurs simultaneously choose a technology $\iota \in \{0, 1\}$ and pay cost K_ι. Recall that $K_0 = 0$. At Date 1, firms compete for workers as described below.

3.1 Competitive Equilibrium

At Date 1, we consider a competitive equilibrium involving all firms and workers. We can think of the model as a location game in which each contract (s, w) on the plane $\Re^+ \times \Re$ is a feasible location. In a competitive equilibrium, a Walrasian auctioneer chooses a set $\Gamma \subseteq \Re^+ \times \Re$. Then, each firm chooses a location in Γ that maximizes its profit. Flexible firms can locate anywhere in Γ, but inflexible firms can only locate in points $(s_0, w) \in \Gamma$. Workers also choose their location (i.e., they apply for a job) by maximizing their utility over contracts in Γ. For an allocation to be an equilibrium, labor demand in each location must equal labor supply.

Consider an equilibrium in which a worker of type i chooses contract (s, w). If $s \neq s_i^*$ (as given by (2)), the worker and a flexible firm could renegotiate the contract so that both are better off. Thus, in equilibrium, if a worker of type i chooses to locate at (s, w), where a flexible firm is also located, then we must have $s = s_i^*$. In addition, all agents of type i working for flexible firms must have the same w_i.[9] We conclude that there are at most n flexible-sector contracts that some workers could accept in equilibrium, where (s_i^*, w_i) is the contract *intended* for worker $i \in \{1, ..., n\}$. In the inflexible sector, all firms must choose the same location, (s_0, w_0), because for a given s_0 the profit is strictly decreasing in w_0. Thus, without loss of generality, we can write Γ as $\{(s_0, w_0), (s_1^*, w_1), ..., (s_n^*, w_n)\}$. That is, Γ is a set of $n+1$ contracts, one for each s-quality in $(s_0, s_1^*, ..., s_n^*)$.

Because the vector $(s_0, s_1^*, ..., s_n^*)$ is fixed, choosing Γ is equivalent to choosing a wage vector, $\mathbf{w} = (w_0, ..., w_n)$, where w_0 is the wage in the inflexible sector and $(w_1, ..., w_n)$ are the wages intended for each s_i^* location in the flexible sector. When referring to such wages, we call each index $j \in \{0, 1, ..., n\}$ a *market*. Let

$$A(\mathbf{w}) := \arg \max_{j \in \{0,1,...,n\}} \pi(s_j^*, w_j) \text{ subject to } \pi(s_j^*, w_j) \geq 0. \tag{4}$$

That is, $A(\mathbf{w})$ is the set of indices $j \in \{0, 1, ..., n\}$ representing the markets that offer the highest (non-negative) profit to firms given the vector of wages $\mathbf{w}$. We can then define the flexible firms' *labor demand correspondence* for market j as

$$D_j(\mathbf{w}) := \begin{cases} F_1 & \text{if } \{j\} = A(\mathbf{w}) \\ 0 & \text{if } \{j\} \not\subseteq A(\mathbf{w}) \\ [0, F_1] & \text{if } \{j\} \subset A(\mathbf{w}), \end{cases} \tag{5}$$

where F_1 is the mass of flexible firms and $\subset$ denotes a proper subset. That is, if only market j offers the highest profit, all F_1 firms will demand workers of type j. If market j is not a profit-maximizing market, labor demand in that market will be zero. If there are multiple markets with the same maximal profit, firms will be indifferent among these

[9] Suppose there are two locations, (s_i, w_i) and (s_i, w_i'), with $w_i' < w_i$. Then all firms that demand a worker of type i would choose location (s_i, w_i'), and no worker would be employed at (s_i, w_i).

markets. Similarly, define the labor demand correspondence for inflexible firms as

$$D_0(w_0) := \begin{cases} F_0 & \text{if } \pi(s_0, w_0) > 0 \\ 0 & \text{if } \pi(s_0, w_0) < 0 \\ [0, F_0] & \text{if } \pi(s_0, w_0) = 0, \end{cases} \tag{6}$$

where F_0 is the mass of inflexible firms. Note that $D_0(w_0)$ denotes the inflexible firms' labor demand, while $D_0(\mathbf{w})$ is the flexible firms' demand in market $j = 0$. That is, flexible firms can also offer the inflexible firms' contract.

Define

$$B_i(\mathbf{w}) := \arg \max_{j \in \{0,1,...,n\}} u^i(s_j^*, w_j). \tag{7}$$

That is, $B_i(\mathbf{w})$ is the set of indices $j \in \{0, 1, ..., n\}$ representing the contracts that offer the highest utility to workers of type i. We can then define worker i's *labor supply correspondence* for market j as

$$S_{ij}(\mathbf{w}) := \begin{cases} p_i L & \text{if } \{j\} = B_i(\mathbf{w}) \\ 0 & \text{if } \{j\} \not\subseteq B_i(\mathbf{w}) \\ [0, p_i L] & \text{if } \{j\} \subset B_i(\mathbf{w}). \end{cases} \tag{8}$$

An equilibrium is characterized by a set of vectors of wages and quantities $(\mathbf{w}^*, \mathbf{x}_1^*, ..., \mathbf{x}_n^*)$, where $\mathbf{x}_i = (x_{i0}, x_{i1} ..., x_{in})$ are non-negative values. Quantity x_{i0} is the mass of workers of type i employed in the inflexible sector, and $(x_{i1} ..., x_{in})$ are the masses of workers of type i employed in each flexible market $j = 1, ..., n$.

Definition 1. A *competitive equilibrium* is defined by the following supply and demand conditions:
(i) The mass of workers employed in each market must belong to the demand correspondence for that market:

$$\sum_{i=1}^{n} x_{i0}^* \in \{d_1 + d_2 : d_1 \in D_0(w_0^*) \text{ and } d_2 \in D_0(\mathbf{w}^*)\},$$

and

$$\sum_{i=1}^{n} x_{ij}^* \in D_j(\mathbf{w}^*) \text{ for all } j \in \{1, ..., n\}.$$

(ii) The mass of workers of type i employed in each market must belong to i's supply correspondence for that market:

$$x_{ij}^* \in S_{ij}(\mathbf{w}^*) \text{ for all } i \in \{1, ..., n\} \text{ and } j \in \{0, ..., n\}.$$

(iii) Type-i employment must not be greater than type-i labor supply:

$$\sum_{j=0}^{n} x_{ij}^* \leq p_i L, \text{ for all } i \in \{1, ..., n\}.$$

(iv) Total employment must not be greater than aggregate labor demand:

$$\sum_{j=1}^{n}\sum_{i=1}^{n} x_{ij}^* \leq F_1 \text{ and } \sum_{i=1}^{n} x_{i0}^* + \sum_{j=1}^{n}\sum_{i=1}^{n} x_{ij}^* \leq F_0 + F_1.$$

Before discussing the characteristics of the equilibrium, we introduce some further concepts and notation. In equilibrium, only workers of type j may accept contract $j \geq 1$ (we can always define contract j so that this is true). To simplify notation, we denote the equilibrium employment in market j by x_j^*. If $x_j^* > 0$, we say that market j is *active* in equilibrium. Recall that type k is defined as $s_0 = h(\alpha_k)$. Without loss of generality, we assume that $p_k \in (0, \epsilon)$, i.e., there is a positive but arbitrarily small ($\epsilon \to 0$) mass of workers of type k.[10]

We first consider the case in which $F_1 > L$, i.e., the mass of flexible firms at Date 1 is larger than the mass of workers:

Lemma 1 (Excess Demand Implies Zero Profit). *In an equilibrium where $F_1 > L$, flexible firms have zero profit.*

[10] This assumption is made purely for expositional convenience, and has no implication for the results. This assumption is automatically satisfied in the continuum case we discuss next.

This result follows because competition for scarce workers will dissipate profits. Because the cost of acquiring the flexible technology is positive ($K_1 > 0$), to acquire such a technology at Date 0, firms must expect a strictly positive profit after entry. Lemma 1 thus implies that there is no equilibrium in which $F_1 > L$. Thus, from now on, we consider only the case in which $F_1 < L$ (ignoring the knife-edge case $F_1 = L$ for simplicity of exposition). There are now two cases to consider: $F_0 + F_1 > L$ or $F_0 + F_1 \leq L$. Because our main results are the same in either case, for simplicity, we consider only the first case in the main text; we leave the analysis of the second case in the Internet Appendix. Thus, for the rest of this section, we assume the following:

Assumption 1. $F_1 < L < F_0 + F_1$.

The next lemma is a consequence of profit equalization in competitive markets:

Lemma 2 (Profit Equalization). *If Assumption 1 holds, firms in the inflexible sector have zero profit (i.e., $\pi(s_0, w_0^*) = 0$) and firms in the flexible sector have strictly positive profit, $\pi(s_j^*, w_j^*) = \pi^* > 0$ for all $j \in \{1, ..., n\}$ such that $x_j^* > 0$.*

Lemma 2 implies that profits are the same across all active markets in the flexible sector. In the cross-section of flexible firms, there is no relation between profit and the s-attribute. Lemma 2 also implies that $w_0^* = y - c(s_0)$.

From Proposition 1, we know the profit potential $v(\alpha_i)$ is strictly U-shaped and reaches its minimum at α_k. Thus, for each $j \in \{1, ..., k\}$, there exists at most one $j' > k$ such that $v(\alpha_j) = v(\alpha_{j'})$. For expositional simplicity, we make the following assumption:

Assumption 2. *There is no pair $(j, j') \in \{1, ..., n\}^2$ for which $v(\alpha_j) = v(\alpha_{j'})$.*

This assumption allows us to rule out measure-zero cases in which the equilibrium may not be unique, but, otherwise, it is not important for the results.[11] We prove the existence of a unique equilibrium in the next proposition.

[11] Note that Assumption 2 is violated if the distribution of worker types is continuous. However, in that case, the equilibrium is always unique, and Assumption 2 is irrelevant, as we will show.

Proposition 2 (Labor Market Equilibrium). *Under Assumptions 1 and 2, there exists a unique type $z \in \{1, ..., n\}$ such that the equilibrium quantities are $x_0^* = L - \sum_{j=1}^n x_j^*$ and*

$$x_j^* = \begin{cases} p_j L & \text{if } v(\alpha_j) > v(\alpha_z) \\ 0 & \text{if } v(\alpha_j) < v(\alpha_z) \\ F_1 - \sum_{j \in \{j \neq z : x_j^* > 0\}} p_j L & \text{if } j = z \end{cases} \tag{9}$$

for $j \in \{1, ..., n\}$. The equilibrium wages are $w_0^* = y - c(s_0)$ and

$$w_j^* = \begin{cases} y - c(s_j^*) - v(\alpha_z) & \text{if } x_j^* > 0 \\ w \in \left[y - c(s_j^*) - v(\alpha_z), \frac{\alpha_j s_0 + (1-\alpha_j) w_0^* - \alpha_j s_j^*}{1-\alpha_j} \right] & \text{if } x_j^* = 0 \end{cases} \tag{10}$$

for $j \in \{1, ..., n\}$.

The equilibrium implies unique quantities in each market. Wages are also unique in all active markets (i.e., where $x_j^* > 0$).[12] Proposition 2 shows that the Walrasian auctioneer chooses a wage vector that (i) equalizes profits in all active, flexible markets and (ii) maximizes the *profit potential* of flexible firms. Because the profit potential is U-shaped (see Proposition 1), requirement (ii) implies our main result:

Corollary 1 (Polarization). *The equilibrium is polarized: flexible firms cater to the most extreme preferences. Formally, if $j \leq k$, $x_j^* > 0$ implies $x_{j'}^* = p_{j'} L$ for all $j' < j$. If $j \geq k$, $x_j^* > 0$ implies $x_{j'}^* = p_{j'} L$ for all $j' > j$.*

Because flexible firms are scarce ($F_1 < L$), there must be some worker types not employed by flexible firms. Corollary 1 shows that flexible firms do not employ workers of intermediate types. Because flexible firms cater to those with extreme preferences, these

[12]To simplify the exposition, we ignore the knife-edge case in which $F_1 = \sum_{j \in \{j : x_j^* > 0\}} p_j L$. In this case, w_z^* may be anywhere in $\left[\frac{\alpha_j s_0 + (1-\alpha_j) w_0^* - \alpha_j s_j^*}{1-\alpha_j}, y - c(s_j^*) - \widehat{v} \right]$, where $\widehat{v} = \max_{j \in \{j : v(\alpha_j) < v(\alpha_z)\}} v(\alpha_j)$.

firms are polarized in equilibrium. That is, flexible firms are more extreme than the underlying worker preferences for the s-attribute.

Firm polarization arises in equilibrium due to the combination of two forces. First, technological flexibility is valuable but costly to develop or acquire. This cost implies that flexible firms will be scarce in equilibrium. Second, flexibility is more valuable to workers with extreme preferences. Because these two forces drive the results, Corollary 1 easily generalizes to other setups, such as the case of multiple technologies with varying degrees of flexibility.[13]

Another way that we can generalize the model is by allowing workers to view s as a positive or negative attribute. For example, suppose s is a measure of political partisanship. A firm invests in s by donating to a specific political party. In a two-party system, $s < 0$ represents donations to one party, and $s > 0$ donations to the other party. We let $\alpha \in [-1, 1]$ so that negative (positive) α represents support for the first (second) party. In this case, the utility function becomes $u^i(s, w) = \alpha s + (1 - |\alpha|)w$. In this context, flexible firms will either make significant donations to one party or the other, while inflexible firms will remain politically neutral (we can think of inflexible firms as firms that are required to maintain political neutrality, either by law or other constraints). This version of the model predicts political polarization among flexible firms. We consider this generalization in the Internet Appendix.

Because Lemma 2 implies that flexible firms are also the most profitable (and thus more valuable) firms, Corollary 1 has the following empirical prediction.

Prediction 1. *Firms in the most valuable and profitable sectors will display more polarization in s-quality levels.*

The next result confirms that wages fall with the s-attribute:

Corollary 2 (Compensating Differentials). *The equilibrium displays compensating differentials: for $j' > j$, if $x^*_j > 0$ and $x^*_{j'} > 0$, then $s^*_j < s^*_{j'}$ and $w^*_j > w^*_{j'}$.*

[13] In the Internet Appendix, we consider the case where Sector 0 is not completely inflexible and also the case of multiple flexible technologies.

That is, in the cross-section, firms with higher levels of the s-attribute offer lower wages to their employees.

Let u^{i*} denote a type-i worker's utility in equilibrium and u_0^i denote her utility if she chose instead to work in the inflexible sector. Let $U_i^* := u^{i*} - u_0^i$ denote the equilibrium surplus enjoyed by a type-i worker. The next corollary summarizes the equilibrium welfare implications for workers:

Corollary 3 (Workers' Surplus Inequality). *In the flexible sector, workers with extreme preferences have higher surpluses: If type i works in the flexible sector and $i < k$, $U_{i-1}^* < U_i^*$; if $i > k$, $U_{i+1}^* > U_i^*$.*

In equilibrium, workers with extreme preferences benefit more from working in the flexible sector than workers with more moderate preferences toward the s-attribute. Workers in jobs with more surplus have a higher willingness to pay to keep their jobs. Thus, Corollary 3 implies the following empirical prediction.

Prediction 2. *Employee satisfaction is higher in firms with extreme levels of the s-attribute.*

Proposition 2 implies the existence of two groups of flexible firms in equilibrium: high-s firms (firms in which $s_j^* > s_0$) and low-s firms (firms in which $s_j^* < s_0$). We define the *degree of firm polarization* as $\rho = s^h - s^l$, where s^h is the minimum s among high-s firms and s^l is the maximum s among low-s firms. The degree of firm polarization is a potentially observable equilibrium outcome. Thus, we use it as one of the outcome variables in our comparative statics exercises.

3.2 Equilibrium under Continuous Types

It is often more convenient to perform comparative statics in the limiting case of a continuum of types distributed according to $P(.)$, with density $p(.)$. In this case, there are no differences between types and indices; we denote a type by $\alpha \in (0,1)$. Let k denote the type that minimizes the profit potential, i.e., $k := \arg\min_{\alpha \in [0,1]} v(\alpha)$. The equilibrium is then defined by equating supply and demand:

Corollary 4 (Equilibrium under Continuous Types). *Under Assumption 1, if the distribution of types, $P(.)$, is continuous, then the equilibrium is given by a unique type $z \in (k, 1)$ such that*

$$F_1 = L\left(\int_0^{\phi(z)} p(\alpha)d\alpha + \int_z^1 p(\alpha)d\alpha\right) \tag{11}$$

where $\phi(\alpha) : (k, 1) \to [0, k]$ is defined as

$$\phi(\alpha) := \arg\max_{x \in [0,k]} v(x) \leq v(\alpha). \tag{12}$$

Because the equilibrium is such that only the extreme types work in the flexible sector, there are two thresholds: $z \in (k, 1)$ and $\phi(z) \in [0, k]$. In an interior equilibrium (i.e., $\phi(z) > 0$), (12) implies $v(z) = v(\phi(z)) = \pi^*$, which is the equilibrium profit in the flexible sector. All types $\alpha \leq \phi(z)$ and $\alpha \geq z$ are employed in the flexible sector. The equilibrium degree of polarization is $\rho^* = s_z^* - s_{\phi(z)}^*$.

Figure 1 illustrates the equilibrium in the continuous case. The wage vector becomes a *wage function* $w(s)$. In equilibrium, all flexible firms must obtain the same profit π^* in all active markets. The wage function is not uniquely determined in inactive markets (see (10)). For simplicity and without loss of generality, we assume that all flexible markets (active or inactive) are equally profitable. Thus, the wage function is $w(s) = y - \pi^* - c(s)$, which is the isoprofit for profit level π^*. Figure 1 depicts the wage function on the (s, w) plane. Note that $c''(s) > 0$ implies that the wage function is concave. For a given wage function, flexible firms decide where to locate themselves. Since profits are the same everywhere, firms are indifferent about where they are located.

The wage function $w(s)$ is a menu of choices for workers. A type-α worker solves the problem

$$\max_s \alpha s + (1 - \alpha)w(s) \text{ s.t. } \alpha s + (1 - \alpha)w(s) \geq \alpha s_0 + (1 - \alpha)w_0. \tag{13}$$

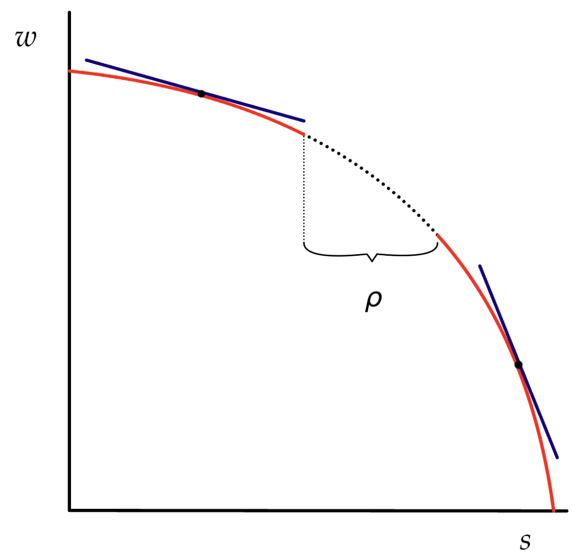

Figure 1: Equilibrium Wage Function and Polarization

As shown in Figure 1, the worker will choose the highest indifference curve given the wage function and will thus choose $s^*_\alpha = h(\alpha)$, where the (absolute value of the) slope of her indifference curve, $\alpha/(1-\alpha)$, equals the slope of the wage function, $c'(s)$. Because there are fewer flexible firms than workers, there must be empty regions where workers and firms are not located. Because workers with extreme preferences enjoy greater surplus, that region must be an interval: $[s^l, s^h]$. The degree of polarization, ρ, is the length of this interval, as shown in the figure.

Corollary 5 (Corner Solution Exists for Low $\mathbf{s_0}$). *There exists s'_0 such that, if $s_0 \leq s'_0$, $s^l = 0$.*

If $s_0 \leq s'_0$, the degree of polarization becomes $\rho = s^h$. For s_0 sufficiently low, no low-α worker works in the flexible sector. Thus, the flexible sector becomes "the high-s sector" and the inflexible sector "the low-s sector." In this case, flexible firms match with workers with large α's. If we had multiple technologies with varying degrees of flexibility, more flexible firms would match with workers with stronger preferences for s. Thus, the equilibrium would display assortative matching. This special corner-solution case does not arise in a more general model where $\alpha \in [-1, 1]$, as discussed in the Internet Appendix. Generally, under an interior equilibrium, no intrinsic worker characteristic matches monotonically with firm characteristics. Thus, our model typically does not display positive or negative assortative matching.

While ρ measures polarization within the flexible sector, we can also measure the (average) degree of polarization between sectors by

$$\rho_b = \int_0^{\phi(z)} h(\alpha)p(\alpha)d\alpha + \int_z^1 h(\alpha)p(\alpha)d\alpha - s_0. \tag{14}$$

Both degrees of polarization (within-sector and between-sector) are maximal at $s_0 = 0$. Intuitively, as s_0 falls, the flexible sector becomes less valuable for low-α workers and more valuable for high-α workers. Thus, in equilibrium, as s_0 decreases, flexible firms replace some low-α workers with high-α workers.

The distribution of preferences over the s-attribute may change over time. For example, some workers may become more concerned about the environmental impact of their firms. If s measures the extent to which firms use green technologies, such workers would now have higher α. At the same time, it is possible that some workers become *less* concerned about the environment, for example, if they think that environmental concerns have been overblown and politicized. Such workers would then have a lower α.

What would happen if workers became more polarized in their tastes for the s-attribute? To answer this question, we consider changes in $P(.)$ that shift density away from moderate preferences. Mas-Colell et al. (1995, p. 198) define an elementary increase in risk as follows: "*$G(.)$ constitutes an elementary increase in risk from $F(.)$ if $G(.)$ is generated from $F(.)$ by taking all the mass that $F(.)$ assigns to an interval $[x', x'']$ and transferring it to the end-points x' and x'' in such a manner that the mean is preserved.*" We generalize the notion of increase in risk and say that $\widehat{P}(.)$ is a *generalized increase in risk* from $P(.)$ if $\widehat{P}(.)$ is generated from $P(.)$ by taking some of the mass that $P(.)$ assigns to an interval $[x', x'']$ and transferring it to points smaller than x' and greater than x'' in such a manner that the mean is preserved.

Formally, $\widehat{P}(.)$ is a generalized increase in risk from $P(.)$ if (i) $\int_{x'}^{x''} p(\alpha)d\alpha > \int_{x'}^{x''} \hat{p}(\alpha)d\alpha$ and (ii) $\int_0^1 \alpha p(\alpha)d\alpha = \int_0^1 \alpha \hat{p}(\alpha)d\alpha$. It is immediate that a generalized increase in risk is a mean-preserving spread (and thus $P(.)$ second-order stochastically dominates $\widehat{P}(.)$). Then, we have the following result:

Proposition 3 (Increase in Taste Dispersion). *For a given F_1 such that Assumption 1 holds, if $\widehat{P}(.)$ is a generalized increase in risk from $P(.)$ for $x' = \phi(z)$ and $x'' = z$, then the equilibrium under $\widehat{P}(.)$ has higher profits than under $P(.)$.*

An increase in taste dispersion implies that more workers have extreme preferences for the s-attribute (either high or low α). Since the flexible technology is more valuable to workers with extreme preferences, flexible firms would cater to those workers, thus becoming more polarized in their provision of the desirable attribute. Profits increase because workers with extreme preferences—the most valuable to firms—are now less scarce.

3.3 Technology Choice

In this subsection, we solve the entrepreneurs' first-period decision. We work with the continuum case. Suppose that, at Date 0, entrepreneurs expect a mass of F_1 firms to enter Sector 1. As discussed, if $F_1 > L$, post-entry profits are zero. In this case, no entrepreneur would choose the flexible technology because it has an adoption cost of $K_1 > 0$. Thus, in equilibrium, we must have $F_1 < L$. Let z denote the equilibrium type as given by Corollary 4. If $v(z) > K_1$, all entrepreneurs prefer to operate in Sector 1. If $v(z) < K_1$, all entrepreneurs prefer to operate in Sector 0. For an equilibrium with $0 < F_1 < L$ to exist, we need $v(z^*) = K_1$.

Proposition 4 (Equilibrium Existence and Uniqueness). *If the distribution of types, $P(.)$, is continuous, a competitive equilibrium exists for any $K_1 > 0$. The equilibrium is given by a unique type $z^* \in (k, 1)$ such that $v(z^*) = K_1$, $\phi(z^*)$ is given by (12), F_1^* is given by (11), and the* *equilibrium wages are* $w_0^* = y - c(s_0)$ *and*

$$w(\alpha) = \begin{cases} y - c(s_\alpha^*) - v(z^*) & \text{if } \alpha \notin (\phi(z^*), z^*) \\ w \in \left[y - c(s_\alpha^*) - v(z^*), \frac{\alpha s_0 + (1-\alpha) w_0^* - \alpha s_\alpha^*}{1-\alpha} \right] & \text{if } \alpha \in (\phi(z^*), z^*) \end{cases} . \tag{15}$$

With endogenous entry, entrepreneurs in the flexible sector make zero *ex-ante* profit: $\Pi_1^* = \pi_1^* - K_1 = 0$. Similarly, entrepreneurs will enter the inflexible sector until their ex-post profits are zero. Only workers end up with positive surpluses in equilibrium. This makes sense: Labor is the only scarce resource in this economy.

In equilibrium, the degree of polarization is $\rho^* = s_{z^*}^* - s_{\phi(z^*)}^*$. Note that the degree of polarization does not depend on the distribution of types. We then have:

Corollary 6 (Technology Cost and Polarization). *A higher cost of acquiring the flexible technology,* K_1*, increases equilibrium polarization,* ρ^**, and decreases the equilibrium mass of flexible firms,* F_1^**.*

Intuitively, an increase in the cost of flexibility reduces the equilibrium supply of flexibility. As flexibility becomes scarcer, it is allocated only to workers with more extreme preferences, thus increasing polarization.

Corollary 7 (Taste Dispersion and Number of Firms). *If* $\widehat{P}(.)$ *is a generalized increase in risk from* $P(.)$ *for* $x' = \phi(z^*)$ *and* $x'' = z^*$*, then the equilibrium mass of flexible firms is larger under* $\widehat{P}(.)$ *than under* $P(.)$*.*

Intuitively, all else equal, an increase in taste dispersion increases the benefit of acquiring the flexible technology. Thus, more firms want to enter Sector 1. Notice that an increase in taste dispersion has no effect on equilibrium firm polarization. This result shows that firm polarization is primarily a technological phenomenon driven by the scarcity of flexible technologies.

4 Polarization, Wages, and the Labor Share

This section builds upon our core results and establishes further empirical predictions. We begin by presenting a parametric version of the model, which we use to illustrate the main equilibrium properties. We then derive additional results linking the degree of firm polarization to wages and the labor share of a sector's income and consider how these equilibrium outcomes vary with technological changes.

We consider a parametric version of the model that allows for a closed-form analytical solution. The cost function is quadratic: $c(s) = \frac{s^2}{2}$. Let $a := \frac{\alpha}{1-\alpha}$ denote the marginal rate of substitution between s and w. For convenience, from now on, we refer to a as the worker's type. Zero profit in the inflexible sector (Lemma 2) implies $w_0^* = y - \frac{s_0^2}{2}$. The optimal level of the s-attribute in the flexible sector is $h(a) = a$. The profit potential as a function of a is $v(a) = y - w_0^* - as_0 + \frac{a^2}{2\sigma} = \frac{s_0^2}{2} - as_0 + \frac{a^2}{2}$, which is strictly U-shaped in a (consistent with Proposition 1). The type that minimizes $v(a)$ is $a_k = s_0$. Let a_z denote the equilibrium threshold for a given K_1, assuming an interior equilibrium. That is, $v(a_z) = v(a_{\phi(z)}) = K_1$. Solving these conditions proves the next result.

Proposition 5 (**Equilibrium in the Quadratic Cost Case**). *In an interior equilibrium of the quadratic cost case, types $a \in \left(s_0 - \sqrt{2K_1}, s_0 + \sqrt{2K_1}\right)$ work in the inflexible sector and are paid wage $w_0^* = y - \frac{s_0^2}{2}$, and types $a \leq s_0 - \sqrt{2K_1}$ and $a \geq s_0 + \sqrt{2K_1}$ work in the flexible sector and are paid wage $w^*(a) = y - K_1 - \frac{a^2}{2}$.*

Wages decrease with a (consistent with Corollary 2). Consistent with Corollary 1, flexible firms are polarized. The equilibrium degree of polarization is

$$\rho^* = 2\sqrt{2K_1}. \tag{16}$$

Consistent with Corollary 6, the degree of polarization increases with K_1.

To understand the relation between polarization and average wages, we now assume that a is uniformly distributed on $[a_k - \Delta, a_k + \Delta]$.[14] Parameter Δ measures the dispersion of preferences for s around the mean a_k. We focus on the case where $\Delta > \sqrt{2K_1}$, that is interior solutions exist. Averaging $w^*(a)$ over all types employed in the flexible sector defines the average wage in that sector:

$$\overline{w}^* := y - K_1 - M^*, \tag{17}$$

where M^* is the average monetary cost of producing s:

$$M^* := \frac{\int_{a_k-\Delta}^{a_{\phi(z^*)}} a^2 da + \int_{a_{z^*}}^{a_k+\Delta} a^2 da}{4\left(\Delta - \sqrt{2K_1}\right)} = \frac{s_0^2}{2} + \frac{\Delta^2}{6} + \frac{\Delta}{6}\sqrt{2K_1} + \frac{K_1}{3}. \tag{18}$$

Next, we consider the impact of K_1 on polarization, profits, and wages.

Prediction 3. In more concentrated sectors, firms are more polarized, the profit is higher, and the average wage is lower.

In more concentrated sectors, i.e., sectors with higher entry costs and therefore fewer firms (F_1), there is less competition for those workers qualified to work in the sector. Because firms first target workers with extreme preferences, polarization in s-quality is more pronounced when there are fewer firms.

The dispersion in worker preferences for s-quality, measured by Δ, has no impact on polarization or profits because entry into the flexible sector offsets the effect of Δ on profits. However, Δ affects the average wage:

Prediction 4. In sectors with more dispersion in worker preferences for s-quality, the average wage is lower.

This result is closely related to Proposition 3. An increase in Δ is an increase in risk: it removes mass from intermediate values of a and reallocates this mass to the tails without

[14]Equivalently, α is distributed according to c.d.f. $P(\alpha) = \frac{\alpha}{1-\alpha}$ on $[\frac{a_k-\Delta}{1+a_k-\Delta}, \frac{a_k+\Delta}{1+a_k+\Delta}]$.

changing the mean. The average wage decreases because the average cost of producing s increases due to the convexity of the cost function.

An extensive empirical literature documents a decline in the labor share of value added (Autor et al. (2020); Covarrubias, Gutiérrez, and Philippon (2019); Barkai (2020)). Here, we consider the relationship between the flexible sector's labor share and firm polarization in job quality. Formally, the flexible sector's labor share is defined (in the general model) as

$$\text{Labor share} := \frac{L\int_0^{\phi(\alpha_z)} w(\alpha)dP(\alpha) + L\int_{\alpha_z}^1 w(\alpha)dP(\alpha)}{F_1\pi^* + L\int_0^{\phi(\alpha_z)} w(\alpha)dP(\alpha) + L\int_{\alpha_z}^1 w(\alpha)dP(\alpha)}, \tag{19}$$

where the numerator is the sector's aggregate wage bill, and the denominator is the sector's (financial) value added. In the quadratic-uniform case, we can rewrite the labor share as

$$\text{Labor share} = \frac{y - K_1 - M^*}{y - M^*}, \tag{20}$$

which is the average wage over the average value added. The next proposition shows that firm polarization is negatively related to the labor share.

Proposition 6 (**Polarization and the Labor Share**). *In the quadratic-uniform case, the labor share decreases with K_1 and Δ.*

If K_1 increases, fewer firms enter the flexible sector, polarization increases, and the post-entry profit increases, pushing the labor share down. An increase in the dispersion in preferences for s reduces the average wage (see Prediction 4) without changing profits, thus reducing the labor share.

5 Outside investors

In this section, we introduce a new type of agent: outside investors. Just like entrepreneurs and workers, investors are atomistic. For simplicity, we assume that the outside investors' identities do not overlap with those of other agents (workers and entrepreneurs). Outside investors can buy shares from entrepreneurs; we normalize the number of shares in each firm to one. After acquiring shares, outside investors hold them until the end of the period, when firms are liquidated and profits are paid out as dividends. There is no time discounting or uncertainty.[15]

We assume that an investor who holds a share of a firm that offers contract (s, w) and pays $\pi(s, w)$ as a dividend enjoys utility $\Omega(s, w) = \pi(s, w) + \beta H(s, w)$, where $\beta \in [0, 1]$. $\beta H(s, w)$ represents the shareholder's taste for socially-responsible attributes, or "purpose," for short. Investors may care about s-quality directly if they prefer to invest in companies offering better job conditions. They may also care about s-quality indirectly if they share some of their employees' values, such as a concern for sustainability or environmental responsibility. Similarly, investors may care about wages due to concerns about workers' welfare. Thus, we assume $H_s(s, w) \geq 0$ and $H_w(s, w) \geq 0$.

To simplify the analysis while conveying the main message, we assume only two types of outside investors: $\beta = 0$ and $\beta > 0$. We call investors of the first type "profit-driven investors" and the second "socially responsible investors." Using Stark's (2023) terminology, profit-driven investors care about financial *value*, while socially responsible investors also care about *values*.[16] We assume that both investor types are in large supply. This assumption implies that, unlike much (but not all) of the literature, introducing socially responsible investors expands the set of financing choices, thus increasing the options available to all flexible entrepreneurs.

Outside investors can buy shares in both flexible and inflexible firms. To introduce a trading stage, we assume that entrepreneurs first set up their firms and then sell shares

[15] The lack of risk in our model can be alternatively interpreted as perfect risk sharing. Suppose that each firm produces $y + \epsilon$, with ϵ idiosyncratic. One can perfectly diversify away all risks by holding shares in a mass of firms.

[16] This preference is of a "warm-glow" type. Investors may also care about the aggregate value of s in the economy, regardless of their shareholdings (in Oehmke and Opp's (2024) language, they could have a "broad mandate"). However, because investors are atomistic, such preferences would have no impact on firm outcomes. Pástor et al. (2021) reach a similar conclusion in an asset pricing model with atomistic investors; Dangl et al. (2023) also make a similar point.

to outside investors. Operating costs, $w + c(s)$, are paid out of current cash flows, y, whenever possible. If $y < w + c(s)$, the firm uses its working capital to plug the difference. To invest in working capital, a firm needs to raise funds from outside investors. Let $e_1(s,w) + e_2(s,w)$ denote the total amount that outside investors pay in exchange for one share of a company that offers contract (s,w), where $e_1(s,w)$ is the amount raised in a primary offering (i.e., the funds stay in the firm) and $e_2(s,w)$ is the secondary offering amount (i.e., the proceeds go to the entrepreneur). Suppose first that $\pi(s,w) = y - w - c(s) \geq 0$, so that there is no need to raise primary funds (i.e., $e_1(s,w) = 0$). Then, an investor may acquire a share by paying $e_2(s,w)$ to the entrepreneur. The investor later collects $\pi(s,w)$ as a dividend. If $\pi(s,w) < 0$, the investor funds the expected loss by paying $e_1(s,w) = -\pi(s,w)$ into the firm when acquiring the share and later receives zero dividends. In either case, the shareholder's net utility from buying one share is $\Omega(s,w) - e_2(s,w)$.

How socially responsible investors affect the equilibrium depends on their preferences. We can think of investors caring about a measure of social responsibility $I(s,w)$ and having utility $\beta H(s,w) = \beta(I(s,w) - I_0)$, where I_0 is the index's benchmark. We consider two cases. First, we assume that socially responsible investors care only about s. Thus, we set $I(s,w) = s$ and $I_0 = s_0$. For example, investors might care only about an environmental metric, here proxied by s. Second, we consider the case in which they care about both s and w, and then we set $I(s,w) = s + w$ and $I = s_0 + w_0$. For example, investors might care about both environmental and social issues. For simplicity, we proceed with the quadratic cost function (none of the results in this section depend on the type distribution).

Case 1: $H(s,w) = s - s_0$. In this case, we have that socially responsible investors value one share at $\Omega(s,w) = \pi(s,w) + \beta(s - s_0)$. These investors value firms with higher than the "reference" or "average" s-quality (which, for simplicity, is normalized to s_0) more than profit-driven investors. Conversely, socially responsible investors have a distaste for firms that are less purposeful than the average.

To characterize the equilibrium, we note first that the efficient s level for a firm owned by a socially responsible investor depends on β. Suppose a socially responsible investor matches with a worker of type a. Using the same reasoning as before, we can show that, under a quadratic cost function, $s^*_{a\beta} = a + \beta$. The socially responsible investor increases the efficient s level by β.

Do socially responsible investors affect s levels through "impact" (i.e., voice) or "divestment" (i.e., exit)? Because the model has no frictions, either channel delivers the same result. To see this, suppose the entrepreneur cannot commit to a contract; any contract between a worker and an entrepreneur can be renegotiated after the firm is sold to a socially responsible investor, and either party can unilaterally exit. In this case, the socially responsible investor and the worker will always renegotiate the contract and agree to the efficient s level, $s^*_{a\beta}$. Under this interpretation, socially responsible investors are "impact investors."

Suppose, instead, an entrepreneur commits to a contract (s, w). To maximize the price of the share, the entrepreneur should choose contract $(s^*_{a\beta}, w^*_{a\beta})$ because it maximizes the surplus for a socially responsible investor. That is, the most profitable way of attracting investors is choosing the efficient s level. Socially responsible investors would not invest at an attractive price unless the entrepreneur commits to $(s^*_{a\beta}, w^*_{a\beta})$.

The following proposition characterizes the equilibrium in the presence of both socially responsible investors and profit-driven investors. For simplicity, we focus on interior solutions: $F_1 < L$ and $a_{\phi(z)} > 0$.

Proposition 7 (Equilibrium with Outside investors: $I = s$**).** *Suppose* $H(s, w) = s - s_0$. *In an interior equilibrium of the quadratic cost case, types* $a \in \left(s_0 - \sqrt{2K_1}, s_0 - \beta + \sqrt{2K_1}\right)$ *work in the inflexible sector and are paid wage* $w^*_0 = y - \frac{s_0^2}{2}$. *Types* $a \leq s_0 - \sqrt{2K_1}$ *work for flexible firms owned by profit-driven investors and are paid wage* $w(a) = y - K_1 - \frac{a^2}{2}$. *Types* $a \geq s_0 - \beta + \sqrt{2K_1}$ *work for flexible firms owned by socially responsible investors and are paid wage* $w(a) = y - K_1 - \frac{(a+\beta)^2}{2}$. *The degree of polarization is* $\rho = 2\sqrt{2K_1}$.

This proposition implies that socially responsible investors create more value if matched with workers with strong preferences for s. In contrast, profit-driven investors create more

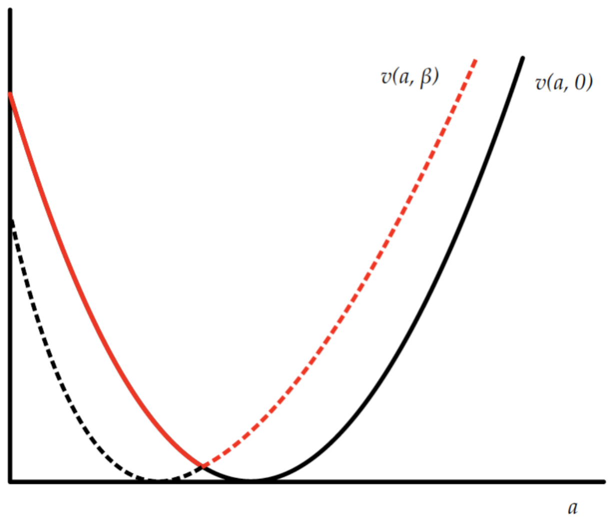

Figure 2: Profit Potential with Socially Responsible Investors: Case 1

value if matched with workers with weak preferences for s. Figure 2 shows the profit potential of profit-driven investors, $v(a, 0)$ (solid line), and the profit potential of socially responsible investors, $v(a, \beta)$ (dashed line). The unique equilibrium is given by the roots of $v(a) = K_1$, once we define $v(a) := \max\{v(a, 0), v(a, \beta)\}$.[17] That is, $v(a)$ is the upper envelope (in red) in Figure 2.

The presence of socially responsible investors increases labor demand in the flexible sector. To see this, recall that the minimum of $v(a, 0)$ is at $a = s_0$. Figure 2 shows that to the right of $a = s_0$, $v(a, \beta) > v(a, 0)$. Thus, given K_1, a_z such that $v(a_z, \beta) = K_1$ is lower than a'_z such that $v(a'_z, 0) = K_1$, which implies that the introduction of socially responsible investors brings types in (a_z, a'_z) into the flexible sector. In addition, for types larger than a_z, the profit potential increases after socially responsible investors buy shares in these firms. Because competition keeps investors' utility at K_1, workers capture all the increase in surplus. We conclude that workers with types larger than a_z are strictly better off when socially responsible investors buy shares of flexible firms. Workers of types smaller than

[17] The analysis can be easily generalized to any number m of different types of investors, $\{\beta_1, ..., \beta_m\}$, by defining $v(a) = \max\{v(a, \beta_1), ..., v(a, \beta_m)\}$.

a_z are not affected by socially responsible investors. Thus, socially responsible investors improve workers' welfare, but only for those with sufficiently strong preferences for the s-attribute.

Case 2: $H(s,w) = s + w - s_0 - w_0$. In this case, we have that socially responsible investors value shares at $\Omega(s,w) = \pi(s,w) + \beta(s + w - s_0 - w_0)$. The efficient s level is $s^*_{a\beta} = (1-\beta)(a+b)$, where $b := \frac{\beta}{1-\beta}$. For a profit-driven investor, $\beta = 0$, implying $s^*_{a0} = a$. The following proposition characterizes the equilibrium.

Proposition 8 (Equilibrium with Outside investors: $I = s + w$**).** *Suppose* $H(s,w) = s + w - s_0 - w_0$. *In an interior equilibrium of the quadratic cost case, types* $a \in \left(a_{\phi(z)}, a_z\right)$ *work in the inflexible sector and are paid wage* $w^*_0 = y - \frac{s_0^2}{2}$. *All other types work for flexible firms and are paid wage* $w(a) = y - K_1 - \frac{s^{*2}_{a\beta}}{2}$. *The degree of polarization is* $\rho = 2\sqrt{2K_1}$. *There are two cases:*

1. *If* $s_0 < 1$, *then* $a_{\phi(z)} = s_0 - \sqrt{2K_1}$ *and* $a_z = \min\{\frac{s_0-\beta}{1-\beta} + \frac{\sqrt{2K_1}}{1-\beta}, s_0 + \sqrt{2K_1}\}$. *Types* $a \in \left(\min\{a_z, 1\}, 1\right)$ *work for flexible firms owned by socially responsible investors.*

2. *If* $s_0 \geq 1$, *then* $a_{\phi(z)} = \max\{\frac{s_0-\beta}{1-\beta} - \frac{\sqrt{2K_1}}{1-\beta}, s_0 - 2\sqrt{2K_1}\}$ *and* $a_z = s_0 + \sqrt{2K_1}$. *Types* $a \in \left(1, \max\{1, a_{\phi(z)}\}\right)$ *work for flexible firms owned by socially responsible investors.*

Proposition 8 implies that profit-driven investors match with workers with either very high or low a. In contrast, socially responsible investors match with workers with intermediate values of a. Thus, socially responsible investors appear more moderate in their investment choices than profit-driven investors. Figure 3 shows that the profit potential for socially responsible investors is flatter than that of profit-driven investors, which explains why socially responsible investors appear more moderate.

Figure 3 shows the profit potential function in the case of $s_0 < 1$. In this case, socially responsible investors will locate to the right of the minimum of $v(a)$. That is, they will buy relatively high-s firms. The presence of socially responsible investors increases the employment of moderate but right-of-center workers. If $s_0 > 1$ instead, the presence of socially responsible investors increases the employment of moderate but left-of-center

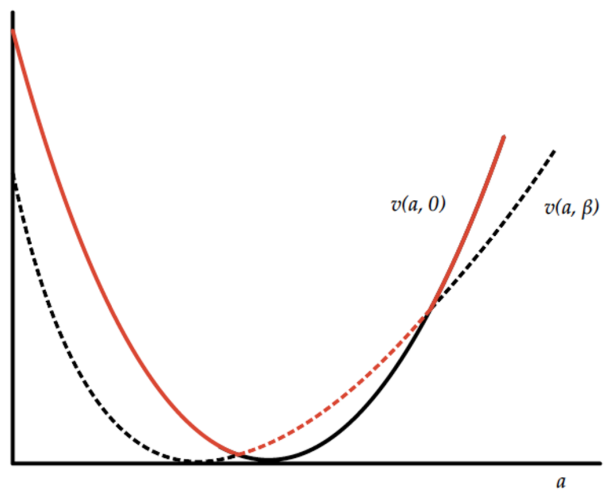

Figure 3: Profit Potential with Socially Responsible Investors: Case 2

workers in the flexible sector. As before, the presence of socially responsible investors increases workers' welfare by increasing labor demand.

In both cases, profit-driven investors pay K_1 and receive $\pi(s, w)$ as dividends. In equilibrium, $K_1 = \pi(s, w)$; thus ,such investors always get zero returns.[18] By contrast, we have that $K_1 = \pi(s, w) + \beta H(s, w)$ for socially responsible investors. That is, these investors have negative stock returns. The relationship between purpose and stock returns thus depends on investors' preferences. If $H(s, w) = s - s_0$, then high-purpose firms have lower stock returns than low-purpose firms. If $H(s, w) = s + w - s_0 - w_0$, firms with either very high or very low levels of s have higher stock returns than firms with intermediate levels of s. In this case, the model also predicts a link between employee satisfaction and expected stock returns. In particular, firms with the highest stock returns are flexible firms sold to profit-driven investors. These firms also have the highest levels of employee satisfaction (measured by U_i^*, which is the willingness to pay for a job). Because employee satisfaction is U-shaped in a, firms with the lowest stock returns have relatively low levels

[18]Note there is no risk or time discounting in our environment; thus, zero return is the fair compensation for their investments.

of employee satisfaction.

6 Related Literature

While the empirical literature on compensating differentials is vast, there are few works on the theory of compensating differentials. Our model is inspired by Rosen (1986), who models firms that compete by offering bundles of wages and nonwage attributes (see Lavetti (2023) for a recent review of the Rosen framework). By imposing further structure to Rosen's general framework, we can solve for the equilibrium fully and derive testable predictions. Importantly, unlike Rosen (1986), we assume the existence of two sectors with different degrees of technological flexibility. This difference in flexibility is essential for our main result (firm polarization in equilibrium).

Berk, Stanton, and Zechner (2010) make an important contribution to the theory of compensating differentials in competitive markets by developing a model in which risk-averse workers accept lower wages in exchange for job stability. They show that firms that commit to job stability choose lower debt levels. Because workers are heterogeneous, firms will cater to workers by offering different bundles of wages and debt levels. Our work differs in several ways, but mainly by focusing on job design under different degrees of technological flexibility, and its consequences for equilibrium sorting and polarization. Ferreira and Nikolowa (2024) provide another example of a compensating differentials model à la Rosen. In a dynamic model of careers inside firms, firms compete for workers with preferences over money and prestige. In the Internet Appendix, we extend our model to allow for careers, following Ferreira and Nikolowa (2024). We then derive additional predictions relating technological parameters to worker turnover and within-firm inequality.

Our model is related to models of product differentiation and spatial competition. In particular, our model resembles Hotelling's (1929) in that firms choose a location along a straight line. In strategic models of spatial competition, such as Hotelling (1929) and

Salop (1979), firms have incentives to "maximally differentiate" themselves by locating as far apart from one another to gain local market power. Such incentives are absent in our model because there are no strategic interactions. Thus, the model is closer to Rosen's (1974) model of product differentiation under pure competition. Our firms are price-takers and, thus, most firms choose to locate near or at the same point as others. Firm polarization nevertheless arises in equilibrium because workers (or in the case of product differentiation, consumers) do not enter the market in intermediate locations.

Our paper is also related to a small theoretical literature on the impact of organization and job design on labor market sorting. Aghion and Tirole (1997) show that the delegation of decision rights benefits firms through the agent's participation decision because agents who value autonomy are willing to work for lower compensation. Van den Steen (2005) shows that firms may wish to appoint CEOs with a particular "vision" to attract employees who share such a vision. A shared vision is modeled as shared beliefs in a world of multiple priors. Firms benefit from committing to a vision in multiple ways, such as improved motivation, coordination, and lower compensation costs. Van den Steen (2010) extends the analysis and broadens the interpretation of shared vision to include shared values (i.e., similar preferences). More closely related to our model is Henderson and Van den Steen's (2015) analysis of purposeful firms. In their model, firms commit to a pro-social purpose to attract employees who wish to develop a reputation for being pro-socially minded. In related work, Song, Thakor, and Quinn (2023) develop a model in which firms and workers are heterogeneous in their preferences for firm purpose. In a search model, they show that firms that offer a higher purpose can save on wage costs by matching with workers with strong purpose preferences. In these models, as in our model, firms that adopt a purpose can be more profitable because employees accept to work for lower wages. In a more recent contribution to this literature, Geelen, Hajda, and Starmans (2022) develop a delegation model of an organization in which controlling and non-controlling stakeholders can have pro-social preferences.

Our model features agents with preferences over nonpecuniary firm attributes in a frictionless competitive environment. A similar approach is found in a strand of the literature on responsible investment, which modifies standard asset pricing models to allow some investors to have social preferences (Heinkel, Kraus, and Zechner (2001); Pástor, Stambaugh, and Taylor (2021); Berk and van Binsbergen (2024)). Despite the absence of frictions, these models deliver many insights. While in the asset pricing literature the key scarce resource is capital, in our model the scarce resource is labor. Other related competitive models with few frictions (but no labor markets) include those of Pedersen, Fitzgibbons, and Pomorski (2021), who develop a mean-variance analysis of responsible investing when some investors are unaware of the informational content of ESG scores, Goldstein et al. (2022), who consider a rational expectations equilibrium model of stock prices when information about cash flow and ESG risk is dispersed among atomistic investors (who can be either green or traditional investors), Landier and Lovo (2024), who present a general equilibrium model of responsible investing in which the matching between entrepreneurs and capital is subject to frictions, and Wu and Zechner (2024), who develop a model in which firms cater to the political preferences of their investors.

More generally, our paper is related to the theoretical literature on socially responsible investing. A vast literature has developed since the pioneering work of Heinkel, Kraus, and Zechner (2001); for brevity, we review only the papers that share some of our modeling choices and applications. Most papers in this literature assume that some firms have technological flexibility. For example, Chowdry, Davies, and Waters (2019) consider a model of impact investing in which a manager allocates a scarce resource (e.g., attention) between a for-profit technology and a social technology. Oehmke and Opp (2024) present a corporate-finance model of socially responsible investing in which an entrepreneur chooses between two productive technologies—clean and dirty—and then raises funds from investors that can be either purely financially motivated or socially responsible. Edmans, Levit, and Schneemeier (2023) present a model in which a firm can take costly corrective actions to reduce externalities. They compare different forms of divestment strategies by responsible investors (blanket exclusion versus tilting). Dangl et al.

(2023) analyze the equilibrium impact of different kinds of social preferences on corporate investment. They explicitly model firms' choices between green and brown technologies.

Broccardo, Hart, and Zingales (2022) consider a model in which some agents care about the welfare of those affected by a decision. They show how investor voice (i.e., voting) can have an impact when investors are socially responsible. Piatti, Shapiro, and Wang (2023) consider a model in which some investors care about public good provision. Those investors invest more in firms delivering the public good (green firms) and may also invest more in brown firms for hedging reasons.

In addition, many models of sustainable investing consider the interactions between financial markets and corporate insiders, such as employees and managers. Davies and Van Wesep (2018) show that divestment campaigns can backfire because executive compensation typically rewards stock *returns*, not prices. Bond and Levit (2024) develop a model of imperfect competition in labor markets where an ESG policy is a commitment to pay workers above the market wage. In a similar vein, Stoughton, Wong, and Yi (2020) and Xiong and Yang (2023) model CSR as a commitment device, for firms with market power, to consider consumer or employee interests. In Albuquerque, Koskinen, and Zhang (2019), firms that adopt a CSR technology directly impact the consumers' demand by decreasing the elasticity of substitution. Thus, the adoption of a CSR technology decreases profit sensitivity to aggregate productivity shocks. Bisceglia, Piccolo, and Schneemeier (2022) present a model in which ex-ante identical firms can choose between two different technologies—brown and green—and a fraction of their customers and investors may have socially responsible preferences. Bucourt and Inostroza (2023) consider a setup where a manager exerts costly effort to increase the firm's ES quality, and heterogeneous investors trade shares based on their beliefs about the firm's ES quality. The authors show investor heterogeneity reduces the firm's ES investments.

7 Conclusion

When workers prefer purposeful or socially responsible jobs, profit-maximizing firms will cater to these preferences. By designing jobs with these positive attributes, firms can reduce their wage bills. Conversely, firms may also benefit from making a job less socially responsible or sustainable, as it may be cheaper to produce using "dirty" technologies. When dealing with workers who have heterogeneous preferences for job attributes, firms with flexible technologies will cater to those with the most extreme preferences, thereby amplifying the polarized preferences of the underlying population.

Firm polarization has several normative and positive implications. In the cross-section, firms in more polarized sectors are more valuable. This polarization is particularly advantageous for workers with extreme preferences. As the distribution of worker preferences becomes more polarized, more firms will adopt flexible technologies to cater to these preferences, resulting in a greater surplus for workers in polarized sectors. Consequently, workers with extreme preferences may welcome the dissemination of conflicting information that polarizes opinions and entrenches extreme views.

Our model is relevant to the discussion on corporate greenwashing and sustainability disclosures by companies. Concerned about firms engaging in "climate cheap talk," the SEC has adopted rules to standardize climate-related disclosures.[19] However, firms have few credible signals of green credentials at their disposal. Since workers are better informed about firms' green initiatives, if they value these efforts, wage concessions can act as a credible signal of such commitments.

[19] https://www.sec.gov/news/press-release/2024-31

Appendix

Proof of Proposition 1. The Lagrangian for the problem in (1) is:

$$\max_{s,w} \omega f(u^i(s,w)) + (1-\omega)\pi(w,s) - \lambda(\underline{u} - u^i(s,w)) - \mu(\underline{\pi} - \pi(s,w)). \tag{A.1}$$

The first-order conditions are:

$$\begin{aligned} &\omega\alpha_i f'(u^i(s,w)) - (1-\omega)c'(s) + \lambda\alpha_i - \mu c'(s) = 0 \\ &\omega(1-\alpha_i) f'(u^i(s,w)) - (1-\omega) + \lambda(1-\alpha_i) - \mu = 0. \end{aligned} \tag{A.2}$$

Only one of the two participation constraints can bind, so there are three cases: $\lambda = \mu = 0$, $\lambda > 0$ and $\mu = 0$, or $\lambda = 0$ and $\mu > 0$. In each of these three cases, from (A.2) we find that $\frac{\alpha_i}{1-\alpha_i} = c'(s_i)$, and therefore $s_i^* = h(\alpha_i) = c'^{-1}(\frac{\alpha_i}{1-\alpha_i})$.

For $\omega = 0$, the worker's participation constraint binds, i.e., $u^{i*} := u^i(s_i^*, w_i^*) = u^i(s_0, w_0) = w_0 + \alpha_i(s_0 - w_0)$. Thus, using the envelope theorem, we obtain

$$v'(\alpha_i) = \lambda(s_i^* - w_i^* - s_0 + w_0). \tag{A.3}$$

Since $w_i^* = w_0 + \frac{\alpha}{1-\alpha}(s_0 - s_i^*)$, we can simplify equation (A.3) as follows

$$v'(\alpha_i) = \lambda(s_i^* - w_i^* - s_0 + w_0) = \frac{s_i^* - s_0}{(1-\alpha_i)^2}. \tag{A.4}$$

Define α_k such that $s_0 = h(\alpha_k)$. For $\alpha_i < \alpha_k$, $v'(\alpha_i) < 0$, and for $\alpha_i > \alpha_k$, $v'(\alpha_i) > 0$, that is $v(\alpha_i)$ is strictly U-shaped and reaches its minimum value at α_k. □

Proof of Lemma 1. Because $F_1 > L$, some flexible firms will not employ any workers and thus must have zero profit. If firms operating in market j have positive profits, then the demand correspondence in (5) implies that all firms should locate in market j, implying that demand is greater than supply, and thus not an equilibrium. We conclude that profits must be zero in all active markets. $\square$

Proof of Lemma 2. To show that $\pi(s_0, w_0^*) = 0$, we need to consider two possible cases. First, suppose that all inflexible firms are active. Since $L < F_0 + F_1$, it follows that some flexible firms do not employ anyone, which implies (using the same argument as in Lemma 1) that all flexible firms have zero profit in equilibrium, in every market they can possibly operate, including market $j = 0$, which implies $\pi(s_0, w_0^*) = 0$. Second, suppose instead that some inflexible firms do not operate. The labor demand correspondence says that if $\pi(s_0, w_0^*) > 0$, $D_0(w_0^*) = F_0$, in which case the labor demand at market 0 is greater than the labor supply, which cannot happen in equilibrium. Finally, we cannot have $\pi(s_0, w_0^*) < 0$ because no inflexible firm would operate. Therefore, in equilibrium, we must have $\pi(s_0, w_0^*) = 0$.

To show that $\pi(s_j^*, w_j^*) = \pi^* > 0$ for all $j \in \{1, ..., n\}$ such that $x_j^* > 0$, note that the labor demand correspondence implies that all flexible firms must have the same profit in equilibrium, i.e., $\pi(s_j^*, w_j^*) = \pi^* \geq 0$ for all $j \in \{1, ..., n\}$ such that $x_j^* > 0$. Suppose $\pi(s_j^*, w_j^*) = 0$ for $x_j^* > 0$ and $j \neq k$. Then, profits must be zero in all active markets. Note that the profit potential at α_k is $v(\alpha_k) = 0$. Because $v(.)$ is U-shaped and reaches its minimum at α_k, for $j \neq k$ we have $v(\alpha_j) > \pi(s_j^*, w_j^*) = 0$. This implies that, at market $j \neq k$, workers of type j must enjoy a surplus relative to the inflexible sector: $u^j(s_j^*, w_j^*) - u^j(s_0, w_0^*) > 0$. Such workers will apply to work in the flexible sector, implying that the labor supply to the flexible sector will be arbitrarily close to L (because p_k is arbitrarily small), which is not possible in equilibrium because $L > F_1$. Thus, we must have $\pi^* > 0$. $\square$

Proof of Proposition 2. Assumption 2 implies that $v(\alpha_j)$ can be strictly ranked for all $j \in \{1, ..., n\}$. Let m index types according to $v(\alpha_j)$, that is, $m + 1 > m$ implies $v(\alpha_{m+1}) > v(\alpha_m)$ for all $m \in M = \{1, ..., n\}$. That is, we reorder all n types, from $m = 1$ to $m = n$, so that lower indices mean a lower profit potential. Note that the type that leads to the minimum profit potential is α_k. Define z as the largest element in M such that $\sum_{m=z}^{n} p_m L \geq F_1$.

Note that z always exists (because $L > F_1$) and is uniquely defined. Note that the subset $\{z, ..., n\} \subset M$ includes all types with extreme preferences because $v(\alpha_j)$ is strictly U-shaped.

We first show that $x_m^* = 0$ if and only if $m < z$. To show the sufficiency part, suppose that $m < z$ and $x_m^* > 0$. For this quantity to be feasible, there must exist at least one $m' \geq z$ such that $x_{m'} < p_{m'} L$. That is, there must be a positive mass of workers of type m' that are employed in the inflexible sector (because, in equilibrium, workers of type m' are either employed in market m' or in market 0). Without loss of generality, assume that $m' = z$. Because not all workers of type z are employed in the flexible sector, workers of that type must be indifferent between working in the flexible or the inflexible sector. Thus, the flexible firms' profit in this market must be $v(\alpha_z)$. Because the profit in market m is at most $v(\alpha_m)$, which is lower than $v(\alpha_z)$ by the definition of z, the demand for workers in market m must be zero. Thus, if $m < z$, then $x_m^* = 0$.

To show necessity, suppose $x_m^* = 0$. Then, it must be that all workers of type m work in the inflexible sector. That is, $w_m^* + \alpha_m(s_m^* - w_m^*) \leq w_0^* + \alpha_m(s_0 - w_0^*)$. Thus, $\pi(s_m^*, w_m^*) \geq v(\alpha_m)$. If $m \geq z$, then there must exist $m' < z$ such that $x_{m'}^* > 0$; otherwise we have $\sum_{m=1}^{n} x_m^* < F_1$, which implies that not all flexible firms are active and thus must have zero profit, contradicting Lemma 2. Because m' is an active market, by Lemma 2 it offers profit $\pi^* > 0$. Then, we have $\pi^* \leq v(\alpha_{m'})$ (because $v(.)$ gives the maximum profit for that market), $v(\alpha_{m'}) < v(\alpha_m)$ (because $m' < m$), and $v(\alpha_m) \leq \pi(s_m^*, w_m^*)$ (as argued above). Thus, $\pi(s_m^*, w_m^*) > \pi^*$, which is a contradiction. Thus, if $x_m^* = 0$, then $m < z$.

We now show that for all $m > z$, we have $x_m^* = p_m L$. Because z is the lowest index $j \in M$ such that $x_j^* > 0$, then $\pi^* \leq v(\alpha_z)$. If $x_m^* < p_m L$, the profit in that market is $v(\alpha_m) > v(\alpha_z) \geq \pi^*$, which violates Lemma 2. Thus, for all $m > z$, we have $x_m^* = p_m L$. If $m = z$, $x_z^* = F_1 - \sum_{j \in \{j \neq j : x_z > 0\}} p_j L$, which follows from the aggregate constraints.

The equilibrium wages for $x_j^* > 0$ follow immediately from the fact that all flexible firms have the same profit $v(z)$. If $x_j^* = 0$, wages can be anywhere between $y - c(s_j^*) - v(\alpha_z)$ and $[\alpha_j s_0 + (1 - \alpha_j) w_0^* - \alpha_j s_j^*]/(1 - \alpha_j)$ since both supply and demand can be zero for such (s_j^*, w) pairs. $\square$

Proof of Corollary 1. If $j > 1$, $j \leq k$, and $x_j^* > 0$, then $v(\alpha_{j-1}) > v(\alpha_j) \geq v(\alpha_z)$, thus (9) implies $x_{j-1}^* = p_{j-1}L$. The argument is symmetric for the other case. $\square$

Proof of Corollary 2. Since profits are the same across all active markets, the equilibrium wages in markets j and j' are such that:

$$w_j^* = w_{j'}^* + c(s_{j'}^*) - c(s_j^*), \tag{A.5}$$

where $s_{j'}^* = h(\alpha_{j'}) > h\left(\alpha_j\right) = s_{j'}^*$, and $c(s_{j'}^*) > c(s_j^*)$. It follows that $w_j^* > w_{j'}^*$. $\square$

Proof of Corollary 3. Define the *utility surplus potential* as

$$\vartheta(\alpha_i) := \max_{(s,w)} U_i(s, w) \text{ subject to } y - w - c(s) = \pi^*. \tag{A.6}$$

In an equilibrium with profit π^*, the surplus of a type-i worker employed in the flexible sector is $\vartheta(\alpha_i)$. By the Envelope Theorem, $\vartheta'(\alpha_i) = s_i^* - s_0 - w(s_i^*) + w_0$, where $w(s_i^*) = y - \pi^* - c(s_i^*)$. We have $\vartheta''(\alpha_i) = s_i^{*\prime} + c'(s_i^*)s_i^{*\prime} > 0$, thus the utility surplus potential is strictly convex in α_i.

Suppose first that the equilibrium is such that type $i = 1$ is hired by a flexible firm. At $i = 1$, we have $\vartheta'(\alpha_1) = s_1^* - s_0 - w(s_1^*) + w_0$. We have $s_1^* < s_0$ because $s_0 = s_k$. It must then be that $w(s_1^*) > w_0$, otherwise $U_1(s_1^*, w(s_1^*)) = \alpha_1(s_1^* - s_0) + (1 - \alpha_1)(w(s_1^*) - w_0) < 0$, implying that market 1 cannot simultaneously support profit π^* and a non-negative worker surplus. Thus, $\vartheta'(\alpha_1) < 0$. Because $\lim_{\alpha\to\infty} \vartheta'(\alpha) = \infty$, $\vartheta(\alpha_i)$ is strictly U-shaped, and the result follows.

If, instead, type $i = 1$ is not hired by a flexible firm, the equilibrium threshold type z is such that $s_z^* > s_0$. Because $v(\alpha_k) = 0$, then $\vartheta(\alpha_k) < 0$, implying $w(s_0) < w_0$. Thus, $0 < \vartheta'(\alpha_k) < \vartheta'(\alpha_z)$ (the latter inequality follows from the strict convexity of $\vartheta(\alpha_i)$), and the result follows. $\square$

Proof of Corollary 4. A density $p(.)$ can be approximated by a discrete probability function $\hat{p}(.)$ for n equidistant types. Proposition 2 implies the existence of z which characterizes the equilibrium under $\hat{p}(.)$. As $n \to \infty$, if $\hat{p}(.) \to p(.)$, then $z \to z^*$. We then define $z = z^*$. $\square$

Proof of Corollary 5. Use $w_0 = y - c(s_0)$ to write the profit potential as $v(\alpha) = c(s_0) - c(h(\alpha)) + \frac{\alpha}{1-\alpha}(h(\alpha) - s_0)$. The profit potential's intercept is $v(0) = c(s_0)$, which is positive and strictly increasing in s_0. As $s_0 \to 0$, $c(s_0) \to 0$. Because $\pi^* > 0$, we have $v(z) = \pi^*$ and $\phi(z) = 0$ (i.e., a corner solution). $\square$

Proof of Proposition 3. First, note that $v(\alpha)$ does not depend on the distribution and, thus, it is not affected by a generalized increase in risk. Let z denote the equilibrium threshold when the distribution is $P(.)$. From the definition of a generalized increase in risk, we have $\int_z^{\phi(z)} p(\alpha)d\alpha > \int_z^{\phi(z)} \hat{p}(\alpha)d\alpha$, and therefore

$$F_1 < L\left(\int_0^{\phi(z)} \widehat{p}(\alpha)d\alpha + \int_z^1 \widehat{p}(\alpha)d\alpha\right). \tag{A.7}$$

Since the right-hand side of equation (A.7) is continuous and strictly decreasing in z, it follows that $\widehat{z} > z$, where $\widehat{z}$ is given by: $F_1 = L\left(\int_0^{\phi(\widehat{z})} \widehat{p}(\alpha)d\alpha + \int_{\widehat{z}}^1 \widehat{p}(\alpha)d\alpha\right)$. Parts (ii) and (iii) of the proposition follow directly from $\widehat{z} > z$. $\square$

Proof of Proposition 4. From Proposition 1, we know that the profit potential is U-shaped and reaches its minimum for $\alpha = k$, and therefore is increasing for $\alpha > k$. Since $v(k) = 0$ and $v(\alpha)|_{\alpha \to 1} \to \infty$, it follows that $v(z^*) = K_1$ exists for any $K_1 > 0$. F_1^* and $\phi(z^*)$ follow from Corollary 4. The wage function $w(\alpha)$ is the continuous analog of (10). $\square$

Proof of Corollary 6. From $v(z^*) = K_1$ and $v'(\alpha) > 0$ for $\alpha > k$, it follows that $\frac{\partial z^*}{\partial K_1} > 0$. From equation (12) and $v'(\alpha) < 0$ for $\alpha < k$, it follows that $\frac{\partial \phi(z^*)}{\partial K_1} \leq 0$. It then immediately follows that polarization (i.e., $\rho^* = s_z^* - s_{\phi(z)}^*$) increases with K_1. As the equilibrium mass of firms in the flexible sector is given by (11), it then follows that $\frac{\partial F_1^*}{\partial K_1} < 0$. $\square$

Proof of Corollary 7. From Proposition 3, if F_1^* did not change, Date 1 profits would have increased. Thus, the number of firms must increase, so that competition brings the profit back to $\pi^* = K_1$. $\square$

Proof of Predictions 3 and 4. Polarization is $\rho^* = 2\sqrt{2K_1}$ and the average wage is

$$\overline{w}^* = y - K_1 - \frac{s_0^2}{2} - \frac{\Delta^2}{6} - \frac{\Delta}{6}\sqrt{2K_1} - \frac{K_1}{3} \tag{A.8}$$

From Proposition 5, we see that if K_1 increases, less employees work for flexible firms, that is there are less flexible firms entering Sector 1. From equation (A.8) it follows that $\frac{\partial \overline{w}^*}{\partial K_1} < 0$ and $\frac{\partial \overline{w}^*}{\partial \Delta} < 0$. $\square$

Proof of Proposition 6. The expression for the Labor share can be rewritten as follows:

$$\text{Labor share} = \frac{y - K_1 - \frac{s_0^2}{2} - \frac{\Delta^2}{6} - \frac{\Delta}{6}\sqrt{2K_1} - \frac{K_1}{3}}{y - \frac{s_0^2}{2} - \frac{\Delta^2}{6} - \frac{\Delta}{6}\sqrt{2K_1} - \frac{K_1}{3}} \tag{A.9}$$

We now find the effect of K_1 and Δ on the labor share.

$$\frac{\partial \text{Labor share}}{\partial K_1} = \frac{-(y-M^*) - \left(\frac{\Delta}{6\sqrt{2K_1}} + \frac{1}{3}\right)K_1}{\left(y - \frac{s_0^2}{2} - \frac{\Delta^2}{6} - \frac{\Delta}{6}\sqrt{2K_1} - \frac{K_1}{3}\right)^2} < 0 \tag{A.10}$$

$$\frac{\partial \text{Labor share}}{\partial \Delta} = \frac{-\left(\frac{\Delta}{3} + \frac{\sqrt{2K_1}}{6}\right)K_1}{\left(y - \frac{s_0^2}{2} - \frac{\Delta^2}{6} - \frac{\Delta}{6}\sqrt{2K_1} - \frac{K_1}{3}\right)^2} < 0 \tag{A.11}$$

$\square$

Proof of Proposition 7. Consider the inflexible sector contract, (s_0, w_0^*). Both profit-driven and socially responsible investors derive the same utility $\pi(s_0, w_0^*)$ from this contract. Thus, because $L < F$, competition among entrepreneurs drives profits to zero, $\pi(s_0, w_0^*) = 0$, implying $w_0^* = y - \frac{s_0^2}{2}$.

The profit potential function of the socially responsible investors is $v(a,\beta) = y - w_0 + \frac{(a+\beta)^2}{2} - (a+\beta)s_0$ and is U-shaped in a. $v(a,0) = y - w_0 + \frac{a^2}{2} - as_0$ is the profit potential of a profit-driven investor. It follows that $v(a,\beta) \geq v(a,0)$ for any $a \geq \max\{0, s_0 - \frac{\beta}{2}\}$. We assume that $s_0 > \frac{\beta}{2}$, otherwise $a_{\phi(z)} = 0$, i.e., the solution is not interior. Define $v(a) := \max\{v(a,0), v(a,\beta)\}$, that is,

$$v(a) = \begin{cases} v(a,0) & \text{for } a \leq s_0 - \frac{\beta}{2} \\ v(a,\beta) & \text{for } a > s_0 - \frac{\beta}{2} \end{cases} . \tag{A.12}$$

Define $a_{min} = s_0 - \frac{\beta}{2}$. We have the following properties for $v(a)$ at $a = a_{min}$, $v(a_{min}, 0) = v(a_{min}, \beta)$, $v'(a_{min}, 0) < 0$, and $v'(a_{min}, \beta) > 0$. It then follows that $v(a_{min})$ is the minimum profit potential. To guarantee $F_1 < L$, the following condition must hold:

$$K_1 > v(a_{min}) \quad \Leftrightarrow K_1 > \frac{\beta^2}{8}. \tag{A.13}$$

The equilibrium values for a_z and $a_{\phi(z)}$ are given by $v(a) = K_1$, implying $a_z = s_0 - \beta + \sqrt{2K_1}$ and $a_{\phi(z)} = s_0 - \sqrt{2K_1}$, where $a_z > a_{\phi(z)}$ is implied by (A.13).

An interior solution also requires $s_0 > \sqrt{2K_1}$. The s-quality levels are $s_z = s_0 + \sqrt{2K_1}$ and $s_{\phi(z)} = s_0 - \sqrt{2K_1}$. The degree of polarization is $\rho = 2\sqrt{2K_1}$. Wages are $w(a) = y - K_1 - \frac{1}{2}s^{*2}_{a\beta}$, where $s^{*2}_{a\beta} = a$ for profit-driven firms and $s^{*2}_{a\beta} = a + \beta$ for socially responsible firms. □

Proof of Proposition 8. The profit potential of the socially-responsible investor is $v(a,\beta) = y - w_0 + 0.5[(1-\beta)^2(a+b)^2] - s_0(1-\beta)(a+b)$ and is U-shaped in a. The profit potential of the profit-driven investor is $v(a,0) = y - w_0 + \frac{a^2}{2} - as_0$.

Suppose $s_0 < 1$. Then, it follows that $v(a,\beta) \geq v(a,0)$ for any $a \in [\frac{2s_0 - \beta}{2-\beta}, 1]$. The overall profit potential function is the upper envelope of $v(a,\beta)$ and $v(a,0)$:

$$v(a) = \begin{cases} v(a,0) & \text{for } a \leq \frac{2s_0-\beta}{2-\beta} \\ v(a,\beta) & \text{for } \frac{2s_0-\beta}{2-\beta} < a < 1 \\ v(a,0) & \text{for } a \geq 1 \end{cases} . \tag{A.14}$$

Define $a_{min} = \frac{2s_0-\beta}{2-\beta}$. We have $v(a_{min},0) = v(a_{min},\beta)$, $v'(a_{min},0) < 0$, and $v'(a_{min},\beta) > 0$. It then follows that $v(a_{min})$ is the minimum profit potential. It must be that $a_{min} > 0$, otherwise $a_{\phi(z)} = 0$, i.e., the solution is not interior. This implies $s_0 > \frac{\beta}{2}$. To guarantee $F_1 < L$, we need

$$\begin{aligned} K_1 > v(a_{min}) \quad & \Leftrightarrow K_1 > \frac{(a_{min}-s_0)^2}{2} \\ & \Leftrightarrow K_1 > \frac{1}{2}\left(\frac{\beta(1-s_0)}{2-\beta}\right)^2. \end{aligned} \tag{A.15}$$

The equilibrium is determined by $v(a) = K_1$, which gives solutions $a_{\phi(z)}$ and a_z. $a_{\phi(z)}$ is the lowest root such that $v(a,0) = K_1$, which is $a_{\phi(z)} = s_0 - \sqrt{2K_1}$. To ensure $a_{\phi(z)} > 0$, $K_1 < \frac{s_0^2}{2}$. Now we have two cases to consider. If $K_1 > v(1)$, then a_z is the largest root of $v(a,0) = K_1$, which is $a_z = s_0 + \sqrt{2K_1}$. If, instead, $K_1 < v(1)$, then a_z is the largest root of $v(a,\beta) = K_1$, which is $a_z = \frac{s_0-\beta}{1-\beta} + \frac{\sqrt{2K_1}}{1-\beta}$. It follows from (A.14) that workers with types $a \in (a_z, 1)$ work for socially responsible firms.

If $s_0 > 1$, we follow the same procedure and find that $a_{\phi(z)} = \max\{\frac{s_0-\beta}{1-\beta} - \frac{\sqrt{2K_1}}{1-\beta}, s_0 - 2\sqrt{2K_1}\}$ and $a_z = s_0 + \sqrt{2K_1}$. □

References

AGHION, P. AND J. TIROLE (1997): "Formal and real authority in organizations," *Journal of Political Economy*, 105, 1–29.

ALBUQUERQUE, R., Y. KOSKINEN, AND C. ZHANG (2019): "Corporate Social Responsibility and Firm Risk: Theory and Empirical Evidence," *Management Science*, 65, 4451–4469.

AUTOR, D., D. DORN, L. F. KATZ, C. PATTERSON, AND J. VAN REENEN (2020): "The fall of the labor share and the rise of superstar firms," *Quaterly Journal of Economics*, 135, 645–709.

BARKAI, S. (2020): "Declining Labor and Capital Shares," *Journal of Finance*, 75, 2421–2463.

BERK, J. AND J. H. VAN BINSBERGEN (2024): "The impact of impact investing," *Journal of Financial Economics*, fothcoming.

BERK, J. B., R. STANTON, AND J. ZECHNER (2010): "Human capital, bankruptcy, and capital structure," *Journal of Finance*, 65, 891–926.

BISCEGLIA, M., A. PICCOLO, AND J. SCHNEEMEIER (2022): "Externalities of Responsible Investments," Working paper, Toulouse School of Economics and Indiana University.

BOND, P. AND D. LEVIT (2024): "ESG: A Panacea for Market Power?" *Journal of Financial Economics*, forthcoming.

BROCCARDO, E., O. HART, AND L. ZINGALES (2022): "Exit versus voice," *Journal of Political Economy*, 130, 3101–3145.

BUCOURT, N. AND N. INOSTROZA (2023): "ESG investing and managerial incentives," Working paper, U. of Toronto.

CASSAR, L. AND S. MEIER (2018): "Nonmonetary incentives and the implications of work as a source of meaning," *Journal of Economic Perspectives*, 32, 215–238.

CEN, X., Y. QIU, AND T. Y. WANG (2022): "Corporate social responsibility and employee retention," Working paper, Texas AM, Temple U., and U. of Minnesota.

CHOWDRY, B., S. W. DAVIES, AND B. WATERS (2019): "Investing for Impact," *Review of Financial Studies*, 32, 864–904.

COLONNELLI, E., T. MCQUADE, G. RAMOS, T. RAUTER, AND O. XIONG (2023): "Polarizing corporations: Does talent flow to "good" firms?" Working Paper, U. of Chicago, U. of California at Berkeley, and Imperial College.

COLONNELLI, E., V. PINHO NETO, AND E. TESO (2022): "Politics at work," Working Paper, U. of Chicago, Fundação Getulio Vargas, and Northwestern U.

CONWAY, J. AND L. BOXELL (2023): "Consuming values," Working Paper, Stanford U.

COVARRUBIAS, M., G. GUTIÉRREZ, AND T. PHILIPPON (2019): "From good to bad concentration? US industries over the past 30 years," *NBER Macroeconomics Annual*, 34, 1–46.

DANGL, T., M. HALLING, J. YU, AND J. ZECHNER (2023): "Social preferences and corporate investment," Working Paper, Vienna University of Technology, U. of Luxembourg, Monash U., and Vienna U. of Economics and Business.

DAVIES, S. W. AND E. D. VAN WESEP (2018): "The unintended consequences of divestment," *Journal of Financial Economics*, 128, 558–575.

DI GIULI, A. AND L. KOSTOVETSKY (2014): "Are red or blue companies more likely to go green? Politics and corporate social responsibility," *Journal of Financial Economics*, 111, 158–180.

DUCHIN, R., A. E. K. FARROUKH, J. HARFORD, AND T. PATEL (2023): "The economic effects of political polarization: Evidence from the real asset market," Working Paper, Boston College, Indiana U., U. of Washington, and Southern Methodist U.

EDMANS, A. (2011): "Does the stock market fully value intangibles? Employee satisfaction and equity prices," *Journal of Financial Economics*, 101, 621–640.

EDMANS, A., D. LEVIT, AND J. SCHNEEMEIER (2023): "Socially responsible divestment," ECGI Finance Working Paper 823/2022.

EDMANS, A., D. PU, C. ZHANG, AND L. LI (2024): "Employee satisfaction, labor market flexibility, and stock returns around the world," *Management Science*, 70, 4167–4952.

FERREIRA, D. AND R. NIKOLOWA (2024): "Prestige, promotion, and pay," *Journal of Finance*, 79, 505–540.

FOCKE, F., E. MAUG, AND A. NIESSEN-RUENZI (2017): "The impact of firm prestige on executive compensation," *Journal of Financial Economics*, 123, 313–336.

FOS, V., E. KEMPF, AND M. TSOUTSOURA (2023): "The political polarization of Corporate America," Working Paper, Boston College, Harvard U., and Washington U. in St. Louis.

GARICANO, L. AND E. ROSSI-HANSBERG (2006): "Organization and inequality in a knowledge economy," *Quarterly Journal of Economics*, 121, 1383–1435.

GEELEN, T., J. HAJDA, AND J. STARMANS (2022): "Sustainable organizations," Working paper, Copenhagen Business School, HEC Montreal, and Stockholm School of Economics.

GIANNETTI, M. AND T. Y. WANG (2023): "Public attention to gender equality and board gender diversity," *Journal of Financial and Quantitative Analysis*, 58, 485–511.

GOLDSTEIN, I., A. KOPYTOV, L. SHEN, AND H. XIANG (2022): "On ESG investing: Heterogeneous preferences, information, and asset prices," Working Paper, U. of Pennsylvania, U. of Hong Kong, INSEAD, and Peking University.

HEDBLOM, D., B. R. HICKMAN, AND J. A. LIST (2019): "Toward an understanding of corporate social responsibility: Theory and field experimental evidence," NBER Working Paper 26222.

HEINKEL, R., A. KRAUS, AND J. ZECHNER (2001): "The effect of green investment on corporate behavior," *Journal of Financial and Quantitative Analysis*, 36, 431–449.

HENDERSON, R. AND E. VAN DEN STEEN (2015): "Why do firms have "purpose"? The firm's role as a carrier of identity and reputation," *American Economic Review: Papers Proceedings*, 105, 326–330.

HOTELLING, H. (1929): "Stability in competition," *Economic Journal*, 39, 41–57.

KRUEGER, P., D. METZGER, AND J. WU (2023): "The sustainability wage gap," ECGI Working Paper 718/2020.

LANDIER, A. AND S. LOVO (2024): "Socially responsible finance: How to optimize impact?" *Review of Financial Studies*, forthcoming.

LAVETTI, K. (2023): "Compensating wage differentials in labor markets: Empirical challenges and applications," *Journal of Economic Perspectives*, 37, 189–212.

MAS, A. AND A. PALLAIS (2017): "Valuing alternative work arrangements," *American Economic Review*, 107, 3722–3759.

MAS-COLELL, A., M. D. WHINSTON, AND J. R. GREEN (1995): *Microeconomic Theory*, Oxford University Press.

OEHMKE, M. AND M. OPP (2024): "A theory of socially responsible investment," *Review of Economic Studies*, forthcoming.

OUIMET, P. AND G. A. TATE (2022): "Firms with benefits? Nonwage compensation and implications for firms and labor markets," Working paper, University of North Carolina and University of Maryland.

PÁSTOR, L., R. F. STAMBAUGH, AND L. A. TAYLOR (2021): "Sustainable investing in equilibrium," *Journal of Financial Economics*, 142, 550–571.

PEDERSEN, L. H., S. FITZGIBBONS, AND L. POMORSKI (2021): "Responsible Investing: The ESG-efficient frontier," *Journal of Financial Economics*, 142, 572–597.

PIATTI, I., J. SHAPIRO, AND J. WANG (2023): "Sustainable investing and public goods provision," Working paper.

ROSEN, S. (1974): "Hedonic prices and implicit markets: Product differentiation in pure competition," *Journal of Political Economy*, 82, 34–55.

——— (1986): "The theory of equalizing differences," *Handbook of labor economics*, 1, 641–6922.

SALOP, S. C. (1979): "Monopolistic competition with outside goods," *Bell Journal of Economics*, 10, 141–155.

SATTINGER, M. (1993): "Assignment models of the distribution of earnings," *Journal of Economic Literature*, 31, 831–880.

SOCKIN, J. (2022): "Show me the amenity: Are higher-paying firms better all around?" Working paper, University of Pennsylvania.

SONG, F., A. THAKOR, AND R. QUINN (2023): "Purpose, Profit and Social Pressure," *Journal of Financial intermediation*, 55.

SORKIN, I. (2018): "Ranking firms using revealed preference," *The Quarterly Journal of Economics*, 133, 1331–1393.

STEEL, R. S. (2024): "The political transformation of Corporate America, 2001–2022," Working Paper, Columbia University.

STERN, S. (2004): "Do scientists pay to be scientists?" *Management Science*, 50, 835–853.

STOUGHTON, N. M., K. P. WONG, AND L. YI (2020): "Competitve corporate social responsibility," Working paper, WU-Vienna University of Economics and Business, University of Hong Kong, and Hong Kong Baptist University.

TINBERGEN, J. (1956): "On the theory of income distribution," *Weltwirtschaftliches Archiv*, 77, 155–175.

VAN DEN STEEN, E. J. (2005): "Organizational beliefs and managerial vision," *Journal of Law, Economics & Organization*, 21, 256–283.

——— (2010): "Culture clash: The costs and benefits of homogeneity," *Management Science*, 56, 1718–1738.

WISWALL, M. AND B. ZAFAR (2018): "Preference for the workplace, investment in human capital, and gender," *The Quarterly Journal of Economics*, 133, 457–507.

WU, Y. AND J. ZECHNER (2024): "Political Preferences and Financial Market Equilibrium," Working Paper, University of Oregon and Vienna University of Economics and Business.

XIONG, Y. AND L. YANG (2023): "Personalized Pricing, Network Effects, and Corporate Social Responsibility," Working Paper.

Internet Appendix for "Polarization, Purpose and Profit"

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1 Excess supply of workers

In this section, we extend the analysis to the case where workers, rather than firms, are in excess supply. That is, we assume that $L > F$. This assumption implies that some workers will remain unemployed in equilibrium. The contract of an unemployed worker is normalized to $(0,0)$. For simplicity we derive the results in the quadratic-uniform case presented in Section 4. Let's assume that in Date 1 some firms are flexible (F_1) and some are inflexible (F_0). Below we will discuss the Date 0 entry conditions in Sector 1.

At Date 1, we solve by taking F_1 as given. The profit potential function is $v(a) = y - w_0^* - as_0 + \frac{a^2}{2}$. For a given F_1 the equilibrium conditions are as in Corollary 4: $v(a_z) = v(\phi(a_z))$ and $\frac{1}{2\Delta}(2\Delta - a_z + \phi(a_z)) = \tau_1$, where $\tau_1 = \frac{F_1}{L}$. Solving these conditions we find $a_z = a_k + \Delta(1-\tau_1)$ and $\phi(a_z) = a_k - \Delta(1-\tau_1)$. The wage function is thus $w(a) = w_0^* + \frac{s_0^2}{2} - \frac{\Delta^2}{2}(1-\tau_1)^2 - \frac{a^2}{2}$. To solve for the equilibrium, we need to determine w_0^*. Because all inflexible firms will now hire workers, we also need to determine which workers are hired. Firms in the inflexible sector prefer to hire workers with higher a. Thus, for a

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given equilibrium a_z, there exists a threshold type $a_0 = a_z - 2\Delta\tau_0 = a_k + \Delta(1 - \tau_1 - 2\tau_0)$, where $\tau_0 = \frac{F-F_1}{L}$. The inflexible firms hire all types in (a_0, a_z). Because we normalize the utility of unemployed workers to zero, we find that $w_0^* = -s_0 a_0 = -s_0(a_k + \Delta(1 - \tau_1 - 2\tau_0))$. This case has the same qualitative properties as when workers are in short supply. In addition, wages and profits in the flexible sector now depend on the inflexible sector market tightness, τ_0, and the profit in the inflexible sector is given by $\pi_0^* = y + \frac{s_0^2}{2} + s_0\Delta(1 - \tau_1 - 2\tau_0)$.

At Date 0, suppose that entrepreneurs expect a mass F_1 of firms to enter Sector 1. For an equilibrium with $F_1 > 0$ to exist, we need $v(\phi(a_z^*)) - K_1 = v(a_z^*) - K_1 = \pi_0^*$, that is: $y - w_0^* - as_0 + \frac{a^2}{2} - K_1 = y - w_0^* - \frac{s_0^2}{2}$. It follows that $a_z^* = a_k + \sqrt{2K_1}$ and $\phi(a_z^*) = a_k - \sqrt{2K_1}$. The mass of firms F_1^* that enter Sector 1 and the level of polarization ρ^* are the same under $F < L$ and $F > L$. The only difference between the two cases is in terms of how the overall surplus is split between workers and firms.

2 General Utility Function

Here we show that our main results hold for a large family of utility functions. By "main results" we mean the existence of a unique equilibrium as described in Proposition 2 (characterized in an analogous way) and Corollaries 1 to 4.

For utility $u^i(s, w)$, define (as in the proof of Corollary 3) the *utility surplus potential* as

$$\vartheta(\alpha_i) := \max_{(s,w)} u^i(s, w) - u^i(s_0, w_0) \text{ subject to } y - w - c(s) = \pi^*. \tag{IA.1}$$

In an equilibrium with profit π^*, the surplus of a type-i worker employed in the flexible sector is $\vartheta(\alpha_i)$. A sufficient (but not necessary) condition for our results to hold is a strictly convex $\vartheta(\alpha_i)$. To see this, notice that strict convexity implies that $\vartheta(\alpha_i)$ is increasing, decreasing, or U-shaped. If it is U-shaped, it is immediate that the profit potential is also U-shaped, and our results follow. If it is increasing or decreasing, only high-α workers or low-α workers will be employed in the flexible sector. In either case, polarization occurs, and the other corollaries hold as well. Thus, here we focus on establishing sufficient conditions for $\vartheta(\alpha_i)$ to be strictly convex.

We consider a utility function $u^i(s,w)$ with the following properties.

Condition IA.1. *Utility $u^i(s,w)$ is strictly increasing in (s,w) and quasi-concave.*

Condition IA.1 simply says that both s and w are goods and indifference curves are convex.

Condition IA.2. *We can write $u^i(s,w) = f\big(g_1(\alpha_i)h_1(s,w) + g_2(1-\alpha_i)h_2(s,w)\big)$, where $f(.)$, $g_1(.)$ and $g_2(.)$ are strictly increasing, and*

$$\begin{array}{l} g_1'(\alpha_i)\frac{\partial h_1(s,w)}{\partial s} - g_2'(1-\alpha_i)\frac{\partial h_2(s,w)}{\partial s} > 0 \\ g_1'(\alpha_i)\frac{\partial h_1(s,w)}{\partial w} - g_2'(1-\alpha_i)\frac{\partial h_2(s,w)}{\partial w} < 0 \end{array} \tag{IA.2}$$

for all $s > 0$, w, and $\alpha \in (0,1)$.

Note that (IA.2) is merely definitional: it defines α as a parameter that increases the marginal utility of s and decreases the marginal utility of w. Without this condition, we would not be able to interpret α.

There are several families of utility functions that satisfy Conditions 1 and 2, including all the standard functions commonly used in consumer theory. Note that the linear utility used in the main text is a special case where $f(x) = x$, $g_1(x) = g_2(x) = x$, $h_1(s,w) = s$ and $h_2(s,w) = w$. Note that all Cobb-Douglas functions such as $u(s,w) = Ks^{g_1(\alpha)}w^{g_2(1-\alpha)}$ also satisfy these conditions, because they can be equivalently written as $g_1(\alpha)\ln s + g_2(1-\alpha)\ln w$. Similarly, CES functions of the type $\big(g_1(\alpha)s^r + g_2(1-\alpha)w^r\big)^{\frac{v}{r}}$ also satisfy these properties (for $r < 1$). An example of a nonstandard function that also satisfies Conditions 1 and 2 is $u(s,w) = g_1(\alpha)h(s+kw) + g_2(1-\alpha)h(ks+w)$ where $h(.)$ is concave and strictly increasing and $k \in (0,1)$.

Not all functions satisfying Conditions 1 and 2 imply a convex utility surplus potential. As we will show, we need to impose further conditions on the second derivative of $g_1(.)$ and $g_2(.)$. First, we begin with a simple example.

Example: Cobb-Douglas. Suppose $u(s,w) = s^{\alpha}w^{1-\alpha}$. For this example, we need to restrict the domain to $s > 0$ and $w > 0$. As we will see below, we can impose this condition indirectly by choosing α_1 and α_n (i.e., the min and the max types) suitably. Working with the log transformation, the first-order condition for (IA.1) is

$$\frac{\alpha}{s} - \frac{(1-\alpha)c'(s)}{y - \pi^* - c(s)} = 0 \tag{IA.3}$$

and the second-order condition is

$$-\frac{\alpha}{s^2} - \frac{(1-\alpha)c''(s)(w + c'(s)^2)}{w^2} < 0. \tag{IA.4}$$

Note that (IA.3) defines function $s(\alpha)$ and that $s'(\alpha) > 0$. Replacing $s(\alpha)$ in the constraint yields $w(\alpha) = y - \pi^* - c(s(\alpha))$, implying $w'(\alpha) < 0$. By the Envelope Theorem, we have

$$\vartheta'(\alpha) = \ln s - \ln w - \ln s_0 + \ln w_0 \tag{IA.5}$$

and

$$\vartheta''(\alpha) = \frac{1}{s}s'(\alpha) - \frac{1}{w}w'(\alpha) > 0. \tag{IA.6}$$

Thus, $\vartheta(\alpha)$ is strictly convex. In this case, we can also show that $\vartheta(\alpha)$ is strictly U-shaped. As $\alpha \to 0$, $s \to 0$ and $w \to y - \pi^* > 0$. Thus, $\lim_{\alpha \to 0} \vartheta'(\alpha) = -\infty$, implying that $\vartheta(\alpha)$ is initially decreasing. As $\alpha \to 1$, the lower bound $w = 0$ eventually binds for some $\hat{\alpha}$, implying that as $\lim_{\alpha \to \hat{\alpha}} \vartheta'(\alpha) = \infty$. Thus, as long as α_1 is close to zero and α_n is close to $\hat{\alpha}$, $\vartheta(\alpha)$ is strictly U-shaped in its relevant domain. We also note that the strict convexity of $c(s)$ is not necessary here; the problem is also well-behaved if $c(s)$ is, e.g., linear everywhere. Thus, the strict convexity of the utility surplus potential (and the profit potential) does not hinge on $c(s)$ being convex. In general, if the utility function is *strictly* quasi-concave, strict cost convexity is not necessary for a unique solution.

We now consider more general functions. We first show that, if $g_1(.)$ and $g_2(.)$ are linear, Conditions 1 and 2 are sufficient to guarantee that $\vartheta(\alpha)$ is strictly convex. Write the utility as $u(s,w) = \alpha h_1(s,w) + (1-\alpha)h_2(s,w)$. To simplify notation, we write condition (IA.2) as $h_{1s}(s,w) - h_{2s}(s,w) > 0$ and $h_{1w}(s,w) - h_{2w}(s,w) < 0$. The first-order condition is

$$\alpha\big(h_{1s}(s,w) - h_{1w}(s,w)c'(s)\big) + (1-\alpha)\big(h_{2s}(s,w) - h_{2w}(s,w)c'(s)\big) = 0. \tag{IA.7}$$

Quasi-concavity plus strict convexity of $c(s)$ imply that the problem is globally (strictly) concave, thus there is a unique solution, which we denote by $s(\alpha)$. Differentiating IA.7 with respect to α yields

$$h_{1s}(s,w) - h_{2s}(s,w) + \big(h_{2w}(s,w) - h_{1w}(s,w)\big)c'(s) > 0 \tag{IA.8}$$

which is positive because of (IA.2). Thus, we have that $s'(\alpha) > 0$ and $w'(\alpha) < 0$. By the Envelope Theorem, we have

$$\vartheta'(\alpha) = h_1(s,w) - h_2(s,w) - h_1(s_0,w_0) + h_2(s_0,w_0) \tag{IA.9}$$

and

$$\vartheta''(\alpha) = \big(h_{1s}(s,w) - h_{2s}(s,w)\big)s'(\alpha) + \big(h_{1w}(s,w) - h_{2w}(s,w)\big)w'(\alpha) > 0. \tag{IA.10}$$

Thus, $\vartheta(\alpha)$ is strictly convex.

The case for general $g_1(.)$ and $g(.)$ is solved similarly. Quasi-concavity and $c'' > 0$ imply a unique solution for each α and (IA.2) implies $s'(\alpha) > 0$ and $w'(\alpha)$. By the Envelope Theorem, we have

$$\vartheta'(\alpha) = g_1'(\alpha)h_1(s,w) - g_2'(1-\alpha)h_2(s,w) - g_1'(\alpha)h_1(s_0,w_0) + g_2'(1-\alpha)h_2(s_0,w_0) \tag{IA.11}$$

and

$$
\begin{aligned}
\vartheta''(\alpha) = & \big(g_1'(\alpha)h_{1s}(s,w) - g_2'(1-\alpha)h_{2s}(s,w)\big)s'(\alpha) + && \text{(IA.12)}\\
& \big(g_1'(\alpha)h_{1w}(s,w) - g_2'(1-\alpha)h_{2w}(s,w)\big)w'(\alpha) + && \text{(IA.13)}\\
& g_1''(\alpha)\big(h_1(s,w) - h_1(s_0,w_0)\big) + g_2''(1-\alpha)\big(h_2(s,w) - h_2(s_0,w_0)\big). && \text{(IA.14)}
\end{aligned}
$$

We have that (IA.12) and (IA.13) are positive for all values. Thus, the utility surplus potential is convex at all points where (IA.14) is not "too negative." In particular, if $g_1(.)$ and $g_2(.)$ are linear, then (IA.14) is zero everywhere and $\vartheta(\alpha)$ is convex, as we showed before. Thus, if the absolute value of g_1'' and g_2'' is small, $\vartheta(\alpha)$ is convex.

Alternatively, we can verify Proposition 1 directly. Without loss of generality, set $f(x) = x$. Conditions 1 and 2 apply. The maximum profit a flexible firm could extract from a worker of type α_i whose outside option is to work for an inflexible firm is:

$$v(\alpha_i) := \max_{s,w} \pi(s,w) \quad \text{s.t. } u^i(s,w) \geq u^i(w_0, s_0). \tag{IA.15}$$

The Lagrangian for the problem is:

$$L = \pi(s,w) - \lambda(u^i(s_0,w_0) - u^i(s,w)). \tag{IA.16}$$

The first-order conditions are:

$$
\begin{aligned}
\tfrac{\partial L}{\partial w} &= -1 + \lambda u^i_w(s,w) = 0\\
\tfrac{\partial L}{\partial s} &= -c'(s) + \lambda u^i_s(s,w) = 0.
\end{aligned} \tag{IA.17}
$$

From the two first-order conditions we have $c'(s) = \frac{u^i_s(s,w)}{u^i_w(s,w)}$. From $\lambda = \frac{1}{u^i_w(s,w)} > 0$, it follows that the participation constraint holds with equality. Therefore

$$u^i(s,w) = u^i(s_0,w_0) \Leftrightarrow h_2(s,w) - h_2(s_0,w_0) = -\frac{g_1(\alpha_i)}{g_2(1-\alpha_i)}(h_1(s,w) - h_1(s_0,w_0)) \tag{IA.18}$$

and

$$
\begin{aligned}
v'(\alpha_i) &= \lambda\left(\frac{\partial u^i(s,w)}{\partial \alpha_i} - \frac{\partial u^i(s_0,w_0)}{\partial \alpha_i}\right) \\
&= \frac{1}{u^i_w(s,w)}\left(g_1'(\alpha_i)h_1(s,w) - g_2'(1-\alpha_i)h_2(s,w) - g_1'(\alpha_i)h_1(s_0,w_0) + g_2'(1-\alpha_i)h_2(s_0,w_0)\right) \\
&= \frac{1}{u^i_w(s,w)}\left(g_1'(\alpha_i) + g_2'(1-\alpha_i)\frac{g_1(\alpha_i)}{g_2(1-\alpha_i)}\right)\left(h_1(s,w) - h_1(s_0,w_0)\right)
\end{aligned}
\tag{IA.19}
$$

We now derive sufficient conditions under which there exists a unique α_i^* for which $v'(\alpha_i^*) = 0$. For this we need: $\frac{\partial h_1(s,w)}{\partial \alpha} > 0$ and for $\alpha = 0$, $h_1(s,w) < h_1(s_0,w_0)$ and

$$
\frac{\partial}{\partial \alpha}\left(\frac{1}{u^i_w(s,w)}\left(g_1'(\alpha_i) + g_2'(1-\alpha_i)\frac{g_1(\alpha_i)}{g_2(1-\alpha_i)}\right)\right) > 0.
$$

that is

$$
\begin{aligned}
&\frac{-u^i_{w\alpha}(s,w)}{(u^i_w(s,w))^2}\left(g_1'(\alpha_i) + g_2'(1-\alpha_i)\frac{g_1(\alpha_i)}{g_2(1-\alpha_i)}\right) \\
&+\frac{1}{u^i_w(s,w)}\left(g_1''(\alpha_i) + \frac{g_1'(\alpha_i)g_2'(1-\alpha_i) + g_2'(1-\alpha_i)^2}{g_2(1-\alpha_i)} - g_2''(1-\alpha_i)\frac{g_1(\alpha_i)}{g_2(1-\alpha_i)}\right) > 0.
\end{aligned}
\tag{IA.20}
$$

As before, note that if $g''(.) = g''(.) = 0$ (i.e., linearity in α), the expression above is positive. A sufficient condition for (IA.20) to hold is

$$
\frac{g_1''(\alpha_i)}{g_2''(1-\alpha)} \geq \frac{g_1(\alpha_i)}{g_2(1-\alpha_i)}. \tag{IA.21}
$$

3 Political partisanship

In this section we allow for s to be perceived as either a positive or a negative attribute. One possible interpretation is to consider s as political partisanship. That is we allow for $\alpha \in (-1,1)$ and the utility function is $u^i(s,w) = \alpha_i s + (1-|\alpha_i|)w$. We now show that our key result regarding the shape of the profit potential function continues to hold.

Proposition IA.1. *The profit potential $v(\alpha_i)$ is strictly U-shaped in α_i, for $\alpha_i \in (-1,1)$.*

Proof. The profit potential function is:

$$v(\alpha_i) := \max_{s,w} \pi(s,w) \;\; \text{s.t. } u^i(s,w) \geq u^i(s_0,w_0). \tag{IA.22}$$

The Lagrangian for the problem is:

$$\max_{s,w} \pi(w,s) - \lambda(\alpha_i s_0 + (1-|\alpha_i|)w_0 - \alpha_i s_i - (1-|\alpha_i|)w_i). \tag{IA.23}$$

The first-order conditions are:

$$\begin{aligned} -c'(s) + \lambda\alpha_i &= 0 \\ -1 + \lambda(1-|\alpha_i|) &= 0. \end{aligned} \tag{IA.24}$$

Thus the solution for (s,w) for an agent of type α_i is given by:

$$\begin{cases} c'(s_i) = \frac{\alpha_i}{1-|\alpha_i|} \\ w_i = w_0 - \frac{\alpha_i}{1-|\alpha_i|}(s_i - s_0), \end{cases} \tag{IA.25}$$

that is for $\alpha_i < 0$, $s_i < 0$.

We now derive the profit potential function with respect to α_i.

$$v'(\alpha_i) = \begin{cases} \lambda(s_i - s_0 + w_i - w_0) & \text{if } \alpha_i < 0 \\ \lambda(s_i - s_0 - w_i + w_0) & \text{if } \alpha_i > 0 \end{cases} \tag{IA.26}$$

Since $w_i = w_0 - \frac{\alpha_i}{1-|\alpha_i|}(s_i - s_0)$ and $\lambda = \frac{1}{1-|\alpha_i|}$, we can further simplify (IA.26) as follows:

$$v'(\alpha_i) = \begin{cases} \frac{1-|\alpha_i|-\alpha_i}{(1-|\alpha_i|)^2}(s_i - s_0) & \text{if } \alpha_i < 0 \\ \frac{1-|\alpha_i|+\alpha_i}{(1-|\alpha_i|)^2}(s_i - s_0) & \text{if } \alpha_i > 0 \end{cases} \tag{IA.27}$$

In the context of political partisanship, it is natural to think that the inflexible firms are politically neutral and $s_0 = 0$. The derivative of the profite potential then becomes: That is $v'(\alpha_i) = \frac{1}{(1-|\alpha_i|)^2} s_i$. It then follows that for $\alpha_i < 0$, $v'(\alpha_i) < 0$ and for $\alpha_i > 0$, $v'(\alpha_i) > 0$, that is the profit potential function is strictly U-shaped. $\square$

As the shape of the profit potential function is the main force driving our results, all results would continue to hold in the case where $\alpha \in (-1, 1)$.

4 The case where both sectors have some flexibilty

In this section, we relax the assumption that the inflexible sector is fully inflexible. We now assume that the firms that adopt the inflexible technology can offer $s \in [\underline{s}_0, \overline{s}_0]$. For simplicity only, we keep the assumption that Sector 1 is fully flexible (i.e., $\underline{s}_1 = 0$ and $\overline{s} = \infty$).

The optimal s offered by firms in the inflexible sector is:

$$s^{\star}_{0i} = \begin{cases} \underline{s}_0 & \text{for } \alpha_i \leq \underline{\alpha}_k \\ h(\alpha_i) & \text{for } \underline{\alpha}_k < \alpha_i < \overline{\alpha}_k \\ \overline{s}_0 & \text{for } \alpha_i \geq \overline{\alpha}_k, \end{cases} \tag{IA.28}$$

where $\underline{s}_0 = h(\underline{\alpha}_k)$ and $\overline{s}_0 = h(\overline{\alpha}_k)$. Lemma 2 continues to hold and therefore $\pi_{0i}(s_{0i}, w_{0i}) = 0$ and the wages offered by the inflexible firms are $w^{\star}_{0i} = y - c(s^{*}_{0i})$. We can now write the profit potential function of the flexible firms:

$$v_1(\alpha_i) = \begin{cases} c(\underline{s}_0) + \frac{\alpha}{1-\alpha}(s^*_i - \underline{s}_0) - c(s^*_i) & \text{for } \alpha_i \leq \underline{\alpha}_k \\ 0 & \text{for } \underline{\alpha}_k < \alpha_i < \overline{\alpha}_k \\ c(\overline{s}_0) + \frac{\alpha}{1-\alpha}(s^*_i - \underline{s}_0) - c(s^*_i) & \text{for } \alpha_i \geq \overline{\alpha}_k, \end{cases} \tag{IA.29}$$

where $s^*_i = h(\alpha_i)$. The profit potential is decreasing in α for $\alpha_i < \underline{\alpha}_k$ and increasing in α for $\alpha_i > \overline{\alpha}_k$. Since $v(\overline{\alpha}_k) = 0$, $v'(\alpha) > 0$ for $\alpha > \overline{\alpha}_k$, and $v(\alpha)|_{\alpha \to 1} \to \infty$, the equilibrium is as follows.

Proposition IA.2. *If the distribution of types, $P(.)$, is continuous, for any $K_1 > 0$, a competitive* *equilibrium exists. The equilibrium is given by a unique type $z^* \in (\overline{\alpha}_k, 1)$ such that $v(z^*) = K_1$, $\phi(z^*)$ is given by*

$$\phi(\alpha) = \alpha' \textit{ such that } \max_{\alpha' \in [0, \underline{\alpha}_k]} v(\alpha') \leq v(\alpha), \tag{IA.30}$$

$F_1^* < L$ and is given by

$$F_1^* = L\Big(\int_0^{\phi(z)} p(\alpha) d\alpha + \int_z^1 p(\alpha) d\alpha \Big), \tag{IA.31}$$

and wages are given by

$$w^*(\alpha_i) = \begin{cases} y - c(s_i^*) - v(\alpha_z) & \textit{for } \alpha_i \in [0, \alpha_{\phi(z)}] \cup [\alpha_z, 1] \\ w \in [y - c(s_i^*) - v(\alpha_z), w_{0i}^* - \frac{\alpha_i}{1-\alpha_i}(s_i^* - s_{0i}^*)] & \textit{for } \alpha_i \in [\alpha_{\phi(z)}, \alpha_z]. \end{cases} \tag{IA.32}$$

The degree of polarization in this case is:

$$\rho = s_z^* - \overline{s}_0 + \underline{s}_0 - s_{\phi(z)}^* \tag{IA.33}$$

In the case of quadratic cost function $c(s) = \frac{s^2}{2}$. In this case $s_i^* = a_i$, where $a_i \equiv \frac{\alpha_i}{1-\alpha_i}$ and a_z^* is given by:

$$\frac{\overline{s}_0^2}{2} + \frac{a^2}{2} - a\overline{s}_0 = K_1 \Rightarrow a_z^* = \min\{\overline{s}_0 + \sqrt{2K_1}, \overline{a}\} \tag{IA.34}$$

and $\phi(a_z)^*$ is given by:

$$\frac{\underline{s}_0^2}{2} + \frac{a^2}{2} - a\underline{s}_0 = K_1 \Rightarrow \phi(a_z)^* = \max\{\underline{s}_0 - \sqrt{2K_1}, \underline{a}\}, \tag{IA.35}$$

It then follows that in the quadratic cost function case with interior solutions, the degree of polarization is $\rho = 2\sqrt{2K_1}$.

5 More than two technologies

In this Section we consider the case where there are three available technologies, $\iota \in \{0, 1, 2\}$. We assume that technology $\iota = 0$ is fully inflexible $\underline{s}_0 = \overline{s}_0 = s_0$ and technology $\iota = 2$ is fully flexible $\underline{s}_2 = 0$ and $\overline{s}_2 = \infty$. We also assume that $K_2 > K_1 > K_0 = 0$.

The profit potential of firms adopting technology $\iota = 1$ is:

$$v_1(\alpha_i) = \begin{cases} y - w_0 + \frac{\alpha_i}{1-\alpha_i}(\underline{s}_1 - s_0) - c(\underline{s}) & \text{for } \alpha_i \leq \underline{\alpha}_k \\ y - w_0 + \frac{\alpha_i}{1-\alpha_i}(s_i^* - s_0) - c(s_i^*) & \text{for } \underline{\alpha}_k < \alpha_i < \overline{\alpha}_k \\ y - w_0 + \frac{\alpha_i}{1-\alpha_i}(\overline{s}_1 - s_0) - c(\underline{s}) & \text{for } \alpha_i \geq \overline{\alpha}_k, \end{cases} \tag{IA.36}$$

where $\underline{s}_1 = h(\underline{\alpha}_k)$ and $\overline{s}_1 = h(\overline{\alpha}_k)$. The profit potential function is U-shaped. If

$\max\{v_1(\underline{\alpha}_k), v_1(\overline{\alpha}_k))\} < K_1$, then no entrepreneurs decide to adopt technology 1 and we are back to the two-sector solution presented in the paper. We now consider the most interesting case where $\min\{v_1(\underline{\alpha}_k), v_1(\overline{\alpha}_k))\} > K_1$ then some firms will adopt technology $\iota = 1$ and the solutions for z_1 and $\phi(z_1)$ are interior, i.e., $z_1 < \overline{\alpha}_k$ and $\phi(z_1) > \underline{\alpha}_k$.

If technology $\iota = 1$ is adopted by some firms the profit potential of firms that adopt technology $\iota = 2$ is:

$$v_2(\alpha_i) = \begin{cases} w_1(\alpha) + \frac{\alpha}{1-\alpha}(s_i^* - \underline{s}_0) - c(s_i^*) & \text{for } \alpha_i \leq \underline{\alpha}_k \\ K_1 & \text{for } \underline{\alpha}_k < \alpha_i < \overline{\alpha}_k \\ c(\overline{s}_0) + \frac{\alpha}{1-\alpha}(s_i^* - \underline{s}_0) - c(s_i^*) & \text{for } \alpha_i \geq \overline{\alpha}_k. \end{cases} \tag{IA.37}$$

The profit potential is decreasing in α for $\alpha_i < \underline{\alpha}_k$ and increasing in α for $\alpha_i > \overline{\alpha}_k$. Since $v(\overline{\alpha}_k) = K_1$, $v'(\alpha) > 0$ for $\alpha > \overline{\alpha}_k$, and $v(\alpha)|_{\alpha \to 1} \to \infty$, the equilibrium is as follows.

Proposition IA.3. *If the distribution of types, $P(.)$, is continuous, for any $K_2 > K_1$, a competitive equilibrium exists. There exists a unique type $z_2^* \in (\overline{\alpha}_k, 1)$ such that $v_2(z_2^*) = K_2$, $\phi_2(z_2^*)$ is given by*

$$\phi_2(\alpha) = \alpha' \text{ such that } \max_{\alpha' \in [0, \underline{\alpha}_k]} v_2(\alpha') \leq v_2(\alpha), \tag{IA.38}$$

and a unique pair of types $(z_1^\star, \phi(z_1^\star))$, $z_1^* \in [a_k, \overline{\alpha}_k]$ and $\phi(z_1^*) \in [\underline{a}_k, a_k]$, is given by $v_1(z_1^\star) = v_1(\phi(z_1^*)) = K_1$. F_2^* is given by

$$F_2^* = L\Big(\int_0^{\phi_2(z_2^\star)} p(\alpha)d\alpha + \int_{z_2^\star}^1 p(\alpha)d\alpha\Big), \tag{IA.39}$$

F_1^* is given by

$$F_1^* = L\Big(\int_{\phi_2(z_2^\star)}^{\phi_1(z_1^\star)} p(\alpha)d\alpha + \int_{z_1^\star}^{z_2^\star} p(\alpha)d\alpha \Big), \tag{IA.40}$$

and wages are given by

$$w_2^*(\alpha_i) = \begin{cases} y - c(s_i^*) - v_2(\alpha_{z_2}) & \textit{for } \alpha_i \in [0, \alpha_{\phi_2(z_2^\star)}] \cup [\alpha_{z_2^\star}, 1] \\ w \in [y - c(s_i^*) - v_2(\alpha_{z_2}), w_{1i}^* - \frac{\alpha_i}{1-\alpha_i}(s_i^* - s_{i1}^*)] & \textit{for } \alpha_i \in [\alpha_{\phi_2(z_2^\star)}, \alpha_{z_2^\star}] \end{cases} \tag{IA.41}$$

and

$$w_1^*(\alpha_i) = \begin{cases} y - c(s_{i1}^*) - v_1(\alpha_{z_1^*}) & \textit{for } \alpha_i \in [\alpha_{\phi_2(z_2^*)}, \alpha_{\phi_1(z_1^*)}] \cup [\alpha_{z_1^\star}, \alpha_{z_2^\star}] \\ w \in [y - c(s_i^*) - v_1(\alpha_{z_1^\star}), w_0^* - \frac{\alpha_i}{1-\alpha_i}(s_{i1}^* - s_0)] & \textit{for } \alpha_i \in [\alpha_{\phi_1(z_1^*)}, \alpha_{\phi_1(z_1^*)}], \end{cases} \tag{IA.42}$$

where

$$s_{i1}^* = \begin{cases} \underline{s}_1 & \textit{for } \alpha_i \le \underline{\alpha_k} \\ h(\alpha_i) & \textit{for } \alpha_i \in (\underline{\alpha_k}, \overline{\alpha}_k) \\ \overline{s}_1 & \textit{for } \alpha_i \ge \overline{\alpha_k}. \end{cases} \tag{IA.43}$$

6 Career Paths

Most high-skilled workers join firms in entry-level jobs that may eventually lead to promotion. In this section, we extend our model to the case in which firms compete for workers by offering career paths where both wages and other job attributes may change with career progression. This extension is non-trivial because now agents may care not only about the attributes of the entry-level job but also about the attributes of higher-level jobs, as well as the probability of promotion. We use the model to study the effects of flexible technologies on worker turnover rates and within-firm inequality.

At each period $t = 1, 2, ...,$ a mass $\frac{p_j L}{2}$ of workers of type $j \in \{1, ..., n\}$ join the labor force. Workers live for two periods. As before, there are F_1 flexible firms and F_0 inflexible firms.[1] Firms live forever. As before, each firm can hire one worker to fill a vacancy,

[1] We can endogenize F_ι by introducing an entry stage at $t = 0$, when entrepreneurs (who discount future

which we now interpret as a high-level position, called *job h*. In addition, a firm can now create m vacancies in a different job, which we call *job l*.[2] The utility of a job that offers consumption C is $\tau u(C)$, where $\tau \in \{l, h\}$. We normalize $h = 1$ and assume $l = \theta < 1$, that is, job l is a lower quality job. Job $\tau \in \{l, h\}$ generates revenue y_τ, with $y_l \leq y_h$. To simplify the exposition, we assume that $u(C) = C^\gamma$, $\gamma < 1$, and $c(s) = \frac{\sigma s^2}{2}$, with $\sigma > 0$.

Suppose a firm matches with a worker of type α_j who is then assigned to job τ. What is the efficient level of the s-attribute for this worker in this job? Using the same reasoning as in the previous sections, cost minimization implies that $s^*_{j\tau} = \frac{\alpha_j}{\sigma(1-\alpha_j)} =: s^*_j$ (for simplicity, we consider only profit-driven investors). Note that the optimal level of the s-attribute is independent of τ.

We first consider *spot contracts*, which are one-period contracts of the form (s_j, w_j). We assume that a worker would never accept a position in job l under a spot contract:

Assumption IA.1. *Job l is individually undesirable:*

$$\theta \left(\alpha_j s^*_j + (1-\alpha_j)\left(y_l - \frac{\sigma s^{*2}_j}{2} \right) \right)^\gamma < \left(\alpha_j s_0 + (1-\alpha_j) w_0 \right)^\gamma \text{ for all } j \in \{1, ..., n\}. \quad \text{(IA.44)}$$

The left-hand side of (IA.44) is the utility of a type-j worker in job l with wage $w_j = (y_l - \frac{\sigma s^{*2}_j}{2})$ (the wage that equates the profit of a flexible firm to zero). The right-hand side of (IA.44) is the utility of the same type of worker in job h under contract (s_0, w_0) (the inflexible contract). Assumption IA.1 says that if a flexible firm offers job l under a spot contract, no worker will accept it; the worker prefers to work in the inflexible sector.

Despite job l being undesirable as a standalone job, job l can be used in conjunction with job h in a long-term contract in which workers are offered a career path inside the firm. Suppose a firm in Sector ι chooses to hire young workers of type j on a career path contract. This contract specifies the s level and the wage for an entry position in job l, $(s^\iota_{jl}, w^\iota_{jl})$, the s level and the wage for a top-level position in job h, $(s^\iota_{jh}, w^\iota_{jh})$, and the num-

profits) decide whether to invest K_ι to enter Sector ι.

[2]Formally, a unit mass of firms can create mass m of positions in job l.

ber of workers m_j^l who will compete for the top-level position after working in job l for one period. Suppose a young type-j worker has an outside lifetime (i.e., two-period) utility of U_j. The firm must choose a long-term contract $(m_j^l, s_{jl}^l, w_{jl}^l, s_{jh}^l, w_{jh}^l)$ that maximizes profit subject to providing lifetime utility U_j to the worker. Under such contracts, a young worker (of type α_j) first joins the firm in job l and then is promoted to job h (with probability $\frac{1}{m_j^l}$) or fired (with probability $1 - \frac{1}{m_j^l}$) .[3] In what follows, to simplify the exposition, we characterize only interior solutions in which $m_j^l > 1$ in all active markets. We also assume that not all young workers will be employed by flexible firms in equilibrium.

In the following proposition, we show that career path contracts are never adopted by firms in the inflexible sector.

Proposition IA.4 (Optimal contract in the inflexible sector). *Inflexible firms do not employ workers in job l. To hire workers for job h, inflexible firms offer spot contracts (s_0, w_0), with $w_0 = y_h - c(s_0)$, to both young and old workers.*

Proof. Because workers in the inflexible sector are in short supply, if inflexible firms offer career path contracts, it must be that $m_j^0 = 1$. That is, inflexible firms must offer either safe career paths or spot contracts. An inflexible firm with a vacancy can approach a young worker in a career path contract in another inflexible firm with the offer of two consecutive spot contracts with wage $w_0 = y_h - c(s_0) - \epsilon$ with ϵ arbitrarily small. In that case, we have

$$\begin{aligned} 2u(C_j(s_0, y_h - c(s_0))) &> u(C_j(s_0, x)) + u(C_j(s_0, y_h + y_l - x - 2c(s_0))) \\ &> \theta u(C_j(s_0, x)) + u(C_j(s_0, y_h + y_l - x - 2c(s_0))). \end{aligned}$$

Thus, the worker would accept this contract. Therefore, only spot contracts that yield zero profits will be offered by inflexible firms. $\square$

Because in the inflexible sector workers are in short supply, inflexible firms will only offer spot contracts that yield zero profit. In what follows, for simplicity and without loss of generality, we assume that $s_0 = y_h - c(s_0) = w_0$. This assumption implies that

[3] Ferreira and Nikolowa (2024) prove the optimality of such up-or-out contracts in a similar setup.

$C_{j0} = C_{j'0} = C_0$ for all $j, j' \in \{1, ..., n\}$ and that the lifetime utility of an employee with type j must be such that $U_j \geq 2C_0^{\gamma}$.

We now consider the problem of a flexible firm. We assume that the firm offers long-term contracts.[4] A flexible firm that operates in market j chooses a contract to maximize its profit, taking the lifetime utility of type-j workers, U_j, as given. The representative flexible firm's maximization problem (per period) in market j is:[5]

$$V(\alpha_j, U_j) := \max_{(m_j, s_{jl}, w_{jl}, s_{jh}, w_{jh})} m_j \left(y_l - \frac{\sigma s_{jl}^2}{2} - w_{jl} \right) + y_h - \frac{\sigma s_{jh}^2}{2} - w_{jh} \tag{IA.45}$$

subject to

$$\theta(\alpha_j s_{jl} + (1-\alpha_j) w_{jl})^{\gamma} + \frac{1}{m_j}(\alpha_j s_{jh} + (1-\alpha_j) w_{jh})^{\gamma} + \frac{m_j - 1}{m_j} C_0^{\gamma} \geq U_j. \tag{IA.46}$$

The profit (IA.45) has two parts: the (per period) profit per worker in job l times the mass of such workers (m_j) plus the (per period) profit per worker in job h times the mass of such workers (which is one). Equation (IA.46) is the participation constraint of a young worker of type j. This worker works in the entry-level job in the first period, where she earns w_{jl} and enjoys s_{jl}, and then is promoted with probability $\frac{1}{m_j}$ to the high-level job, where she earns w_{jh} and enjoys s_{jh}. With probability $\frac{m_j - 1}{m_j}$, the worker is not promoted, leaves the firm when old and finds a job in an inflexible firm, where she enjoys consumption C_0. The young worker's participation constraint (IA.46) must be binding in an optimal solution. It is easy to see that an old worker who is promoted strictly prefers to stay in the firm instead of leaving for an inflexible firm.

In the following proposition, we characterize the optimal career path contract for a given (α_j, U_j).

[4]It can be shown that long-term contracts dominate spot contracts for sufficiently high h (see Ferreira and Nikolowa (2024))

[5]Because only flexible firms will offer career path contracts, we drop the superscript ι from the contract variables.

Proposition IA.5 (Optimal career path contract). *In a career path equilibrium,* $s_j^* = \frac{\alpha_j}{\sigma(1-\alpha_j)}$*,* $w_{jh}^* = \frac{C_{jh}^* - \alpha_j s_j^*}{1-\alpha_j} > \frac{C_{jl}^* - \alpha_j s_j^*}{1-\alpha_j} = w_{jl}^*$*, and* $C_{jh}^* = \theta^{\frac{1}{\gamma-1}} C_{jl}^*$ *where* C_{jl}^* *is implicitly determined by*

$$C_{jl} = \frac{C_{jl}^{1-\gamma}}{\theta(1-\gamma)}(U_j - C_0^\gamma) - \frac{\gamma}{1-\gamma}\overline{C}_{jl}, \tag{IA.47}$$

where $\overline{C}_{jl} := (1-\alpha_j)y_l + \frac{\alpha_j^2}{2\sigma(1-\alpha_j)}$.

Proof. The firm maximizes its per-period profit subject to the the workers lifetime participation constraint.

$$\begin{aligned}\max_{(m_j, s_{jl}, w_{jl}, s_{jh}, w_{jh})} \quad & m_j(y_l - \tfrac{\sigma s_{jl}^2}{2} - w_{jl}) + y_h - \tfrac{\sigma s_{jh}^2}{2} - w_{jh} \\ & -\lambda(U_j - \theta(\alpha_j s_{jl} + (1-\alpha_j)w_{jl})^\gamma - \tfrac{1}{m_j}(\alpha_j s_{jh} + (1-\alpha_j)w_{jh})^\gamma - \tfrac{m_j - 1}{m_j}C_0^\gamma))\end{aligned}$$

The first-order conditions are:

$$-m_j + \lambda\theta(1-\alpha_j)\gamma C_{jl}^{(\gamma-1)} = 0, \tag{IA.48}$$

$$-1 + \frac{\lambda}{m_j}(1-\alpha_j)\gamma C_{jh}^{(\gamma-1)} = 0, \tag{IA.49}$$

$$-m_j\sigma s_{jl} + \lambda\theta\alpha_j\gamma C_{jl}^{(\gamma-1)} = 0, \tag{IA.50}$$

$$-\sigma s_{jh} + \frac{\lambda}{m_j}\alpha_j\gamma C_{jh}^{(\gamma-1)} = 0, \tag{IA.51}$$

$$y_l - \frac{\sigma s_{jl}^2}{2} - w_{jl} - \frac{\lambda}{m_j^2}\left(C_{jh}^\gamma - C_0^\gamma\right) = 0, \tag{IA.52}$$

$$\frac{1}{m_j} - \frac{U_j - C_0^\gamma - \theta C_{jl}^\gamma}{C_{jh}^\gamma - C_0^\gamma} = 0. \tag{IA.53}$$

From (IA.48) and (IA.50) we have: $\sigma s_{jl} = \frac{\alpha_j}{1-\alpha_j}$. From (IA.49) and (IA.51) we have: $\sigma s_{jh} = \frac{\alpha_j}{1-\alpha_j}$. Thus, $s_{jl}^* = s_{jh}^* = \frac{\alpha_j}{\sigma(1-\alpha_j)}$. From (IA.48) and (IA.49), we have $\theta C_{jl}^{(\gamma-1)} = C_{jh}^{(\gamma-1)} \Rightarrow C_{jh}^* = \frac{1}{\theta^{\frac{1}{1-\gamma}}}C_{jl}^*$. Since $\theta < 1$ and $\gamma < 1$, this implies that $C_{jh}^* > C_{jl}^*$. It then follows that

$w_{jh}^* = \frac{C_{jh}^*}{1-\alpha_j} - \frac{\alpha_j^2}{\sigma(1-\alpha_j)^2} > \frac{C_{jl}^*}{1-\alpha_j} - \frac{\alpha_j^2}{\sigma(1-\alpha_j)^2} = w_{jl}^*$. To find C_{jl}^*, we simplify (IA.52) as follows:

$$y_l + \frac{\alpha_j^2}{2\sigma(1-\alpha_j)^2} - \frac{C_{jl}}{1-\alpha_j} - \frac{1}{m_j\theta(1-\alpha_j)\gamma C_{jl}^{(\gamma-1)}}\left(C_{jh}^\gamma - C_0^\gamma\right) = 0 \tag{IA.54}$$

$$y_l + \frac{\alpha_j^2}{2\sigma(1-\alpha_j)^2} - \frac{C_{jl}}{1-\alpha_j} - \frac{1}{m_j\theta(1-\alpha_j)\gamma C_{jl}^{(\gamma-1)}}\left(C_{jh}^\gamma - C_0^\gamma\right) = 0 \tag{IA.55}$$

$$\Leftrightarrow (1-\alpha_j)y_l + \frac{\alpha_j^2}{2\sigma(1-\alpha_j)} - C_{jl} = \frac{1}{\theta\gamma C_{jl}^{(\gamma-1)}}(U_j - C_0^\gamma - \theta C_{jl}^\gamma) \tag{IA.56}$$

$$C_{jl} = \frac{C_{jl}^{(1-\gamma)}}{\theta(1-\gamma)}(U_j - C_0^\gamma) - \frac{\gamma}{1-\gamma}\overline{C}_{jl}. \tag{IA.57}$$

To show existence, define

$$f(C_{jl}) = \frac{C_{jl}^{(1-\gamma)}}{\theta(1-\gamma)}(U_j - C_0^\gamma) - \frac{\gamma}{1-\gamma}\overline{C}_{jl}. \tag{IA.58}$$

Note that $f'(C_{jl}) > 0$. $f(0) < 0$ and

$$\begin{aligned} f(\overline{C}_j) - \overline{C}_j &= \tfrac{\overline{C}_j^{(1-\gamma)}(U_j - C_0^\gamma)}{\theta(1-\gamma)} - \tfrac{\gamma\overline{C}_j}{1-\gamma} - \overline{C}_j \\ &\geq \tfrac{\overline{C}_j^{(1-\gamma)}}{1-\gamma}\left(\tfrac{C_0^\gamma}{\theta} - \overline{C}_j^\gamma\right) > 0. \end{aligned}$$

because $U_j \geq 2C_0^\gamma$ and individual undesirability implies $C_0^\gamma > \theta\overline{C}^\gamma$. Thus, there exists a unique $C_{jl} = C_{jl}^* \in (0, \overline{C}_\gamma)$. □

This proposition shows two important properties of career path contracts. First, the optimal level of the *s*-attribute is constant across jobs in the same firm. Second, wages increase with career progression. Thus, in an optimal contract, within-firm inequality is driven by differences in wages rather than differences in nonwage attributes. This is consistent with Ouimet and Tate's (2022) findings of little within-firm variation in nonwage benefits but significant within-firm variation in wages.

Proposition IA.5 characterizes the optimal contracts conditional on a given vector of lifetime utilities $\{U_1, ..., U_n\}$. The equilibrium vector of lifetime utilities is, in turn, determined by supply and demand, as described in Section 3. Let $z \in \{1, ..., n\}$ denote the marginal type (as defined in Proposition 2), i.e., the worker type with the lowest surplus among those who are hired by flexible firms in equilibrium. Set this worker's equilibrium lifetime utility to $U_z^* = 2C_0^\gamma$. The next proposition shows that the profit potential is U-shaped:

Proposition IA.6 (Profit potential in career path equilibrium). *The profit potential $V(\alpha_j, U_z^*)$ is U-shaped in α_j.*

Proof. A direct way to determine the effect of α_j on the profit potential is to use the Envelope Theorem:

$$\begin{aligned}
\frac{\partial V(\alpha_j, 2C_0^\gamma)}{\partial \alpha_j} &= \lambda(s_j^* - w_{jl}^*)\gamma\theta C_{jl}^{*(\gamma-1)} + \lambda \frac{1}{m_j^*}(s_j^* - w_{jh}^*)\gamma C_{jh}^{*(\gamma-1)} \\
&= \frac{m_j^*}{1-\alpha_j}(s_j^* - w_{jl}^*) + \frac{1}{1-\alpha_j}(s_j^* - w_{jh}^*) \\
&= \frac{1}{(1-\alpha_j)}\left[s_j^*(m_j^*+1) - m_j^* w_{jl}^* - w_{jh}^*\right]
\end{aligned} \tag{IA.59}$$

Since $w_{jl} = \frac{C_{jl}}{1-\alpha_j} - \frac{\alpha_j s_j^*}{1-\alpha_j}$, $w_{jh} = \frac{C_{jh}}{1-\alpha_j} - \frac{\alpha_j s_j^*}{1-\alpha_j}$, and $C_{jh} = \frac{1}{\theta^{\frac{1}{1-\gamma}}} C_{jl}$ it follows that:

$$\begin{aligned}
\frac{1}{1-\alpha_j}\left(s^* - \frac{w_1 + p w_2}{1+p}\right) &= \frac{1}{(1-\alpha_j)^2}\left(s_j^* - \frac{m_j^* C_{jl}^* + C_{jh}^*}{m_j^*+1}\right) \\
&= \frac{1}{(1-\alpha_j)^2}\left(s_j^* - \frac{C_{jl} + C_{jh}\frac{C_0^\gamma - \theta C_{jl}^\gamma}{C_{jh}^\gamma - C_0^\gamma}}{1 + \frac{C_0^\gamma - \theta C_{jl}^\gamma}{C_{jh}^\gamma - C_0^\gamma}}\right) \\
&= \frac{1}{(1-\alpha_j)^2}\left(s_j^* - \frac{C_{jl}^{1-\gamma} C_0^\gamma}{\theta}\right),
\end{aligned} \tag{IA.60}$$

where C_{jl} is given by: $C_{jl} = \frac{C_{jl}^{(1-\gamma)}}{\theta(1-\gamma)} C_0^\gamma - \frac{\gamma}{1-\gamma}\overline{C}_{jl}$. We now show that there exists a unique

α_j for which

$$\frac{1}{(1-\alpha_j)^2}\left(s_j^* - \frac{C_{jl}^{1-\gamma}C_0^\gamma}{\theta}\right) = 0 \tag{IA.61}$$

The derivative of the left-hand side of (IA.61) is:

$$\frac{1}{(1-\alpha_j)^2}\left(\frac{\partial s_j^*}{\partial \alpha_j} - \frac{C_0^\gamma(1-\gamma)}{\theta C_{jl}^\gamma}\frac{\partial C_{jl}}{\partial \alpha_j}\right) + \frac{2}{(1-\alpha_j)^3}\left(s_j^* - \frac{C_{jl}^{1-\gamma}C_0^\gamma}{\theta}\right)$$

where

$$\frac{\partial C_{jl}}{\partial \alpha_j}\left(\frac{C_0^\gamma}{\theta C_{jl}^\gamma} - 1\right) = \frac{\gamma}{1-\gamma}\left(-y_l + \frac{\alpha_j(2-\alpha_j)}{2\sigma(1-\alpha_j)^2}\right),$$

$$\frac{\partial s_j^*}{\partial \alpha_j} = \frac{1}{\sigma(1-\alpha_j)^2}.$$

$$\begin{aligned}
\frac{1}{(1-\alpha_j)^2}\left(\frac{\partial s_j^*}{\partial \alpha_j} - \frac{C_0^\gamma(1-\gamma)}{\theta C_{jl}^\gamma}\frac{\partial C_{jl}}{\partial \alpha_j}\right) &= \frac{1}{(1-\alpha_j)^2}\left(\frac{\gamma C_0^\gamma y}{C_0^\gamma - \theta C_{jl}^\gamma} + \frac{1}{\sigma(1-\alpha)^2}\left(1 - \frac{\gamma C_0^\gamma}{C_0^\gamma - \theta C_{jl}^\gamma}\frac{\alpha(2-\alpha)}{2}\right)\right) \\
&= \frac{1}{(1-\alpha_j)^2}\left(\frac{\gamma C_0^\gamma y}{C_0^\gamma - \theta C_{jl}^\gamma} + \frac{1}{\sigma(1-\alpha)^2}\frac{2(C_0^\gamma(1-\alpha_j\gamma) - \theta C_{jl}^\gamma) + \alpha^2\gamma C_0^\gamma}{2(C_0^\gamma - \theta C_{jl}^\gamma)}\right) \\
&> 0.
\end{aligned}$$

We now show that there exists a unique $\alpha_{j'}$ such that $s_{j'}^* = \frac{C_{j'l}^{1-\gamma}C_0^\gamma}{\theta}$. First, we note that $s_j\mid_{\alpha_j=0} = 0$ and $s_j\mid_{\alpha_j=1} \rightarrow \infty$. $\frac{C_{jl}^{1-\gamma}C_0^\gamma}{\theta}$ first decreases and then increases in α_j, with $C_{jl} \in (0, \overline{C}_j)$. It follows that for $\alpha_j = 0$, $\frac{C_{jl}^{1-\gamma}C_0^\gamma}{\theta} > s_j^*$ and for $\alpha_j = 1$, $s_j^* > \frac{C_{jl}^{1-\gamma}C_0^\gamma}{\theta}$. Therefore $\alpha_{j'}$ such that $s_{j'}^* = \frac{C_{j'l}^{1-\gamma}C_0^\gamma}{\theta}$ exists. For $\alpha_j \leq \alpha_{j'}$, $\frac{C_{jl}^{1-\gamma}C_0^\gamma}{\theta} \geq s_j^*$; for $\alpha_j \geq \alpha_{j'}$, $\frac{C_{jl}^{1-\gamma}C_0^\gamma}{\theta} \leq s_j^*$. This and the fact that $\frac{1}{(1-\alpha_j)^2}\left(\frac{\partial s_j^*}{\partial \alpha_j} - \frac{C_0^\gamma(1-\gamma)}{\theta C_{jl}^\gamma}\frac{\partial C_{jl}}{\partial \alpha_j}\right) > 0$ imply that the left-hand side of (IA.61) is either always increasing or first decreasing and then increasing. For $\alpha_j = 0$ the left-hand side of (IA.61) is negative, while for $\alpha_j = 0$, it goes to ∞. It therefore follows that $\alpha_{j'}$ exists and is unique.

$\square$

Proposition IA.6 is the equivalent of Proposition 1 for the case where firms offer career path contracts. It shows that the per-period profit potential for a fixed level of a worker's lifetime utility is also U-shaped. Since the shape of the profit potential function drives the main properties of the equilibrium, such properties continue to hold in the case of career path contracts. The proof of equilibrium existence now follows the same steps as in Proposition 2, which we omit for brevity.

The model in this section allows us to study the effect of the flexible technology on within-firm inequality and turnover rates.

Proposition IA.7 (Technology, Inequality, and Turnover). *A lower σ increases within-firm inequality and turnover rates.*

Proof. First, we show that $\frac{\partial C_{jl}}{\partial \sigma} < 0$. From (IA.47) we have:

$$\frac{\partial C_{jl}}{\partial \sigma}\left(\frac{U_j - C_0^{\gamma}}{\theta C_{jl}^{\gamma}} - 1\right) = \frac{\gamma}{1-\gamma}\frac{\partial \overline{C}_{jl}}{\partial \sigma} \tag{IA.62}$$

$$\Leftrightarrow \frac{\partial C_{jl}}{\partial \sigma} = -\frac{\gamma}{1-\gamma}\frac{\alpha_j^2}{2\sigma^2(1-\alpha_j)}\frac{1}{\left(\frac{U_j - C_0^{\gamma}}{\theta C_{jl}^{\gamma}} - 1\right)} < 0 \tag{IA.63}$$

Since $w_{jh}^* - w_{jl}^* = \frac{1}{1-\alpha_j}(C_{jh} - C_{jl})$,

$$\frac{\partial (w_{jh}^* - w_{jl}^*)}{\partial \sigma} = \frac{1}{1-\alpha_j}\left(\frac{1}{\theta^{\frac{1}{1-\gamma}}} - 1\right)\frac{\partial C_{jl}}{\partial \sigma} < 0. \tag{IA.64}$$

The probability of promotion is $p_j^* = \frac{U_j - C_0^{\gamma} - \theta C_{jl}^{\gamma}}{C_{jh}^{\gamma} - C_0^{\gamma}}$, where $C_{jh}^{\gamma} = \frac{1}{\theta^{\frac{\gamma}{1-\gamma}}} C_{jl}^{\gamma}$.

$$\frac{\partial p_j^*}{\partial \sigma} = -\frac{\partial C_{jl}}{\partial \sigma}\frac{\gamma C_{jl}^{\gamma-1}}{(C_{jh}^{\gamma} - C_0^{\gamma})^2}\left(\frac{U_j - C_0^{\gamma}}{\theta^{\frac{\gamma}{1-\gamma}}} - \theta C_0^{\gamma}\right) > 0 \tag{IA.65}$$

□

A change in the flexible technology that makes the firm more efficient in producing the s-attribute (i.e., σ is lower) translates into higher equilibrium s levels in both jobs. All else constant, such jobs become more attractive to workers. The firm benefits from improved labor supply by hiring more entry-level workers, which reduces the probability of promotion and increases turnover rates. Given the higher number of entry-level employees, the firm prefers to pay lower wages initially in exchange for higher wages for those who are promoted, thus increasing the wage gap between young and old workers.

7 Minimum Standards Regulation

Here we consider the effect of a simple regulatory proposal, such as a minimum requirement for s. For example, regulators can impose a minimum environmental standard, require a minimum provision of workplace amenities, or impose a minimum quota on workforce diversity. Let $\tilde{s}$ be the minimum s-quality requirement. We assume that the requirement is binding only for low-s firms.

Proposition IA.8 (Minimum standards). *Let z denote an unconstrained equilibrium. If a minimum standard $\tilde{s} \in \left(s^*_{\phi(z)}, s_0\right)$ is introduced, then the new equilibrium, $\tilde{z}$, is such that $\tilde{z} < z$, $\pi(\tilde{z}) < \pi(z)$, and $\tilde{w}^*(\alpha) > w^*(\alpha)$ for $\alpha > \tilde{z}$.*

Proof. For any $\alpha \leq \tilde{\alpha}$, where $h(\tilde{\alpha}) = \tilde{s}$, the firms are constrained to offer a sustainability level $\tilde{s}$. The maximum profit under the minimum standard is as follows: For $\alpha \leq \tilde{\alpha}$, $\tilde{v}(\alpha) = y - \tilde{w}(\alpha) - c(\tilde{s})$, where $\tilde{w}(\alpha) = w_0 + \frac{\alpha}{1-\alpha}(s_0 - \tilde{s})$; For $\alpha \geq \tilde{\alpha}$, $\tilde{v}(\alpha) = v(\alpha)$ (i.e., the minimum standard does not bind). It follows that $\tilde{v}(\alpha)$ is decreasing in α for $\alpha < k$ and increasing in α for $\alpha > k$. Thus the new equilibrium is determined by conditions in Corollary 4 for the function $\tilde{v}(\alpha)$.

Because $\tilde{s} > s^*_{\phi(z)}$ the minimum standard constraint binds at point $\phi(z)$ and therefore $\tilde{v}(\phi(z)) < v(z)$. This implies that $\tilde{\phi}(z) < \phi(z)$ and therefore

$$F > L\left(\int_0^{\tilde{\phi}(z)} p(\alpha)d\alpha + \int_z^1 p(\alpha)d\alpha\right), \tag{IA.66}$$

so the equilibrium $\tilde{z}$, must be such that $\tilde{z} < z$. This implies $\pi(\tilde{z}) < \pi(z)$, and $\tilde{w}(\alpha) > w(\alpha)$ for $\alpha > \tilde{z}$. □

The introduction of a binding minimum standard implies that low-s firms can no longer offer the efficient levels of the s-attribute to workers with low-s preferences. This constraint leads to a decrease in the equilibrium profits of all flexible firms. High-s workers benefit from the introduction of $\tilde{s}$ because they now earn higher wages and consume more. The next corollary describes the effect of the introduction of a minimum standard on the average s level in the flexible sector.

Corollary IA.1 (Minimum Standards and Average S-Quality). *The minimum standard increases the average s in the flexible sector by*

$$\int_0^{\tilde{\phi}(z)} (\tilde{s} - s_\alpha) p(\alpha) d\alpha + \int_{\tilde{z}}^{z} s_\alpha p(\alpha) d\alpha - \int_{\phi(z)}^{\tilde{\phi}(\tilde{z})} s_\alpha p(\alpha) d\alpha. \tag{IA.67}$$

Proof. The difference in the average s level with and without the minimum standard $\tilde{s}$ is:

$$\int_0^{\tilde{\phi}(\tilde{z})} \tilde{s} p(\alpha) d\alpha + \int_{\tilde{z}}^{1} s_\alpha p(\alpha) d\alpha - \int_0^{\phi(z)} s_\alpha p(\alpha) d\alpha - \int_z^1 s_\alpha p(\alpha) d\alpha. \tag{IA.68}$$

Since $\int_{\tilde{z}}^{z} p(\alpha) d\alpha = \int_{\tilde{\phi}(\tilde{z})}^{\phi(z)} p(\alpha) d\alpha$, equation (IA.68) becomes:

$$\int_0^{\phi(z)} \tilde{s} p(\alpha) d\alpha + \int_{\tilde{z}}^{z} s_\alpha p(\alpha) d\alpha - \int_0^{\phi(z)} s_\alpha p(\alpha) d\alpha - \int_{\tilde{z}}^{z} \tilde{s} p(\alpha) d\alpha \tag{IA.69}$$

The increase in the average s in the flexible sector is:
$\int_0^{\phi(z)} (\tilde{s} - s_\alpha) p(\alpha) d\alpha + \int_{\tilde{z}}^{z} (s_\alpha - \tilde{s}) p(\alpha) d\alpha$. □

As expected, the introduction of a binding minimum standard leads to an increase in the average s level in the flexible sector. However, the low-s firms' reaction to introducing a minimum standard is heterogeneous. Some firms adjust on the intensive margin by increasing their s levels to meet the minimum standard (i.e., $\tilde{s}$). This effect is measured by $\int_0^{\tilde{\phi}(z)} (\tilde{s} - s_\alpha) p(\alpha) d\alpha$. Other firms adjust on the extensive margin by becoming high-s

firms. This effect is measured by $\int_{\tilde{z}}^{z} s_\alpha p(\alpha) d\alpha - \int_{\phi(z)}^{\tilde{\phi}(\tilde{z})} s_\alpha p(\alpha) d\alpha$. As more firms now choose to locate at the high-s end, high-s workers benefit from an increase in the demand for their types.

References

FERREIRA, D. AND R. NIKOLOWA (2024): "Prestige, promotion, and pay," *Journal of Finance*, 79, 505–540.

OUIMET, P. AND G. A. TATE (2022): "Firms with benefits? Nonwage compensation and implications for firms and labor markets," Working paper, University of North Carolina and University of Maryland.

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