# A theory of redistributive conflict for the age of automation

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**Abstract**

What are the consequences of automation for redistributive politics? I develop a model of distributive conflict between firms and workers to investigate the effect of automation on the redistribution of resources. Automation affects the incentives to allocate resources into politics, and the amounts of these resources shape redistribution in turn. The main trade-off comes from investing resources into political participation (lobbying, campaign contributions, etc.) instead of productive activities. I find that it is important to distinguish between automation reflecting capital deepening, like robot adoption, and automation that is deskilling, like the advent of AI. When automation is deskilling the distributive conflict between firms and workers intensifies despite workers weaken; when it is not there are stark differences regarding the rent-seeking behavior between skilled and unskilled workers, leading to lower distributive conflict and a non-monotonic increase in inequality to the benefit of firms. Further, I find that capital deepening is especially relevant to understand increasing inequality due to automation.

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# 1 Introduction

The world has seen a steep increase in the development and adoption of robots and AI: the International Federation of Robotics reports that the stock of robots has increased by 540% accross the world between 1993 and 2020; likewise the power of Generative Pretrained Transformers (GPTs) has increased from 117 mill. parameters to 1.76 trillion, with 200 mill. users worldwide and growing. Although economists have made progress in understanding the effects of automation on the economy, there are important gaps regarding the effects of automation on politics (Gallego and Kurer, 2022).

Scholars have found that automation has increased support for the radical right and lowered support for international integration, including other-regarding attitudes due to fears of job scarcity, thanks to machines' capacity to replace labor and depress wages (e.g., Gallego, Kurer and Schöll 2018; Anelli, Colantone and Stanig 2018; Thewissen and Rueda 2019; Owen 2020; Balcazar 2023). However, these findings don't account for technology's capacity to generate new jobs, which mitigates job displacement (Mokyr, 2018).[1] Others have suggested that automation may affect the balance of power between firms and workers, reducing workers' (Boix, 2019). Herein I investigate the effect of automation on the latter issue. I establish novel micro-foundations using a game-theoretic model, showing that automation transforms the levels of political action for firms and workers, shaping redistributive politics, conditional on the type of automation.

I lay out a theoretical framework that maps economic power onto political power in the process of redistribution, wherein the distribution of political power is affected by the level of automation. I adopt the stylized fact that machines are owned by a small number of firm owners (or *firms*) whereas most citizens (or *workers*) work in exchange for a wage. Firms and workers compete for the distribution of resources in the economy after production takes place. This conflict is political and it is solved through political participation: campaign contributions, lobbying, etc., and it evokes the long-held notion that economic power translates into political power in the policy-making process. Political participation is costly: workers and firms decide how much to allocate from their finite endowments to both production and political influence. The share of resources devoted to the latter action determines endogenously the political clout of each group and thus redistribution in equilibrium; however this political rent-seeking reduces production.

I investigate the effects of automation on the decision to allocate resources to rent-seeking by studying changes to the extent to which machines take over (substitute) or complement the tasks performed by workers. In this regard, I show that the recent focus on labor-replacing automation misses important nuances for understanding the political consequences of automation.

[1] There is no consensus that automation generates job displacement structurally (Aghion et al., 2023).

First, when machines can take over workers' tasks the opportunity cost of rent-seeking falls for workers because the return to work decreases—as such workers are more likely to participate in politics. Conversely, when machines and workers are complements instead of substitutes, workers' incentives to participate in politics diminish because the marginal return to productive effort is higher. Firms face a similar trade-off but to a much lower extent, thus firms' best responses are to allocate more effort into political action. Hence job polarization created by automation translates into polarization in political participation between the winners and losers from automation, which hamstrings redistribution in favor of workers, leading to higher inequality—favoring firms. I tie these dynamics to capital deepening in the form of *robot adoption* and *information and communication technologies* (ICTs)—technologies that have been around for years and are easy to adopt.[2]

Second, technological innovations can create a *deskilling* process; i.e., the marginal productivity of skilled workers relative to machines decreases. In this case, observationally, automation can be understood as a "flow" that transforms some skilled workers into unskilled ones. In other words, technological innovation can replace skilled workers. This occurred in the past when skilled craftsmen were replaced by industrial robots, or concurrently as AI now performs skilled work such as coding, writing, provides financial services, etc., which often require higher education. Skill and thus workers incentives to participate politically are contingent on the effect of automation on the marginal productivity of labor vis-á-vis machines, consistent with the tasks based approach (e.g., Acemoglu and Restrepo 2020). Hence "skill" is high (low) if the marginal productivity of labor is higher (lower) than that of machines; skill is then relative. Skilled workers participate more politically if they face deskilling because the return to their effort decreases through a fall in the relative productivity of their labor vis-á-vis machines. Thus automation may not necessarily affect the political incentives of unskilled or highly skilled labor, if they are not (further) deskilled, but it may for instance affect the political participation of workers in the middle of the skill redistribution if they face deskilling.

All in all, since the redistributive process is contingent on the level of political participation by workers and firms, when workers are mostly unskilled or face deskilling, they invest more effort on political participation vis-á-vis production, reducing economic inequality at the expense of economic output. When automation complements labor, the opposite occurs—which can happen in the case of highly skilled labor (Autor, Levy and Murnane, 2003)—but the proportion of economic output that workers get may decrease because firms invest comparatively more in the distributive conflict. As a result, the equalizing effect of rent-seeking exhibits a U-shape as a function of technological change.

[2]Observationally, increasing automation is tantamount to increasing the stock of machines.

## 2 Distributive conflict between firms and workers

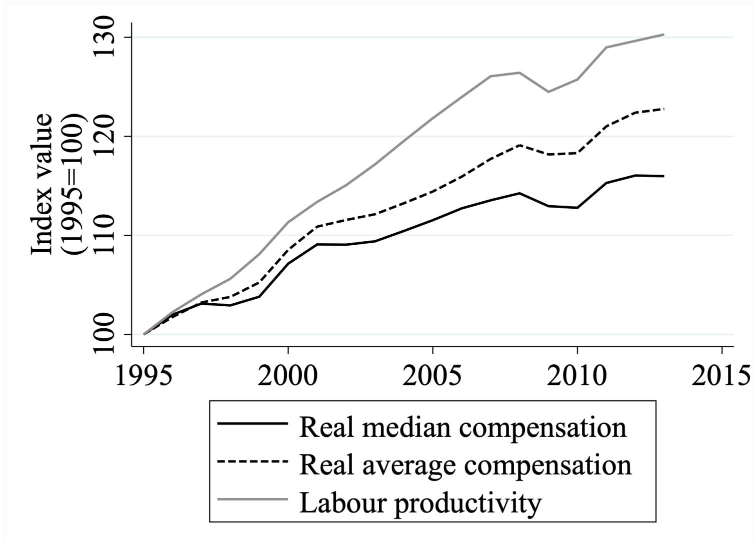
A powerful insight that has emerged in recent decades is that economic inequality can affect politics because economic power translates into political power, shaping redistribution in equilibrium. The idea is that asymmetric economic power can translate into asymmetric political power where those with more economic influence guarantee disproportionate rents, after redistribution, for themselves (Congleton, Hillman and Konrad, 2008).

Automation can exacerbate redistributive issues. On the one hand, automation can re-allocate bargaining power from workers to firms, specially if automation takes over the tasks performed by workers, reducing wages. On the other hand, automation increases the return to capital as machines become more productive, reducing the labor share. Indeed, an important stylized fact that has emerged in recent decades is the decoupling between the marginal productivity of labor and wages (Figure 1). This phenomenon has been attributed primarily to the automation of work (Brynjolfsson and McAfee, 2014). Further, this decoupling reflects a widening gap in the economic power of workers v. firms, which has been reflected for example in weaker labor unions and higher inequality (Farber et al., 2018). Tellingly, the residualized correlation between robot adoption and the Gini index across numerous countries provides credence to this idea (Figure 2).

This problem can be further exacerbated by collective action problems: Unskilled workers can be replaced by machines while skilled workers may benefit from automation, creating winners and losers. Moreover, reflections of worker political participation, such as unionization, can create compression in incomes to the benefit (detriment) of unskilled (skilled) workers, reducing the incentives of skilled workers to participate in political action—phenomenon that can be amplified by automation (e.g., Acemoglu, Aghion and Violante 2001; Balcazar 2023). Curiously, we are seeing a resurgence in political mobilization from workers in response to automation as the Hollywood and United Auto Workers strikes of 2023 in the US exemplify,[3] evoking the distributive conflict between workers and firms in the 80s and 90s—an era of fast-paced robot adoption (Brynjolfsson and McAfee, 2014; Baldwin, 2019).

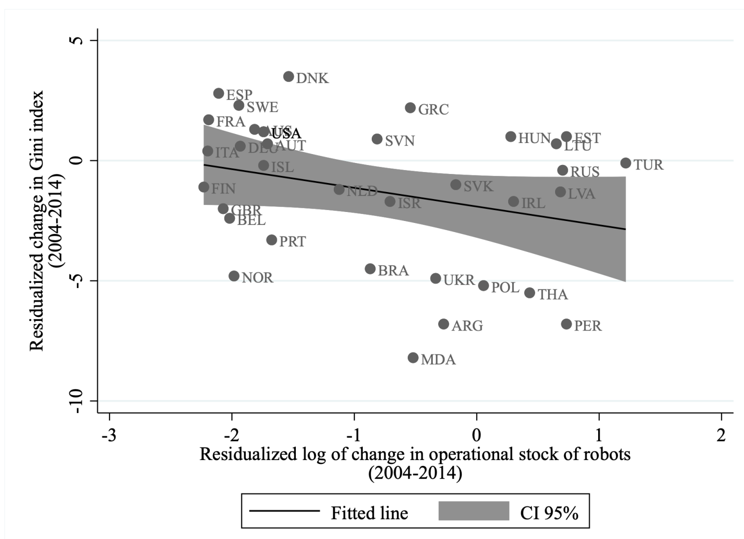
[3] See for instance related articles at: https://aflcio.org/issues/future-work, also news articles such as:
https://www.nytimes.com/2024/07/30/business/economy/artificial-intelligence-hollywood-unions.html
https://www.pbs.org/newshour/politics/what-does-the-uaw-strike-have-in-common-with-this-years-wave-of-labor-action-3-experts
https://www.nytimes.com/2023/09/16/business/dealbook/uaw-strike-tech-ai-unions.html

**Figure 1: Marginal productivity per worker and wages**




Note: Employment weighted average of 24 countries (two-year moving averages ending in the indicated years) using data gleaned from OECD productivity statistics.

**Figure 2: Automation and inequality**




Note: Data on inequality is gleaned from the World Banks' World Development Indicators; data for robot adoption is obtained from the International Federation of Robotics. These variables are residualized by controlling for country and time fixed effects.

# 3 The model

Consider a firm labeled by $k$ and $n$ workers that are hired by the firm. For simplicity I assume that the firm only provides machines to the production process (e.g., it buys robots or installs servers and/or AI software); the workers provide labor. Machines are denoted by $K$ as in capital, and labor from workers is denoted by $L$. These factors are used to produce a good or service in a market economy whereby all markets are in equilibrium.

All actors are endowed with some positive amount of resources in an unidimensional measure. The firm is endowed with an amount $A > L > 0$ of assets that she can choose to allocate between purchasing machines $K \geq 0$ or political influence $r_k \geq 0$:

$$A \geq r_k + K.$$

That is, the firms can use part of their endowments to influence public policy through lobbying, campaign contributions, etc. Similarly, each worker $i \in \{1, \ldots, n\}$ decides whether to work or participate in politics—through campaign donations, voting, union activities, etc.—to sway policy in their favor. Thus $r_i \in \{0, 1\}$, where $r_i = 0$ implies that the workers allocate their effort only to working, and $r_i = 1$ only to politics.[4] Given the decision schedule $r = (r_1, \ldots, r_n)$ the total amount of productive work is given by

$$L = n - \omega r_w$$

where $r_w = \sum_i r_i$ are the resources that workers allocate for political participation, and $\omega \in (0, 1)$ is a factor that determines the effectiveness of workers' political power, and subsumes institutions that may weaken or strengthen the political power of organized labor (e.g., labor union legislation or even a weak labor market with few outside job options).[5] Below I also discuss the robustness of the model to both heterogeneous workers and collective action issues.

**Automation.** Let us consider the following continuous, concave and differentiable production function:

$$F(L, K) = \left(a_L L^{1-\alpha} + a_K K^{1-\alpha}\right)^{\frac{1}{1-\alpha}}, \ \alpha \in (0, 1); \ L, K \geq 0; \ \sum_j a_j = 1.$$

This production function is know as the *constant elasticity of substitution* function (CES), and it is the base for all modern task-based approaches in the automation literature. This production function allows us to incorporate the most commonly used typology in the study of automation: First, $a_L$ and $a_K$ are the specific-factor productivity parameters. An increase in $a_K$ embodies the notion

[4] $r$ can be understood as money or time or any other resource from workers, or combination thereof.

[5] A higher likelihood of unemployment due to automation translates into lower expected wages, which in this case is tantamount to a fall in the opportunity cost of rent seeking.

of *factor-biased* technical change, and it corresponds to a change in the production technology that reduces the labor share in the production process ($a_L = 1 - a_K$).[6] An example of this type of technological change are better manufacturing robots; better robots can reduce the need for manual labor reducing the labor-share parameter. Similarly, better information and communication technologies (ICTs) such as better software, processors or Internet bandwidth has allowed for more efficient and effective (remote) work. An increase in $a_K$ reflects capital deepening.

Second, $\alpha$ is the substitution parameter, which captures the degree of substitutability (or complementarity) between machines and workers.[7] When $\alpha \to 0$ the adoption of machines becomes less friendly to workers. This occurs when jobs have a high routine task content because complex tasks are not easily automatable; these are tasks performed usually by skilled workers; machines and workers are thus likely complements. In contrast, when $\alpha \to 1$, machines are less friendly to workers because the former act as substitutes for the latter insofar as their tasks are automatable; these tasks are usually performed by unskilled workers. Higher values of $\alpha$ capture the concept of deskilling because $\alpha$ determines the marginal productivity of workers vis-á-vis machines (or their elasticity of substitution). Deskilling can be a product of technological innovations.

Deskilling is, however, conditional to relationship between technology and tasks in the production process insofar as something like AI may not deskill manual workers, but it might do so for workers that use information technologies intensively for performing routine tasks—e.g., robot operators, software developers, writers, and other similar. Thus the key quantity explaining the dependency between machines and workers is the relative marginal productivity between workers and machines; that is, how much productive or not are workers vis-á-vis machines as technology progresses. In this sense I define a skill as a quantity relative to this relative marginal productivity for ease of exposition—which is consistent with the standard tasks-based approach.

**Distributive conflict.** The way that the resources in the economy are divided among the firm $k$ and the $n$ workers, after production takes place, is determined by the firm's political influence ($r_k$) and the number of workers participating in politics ($r_w$). The share of the resources that each gets is determined by a *Contest Success Function* (CSF) $\phi : \mathbb{R}^2_+ \mapsto [0,1]$, which is assumed to be differentiable at $\mathbb{R}^2_+ \setminus \{(0,0)\}$ and symmetric:

$$\phi(r_w, r_k) + \phi(r_k, r_w) = 1.$$

$\phi(\cdot,\cdot)$ satisfies the standard Skaperdas (1992) properties.

[6]In the context of capital deepening this reflects an increase in the stock of capital per worker.

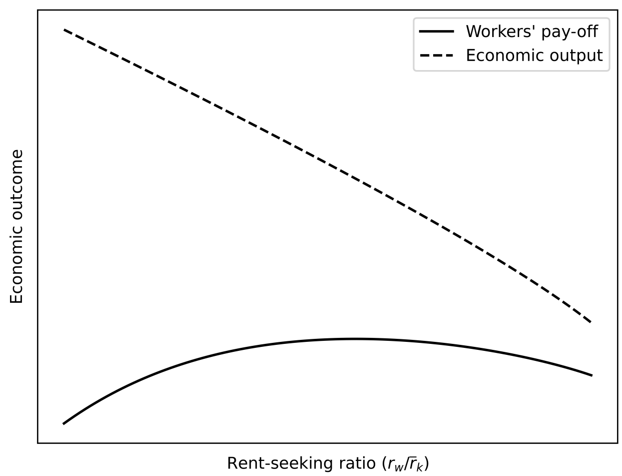
[7]Recall $\lim_{\alpha\to 1} \left(a_L L^{1-\alpha} + a_K K^{1-\alpha}\right)^{\frac{1}{1-\alpha}} = L^{a_L} K^{a_K}$ and $\lim_{\alpha\to 0} \left(a_L L^{1-\alpha} + a_K K^{1-\alpha}\right)^{\frac{1}{1-\alpha}} = a_L L + a_K K$.

The payoffs for the firm and each worker are given by:

$$U_k = \phi\left(r_k, r_w\right) \cdot F(K, L);$$
$$U_w = \frac{\phi\left(r_w, r_k\right) \cdot F(K, L)}{n}.$$

Therefore political power is a consequence of economic inequality projected onto the way political institutions operate in a democratic environment. Figure 3 illustrates the basic trade-off that the players face, whereby given a level of political participation (or rent-seeking) by firms ($\bar{r}_k$), increased political participation from workers comes at the expense of economic output.

**Figure 3: Economic output and relative pay-offs as a function of rent-seeking**




## 3.1 Equilibrium and analysis

Propositions 1 and 2 provide sufficient conditions for the existence of a unique interior Nash equilibrium:

**Proposition 1.** *If either $\phi_{11} < 0$ or the Skaperdas (1992) assumptions hold, then we can characterize the solution to the game $(r_k^*, r_w^*)$ with the FOCs:*

$$\phi_1(r_k^*, r_w^*) F(K^*, L^*) \leq (K^*)^{-\alpha)} F_1(K^*, L^*),$$
$$\phi_1(r_w^*, r_k^*) F(K^*, L^*) \leq \omega \cdot (L^*)^{-\alpha} F_2(K^*, L^*)$$

*Proof.* In Appendix B □

**Proposition 2.** *Under the Skaperdas (1992) conditions, and if $r_w^* \in (0,n)$, there exist an equilibrium of the game where $r_w$ workers participate in politics and $r_w \in (r_w^* - 1, r_w^* + 1)$.*

*Proof.* In Appendix B □

Further, given the unequal distribution of endowments assumed above, then $r_k^* > r_w^*$ in equilibrium (Corollary 1).

**Collorary 1.** *If $A > L$ then $r_k > r_w \iff A - r_k > n - \omega r_w$*

*Proof.* In Appendix B □

The propositions and the corollary above indicate that whenever firms have more resources than labor, the best-response allocation of resources into political participation is larger for firms vis-á-vis labor. Therefore in equilibrium firms are more likely to invest in political participation vis-á-vis workers and as such, workers will obtain a smaller share of the economic pie after redistribution takes place.[8] I expand on this regard in the discussion in Section 4.

**Comparative statics.** Proposition 3 below illustrates the equations that characterize the main comparative statics of this model.[9] Changes in the technology of production induce two forces that alter the levels of rent-seeking activities: i) A *direct effect* associated to changes in economic output, and ii) A *strategic effect* associated to changes in the distribution of resources. The first effect is tied to the positive effect of automation on economic output ceteris paribus, while the second one is associated to changes in the marginal productivity of labor relative to capital, which affect the opportunity cost of using resources in political participation.

All in all, higher productivity via automation increases the size of the pie, which should increase the incentives for rent-seeking. But automation that reduces the labor share —i.e., higher $a_K$— pushes downward the opportunity cost of rent-seeking because workers are bound to receive less in equilibrium relative to the growing size of the economic output, given their lower level of marginal productivity. Similarly, faced with deskilling (i.e., $\alpha \to 1$), the opportunity cost of rent-seeking for workers fall because workers are bound to receive less in equilibrium relative to the growing size of the economic output as a result of a reduced marginal productivity from labor. The opposite occurs if machines are complements to labor (i.e., $\alpha \to 0$) insofar as the marginal productivity of labor increases with automation, rising the opportunity cost of political activities. Firms face a

[8] For instance this assumption is largely met regarding campaign contributions for most congressional districts in the US in recent decades (Figure A1). This is harder to assess in other countries given the dearth of official statistics.

[9] Straightforwardly, the effects of changes in $\omega$ reduce the effectiveness of rent-seeking by workers increasing the opportunity cost of rent-seeking.

similar change in their incentives but in the opposite direction. Both workers and firms balance these considerations taking into account the other's best response.

Relevantly, it's difficult to determine which effect dominates without imposing further assumptions on the functional form for the CSF. Thus in the next Section I discuss further the comparative statics by assuming the standard ratio CSF.

**Robustness.** In Appendix B.1 I discuss the robustness of my set-up to two important extensions: i) Worker heterogeneity, and ii) Collective action problems. On the one hand, I show equilibrium existence and uniqueness to these extensions. On the other hand, these robustness tests indicate as that we can illustrate the logic of the model by performing some straightforward simplifications, such as assuming a representative worker insofar as workers follow symmetric cut-off strategies in equilibrium.

**Proposition 3.** *Assume $(r_k^*, r_w^*)$ is an interior solution, then the comparative statics are:*

*For $\alpha$:*

$$\frac{\partial r_k^*}{\partial \alpha} = \overbrace{\frac{\frac{a_K K^\alpha \ln(K) + a_L L^\alpha \ln(L)}{a_K K^\alpha + a_L L^\alpha} - \ln(K)}{\frac{\phi_{11}(r_k,r_w)}{\phi_1(r_k,r_w)} - \frac{(\alpha) a_K K^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha} - \frac{(1-\alpha)}{K}}}^{\text{direct effect}} - \overbrace{\frac{\partial r_w}{\partial \alpha} \cdot \frac{\frac{\phi_{12}(r_k,r_w)}{\phi_1(r_k,r_w)} - \omega \frac{(\alpha) a_L L^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha}}{\frac{\phi_{11}(r_k,r_w)}{\phi_1(r_k,r_w)} - \frac{(\alpha) a_K K^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha} - \frac{(1-\alpha)}{K}}}^{\text{strategic effect}}$$

$$\frac{\partial r_w^*}{\partial \alpha} = \underbrace{\frac{\frac{a_K K^\alpha \ln(K) + a_L L^\alpha \ln(L)}{a_K K^\alpha + a_L L^\alpha} - \ln(L)}{\frac{\phi_{11}(r_w,r_k)}{\phi_1(r_w,r_k)} - \omega \frac{(\alpha) a_L L^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha} - \frac{\omega(1-\alpha)}{L}}}_{\text{direct effect}} - \underbrace{\frac{\partial r_k}{\partial \alpha} \frac{\frac{\phi_{12}(r_w,r_k)}{\phi_1(r_w,r_k)} - \frac{(\alpha) a_K K^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha}}{\frac{\phi_{11}(r_w,r_k)}{\phi_1(r_w,r_k)} - \omega \frac{(\alpha) a_L L^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha} - \frac{\omega(1-\alpha)}{L}}}_{\text{strategic effect}},$$

*and for $a_K$:*

$$\frac{\partial r_k^*}{\partial a_K} = \overbrace{\frac{\frac{L^\alpha - K^\alpha}{a_K K^\alpha + a_L L^\alpha} + \frac{1}{a_K}}{\frac{\phi_{11}(r_k,r_w)}{\phi_1(r_k,r_w)} - \frac{a_K K^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha} - \frac{(1-\alpha)}{K}}}^{\text{direct effect}} - \overbrace{\frac{\partial r_w}{\partial a_K} \cdot \frac{\frac{\phi_{12}(r_k,r_w)}{\phi_1(r_k,r_w)} - \omega \frac{a_L L^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha}}{\frac{\phi_{11}(r_k,r_w)}{\phi_1(r_k,r_w)} - \frac{a_K K^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha} - \frac{(1-\alpha)}{K}}}^{\text{strategic effect}}$$

$$\frac{\partial r_w^*}{\partial a_K} = \underbrace{\frac{\frac{L^\alpha - K^\alpha}{a_K K^\alpha + a_L L^\alpha} - \frac{1}{a_L}}{\frac{\phi_{11}(r_w,r_k)}{\phi_1(r_w,r_k)} - \omega \frac{a_L L^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha} - \frac{\omega(1-\alpha)}{L}}}_{\text{direct effect}} - \underbrace{\frac{\partial r_k}{\partial a_K} \frac{\frac{\phi_{12}(r_w,r_k)}{\phi_1(r_w,r_k)} - \frac{a_K K^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha}}{\frac{\phi_{11}(r_w,r_k)}{\phi_1(r_w,r_k)} - \omega \frac{a_L L^{-(1-\alpha)}}{a_K K^\alpha + a_L L^\alpha} - \frac{\omega(1-\alpha)}{L}}}_{\text{strategic effect}}$$

*Proof.* In Appendix B. □

## 4 Discussion

To illustrate the underlying logic above I use the standard ratio contest function (CSF) to parameterize the political mechanism: $\phi(r_w, r_k) = \frac{r_w}{r_w + r_k}$. Also assume a representative worker—which is warranted given the results above. Thus we can write workers' resource constraint as

$$L = A_w - \omega r_w$$

where $\omega$ subsumes the average worker resolve in the distributive conflict. For simplicity we normalize the total amount of assets to one, such that $\sum_i A_i = 1$. This simplifcation is without loss of generality. The complete solution to this simplification can be found in Appendix C. Below, I focus on illustrating the lessons we obtain from the comparative statics.

Figure 4 illustrates the basic comparative statics regarding political participation (or rent-seeking.[10] Under the prospect of substitution—illustrated here by capital deepening—or deskilling, workers have incentives to increase their rent-seeking effort despite they may reduce the size of the total economic pie; i.e., $\partial r_w / \partial \alpha > 0$ and $\partial r_w / \partial a_K > 0$. This means that faced with the prospect of being replaced by machines, the marginal benefit from investing one unit of resources into political participation is higher than investing one unit of resources into productive activities. In this regard, we should expect higher worker political participation as a result of automation as we have observed recently with the Hollywood strikes, and numerous other strikes that have emerged in response to automation (see footnote 3).[11] In contrast, firms increase their level of political influence as a result of automation ($\partial r_k / \partial \alpha > 0$).[12]

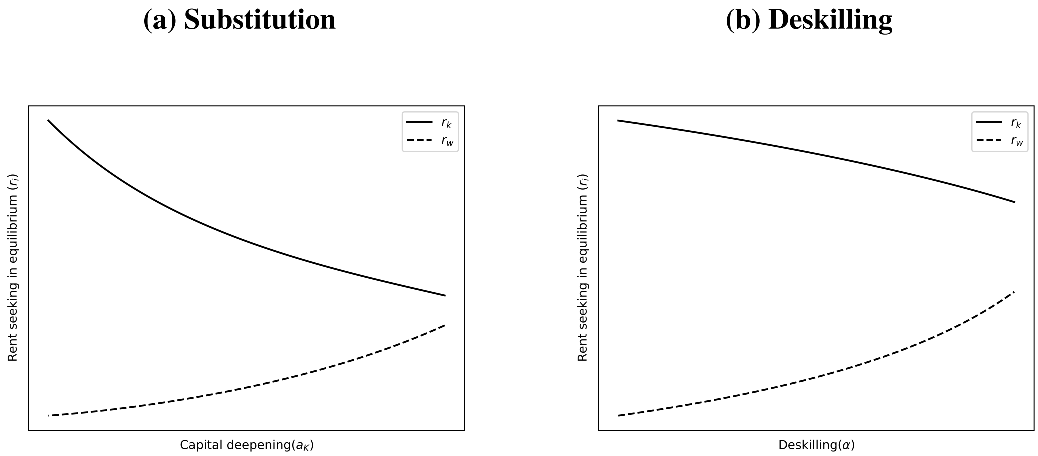
**Inequality.** To understand how the aforementioned results translate into inequality, let us consider the shares gap

$$G = \frac{r_k}{r_w + r_k} - \frac{r_w}{r_w + r_k} = \frac{1 - \frac{r_w}{r_k}}{1 + \frac{r_w}{r_k}},$$

where $G > 0$ by Corollary 1. Note that inequality is decreasing on the relative political advantage of workers: $\partial G / \partial (r_w / r_k) < 0$. This means that in equilibrium whichever group is investing the larger amount of assets into production must also have greater political advantage, otherwise

[10] These comparative statics are computed using numeric methods insofar as only $r_w^\star / r_k^\star$ has a closed form solution.
[11] Another prominent example are the Luddite riots of nineteenth century England.
[12] Figure A2 shows some suggestive evidence in the case of the US' congressional districts.

**Figure 4: Changes in political participation as a function of automation**




it would have incentives to allocate productive assets into political participation activities. The wealthier individuals (e.g., firm owners) allocate more resources to both production and political participation vis-á-vis the poorest and inequality increases in equilibrium: $\partial G/\partial A_k > 0$. Furthermore, note that when machines replace workers, automation provides workers incentives to allocate more resources in political participation: $\partial G/\partial a_K < 0$ and $\partial G/\partial \alpha < 0$, pushing inequality downwards. However, despite firms relative benefit of productive activities vis-á-vis rent-seeking rises, firms may remain stronger in the political arena insofar as they posses higher endowments. This simplistic analysis, however, hides important nuances as I show next.

**Polarization.** Consider three type of workers: (A)lice, (B)ob and (C)harles. Charles is unskilled, Bob is skilled, and Alice is highly skilled. Figure 5, panel a, displays the equilibrium rent-seeking level of effort for workers at the status quo given $r_k^\star$, which is the best response to $r_w^\star = \sum_i r_i^\star$. For high capital deepening ($\overline{a}_K$), the function $r_i^\star(\cdot;\alpha_i,\overline{a}_K)$ is depicted using the solid line. Note Alice faces a higher opportunity cost of participating in politics than Bob because she is more productive per hour of work; similarly Bob faces a higher opportunity cost than Charles, hence $r_C^\star > r_B^\star > r_A^\star$. The dashed line corresponds to the low capital deepening case: $r_i^{\star\star}(\cdot;\alpha_i,\underline{a}_K)$. Figure 5, panel b, shows the level of inequality for the high capital deepening case using the solid line, whereas the dashed line illustrates the low capital deepening case.

Now, let us consider two illustrative cases:

i) *Automation via deskilling*: If the advent of AI deskills workers like Bob, who are in the middle of the distribution of skills—i.e., $\alpha_B$ increases to $\alpha_B'$—then the return to political participation increases relative to the return to work.[13] As a result the rent-seeking effort by

[13] This means that automation reduces the set of tasks $B$ can perform without necessarily creating a new set of tasks.

Bob increases, matching the rent-seeking effort by Charles ($r_B^\star \to r_B^{\star\star}$ in Figure 5, panel a). This also implies that inequality decreases from $G$ to $G'$ as show in Figure 5, panel b, because although Alice doesn't face incentives to increase her rent-seeking effort, Bob and Charles rent-seeking effort increase workers' share of pie. This is facilitated by the low levels of capital deepening, which guarantee a high labor share—echoing the analysis above.

ii) *Automation via capital deepening*: If the stock of machines—like robots and/or ICTs—increases from $\underline{a}_K$ to $\overline{a}_K$, Bob may face stronger incentives to participate in political action because the fall in his relative marginal productivity vis-á-vis machines is more intense. This is reflected in a steeper slope in Bob's the rent-seeking function (dashed line in Figure 5, panel a), and also in the jump in rent-seeking effort from $r_B^{\star\star}$ to $r_B^{\star\star\star}$ that we observe. This implies for instance that the opportunity cost of rent-seeking falls more rapidly when moving form $\alpha_B$ to $\alpha_B'$.

Importantly, we also observe that inequality under high capital deepening increases from $G''$ to $G'''$ when machines substitute more labor ($\overline{\alpha} \to \overline{\alpha}'$), unlike the previous analysis. This occurs because a lower labor share weakens labor in the contest against firms despite the former are putting even higher rent-seeking effort.

# 5 Conclusions

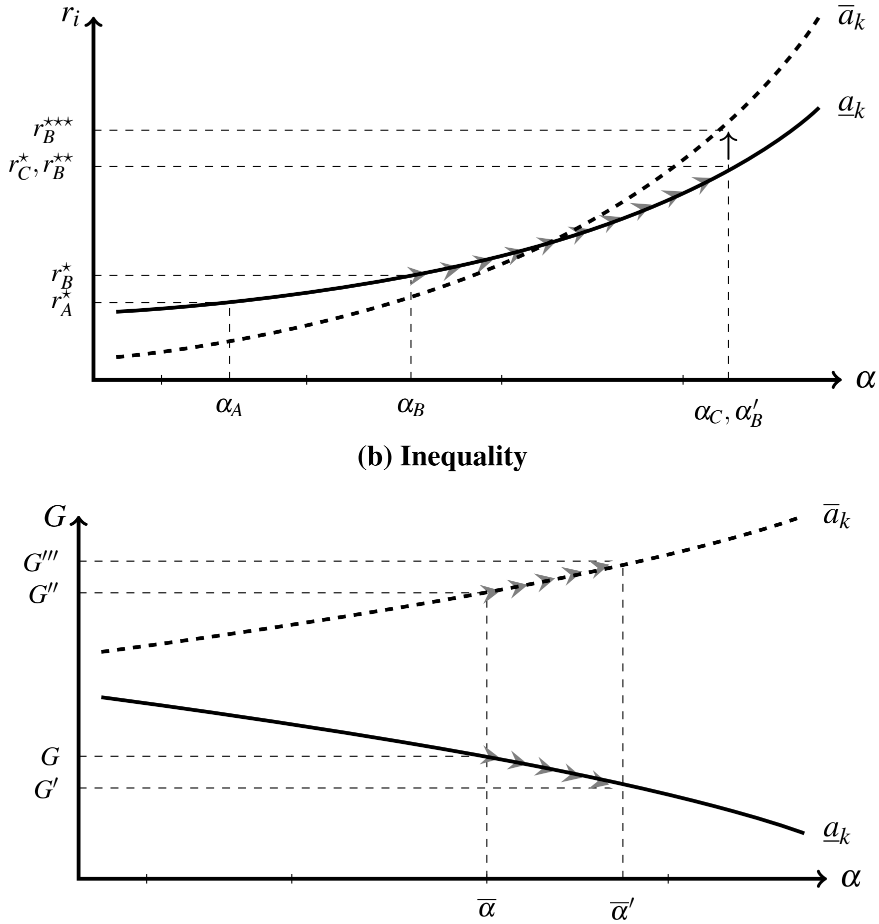
I provide evidence of a connection between automation and the plausible redistribution of de facto political power from workers to firms that this causes, and the political consequences thereof. I show that automation can increase rent-seeking effort in the form of political participation in a redistributive conflict, when automation replaces workers or when we observe deskilling, otherwise if automation complements labor they reduce their rent-seeking effort. Thus we may observe polarization in rent-seeking effort that can benefit firms. Furthermore, my analysis reveals that although the result of the redistributive conflict is impacted by the deskilling process, it is especially shaped by capital deepening. In this sense, inequality can increases non-monotonically as a function of automation as deskilling innovations, which may generate pressures to reduce inequality initially, may be accompanied later on by higher levels of capital deepening as skill-biased technical change, reducing the labor share. Thus the equalizing effect of rent-seeking exhibits a U-shape as a function of technological change.

Hence there we should not expect additional general equilibrium adjustment in the labor market.

**Figure 5: Opportunity cost analysis**

**(a) Workers' rent-seeking effort**

**(b) Inequality**

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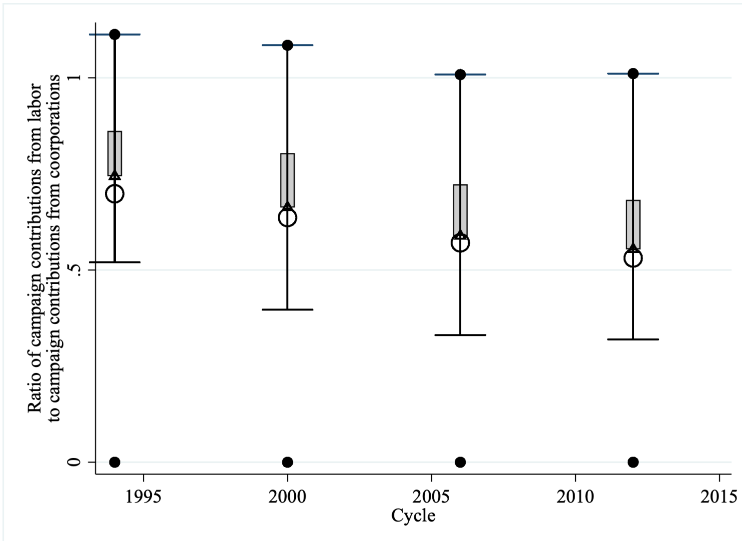
# Online Appendix

## Contents

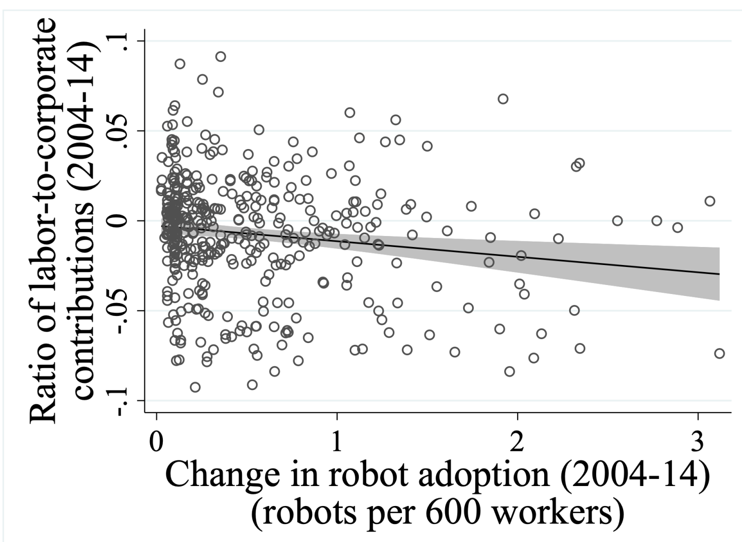
# A Empirical appendix

**Figure A. 1: Box plot Labor-to-corporate contributions ratio**




Note: The data on campaign contributions comes from the Center of Responsive Politics (CRP). It corresponds to labor aggregates in constant US dollars of 2009, which I aggregate at the congressional district level.

**Figure A. 2: Robot adoption and labor-to-corporate contributions ratio**




Note: The data on campaign contributions comes from the Center of Responsive Politics (CRP). It corresponds to labor aggregates in constant US dollars of 2009, which I aggregate at the congressional district level. The date on robot adoption comes from Balcazar (2023).

# B Proofs for main model

*Proof of Proposition 1.* Consider the following conditions on contest success functions (Skaperdas, 1992):

i) $\phi_1 \in (0,\infty)$;

ii) $\phi_{11}(r_1,r_2) < 0$ if and only if $r_1 > r_2$;

iii) $\phi_{12}(r_1,r_2) > 0$ if and only if $r_1 > r_2$;

iv) $\phi \in (0,1)$;

v) $\phi_{11}\phi < \phi_1^2$;

vi) $\phi \cdot (1-\phi)\phi_{12} + (2\phi - 1)\phi_1\phi_2 = 0$.

- Case 1: If $\phi_{11}$ holds, then it means that the SOC is met whenever the FOC is met.

$$\frac{\partial^2}{\partial r_k}[\phi(r_k,r_w)F(K-r_k,L-\omega r_w] = \underbrace{\phi_{11}\cdot F}_{<0} - 2\overbrace{\phi_1 \cdot F_1}^{>0} + \underbrace{\phi \cdot F_{11}}_{<0} < 0,$$

$$\frac{\partial^2}{\partial r_w}[\phi(r_w,r_k)F(K-r_k,L-\omega r_w] = \underbrace{\phi_{11}\cdot F}_{<0} - 2\overbrace{\phi_1 \cdot F_2}^{>0} + \underbrace{\phi \cdot F_{22}}_{<0} < 0$$

  Since the CES function is concave on $L$ and $K$. This means that – omitting the constraints – the best response can be computed by the value that minimizes the distance between the FOC and 0. Depending on $\phi$ it might be the case that the best response is a corner solution, and thus we can only establish the inequality condition of the FOCs.

- Case 2: If the Skaperdas (1992) conditions are met, then by its theorems 1 and 2 there is a unique interior Nash equilibrium in pure strategies, and can be characterized by the FOCs.

□

*Proof of Proposition 2.* Again, consider the following conditions on contest success functions (Skaperdas, 1992):

- $\phi_1 \in (0,\infty)$;

- $\phi_{11}(r_1, r_2) < 0$ if and only if $r_1 > r_2$;
- $\phi_{12}(r_1, r_2) > 0$ if and only if $r_1 > r_2$;
- $\phi \in (0, 1)$;
- $\phi_{11}\phi < \phi_1^2$;
- $\phi \cdot (1-\phi)\phi_{12} + (2\phi - 1)\phi_1\phi_2 = 0$.

Because $r_w^* \in (0, n)$, then the FOCs are met with equality. As Skaperdas (1992) shows the concatenation of the best responses (of the relaxed game) has a unique fixed point (the proof also holds for $\phi_{11}$ because is a less restringent assumption), then $BR_k' < 0$ and $BR_w' < 0$ around $(r_k^*, r_w^*)$. Noting also that because the payoff functions have an inverted U on the respective rent seeking effort of each agent, then it must be the case that

$$BR_w(BR_k(\lceil r_w^* \rceil)), BR_w(BR_k(\lfloor r_w^* \rfloor)) \subseteq \{\lceil r_w^* \rceil, \lfloor r_w^* \rfloor\},$$

otherwise the stability of the equilibrium would be violated. The proof is completed by noting that (because of the inverted U shape) either $\lceil r_w^* \rceil$ or $\lfloor r_w^* \rfloor$ must be a fixed point of the concatenation of the best responses. Thus an equilibrium exist when workers have the binary decision. □

*Proof of Corollary 1.* The FOCs:

$$\phi_1(r_k, r_w)(a_K K^{1-\alpha} + a_L L^{1-\alpha}) = a_K K^{-\alpha}$$
$$\phi_1(r_w, r_k)(a_K K^{1-\alpha} + a_L L^{1-\alpha}) = \omega a_L L^{-\alpha}$$

Divide the FOCs

$$\frac{\phi_1(r_k, r_w)}{\phi_1(r_w, r_k)} = \frac{a_K}{\omega a_L}\left(\frac{n - \omega r_w}{A_k - r_k}\right)^{\alpha}.$$

Given a symmetric CSF, if $A_k$ increases to $A_k'$, then the right side of the equation above will decrease, which means that without the strategic adjustment we have

$$\frac{a_K}{\omega a_L}\left(\frac{n - \omega r_w}{A_k' - r_k}\right)^{\alpha} < \frac{\phi_1(r_k, r_w)}{\phi_1(r_w, r_k)}.$$

Thus in the new equilibrium $\frac{r_w}{r_k}$ has to decrease. □

*Proof of Proposition 3.* The FOC:

$$\phi_1(r_k, r_w)(a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}) = a_K K^{-\alpha}$$
$$\phi_1(r_w, r_k)(a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}) = \omega(1-a_K)L^{-\alpha}$$

then taking the ln()

$$\ln(\phi_1(r_k, r_w)) + \ln(a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}) = \ln(a_K) - \alpha \ln(K)$$
$$\ln(\phi_1(r_w, r_k)) + \ln(a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}) = \ln(\omega) + \ln((1-a_K)) - \alpha \ln(L)$$

Noting that

$$\frac{\partial}{\partial \alpha}[\ln(\phi_1(r_j, r_{-j}))] = \frac{\phi_{11}}{\phi_1}\frac{\partial r_j}{\partial \alpha} + \frac{\phi_{12}}{\phi_1}\frac{\partial r_{-j}}{\partial \alpha}$$

$$\frac{\partial}{\partial \alpha}\left[\ln(a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha})\right] = \frac{a_K K^{1-\alpha}\left((1-\alpha)\frac{\partial K}{\partial \alpha}/K - \ln(K)\right) + (1-a_K)L^{1-\alpha}\left((1-\alpha)\frac{\partial L}{\partial \alpha}/L - \ln(L)\right)}{a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}}$$

$$= \frac{-a_K K^{1-\alpha}\ln(K) - (1-a_K)L^{1-\alpha}\ln(L)}{a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}} + \frac{\partial K}{\partial \alpha}\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}} + \frac{\partial L}{\partial \alpha}\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}}$$

$$\frac{\partial}{\partial \alpha}[-\alpha \ln(K)] = -\ln(K) - \alpha\frac{\partial K}{\partial \alpha}/K$$

$$\frac{\partial}{\partial a_K}[\ln(\phi_1(r_j, r_{-j}))] = \frac{\phi_{11}}{\phi_1}\frac{\partial r_j}{\partial a_K} + \frac{\phi_{12}}{\phi_1}\frac{\partial r_{-j}}{\partial a_K}$$

$$\frac{\partial}{\partial a_K}\left[\ln(a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha})\right] = \frac{K^{1-\alpha} + a_K K^{-\alpha}\frac{\partial K}{\partial a_K} - L^{1-\alpha} + (1-a_K)L^{-\alpha}\frac{\partial L}{\partial a_K}}{a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}}$$

$$= \frac{K^{1-\alpha} - L^{1-\alpha}}{a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}} + \frac{\partial K}{\partial a_K}\frac{a_K K^{-\alpha}}{a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}} + \frac{\partial L}{\partial a_K}\frac{(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}}$$

$$\frac{\partial K}{\partial \alpha} = -\frac{\partial r_k}{\partial \alpha}$$
$$\frac{\partial L}{\partial \alpha} = -\omega\frac{\partial r_w}{\partial \alpha}$$
$$\frac{\partial K}{\partial a_K} = -\frac{\partial r_k}{\partial a_K}$$
$$\frac{\partial L}{\partial a_K} = -\omega\frac{\partial r_w}{\partial a_K}$$

Then differentiating the FOC by $\alpha$:

$$\frac{\phi_{11}(r_k,r_w)}{\phi_1(r_k,r_w)}\frac{\partial r_k}{\partial\alpha}+\frac{\phi_{12}(r_k,r_w)}{\phi_1(r_k,r_w)}\frac{\partial r_w}{\partial\alpha}-\frac{a_K K^{1-\alpha}\ln(K)+(1-a_K)L^{1-\alpha}\ln(L)}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\frac{\partial r_K}{\partial\alpha}\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}$$
$$-\omega\frac{\partial r_w}{\partial\alpha}\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}=-\ln(K)+\alpha\frac{\partial r_K}{\partial\alpha}/K$$
$$\frac{\phi_{11}(r_w,r_k)}{\phi_1(r_w,r_k)}\frac{\partial r_w}{\partial\alpha}+\frac{\phi_{12}(r_w,r_k)}{\phi_1(r_w,r_k)}\frac{\partial r_k}{\partial\alpha}-\frac{a_K K^{1-\alpha}\ln(K)+(1-a_K)L^{1-\alpha}\ln(L)}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\frac{\partial r_K}{\partial\alpha}\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}$$
$$-\omega\frac{\partial r_w}{\partial\alpha}\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}=-\ln(L)+\omega\alpha\frac{\partial r_w}{\partial\alpha}/L$$

Which is equivalent to

$$\frac{\partial r_k}{\partial\alpha}\left(\frac{\phi_{11}(r_k,r_w)}{\phi_1(r_k,r_w)}-\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\frac{\alpha}{K}\right)+\frac{\partial r_w}{\partial\alpha}\left(\frac{\phi_{12}(r_k,r_w)}{\phi_1(r_k,r_w)}-\omega\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}\right)$$
$$=\frac{a_K K^{1-\alpha}\ln(K)+(1-a_K)L^{1-\alpha}\ln(L)}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\ln(K)$$
$$\frac{\partial r_k}{\partial\alpha}\left(\frac{\phi_{12}(r_w,r_k)}{\phi_1(r_w,r_k)}-\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}\right)+\frac{\partial r_w}{\partial\alpha}\left(\frac{\phi_{11}(r_w,r_k)}{\phi_1(r_w,r_k)}-\omega\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\frac{\omega\alpha}{L}\right)$$
$$=\frac{a_K K^{1-\alpha}\ln(K)+(1-a_K)L^{1-\alpha}\ln(L)}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\ln(L)$$

From this, we can clear $\frac{\partial r_k}{\partial\alpha}$ and $\frac{\partial r_w}{\partial\alpha}$ which gives us the expression of the proposition.

Note that we can find a closed form expression for the partial derivatives:

$$\frac{\partial r_k}{\partial\alpha}=\frac{\begin{vmatrix}\frac{a_K K^{1-\alpha}\ln(K)+(1-a_K)L^{1-\alpha}\ln(L)}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\ln(K) & \frac{\phi_{12}(r_k,r_w)}{\phi_1(r_k,r_w)}-\omega\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}\\ \frac{a_K K^{1-\alpha}\ln(K)+(1-a_K)L^{1-\alpha}\ln(L)}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\ln(L) & \frac{\phi_{11}(r_w,r_k)}{\phi_1(r_w,r_k)}-\omega\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\frac{\omega\alpha}{L}\end{vmatrix}}{\begin{vmatrix}\frac{\phi_{11}(r_k,r_w)}{\phi_1(r_k,r_w)}-\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\frac{\alpha}{K} & \frac{\phi_{12}(r_k,r_w)}{\phi_1(r_k,r_w)}-\omega\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}\\ \frac{\phi_{12}(r_w,r_k)}{\phi_1(r_w,r_k)}-\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}} & \frac{\phi_{11}(r_w,r_k)}{\phi_1(r_w,r_k)}-\omega\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\frac{\omega\alpha}{L}\end{vmatrix}}$$

$$\frac{\partial r_w}{\partial\alpha}=\frac{\begin{vmatrix}\frac{\phi_{11}(r_k,r_w)}{\phi_1(r_k,r_w)}-\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\frac{\alpha}{K} & \frac{a_K K^{1-\alpha}\ln(K)+(1-a_K)L^{1-\alpha}\ln(L)}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\ln(K)\\ \frac{\phi_{12}(r_w,r_k)}{\phi_1(r_w,r_k)}-\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}} & \frac{a_K K^{1-\alpha}\ln(K)+(1-a_K)L^{1-\alpha}\ln(L)}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\ln(L)\end{vmatrix}}{\begin{vmatrix}\frac{\phi_{11}(r_k,r_w)}{\phi_1(r_k,r_w)}-\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\frac{\alpha}{K} & \frac{\phi_{12}(r_k,r_w)}{\phi_1(r_k,r_w)}-\omega\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}\\ \frac{\phi_{12}(r_w,r_k)}{\phi_1(r_w,r_k)}-\frac{(1-\alpha)a_K K^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}} & \frac{\phi_{11}(r_w,r_k)}{\phi_1(r_w,r_k)}-\omega\frac{(1-\alpha)(1-a_K)L^{-\alpha}}{a_K K^{1-\alpha}+(1-a_K)L^{1-\alpha}}-\frac{\omega\alpha}{L}\end{vmatrix}}$$

However without further modeling assumptions on $\phi$ the sign of the partial derivatives cannot be determine, such as for instance the ratio CSF: $\phi(r_w, r_k) = r_w/(r_w + r_k)$.

□

## B.1 Robustness

**Heterogeneous workers.** Assume each worker is characterized by a different opportunity cost of participating in politics $c_i \in [0,1]$, because they exhibit different underlying levels of productivity. For simplicity and tractability, I assume that for any two workers $i$ and $j$, $i < j$ implies $c_i < c_j$, hence

$$L = n - \omega \sum_{i=1}^{n} c_i r_i.$$

We say that skilled workers (i.e., high $c_i$) face a higher cost of political participation vis-á-vis un skilled workers (i.e., low $c_i$) because for the formers' net marginal return to workers is comparatively higher than that of political participation.

Proposition 4 below indicates that the more skilled the worker is the less likely it will have incentives to participate in rent-seeking. This occurs because the marginal return to workers is comparatively lower than that of political participation. The opposite occurs for less skilled workers. Since $c_i$ has similar implications as $\omega$ above, then as the average $c$ increases, the opportunity cost for participating in rent-seeking for the average worker also does, implying that as skilled workers benefit from automation this generates a wider gap in the levels of rent-seeking between skilled and unskilled labor, reducing redistribution.[B.1]

**Proposition 4.** *Let $(r,k)$ be an equilibrium of the heterogeneous-workers extension, then:*

- *There is at most one worker such that $r_i \in (0,1)$.*
- *There is a threshold $c^*$ such that $r_i = 0$ $(= 1)$ if and only if $c_i < c^*$ $(> c^*)$.*

*Proof.* To show the first bulletpoint of the proposition let's assume there are two workers $i$ and $j$ such that $r_i, r_j \in (0,1)$, this implies that their FOC is met with equality:

[B.1] Alternatively workers can be placed in a continuum of elasticities of substitution at the expense of tractability. However all the results herein would follow insofar as this function would still be continuous, concave and differentiable (Cahuc, Carcillo and Zylberberg, 2014).

$$\phi_1(r_w, r_k)(a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}) = c_i \omega a_L L^{-\alpha}$$
$$\phi_1(r_w, r_k)(a_K K^{1-\alpha} + (1-a_K)L^{1-\alpha}) = c_j \omega a_L L^{-\alpha},$$

which implies that $c_i = c_j$, which is a contradiction.

To prove the second bulletpoint of the proposition, it is enough to note that if $i^*$ is such that $U_i'(r_i^*; c_i) = 0$, and if $j$ is such that $c_j < c_{i*}$, then this implies that $U_{i*}' < U_j'$, and it cannot be the case that $r_j < 1$ otherwise since $0 = U_{i*}' < U_j'$, thus $j$ has incentives to deviate. □

**Collective action.** One of the most relevant problems for political activities from workers is overcoming collective action problems. These problems can be modeled using the Global Games literature, following the finite player case (Shin and Morris 2003, pp. 108): Assume each worker $i$ can choose between "participate" and "not participate" in politics, or $r_i = \{0, 1\}$ as before. All agents move simultaneously. As before, $r_w \equiv \sum_i r_i$ denotes the mass of agents mobilizing. However there is uncertainty about the level of political engagement among workers, $\theta > 0$.

Workers have a uniform common prior about $\theta > 0$ whereby worker $i$ observes a private signal $x_i = \theta + \sigma\varepsilon_i$, with precision $\sigma$, and where the noise terms $(\varepsilon_i)$ are identically and independently distributed with continuous density $f(\cdot)$, with support on the real line. Denote $l$ the proportion of workers different from $i$ that chose to participate; $l$ is distributed uniformly in $[0, 1]$. Thus for instance

$$L = n(1 - \omega l)$$

if $i$ does not participate.[B.2]

To analyze best responses it is enough to know the payoff gain from choosing one participating versus not doing so. Thus, the utility function is parameterized by

$$\pi_w(l, x, \cdot) = U(1, l, x, \cdot) \cdot F(\cdot) - U(0, l, \cdot) \cdot F(\cdot).$$

Next, let us impose five properties on the payoffs (Shin and Morris, 2003):

i) $\pi_w(l, x, \cdot)$ is nondecreasing in $l$.

ii) $\pi_w(l, x, \cdot)$ is nondecreasing in $\theta$

[B.2] $l$ will always be an element of the set $\{0, 1/(n-1), 2/(n-1), ..., 1\}$.

iii) There exists a unique $\theta^\star$ solving $\int_{l=0}^{1} \pi_w(l,x,\cdot)dl = 0$.

iv) There exist $\theta \in \Re$ and $\theta \in \Re$, such that (a) $\pi_w(l,x,\cdot) < 0$ for all $l \in [0,1]$ and $x \leq \theta$; and (b) $\pi_w(l,x,\cdot) > 0$ for all $l \in [0,1]$ and $x \geq \theta$

v) $\int_{l=0}^{1} g(l)\pi_w(l,x,\cdot)dl$ is continuous with respect to signal $x$ and density $g$.

The actions of the agents are strategic complements since it pays for a worker to participate if and only if a sufficiently large fraction of the workers participate. Hence

$$\pi_w = \begin{cases} \phi(0,l,x,\cdot)\cdot F(\cdot) & \text{if } x < \theta^\star \\ \phi(1,l,x,\cdot)\cdot F(\cdot) & \text{if } x \geq \theta^\star. \end{cases}$$

where $\theta^\star$ is defined as in property 3, above.

Proposition 5 summarizes the equilibrium.[B.3] Hence if uncertainty about political engagement decreases generally speaking, workers are more likely to participate in rent-seeking behavior.

**Proposition 5.** *Let $\theta^\star$ be defined as in property 3 above. The game herein has a unique (symmetric) switching strategy equilibrium, with $r(x) = 0$ for all $x < \theta^\star$ and $r(x) = 1$ for all $x \geq \theta^\star$.*

*Proof.* Assume there exists a unique $\theta_n^\star$ solving $\sum_{i=0}^{n-1}(1/n)\pi(i/(n-1),\theta_n^\star) = 0$; assume also the standard Monotone Likelihood Ratio Property: if $\bar{x} > \underline{x}$, then $f(x-\theta)/f(x-\theta)$ is increasing in $\theta$. Then if properties 1-5 above are satisfied Shin and Morris (2003), pp. 108, demonstrates that there is a unique and symmetric switching strategy equilibrium where $r(x) = 0$ for all $x < \theta^\star$ and $r(x) = 1$ for all $x \geq \theta^\star$. □

[B.3] Shin and Morris (2003) discuss other extensions following a set-up like the one used herein, such as the existence of public information, having heterogeneous players, and even dynamics pay-offs, showing that under sensible assumptions the results are robust to these extensions.

# C Simplified model

The model is similar to the main model described in Section 3. However, assume a representative worker. Let us denote $r_i \in [0, A_i]$ as the effort allocated by group $i$ to sway public policy in their favor, such that

$$L \leq A_w - \omega r_w$$

and

$$K \leq A_k - r_k,$$

where $\sum_i A_i = 1$.

The payoff for each group $i$ is given by

$$U_i = \phi(r_i, r_{-i}) \cdot F(L, K).$$

However, I use the standard ratio CSF to parameterize the political mechanism: $\phi(r_w, r_k) = \frac{r_w}{r_w + r_k}$; $F(\cdot)$ is a CES as before.

There is a unique pure-strategy Nash equilibrium, and it is characterized by the following system:

$$r_k \left[ a_L (A_w - \omega r_w)^{1-\alpha} + a_K (A_k - r_k)^{1-\alpha} \right] (A_w - \omega r_w)^{\alpha} = \omega a_L r_w (r_w + r_k), \tag{C.1}$$

$$r_w \left[ a_L (A_w - \omega r_w)^{1-\alpha} + a_K (A_k - r_k)^{1-\alpha} \right] (A_k - r_k)^{\alpha} = a_K r_k (r_w + r_k).. \tag{C.2}$$

This result emerges from applying theorems 1 and 2 in Skaperdas (1992) (e.g., propositions 2 and 1 herein).

We can divide equations (C.1) and (C.2) to obtain

$$\frac{r_w}{r_k} = \frac{\omega a_L}{a_K} \left( \frac{A_w - \omega r_w}{A_k - r_k} \right)^{\frac{\alpha}{2}},$$

which provides an endogenous relation between labor, capital and the relative political disadvantage of labor over capital. Furthermore, by Corollary 1 ,if $A_k > A_w$ then $r_k > r_w \iff A_k - r_k > A_w - r_w$.

Define the level of inequality as the index

$$G \doteq \frac{|U_k - U_w|}{F(L, K)} = \frac{\left| 1 - \frac{r_w}{r_k} \right|}{1 + \frac{r_w}{r_k}}.$$

If $A_k > A_w$, then it is straightforward to show that $\partial G/\partial(r_w/r_k) < 0$. Moreover, by Corollary 1, if the groups enter the political competition with unequal assets, then it follows that the wealthier individuals allocate more resources to both production and rent-seeking vis-á-vis the poorest and inequality increases in equilibrium: $\partial G/\partial A_k > 0$.

## C.1 Comparative statics

Assume $\omega = 1$ without loss of generality. To obtain comparative statics on the degree of complementarity $\alpha$, we take log on both sides of the first order conditions and differentiate with respect to $\alpha$ yielding the following system of equations

$$\frac{\frac{\partial r_k}{\partial \alpha}}{r_k} + \frac{F_L L_L + F_K L_K}{F_L + F_K} - (1-\alpha)\frac{F_L \frac{\frac{\partial r_w}{\partial \alpha}}{A_w - r_w} + F_L \frac{\frac{\partial r_k}{\partial \alpha}}{A_k - r_k}}{F_L + F_K} - L_L - \alpha \frac{\frac{\partial r_w}{\partial \alpha}}{A_w - r_w} = \frac{\frac{\partial r_w}{\partial \alpha}}{r_w} + \frac{\frac{\partial r_w}{\partial \alpha} + \frac{\partial r_k}{\partial \alpha}}{r_w + r_k},$$
$$\frac{\frac{\partial r_w}{\partial \alpha}}{r_w} + \frac{F_L L_L + F_K L_K}{F_L + F_K} - (1-\alpha)\frac{F_L \frac{\frac{\partial r_w}{\partial \alpha}}{A_w - r_w} + F_L \frac{\frac{\partial r_k}{\partial \alpha}}{A_k - r_k}}{F_L + F_K} - L_K - \alpha \frac{\frac{\partial r_k}{\partial \alpha}}{A_k - r_k} = \frac{\frac{\partial r_k}{\partial \alpha}}{r_k} + \frac{\frac{\partial r_w}{\partial \alpha} + \frac{\partial r_k}{\partial \alpha}}{r_w + r_k},$$

where

$$F_L = a_L (A_w - r_w)^{1-\alpha},$$
$$F_K = a_K (A_k - r_k)^{1-\alpha},$$
$$L_L = \log(A_w - r_w),$$
$$L_K = \log(A_k - r_k).$$

The previous system can be re-written as

$$\frac{\partial r_w}{\partial \alpha}\Delta_{L1} + \frac{\partial r_k}{\partial \alpha}\Delta_{K1} = \frac{F_K}{F_L + F_K}(L_K - L_L),$$
$$\frac{\partial r_w}{\partial \alpha}\Delta_{L2} + \frac{\partial r_k}{\partial \alpha}\Delta_{K2} = \frac{F_L}{F_L + F_K}(L_L - L_K),$$

where

$$\Delta_{L1} = \frac{1-\alpha}{A_L - r_w}\frac{F_L}{F_L+F_K} + \frac{1}{r_w+r_k} + \frac{1}{r_w} + \frac{\alpha}{A_L - r_w},$$
$$\Delta_{K1} = \frac{1-\alpha}{A_K - r_k}\frac{F_K}{F_L+F_K} + \frac{1}{r_w+r_k} - \frac{1}{r_k},$$
$$\Delta_{L2} = \frac{1-\alpha}{A_L - r_w}\frac{F_L}{F_L+F_K} + \frac{1}{r_w+r_k} - \frac{1}{r_w},$$
$$\Delta_{K2} = \frac{1-\alpha}{A_K - r_k}\frac{F_K}{F_L+F_K} + \frac{1}{r_w+r_k} + \frac{1}{r_k} + \frac{\alpha}{A_K - r_k}.$$

Then we computing the determinant of matrix $\Delta = \begin{pmatrix} \Delta_{L1} & \Delta_{K1} \\ \Delta_{L2} & \Delta_{K2} \end{pmatrix}$, thus

$$\begin{aligned} det\,(\Delta) = & \left(\frac{1-\alpha}{A_w - r_w}\frac{F_L}{F_L+F_K} + \frac{1}{r_w+r_k}\right)\left(\frac{2}{r_k} + \frac{\alpha}{A_k - r_k}\right) \\ & + \left(\frac{1-\alpha}{A_k - r_k}\frac{F_K}{F_L+F_K} + \frac{1}{r_w+r_k}\right)\left(\frac{2}{r_w} + \frac{\alpha}{A_w - r_w}\right) \\ & + \frac{\alpha^2}{(A_w - r_w)(A_k - r_k)} + \frac{\alpha}{r_w(A_k - r_k)} + \frac{\alpha}{r_k(A_w - r_w)} > 0. \end{aligned}$$

Finally, we solve the system of two variables-two equations and obtain the exact derivatives of rent seeking in equilibrium as the level of economic interdependence changes:

$$\frac{\partial r_w}{\partial \alpha} = (L_K - L_L)\left(\frac{1}{A_k - r_k}\frac{F_K}{F_L+F_K} + \frac{1}{r_w+r_k} + \frac{1}{r_k}\frac{F_K - F_L}{F_L+F_K}\right)/det(\Delta)$$
$$\frac{\partial r_k}{\partial \alpha} = (L_L - L_K)\left(\frac{1}{A_w - r_w}\frac{F_L}{F_L+F_K} + \frac{1}{r_w+r_k} + \frac{1}{r_w}\frac{F_L - F_K}{F_L+F_K}\right)/det(\Delta)$$

From this equations we have that if $a_K = a_L$ and $A_w \neq A_k$ then (without loss of generality) $A_w - r_w^* < A_k - r_k^*$ which implies $F_K > F_L$ and $L_K > L_L$, and thus $\frac{\partial r_w^*}{\partial \alpha} < 0$. The proof for the statement $\frac{\partial r_k^*}{\partial \alpha} > 0$ is done computationally, for the case where $a_L = \frac{1}{2}$.

Now, taking log at both sides of both FOC and derivatives with respect to $a_K$ yields

$$\frac{\frac{\partial r_k}{\partial a_K}}{r_k} + \frac{-(A_w - r_w)^{1-\alpha} - a_L(A_w - r_w)^{-\alpha}(1-\alpha)\frac{\partial r_w}{\partial a_K} + (A_k - r_k)^{1-\alpha} - a_K(A_k - r_k)^{-\alpha}(1-\alpha)\frac{\partial r_k}{\partial a_K}}{a_L(A_w - r_w)^{1-\alpha} + a_K(A_k - r_k)^{1-\alpha}} - \alpha\frac{\frac{\partial r_w}{\partial a_K}}{A_w - r_w}$$
$$= -\frac{1}{a_L} + \frac{\frac{\partial r_w}{\partial a_K}}{r_w} + \frac{\frac{\partial r_w}{\partial a_K} + \frac{\partial r_k}{\partial a_K}}{r_w + r_k},$$

$$\frac{\frac{\partial r_w}{\partial a_K}}{r_w} + \frac{-(A_w-r_w)^{1-\alpha} - a_L(A_w-r_w)^{-\alpha}(1-\alpha)\frac{\partial r_w}{\partial a_K} + (A_k-r_k)^{1-\alpha} - a_K(A_k-r_k)^{-\alpha}(1-\alpha)\frac{\partial r_k}{\partial a_K}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{1-\alpha}} - \alpha\frac{\frac{\partial r_k}{\partial a_K}}{A_k-r_k}$$

$$= \frac{1}{a_K} + \frac{\frac{\partial r_k}{\partial a_K}}{r_k} + \frac{\frac{\partial r_w}{\partial a_K}+\frac{\partial r_k}{\partial a_K}}{r_w+r_k};$$

which yields in turn

$$\frac{\partial r_w}{\partial a_K}\Lambda_{w1} + \frac{\partial r_k}{\partial a_K}\Lambda_{k1} = \frac{1}{a_L}\frac{(A_k-r_k)^{1-\alpha}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{1-\alpha}}$$
$$\frac{\partial r_w}{\partial a_K}\Lambda_{w2} + \frac{\partial r_k}{\partial a_K}\Lambda_{k2} = -\frac{1}{a_K}\frac{(A_w-r_w)^{1-\alpha}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{\alpha}}$$

where

$$\Lambda_{w1} = (1-\alpha)\frac{a_L(A_w-r_w)^{-\alpha}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{1-\alpha}} + \frac{1}{r_k+r_w} + \frac{1}{r_w} + \frac{\alpha}{A_w-r_w}$$
$$\Lambda_{k1} = (1-\alpha)\frac{a_K(A_k-r_k)^{-\alpha}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{1-\alpha}} + \frac{1}{r_w+r_k} - \frac{1}{r_k}$$
$$\Lambda_{w2} = (1-\alpha)\frac{a_L(A_w-r_w)^{-\alpha}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{1-\alpha}} + \frac{1}{r_w+r_k} - \frac{1}{r_w}$$
$$\Lambda_{k2} = (1-\alpha)\frac{a_K(A_k-r_k)^{-\alpha}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{1-\alpha}} + \frac{1}{r_k+r_w} + \frac{1}{r_k} + \frac{\alpha}{A_k-r_k}.$$

Then

$$\frac{\partial r_w}{\partial a_K} = \left[\left(\frac{(A_k-r_k)^{1-\alpha}-(A_w-r_w)^{1-\alpha}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{1-\alpha}}\right)\left(\frac{2}{r_k}+\frac{\alpha}{A_k-r_k}\right) + \frac{\Lambda_{k1}}{a_K} + \frac{\Lambda_{k2}}{a_L}\right]/det(\Lambda) > 0$$
$$\frac{\partial r_k}{\partial a_K} = \left[\left(\frac{(A_k-r_k)^{1-\alpha}-(A_w-r_w)^{1-\alpha}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{1-\alpha}}\right)\left(\frac{2}{r_w}+\frac{\alpha}{A_w-r_w}\right) - \left(\frac{\Lambda_{w1}}{a_K} + \frac{\Lambda_{w2}}{a_L}\right)\right]/det(\Lambda),$$

and finally

$$\frac{\partial r_w}{\partial a_L} = -\left[\left(\frac{(A_k-r_k)^{1-\alpha}-(A_w-r_w)^{1-\alpha}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{1-\alpha}}\right)\left(\frac{2}{r_k}+\frac{\alpha}{A_k-r_k}\right) + \frac{\Lambda_{k1}}{a_K} + \frac{\Lambda_{k2}}{a_L}\right]/det(\Lambda) < 0$$
$$\frac{\partial r_k}{\partial a_L} = -\left[\left(\frac{(A_k-r_k)^{1-\alpha}-(A_w-r_w)^{1-\alpha}}{a_L(A_w-r_w)^{1-\alpha}+a_K(A_k-r_k)^{1-\alpha}}\right)\left(\frac{2}{r_w}+\frac{\alpha}{A_w-r_w}\right) - \left(\frac{\Lambda_{w1}}{a_K} + \frac{\Lambda_{w2}}{a_L}\right)\right]/det(\Lambda)$$

If $\alpha$ rises we observe *ceteris paribus* an increase in the marginal productivity of both groups, so intuitively we may think that this would push both groups to reduce their rent-seeking effort, but this would directly increase the size of the pie and thus provide strategic incentives for both groups to increase their rent-seeking effort. It is then not straightforward to determine a priori what effect dominates. On the other hand, when technological change is non-neutral (i.e., $a_K$ changes), it is hard to determine the direction of the effect on labor's marginal productivity because the latter depends on the values of the other parameters.[C.1] Then it follows that

$$\frac{\partial r_w}{\partial \alpha} < 0,$$
$$\frac{\partial r_k}{\partial \alpha} > 0,$$
$$\frac{\partial r_w}{\partial a_L} < 0,$$

and thus we obtain that

$$\frac{\partial G}{\partial \alpha} > 0.$$

[C.1] The rate of change of the marginal productivities in terms of $a_L$ are the following:

$$\frac{\partial^2 F}{\partial a_L \partial L} = \frac{\partial F}{\partial L} \cdot \left( \frac{1}{a_L} - \frac{K^{1-\alpha} - L^{1-\alpha}}{a_L \cdot L^{1-\alpha} + (1-a_L) \cdot K^{1-\alpha}} \cdot \frac{\alpha}{1-\alpha} \right),$$
$$\frac{\partial^2 F}{\partial a_L \partial K} = -\frac{\partial F}{\partial K} \cdot \left( \frac{1}{1-a_L} + \frac{K^{1-\alpha} - L^{1-\alpha}}{a_L \cdot L^{1-\alpha} + (1-a_L) \cdot K^{1-\alpha}} \cdot \frac{\alpha}{1-\alpha} \right) < 0.$$

From previous equations it is straightforward to see that if $K > L$, the marginal productivity of capital decreases with $a_L$, but the direction of the effect on the marginal productivity of labor is not the same for any combinations of parameters, in fact it will be positive if and only if $K^{1-\alpha} \cdot \frac{a_L - (1-\alpha)}{a_L} < L^{1-\alpha}$. Further notice that:

$$\varepsilon_{L,K} \equiv \frac{\partial F(L,K)/\partial L}{\partial F(L,K)/\partial K} \cdot \frac{L}{K} = \frac{a_L}{a_K} \cdot \left( \frac{L}{K} \right)^{1-\alpha}.$$

Hence $\partial \varepsilon_{L,K}/\partial \alpha < 0$ if $L > K$ and $\partial \varepsilon_{L,K}/\partial \alpha > 0$ if $K > L$, but in equilibrium $L/K < 1$ by Corollary 1.