Organizational Belief, Managerial Vision, and International Trade

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Abstract

In this paper, we develop a simple general-equilibrium trade model in which heterogeneous workers make an investment decision in acquiring advanced managerial skills and choose their optimal effort level based on their own individual organizational beliefs and CEO's managerial vision. In doing so, we show how trade liberalization and/or changes in managerial vision of CEO may lead to non-monotonic income changes within firms due to the interaction between workers' beliefs and CEO's managerial vision. Whether a stronger (or weaker) CEO's managerial vision benefits the firm or not depends on its extent relative to workers' overall beliefs, and may involve some winners and losers within firms.

Keywords: Organizational belief, Managerial vision, Organizational change, International trade.
JEL codes: F16, F66.

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1 Introduction

Why some firms engage in international trade while the others focus only on domestic market, and the impacts of trade liberalization (or more broadly, globalization) when firms differ have long been one of the main concerns of trade economists. Addressing these issues, recent firm heterogeneity literature in international trade discovered many systematic links between the characteristics of firms and their degree of internationalization. In particular, it is now widely documented that exporting firms are more productive than non-exporters and/or that more productive firms self-select into export markets (see e.g. Clerides et al., 1998; Bernard and Jensen, 1999). Consequently, on the theoretical side such selection effects of trade have largely been modeled and examined by incorporating exogenously given firm-level productivity differences (see Melitz, 2003). Another branch of modeling firm heterogeneity is to assume exogenously given worker-level ability differences and consider firms' endogenous technological choice together with employment decisions (see e.g. Yeaple, 2005; Jung and Mercenier, 2014). Some other papers model a continuum of tasks instead of a continuum of heterogeneous worker skills (see e.g. Grossman and Rossi-Hansberg, 2008; Acemoglu and Autor, 2011). Costinot and Vogel (2010) generalize this by assuming log-supermodularity between continuum of worker skills and continuum of tasks.

Though many important new insights have been gained at the aggregate level, all these approaches are, however, limited in studying intra-firm managerial mechanisms and the resulting strategic direction and performance of firms. It has been extensively discussed in the management literature that the interaction between CEO's managerial vision and employees' organizational beliefs has a considerable influence to form a corporate culture, and thus has important implications for the firm's behavior and performance: see, for instance, Schein (2004) and references therein. Though the economic literature has largely neglected these issues, some exceptions are found. By formally modeling CEO's leadership style and/or vision, Rotemberg and Sloner (1993, 2000) show that managerial preferences have an important effect on firm performance through encouraging incentives. Van den Steen (2005, 2010a,b) focuses on the sorting effect induced by managerial beliefs and shows that a firm attracts employees having similar beliefs to that of its manager and the shared beliefs have very pervasive performance effects for the firm. Also some papers study how managerial characteristics can be determinant of firm boundaries (see e.g.

Hart and Holmstrom, 2010), or investigate how competition fosters commitment of firms by interacting with leadership styles (see e.g. Ferreira and Kittsteiner, 2016). While the important implications of organizational belief and managerial vision on firm strategy and performance have been widely documented in the management literature during the last decades and some pioneering papers dealt with these implications in economics context, much less attention has been devoted to studying such implications in the international trade context.

In this paper, we make a first attempt in the literature (at my best knowledge) to bridge the gap. We develop a simple general-equilibrium trade model in which heterogeneous employees make an investment decision in acquiring advanced managerial skills and choose their optimal effort level based on their own individual organizational beliefs and CEO's managerial vision. Firms are free to enter the market and choose whether or not to enter the export market according to CEO's managerial vision. The key element of the model is the interaction between workers' organizational beliefs and CEO's managerial vision concerning two market strategies: localization vs. internationalization. Since similar beliefs lead to higher productivity as well as obtaining managerial skills requires learning costs, workers endogenously sort into CEOs and tasks (production vs. management). Finally, workers with high beliefs on internationalization self-select to work as managers in exporting firms, while those with high beliefs on localization self-select to work as managers in domestic firms. The middling workers having relatively indifferent beliefs on both strategies self-select to work as production workers without making any investment to obtain managerial skills. By modeling explicitly the optimal effort level decision of individual workers based on their own beliefs and CEO's managerial vision, the model therefore highlights a new source of productivity effects from trade and changes in CEO's managerial vision which could not be captured by previous models in the firm heterogeneity literature where the productivity effect comes mainly from the self-selection (reassignment) of firms (or workers) with exogenously given productivity (or ability) differences.

Given this setup, we first investigate the effects of trade liberalization due to a fall in marginal trade cost. Since the externality between workers' organizational beliefs and CEO's managerial vision is the key element of the model, two versions of the model are explored: *i)* workers' productivity monotonically rises in both workers' organizational beliefs and CEO's managerial vision, and *ii)* CEO has an overall stronger belief than em-

ployees but his/her belief lies within the range of workers' beliefs so that the similarity of beliefs matters more. In both of the cases, trade liberalization increases the optimal effort level of exporting-firm managerial workers while decreases that of domestic-firm managerial workers, which in turn results in a rise of within-exporting-firm income inequality and a compression of it within domestic firms. On the other hand, in the former case it is the worker having the highest internationalization (localization) belief whose income increases (decreases) the most, while in the latter case it is the worker having the same belief as that of CEO whose income is affected the most (a rise in exporting firms and a fall in domestic firms, respectively).

We then investigate the impact of changes in managerial vision for both cases. Here, the two versions of the model lead to significantly different results. In the first case, a rise of managerial vision in exporting firms yields similar effects as trade liberalization, which favors in general exporters. Optimal effort level of exporting-firm managerial workers rises while that of domestic-firm managerial workers decreases, which in turn results in a rise of within-exporting-firm income inequality and a compression of it within domestic firms. A rise of managerial vision in domestic firms yields just the inverse effects. On the other hand, in the second case the income implications are more complex. When CEOs are visionary in the sense that CEOs have beliefs at least stronger than the median belief of inside managers, a further rise of managerial vision in exporting firms favors domestic firms since CEO's belief gets even far from overall beliefs of employees. This may involve some winners and losers within exporting firms since some workers with initially stronger beliefs than that of CEO now get closer to CEO's managerial vision, while some others get far from it. Also interestingly, a rise of managerial vision in exporting firms increases the income of domestic-firm managerial workers. Similarly, a fall in managerial vision in domestic firms favors domestic firms since CEO's managerial vision now gets closer to overall beliefs of employees. Thus, whether a stronger (or weaker) CEO's managerial vision benefits the firm or not depends on its extent relative to within-firm workers' overall beliefs, and may involve some winners and losers within the same firm.

The rest of the paper is organized as follows. In Section 2, we present the basic setup of the model where workers' productivity monotonically rises in both workers' organizational beliefs and CEO's managerial vision. In Section 3 and 4, we study the effects of trade liberalization and changes in managerial vision in this case. In Section 5, we extend the basic model to incorporate more explicitly externalities from the similar CEO's managerial

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vision and workers' organizational beliefs, and investigate the effects of trade liberalization and changes in managerial vision in this case. Section 6 concludes with some concluding remarks.

2 Setup of the model

We consider two symmetric countries. Each country is populated by a unit mass continuum of workers (households), indexed by z. The distribution is given by $G(z)$ with density $g(z)$ on support $[0, 1]$. For simplicity of analysis, we assume a uniform distribution. All workers are endowed with one unit of raw input R. Each worker either provides R or can make investments to gain managerial skills, M.[1] There are two types of managerial skills to be obtained for two types of strategies, $s \in \{D, E\}$: localization (domestic) strategy-specific M_D or internationalization (exporting) strategy-specific M_E.

2.1 Organizational belief and managerial vision

One key element of the model is the uncertainty about the market demand of the two types of M_s, $s \in \{D, E\}$. All workers have their own subjective belief about the likelihood of each strategy dominance in the market (and/or in the organization they work for). Workers' beliefs differ, but are common knowledge. We align workers according to their belief from high D-strategy belief to high E-strategy belief: a worker z believes that with probability z the dominant overall market (and/or organization he/she works for) strategy is E, while believes with probability $(1 - z)$ D is dominant; a worker with $z = 1/2$ has the same belief in both states, and is thus indifferent to both strategies.[2]

We now consider managerial vision of CEOs (or entrepreneurs). A vision is defined as a strong belief of CEO about the right course of action for the firm. A CEO is visionary when his/her belief is at least stronger than the median (reference) belief of

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[1] R can also be viewed as time of workers, which can be used either to work as production worker or to invest to obtain managerial skills.

[2] This mirror-characteristic linear belief schedule is adopted for simplification reason. Any more general functional forms, however, can of course be adopted. Though common in the management literature, the workers' belief z might also be viewed as individual productivity of workers for a specific strategy since individual belief would finally materialize as individual productivity that we observe. Note, however, that differently from the conventional models in the firm heterogeneity literature in international trade this paper focuses on the horizontal differentiation of workers (beliefs) rather than vertical differentiation of workers (productivities). As a result, as will be shown below it is possible in the model that some workers in domestic firms have higher wages than some workers in exporting firms although on average exporting firms may pay higher wages.

his/her managerial team. There are two types of CEOs with different managerial visions v_s, $s \in \{D, E\}$: a CEO with $v = v_s$ has a strong belief to pursue s-strategy, $s \in \{D, E\}$.[3] The output of a M-worker with organizational belief z depends on his/her own effort level e_z for both strategies and the CEO's managerial vision:[4]

$$q_z^s = \varphi_z^s e_z^s, \quad s \in \{D, E\}, \tag{1}$$

where φ_z^s is a function of z and v_s, a productivity factor that converts individual effort into respective output of M_D or M_E. We assume positive externalities between a worker's organizational belief z and CEO's managerial vision v in a sense that the closer between z and v is, the more productive the worker is.[5] In order to highlight the main mechanisms through which workers' organizational beliefs and CEO's managerial vision interact, in this section we begin by considering a simpler version of the model in which φ_z^s is linear in z and v_s, $s \in \{D, E\}$. Specifically, we assume that:

$$\varphi_z^D = 1 + v_D(1 - z), \quad \text{and} \quad \varphi_z^E = 1 + v_E z. \tag{2}$$

Eq. (2) implicitly implies that CEO's managerial vision is stronger enough than any worker's belief in each managerial team, so that φ_z^D and φ_z^E monotonically increase in $(1 - z)$ and z, respectively, and that even stronger managerial vision only affects positively workers' productivity. This will be relaxed later.

Learning managerial skills requires each strategy-specific individual investments c_s, $s \in \{D, E\}$, measured in terms of individual's forgone output. We assume that $c_D < c_E$. Workers derive utility from net income, and disutility from exerting effort. The utility function is given by:

$$u_z^s = w_s \left(q_z^s - c_s\right) - \gamma \left(e_z^s\right)^2, \quad s \in \{D, E\}, \tag{3}$$

where w_s is respective measured-in-efficiency-units wage rate for $s \in \{D, E\}$, and $\gamma > 0$

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[3] Assuming that there is an infinite potential supply of CEOs with two different types, in this paper we focus on the worker-side heterogeneity.

[4] Various interpretations might be applicable to the M-workers. One natural interpretation would be middle mangers who carry out the strategic directives of CEO at the operational level and supervise the production R-workers. In the paper we refer to them as managerial workers or simply managers in contrast to CEO and production workers.

[5] It is widely documented that similar beliefs between manager and employees (shared beliefs) have considerable influences for corporate culture and to enhance firm performance: see e.g. Van den Steen (2010a,b) and references therein.

is a parameter that governs disutility from exerting effort. A utility-maximizing worker z determines his/her optimal level of effort for a given wage rate. From Eqs. (1), (2) and (3), optimal effort level of a worker z is given by:

$$e_z^{Opt} = \begin{cases} \frac{w_D[1+v_D(1-z)]}{2\gamma} & \text{if } s = D \\ \frac{w_E[1+v_E z]}{2\gamma} & \text{if } s = E. \end{cases} \tag{4}$$

Given this individual optimal level of effort and from Eqs. (1) and (2), the output of a worker z is then given by:

$$q_z^{Opt} = \begin{cases} \frac{w_D[1+v_D(1-z)]^2}{2\gamma} & \text{if } s = D \\ \frac{w_E[1+v_E z]^2}{2\gamma} & \text{if } s = E. \end{cases} \tag{5}$$

Note from above that e_z^{Opt} and q_z^{Opt} increase in respective wage rate and managerial vision, while decrease in γ.

2.2 Production

There is a continuum of firms, each producing a differentiated variety i using a Leontief technology. Production of any variety requires combining two inputs, α_R units of R and α_M units of M or equivalently, α_R efficiency units of production workers and α_M efficiency units of non-production managerial workers:[6]

$$x(i) = \min\left(\frac{R(i)}{\alpha_R}, \frac{M(i)}{\alpha_M}\right). \tag{6}$$

Firms are free to enter the market and choose whether or not to engage in international trade according to CEO's managerial vision.[7] Adopting either strategy incurs strategy-specific fixed costs f_s, $s \in \{D, E\}$, measured in terms of firms' foregone output.[8] We assume that $f_D < f_E$.

Firms are atomistic profit-maximizers and produce goods under monopolistic compe-

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[6]These two inputs can also be viewed as blue-collar tasks and white-collar tasks which are not substitutable in general. Introducing some substitutability between the two inputs is straightforward, but that would only complicates the analysis with no additional insight gained.

[7]Why CEOs have different vision is out of the scope of this paper, but it is widely documented that firm policies and/or strategies systematically depend on the identity of the CEO. See e.g. Bertrand and Schoar (2003).

[8]Given that in what follows we focus on wage distribution due to individual employees' self-selection and do not model explicitly the earnings of CEOs, these fixed costs can also be viewed as including the payments to CEOs.

tition, so that firms charge a constant mark-up over marginal production costs. From the Leontief technology (6), prices are given by:

$$p_s = \frac{\sigma}{\sigma - 1} \left(\alpha_R w + \alpha_M w_s \right), \quad s \in \{D, E\}, \tag{7}$$

where w and w_s, $s \in \{D, E\}$, are unit production costs of each input (or task-specific efficiency wage rates).

2.3 Self-selection of workers

Assuming in what follows that both firm types, D (domestic) and E (exporting), exist in equilibrium, workers will sort based on their respective organization belief z. Let z_1, z_2 and z_3 be equilibrium thresholds with $0 < z_1 < z_2 < z_3 < 1$. Then from Eqs. (1) and (2), workers with low z, $z \in [0, z_1]$, would self-select to develop and provide D-specific managerial inputs (M_D), whereas workers with high z, $z \in [z_3, 1]$, would self-select to develop and provide E-specific managerial inputs (M_E). The middling workers, $z \in [z_1, z_3]$, are relatively indifferent to both strategies, and thus provide their inherently endowed raw inputs R without making any investment to obtain managerial skills. Assuming further that workers with relatively similar beliefs work together, workers with $z \in [z_1, z_2]$ provide R in domestic firms, while workers with $z \in [z_2, z_3]$ provide R in exporting firms.[9]

From Eq. (5), competitive wage of a worker z net of any learning costs c_s is therefore given by:

$$w(z) = \begin{cases} w_D \left[\frac{w_D [1 + v_D(1-z)]^2}{2\gamma} - c_D \right] & 0 \leq z \leq z_1 \\ w & z_1 \leq z \leq z_3 \\ w_E \left[\frac{w_E [1 + v_E z]^2}{2\gamma} - c_E \right] & z_3 \leq z \leq 1, \end{cases} \tag{8}$$

where we choose w as our numeraire: $w = 1$.

In a perfectly competitive labor market, no-arbitrage conditions for the threshold workers lead to:

$$w_D \left[\frac{w_D \left[1 + v_D \left(1 - z_1 \right) \right]^2}{2\gamma} - c_D \right] = 1, \quad \text{and} \tag{9}$$

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[9] Given that all the workers with $z \in [z_1, z_3]$ offer homogeneous R, this distinction has no effect on the main results of the paper. But it serves for the boundary between the two firm-types as well as corresponds to the widely documented corporate culture literature in the management.

$$w_E \left[\frac{w_E \left[1 + v_E z_3 \right]^2}{2\gamma} - c_E \right] = 1, \tag{10}$$

which implicitly pin down z_1 and z_3 as a function of w_D and w_E, respectively, and vice versa. Investigating Eqs. (9) and (10) leads immediately to following lemma.[10]

Lemma 1 *A rise (fall) in w_D increases (decreases) the threshold z_1, while a rise (fall) in w_E decreases (increases) the threshold z_3: $\frac{dz_1}{dw_D} > 0$ and $\frac{dz_3}{dw_E} < 0$.*

Intuitively, higher managerial wages attract more workers to invest and develop managerial skills rather than simply offering their inherently endowed R.

Following Figure 1 illustrates the equilibrium individual wage distribution for different organizational beliefs.
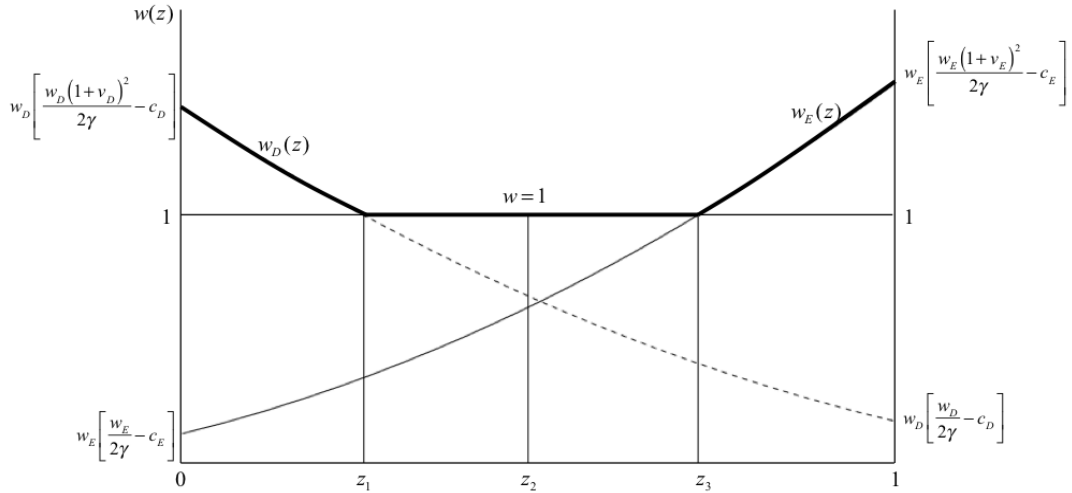

Figure 1: The equilibrium individual wage distribution

As the figure shows, workers with high z (high E-belief) get paid the most when they work for exporting firms as managerial workers, while workers with low z (high D-belief) get paid the most when they work for domestic firms as managerial workers. The middling workers having relatively indifferent beliefs get the highest wage when they work as production workers without making any investment to be a manager. Finally,

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[10] Totally differentiating Eq. (9) and using Eq. (9), we get $\frac{dz_1}{dw_D} = \frac{\gamma(2 + c_D w_D)}{v_D w_D^3 [1 + v_D(1 - z_1)]} > 0$. Similarly, totally differentiating Eq. (10), we get $\frac{dz_3}{dw_E} = -\frac{\gamma(2 + c_E w_E)}{v_E w_E^3 (1 + v_E z_3)} < 0$.

the outer bold curve in Figure 1 represents the equilibrium individual wage distribution resulting from self-selection of workers based on their individual organizational beliefs.[11]

2.4 Demand

Households have Dixit-Stiglitz preferences over a continuum of differentiated varieties:

$$C = \left[\int_{i \in N} x(i)^{\frac{\sigma-1}{\sigma}} di \right]^{\frac{\sigma}{\sigma-1}}, \tag{11}$$

where N represents the mass of available varieties, and $\sigma > 1$ is the elasticity of substitution between varieties. Consumer's optimization yields demand schedule for each variety:

$$x(i) = \left[\frac{P_C}{p(i)} \right]^{\sigma} C, \tag{12}$$

associated with an aggregate price index:

$$P_C = \left[\int_{i \in N} p(i)^{1-\sigma} di \right]^{\frac{1}{1-\sigma}}. \tag{13}$$

We assume that exporting goods is associated with iceberg trade costs $\tau > 1$ per unit. The domestic demands for domestically produced and imported goods are then given respectively by:

$$x_s^d = \left[\frac{P_C}{p_s} \right]^{\sigma} C, \quad s \in \{D, E\}, \quad \text{and} \quad x_m^d = \tau^{1-\sigma} \left[\frac{P_C}{p_E^*} \right]^{\sigma} C, \tag{14}$$

where p_E^* denotes foreign exporters price.[12]

The aggregate consumption price index (13) can be written as:

$$P_C = \left[N_D p_D^{1-\sigma} + N_E p_E^{1-\sigma} + N_E^* (\tau p_E^*)^{1-\sigma} \right]^{\frac{1}{1-\sigma}}, \tag{15}$$

where N_D, N_E and N_E^* denote the number of domestic, exporting and foreign exporting firms, respectively, and $N_E = N_E^*$ and $p_E = p_E^*$ from the symmetry.

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[11]Note that in each firm-type (domestic or exporting), firms are identical so that the same number of workers for each belief level is employed: each domestic (exporting) firm employs all the workers with $z \in [0, z_2]$ ($z \in [z_2, 1]$), respectively. Why do firms employ all the workers with different belief levels rather than employ some specific belief-level workers given that all of them offer homogeneous R or M? Though current paper does not model it explicitly, it can be easily justified by the externalities from diversity.

[12]In what follows, we use an asterisk to denote foreign variables.

2.5   Equilibrium

From previously defined z_1, z_2 and z_3, the total supply of R_s, $s \in \{D, E\}$, is given by:

$$R_D = \int_{z_1}^{z_2} 1 g(z) dz, \quad \text{and} \quad R_E = \int_{z_2}^{z_3} 1 g(z) dz, \tag{16}$$

which also can be written simply as $R_D = z_2 - z_1$ and $R_E = z_3 - z_2$ from our uniform distribution assumption. The total supply of M_s, $s \in \{D, E\}$, is given respectively by:

$$\begin{aligned} M_D &= \int_0^{z_1} \left[\frac{w_D[1+v_D(1-z)]^2}{2\gamma} - c_D \right] g(z) dz, \\ M_E &= \int_{z_3}^1 \left[\frac{w_E[1+v_E z]^2}{2\gamma} - c_E \right] g(z) dz. \end{aligned} \tag{17}$$

From the technology (6) and Eqs. (16) and (17), it follows then that:

$$\frac{1}{\alpha_R} \int_{z_1}^{z_2} 1 g(z) dz = \frac{1}{\alpha_M} \int_0^{z_1} \left[\frac{w_D \left[1 + v_D \left(1 - z \right) \right]^2}{2\gamma} - c_D \right] g(z) dz, \tag{18}$$

$$\frac{1}{\alpha_R} \int_{z_2}^{z_3} 1 g(z) dz = \frac{1}{\alpha_M} \int_{z_3}^1 \left[\frac{w_E \left[1 + v_E z \right]^2}{2\gamma} - c_E \right] g(z) dz. \tag{19}$$

Free entry ensures zero profits for both firm types, so that mark-up revenues exactly cover the fixed costs (forgone outputs):

$$\frac{1}{\sigma} p_s x_s = (\alpha_R w + \alpha_M w_s) f_s, \quad s \in \{D, E\}, \tag{20}$$

where $x_D = x_D^d$ and $x_E = x_E^d + x_m^{d*}$. Now consider the revenue ratio between domestic firms and exporters. From (7), (14) and (20), we have:

$$\left[\frac{\alpha_R w + \alpha_M w_E}{\alpha_R w + \alpha_M w_D} \right] = \left[\frac{f_E}{(1 + \tau^{1-\sigma}) f_D} \right]^{-\frac{1}{\sigma}}. \tag{21}$$

Here from the assumption that domestic firms serve only domestic market (or equivalently, domestic firms exist in equilibrium), it can be easily derived that $w_E < w_D$, implying that $p_E < p_D$.[13] Given the presence of both fixed cost to exporting and iceberg trade

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[13]Suppose potential revenue of D-firms, y_D^*, if they would engage in international trade too after paying the fixed cost to exporting f_E. The fact that domestic firms serve only domestic market implies that the potential mark-up revenue from exporting does not cover the necessary fixed costs: $\frac{1}{\sigma} y_D^* < (\alpha_R w + \alpha_M w_D) f_E$. Now consider the revenue ratio between exporting E-firms and these potential D-firms. From Eqs. (7), (14) and (20), and now by substituting $x_D^* = x_D^d + x_{m,D}^{d*}$ and f_E for x_D and f_D, respectively, we get $\frac{\sigma y_E}{\sigma y_D^*} = \left(\frac{\alpha_R w + \alpha_M w_E}{\alpha_R w + \alpha_M w_D} \right)^{1-\sigma}$, while the fixed cost ratio is given by $\frac{(\alpha_R w + \alpha_M w_E) f_E}{(\alpha_R w + \alpha_M w_D) f_E}$. Now

cost, entering the export market requires to offer their products at cheaper prices than their local competitors to be profitable. Also, from our characterization of fixed costs as foregone output and from the technology (6), we have the following equilibrium condition:

$$\frac{1}{\alpha_M} M_s = (x_s + f_s) N_s, \quad s \in \{D, E\}. \tag{22}$$

Finally, aggregate income follows from factor supplies and prices:

$$Inc = w(R_D + R_E) + w_D M_D + w_E M_E. \tag{23}$$

To sum up, in this model the equilibrium is characterized by five key variables – z_1, z_2, z_3, w_D and w_E –, which are determined by five equations (9), (10), (18), (19) and (21). In the following sections, we therefore focus on how these variables are affected by parameter changes in τ, v_E and v_D.

3 Trade liberalization

In this section we investigate the impacts of trade liberalization. For this, we begin by studying possible relations between the thresholds (z_1, z_2 and z_3) and w_s, $s \in \{D, E\}$. It can be done by investigating Eqs. (18) and (19). Consider now a rise in z_1. From Lemma 1 ($dz_1/dw_D > 0$), this increases RHS of Eq. (18) unambiguously, which in turn induces a rise in z_2 due to a rise in demand for R in domestic firms. This rise in z_2 decreases LHS of (19) for a given z_3. Then from Lemma 1 ($dz_3/dw_E < 0$) again, it is straightforward to check that a rise in z_3 is the only possibility to recover the equilibrium condition (19). A fall in z_1 induces inverse effects from the same reasoning. The following lemma establishes.

Lemma 2 z_1, z_2 and z_3 move in the same direction. And if z_1, z_2 and z_3 increase, w_D rises and w_E falls, while if z_1, z_2 and z_3 decrease, w_D falls and w_E rises.

We now consider trade liberalization. Trade liberalization can occur either from a fall in τ or from a fall in fixed costs to exporting f_E, both of which induce very similar

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we have $\left(\frac{\alpha_R w + \alpha_M w_E}{\alpha_R w + \alpha_M w_D}\right)^{1-\sigma} > \frac{(\alpha_R w + \alpha_M w_E) f_E}{(\alpha_R w + \alpha_M w_D) f_E}$ since $\frac{1}{\sigma} y_D^* < (\alpha_R w + \alpha_M w_D) f_E$. Arranging this leads to $\frac{\alpha_R w + \alpha_M w_E}{\alpha_R w + \alpha_M w_D} < 1$, which implies that $w_E < w_D$ and $p_E < p_D$. Note, however, that this does not imply that workers in exporting firms get paid lower wages. For the main results of the model, here we do not need to derive explicit conditions for $w_E(z') > w_D(z'')$, where worker z' has a high E-belief while worker z'' has a high D-belief.

qualitative effects from Eq. (21).[14] Let us consider a fall in τ. This increases RHS of Eq. (21) unambiguously, which in turn induces a rise in w_E/w_D to recover the equilibrium. Then, from Eq. (21) and Lemma 2, following proposition establishes immediately.

Proposition 1 *A fall in τ induces a fall in w_D and a rise in w_E, and z_1, z_2 and z_3 decrease.*

From Proposition 1 and Eqs. (4) and (5), following corollaries follow then immediately.

Corollary 1 *A fall in τ increases the optimal effort level of exporting-firm managerial workers, while decreases that of domestic-firm managerial workers. Consequently, exporting firms' overall productivity increases, while that of domestic firms decreases.*

Corollary 2 *A fall in τ increases between-firm relative managerial incomes in favor of exporting firms; decreases within-firm income inequality in domestic firms, while increases it in exporting firms: $d\left(\frac{w_E}{w}\right)/d\tau < 0$, $d\left(\frac{w_D}{w}\right)/d\tau > 0$, and $d\left(\frac{w_E}{w_D}\right)/d\tau < 0$.*

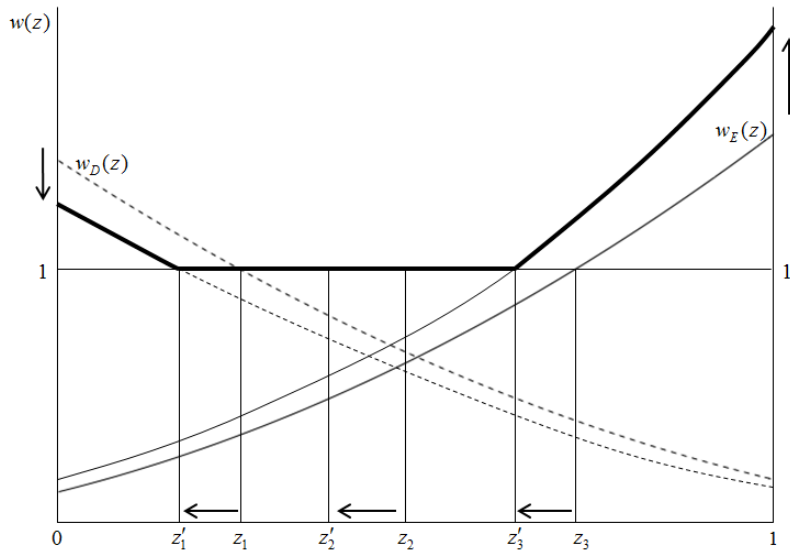Following Figure 2 illustrates the induced changes in the equilibrium wage distribution.

Figure 2: The effects of a fall in τ on the equilibrium wage distribution

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[14]One difference lies on the individual firm size adjustments. In this type of monopolistic competition models, changing the marginal costs to exporting (τ) indirectly affects the relative individual firm size from the market competition, while changing firms' fixed costs directly influences the individual firm size.

The rise in w_E attracts more workers, $z \in [z_3', z_3]$, to invest in obtaining managerial skills and to become managers in exporting firms, while the fall in w_D induces some managers with relatively low D-beliefs, $z \in [z_1', z_1]$, to disinvest and turn to production workers in domestic firms. The expansion (compression) of exporting (domestic) firms leads to more (less) employment of production workers in exporting (domestic) firms, so that some production workers previously employed in domestic firms, $z \in [z_2', z_2]$, are now employed by exporting firms.

The impact of a fall in τ on market concentration can be investigated as follows. From Eqs. (7), (17), (20) and (22), we have:

$$
\begin{aligned}
N_D &= \frac{1}{\sigma f_D \alpha_M} \int_0^{z_1} \left[\frac{w_D [1 + v_D (1-z)]^2}{2\gamma} - c_D \right] g(z) dz, \\
N_E &= \frac{1}{\sigma f_E \alpha_M} \int_{z_3}^1 \left[\frac{w_E [1 + v_E z]^2}{2\gamma} - c_E \right] g(z) dz.
\end{aligned}
\tag{24}
$$

From Proposition 1, following corollary follows immediately.

Corollary 3 *A fall in τ reduces the number of domestic firms (N_D), while increases that of exporting firms (N_E).*

4 The impacts of managerial vision

In this section we now investigate the impacts of changes in managerial vision. Note that the analysis is not as simple as before since changes in managerial vision directly affect the productivity factor in Eq. (2) from the externality between workers' organizational beliefs and CEO's managerial vision, so that now Lemmas 1 and 2 do not hold a priori. The impacts can be investigated in the following steps instead. Given that the same reasoning applies for changes in v_E or v_D, here we focus on a rise in v_E.

First, consider relatively short-run within-exporting-firm impacts. *(i)* For given employment level and measured-in-efficiency-units wage rate (given z_2 and w_E), the first-order direct impact of a rise in v_E is to increase expected remunerations for managerial workers, which induces a fall in z_3. *(ii)* Then, to recover the within-firm factor clearing condition (19), w_E starts to decrease and z_3 is shifted back, but finally is situated somewhere below the initial z_3. By considering $w(z)/w_E$ schedule from Eq. (8) and from Eq. (10), following figure illustrates the short-run within-exporting-firm adjustments, where z_3^0 denotes the initial level of z_3, while z_3^1 and z_3^2 denote the sequential changes in z_3.
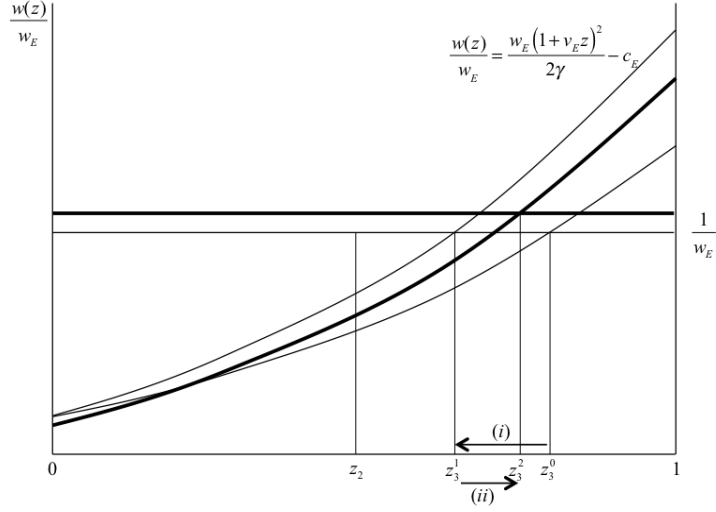
Figure 3: First impacts of a rise in v_E within exporting firms

These changes will then induce between-firm repercussions. From Eq. (21), a fall in w_E induces a fall in w_D, which in turn induces a fall in z_1 from Eq. (9). The final equilibrium requires overall factors' market clearing conditions (18) and (19). Note from Figure 3 that $w(z)/w_E$ schedule represents also individual's output (net of learning cost c_E) schedule from Eq. (5). A rise in v_E together with the induced leftward shift of z_3 requires more employment of production workers within exporting firms. On the other hand, a fall in w_D together with leftward shift of z_1 clearly implies less employment of production workers within domestic firms. Finally, from Eqs. (18) and (19) z_2 should shift left to ensure the overall factors' market clearing.

The same reasoning applies for a rise in v_D, which induces falls in w_D and w_E, and rightward shifts of z_1, z_2 and z_3. The effects are summarized in the following proposition.

Proposition 2 *In this economy, a rise in v_E induces falls in w_D and w_E, and leftward shifts of z_1, z_2 and z_3. A rise in v_D induces falls in w_D and w_E, and rightward shifts of z_1, z_2 and z_3.*

Following Figure 4 illustrates the induced changes.

(a) A rise in v_E
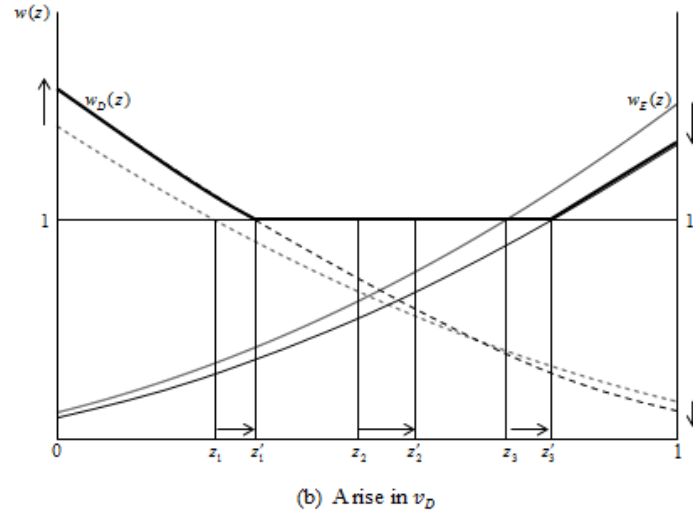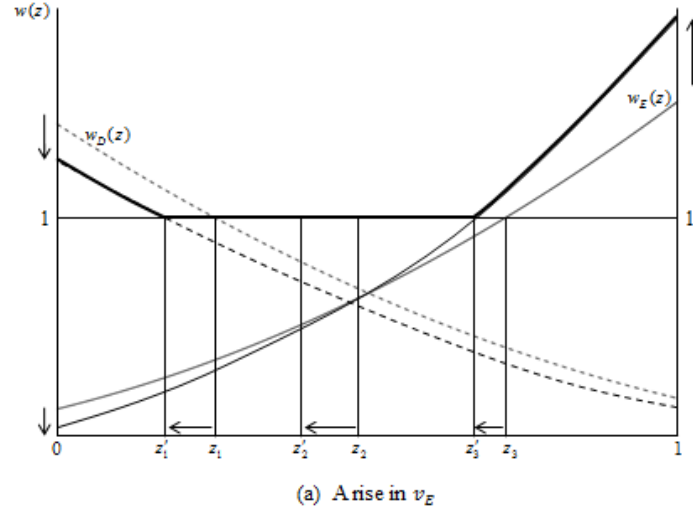

(b) A rise in v_D

Figure 4: The effects of a rise in v_E and v_D on the equilibrium wage distribution

Note the positive relationships among the optimal effort level (4), output level (5), and wage schedule of workers (8). Following corollary follows immediately.

Corollary 4 *A rise in v_E (v_D) increases (decreases) the optimal effort and output levels of exporting-firm managerial workers, while decreases (increases) those of domestic-firm managerial workers.*

Also, as Figure 4 shows, following corollary follows immediately concerning income changes.

Corollary 5 *A rise in v_E increases between-firm relative managerial incomes in favor of*

exporting firms; decreases within-firm income inequality in domestic firms, while increases it in exporting firms. Contrarily, a rise in v_D induces the inverse effects.

Note however that the effects on the measured-in-efficiency-units wages are not the same as the changes in income in this case. In this economy, a rise in v_E (or v_D) acts like a technological shock that positively affects the associated workers' productivity. Though a rise in v_E (or v_D) decreases the associated measured-in-efficiency-units wage rate w_E (or w_D), the final income of managerial workers increases due to the positive productivity effect. Thus in this economy, CEO's stronger vision attracts more workers to invest in obtaining related managerial skills and to become managers within firms, while the opposite occurs within competitors.[15]

From the above induced changes and from Eq. (24), following corollary follows.

Corollary 6 *A rise in v_E (v_D) increases the number of exporting (domestic) firms, while reduces the number of domestic (exporting) firms.*

5   Externalities from the similar v and z

Our analyses so far have been based on a simplifying assumption that φ_z^E and φ_z^D monotonically increase in both workers' beliefs, z and $(1 - z)$, and CEO's managerial vision, v_E and v_D, respectively. Though simple enough to highlight the main mechanisms, such simplifying assumption is limited in investigating the interactions between CEO's managerial vision and workers' organizational beliefs. In this section we extend the model to incorporate more explicitly externalities from the similar CEO's managerial vision and workers' organizational beliefs. The extension requires only minor modification. We now assume that:

$$\varphi_z^D = a_D - (v_D - z)^2, \quad \text{and} \quad \varphi_z^E = a_E - (v_E - z)^2, \tag{25}$$

where a_D and a_E are parameters representing the maximum productivity of a worker who has the same belief as that of CEO in domestic and exporting firms, respectively. We

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[15]Equivalently, we could consider the impacts of changes in workers' organizational beliefs. This could be done by adding shift parameters θ_D and θ_E to workers' belief schedules $(1 - z)$ and z, respectively, so that Eq. (2) is now modified to: $\varphi_z^D = 1 + v_D \theta_D (1 - z)$, and $\varphi_z^E = 1 + v_E \theta_E z$. Changing θ_D or θ_E acts also like a technological shock that affects the associated workers' productivity, and leads just to the same results as changes in v_D or v_E.

assume that $a_E > a_D$ given the higher learning cost to obtain export market managerial skills: $c_E > c_D$. Replacing these in Eq. (3), optimal effort level of a worker z is now given by:

$$e_z^{Opt} = \begin{cases} \frac{w_D\left[a_D-(v_D-z)^2\right]}{2\gamma} & \text{if } s = D \\ \frac{w_E\left[a_E-(v_E-z)^2\right]}{2\gamma} & \text{if } s = E, \end{cases} \tag{26}$$

and the output of a worker z is given by:

$$q_z^{Opt} = \begin{cases} \frac{w_D\left[a_D-(v_D-z)^2\right]^2}{2\gamma} & \text{if } s = D \\ \frac{w_E\left[a_E-(v_E-z)^2\right]^2}{2\gamma} & \text{if } s = E. \end{cases} \tag{27}$$

Note from above that differently from the previous model e_z^{Opt} and q_z^{Opt} increase now in the similarity between z and v_s, $s \in \{D, E\}$. From above, the modified wage schedules are given by:

$$w(z) = \begin{cases} w_D\left[\frac{w_D\left[a_D-(v_D-z)^2\right]^2}{2\gamma} - c_D\right] & 0 \le z \le z_1 \\ w & z_1 \le z \le z_3 \\ w_E\left[\frac{w_E\left[a_E-(v_E-z)^2\right]^2}{2\gamma} - c_E\right] & z_3 \le z \le 1. \end{cases} \tag{28}$$

Previous no-arbitrage conditions in Eqs. (9) and (10) and M_s, $s \in \{D, E\}$, supply equations in Eq. (17) are modified accordingly to:

$$w_D\left[\frac{w_D\left[a_D - (v_D - z_1)^2\right]^2}{2\gamma} - c_D\right] = 1, \quad \text{and} \tag{29}$$

$$w_E\left[\frac{w_E\left[a_E - (v_E - z_3)^2\right]^2}{2\gamma} - c_E\right] = 1, \tag{30}$$

and

$$\begin{aligned} M_D &= \int_0^{z_1} \left[\frac{w_D\left[a_D-(v_D-z)^2\right]^2}{2\gamma} - c_D\right] g(z)dz, \\ M_E &= \int_{z_3}^1 \left[\frac{w_E\left[a_E-(v_E-z)^2\right]^2}{2\gamma} - c_E\right] g(z)dz, \end{aligned} \tag{31}$$

from which factors clearing conditions (18) and (19) are also modified accordingly to:

$$\frac{1}{\alpha_R}\int_{z_1}^{z_2} 1g(z)dz = \frac{1}{\alpha_M}\int_0^{z_1}\left[\frac{w_D\left[a_D - (v_D - z)^2\right]^2}{2\gamma} - c_D\right]g(z)dz, \tag{32}$$

$$\frac{1}{\alpha_R}\int_{z_2}^{z_3} 1 g(z)dz = \frac{1}{\alpha_M}\int_{z_3}^{1}\left[\frac{w_E\left[a_E - (v_E - z)^2\right]^2}{2\gamma} - c_E\right]g(z)dz. \qquad (33)$$

As before, the equilibrium is characterized by five key variables – z_1, z_2, z_3, w_D and w_E –, which are determined accordingly in this case by five equations (21), (29), (30), (32) and (33). Note however from Eqs. (29) and (30) that in this case the initial v_D and v_E relative to workers' overall beliefs matter. If initially $v_D < z_1$ and $v_E > z_3$, we have $\frac{dw_D}{dz_1} > 0$ and $\frac{dw_E}{dz_3} < 0$. Though much less plausible, however, if initially $v_D > z_1$ and $v_E < z_3$, we would have $\frac{dw_D}{dz_1} < 0$ and $\frac{dw_E}{dz_3} > 0$.[16] Following Figure 5 illustrates the modified equilibrium wage distribution for the former case.
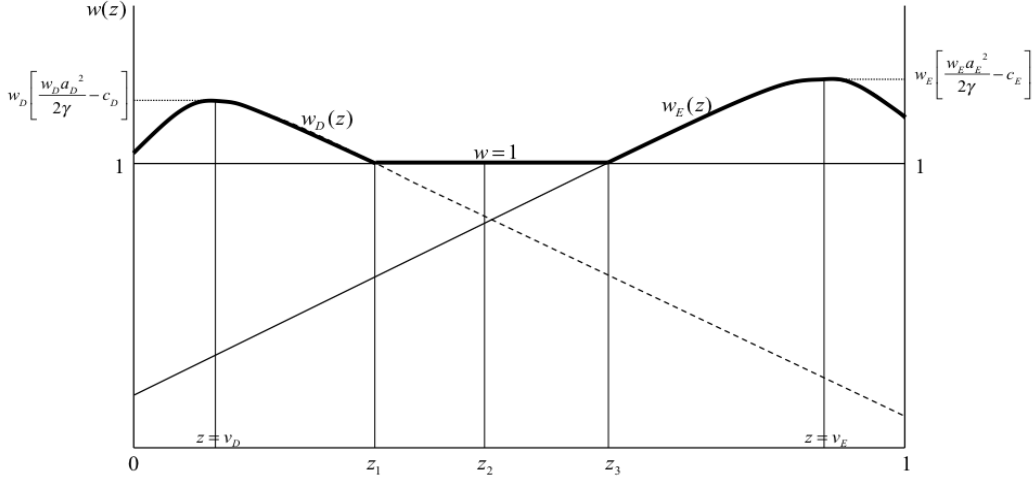

Figue 5: The equilibrium wage distribution when $\varphi_z^s = a_s - (v_s - z)^2$, $s \in \{D, E\}$

Thus, in this case it is the worker with the same belief as CEO's managerial vision who earns the highest income in each firm-type. Also, the presence of fixed learning costs to obtain managerial skills requires higher remunerations justifying such investments. Note that the sufficient condition for all managerial workers to get higher income than production workers is that initially v_E and v_D are stronger than the median belief of managerial workers in each firm-type, i.e. $v_E > (z_3 + 1)/2$ and $v_D < z_1/2$.[17] From the

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[16]More formally, totally differentiating Eq. (29) and using Eq. (29), we get $\frac{dw_D}{dz_1} = -\frac{2w_D^3\left[a_D - (v_D - z_1)^2\right](v_D - z_1)}{\gamma(2 + c_D w_D)}$, which is negative (positive) if $v_D > z_1$ ($v_D < z_1$). Similarly, totally differentiating Eq. (30), we get $\frac{dw_E}{dz_3} = -\frac{2w_E^3\left[a_E - (v_E - z_3)^2\right](v_E - z_3)}{\gamma(2 + c_E w_E)}$, which is negative (positive) if $v_E > z_3$ ($v_E < z_3$).

[17]This condition rules out the case where the wage distribution cuts the horizontal line again on the

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definition of visionary CEO, we focus in what follows on such cases.

Then, it follows immediately that Lemma 2 applies in this case too from the same reasoning as before. It can also be checked easily that a fall in τ induces the same effects as before. A fall in τ induces a fall in w_D and a rise in w_E, and z_1, z_2 and z_3 shift leftward.

Following Figure 6 illustrates the effects of a fall in τ in this case.
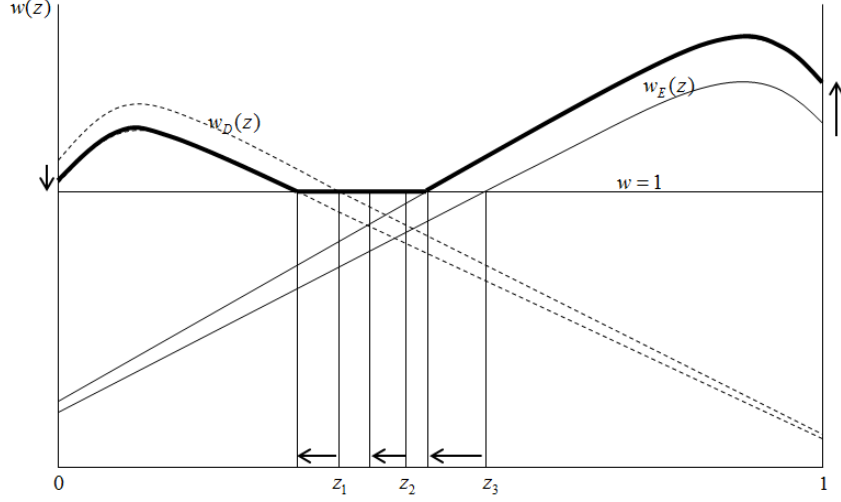

Figure 6: The effects of a fall in τ when $\varphi_z^s = a_s - (v_s - z)^2$, $s \in \{D, E\}$

Note however that in this case within-firm income implications are different from before. It is now the worker with $z = v_E$ whose income increases the most following a fall in τ, while it is the worker with $z = v_D$ in domestic firms whose income decreases the most. It is due to the presence of fixed learning cost c_s, $s \in \{D, E\}$. A rise in w_E due to a fall in τ increases also the learning cost in nominal term. And this comes as a relatively less burden to the workers having similar beliefs as that of CEO since initially the proportion of learning cost in their total income is relatively small. Similarly, a fall in w_D due to a fall in τ decreases also the learning cost in nominal term in domestic firms. This beneficial effect is relatively small to the workers having similar beliefs as that of CEO since initially the proportion of learning cost in their total income is relatively small. Consequently, the overall negative impact from a fall in w_D affects the most negatively the worker with $z = v_D$.

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extreme left and on the extreme right in Figure 5.

We now investigate the impacts of changes in managerial vision in this case. The impacts can be investigated in the same way as before. Consider a rise in v_E. We start by investigating the first-order direct impact of a rise in v_E within exporting firms. *(i)* For given z_2 and w_E, the first direct impact of a rise in v_E is to decrease overall expected remunerations for managerial workers since v_E gets far from the median belief of inside managerial workers, which induces a rise in z_3. *(ii)* Then, to recover the within-firm factor clearing condition (33), w_E starts to increase and z_3 is shifted back, but finally is situated somewhere above the initial z_3. Note that for the moment for a given z_2, the within-firm factor clearing is not yet fully recovered. Following figure illustrates such short-run within-exporting-firm adjustments.
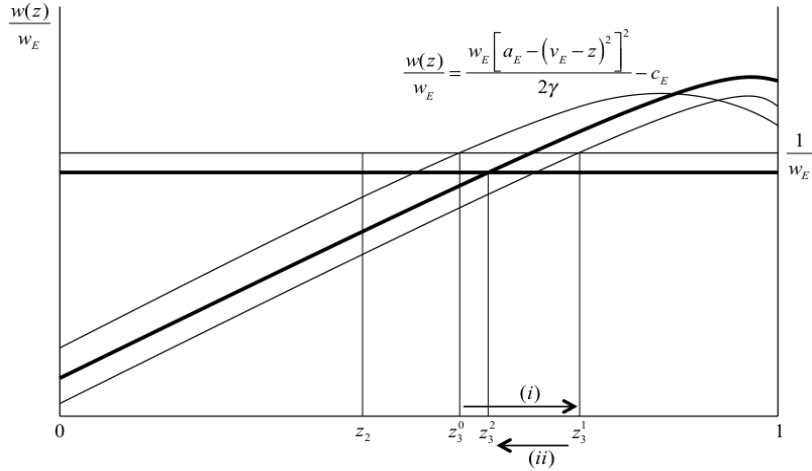

Figure 7: First within impacts of a rise in v_E when $\varphi_z^E = a_E - (v_E - z)^2$

Now consider between-firm repercussions of these changes. From Eq. (21), a rise in w_E induces a rise in w_D, which in turn induces a rise in z_1 from Eq. (29). The final equilibrium requires overall factors' market clearing (32) and (33), so that z_2 is shifted right to ensure full employment of factors.

The same reasoning applies also for a rise in v_D, which induces falls in w_D and w_E, and rightward shifts of z_1, z_2 and z_3. Note that differently from the case of a rise in v_E, a rise in v_D is beneficial to domestic firms where the rise occurs and leads to an expansion of these firms since v_D gets closer to the median belief of inside managerial workers.[18]

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[18] Note that here a rise of v_D represents a fall in CEO's managerial vision in domestic firms as v_D gets

The effects are summarized in the following proposition.

Proposition 3 *In this economy, a rise in v_E induces rises in w_D and w_E, and rightward shifts of z_1, z_2 and z_3. A rise in v_D induces falls in w_D and w_E, and rightward shifts of z_1, z_2 and z_3.*

Following Figure 8 illustrates the induced changes.

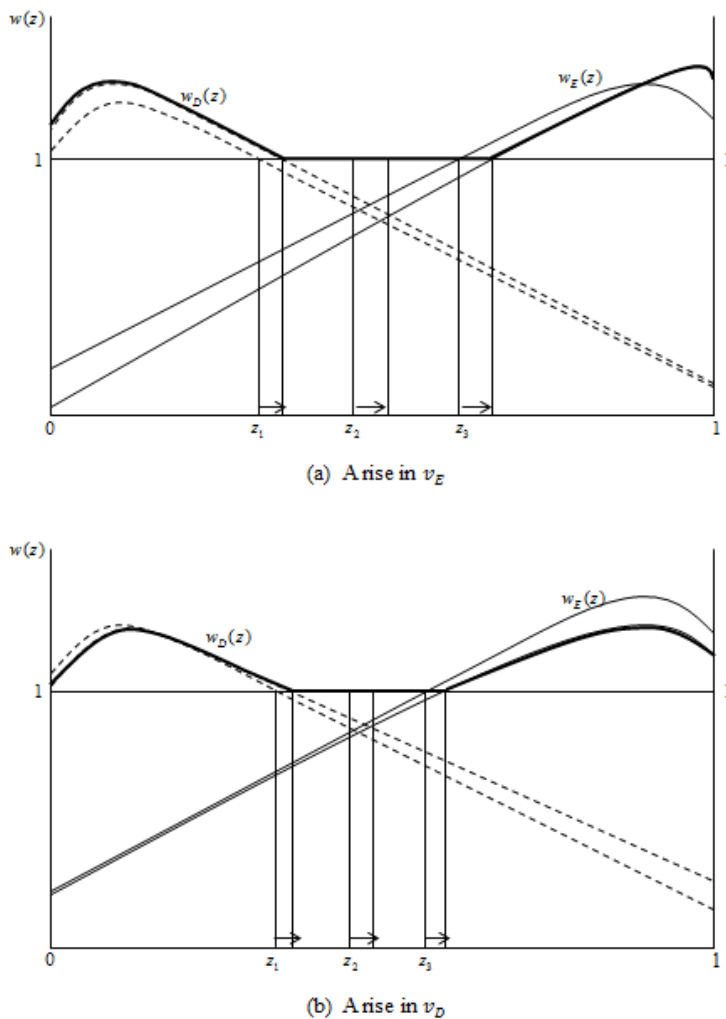(a) A rise in v_E

(b) A rise in v_D

Figure 8: The effects of a rise in v_E and v_D when $\varphi_z^s = a_s - (v_s - z)^2$, $s \in \{D, E\}$

As the figure shows, in this case the income implications are more complex than before. A rise in v_E may involve some winners and losers within exporting firms. As v_E gets far

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far from zero and closer to unity.

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from the median belief of inside managerial workers and approaches the highest E-belief ($z = 1$), inside M-workers with high E-belief (high z) see their income rise while the income of relatively low E-belief (low z) M-workers reduces. However, if v_E continues to rise beyond the highest belief level so that a further rise in v_E affects only negatively all managerial workers, then finally all managerial workers may lose within exporting firms. Similarly, a rise in v_D involves some winners and losers within domestic firms. As v_D gets closer to the median belief of inside managerial workers, inside M-workers with high D-belief (low z) see their income fall while the income of relatively low D-belief (high z) M-workers increases. Note that in this case though v_D continues to rise beyond any thresholds (within the range ensuring Eq. (32)), there would be always some inside beneficiaries due to the workers who upgrade their tasks from production to management and earn higher income. On the other hand, both rises in v_E and v_D are beneficial to domestic firms (as also shown by rightward shifts of z_1, z_2 and z_3 in Figure 8), so that a rise in v_E increases income of all domestic-firm managerial workers while a rise in v_D decreases income of all exporting-firm managerial workers. The model therefore may partly explain why firms having highly visionary CEO are not necessarily successful in the market.[19] Whether a stronger (or weaker) CEO's managerial vision benefits the firm or not depends on its extent relative to within-firm workers' overall beliefs.[20]

6   Conclusion

It has been widely documented in the management literature that the interaction between workers' organizational beliefs and the CEO's managerial vision has important implications for the firm's behavior and performance. Though recent firm heterogeneity literature in international trade has made substantial advances in highlighting many systematic links between the characteristics of firms and their degree of internationalization as well as bringing many important trade policy implications at the aggregate level, much less attentions has been paid to within-firm managerial mechanisms and the resulting strategic direction and performance of firms.

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[19]We might simply reorder workers so that φ_z^E and φ_z^D monotonically increase in both workers' beliefs, z and $(1 - z)$, and CEO's managerial vision, v_E and v_D, as before. But this would of course not explain the possible complex implications due to the interaction between workers' beliefs and CEO's managerial vision of this section.

[20]Earlier versions of this paper include numerical simulation results, which confirm the theoretical discussions of this paper.

This paper made a first attempt to bridge the gap by developing a simple general-equilibrium trade model in which heterogeneous employees make an investment decision in acquiring advanced managerial skills and choose their optimal effort level based on their own individual organizational beliefs and managerial vision of the CEO. By modeling explicitly the optimal effort level decision of individual workers, the model highlighted a new source of productivity effect coming from the interplay between workers' beliefs and CEO's managerial vision. Also due to such interplay, it was shown that the income (welfare) effects of trade liberalization and/or changes in managerial vision may not be simply monotonic or proportional as in previous models in the literature. In particular, it was shown that when the similarity of beliefs between CEO and employees matters, whether a stronger (or weaker) CEO's managerial vision benefits the firm or not depends on its extent relative to within-firm workers' overall beliefs, and may involve some winners and losers even within the same firm.

At least in this model's context, it should be clear that both overall workers' beliefs and CEO's managerial vision as well as their interactions are as important factors as tariff reduction movements to enhance international trade. Needless to say, the model abstracts from some important real world issues such as various labor market imperfections. I believe that this paper opens up new avenues for various promising extensions and for future research.

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