RUHR
ECONOMIC PAPERS

Avtandil Abashishvili

Exporting and Endogenous Workplace Amenities Under Monopsonistic Competition

technische universität dortmund

#1008

Imprint

Ruhr Economic Papers

Published by

RWI – Leibniz-Institut für Wirtschaftsforschung
Hohenzollernstr. 1-3, 45128 Essen, Germany

Ruhr-Universität Bochum (RUB), Department of Economics
Universitätsstr. 150, 44801 Bochum, Germany

Technische Universität Dortmund, Department of Economic and Social Sciences
Vogelpothsweg 87, 44227 Dortmund, Germany

Universität Duisburg-Essen, Department of Economics
Universitätsstr. 12, 45117 Essen, Germany

Editors

Editorial Office

Ruhr Economic Papers #1008

Responsible Editor: Ludger Linnemann

ISSN 1864-4872 (online) – ISBN 978-3-96973-174-1

Ruhr Economic Papers #1008

Avtandil Abashishvili

Exporting and Endogenous Workplace Amenities Under Monopsonistic Competition

technische universität dortmund

Bibliografische Informationen der Deutschen Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available on the Internet at **http://dnb.dnb.de**

RWI is funded by the Federal Government and the federal state of North Rhine-Westphalia.

http://dx.doi.org/10.4419/96973174
ISSN 1864-4872 (online)
ISBN 978-3-96973-174-1

Avtandil Abashishvili[1]

Exporting and Endogenous Workplace Amenities Under Monopsonistic Competition

Abstract

This paper introduces endogenous workplace quality choice into an international trade model with a monopsonistically competitive labour market, in which firms compete for potential employees by offering them a combination of monetary and non-monetary benefits. To attract the workers required to produce for the foreign market in addition to the domestic market, exporting firms have to offer more attractive compensation to their employees than comparable non-exporting firms, which is why they are not only paying higher wages but also offering better workplace amenities. The gains from trade, therefore, not only materialise in terms of a higher purchasing power but also in terms of a higher average workplace quality. Welfare metrics, which exclusively focus on real income gains, might underestimate the gains from globalisation.

JEL-Code: F12, F16, F23

Keywords: Monopsonistic competition; workplace quality; wages; exporting; gains from trade

March 2023

1 Avtandil Abashishvili, TU Dortmund. – I would like to thank my advisor, Jens Wrona, for his valuable feedback and suggestions. I also thank Philip Jung and members of the Research training group (RTG) 2484 – "Regional Disparities and Economic Policy" for helpful discussions – All correspondence to: Avtandil Abashishvili, TU Dortmund, Faculty of Business and Economics, Vogelpothsweg 87, 44227 Dortmund, Germany; Email: avtandil.abashishvili@tu-dortmund.de

1 Introduction

This paper extends the international trade model of Egger et al. (2022), which features heterogeneous firms operating in a monopsonistically competitive labour market by allowing firms to endogenously choose their average workplace quality. Workers perceive firms as horizontally differentiated employers, which results in a firm-specific labour supply function that is upward-sloping in the monetary (wages) and non-monetary (workplace quality) compensations that firms grant their workers in exchange for their labour supply. As a consequence, it is optimal for firms to compete for workers not only in terms of wages but also in terms of workplace quality, which results in wage and workplace quality premia for more productive and, therefore – ceteris paribus – larger firms.

Firms are different in terms of their productivity à la Melitz (2003), and not all the firms active in the domestic market are productive enough to be engaged in global trade through exporting. In the labour market, firms hire workers to produce intermediate inputs. As a part of the optimal hiring strategy, firms thereby have to choose the average quality of their workplace amenities, which are subject to a fixed-cost investment. The crude summary of this paper is that compared to non-exporters, exporters not only pay higher wages but also offer higher workplace amenities to their workers. The underlying mechanism can be structured as follows: if a firm decides to export, it has to hire more domestic workers, which translates into increased wages and workplace quality, as the firm must compensate the marginal worker for the utility loss caused by giving up alternative employment opportunities.

Monopsonistic competition in the labour market is modelled in the spirit of Egger et al. (2022), where the firms face an upward labour supply curve, which depends positively on the wages firms have to pay to their employees, as well as on the average quality of firm-specific workplace amenities. Using the well-established discrete choice framework as in McFadden (1976), Thisse and Toulemonde (2010), the firm-specific upward labour supply curve is derived by assuming that workers' preferences are independently and identically distributed over the continuum of firms. As a result, compared to Egger et al. (2022), in this model, when firms require to hire more workers, they can pay not only higher wages to their workers but also offer better workplace quality.

By allowing firms to endogenously adjust the quality of their workplace quality, a new adjustment margin for the gains from globalisation is established, which materializes not only through the goods market but also through the labour market. Non-pecuniary welfare gains in the labour market thereby emerge for two reasons: Either there is an increase in average workplace quality across all firms, which benefits workers because workplace quality directly enters their utility, or there is an increase in the number of firms that are active in the labour market, which is good for workers that prefer to choose among more options in the labour market. The exporting activity is associated with non-pecuniary welfare gains although for very different reasons: As in Melitz (2003), the trade in intermediate inputs is associated with a reallocation of workers from less to more productive firms, which due to their larger size not only pay higher wages but also offer on average better amenities to their employees. At the same time, the exit of low-productivity non-exporting firms results in fewer options in the labour market, which ceteris paribus is associated with lower welfare. Solving for workplace quality-based welfare gains from exporting in general equilibrium, this paper demonstrates that the welfare increase due to consumption and an average better workplace quality dominates the welfare loss due to a reduction in the number of firms that operate in the labour market.

Having established that there are aggregate welfare gains from globalisation, it is essential to note that these gains not only arise through the usual increase in overall consumption but also through the increase of non-pecuniary welfare. A quantification of the gains from globalisation that only accounts for the real-income gains may therefore underestimate the total gains from trade. Using the World input-output table, constructed by Timmer et al. (2015), this paper computes the sufficient statistic for the gains from trade. Obtained empirical results strengthen the theoretical findings –the welfare gains from globalisation are systematically underestimated if the endogenous adjustment in workplace quality in response to a globalisation shock is not taken into account.

By introducing a new margin for firms to optimally adjust to a globalisation shock, this paper contributes to sizeable literature studying the welfare gains from international trade. Arkolakis et al. (2012) (henceforth - ACR) derive the welfare gains from trade using two sufficient statistics: the domestic expenditure share and the elasticity of imports with respect to the international trade costs. This paper contributes to sizeable literature discussing the gains from globalisation (see Costinot and Rodríguez-Clare (2014), for an overview) by incorporating preferences for non-monetary compensations in the labour market when evaluating the aggregate welfare gains from trade.

This paper is also related to the recent research studying the effects of international trade on the wage premium. The majority of existing works in the literature assumes either rent sharing mechanism (Amiti and Davis, 2012; Helpman et al., 2017; Egger and Kreickemeier, 2012), or assortative matching between firms and workers (Sampson, 2014; Grossman et al., 2017). In Egger et al. (2022), firm-specific wage effects of exporting and offshoring are derived under monopsonistic competition in the labour market. This article contributes to this literature by showing that firms not only may differ in their optimal wage-setting policies but also in terms of the average quality of workplace that they offer to their employees.

The assumption that workers react to non-wage job attributes is already well-grounded in applied labour economics literature Eriksson and Kristensen (2014), Mas and Pallais (2017), and Wiswall and Zafar (2018). Despite the differences in their identification strategies, all of these papers provide evidence that workers value non-wage job characteristics, such as alternative working arrangements and scheduling flexibility. The purpose of such studies is to estimate the workers' valuation of particular firm-level amenities. The goal of this paper is rather different. This article does not attempt to evaluate the explicit bundle of non-wage job characteristics to which workers could potentially react. Instead, the objective of this paper is to show that, whatever the valuation of workplace amenities may be, trade liberalization always delivers non-pecuniary welfare gains.

The rest of this paper is structured as follows. In section 2, the article discusses the firms' optimal behaviour in a partial equilibrium framework. Section 3 characterises the general equilibrium and provides the microeconomic foundations of the labour supply. Section 4 discusses the effects of exporting on aggregate welfare, Section 5 provides the quantitative relevance of the model, and the last section summarizes the main findings.

2 Theory

The world economy consists of two countries, each with two sectors. In the upstream sector, labour is used to produce horizontally differentiated intermediate inputs under monopolistic competition in the goods market and monopsonistic competition in the labour market. In the downstream sector, these intermediate inputs are then used to produce a freely tradable numéraire good under perfect competition. Upon paying the fixed entry costs $f_e > 0$ intermediate input producer ω draws a constant productivity $\varphi(\omega)$ from the Pareto distribution $G(\varphi) = 1 - \varphi^{-g}$ and decides whether to enter the domestic market at fixed costs $f_d > 0$. Exporting is associated with variable trade costs $\tau \geq 1$ and foreign market entry costs $f_x > 0$. All fixed costs are paid in units of the numéraire.

2.1 Optimal firm behaviour

Firms compete under monopolistic competition in the goods market and under monopsonistic competition in the labour market. In the goods market, an iso-elastic demand function $x(\omega) = A_G p(\omega)^{-\sigma}$ with a constant price elasticity of demand $\sigma > 1$ is assumed. The demand shifter A_G thereby captures all general equilibrium effects that operate through the goods market. Labour supply to the firm is given by $h(\omega) = A_L[a(\omega)^{\alpha} w(\omega)^{1-\alpha}]^{\frac{1-\theta}{\theta}}$, which is positively associated with the wage $w(\omega)$, that firm ω has to offer, and on the average workplace quality $a(\omega)$, that workers can expect when deciding in favor of firm ω. The parameter $\theta \in [0, 1]$ is a constant that is inversely related to the labour supply elasticity with respect to the compensation bundle $a(\omega)^{\alpha} w(\omega)^{1-\alpha}$. The importance of workplace quality versus wages in the compensation of workers thereby is governed by $\alpha \in [0, 1)$. The supply shifter $A_L > 0$ captures all general equilibrium effects that operate through the labour market.[1]

Firms can optimally choose the average workplace quality $a(\omega)$ that they would like to offer to their workers. The workplace quality $a(\omega)$ thereby is associated with fixed costs $a(\omega)^\delta/\delta > 0$, that depend on the cost parameter $\delta > \alpha(1-\theta)/\theta$. Binary indicator $I(\omega)$ differentiates exporters (with $I(\omega) = 1$) from non-exporters (with $I(\omega) = 0$), while an asterisk marks foreign variables. The firm's profit maximization problem can be written as

$$\max_{x(\omega),x^*(\omega),l(\omega),a(\omega),I(\omega)} \; p(\omega)x(\omega) + \frac{I(\omega)}{\tau}p^*(\omega)x^*(\omega) - w(\omega)l(\omega) - \frac{a(\omega)^\delta}{\delta} - I(\omega)f_x - f_d - f_m, \quad (1)$$

which is solved subject to the *(i)* the labour market clearing conditions, which are given by $l(\omega) = h(\omega) = A_L[a(\omega)^\alpha w(\omega)^{1-\alpha}]^{\frac{1-\theta}{\theta}}$; *(ii)* the goods market clearing conditions given by $x(\omega) = A_G p(\omega)^{-\sigma}$ and $x^*(\omega)/\tau = A_G^* p^*(\omega)^{-\sigma}$ in the case of exporting; and *(iii)* the constraint that the firm's domestic and exporting market output must be equal to its total production, $x(\omega) + I(\omega)x^*(\omega) = y(\omega)$.

The optimal allocation of aggregate output $y(\omega)$ across markets is given by $x(\omega) = y(\omega)$ for non-exporters and $x^*(\omega) = (A_G^*/A_G)\tau^{1-\sigma}x(\omega)$ as well as $x(\omega) = y(\omega)[1 + (A_G^*/A_G)\tau^{1-\sigma}]^{-1}$ for exporters. Firm-level revenues, therefore, are given by

$$r(\omega) \equiv p(\omega)x(\omega) + \frac{I(\omega)}{\tau}p^*(\omega)x^*(\omega) = A_G^{\frac{1}{\sigma}}\Big[\kappa(\omega)y(\omega)\Big]^{\frac{\sigma-1}{\sigma}} \text{ with } \kappa(\omega) \equiv \left(1 + \frac{A_G^*}{A_G}\tau^{1-\sigma}\right)^{\frac{I(\omega)}{\sigma-1}}. \quad (2)$$

Similar to Egger et al. (2022), the multiplier $\kappa(\omega)$ in Eq. (2) captures the relative size difference between overall and domestic markets and equals to one for non-exporters while $\kappa \equiv \left[1 + (A_G^*/A_G)\tau^{1-\sigma}\right]^{\frac{1}{\sigma-1}} > 1$ for exporters.

The optimal average workplace quality $a(\omega)$ has to minimize

$$\min_{a(\omega)} \; w(\omega)l(\omega) + \frac{a(\omega)^\delta}{\delta}. \quad (3)$$

The wage bill $w(\omega)l(\omega)$ in Eq. (3) can be replaced by $w(\omega)l(\omega) = a(\omega)^{-\alpha/(1-\alpha)}[y(\omega)/\varphi(\omega)]^{1/(1-\beta)}$ $A_L^{-\beta/(1-\beta)}$ with $\beta \equiv \theta/[(1-\alpha)(1-\theta)+\theta] \in (\alpha/[\alpha + (1-\alpha)\delta], 1]$, which is obtained by equating firm ω's labour demand $l(\omega) = y(\omega)/\varphi(\omega)$ with the labour supply $h(\omega) = A_L[a(\omega)^\alpha w(\omega)^{1-\alpha}]^{\frac{1-\theta}{\theta}}$. The cost-minimizing average workplace quality can therefore be determined as

$$a(\omega) = \left\{ \frac{\alpha}{1-\alpha} \left[\frac{y(\omega)}{\varphi(\omega)}\right]^{\frac{1}{1-\beta}} A_L^{-\frac{\beta}{1-\beta}} \right\}^{\frac{1-\beta}{1-\gamma}\frac{1}{\delta}}, \quad (4)$$

[1]Detailed microfoundations for the firm-level goods demand and labour supply are derived in Section 3

in which $\gamma \equiv \{\beta[\alpha + (1-\alpha)\delta] - \alpha\}/(1-\alpha)\delta \in (0, 1]$ with $\gamma \leq \beta$. Substituting $a(\omega)$ from Eq. (4) back into the objective function from Eq. (3) then yields the minimum cost function

$$c(\omega) = \frac{1-\gamma}{1-\beta} \left(\frac{1-\alpha}{\alpha}\right)^{\frac{\beta-\gamma}{1-\gamma}} \left[\frac{y(\omega)}{\varphi(\omega)}\right]^{\frac{1}{1-\gamma}} A_L^{-\frac{\beta}{1-\gamma}}. \tag{5}$$

To derive the profit-maximizing output level

$$y(\omega) = \left[CAA_G^{-\frac{1-\rho}{\sigma-1}} \kappa(\omega)^\rho \varphi(\omega)\right]^{\frac{1}{1-\rho}} \quad \text{with} \quad A \equiv A_G^{\frac{1}{\sigma-1}} A_L^\beta \tag{6}$$

the difference $\pi(\omega) \equiv r(\omega) - c(\omega)$ between revenues $r(\omega)$ in Eq. (2) and costs $c(\omega)$ in Eq. (5) is maximised with respect to $y(\omega)$.[2] The respective first-order condition $dr(\omega)/dy(\omega) = dc(\omega)/dy(\omega)$ can be easily solved for $y(\omega)$ by linking marginal revenue and marginal cost to average revenue and average variable cost

$$\frac{r(\omega)}{y(\omega)} = \frac{\sigma}{\sigma-1}\frac{dr(\omega)}{dy(\omega)} \qquad \text{and} \qquad \frac{c(\omega)}{y(\omega)} = (1-\gamma)\frac{dc(\omega)}{dy(\omega)}$$

As in Egger et al. (2022), monopolistic competition in the goods market results in a constant price mark-up $\sigma/(\sigma-1) > 1$ over marginal revenue. Moreover, the average variable and marginal costs are linked to each other by the mark-down $1-\gamma < 1$, which mirrors the firm's monopsony power in the labour market. Due to the fact that labour supply and product demand are iso-elastic, the product of the wage markdown and price markup $1/\rho$ with $\rho \equiv (1-\gamma)(\sigma-1)/\sigma \in [0, 1]$ is independent of the firm's output level.

Evaluating $r(\omega)$ from Eq. (2) at the optimal output level $y(\omega)$ from Eq. (6) allows us to solve for firm-level revenues

$$r(\omega) = [CA\kappa(\omega)\varphi(\omega)]^\xi. \tag{7}$$

From Eq. (7), $\xi \equiv (\sigma-1)/\sigma(1-\rho) = (\sigma-1)/[1+\gamma(\sigma-1)] \in [(\sigma-1)/\sigma, \sigma-1]$ corresponds to the elasticity of revenues with respect to productivity $\varphi(\omega)$. It is easily verified that ξ becomes $\sigma-1$ for $\gamma = 0$ (requiring $\theta = 0$ and $\delta \to \infty$). The elasticity ξ is smaller compared to the elasticity $\sigma-1$ obtained in Melitz (2003). This difference stems from the fact that more productive firms pay higher wages and offer expensive workplace amenities, which weakens their advantage in terms of lower marginal production costs. Following Egger et al. (2022), the term $\kappa(\omega)$ in Eq. (7) can be considered as the productivity equivalent of exporting, as it also affects firm-level revenues with the elasticity of ξ.

Having determined firm-level revenues in Eq. (7), solutions for employment $l(\omega)$, wages $w(\omega)$,

[2]The constant $C \equiv [(1-\alpha)/\alpha]^{\beta-\gamma} [\rho(1-\beta)/(1-\gamma)]^{1-\gamma} > 0$ summarizes exogeneous parameters.

and average amenities $a(\omega)$ as a function of $r(\omega)$ can be derived. In order to obtain

$$l(\omega) = CA_L^{\beta} r(\omega)^{1-\gamma}, \qquad a(\omega) = B^{\frac{1}{\delta}} C^{\frac{1}{1-\gamma}\frac{1}{\delta}} r(\omega)^{\frac{1}{\delta}}, \qquad w(\omega) = BC^{\frac{\gamma}{1-\gamma}} A_L^{-\beta} r(\omega)^{\gamma}, \tag{8}$$

The firm's labour demand $l(\omega) = y(\omega)/\varphi(\omega)$ and the average workplace quality $a(\omega)$ from Eq. (4) are evaluated at $y(\omega)$ from Eq. (6). The firm's wage rate $w(\omega)$ then follows from the inverse labour supply function $w(\omega) = a(\omega)^{-\alpha/(1-\alpha)} l(\omega)^{\beta/(1-\beta)} A_L^{-\beta/(1-\beta)}$ evaluated at $a(\omega)$ and $l(\omega)$ from Eq. (8).[3] Evaluating the firm-level outcomes in Eq. (8) at $r(\omega)$ from Eq. (7) reveals that more productive firms offer higher wages and a higher average workplace quality to attract more workers. Because exporting firms are – *ceteris paribus* – larger, they pay an exporter-wage premium and offer higher average amenities relative to a non-exporting firm with similar productivity.

Eqs. (7) and (8) together imply that operating profits $\pi(\omega)$ are a constant share $\mu_\pi = [\sigma\delta - (\sigma-1)(\delta-1)(1-\beta)]/\sigma\delta \in (0,1)$ of the revenues $r(\omega)$, whereas the firm's wage bill $w(\omega)l(\omega)$ accounts for a constant share $\mu_w = \rho(1-\beta)/(1-\gamma) \in (0,1)$ of the revenues $r(\omega)$.

3 General equilibrium

Before determining market entry and the allocation of labour in general equilibrium, detailed microfundations for the demand and supply shifters A_G and A_L are provided.

3.1 Microfoundation for labour supply and goods demand

Following Card et al. (2018) and Egger et al. (2022), it is assumed that workers' workplace choice is governed by two factors. A worker ν cares about the wage rate $w(\omega)$ and the workplace quality $a(\nu,\omega)$ offered by employer ω. The worker-firm-specific workplace quality term $a(\nu,\omega)$ thereby captures the worker's individual preferences for non-monetary job characteristics, for example, the firm's working environment or the worker's commuting distance between residence and workplace. The indirect utility of worker ν working for firm ω therefore equals

$$v(\nu,\omega) = (1-\alpha)\ln[w(\omega)] + \alpha\hat{a}(\nu,\omega) - \bar{v}, \tag{9}$$

in which $\alpha \in (0,1)$ determines the relative importance of non-pecuniary job aspects that are represented by an idiosyncratic amenity draw $\hat{a}(\nu,\omega)$ from a Type I extreme value (Gumbel) distribution with dispersion parameter $\theta/(1-\theta)\alpha > 0$, firm-specific location parameter $\ln[a(\omega)]$, and cumulative density function $\exp\{-a(\omega)^{\alpha(1-\theta)/\theta}\exp[-\hat{a}(\omega)\alpha(1-\theta)/\theta]\}$.[4]

[3] The constant $B \equiv [\alpha/(1-\alpha)]^{(1-\beta)/(1-\gamma)} > 0$ summarizes exogeneous parameters.

[4] The constant utility term $\bar{v} \equiv \Gamma'(1)\theta/(1-\theta)\alpha$ summarizes various exogenous parameters with $\Gamma'(1)$ representing the Euler-Mascheroni constant.

The probability of worker ν to choose a job in a firm ω bringing utility $v(\nu,\omega)$ over all alternative options $\omega' \neq \omega$ is given by

$$\text{Prob}[v(\nu,\omega) \geq \max\{v(\nu,\omega')\}] = \frac{[a(\omega)^{\alpha} w(\omega)^{1-\alpha}]^{\frac{1-\theta}{\theta}}}{\int_{\omega\in\Omega}[a(\omega)^{\alpha} w(\omega)^{1-\alpha}]^{\frac{1-\theta}{\theta}} d\omega}, \tag{10}$$

and depends positively on the firm's average workplace quality $a(\omega)$ and on the firm's wage rate $w(\omega)$ relative to the workplace quality and wages offered by its competitors.[5] The state of the labour market, therefore, is captured by the following quality-weighted wage index

$$W \equiv \left\{ \int_{\omega\in\Omega} [a(\omega)^{\alpha} w(\omega)^{1-\alpha}]^{\frac{1-\theta}{\theta}} d\omega \right\}^{\frac{\theta}{1-\theta}}. \tag{11}$$

The supply of labour $h(\omega) = A_L[a(\omega)^{\alpha} w(\omega)^{1-\alpha}]^{\frac{1-\theta}{\theta}}$ to firm ω is then obtained by the total labour endowment L multiplied by the firm-specific probability of employing a given worker $\left[a(\omega)^{\alpha} w(\omega)^{1-\alpha}/W\right]^{\frac{1-\theta}{\theta}}$, with $A_L \equiv L/W^{\frac{1-\theta}{\theta}}$ summarizing all aggregate variables.

The elasticity $(1-\theta)/\theta$ determines the responsiveness of labour supply with respect to changes in the compensation bundle $a(\omega)^{\alpha} w(\omega)^{1-\alpha}$. if $\theta = 0$, firms do not differ in terms of their workplace quality. Workplaces, therefore, are perceived as perfect substitutes, which is why labour supply becomes perfectly elastic. The labour market then reaches its competitive limit, with all firms paying the same wage as for example in Melitz (2003).

Similar to Ethier (1982) and Egger et al. (2022), the homogeneous consumption good $X = \left[\widehat{M}^{-\frac{1}{\sigma}} \int_{\omega\in\Omega} x(\omega)^{\frac{\sigma-1}{\sigma}} d\omega\right]^{\frac{\sigma}{\sigma-1}}$ is produced by combining the differentiated inputs provided by the manufacturing firms, where Ω represents the set of available inputs. As in Blanchard and Giavazzi (2003) and Egger and Kreickemeier (2009), external scale economies are ruled out by assumption[6] By eliminating external scale economies, which is already well understood from Ethier (1982), the various fixed costs in the model, which are accounted for in units of the final consumption good, are not subject to external increasing returns to scale and therefore do not depend on country size.[7] By normalizing the price of the final consumption good to one, i.e. $P = \left[\widehat{M}^{-1} \int_{\omega\in\Omega} p(\omega)^{1-\sigma} d\omega\right]^{\frac{1}{1-\sigma}} \stackrel{!}{=} 1$, the demand shifter A_G can be solved as $X/\widehat{M}$.

[5]The derivation of Eq. (10) is delegated to Appendix A.1. See also Jha and Rodriguez-Lopez (2019), who demonstrate how the results in Ben-Akiva et al. (1985) can be used to extend the discrete choice problem from Card et al. (2018) to the continuous choice set case.

[6]For more technical details, see Egger and Kreickemeier (2009).

[7]See Jha and Rodriguez-Lopez (2019) for an example, in which fixed costs are subject to external scale economies, which results in the additional parameter constraint $\sigma > 2$, that is needed to ensure that larger countries have more firms, and in a non-constant worker-to-firm ratio, that is an increasing function of country size.

3.2 Market entry

The indifference condition $\pi_d(\varphi_d) = f_d$ yields a productivity level $\varphi_d > 0$ at which a firm makes zero profits. Therefore, the cutoff productivity φ_d separates firms with $\varphi \geq \varphi_d$, choosing to produce from firms with $\varphi < \varphi_d$, choosing to remain inactive.[8] The respective indifference condition for foreign market entry is given by $\pi_x(\varphi_x) - \pi_d(\varphi_x) = f_x$. The share of exporting firms can therefore be derived as

$$\chi = \frac{1 - G(\varphi_x)}{1 - G(\varphi_d)} = \left(\frac{\varphi_d}{\varphi_x}\right)^g = \left[\frac{\pi_d(\varphi_d)}{\pi_d(\varphi_x)}\right]^{\frac{g}{\xi}} = \left[\frac{\pi_d(\varphi_d)}{\pi_x(\varphi_x) - \pi_d(\varphi_x)} \frac{\pi_x(\varphi_x) - \pi_d(\varphi_x)}{\pi_d(\varphi_x)}\right]^{\frac{g}{\xi}} = \left[\frac{f_d}{f_x}(\kappa^\xi - 1)\right]^{\frac{g}{\xi}}. \quad (12)$$

Defining $\bar{r}_d$ as average domestic revenues and $\Delta\bar{r}_x \equiv \int_{\varphi_x}^{\infty} r_x(\varphi_x) - r_d(\varphi_x) dG(\varphi)/[1 - G(\varphi_d)]$ as the average foreign revenues that only accrue to exporting firms, the economy's domestic expenditure share can be solved

$$\lambda = \frac{\bar{r}_d}{\bar{r}_d + \chi\Delta\bar{r}_x} = \frac{r_d(\varphi_d)}{r_d(\varphi_d) + \chi[r_x(\varphi_x) - r_d(\varphi_x)]} = \frac{f_d}{f_d + \chi f_x}. \quad (13)$$

Eq. (13) exploits the direct proportionality between average and cut-off revenues $\bar{r}_d/r_d(\varphi_d) = \Delta\bar{r}_x/[r_x(\varphi_x) - r_d(\varphi_x)] = [g/(g - \xi)]$ that follows form the Pareto distribution for firm-level productivities. Conveniently, $1/\lambda \geq 1$ is a natural openness measure that nicely summarizes the effect of trade frictions, which is why the model is solved in terms of λ (rather than in terms of the underlying parameters τ and f_x). Free market entry requires the expected profits of potential entrants to be zero:

$$0 \stackrel{!}{=} [1 - G(\varphi_d)]\{\bar{\pi} - f_d - \chi f_x\} - f_e, \quad (14)$$

with $[1 - G(\varphi_d)]$ as the *ex ante* probability of entering the market, $\bar{\pi}$ as the expected operating profits, and $f_d + \chi f_x$ as the expected fixed costs associated with market entry.

3.3 Factor allocation

Average operating profits $\bar{\pi} = \mu_\pi[\bar{r}_d + \chi\Delta\bar{r}_x]$ are defined as the sum of average domestic profits and average exporting profits. Using the market entry conditions $\mu_\pi r_d(\varphi_d) = f_d$ and $\mu_\pi[r_x(\varphi_x) - r_d(\varphi_x)] = f_x$ in combination with Eq. (13) allows us to solve for $\bar{\pi} = [g/(g-\xi)]f_d/\lambda$. Substituting this expression into the free entry condition in Eq. (14) then yields the cut-off productivity level

$$\varphi_d = \left(\frac{\xi}{g - \xi}\frac{1}{\lambda}\frac{f_d}{f_e}\right)^{\frac{1}{g}}. \quad (15)$$

[8] Because firm performance can fully be characterised by the firm's productivity level φ and the firm's exporting status $i \in d, x$, the firm-specific index ω is dropped whenever possible for the simplification.

From the inspection of the free entry condition in Eq. (14), it follows that an increase in firms' expected profits by a factor $1/\lambda$ has to be offset by a stronger selection into production (i.e. a lower probability of market entrance $1 - G(\varphi_d)$, which is why firms in the open economy are on average more productive than in the closed economy.

The number of firms M is solved in two steps. At first, according to the full-employment condition, the number of firms $M = L/\bar{l}$ is determined by the ratio of aggregate labour endowment L to the average labour demand per firm $\bar{l}$. Average employment $\bar{l} = \{g/[g - (1-\gamma)\xi]\} l_d(\varphi_d)/\Lambda$ thereby is proportional to the cut-off employment level of the least productive firm $l_d(\varphi_d)$ with

$$\frac{1}{\Lambda} = 1 + \left\{ \left[\left(\frac{1}{\lambda} - 1\right)^{\frac{\xi}{g}} \left(\frac{f_d}{f_x}\right)^{\frac{\xi - g}{g}} + 1 \right]^{1-\gamma} - 1 \right\} \left[\left(\frac{1}{\lambda} - 1\right) \frac{f_d}{f_x} \right]^{\frac{g-(1-\gamma)\xi}{g}} \geq 1 \tag{16}$$

as a factor of proportionality that accounts for disproportionately higher employment levels among exporting firms.[9] Note that $1/\Lambda$ is increasing in our openness measure $1/\lambda$, taking a value of $1/\Lambda = 1$ for $1/\lambda = 1$. With constant mark-ups and mark-downs the cut-off employment level $l_d(\varphi_d)$ follows from $w_d(\varphi_d) l_d(\varphi_d)/\mu_w = r_d(\varphi_d) = \pi_d(\varphi_d)/\mu_\pi$ as $l_d(\varphi_d) = (\mu_w/\mu_\pi) f_d / w_d(\varphi_d)$ with the corresponding cut-off wage following from $p_d(\varphi_d) = (1/\rho) w_d(\varphi_d)/\varphi_d$ as $w_d(\varphi_d) = \rho \varphi_d p_d(\varphi_d)$. It moreover can be show that the aggregate price index $P = 1$ is proportional to the cut-off price level such that $p_d(\varphi_d) = [g/(g-\xi)]^{1/(\sigma-1)} (1/\lambda)^{1/(\sigma-1)}$.[10] Putting the above pieces together allows us to solve for cut-off employment and cut-off wage levels

$$l_d(\varphi_d) = \frac{\mu_w}{\mu_\pi} \frac{f_d}{w_d(\varphi_d)} = \frac{\mu_w}{\mu_\pi} \frac{f_d}{\rho} \frac{1}{\varphi_d} \frac{1}{p_d(\varphi_d)} = D \lambda^{\frac{1}{g} + \frac{1}{\sigma - 1}}, \tag{17}$$

in which φ_d from Eq. (15) has been substituted.[11] The number of firms follows finally as $M = L/\bar{l} = \{[g - (1-\gamma)\xi]/g\} \Lambda L / l_d(\varphi_d)$ with $l_d(\varphi_d)$ given in Eq. (17).

3.4 Aggregate supply and demand shifters

The aggregate supply and demand shifters

$$A_L = \left(\frac{D}{C}\right)^{\frac{1}{\beta}} \left(\frac{\mu_\pi}{f_d}\right)^{\frac{1}{\beta}\frac{1}{1-\gamma}} \lambda^{\frac{1}{\beta}\left(\frac{1}{g} + \frac{1}{\sigma-1}\right)} \quad \text{and} \quad A_G = \left[\left(\frac{f_d}{\mu_\pi}\right)^{\frac{1}{\xi} - \frac{1}{1-\gamma}} \frac{1}{D} \left(\frac{g - \xi}{g} \frac{f_e}{f_d}\right)^{\frac{1}{g}} \right]^{\sigma - 1} \frac{1}{\lambda} \tag{18}$$

can be derived in two steps: Evaluating $l_d(\varphi) = C A_L^\beta r_d(\varphi)^{1-\gamma}$ in Eq. (8) at the domestic market entry condition $r_d(\varphi_d) = f_d/\mu_\pi$ and $l_d(\varphi_d)$ from Eq. (17) allows us to solve for A_L. The solution for A_L is then used to solve for A_G from Eq. (7) evaluated at the domestic market entry condition

[9] The derivation of Λ in Eq. (16) is delegeted to Appendix A.2.

[10] The aggregate price index $P = 1$ is linked to the cut-off price level $p_d(\varphi_d)$ in Appendix A.3.

[11] The constant $D \equiv \frac{\mu_w}{\mu_\pi} \frac{f_d}{\rho} \left(\frac{f_e}{f_d}\right)^{\frac{1}{g}} \left(\frac{g}{\xi}\right)^{\frac{1}{g}} \left(\frac{g-\xi}{g}\right)^{\frac{1}{g} + \frac{1}{\sigma-1}}$ summarizes exogenous parameters.

$r_d(\varphi_d) = f_d/\mu_\pi$.

4 Gains from trade

Aggregate welfare V is given by workers' expected utility conditional on optimal workplace choice $V = \mathrm{E}[v(\nu,\omega)|v(\nu,\omega) \geq \max_{\omega' \neq \omega}\{v(\nu,\omega')\}] = \ln W$.[12] Because $W = (L/A_L)^{\theta/(1-\theta)}$ the solution of A_L from Eq. (18) can be used to solve aggregate welfare as

$$V = \text{Const.} + \frac{\theta}{1-\theta}\ln L + \Delta \quad \text{with} \quad \Delta \equiv \underbrace{\frac{1-\alpha}{1-\beta}\left(\frac{1}{g} + \frac{1}{\sigma-1}\right)\ln\left(\frac{1}{\lambda}\right)}_{\text{gains from trade}}, \tag{19}$$

Where $\Delta \geq 0$ evaluates the welfare gains from trade. Similar to Arkolakis et al. (2012), Eq. (19) uses the domestic expenditure share $(1/\lambda)$ and the trade elasticity to derive predictions on welfare changes caused by moving from autarky to any open economy equilibrium. The magnitude of the trade elasticity thereby also depends on the labour market imperfection.

Using $a(\omega)$ and $w(\omega)$ from Eq. (8) allows to rewrite the quality-weighted wage index W from Eq. (11) as $W = \{g/[g-(1-\gamma)\xi]\}^{\theta/(1-\theta)} M^{\theta/(1-\theta)} [a_d(\varphi_d)/\Lambda^{\theta/(1-\theta)}]^{\alpha} [w_d(\varphi_d)/\Lambda^{\theta/(1-\theta)}]^{1-\alpha}$. With the cut-off wage $w_d(\varphi_d)$ and the number of firms M following from Eq. (17), the gains from trade can be decomposed into the following three components

$$\Delta = \Delta_c + \Delta_v + \Delta_a, \tag{20}$$

with

$$\begin{aligned}
\Delta_c &\equiv (1-\alpha)\left(\frac{1}{g} + \frac{1}{\sigma-1}\right)\ln\left(\frac{1}{\lambda}\right) + (1-\alpha)\frac{\theta}{1-\theta}\ln\left(\frac{1}{\Lambda}\right) && \text{(consumption gains)},\\
\Delta_v &\equiv \frac{\theta}{1-\theta}\left(\frac{1}{g} + \frac{1}{\sigma-1}\right)\ln\left(\frac{1}{\lambda}\right) - \frac{\theta}{1-\theta}\ln\left(\frac{1}{\Lambda}\right) && \text{(variety gains/losses)},\\
\Delta_a &\equiv \alpha\frac{\theta}{1-\theta}\ln\left(\frac{1}{\Lambda}\right) && \text{(workplace quality gains)}
\end{aligned} \tag{21}$$

To quantify the importance of these three welfare channels, the relative contribution of each channel can be computed as $\hat{\Delta}_s \equiv \Delta_s/\Delta \;\; \forall \;\; s \in \{c, v, a\}$. The effects that trade liberalization has on each welfare channel can then be summarized in Proposition 1.

Proposition 1 *An increase in a country's trade openness, measured by an increase in* $1/\lambda$
a) leads to aggregate welfare gains through increased consumption ($\hat{\Delta}_c$) *and workplace quality* ($\hat{\Delta}_a$) *upgrade.*
b) leads to aggregate welfare losses due to the reduced workplace variety ($\hat{\Delta}_v$) *available on the labour*

[12]The derivation of aggregate welfare is delegated to Appendix A.4.

market.

Proof. *Formal derivations in Appendix B.*

Figure 1 illustrates the relative contributions of $\hat{\Delta}_c$, $\hat{\Delta}_v$, and $\hat{\Delta}_a$ through which the gains from trade materialize. Households benefit from trade liberalisation in terms of a higher average real income and, hence, more consumption, which increases aggregate welfare by $\hat{\Delta}_c \geq 0$.

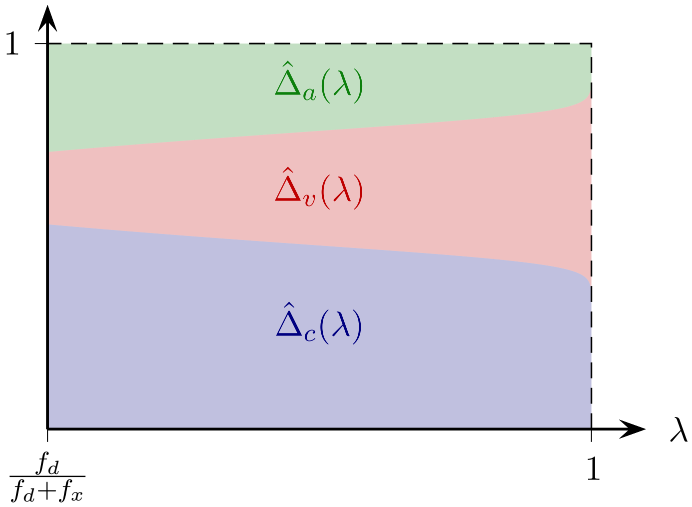

Figure 1: *Decomposing Normalised Gains from Trade*

In addition to these familiar real-income gains, there are two non-pecuniary welfare effects that materialize through the labour market: Workers are less likely to find their ideal employer when having a limited choice of potential workplaces as a consequence, aggregate welfare decreases ambiguously by $\hat{\Delta}_v < 0$, relative to autarky. Because workers value not only a broad workplace choice but also the quality of their workplace amenities, there are workplace quality gains of $\hat{\Delta}_a > 0$, which follow from the endogenous workplace quality upgrading of exporting firms.

5 Quantitative Results

This section provides the quantitative relevance of the obtained results. The primary data source of the quantitative exercise is the World Input-Output Database (WIOD) constructed by Timmer et al. (2015). The data set covers 28 EU and 15 other major countries, and the WIOD 2016 release for 2014 is used for the analysis. All the sectors are aggregated at the country level, and the domestic expenditure share is calculated as follows: $\lambda_{jj} = 1 - \sum_{i \neq j} X_{ij} / \sum_{i=1}^{n} X_{ij}$. Where λ_{jj} is the domestic expenditure share for a given country j. $\sum_{i \neq j} X_{ij}$ is a total imports and $\sum_{i=1} X_{ij}$ is the total expenditure by country j.

As in Melitz and Redding (2015), the elasticity of substitution between varieties σ and the shape parameter for the Pareto productivity distribution g are equal to 4 and 4.25, respectively. The theta parameter equals 0.4, which is borrowed from the recent literature on estimating the firm-specific labour supply elasticity (see Sokolova and Sorensen (2018), for an overview). The last remaining parameter in the model is α, which captures the relative importance of workplace quality in the workers preferences. Due to the data unavailability, the welfare gains from trade are calculated for each possible value of α. While the different alpha values change the magnitude of the quantitive results, they still do not affect the main predictions of the theoretical model developed in this paper. In particular, the welfare gains from trade under monopsonistic competition with endogenous workplace quality upgrading are always higher than the gains from trade under frictionless labour markets. In the baseline results, α is equal to 0.2. Appendix C reports the welfare gains from trade for alternative values of α.

The main results are reported in Table 1. The second column reports the welfare gains obtained under the assumption of a perfectly competitive labour market. The third column reports the welfare gains obtained under monopolistic competition with endogenous workplace quality upgrades. In the second column, the welfare gains from trade tend to be below 4% for the big economies. On the contrary, smaller countries, such as Ireland (26.9%) or Estonia (17.65%), benefit more from trade openness (see also Costinot and Rodríguez-Clare (2014)).

This quantitative exercise also shows that, for each country reported in Table 1, the gains from trade are under monopsonistic competition with endogenous workplace quality upgrading. Aggregate welfare gains are higher under monopsonistic competition as trade liberalization reduces monopsony distortions by relocating domestic resources from least productive to more productive firms (see also Egger et al. (2022)). In addition to this, the gains from trade not only materialise in terms of a higher purchasing power but also in terms of a higher average workplace quality.

Country	Perfect Comp. Labor Market	Monopsonistic Comp. With Amenity Upgrade
AUS	4.88%	7.16%
AUT	12.26%	17.99%
BEL	17.31%	25.39%
BGR	13.99%	20.51%
BRA	3.46%	5.08%
CAN	8.03%	11.78%
CHE	9.85%	14.44%
CHN	2.65%	3.89%
CYP	13.63%	19.99%
CZE	15.55%	22.81%
DEU	9.36%	13.73%
DNK	12.19%	17.88%
ESP	7.03%	10.32%
EST	17.65%	25.88%
FIN	9.22%	13.52%
FRA	7.29%	10.69%
GBR	6.83%	10.02%
GRC	9.13%	13.39%
HRV	11.73%	17.2%
HUN	21.22%	31.12%
IDN	5.51%	8.09%
IND	4.27%	6.26%
IRL	26.9%	39.46%
ITA	6.05%	8.87%
JPN	4.67%	6.85%
KOR	8.22%	12.06%
LTU	19.77%	29.0%
LUX	32.25%	47.3%
LVA	11.8%	17.31%
MEX	8.12%	11.91%
MLT	27.4%	40.19%
NLD	15.01%	22.01%
NOR	7.73%	11.34%
POL	10.49%	15.38%
PRT	9.6%	14.07%
ROU	9.4%	13.79%
ROW	9.16%	13.43%
RUS	5.37%	7.87%
SVK	17.93%	26.29%
SVN	16.21%	23.77%
SWE	10.07%	14.77%
TUR	7.39%	10.83%
USA	3.47%	5.08%
Average	11.43%	16.76%

Table 1: *Welfare Gains from Trade. All data is from WIOD. Trade elasticiteis are from Melitz and Redding (2015). Labor supply elasticity is from Sokolova and Sorensen (2018). The results in the first column are obtained by seting $\beta = 0$ and $\alpha = 0$ in Eq.* (19)

.

6 Conclusion

This paper introduces endogenous workplace quality choice into an international trade model with a monopsonistically competitive labour market, in which firms compete for potential employees by offering them a combination of monetary and non-monetary benefits. To attract the workers required to produce for the foreign market in addition to the domestic market, exporting firms have to offer more attractive compensation to their employees than comparable non-exporting firms, which is why they are not only paying higher wages but also offering better workplace amenities. The gains from trade, therefore, not only materialise in terms of a higher purchasing power but also in terms of a higher average workplace quality. Welfare metrics, which exclusively focus on real income gains, may therefore are likely to underestimate the gains from globalisation.

A Appendix

A.1 Microfundation labour supply

As in Egger et al. (2022), for a given draw $\hat{a}(\nu,\omega)$ the probability of worker ν to choose firm ω is given by $\text{Prob}[v(\nu,\omega) \geq \max_{\omega' \neq \omega}\{v(\nu,\omega')\}|\hat{a}(\nu,\omega)] = \text{Prob}[\,\cdot\,|\hat{a}(\nu,\omega)]$ with

$$\begin{aligned}\text{Prob}[\,\cdot\,|\hat{a}(\nu,\omega)] &= \prod_{\omega'\neq\omega} \text{Prob}\left[v(\nu,\omega) \geq v(\nu,\omega')|\hat{a}(\nu,\omega)\right] \\ &= \prod_{\omega'\neq\omega} \text{Prob}\left(\hat{a}(\nu,\omega') \leq \hat{a}(\nu,\omega) + \frac{1-\alpha}{\alpha}\left\{\ln[w(\omega)] - \ln[w(\omega')]\right\}\right) \qquad (22) \\ &= \prod_{\omega'\neq\omega} \exp\left(-a(\omega')^{\frac{1-\theta}{\theta}\alpha} \exp\left\{-\frac{1-\theta}{\theta}\left[\alpha\hat{a}(\nu,\omega) + (1-\alpha)\{\ln[w(\omega)] - \ln[w(\omega')]\}\right]\right\}\right).\end{aligned}$$

The *ex ante* probability $\text{Prob}[v(\nu,\omega) \geq \max_{\omega'\neq\omega}\{v(\nu,\omega')\}] = \text{Prob}[\,\cdot\,]$ of worker ν choosing firm ω can then be computed as

$$\begin{aligned}\text{Prob}[\,\cdot\,] &= \int_{-\infty}^{\infty} \text{Prob}[v(\nu,\omega) \geq \max_{\omega'\neq\omega}\{v(\nu,\omega')\}|\hat{a}(\nu,\omega)] \\ &\times \frac{1-\theta}{\theta}\alpha a(\omega)^{\frac{1-\theta}{\theta}\alpha} \exp\left[-\frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega)\right] \exp\left\{-a(\omega)^{\frac{1-\theta}{\theta}\alpha}\exp\left[-\frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega)\right]\right\} d\hat{a}(\nu,\omega) \\ &= \int_{-\infty}^{\infty} \prod_{\omega'\neq\omega} \exp\left(-a(\omega')^{\frac{1-\theta}{\theta}\alpha}\exp\left\{-\frac{1-\theta}{\theta}\left[\alpha\hat{a}(\nu,\omega) + (1-\alpha)\{\ln[w(\omega)] - \ln[w(\omega')]\}\right]\right\}\right) \\ &\times \frac{1-\theta}{\theta}\alpha a(\omega)^{\frac{1-\theta}{\theta}\alpha} \exp\left[-\frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega)\right] \exp\left\{-a(\omega)^{\frac{1-\theta}{\theta}\alpha}\exp\left[-\frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega)\right]\right\} d\hat{a}(\nu,\omega) \\ &= \int_{-\infty}^{\infty} \exp\Bigg[-a(\omega)^{\frac{1-\theta}{\theta}\alpha}\exp\left[-\frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega)\right] \qquad (23) \\ &\times \left(1 + \sum_{\omega'\neq\omega}\exp\left\{-\frac{1-\theta}{\theta}[(1-\alpha)\{\ln[w(\omega)] - \ln[w(\omega')]\} + \alpha\{\ln[a(\omega)] - \ln[a(\omega')]\}]\right\}\right)\Bigg] \\ &\times \frac{1-\theta}{\theta}\alpha a(\omega)^{\frac{1-\theta}{\theta}\alpha}\exp\left[-\frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega)\right] d\hat{a}(\nu,\omega) \\ &= \int_{-\infty}^{\infty} \exp\left\{-a(\omega)^{\frac{1-\theta}{\theta}\alpha}\exp\left[-\frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega)\right]\left(\sum_{\omega'}\left\{\left[\frac{a(\omega')}{a(\omega)}\right]^{\alpha}\left[\frac{w(\omega')}{w(\omega)}\right]^{1-\alpha}\right\}^{\frac{1-\theta}{\theta}}\right)\right\} \\ &\times \frac{1-\theta}{\theta}\alpha a(\omega)^{\frac{1-\theta}{\theta}\alpha}\exp\left[-\frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega)\right] d\hat{a}(\nu,\omega).\end{aligned}$$

Introducing the definition $b(\nu,\omega) = a(\omega)^{\frac{1-\theta}{\theta}\alpha}\exp\{-[(1-\theta)/\theta]\alpha\hat{a}(\nu,\omega)\}$ with the corresponding derivative $db(\nu,\omega) = -[(1-\theta)/\theta]\alpha a(\omega)^{\frac{1-\theta}{\theta}\alpha}\exp\{-[(1-\theta)/\theta]\alpha\hat{a}(\nu,\omega)\}\,d\hat{a}(\nu,\omega)$ allows us to change the variable of integration

$$
\begin{aligned}
\text{Prob}[v(\nu,\omega) \geq \max_{\omega' \neq \omega}\{v(\nu,\omega')\}] &= \int_{-\infty}^{\infty} \exp\left(-b(\nu,\omega)\sum_{\omega'}\left\{\left[\frac{a(\omega')}{a(\omega)}\right]^{\alpha}\left[\frac{w(\omega')}{w(\omega)}\right]^{1-\alpha}\right\}^{\frac{1-\theta}{\theta}}\right) db(\nu,\omega) \\
&= \left|\frac{\exp\left(-b(\nu,\omega)\sum_{\omega'}\left\{\left[\frac{a(\omega')}{a(\omega)}\right]^{\alpha}\left[\frac{w(\omega')}{w(\omega)}\right]^{1-\alpha}\right\}^{\frac{1-\theta}{\theta}}\right)}{\sum_{\omega'}\left\{\left[\frac{a(\omega')}{a(\omega)}\right]^{\alpha}\left[\frac{w(\omega')}{w(\omega)}\right]^{1-\alpha}\right\}^{\frac{1-\theta}{\theta}}}\right|_{0}^{\infty} \qquad (24) \\
&= \left[\frac{a(\omega)^{\alpha}w(\omega)^{1-\alpha}}{W}\right]^{\frac{1-\theta}{\theta}},
\end{aligned}
$$

with $W \equiv \{\sum_{\omega'}[a(\omega')^{\alpha}w(\omega')^{1-\alpha}]^{\frac{1-\theta}{\theta}}\}^{\frac{\theta}{1-\theta}}$, which in the notation of measure and integration theory can be expressed as the definite integral

$$
W = \left\{\int_{\omega\in\Omega}\left[a(\omega)^{\alpha}w(\omega)^{1-\alpha}\right]^{\frac{1-\theta}{\theta}} d\omega\right\}^{\frac{\theta}{1-\theta}}, \qquad (25)
$$

with Ω denoting the set of firms.

A.2 Aggregate labour demand

Following Egger et al. (2022), the full-employment condition aggregate labour endowment L has to equal aggregate labour demand

$$
\begin{aligned}
L &= M\left[\int_{\varphi_d}^{\infty} l_d(\varphi)\frac{dG(\varphi)}{1-G(\varphi_d)} + \int_{\varphi_d}^{\infty} l_x(\varphi) - l_d(\varphi)\frac{dG(\varphi)}{1-G(\varphi_d)}\right] \qquad (26) \\
&= Ml_d(\varphi_d)\left[\int_{\varphi_d}^{\infty}\frac{l_d(\varphi)}{l_d(\varphi_d)}\frac{dG(\varphi)}{1-G(\varphi_d)} + \int_{\varphi_x}^{\infty}\frac{l_x(\varphi)-l_d(\varphi)}{l_d(\varphi)}\frac{l_d(\varphi)}{l_d(\varphi_x)}\frac{l_d(\varphi_x)}{l_d(\varphi_d)}\frac{1-G(\varphi_x)}{1-G(\varphi_d)}\frac{dG(\varphi)}{1-G(\varphi_x)}\right].
\end{aligned}
$$

According to Eq. (8), $l_d(\varphi)/l_d(\varphi_i) = (\varphi/\varphi_i)^{(1-\gamma)\xi}\ \forall\ i \in \{d,x\}$ and $[l_x(\varphi)-l_d(\varphi)]/l_d(\varphi) = \kappa^{(1-\gamma)\xi}-1$. Together the Eqs. (12) and (8) moreover imply that $l_d(\varphi_x)/l_d(\varphi_d) = \chi^{-(1-\gamma)\xi/g}$. Using $[1-G(\varphi_x)]/[1-G(\varphi_d]$ from Eq. (12) therefore allows to derive $L = \{g/[g-(1-\gamma)\xi]\}\frac{Ml_d(\varphi_d)}{\Lambda}$ with $\frac{1}{\Lambda} \equiv 1 + [\kappa^{(1-\gamma)\xi}-1]\chi^{[g-(1-\gamma)\xi]/g}$. Using the Eqs. (12) and (13) to replace κ and χ yields $\frac{1}{\Lambda}$ as defined in Eq. (16).

A.3 Aggregate price index

Following Egger et al. (2022) the aggregate price index is defined as

$$\begin{aligned} P^{1-\sigma} &= \int_{\varphi_d}^{\infty} p_d(\varphi)^{1-\sigma} \frac{dG(\varphi_d)}{1-G(\varphi_d)} + \int_{\varphi_d}^{\infty} p_x(\varphi)^{1-\sigma} + [\tau p_x(\varphi)]^{1-\sigma} \frac{dG(\varphi_d)}{1-G(\varphi_d)} \\ &= p_d(\varphi_d)^{1-\sigma} \Bigg\{ \int_{\varphi_d}^{\infty} \left[\frac{p_d(\varphi)}{p_d(\varphi_d)}\right]^{1-\sigma} \frac{dG(\varphi_d)}{1-G(\varphi_d)} \\ &+ \int_{\varphi_x}^{\infty} \frac{p_x(\varphi)^{1-\sigma} + [\tau p_x(\varphi)]^{1-\sigma} - p_d(\varphi)^{1-\sigma}}{p_d(\varphi)^{1-\sigma}} \left[\frac{p_d(\varphi)}{p_d(\varphi_x)} \frac{p_d(\varphi_x)}{p_d(\varphi_d)}\right]^{1-\sigma} \frac{1-G(\varphi_x)}{1-G(\varphi_d)} \frac{dG(\varphi)}{1-G(\varphi_x)} \Bigg\}. \end{aligned} \tag{27}$$

Eqs. (7) and (8) together imply that $[p_d(\varphi)/p_d(\varphi_d)]^{1-\sigma} = \{[w_d(\varphi)/\varphi]/[w_d(\varphi_d)/\varphi_d]\}^{1-\sigma} = (\varphi/\varphi_d)^{\xi}$ and that $[p_d(\varphi_x)/p_d(\varphi_d)]^{1-\sigma} = \{[w_d(\varphi_x)/\varphi_x]/[w_d(\varphi_d)/\varphi_d]\}^{1-\sigma} = (\varphi_x/\varphi_d)^{\xi} = r_d(\varphi_x)/r_d(\varphi_d)$. In combination with the definition of κ from Eq. (2) the Eqs. (7) and (8) moreover imply that $(1+\tau^{1-\sigma})p_x(\varphi)/p_d(\varphi) = \kappa^{\xi} = r_x(\varphi_x)/r_d(\varphi_x)$. In the light of the market entry conditions $r_d(\varphi_d) = f_d/\mu_\pi$ and $r_x(\varphi_x) - r_d(\varphi_x) = f_x/\mu_\pi$ the aggregate price index can then be solved as $P = [g/(g-\xi)]^{1/(\sigma-1)}(1+\chi f_x/f_d)^{1/(1-\sigma)} p_d(\varphi_d) = [g/(g-\xi)]^{1/(1-\sigma)}(1/\lambda)^{1/(1-\sigma)} p_d(\varphi_d)$.

A.4 Aggregate welfare

As already shown in Egger et al. (2022) expected utility equals

$$\mathrm{E}[v(\nu,\omega)|v(\nu,\omega) \geq \max_{\omega'\neq\omega}\{v(\nu,\omega')\}] = (1-\alpha)\ln[w(\omega)] + \alpha\,\mathrm{E}[\hat{a}(\nu,\omega)|v(\nu,\omega) \geq \max_{\omega'\neq\omega}\{v(\nu,\omega')\}] - \bar{v}. \tag{28}$$

The *ex ante* expected amenity level of workers choosing firm ω can be computed as

$$\begin{aligned} \mathrm{E}[\hat{a}(\omega)|v(\nu,\omega) \geq \max_{\omega'\neq\omega}\{v(\nu,\omega')\}] &= \frac{1}{\mathrm{Prob}[v(\nu,\omega) \geq \max_{\omega'\neq\omega}\{v(\nu,\omega')\}]} \\ &\times \int_{-\infty}^{\infty} a(\omega)^{\frac{1-\theta}{\theta}\alpha} \exp\left[-\frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega)\right] \frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega) \\ &\times \exp\Bigg\{ -a(\omega)^{\frac{1-\theta}{\theta}\alpha} \exp\left[-\frac{1-\theta}{\theta}\alpha\hat{a}(\nu,\omega)\right] \left[\frac{W}{a(\omega)^{\alpha} w(\omega)^{1-\alpha}}\right]^{\frac{1-\theta}{\theta}} \Bigg\} d\hat{a}(\nu,\omega). \end{aligned} \tag{29}$$

Defining $\hat{b}(\nu,\omega) \equiv \{W/[a(\omega)^{\alpha} w(\omega)^{1-\alpha}\}^{\frac{1-\theta}{\theta}} b(\nu,\omega)$, such that $d\hat{b}(\nu,\omega) = \{W/[a(\omega)^{\alpha} w(\omega)^{1-\alpha}\}^{\frac{1-\theta}{\theta}} db(\nu,\omega)$, and $\hat{a}(\nu,\omega) = -\frac{\theta}{1-\theta}\frac{1}{\alpha}\ln[\hat{b}(\nu\omega)] + \frac{1}{\alpha}\ln(W) - \frac{1-\alpha}{\alpha}\ln[w(\omega)]$, can be computed

$$\begin{aligned} \mathrm{E}[\hat{a}(\omega)|v(\nu,\omega) \geq \max_{\omega'\neq\omega}\{v(\nu,\omega')\}] &= -\frac{\theta}{1-\theta}\frac{1}{\alpha}\int_{0}^{\infty} \ln[\hat{b}(\nu,\omega)] \exp[-\hat{b}(\nu,\omega)] d\hat{b}(\nu,\omega) \\ &+ \frac{1}{\alpha}\ln(W) - \frac{1-\alpha}{\alpha}\ln[w(\omega)], \end{aligned} \tag{30}$$

which implies that $\mathrm{E}[v(\nu,\omega)|v(\nu,\omega) \geq \max_{\omega'\neq\omega}\{v(\nu,\omega')\}] = \ln(W)$.

B Derivation and discussion of Proposition 1

Relative contribution of each partial effect can be computed as $\hat{\Delta}_s \equiv \Delta_s/\Delta \;\forall\; s \in \{c, v, a\}$

$$\begin{aligned}
\hat{\Delta}_c &= (1-\beta)\left[1 + \frac{\theta}{1-\theta}\left(\frac{1}{g} + \frac{1}{\sigma-1}\right)^{-1}\frac{\ln(\Lambda)}{\ln(\lambda)}\right],\\
\hat{\Delta}_v &= \beta\left[1 - \left(\frac{1}{g} + \frac{1}{\sigma-1}\right)^{-1}\frac{\ln(\Lambda)}{\ln(\lambda)}\right],\\
\hat{\Delta}_a &= \beta\alpha\left(\frac{1}{g} + \frac{1}{\sigma-1}\right)^{-1}\frac{\ln(\Lambda)}{\ln(\lambda)}.
\end{aligned} \tag{31}$$

The derivative of each partial effect in Eq. B with respect to λ can be computed as

$$\frac{d\hat{\Delta}_c}{d\lambda} = (1-\beta)\frac{\theta}{1-\theta}\left(\frac{1}{g} + \frac{1}{\sigma-1}\right)^{-1}\left[\ln\left(\frac{1}{\lambda}\right)\right]^{-1}\frac{1}{\lambda}\left[\frac{\ln(\Lambda)}{\ln(\lambda)} - \frac{d\Lambda}{d\lambda}\frac{\lambda}{\Lambda}\right], \tag{32}$$

$$\frac{d\hat{\Delta}_v}{d\lambda} = -\beta\left(\frac{1}{g} + \frac{1}{\sigma-1}\right)^{-1}\left[\ln\left(\frac{1}{\lambda}\right)\right]^{-1}\frac{1}{\lambda}\left[\frac{\ln(\Lambda)}{\ln(\lambda)} - \frac{d\Lambda}{d\lambda}\frac{\lambda}{\Lambda}\right], \tag{33}$$

$$\frac{d\hat{\Delta}_a}{d\lambda} = \beta\alpha\left(\frac{1}{g} + \frac{1}{\sigma-1}\right)^{-1}\left[\ln\left(\frac{1}{\lambda}\right)\right]^{-1}\frac{1}{\lambda}\left[\frac{\ln(\Lambda)}{\ln(\lambda)} - \frac{d\Lambda}{d\lambda}\frac{\lambda}{\Lambda}\right], \tag{34}$$

with

$$\frac{d\Lambda}{d\lambda}\frac{\lambda}{\Lambda} = \left\{1 - (1-\gamma)\frac{\xi}{g}\left[1 + \left(\frac{1}{\lambda} - 1\right)^{\frac{\xi}{g}}\left(\frac{f_d}{f_x}\right)^{\frac{\xi-g}{g}}\right]^{-1}\right\}\frac{1-\Lambda}{1-\lambda} < 1, \tag{35}$$

due to $\lambda \leq \Lambda$. In the following, the proof that $\frac{\ln(\Lambda)}{\ln(\lambda)} - \frac{d\Lambda}{d\lambda}\frac{\lambda}{\Lambda} \leq 0$ is obtained by contradiction. Let assume that $\frac{\ln(\Lambda)}{\ln(\lambda)} - \frac{d\Lambda}{d\lambda}\frac{\lambda}{\Lambda} > 0$, which is equivalent to

$$\Psi(\lambda) \equiv \frac{\ln(\Lambda)}{1-\Lambda}\frac{1-\lambda}{\ln(\lambda)} > \left\{1 - (1-\gamma)\frac{\xi}{g}\left[1 + \left(\frac{1}{\lambda} - 1\right)^{\frac{\xi}{g}}\left(\frac{f_d}{f_x}\right)^{\frac{\xi-g}{g}}\right]^{-1}\right\}. \tag{36}$$

For Eq. (36) to hold at all possible parameter values (e.g. $g \to \infty$) it is required that $\Psi(\lambda) > 1$. Note that $\lim_{\lambda\to 1}\Psi(\lambda) = 1$. A contradiction would therefore arise if $d\Psi(\lambda)/d\lambda > 0$. Note that

$$\begin{aligned}
\frac{d\Psi(\lambda)}{d\lambda} = \frac{\ln(\Lambda)}{\ln(\lambda)}\frac{1}{1-\Lambda}\Bigg\{&\frac{1-\lambda}{\lambda}\frac{\Lambda}{1-\Lambda}\left[\frac{\ln(\Lambda)}{\ln(\lambda)} - \frac{1-\Lambda}{\Lambda}\frac{\lambda}{1-\lambda}\right]\\
&+ \frac{1-\lambda}{\lambda}\left[\frac{1}{\ln(1/\Lambda)} - \frac{\Lambda}{1-\Lambda}\right]\left[\frac{\ln(\Lambda)}{\ln(\lambda)} - \frac{d\Lambda}{d\lambda}\frac{\lambda}{\Lambda}\right]\Bigg\},
\end{aligned} \tag{37}$$

has a positive sign if $\frac{\ln(\Lambda)}{\ln(\lambda)} > \frac{d\Lambda}{d\lambda}\frac{\lambda}{\Lambda}$ given that $\frac{1-\Lambda}{\Lambda} \geq \ln(1/\Lambda) \;\forall\; \Lambda \in [0,1]$ and $\ln(\Lambda)\Lambda/(1-\Lambda) < \ln(\lambda)\lambda/(1-\lambda)$ if $\Lambda > \lambda$. Therefore it can be concluded that $\frac{\ln(\Lambda)}{\ln(\lambda)} - \frac{d\Lambda}{d\lambda}\frac{\lambda}{\Lambda} > 0$ implies $d\Psi(\lambda)/d\lambda > 0$ and $\Psi(\lambda) < 1$, which contradicts $\frac{\ln(\Lambda)}{\ln(\lambda)} - \frac{d\Lambda}{d\lambda}\frac{\lambda}{\Lambda} > 0$. This complets the proof.

C Welfare gains from trade under the different values of α parameters

Country	Perfect Comp. Labor Market	Monopsonistic Comp. With Amenity Upgrade
AUS	4.88%	7.64%
AUT	12.26%	19.21%
BEL	17.31%	27.12%
BGR	13.99%	21.91%
BRA	3.46%	5.42%
CAN	8.03%	12.58%
CHE	9.85%	15.42%
CHN	2.65%	4.16%
CYP	13.63%	21.35%
CZE	15.55%	24.36%
DEU	9.36%	14.67%
DNK	12.19%	19.09%
ESP	7.03%	11.02%
EST	17.65%	27.65%
FIN	9.22%	14.44%
FRA	7.29%	11.42%
GBR	6.83%	10.7%
GRC	9.13%	14.3%
HRV	11.73%	18.38%
HUN	21.22%	33.24%
IDN	5.51%	8.64%
IND	4.27%	6.68%
IRL	26.9%	42.15%
ITA	6.05%	9.48%
JPN	4.67%	7.32%
KOR	8.22%	12.88%
LTU	19.77%	30.98%
LUX	32.25%	50.52%
LVA	11.8%	18.49%
MEX	8.12%	12.72%
MLT	27.4%	42.93%
NLD	15.01%	23.51%
NOR	7.73%	12.11%
POL	10.49%	16.43%
PRT	9.6%	15.03%
ROU	9.4%	14.73%
ROW	9.16%	14.35%
RUS	5.37%	8.41%
SVK	17.93%	28.09%
SVN	16.21%	25.4%
SWE	10.07%	15.78%
TUR	7.39%	11.57%
TWN	12.89%	20.2%
USA	3.47%	5.43%

Table 2: *Welfare Gains from Trade. All data is from WIOD. Trade elasticiteis are from Melitz and Redding (2015), $\sigma = 4$ and $g = 4.25$. Labor supply elasticity is from Sokolova and Sorensen (2018), $\theta = 0.4$. $\alpha = 0.1$ The results in the first column are obtained by setting $\beta = 0$ and $\alpha = 0$ in Eq.* (19)

.

Country	Perfect Comp. Labor Market	Monopsonistic Comp. With Amenity Upgrade
AUS	4.88%	5.2%
AUT	12.26%	13.08%
BEL	17.31%	18.47%
BGR	13.99%	14.92%
BRA	3.46%	3.69%
CAN	8.03%	8.56%
CHE	9.85%	10.5%
CHN	2.65%	2.83%
CYP	13.63%	14.54%
CZE	15.55%	16.59%
DEU	9.36%	9.98%
DNK	12.19%	13.0%
ESP	7.03%	7.5%
EST	17.65%	18.82%
FIN	9.22%	9.83%
FRA	7.29%	7.77%
GBR	6.83%	7.29%
GRC	9.13%	9.74%
HRV	11.73%	12.51%
HUN	21.22%	22.63%
IDN	5.51%	5.88%
IND	4.27%	4.55%
IRL	26.9%	28.7%
ITA	6.05%	6.45%
JPN	4.67%	4.98%
KOR	8.22%	8.77%
LTU	19.77%	21.09%
LUX	32.25%	34.4%
LVA	11.8%	12.59%
MEX	8.12%	8.66%
MLT	27.4%	29.23%
NLD	15.01%	16.01%
NOR	7.73%	8.25%
POL	10.49%	11.19%
PRT	9.6%	10.24%
ROU	9.4%	10.03%
ROW	9.16%	9.77%
RUS	5.37%	5.72%
SVK	17.93%	19.12%
SVN	16.21%	17.29%
SWE	10.07%	10.74%
TUR	7.39%	7.88%
TWN	12.89%	13.75%
USA	3.47%	3.7%

Table 3: *Welfare Gains from Trade. All data is from WIOD. Trade elasticiteis are from Melitz and Redding (2015), $\sigma = 4$ and $g = 4.25$. Labor supply elasticity is from Sokolova and Sorensen (2018), $\theta = 0.4$. $\alpha = 0.6$ The results in the first column are obtained by setting $\beta = 0$ and $\alpha = 0$ in Eq.* (19)

.

References

Amiti, M. and D. R. Davis (2012): "Trade, Firms, and Wages: Theory and Evidence," *Review of Economic Studies*, 79, 1 – 36. 2

Arkolakis, C., A. Costinot, and A. Rodríguez-Clare (2012): "New trade models, same old gains?" *American Economic Review*, 102, 94–130. 2, 10

Ben-Akiva, M., N. Litinas, and K. Tsunokawa (1985): "Continuous Spatial Choice: The Continuous Logit Model and Distributions of Trips and Urban Densities," *Transportation Research Part A: General*, 19, 119 – 154. 7

Blanchard, O. and F. Giavazzi (2003): "Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets," *The Quarterly Journal of Economics*, 118, 879–907. 7

Card, D., A. R. Cardoso, J. Heining, and P. Kline (2018): "Firms and Labor Market Inequality: Evidence and Some Theory," *Journal of Labor Economics*, 36, S13 – S70. 6, 7

Costinot, A. and A. Rodríguez-Clare (2014): "Trade theory with numbers: Quantifying the consequences of globalization," in *Handbook of international economics*, Elsevier, vol. 4, 197–261. 2, 12

Egger, H. and U. Kreickemeier (2009): "Firm Heterogeneity and the Labor Market Effects of Trade Liberalization," *International Economic Review*, 50, 187 – 216. 7

——— (2012): "Fairness, Trade, and Inequality," *Journal of International Economics*, 86, 184 – 196. 2

Egger, H., U. Kreickemeier, C. Moser, and J. Wrona (2022): "Exporting and offshoring with monopsonistic competition," *The Economic Journal*, 132, 1449–1488. 1, 2, 4, 5, 6, 7, 12, 15, 16, 17

Eriksson, T. and N. Kristensen (2014): "Wages or fringes? Some evidence on trade-offs and sorting," *Journal of Labor Economics*, 32, 899–928. 3

Ethier, W. J. (1982): "National and International Returns to Scale in the Modern Theory of International Trade," *American Economic Review*, 72, 389 – 405. 7

Grossman, G. M., E. Helpman, and P. Kircher (2017): "Matching, Sorting, and the Distributional Effects of International Trade," *Journal of Political Economy*, 125, 224 – 264. 2

Helpman, E., O. Itskhoki, M.-A. Muendler, and S. J. Redding (2017): "Trade and Inequality: From Theory to Estimation," *Review of Economic Studies*, 84, 357 – 405. 2

Jha, P. and A. Rodriguez-Lopez (2019): "Monopsonistic Labor Markets and International Trade," CESifo Working Paper No. 7771. 7

Mas, A. and A. Pallais (2017): "Valuing alternative work arrangements," *American Economic Review*, 107, 3722–3759. 3

McFadden, D. (1976): "The Mathematical Theory of Demand Models," in *Behavioral Travel Demand Models*, ed. by P. Stopher and A. Meyburg, Lexington Books, Lexington, MA., 305 – 314. 1

Melitz, M. J. (2003): "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," *Econometrica*, 71, 1695 – 1725. 1, 2, 5, 7

Melitz, M. J. and S. J. Redding (2015): "New Trade Models, New Welfare Implications," *American Economic Review*, 105, 1105–46. 11, 13, 19, 20

Sampson, T. (2014): "Selection into Trade and Wage Inequality," *American Economic Journal: Microeconomics*, 6, 157 – 202. 2

Sokolova, A. and T. A. Sorensen (2018): "Monopsony in Labor Markets: A Meta-Analysis," IZA Discussion Papers 11966. 12, 13, 19, 20

Thisse, J.-F. and E. Toulemonde (2010): "The Distribution of Earnings under Monopsonistic/polistic Competition," CEPR Discussion Papers 7981. 1

Timmer, M. P., E. Dietzenbacher, B. Los, R. Stehrer, and G. J. De Vries (2015): "An illustrated user guide to the world input–output database: the case of global automotive production," *Review of International Economics*, 23, 575–605. 2, 11

Wiswall, M. and B. Zafar (2018): "Preference for the workplace, investment in human capital, and gender," *The Quarterly Journal of Economics*, 133, 457–507. 3