Income Distribution, Welfare, and the Patterns of Trade*

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Abstract

We develop a two-country model of international trade featuring non-homothetic preferences and income inequality. This generates a price schedule in which cheap necessities coexist with expensive luxury goods. A key driver of price differences is firms' ability to shift fixed costs between countries, which shapes trade patterns and welfare. In a North-South setting, this fixed cost shifting has the greatest negative impact on poor consumers in the rich country, leading to a *Manhattan effect*. Following a mean-preserving spread in one country, trade volumes fall and the composition of traded goods adjusts. In an open economy, strictly more consumers lose out from increased inequality than in autarky, due to firms' pricing-to-market behaviour. Some of the increased inequality is exported to the trading partner, resulting in the propagation of inequality through trade.

Keywords: trade, income inequality, nonhomothetic preferences, pricing-to-market
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1 Introduction

Recent decades have seen declining income inequality between countries due to many countries catching up with the advanced economies. At the same time, income inequality within countries has stagnated on average, though with high variance (Pinkovskiy et al., 2024; Piketty and Saez, 2006). While this has focused attention on countries' fiscal and tax policies in order to address these trends, it also has implications for bilateral trade volumes and consumer welfare.

To understand how inequality shapes trade and welfare, we develop a two-country model of international trade with non-homothetic preferences, income inequality, and firms with market power. Firms operate in a Krugman (1980) framework with fixed costs, but consumers differ in their willingness to pay, generating endogenous price schedules across the income distribution. Consumer demand involves an extensive-margin consumption choice, such that firms face a trade-off between price and market size. A firm's choice of a marginal consumer results in a market size determined by all consumers at least as wealthy as the marginal consumer. The price is then determined by the marginal consumer's willingness to pay. This setup results in a price schedule where cheap mass-market goods, accessible to all, coexist with expensive luxury goods consumed only by the wealthy. Hence, rich and poor consumers have different consumption bundles and face different price levels (Fajgelbaum and Khandelwal, 2016; Faber and Fally, 2022; Neiman and Vavra, 2023). A rise in income inequality, modelled as a mean-preserving spread in income, raises prices for mass-market goods and lowers prices for luxury goods. As a result, poorer consumers lose while richer consumers gain. At the same time, average prices fall and total product variety increases.

Opening up to trade allows firms to pursue pricing-to-market, by adjusting the allocation of fixed costs. They can be shifted across countries, which may impose a disproportionate burden on one country. The fixed cost splitting is determined by the average willingness to pay of consumers. If countries have the same income distribution, fixed costs are shared equally if they also have the same population sizes, leading to identical price schedules. More generally, the relative share of fixed costs depends on relative population sizes, ensuring that per capita burdens are equalised. Trade liberalisation benefits all consumers, but the rich gain more due to the stronger market size effect at higher income levels.

If one country is richer on average, it bears most of the fixed costs. This creates a divergence in price schedules, with the richer country's schedule shifting upwards and the poorer country's schedule shifting downwards. As firms recover a larger share of fixed costs

in the richer market, consumers there face systematically higher prices. We refer to this phenomenon as the *Manhattan effect*: poor consumers fare worse when they are a small minority in a predominantly rich country. This prediction is consistent with the empirical evidence of Handbury (2021), who shows that poor households in richer US cities face higher food prices than poor households in poorer cities. More generally, the results show that the welfare consequences of inequality cannot be understood solely from nominal incomes, because the income distribution itself shapes the prices consumers face.

The richer country, however, also has a larger population of high-income consumers. This expands market size for goods targeted at affluent households and allows firms to spread fixed costs over more consumers. As a result, the upward shift in the price schedule is strongest for mass-market goods and gradually weakens at higher income levels. The richer country also produces a larger share of varieties. Consequently, the value of bilateral trade rises, although less than proportionally with the increase in the richer country's aggregate income.

Import volumes adjust through two channels: changes in real consumption induced by price changes and a reallocation of production toward the richer country. In the poor country, both channels increase imports, as consumers face lower prices and a larger share of varieties is imported. In the rich country, the overall effect is ambiguous. In our numerical example, the production reallocation effect dominates the increase in real consumption, leading to a slight decline in import volumes.

When countries are equally rich on average, but one is more unequal than the other, strictly more consumers lose out from this MPS compared to the autarky case. This is because of a pricing-to-market effect: firms put a larger burden on the more unequal country, because the presence of many high-income consumers drives up the average willingness-to-pay. It is this pricing-to-market channel which makes some winners from inequality in the autarky case become losers from inequality in the open economy setting. The mean-preserving spread leaves aggregate incomes unchanged, and therefore also leaves bilateral trade values unchanged. However, it changes real trade volumes and the composition of trade. In the numerical example, import volumes rise in the more equal country and fall in the more unequal country, while aggregate real trade volume falls. This is in line with the Linder hypothesis: countries with more similar demand structures trade more in real terms. In the unequal country, import demand shifts away from varieties targeted to poorer consumers and toward varieties targeted to richer consumers, consistent with evidence that inequality raises imports of luxuries and lowers imports of necessities.

Since the world market is integrated, we allow for international arbitrage. To the best

of our knowledge, we are the first to study international arbitrage in a setting with income inequality. Arbitrage prevents firms from shifting around the fixed costs and forces them to pursue global uniform pricing. When this fixed-cost shifting channel is shut down, the welfare implications of income inequality within or between countries alter significantly. In the North-South setting with one rich and one poor country, and firms no longer allowed to shift the fixed costs, the *Manhattan effect* disappears. Hence, consumers in the rich country benefit from allowing arbitrage, with the poorest benefitting the most. In the poor country, the welfare implications are inverse: everybody loses, but the poorest do so the most. The notable exception are the very richest consumers, who always prefer arbitrage over market segmentation. Regarding trade flows, introducing arbitrage mainly causes a reallocation of trade flows across countries, without altering the aggregate trade volumes.

Taken together, our results show that inequality affects international trade not only through demand composition, but also through the prices firms choose to charge in different markets. As a consequence, trade can amplify the welfare consequences of inequality and transmit them across borders. The interaction between income distributions and pricing-to-market therefore emerges as an important channel linking trade, prices, and welfare.

1.1 Related Literature

Inequality & Trade. Most of the literature focuses on the effect of trade on inequality (Acemoglu et al. (2016); Adao et al. (2022); Autor et al. (2013); Borusyak and Jaravel (2021); Fajgelbaum and Khandelwal (2016); Galle et al. (2023); Helpman et al. (2016); Nigai and Yang (2024); Waugh (2023)). While there is a consensus that trade can be detrimental to employment and wages at the local level, the distributional consequences of trade from a consumer perspective (at the country level) are much more controversial, with findings ranging from pro-poor to distributionally neutral or even pro-rich. In our setting, opening up to trade benefits the rich more due to the market-size effect, thereby increasing welfare inequality.

Nigai (2025) studies the transmission mechanism of income inequality through international trade and finds that exporting to more unequal countries raises domestic inequality as well. He rationalises this empirical finding in a model with consumer-targeting, thereby generating a link between consumer income inequality and distribution of firm profits. Our model predicts a similar effect, although through a different mechanism: firms react to changes in income inequality adjusting prices, whereas in Nigai (2025), firms adjust wages of their workers. Similar to our framework, firms choose which market segments to serve (and

which not).

Concerning the effect of inequality on trade, Kichko and Picard (2023) show theoretically that lower income inequality not only reduces the volume and value of trade, but also creates a general equilibrium effect that may negatively affect poor individuals. Bekkers et al. (2012) find empirical evidence that prices are negatively related to income inequality in the exporting market and conclude that hierarchic demand is a crucial element for this result. Similarly, Choi et al. (2009) show that countries with more similar income distributions have more similar price distributions. However, also the composition of import demand changes with inequality. In Dalgin et al. (2008), imports of luxury goods increase with inequality, while imports of necessities fall. Additionally, Hummels and Klenow (2005) and Fieler (2011) establish that rich countries trade more than poor countries do, especially along the extensive margin. Our theoretical findings are all consistent with these empirical regularities.

Pricing-to-Market. There is strong empirical evidence that per capita income and prices of tradable consumption goods are highly correlated (Alessandria and Kaboski (2011); Anderson et al. (2018); Feenstra and Romalis (2014); Fieler and Eaton (2025); Hsieh and Klenow (2007); Manova and Zhang (2012); Schott (2004); Simonovska (2015)). Theoretically, pricing-to-market can be generate through market-specific valuations for product quality (Auer et al. (2018)) or income-dependent price elasticities, such that markups and prices are higher in richer countries (Auer et al. (2024); Bils and Klenow (2001); Bekkers et al. (2012); Behrens and Murata (2012); Bertoletti and Etro (2017); Bertoletti et al. (2018); Kichko and Picard (2023)).[1] Our model links to this last strand of literature. Pricing-to-market is driven by differences in the willingness to pay across consumers, leading firms to set higher markups in richer countries. Furthermore, we predict rising markups along the income distribution, which aligns with Sangani (2022).

Cost-of-Living Inequality. Our *Manhattan effect* is also related to a broader literature on cost-of-living inequality and its distributional consequences. Handbury (2021) shows that low-income households in richer US cities face systematically higher prices for identical consumption goods. Similarly, Gaubert and Robert-Nicoud (2025) demonstrate that when housing is a necessity, low-income households bear a disproportionate burden of high

[1]There are other explanations for pricing-to-market, for example limited pass-through of exchange rate shocks (Fitzgerald and Haller (2014); Gopinath et al. (2010); Krugman (1986); Nakamura and Zerom (2010)), non-tradable production inputs (Corsetti and Dedola (2005)) or variable markups with cost-push shocks (Atkeson and Burstein (2008)).

housing costs in expensive cities. Our contribution identifies an analogous mechanism in international trade. Through pricing-to-market, poor consumers living in richer countries face systematically higher prices for tradable goods, even though these goods are internationally traded. In this sense, the Manhattan effect extends the logic of spatial cost-of-living inequality to international goods markets.

International Arbitrage. Pricing-to-market can create international arbitrage opportunities. Resellers may purchase a good cheaply in one country and ship it into another one where they can sell it at a lower price than the official seller and still make a profit. Hence, in order to avoid such market loss, firms have to limit their pricing-to-market behaviour. Rich and poor countries may have diverging interests regarding arbitrage (Roy and Saggi (2012); Föllmi et al. (2025)). However, price discrimination is generally the welfare maximising policy, as it avoids market exclusion (Malueg and Schwartz (1994); Schmalensee (1981); Varian (1985)). In our North-South setting, we confirm the findings of the literature that the rich country prefers arbitrage, while the poor one does not. When we allow for differences in income inequality within countries, we find heterogenous preferences for arbitrage even within each country.

2 The Model

2.1 Demand Side

The economy is populated by $\mathcal{P}$ consumers with heterogeneous labour endowments. Each consumer is endowed with θ units of labour, where $\theta \in [\underline{\theta}, \overline{\theta}]$ has a probability density function $g(\theta)$ and a cumulative density function $G(\theta)$. The labour market is assumed to be perfectly competitive. Consumers spend their income on a continuum of differentiated goods. Goods are assumed to be indivisible, providing utility only for the first unit and none for each additional unit. Thus, the consumption choice is a binary one. While with homothetic CES preferences the consumption bundle between rich and the poor differs only along the intensive margin, with non-homothetic 0-1 preferences it differs exclusively along the extensive margin.[2] Let $c(j)$ denote an indicator taking value 1 if good j is purchased

[2]These preferences have been used, inter alia, by Falkinger (1994); Föllmi and Zweimüller (2006); Föllmi et al. (2018); Matsuyama (2000); Murphy et al. (1989) in various settings, including growth, industrialisation, and Ricardian trade models. Torun (2024) employs such a function in a setting with intermediate inputs to study the extensive margins of production and trade.

and 0 otherwise. Then, utility can be represented by:

$$U = \int_0^\infty c(j)dj, \quad \text{with } c(j) \in \{0, 1\}$$

The budget constraint is given by $\int_0^N p(j)c(j) \leq \tilde{\theta}W$, where W is the wage rate and normalised to one for simplicity. Utility maximisation yields the decision rule:

$$c(j) = 1 \quad \text{if } 1 \geq \lambda(\theta)\ p(j)$$
$$c(j) = 0 \quad \text{if } 1 < \lambda(\theta)\ p(j)$$

where $\lambda(\theta)$ is the marginal utility of income. Consumers with lower labour income have a lower willingness to pay for products. The individual demand function is then a simple step-function on the unit interval with a discontinuity at $p = 1/\lambda$.

2.2 Supply Side

Production follows a simple Krugman (1980) model of international trade, with a mass of homogeneous firms each producing a single, differentiated product. Labour is the only factor of production. Production costs consist of fixed costs F and marginal costs $1/a$, where a denotes productivity. The production of q units requires labour input of $F + q(j)/a$. There is free entry into the market, leading to zero profits in equilibrium. Each firm charges a unique price for the good it sells, which means that depending on the price it charges, it serves a certain proportion of the population. Therefore, firms face a trade-off between price and market size: the higher the price, the smaller the market size.[3] Firms choose a "marginal consumer", i.e. the consumer who is indifferent between buying and not buying. If θ is the labour endowment of the firm's marginal consumer, the price set by the firm will equal the marginal consumer's willingness to pay, so that all richer consumers enjoy a consumer surplus equal to the difference between their willingness to pay and the price of the good.

[3]This firm behaviour is due to our choice of the utility function. It implies that differences in income affect aggregate demand via the extensive margin, i.e. the number of goods consumed. Consequently, the distribution of income affects prices, markups and ultimately trade. Under CES preferences, instead, the distribution of income would not affect aggregate outcomes and the price schedule over income would be flat. Indeed, all Pollak class preferences would generate this independence between income distribution and prices. See e.g. Bertola, Föllmi and Zweimüller (2005, Chapter 10) or Kichko and Picard (2023) for discussion and proof of this result. The preferences proposed here can be combined with an explicit hierarchy of consumption as in Föllmi and Zweimüller (2006). This hierarchy would specify with goods are basic goods and with are luxuries.

Our framework can accommodate empirical evidence on the extensive margin being the key driver of firms' sales (Afrouzi et al. (2023); Argente et al. (2021); Einav et al. (2021)) and of the gains from trade (Fieler and Eaton (2025)).

2.3 Autarky Equilibrium

Firms are ex ante symmetric. Therefore, for any given θ, the labour endowment of the firm's marginal consumer, firms must make zero profits, so that there are no deviation incentives of existing firms and no market entry by new firms. The zero-profit condition is:

$$\underbrace{\mathcal{P}\Big(1-G(\theta)\Big)}_{\text{market size}}\ \underbrace{\Big(p(\theta)-\frac{1}{a}\Big)}_{\text{contribution margin}} = \underbrace{F}_{\text{fixed costs}}, \quad \forall\theta$$

where $(1-G(\theta))$ is the share of consumers willing and able to buy the good at the chosen price $p(\theta)$. Given θ, the market size is determined. The profit maximisation problem boils down to choosing the price given the market size. Solving for $p(\theta)$ gives the price schedule in the economy:

$$p(\theta)=\frac{1}{a}+\frac{F}{(1-G(\theta))\mathcal{P}} \tag{1}$$

Prices are given by marginal costs $1/a$ plus a markup, such that firms can recover the fixed costs of production. The markup, and hence prices, increase in θ and converge to infinity as θ approaches its upper bound $\bar{\theta}$ (since $G(\bar{\theta})=1$). This is intuitive, since a smaller market size implies a larger share of the fixed costs for each consumer to bear, which raises the price. Therefore, necessity goods that are sold to many consumers are cheap, while luxury goods are more expensive. Figure 1 shows the prices along the income distribution for two example distributions, a log-normal and a uniform distribution. The price of the most basic good is identical. Since it it bought by all consumers, the distribution does not matter. However, away from the lower bound $\underline{\theta}$, the shape of the distribution matters because it determines the market size per income group. Accordingly, prices rise faster with the log-normal distribution because the share of consumers above a certain $\tilde{\theta}$ decreases faster than with the uniform income distribution. With CES demand, the price distributions are flat.

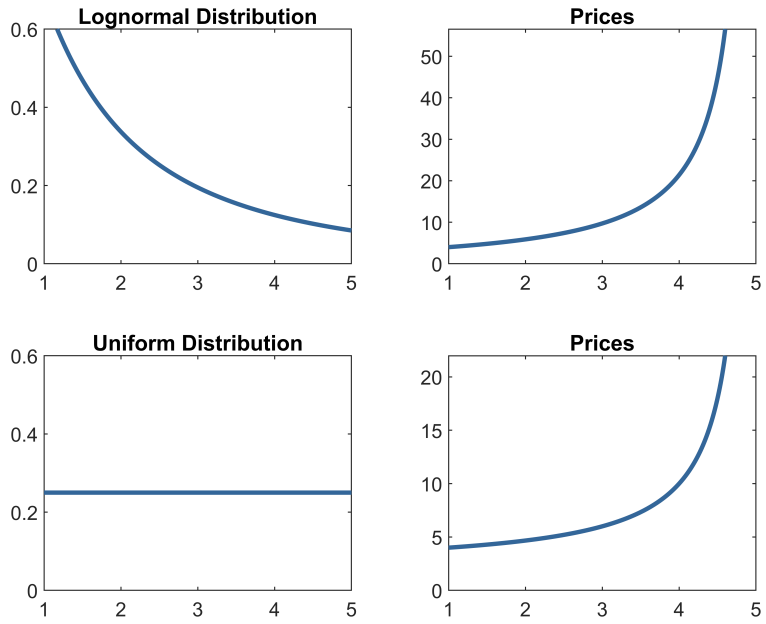

Figure 1: Income Distributions and Prices under Autarky

Notes: The log-normal distribution is a truncated from above. The distribution is determined by $\theta \sim LN(\mu = 0.3, \sigma = 1.2)$, with $1 \leq \theta \leq 5$. The uniform distribution is given by $\theta \sim U(1, 5)$. To calculate prices, we set $\mathcal{P} = 1$, $F = 2$, and $a = 0.5$ for simplicity. Hence, both price schedules start at $p(\underline{\theta}) = 4$ for the most basic product with market size equal $\mathcal{P}$.

This price schedule differs substantially from the one in models with an intensive margin of consumption featuring income inequality, as in Bertoletti and Etro (2017) or Kichko and Picard (2023). In these models, prices of all goods are identical and related to the (weighted) average willingness to pay of all consumers. Thus, rich and poor consumers face the same prices in these models. Poor consumers simply buy less of each good, rather than abstaining from certain varieties altogether, as in our model.[4]

Having established prices, welfare follows from the budget constraint. The budget constraint of a consumer with income $\tilde{\theta}$ is:

$$\tilde{\theta} = \int_{\underline{\theta}}^{\tilde{\theta}} p(\theta) dN(\theta) + p(\underline{\theta}) N(\underline{\theta}) \tag{2}$$

where $N(\theta)$ denotes the mass of products consumed by individual θ. Equation (2) simplifies to $\underline{\theta} = p(\underline{\theta}) N(\underline{\theta})$ for the poorest consumer. Using (1), we obtain the number of mass products consumed by everyone: $N(\underline{\theta}) = \frac{a\mathcal{P}}{aF+\mathcal{P}} \underline{\theta}$. The markup on these products is given by $\mu = \frac{aF+\mathcal{P}}{\mathcal{P}}$,

[4] Mongey and Waugh (2025) can generate a similar price schedule, using a discrete choice model with incomplete markets, thereby creating an extensive margin. They study price and markup dispersion in a closed economy. However, they additionally include an intensive margin and firm heterogeneity, leading to a different relation between firm size and markup compared to our setting.

which depends on the market size and production technologies. Intuitively, higher fixed costs F go together with higher markups. Differentiating the budget constraint (2) with respect to $\tilde{\theta}$ yields $1 = p(\theta)N'(\theta)$. Solving for $N'(\theta)$ and integrating over θ gives the consumption bundle of consumer $\tilde{\theta}$:

$$\begin{aligned} N(\tilde{\theta}) &= \int_{\underline{\theta}}^{\tilde{\theta}} \frac{1}{p(\theta)} d\theta + N(\underline{\theta}) \\ &= \int_{\underline{\theta}}^{\tilde{\theta}} \frac{a\mathcal{P}(1-G(\theta))}{aF + (1-G(\theta))\mathcal{P}} d\theta + \frac{a\mathcal{P}}{aF+\mathcal{P}}\underline{\theta} \end{aligned} \tag{3}$$

Consumer $\tilde{\theta}$ buys all products costing no more than $p(\tilde{\theta})$, i.e. all products for consumers with less income than herself. The number of varieties consumed increases with income, so richer consumers buy a greater variety of products than poorer consumers. Total product variety in the economy is given by $N(\bar{\theta})$ and depends on the shape of the income distribution $G(\theta)$.[5] Suppose the poorest consumers have an income of 100\$. The goods targeted to them are bought by everyone (since all consumers are at least as rich). If production technology allows these "basic" varieties to be produced at a unit cost of 1\$, then each poorest consumer can afford 100 varieties. This corresponds to $N(\underline{\theta}) = 100$. Now consider the next poorest consumer, with income 150\$. She first spends 100\$ on the same 100 basic varieties, just like everyone else. With her remaining 50\$, she demands varieties tailored to her higher income group. But since fewer consumers demand these, the relevant market size is smaller. Suppose these goods cost 2\$ each. Then this consumer can afford an additional 25 varieties, on top of the 100 basic ones. Richer consumers keep adding "layers" of products. Each new layer has a smaller market size, which implies higher markups and higher prices.

Following a mean preserving spread (MPS) in income, total product variety $\bar{\theta}$ increases. To see this, (i) notice that $\int_{\underline{\theta}}^{\bar{\theta}} G(\theta)d\theta = \theta G(\theta)|_{\underline{\theta}}^{\bar{\theta}} - \int_{\underline{\theta}}^{\bar{\theta}} \theta g(\theta)d\theta = \bar{\theta} - 1$, where $G(\bar{\theta}) = 1$. Hence, if we integrate the distribution function over its whole support the resulting value does not depend on second or higher order moments. (ii) The integrand in (3) is concave in $G(\theta)$. By Jensen's Inequality, more inequality increases the value of the integral, implying that total product variety increases. The prices of mass products rise while prices of luxury goods fall. Hu et al. (2025) provide compelling empirical evidence for this using scanner data. Thus, poor consumers are worse off after an increase in income inequality, while rich consumers benefit from it. On average, the price level falls. The budget constraint of the

[5] In the special case of $F = 0$, total product variety only depends on top income $\bar{\theta}$, not on the entire distribution, and is given by $\bar{\theta}a$.

richest consumer can be rewritten as $\bar{\theta} = \int_0^{N(\bar{\theta})} p(\theta)d\theta$, i.e. as an integral over all prices. Given that $N(\bar{\theta})$ rises, and nominal income $\bar{\theta}$ does not change, it must be that prices fall on average, such that all new variety can be afforded. This result is consistent with empirical evidence by Bekkers et al. (2012). It is also consistent with the preferred parameter values of the models by Bertoletti and Etro (2017) and Kichko and Picard (2023), where prices also fall after an MPS, but uniformly across varieties. These price changes not only imply an expansion of high-income varieties, but also a reduction of low-income varieties, which replicates the finding of Fajgelbaum et al. (2011).

3 Trade

Let $G(\cdot)$ and $G^*(\cdot)$ denote the distributions of labour endowments in two countries called "Home" and "Foreign", respectively. The distributions are defined over the same support $\theta \in [\underline{\theta}, \bar{\theta}]$. We assume that trade is costless. This implies that Home and Foreign firms have the same costs and have no incentives to choose a different marginal consumer within each market. Consequently, the price schedules within each market are also identical, regardless of the location of production. This does not imply that price are the same at home and abroad, only that firms choose the same price per market, whether they produce locally or not (conditional on serving the same marginal consumer). Factor price equalisation prevails, i.e. the relative wage is $\omega = 1$. All variables of Foreign are marked with an asterisk.

For now, we exclude the possibility of parallel trade, in which case arbitrageurs would exploit price differences between markets to make a profit, resulting in a single price per good in all markets. Since parallel trade is not possible, markets are segmented and firms can arbitrarily set different prices and markups in the markets they serve, depending on the local distribution of income. As in autarky, the price distribution must be such that there are no deviation incentives of firms. Hence, in equilibrium, all firms must earn the same profits within a single market. However, profits may be unevenly distributed between Home and Foreign. Denote profits in Home and Foreign by Π_H and Π_F, respectively. They will be endogenously determined in equilibrium. The sum of profits must equal the fixed costs by the zero-profit condition:

$$F = \Pi_H + \Pi_F. \tag{4}$$

The zero-profit condition in Home then is $\mathcal{P}\Big(1 - G(\theta)\Big)\Big(p(\theta) - \frac{1}{a}\Big) = \Pi_H, \forall\theta$. Following the procedure from autarky, we solve for the price schedules in Home and Foreign, as functions

of Π_H and Π_F:

$$p(\theta) = p^*(\theta) = \frac{1}{a} + \frac{\Pi_H}{\mathcal{P}\Big(1 - G(\theta)\Big)} \qquad p(\theta^*) = p^*(\theta^*) = \frac{1}{a} + \frac{\Pi_F}{\mathcal{P}^*\Big(1 - G^*(\theta^*)\Big)} \tag{5}$$

where $p(\theta)$ denotes the price of a variety consumed in Home and produced in *Home*, and $p^*(\theta)$ the price for an equivalent variety consumed in Home and produced in *Foreign*. Equivalently, $p(\theta^*)$ and $p^*(\theta^*)$ denote prices for varieties consumed in Foreign. Importantly, firms need not pick equally rich marginal consumers in both markets. This leads to varying consumption bundles along the income distribution and hence unequal welfare implications across countries. The number of products bought by consumers with income $\tilde{\theta}$ follows from the budget constraint:

$$\begin{aligned} N(\tilde{\theta}) &= \int_{\underline{\theta}}^{\tilde{\theta}} \frac{1}{p(\theta)} d\theta + N(\underline{\theta}) \\ &= \int_{\underline{\theta}}^{\tilde{\theta}} \frac{a\mathcal{P}(1 - G(\theta))}{a\Pi_H + (1 - G(\theta))\mathcal{P}} d\theta + \frac{a\mathcal{P}}{a\Pi_H + \mathcal{P}}\underline{\theta} \end{aligned} \tag{6}$$

Since all firms serve both markets (and the bounds on the income distributions are identical), the number of products bought by the richest consumer $\bar{\theta}$ must be the same in Home and Foreign. Hence, it must hold that:

$$\int_{\underline{\theta}}^{\bar{\theta}} \frac{a\mathcal{P}(1 - G(\theta))}{a\Pi_H + (1 - G(\theta))\mathcal{P}} d\theta + \frac{a\mathcal{P}}{a\Pi_H + \mathcal{P}}\underline{\theta} = \int_{\underline{\theta}}^{\bar{\theta}} \frac{a\mathcal{P}^*(1 - G^*(\theta^*))}{a\Pi_F + (1 - G^*(\theta^*))\mathcal{P}^*} d\theta^* + \frac{a\mathcal{P}^*}{a\Pi_F + \mathcal{P}^*}\underline{\theta} \tag{7}$$

Combining (4) and (7) allows us to solve for the profit shares Π_H and Π_F, which fully determines the price schedules (5) as functions of $G(\cdot)$, $G^*(\cdot)$ and model parameters.[6]

Proposition 1. *Under 0/1 preferences with costless trade and within-country inequality, firms split the fixed cost of production across markets, such that the richest consumer $\bar{\theta}$ is equally well of in both countries. The profit split depends on the entire distribution of income. Firms shift more of the fixed costs into the country with higher per capita income.*

With these results in mind, we can determine trade flows for given prices and quantities. Since we assume zero trade costs, the location of production is indeterminate. It does not matter where a firm produces its goods. Since all goods are symmetric ex ante and all firms

[6]Note that an equal mean in income is not a sufficient condition for $\Pi_H = \Pi_F = F/2$. The shape of the entire income distribution matters to determine the profit shares.

make zero profits, we are free to impose the structure that, at every given level of income, both countries each produce a constant share of all varieties. The share equals their relative size, measured by the aggregate labour endowment.

To see this, assume that Home will produce a share s of all varieties $N(\tilde{\theta})$, which are available at income level $\tilde{\theta}$, while Foreign will produce the remaining $1-s$ varieties. The aggregate labour endowment (or equivalently, aggregate spending) is defined as follows:

$$L = \mathcal{P}\int_{\underline{\theta}}^{\bar{\theta}} \theta dG(\theta) = \mathcal{P}\underline{\theta} + \int_{\underline{\theta}}^{\bar{\theta}} \mathcal{P}(1-G(\theta))d\theta \qquad L^* = \mathcal{P}^*\int_{\underline{\theta}}^{\bar{\theta}} \theta dG^*(\theta^*)$$

Under the assumption of constant production shares, the value of imports is given by:

$$IM_V = (1-s)L \qquad IM_V^* = sL^*$$

which solves for the production share as a function of aggregate labour endowments

$$s = \frac{L}{L+L^*}$$

Plugging this back into the imports equations, we get $IM_V = IM_V^* = LL^*/(L+L^*)$.

By construction, the value of imports is identical across countries, i.e. we arrive at balanced trade.

Similarly, we can derive import volumes. Define real aggregate consumption as:

$$Q = \frac{\mathcal{P}\underline{\theta}}{p(\underline{\theta})} + \int_{\underline{\theta}}^{\bar{\theta}} \frac{\mathcal{P}(1-G(\theta))}{p(\theta)}d\theta \qquad Q^* = \frac{\mathcal{P}^*\underline{\theta}}{p^*(\underline{\theta})} + \int_{\underline{\theta}}^{\bar{\theta^*}} \frac{\mathcal{P}^*(1-G^*(\theta^*))}{p^*(\theta^*)}d\theta^*$$

Then, import volumes are given by:

$$IM_Q = (1-s)Q \qquad IM_Q^* = sQ^*$$

Importantly, while import values are equal across countries, import volumes need not be. Since the two countries may face different price schedules, a given value of imports can correspond to different real quantities.

3.1 Identical Countries

First, let us consider the simple case of identical countries, i.e. $G(\cdot) = G^*(\cdot)$. If the two countries are equally populous, $\mathcal{P} = \mathcal{P}^*$, (7) simplifies to $\Pi_H = \Pi_F$, so that fixed costs are spread evenly across countries. Trade in this case is identical to doubling population in one country. Thus, trade leads to lower prices due to the market size effect, each consumer now bears a smaller fraction of fixed costs.[7] The reduction in prices does not follow the population change one-to-one, i.e. double the population does not imply half the prices. Since the fixed costs become increasingly more important for prices at higher income levels due to the smaller market size, the reduction in fixed costs disproportionately affects the prices of luxuries. In the example of Figure 1, the price of necessities $p(\underline{\theta})$ falls from 4 in autarky to 3 with free trade. On the other hand, the prices of luxury goods almost halve (they never fully halve because of the variable costs). Consequently, the prices changes when opening up to trade benefit rich consumers more than poor consumers.

Lower prices imply that consumers can afford more varieties (6), increasing welfare.[8] Since the price reduction is more pronounced at higher income levels, rich consumers can purchase more additional varieties than poor consumers, widening welfare inequality. Figure 2 exemplifies the size of the effect. Although the gains from trade are sizeable for all income classes, rich people benefit most, both absolutely and relatively. The relative gains from trade are strictly increasing in income. Such a pro-rich effect from trade is suggested for example by Adao et al. (2022), Borusyak and Jaravel (2021), Galle et al. (2023), or Helpman, Itskhoki and Redding (2010).

[7] The fall in prices also implies a fall in markups, which is consistent with empirical (Edmond et al. (2015); De Loecker et al. (2016)) and theoretical (Behrens and Murata (2012); De Blas and Russ (2015)) findings in the literature on the effects of trade liberalisation.

[8] In the standard Krugman model, the gains from trade take a different form. Due to the assumption of CES preferences, changes in market size do not affect prices. However, doubling the market size leads to double the amount of varieties available. Because prices did not change, consumers respond by buying less of every variety to be able to afford all of them. The gains from trade then are pure gains from variety. The presence of income inequality would not alter this result. As established earlier, aggregate market outcomes with CES are invariant to income inequality.

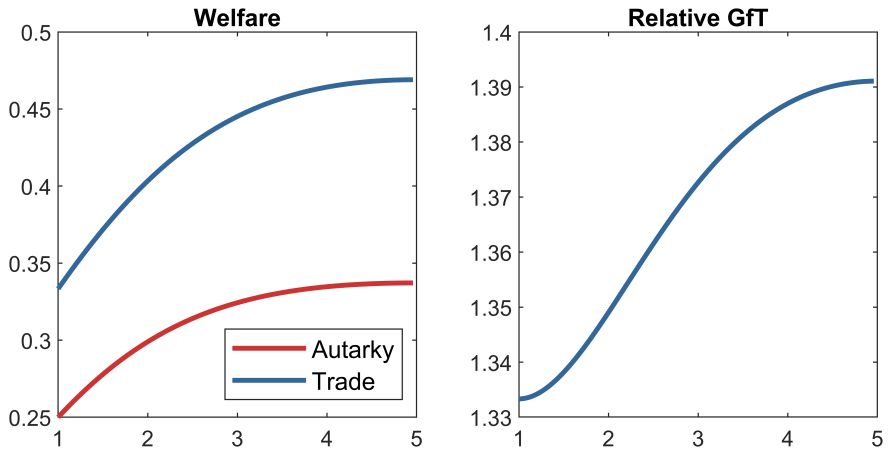

Figure 2: Gains from Trade with Identical Countries

Notes: The log-normal distribution is truncated from above. The distribution is determined by $\theta \sim LN(\mu = 0.3, \sigma = 0.7)$, with $1 \leq \theta \leq 5$. To calculate prices, we set $\mathcal{P} = 1$, $F = 2$, and $a = 0.5$ for simplicity. Welfare is then given by integrating the inverse of prices. Due to the assumption of $G = G^*$, profit shares are identical and opening up to trade is equivalent to half the fixed costs, so trade uses $F = 1$. The gains from trade are calculated as the ratio of welfare under trade to welfare under autarky.

Suppose now that Home is the more populous of the two countries, $\mathcal{P} > \mathcal{P}^*$, but the per capita labor endowment stays the same across countries, thus $L/\mathcal{P} = L^*/\mathcal{P}^*$. By (7), this implies *ceteris paribus* that a larger share of fixed costs is borne by Home, $\Pi_H > \Pi_F$. Intuitively, the country with more people pays a proportionally larger share of fixed costs F. This implies that the fixed costs per capita are identical and prices do not differ across the two countries. In fact, the relative distribution of population does not change prices and hence welfare, as long as total population $\mathcal{P}+\mathcal{P}^*$ is constant. The impact of population sizes can be seen as follows. Expand the ratios on both sides of (7) by multiplying and dividing by the respective population size. Then, everything becomes a function of the fixed costs per capita $\Pi_H/\mathcal{P}$ and $\Pi_F/\mathcal{P}^*$. Hence, we have $\Pi_H/\Pi_F = \mathcal{P}/\mathcal{P}^*$.

Finally, we determine trade patterns. We return to the case where $\mathcal{P} = \mathcal{P}^*$. Since the two countries are identical, aggregate labour endowments are equal to $L = L^*$, and the production share simplifies to $s = 1/2$. Hence, both countries produce one half of the continuum of varieties and import the other half. Import values are therefore given by $IM^V = IM^{*,V} = L/2$, so each country spends exactly one half of its income on imported varieties. Similarly, import volumes are $IM^Q = IM^{*,Q} = Q/2$. Now suppose that both countries become richer in the sense of first-order stochastic dominance, while remaining identical to one another. Aggregate labour endowment increases, and therefore the value of imports increases proportionally. Import volumes also increase. Thus, when countries are identical, trade values and trade volumes are symmetric across countries: each country continues to import one half of its spending and one half of its consumed quantities.

3.2 A North-South Model

Now, consider the case in which Home is, on average, the richer country, resembling a North-South Model with one rich and one poor country. Specifically, we assume that the income distribution in Home first-order stochastically dominates (FOSD) the income distribution in Foreign: $G(\theta) \leq G^*(\theta^*),\ \forall\theta$. The integrand in (7) is monotonically decreasing in the income distributions. Thus, if $G(\theta)$ FOSD $G^*(\theta^*)$, the LHS is larger than the RHS and we require $\Pi_H > \Pi_F$ to restore identity. This implies that consumers in Home bear the bulk of the fixed costs and prices of necessities are higher there. In other words, poor consumers in the rich country are worse off than their counterparts in the poor country. They have the same nominal income, but face higher prices. This is due to firms exploiting the presence of many rich, high willingness-to-pay consumers in Home by charging higher prices. We refer to this as the *Manhattan effect*. Handbury (2021) finds such an effect in the context of US cities. Even though this pricing-to-market effect holds true for all levels of income, it does however not imply that all prices in Home are higher than in Foreign. At the upper end of the income distribution, the market size effect starts to dominate the pricing-to-market effect: although consumers in Foreign carry a smaller share of the fixed costs, they have to be distributed across an ever smaller number of consumers as we move up the income distribution. Because of $G(\theta) \leq G^*(\theta),\ \forall\theta$, this effect is more pronounced in Foreign than in Home. Thus, luxury goods are actually more expensive in the poor Foreign, even though rich consumers in Home pay more fixed costs on average.

Prices determine welfare. Given that poor consumers pay higher prices at Home than Foreign, they are worse off as they can afford fewer product varieties. At the upper end of the income distribution, prices at Home are lower than in Foreign. In terms of welfare, however, this is merely a catch-up, as (7) establishes that the richest consumers are equally well off irrespective of location.[9]

Figure 3 illustrates the price schedules and the welfare differences. We start from a situation where Home and Foreign are equally poor and then we increase average incomes in Home.[10] The green line in Figure 3 on the left represents the situation where income distributions are identical across countries and $\Pi_H = \Pi_F$. Compared to the case of identical income, the income shift in Home shifted the price schedule in Foreign downward in parallel, purely by lower share of fixed costs. At Home, the income shift *rotated* the price schedule

[9]This also implies that the average price of consumption bundles is higher in Home for all income levels (except $\bar{\theta}$), even though high-income varieties are cheaper than in Foreign.

[10]Note that this compares two situations with unequal world endowments. Through the income shift in Home, world endowments have increased, resulting in more product variety.

clockwise. Due to pricing-to-market, the price schedule is shifted upwards along the entire income distribution, making everyone in Home worse off, *ceteris paribus*. It is only due to the market-size effect that some people end up benefitting from the income change. Now, at every given level of income, there is a bigger mass of consumer able to afford a particular variety. Therefore, the increased fixed costs can be spread across more consumers. At the lower end of the distribution, this market-size effect is not sufficiently large to reverse the increase in the fixed costs. However, as we move up along the income distribution, the market-size effect becomes bigger and bigger, eventually dominating the pricing-to-market effect and thus lowering prices. Panel B compares welfare before and after the income shift in both countries separately. In Home, poor people are worse off (the Manhattan effect) and rich people are better off, because of the lower prices for luxuries. In Foreign, everyone is better off than before, simply due to the lower share of fixed costs, which compounds over the income distribution. The richest consumers at the top end of the distribution again are equally well off in both countries by (7).

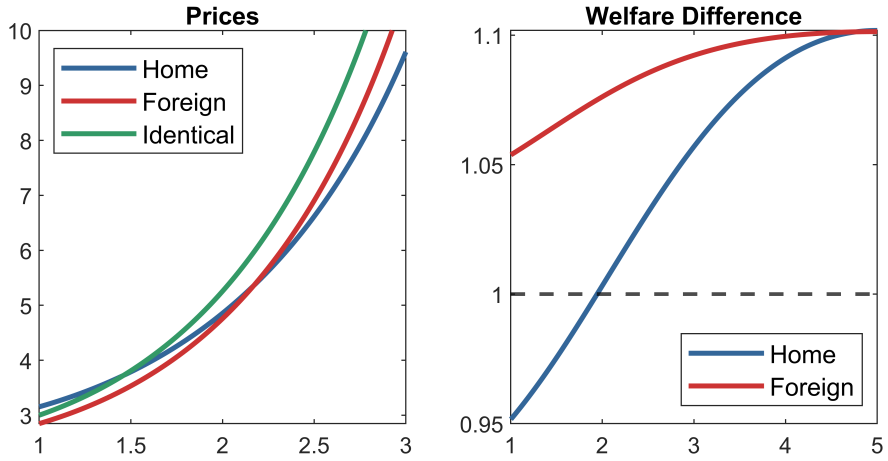

Figure 3: Prices and Welfare in a North-South Model

Notes: The log-normal distribution is truncated from above. The income distributions are determined by $\theta \sim LN(\mu = 0.3, \sigma = 0.7)$ and $\theta^* \sim LN(\mu = 0, \sigma = 0.7)$, with $1 \leq \theta \leq 5$. In the case of identical distributions, both countries have the one of Foreign, with $\Pi_H = \Pi_F = 0.5 \times F$. To calculate prices, we set $\mathcal{P} = \mathcal{P}^* = 1$, $F = 2$, and $a = 0.5$ for simplicity. Welfare is then given by integrating the inverse of prices. The welfare differences in Panel B are defined as welfare after the income shift over welfare before the income shift at every income level $\tilde{\theta}$. The parameter assumptions imply that the profit shares (using (7)) are given by: $\Pi_H \approx 0.575 \times F$ and $\Pi_F \approx 0.425 \times F$.

Following the shift in income distribution according to FOSD, Home has a larger aggregate labour endowment $L' > L = L^*$. Consequently, the value of trade increases in both countries, and the share of production increases in Home. By balanced trade, the value of trade increases equally. Locally, around the starting point of identical countries, a 1% increase in Home's labour endowment leads to a 0.5% increase in production in Home and

a 0.5% increase in imports. In Foreign, domestic production falls by 0.5%. Given Foreign income does not change, this implies a 0.5% increase in imports, which is identical to Home's increase. You can see this by the elasticity of import values with respect to aggregate income and evaluating around the case of identical income: $\frac{\partial \log IM_V}{\partial \log L}\Big|_{L=L^*} = \frac{1}{2}$. Since the world consists of two countries, the elasticities are below one. However, if Home is small relative to Foreign, $L \ll L^*$, the elasticity approaches one, recovering the unit size elasticity familiar from gravity. The volume of imports in Foreign increases following the FOSD in Home, and even more so than the value of imports, since prices in Foreign fall and real consumption Q^* increases accordingly. Specifically, we have that $d\log IM_Q^* = d\log s + d\log Q^* > d\log s = d\log IM_V^*$. In Home, the change in import volume is less straightforward. Although real aggregate consumption increases, warranting more imports, there is a simultaneous reallocation of production towards Home. Therefore, the effect on Home import volumes is in general ambiguous. In the example of Figure 3, aggregate labour endowment in Home rises from $L = 1.84$ to $L' = 2.04$, which is an increase of roughly 11%. Import values in both countries rise by 5.2 %. Foreign's import volume rises by 12%, while Home's falls mildly by 1%. However, overall trade value and trade volume still rises.

Proposition 2. *Under 0/1 preferences with costless trade and within-country inequality, following a FOSD income distribution shift in Home: (a) Home carries larger share of fixed costs. (b) Prices of necessities in Home rise, while all prices in Foreign fall. (c) Production reallocates towards Home. (d) Value of imports rise. (e) Import volume in Foreign increase (by more than import values), the effect in Home is ambiguous.*

Proof. In text and Appendix A. ■

3.3 Mean-Preserving Redistribution

Next, suppose both countries are equally rich on average, but income is not equally distributed. Assume that $\int_{\underline{\theta}}^{x} G(\theta)d\theta \leq \int_{\underline{\theta}}^{x} G^*(\theta^*)d\theta, \quad \forall x \in (\underline{\theta}, \bar{\theta})$, such that the income distribution in Foreign, $G^*(\theta^*)$, is a mean preserving spread of the income distribution in Home $G(\theta)$, i.e. Foreign is the *less* equal country. We have shown under autarky that the consumption bundles $N(\tilde{\theta})$ are concave in $G(\theta)$, such that a MPS increases total product variety $N(\bar{\theta})$. This implies that in 7, the RHS > LHS, i.e. the richest in Foreign are better off than in Home, *ceteris paribus*. To restore equality, the share of fixed costs in the more unequal country must be higher, thus $\Pi_F > \Pi_H$.

The MPS leads to higher prices for poor consumers and lower prices for rich consumers, due to the market-size effect. Therefore, basic goods are more expensive in the more unequal country. Coupled with the higher share of fixed costs Π_F, this implies that poor consumers in Foreign are worse off. In Home, everyone benefits from the lower fixed costs, hence they are better off. By 7, this implies that the richest consumers are also better off, despite the increases fixed costs shares. The LHS of Figure 4 shows prices in Home, Foreign and from before the MPS, where income distributions where identical. The RHS plots welfare differences compared to the situation before the shift in income. Home consumers gain throughout, they share a lower share of fixed costs $\Pi_H < \Pi_F$ and enjoy a higher number of varieties. In the Foreign country, most consumers lose, except for the very top of the income distribution, where the effect of higher varieties dominates. Compared to the MPS under autarky, a larger share of the population (in Foreign) loses out when countries trade. This is due to the additional pricing-to-market channel, which shifts the price schedule in Foreign upward. Under autarky, only the market size effect was operational. It is notable that we can generate price divergence across countries purely by differences in income distribution, without trade costs, home biases or productivity difference being present. The price changes in Home are caused by general equilibrium effects, not by any changes in Home itself. This aligns with empirical evidence of Nigai (2025), that exporting to more unequal countries also increases domestic inequality (at least in terms of welfare).

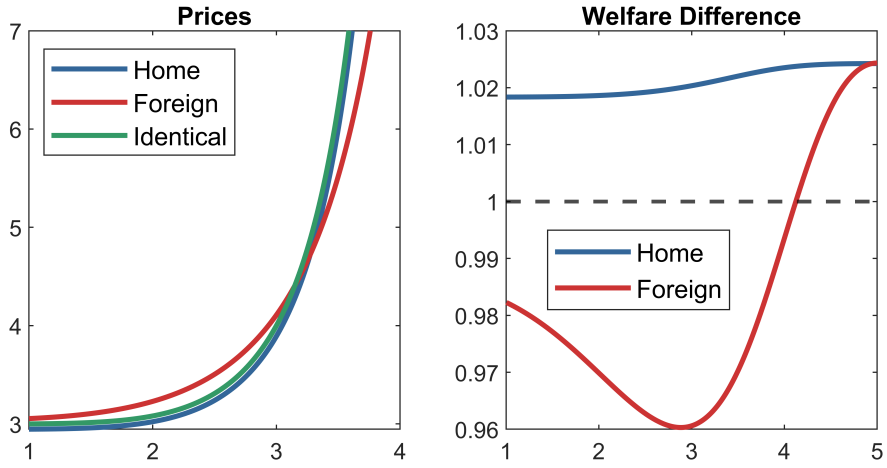

Figure 4: Prices and Welfare in Unequal Countries

Notes: The normal distribution is truncated from above. The income distributions are determined by $\theta \sim N(\mu = 3, \sigma = 0.7)$ and $\theta^* \sim N(\mu = 3, \sigma = 1)$, with $1 \leq \theta \leq 5$. In the case of identical distributions, both countries have the one of Home, with $\Pi_H = \Pi_F = 0.5 \times F$. To calculate prices, we set $\mathcal{P} = \mathcal{P}^* = 1$, $F = 2$, and $a = 0.5$ for simplicity. Welfare is then given by integrating the inverse of prices. The welfare differences in Panel B are defined as welfare after the income shift over welfare before the income shift at every income level $\tilde{\theta}$. The parameter assumptions imply that the profit shares (using (7)) are given by: $\Pi_H \approx 0.475 \times F$ and $\Pi_F \approx 0.525 \times F$.

How do trade patterns evolve? The mean-preserving spread leaves aggregate labour endowments unchanged. Hence $L = L^*$ continues to hold, and the production share remains $s = \frac{L}{L+L^*} = \frac{1}{2}$. Thus, unlike in the FOSD case, the redistribution does not reallocate production across countries. Import values are therefore unchanged, we still have $IM^V = IM^{*,V} = \frac{L}{2}$. Since the redistribution is mean-preserving, L does not change, and neither does the value of bilateral trade. Import volumes, however, do change because prices and real consumption change. The reason lies in the fact that share of fixed costs changes between countries. Since Home's fixed-cost burden falls and its income distribution is unchanged, the entire Home price schedule shifts down. Hence real aggregate consumption Q increases, and so does Home import volume $IM^Q = \frac{Q}{2}$. For Foreign, the change in imports is in general ambiguous. The higher fixed-cost burden raises prices for basic goods, while the thicker upper tail increases the market size for high-income varieties and lowers prices of luxuries. In the more unequal country demand shifts away from varieties targeted to poorer consumers and toward varieties targeted to richer consumers. This compositional change is consistent with Dalgin et al. (2008), who find that imports of luxuries increase with importer inequality, while imports of necessities decrease. In the numerical example in Figure 4, Foreign's import volume falls by 4%, Home's rises by 2%, and the overall trade volume also falls. Hence, the model predicts a Linder (1961) hypothesis of international trade, that countries with more similar demand trade more with each other (Bohman and Nilsson (2007); Choi (2002); Choi et al. (2009); Hallak (2010); Martínez-Zarzoso and Vollmer (2016)).

3.4 International Arbitrage

Allowing for parallel trade implies that firms have to apply global uniform pricing, any other pricing rule would be exploited by arbitrageurs taking advantage of costless trade. Hence, there cannot be any profit shifting across markets. The zero profit condition then looks as follows:

$$\begin{aligned} F &= \Big(1-G(\theta)\Big)\mathcal{P}\left(p(\theta)-\frac{1}{a}\right)+\Big(1-G^*(\theta^*)\Big)\mathcal{P}^*\left(p(\theta^*)-\frac{1}{a}\right), \quad \forall\theta \\ \Leftrightarrow \qquad p(\theta) &= p(\theta^*)=\frac{1}{a}+\frac{F}{\Big(1-G(\theta)\Big)\mathcal{P}+\Big(1-G^*(\theta^*)\Big)\mathcal{P}^*} \end{aligned} \tag{8}$$

where $p(\theta)$ and $p(\theta^*)$ are the prices chosen by Home firms in both markets. With arbitrage, firms set the same price for the same marginal consumer in both markets, which they need

not do before (i.e. we have now $\theta = \theta^*$). As in the case without parallel trade, prices are lower with trade than under autarky because firms can spread their fixed costs over more consumers. The market size for each firm is given by the sum of consumers with income above $\tilde{\theta}$ in both markets, i.e. the income threshold chosen by the firm. Having established the price schedule, we can determine the welfare implications (and hence the preferences for parallel trade policy) for rich and poor consumers. For this section, we assume that the two countries are equally populous $\mathcal{P} = \mathcal{P}^*$.

FOSD. With market segmentation, we established that basic goods are more expensive in Home than Foreign after a FOSD shift, due to the Manhattan effect. Luxury goods, on the other hand, are more expensive in Foreign due to the limited market size. Furthermore, we know that the richest consumers are equally well off in both countries, hence everyone else in Home must be worse off than in Foreign, given the same nominal income $\tilde{\theta}$. The left panel of Figure 5 shows the prices in Home and Foreign, when Home FOSD Foreign, and additionally the prices when arbitrage rules. For poorer marginal consumers, prices are higher in Home compared to Foreign, highlighting the Manhattan effect. By (8), Home and Foreign have the same prices under arbitrage. Clearly, arbitrage reverses the Manhattan effect, which benefits poor consumers in Home but hurts poor consumers in Foreign.

Consequently, there are clear predictions about countries' preferences for parallel trade. Consumers in Home would prefer to allow parallel trade, such that global uniform pricing prevails and the Manhattan effect disappears. This holds true even for richer consumers: in welfare terms, the lower prices for cheaper products outweigh the price increase for the more expensive ones, comparing the left panels of figures 5 and (8). On the other hand, consumers in Foreign would prefer to forbid parallel trade, because they had to carry a lower fixed cost share under market segmentation. The left panel of Figure 6 shows the gains/losses from parallel trade policy on consumers along the entire income distribution. Introducing income distributions in a North-South setting with parallel trade thus reveals *heterogeneous gains* from parallel trade policy within countries. However, it does not reveal *heterogeneous preferences*, except for the richest consumers. They always prefer parallel trade, as the market pooling becomes increasingly important the smaller the market size. Changing the average income difference between both countries does not overturn the result, only the crossing point shifts. Hence, we can generalise Proposition 3 of Föllmi et al. (2025) to a heterogeneous agent setting: the rich country prefers to allow parallel trade, the poor

one prefers not to.[11] Simulations suggest that the welfare losses of Foreign dominate the welfare gains in Home (even though the richest few actually benefit), which would be in line with the literature on third-degree price discrimination (Malueg and Schwartz (1994); Schmalensee (1981); Schwartz (1990); Varian (1985)).

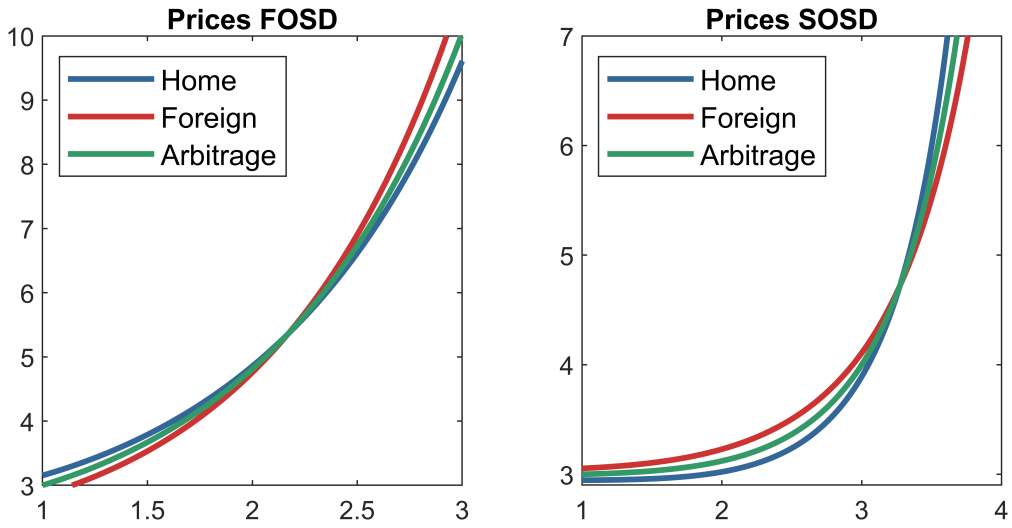

Figure 5: Price Effects of Arbitrage

Notes: Panel A uses truncated log-normal distributions determined by: $\theta \sim LN\big((0.3, 0.0), \text{diag}(0.7, 0.7)\big)$. Panel B uses truncated normal distributions determined by $\theta \sim N\big((3,3), \text{diag}(0.7, 1)\big)$. To calculate prices, we set $\mathcal{P} = \mathcal{P}^* = 1$, $F = 2$, and $a = 0.5$ for simplicity.

SOSD. Following SOSD, Foreign (the unequal country) carries a larger share of fixed costs $\Pi_F > \Pi_H$. Additional market size effects make basic goods significantly more expensive in Foreign. The right panel of Figure 5 shows price in Home and Foreign without arbitrage, as well as the prices with arbitrage (which are identical in Home and Foreign). As a result, all consumers in Foreign would prefer parallel trade, such that fixed costs are shared equally with Home. Conversely, most consumers in Home would prefer a ban on parallel trade, which would allow them to maintain low prices without being lumped together with Foreign consumers. The exception are once again the very richest consumers, who also prefer international arbitrage. The right panel of Figure 6 shows the welfare differences with or without parallel trade for both countries. Again, we have clear preferences on the aggregate country level: the more unequal country prefers arbitrage, while the more equal does not. This is not surprising, given that the main ramification of arbitrage is that fixed cost shifting is no

[11] Note however that the underlying reason is different. Under homogeneity, allowing for parallel trade caused some Home firms to abstain from exporting, benefiting their consumers. Under heterogeneity, firms always export. Here, the effect is driven by the fact that Home consumers would be charged higher prices if firms were allowed to discriminate in prices.

longer allowed. Hence, whoever carries the larger in case without arbitrage prefers to allow arbitrage, and vice versa.[12] We summarise this discussion in the following proposition:

Proposition 3. *Assume $\mathcal{P} = \mathcal{P}^*$. Under 0/1 preferences with costless trade and within-country inequality, allowing for arbitrage rules out fixed cost shifting. All consumers in the country with an initially higher fixed cost share prefer arbitrage, while (most) consumers in the other country do not.*

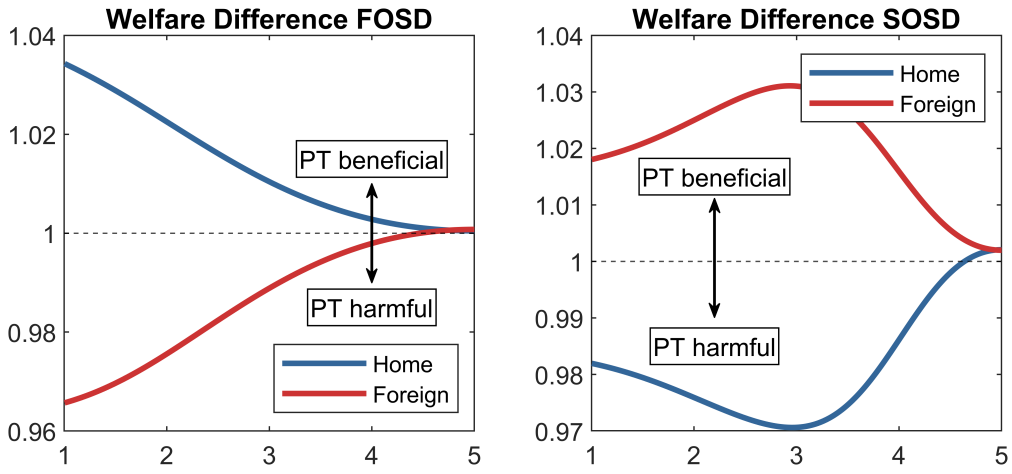

Figure 6: Parallel Trade Policy and Welfare

Notes: Welfare differentials are calculated as the ratio of welfare with parallel trade to welfare without parallel trade. Hence, a value above the zero intercept indicates that welfare is higher if parallel trade is allowed, and vice versa. Panel A uses truncated log-normal distributions determined by: $\theta \sim LN\big((0.3, 0.0), \text{diag}(0.7, 0.7)\big)$. Panel B uses truncated normal distributions determined by $\theta \sim N\big((3, 3), \text{diag}(0.7, 1)\big)$. To calculate prices, we set $\mathcal{P} = \mathcal{P}^* = 1$, $F = 2$, and $a = 0.5$ for simplicity. Welfare is then given by integrating over the inverse of prices.

Trade Volume. Lastly, we can calculate import volumes and compare them to the situation without arbitrage. Because the presence of parallel trade imports implies global uniform pricing, the expressions are simplified considerably. Table 1 summarises the import volumes of both countries under different regimes of parallel trade policy and different scenarios of income distributions. All values are normalised by the trade volume with identical income

[12] Now consider the case of unequal population sizes. Relative population sizes enter both the segmented price schedules and the arbitrage price schedule. Under market segmentation, $p_H(\theta) = \frac{1}{a} + \frac{\Pi_H}{\mathcal{P}[1-G(\theta)]}$. Under arbitrage, the uniform price is $p^A(\theta) = \frac{1}{a} + \frac{F}{\mathcal{P}[1-G(\theta)]+\mathcal{P}^*[1-G^*(\theta)]}$. Hence Home benefits from arbitrage for goods targeted to marginal consumer θ if and only if $p^A(\theta) < p_H(\theta)$, which is equivalent to $\frac{\Pi_H}{F} > \frac{\mathcal{P}[1-G(\theta)]}{\mathcal{P}[1-G(\theta)]+\mathcal{P}^*[1-G^*(\theta)]}$. Thus, what matters is not only whether Home carries a larger total fixed-cost share, but whether its fixed-cost share exceeds its share of the relevant global market size. With identical income distributions but unequal population sizes, for example, the larger country carries a larger total fixed-cost share, but per-capita fixed-cost burdens are equalised and arbitrage does not change prices.

distributions. Column 1 shows the import volumes for Home (left) and Foreign (right), in case they have the same income distribution. Naturally, import volumes do not depend on whether we allow for market segmentation or not. This is because with identical income distributions, prices are already identical across countries. Hence, introducing parallel trade does not change anything in this case.

Table 1: Import Volumes

	Identical	FOSD	SOSD
Market segmentation	1.00 , 1.00 , 2.00	0.99 , 1.12 , 2.11	1.02 , 0.96 , 1.98
Parallel trade	1.00 , 1.00 , 2.00	1.03 , 1.07 , 2.10	1.00 , 0.98 , 1.98

Notes: All values are normalised to the value of import when countries have identical income distributions and market segmentation prevails. Import volumes of Home are on the left, Foreign in the middle, and the aggregate volume on the right. "FOSD" means that the income distribution in Home first-order stochastically dominates the one in Foreign (as in section 3.2). For "SOSD", the distribution in Foreign is a mean-preserving spread of Home, making Foreign the more unequal country (as in section 3.3). All computations use the same income distributions as in the respective sections. With FOSD, mean income in Home rises by 11%

When Home is the richer country and market segmentation prevails, production reallocates toward Home, so that $s > 1/2$. This reduces Home's imported share $1 - s$, while increasing Foreign's imported share s. Quantitatively, Home import volume falls slightly, to 0.99 of the identical-country benchmark, whereas Foreign import volume rises to 1.12. Thus, the increase in Foreign import volume reflects two forces: Foreign imports a larger share of varieties from Home, and Foreign real consumption is higher because it carries a lower fixed-cost burden under market segmentation. Introducing parallel trade dampens this asymmetry. Global uniform pricing eliminates destination-specific fixed-cost shifting. Hence, the Manhattan effect in Home is reduced: basic goods become cheaper for Home consumers, raising Home real consumption and increasing Home import volume from 0.99 to 1.03, compared to a situation without arbitrage. Conversely, Foreign no longer benefits from the lower fixed-cost burden it had under market segmentation. Foreign real consumption therefore falls relative to the segmented equilibrium, and Foreign import volume declines from 1.12 to 1.07. Parallel trade therefore reallocates import volumes toward Home, although Foreign import volume remains above the identical-country benchmark.

Finally, we consider Column 3 with SOSD where Foreign is the more unequal country. Since the redistribution is mean-preserving, aggregate labour endowments remain equal and the production share stays at $s = 1/2$. Hence, there is no production reallocation and import values are unchanged. Instead, import volumes change because prices and real consumption

are different from before. Under market segmentation, Home carries a lower fixed-cost burden and its real consumption rises, so Home import volume increases to 1.02. Foreign carries a larger fixed-cost burden; in the numerical example, this reduces real consumption and lowers Foreign import volume to 0.96. Aggregate import volume therefore falls. This provides a Linder (1961) hypothesis: countries with more similar demand structures trade more in real terms. Allowing for parallel trade attenuates, but does not eliminate, this effect. Since global uniform pricing prevents fixed-cost shifting, Foreign benefits relative to market segmentation and its import volume rises from 0.96 to 0.98. Home, by contrast, loses the advantage of its lower fixed-cost burden, and its import volume falls from 1.02 to 1.00. Aggregate import volume remains below the identical-country benchmark.

If we allow for parallel trade, import volumes across countries are more equalized. Since the production share s is pinned down by aggregate labour endowments, parallel trade affects aggregate import volumes only through its effect on real aggregate consumption in the world, $(1-s)Q + sQ^*$. The latter changes, because the world income distribution is more unequal than before. In the numerical examples, the country-level gains and losses largely offset each other, so aggregate import volumes change only slightly.

4 Conclusion

In this paper, we examine the implications of income inequality, both within and between countries, for trade patterns and welfare. We find that rising income inequality, measured by a mean-preserving spread, leads to distinct welfare effects: poorer individuals face higher prices for basic goods, while the rich benefit from falling prices of luxuries. This results in a decline in the average price level and an increase in product variety. In a free trade regime, the allocation of fixed costs across countries is crucial for prices: the richer country bears the larger share of fixed costs, creating a divergence in price schedules across countries and uneven welfare outcomes. Poor consumers in the rich country are most negatively affected by this fixed cost shifting, resulting in higher prices and significant welfare losses. A MPS in income leads to a result consistent with the Linder hypothesis: aggregate trade volume falls as countries diverge. Allowing for international arbitrage prevents fixed costs from being shifted, thus eliminating the Manhattan effect and altering the implications for welfare. All consumers in the country with an initially higher fixed cost share prefer arbitrage, while (most) consumers in the other country do not. The very richest consumers always prefer global uniform pricing over market segmentation.

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Appendix

A Proof of Proposition 2

Part (c): The value of imports in Home is given by:

$$\begin{aligned}\int_{\underline{\theta}}^{\bar{\theta}} p(\theta)(1-G(\theta))\mathcal{P}dN^*(\theta) &= \int_{\underline{\theta}}^{\bar{\theta}} p(\theta)(1-G(\theta))\mathcal{P}N'^*(\theta)d\theta = \int_{\underline{\theta}}^{\bar{\theta}} p(\theta)(1-G(\theta))\mathcal{P}\frac{1}{p^*(\theta)}d\theta \\ &= \int_{\underline{\theta}}^{\bar{\theta}} (1-G(\theta))\mathcal{P}\frac{\frac{1}{a}+\frac{\Pi_H}{\mathcal{P}\left(1-G(\theta)\right)}}{\frac{1}{a}+\frac{\Pi_F}{\mathcal{P}^*\left(1-G^*(\theta^*)\right)}}d\theta = \int_{\underline{\theta}}^{\bar{\theta}} \frac{\left(\frac{(1-G(\theta))\mathcal{P}}{a}+\Pi_H\right)a(1-G^*(\theta))\mathcal{P}^*}{a\Pi_F+(1-G^*(\theta))\mathcal{P}^*}d\theta \\ &= \int_{\underline{\theta}}^{\bar{\theta}} \frac{\left(1-G(\theta)\right)\left(1-G^*(\theta)\right)\mathcal{P}+a\Pi_H\left(1-G^*(\theta)\right)}{a\Pi_F/\mathcal{P}^*+\left(1-G^*(\theta)\right)}d\theta\end{aligned}$$

where the second line uses the definitions of prices (5) and N'^* denotes the *marginal* change in the consumption bundle given a marginal change in income. Following a FOSD shift in Home, we have that $(1-G(\theta))$ increases, Π_H increases and Π_F decreases. Hence, the value of imports must increase. The result for Foreign follows from the trade balance.

Part (d): The volume of imports in Home is:

$$\begin{aligned}\int_{\underline{\theta}}^{\bar{\theta}} (1-G(\theta))\mathcal{P}dN^*(\theta) &= \int_{\underline{\theta}}^{\bar{\theta}} (1-G(\theta))\mathcal{P}N'^*(\theta)d\theta = \int_{\underline{\theta}}^{\bar{\theta}} (1-G(\theta))\mathcal{P}\frac{1}{p^*(\theta)}d\theta \\ &= \int_{\underline{\theta}}^{\bar{\theta}} \frac{(1-G(\theta))\mathcal{P}}{\frac{1}{a}+\frac{\Pi_F}{\mathcal{P}^*\left(1-G^*(\theta^*)\right)}}d\theta = \int_{\underline{\theta}}^{\bar{\theta}} \frac{(1-G(\theta))(1-G^*(\theta))a\mathcal{P}}{a\Pi_F/\mathcal{P}^*+(1-G^*(\theta))}d\theta\end{aligned}$$

Given that $(1-G(\theta))$ increases and Π_F decreases following a FOSD shift, it is obvious that the import volume rises. The result that the volume rises more than the value follows from the fact that most prices in Home fall following the shift in the income distribution, which dampens the rise in import values. In Foreign, the price effect works in the opposite direction,