Firm Heterogeneity and the Mystery of Diverging Trade: a Demand-based Explanation

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Abstract

I propose a heterogeneous firms model with indirect additivity and asymmetric countries. I provide a new demand-based rationale for firm heterogeneity: more efficient firms face less elastic demand, thus they enjoy higher markup rates and profits. Contrary to the CES model of monopolistic competition, i prove that the elasticity of substitution between varieties is decreasing in income. Using ”Per-Capita Income” as the unique feature of asymmetry between developed and developing countries, i show that consumers in rich countries display a lower elasticity of substitution between varieties, which suggests that they have a stronger love for variety. This gives incentive to Southern exporters, not only, to charge them higher markups, but also, to switch their exports to Northern markets after ”North-South Standards Harmonization” simply because they are more profitable. This, in turn, generates a variety loss and thus a welfare loss for ex-Southern export destinations.

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Introduction

Trade models have been ignoring Linder’s seminal work (1961) for many decades. Even his main contribution has been misinterpreted until its recent clarification by Fieler(2011). The ”Linder hypothesis” predicts more trade between countries displaying identical demand structures. Fieler(2011) shows that this similarity in demand is only driven by identical Income per-capita, thus it can not be approximated with economic size (GDP) as it is the case in Gravity models.

Over the last decade, ”Per-Capita Income” has made its comeback to Trade literature through a handful of papers. Sauré(2012) stresses that the number of imported varieties grows strongly with Income per-capita. This implicitly indicates that consumers in rich countries have a stronger love for variety. Another empirical regularity has been recently revealed by Simonovska(2010). Her paper documents a strong positive correlation between Aggregate Price of Tradable goods and GDP per-capita. In response to Simonovska’s empirical observation, Markusen(2013) ”puts Per-Capita Income back to Trade Theory” and associates it with Non-Homothetic preferences to a provide a demand-side rationale for pricing to markets, the mystery of missing Trade and other facts.

A new puzzle in International Trade has just been highlighted by Disdier, Fontagne and Cadot(2015). The authors find that ”North-South Standards Harmonization” (”NSSH” henceafter) generates a simultaneous increase in North-South Trade and decrease in South-South Trade. They also mention that this divergence of trade may lead to a welfare loss in excluded Southern countries.

My intuition is that all these stylized facts outlined above have a common theoretical explanation, where Income per-capita plays a central role. Specifically, i aim to show that higher Income per-capita implies lower elasticity of substitution between varieties, which suggests stronger taste for diversity. In other words, consumers in rich countries perceive varieties as ”almost imperfect” substitutes and care more about the number of varieties they consume than about the quantity consumed of each variety and its price. In response to their willingness to pay higher prices to have access to a very diversified basket of varieties, foreign exporters charge them higher markups and tend to redirect their exports to their countries after ”NSSH” since they are more profitable than Southern markets, where consumers are poorer, more price sensitive and display a weaker love for variety. In order to prove the validity of my theoretical intuition, i need to propose a monopolistic competition model with non-CES preferences in order to go beyond its restrictions.

It has been well documented that due to its simplicity and tractability, the CES model of monopolistic competition, pioneered by Dixit-Stiglitz(1977), has become the workhorse of New Trade Theories. Yet it is fair to stress that this model is very restrictive and provides a rigid demand system. In fact, under CES preferences, the major demand indicators such as: the price elasticity
of demand, the elasticity of substitution between varieties, the Relative Love for Variety (RLV) are not only, constant, but also, exogenous.

Thus, I find it both meaningful and useful to build a monopolistic competition model with heterogeneous firms à la Melitz and Indirect Additivity following Bertoletti & Etro (2013).

**General setting**

Consider a country populated by L identical agents with individual labor endowment $e$ (in efficiency units). The labor market is perfectly competitive: normalizing the wage rate to 1, individual income $E$ is then equal to the labor endowment. Each agent spends his income on a homogenous good (h) produced under perfect competition and constant returns to scale, and a continuum of horizontally differentiated varieties of the differentiated good (d).

**1 Preferences and Demand**

I follow Bertoletti & Etro (2013) and choose an Indirect utility function that has an intersectoral Cobb-Douglas form:

$$V = \left[ \frac{E}{p_h} \right]^\alpha \left[ \int_0^n \exp \left( -t \left( \frac{p_j}{E} \right) \right) \, dj \right]^{1-\alpha}$$

where $p_h$ is the price of the homogenous good, $\alpha \in ]0,1[$ and $v(\frac{p_j}{E}) = \exp(-t\frac{p_j}{E})$ is the sub-utility of the variety $j$ of the differentiated good.

1.1 Individual demand:

The Roy identity delivers the following log-linear demand function for variety $i$:

$$c_i = -\frac{\partial V}{\partial p_i} = \frac{t \exp(-t\frac{p_i}{E})}{\eta}$$

where $\eta = \int_0^n [ -t \exp(-t\frac{p_j}{E}) \left( \frac{p_j}{E} \right) - \frac{\alpha}{1-\alpha} \exp(-t\frac{p_j}{E})] \, dj < 0$ is unaffected by $p_i$. 
1.2 Price Elasticity of Demand:

In line with Bertoletti & Etro(2013), I find that demand elasticity is increasing in the price-income ratio ($\frac{p_i}{E}$):

$$
(2) \quad \varepsilon_{c_i}^{p_i} = \frac{\partial \ln(c_i)}{\partial \ln(p_i)} = -t\left(\frac{p_i}{E}\right) < 0
$$

Importantly, I extrapolate this result to an asymmetric consumption pattern, which takes place when firms are heterogeneous, and highlight a new demand-based rationale for firm heterogeneity. The proof of this theoretical finding will be provided later in the model once the optimal pricing rule is derived. Before going into the details of this new result, I can easily show that higher Income per-capita implies less price sensitivity using the following partial derivative:

$$
\frac{\partial |\varepsilon_{c_i}^{p_i}|}{\partial E} = -t\frac{p_i}{E^2} < 0.
$$

1.3 Elasticity of Substitution between varieties:

Blackorby & Russel(1989) define the elasticity of substitution between a pair of varieties $i$ and $j$ as the logarithmic derivative of the relative consumption of variety $i$ ($\frac{c_i}{c_j}$) with respect to its relative price ($\frac{p_i}{p_j}$). They suggest that the Morishima elasticity of substitution (MES) is the most likely to mirror this definition. Applying its formula, I obtain the following expression:

$$
(3) \quad \epsilon(p_{i,j}, E) = \frac{\partial \ln(c_i)}{\partial \ln(p_j)} - \frac{\partial \ln(c_j)}{\partial \ln(p_i)} = -t\frac{p_{i,j}}{E} < 0
$$

Notice that under firm heterogeneity, the elasticity of substitution is firm specific and $p_i$ and $p_j$ hover around $p_{i,j}$. Moreover, The negative partial derivative of $|\epsilon|$ with respect to $E$\textsuperscript{1} clearly indicates that consumers in rich countries display a lower elasticity of substitution between varieties. In other words, these wealthy consumers perceive varieties as being very differentiated and care more about the degree of diversity of their consumption basket. This suggests that they have a stronger love for variety, which goes hand in hand with their weaker price sensitivity.

Paralleling New Trade Theories whose results crucially rely on the CES, this simple model goes beyond its restrictions to provide preferences with much more flexibility. For instance, it delivers variable price elasticity of demand $\varepsilon(p_i; E)$ and elasticity of substitution $\epsilon(E)$. Both elasticities are decreasing in Income per-capita and not constant and exogenous as it is the case in CES models. Importantly, under Indirect Additivity, individual Income is the main determinant of the demand

\textsuperscript{1} $\frac{\partial |\epsilon|}{\partial E} = -t\frac{p_{i,j}}{E^2} < 0.$
system, which allows it to play a central role throughout the model with crucial consequences mainly on markups, firm selection and the Mass of available varieties.

2 Supply

2.1 Firm Heterogeneity:

Consider a given country where income per-capita is equal to $E$ and firms produce symmetric varieties at different marginal costs. Following Melitz(2003), I assume that, upon paying a sunk fixed entry cost $F_e$ (measured in efficiency units of labor), firms draw their initial productivity level $\varphi$ from a common distribution $g(\varphi)$. Each firm chooses to produce a single variety. For example, a given variety $i$ is supplied by a firm with productivity $\varphi$. In response to total market demand for its variety, this firm produces

$$y(\varphi) = c(\varphi)L = -\frac{t \exp \left( - \left( \frac{p(\varphi)}{E} \right) \right)}{\eta} L$$

and sells this output at a profit maximizing price.

2.1.1 Homogenous markup, Heterogeneous markup rates:

$$\pi(\varphi) = [p(\varphi) - \left( \frac{1}{\varphi} \right)] \left( -\frac{t \exp \left( - \left( \frac{p(\varphi)}{E} \right) \right)}{\eta} L \right) - F$$

The F.O.C of profit maximization yields a pricing rule

$$p(\varphi) = \left( \frac{1}{\varphi} \right) + \frac{E}{t},$$

where the markup $(\frac{E}{t})$ is country specific and not exogenous and identical across countries as it is the case in CES trade models. In line with Melitz(2003), more productive firms charge lower prices only because they produce their varieties at lower marginal costs.

Recall that price elasticity of demand is increasing in price. Since firms charge different prices, one can expect that they may face different demand elasticities. I make this intuition much more explicit using the following procedure:

\[\text{Note that we assume that this distribution of productivity is identical across countries, so that Income per-capita remains the unique cause of Asymmetry between advanced economies and developing countries.}\]

\[\text{This firm produces its variety according to local standards at a marginal cost } \frac{1}{\varphi}.\]

\[\text{market demand for variety } i = c_i^*L.\]
I plug the pricing rule (5) in the demand elasticity (2) and obtain an endogenous price elasticity of demand

\[
|\varepsilon(E, \varphi)| = \frac{t}{E} \left[ \left( \frac{1}{\varphi} \right) + \frac{E}{t} \right] = \left[ 1 + \frac{t}{E \varphi} \right] > 1,
\]

which is decreasing in Income and also in firm productivity\footnote{\( \frac{\partial |\varepsilon(E, \varphi)|}{\partial E} = -\frac{t}{E^2 \varphi} < 0, \frac{\partial |\varepsilon(E, \varphi)|}{\partial \varphi} = -\frac{t}{E \varphi^2} < 0 \)}. As well known, CES preferences imply that firms face the same constant demand elasticity \( \sigma \) and thus choose the same markup \( \left( \frac{\sigma}{\sigma - 1} \right) \).

Contrary to what happens under the CES, Indirect Additivity provides a completely different rationale for markup choice. In fact, firms charge the same markup only because they operate on the same market. Importantly, this model incorporating both indirect additivity and firm heterogeneity allows more productive firms to face a less elastic demand since demand elasticity is decreasing in firm productivity. This represents a new and additional advantage for them, with appealing consequences on their profitability.

In Melitz(2003), one of the major implications of the CES is that even though firms are heterogeneous, they share the same markup rate \( \left( \frac{1}{\sigma} \right) \)\footnote{It can easily be computed using the Lerner index as follows: \( \frac{p(\varphi) - \left( \frac{1}{\varphi} \right)}{p(\varphi)} = \frac{E}{\sigma} \frac{1}{\sigma} - \left( \frac{1}{\varphi} \right) = 1 \).} since they face the same exogenous price elasticity of demand \( \sigma \). By contrast, i show that, under indirect additivity, more efficient firms enjoy higher markup rates since they face a less elastic demand using the "Lerner index" which i denote by:

\[
(7) \quad \iota(\varphi) = \frac{p(\varphi) - \left( \frac{1}{\varphi} \right)}{p(\varphi)} = \frac{E}{\left[ \left( \frac{1}{\varphi} \right) + \frac{E}{t} \right]}
\]

Recall that demand elasticity is given by \( |\varepsilon(\varphi)| = \frac{t}{E} \left[ \left( \frac{1}{\varphi} \right) + \frac{E}{t} \right] \). The markup rate of a firm with productivity \( \varphi \) is then equal to the inverse of the demand elasticity it faces \( \iota(\varphi) = \frac{1}{|\varepsilon(\varphi)|} < 1 \).

Hence, the markup rate is increasing in firm productivity\footnote{\( \frac{\partial \iota(\varphi)}{\partial \varphi} = \frac{t E}{|t + \varphi E|^2} > 0 \Rightarrow \iota = f^+(\varphi) \) and \( |\varepsilon| = f^-(\varphi) \)}. In other words, high-productivity firms are twice advantaged through two different channels. The first is a standard "volume effect" that already exists in Melitz(2003): their lower marginal cost allows them to set lower prices and attract larger demand and thus produce and sell more.

The second is new and can be called a "relative price effect": using the "price-income ratio", i highlight that these firms charge lower relative prices and thus face less elastic demand\footnote{Recall that the first result of this paper states that demand elasticity is increasing in "price-income ratio".} and enjoy higher markup rates, as it is illustrated in the figure above.

This new channel has a mirror image that may be expressed as follows: the share of the markup in
their prices is larger because the weight of their prices in the consumer’s income is smaller. In Melitz and Ottaviano (2008), more productive firms also face a less elastic demand, yet for a supply-based reason: their prices are the lowest as compared to the average price, which mainly determined by the size of the economy. By contrast, this paper provides a purely demand-based explanation for this fact: more efficient firms set the lower prices, their cheap varieties provide then the consumer with a higher sub-utility as long as they represent a smaller fraction of the consumer’s income (low price-income ratio).

2.1.2 Firm output, revenues and variable profits:

Using total market demand (4) and the pricing rule (5), the output, revenues and profits of a \( \varphi \)-productivity firm can be summarized as follows:

\[
\begin{align*}
    y(\varphi) &= -\frac{tL}{\eta} \exp^{-\left(1 + \frac{L}{E\varphi}\right)} ; \\
    r(\varphi) &= -\left(\frac{L}{\eta} + E\right) \frac{L}{\eta} \exp^{-\left(1 + \frac{L}{E\varphi}\right)} \quad \text{and} \quad v\pi(\varphi) = -\frac{EL}{\eta} \exp^{-\left(1 + \frac{L}{E\varphi}\right)} \tag{9}
\end{align*}
\]

\(9\) Firm profit is given by \(\pi(\varphi) = -\frac{EL}{\eta} \exp^{-\left(1 + \frac{L}{E\varphi}\right)} - F\). Since all firms share the same fixed cost \(F\), their variable profit is a sufficient indicator of their profitability.
In line with Melitz(2003), I show that a more productive firm is bigger and more profitable then a less productive firm using the following static comparatives:

\[ \frac{y(\varphi')}{y(\varphi)} = \frac{-t \exp(-t \frac{p(\varphi')}{B} - L)}{-t \exp(-t \frac{p(\varphi)}{B} - L)} = \exp \frac{t(\varphi' - \varphi)}{E \varphi'} > 1 \quad \forall \varphi' > \varphi; \]

\[ \frac{r(\varphi')}{r(\varphi)} = \frac{p(\varphi') y(\varphi')}{p(\varphi) y(\varphi)} = \frac{p(\varphi')}{p(\varphi)} \exp \frac{t(\varphi' - \varphi)}{E \varphi'} = \frac{\varphi}{\varphi'} \frac{t + \varphi' E}{t + \varphi E} \exp \frac{t(\varphi' - \varphi)}{E \varphi'} > 1 \quad \forall \varphi' > \varphi; \]

\[ v_\pi(\varphi) = \left( p(\varphi) - \left( \frac{1}{\varphi} \right) \right) y(\varphi) \Rightarrow v_\pi(\varphi) = \iota(\varphi) r(\varphi), \text{ relative variable profits are then:} \]

\[ \frac{v_\pi(\varphi')}{v_\pi(\varphi)} = \frac{\iota(\varphi') r(\varphi')}{\iota(\varphi) r(\varphi)} > 1 \quad \forall \varphi' > \varphi. \]

It is important to emphasize the differences of this setting with the baseline Melitz model. Here more efficient firms make higher variable profits, because they enjoy, not only, higher revenues, but also higher markup rates. In other words, they are more profitable because they sell more and, importantly, the share of the markup in the unit price of each unit they sell is bigger. In Melitz(2003), all firms share the same exogenous markup rate \( \left( \frac{1}{\varphi} \right) \), and high-productivity firms earn higher profits only because they enjoy higher revenues.

Note that (11) can be rewritten as follows:

\[ \frac{v_\pi(\varphi')}{v_\pi(\varphi)} = \frac{\iota(\varphi') r(\varphi')}{\iota(\varphi) r(\varphi)} \exp \frac{t(\varphi' - \varphi)}{E \varphi'} = 1 \quad \forall \varphi' > \varphi. \]

In Melitz(2003), more productive firms earn lower variable profits per unit \( \left( \frac{p(\varphi)}{\sigma} \right) \), because they charge lower prices, but they are more profitable. In fact, under CES preferences, the "volume effect" is so strong that it overcompensates the negative "value effect".

By contrast, this model exhibits a neutral "value effect" and a weaker "volume effect". Regardless of its productivity, each firm earns the same variable profit per unit \( \left( \frac{E}{t} \right) \) and high-efficiency firms enjoy higher profits just because they sell more. Hence, this "volume effect" is positive and simply complementary to the neutral "value effect". This outcome mainly stems from the the stronger influence of individual income under indirect additivity.

\(^{10}\)Firms pay the same overhead cost \( F \). Hence, higher variable profits imply higher profits.
2.2 The response of firms to income variation:

Under this class of preferences, individual income \((E)\) is the main determinant of the demand system: High-income consumers are *richer*, thus *less price sensitive* and display a *stronger love for variety*. In this section, I propose to analyze the impact of an increase in *income per-capita* on the profitability of the domestic market.

In line with Krugman’s "Home Market Effect", I find that each firm produces *more* in response to a *larger* market demand in the High-income country\(^\text{11}\):

\[
(12) \frac{\partial y(\varphi)}{\partial E} = \frac{t^2 L}{|\eta|^2 E^{2\varphi}} \exp\left(-\frac{1}{E}\right) > 0
\]

Moreover, each active firm increases its markup as long as the richer consumer is less price sensitive:

\[
(13) \frac{\partial (E/t)}{\partial E} = \frac{1}{E^2} > 0 \ \forall \varphi
\]

The firm enjoys not only higher markup, but also, a higher markup rate due to the elastic demand it faces:

\[
(14) |\varepsilon(E)| = \left[1 + \frac{t}{E\varphi}\right] > 1 \text{ and } \frac{\partial |\varepsilon(E)|}{\partial E} = -\frac{t}{\varphi E^2} < 0
\]

\[
(15) \iota(E) = \frac{1}{|\varepsilon(E)|} = \frac{1}{1 + \frac{t}{E\varphi}} \text{ and } \frac{\partial \iota(E)}{\partial E} = \frac{t}{\varphi |E + (1/\varphi)|^2} > 0
\]

It is important to disentangle 2 effects generating this higher firm profitability. The first is Krugman’s "Home Market Effect": a firm operating on a richer market produces more in response to a larger market demand (higher income implies a larger market size. The second is new and called "Home Preferences Effect": a firm established in a *rich* country chooses a *higher* markup, thus charges a *higher* price and the share of the markup in its price is *bigger*. This firm sets a *higher* price and enjoys a *higher* markup rate as long as rich consumers are *less* price sensitive and have a *stronger* taste for variety.

In autarky, firms operating on the high-income (Northern) market fully enjoy its higher profitability as long as they are sheltered from foreign competition. Importantly, this higher profitability of the Northern market will have an *appealing* implication in open economy. In fact, once this market is accessible through exporting, any southern exporter would prefer to serve this very attractive

\(^{11}\text{Recall that the number of consumers }L\text{ is constant. Therefore, this larger market demand is solely driven by a larger individual demand which, in its turn, is explained by a higher individual income}\)
destination since it is more profitable than any other southern market. Moreover, even though we are still in closed economy, one could expect that any trade agreement which facilitates the access to the Northern market for Southern exporters, such as "North-South Standards Harmonization" would give a strong incentive for Southern exporters who used to serve a symmetric Southern destination to redirect their exports to the North in order to enjoy higher profits. This summarizes the theoretical mechanism that this model proposes to explain this mystery of diverging trade, which has been empirically observed by Disdier, et al.(2015). Furthermore, this simple model theoretically proves the existence of a variety loss and thus a welfare loss for ex-Southern export destinations, as it was initially suggested by these authors. Before going into the details of these major results in open economy, I have to start with deriving the closed economy equilibrium as follows.

3 Closed Economy Equilibrium :

I use the free entry (FE) and zero cutoff profit (ZCP) conditions in order to derive the closed economy equilibrium.

The ZCP condition indicates that the last entrant makes zero profit: \( \pi(\varphi^*) = 0 \Rightarrow v\pi(\varphi^*) = F \).

The Free entry condition imposes that average profit has to equate the fixed cost of entry \( F_e \). That is, (FE): \( v\pi(\varphi) = \frac{-EL}{\eta} \exp^{-\left(1 + \frac{\pi}{\eta}\right)} = (F + F_e) \). The ZCP condition delivers the following expression of the equilibrium cutoff : \( \varphi^* = \frac{t}{E} \left[ \log \left( \frac{EL}{F_e} \right) - 1 \right] \), yet \( \varphi^* \) still depends on an endogenous variable \( \eta \), which unique equilibrium value is obtained using the (FE) condition |\( \eta^* \)| = \( \frac{EL\bar{\varepsilon}(E)}{(F + F_e)} \). Plugging |\( \eta^* \)| in \( \varphi^* \), I can express the domestic cutoff as follows: (16) \( \varphi^* = \frac{t}{E} \left[ \log \left( \frac{F + F_e}{F_e} \right) - 1 \right] > 0 \). This clearly shows that firm selection depends on individual income \( E \), while it doesn’t depend on the population size \( L \) as it is the case under the CES. Equating the unique equilibrium value of |\( \eta \)| to its expression, I obtain the equilibrium mass of firms :

\[ |\eta^*| = \frac{EL\bar{\varepsilon}(E)}{(F + F_e)} = M \int_{\varphi^*}^{+\infty} \left[ \frac{v'(\frac{p(\varphi)}{E})}{(p(\varphi))^\alpha} \right] \frac{\sigma(\varphi)}{1-\alpha(\varphi^*)} \varphi d\varphi \Rightarrow M = \frac{(1-\alpha)EL}{(F + F_e)[(1-\alpha)\bar{\varepsilon}(E) + \alpha]} \tag{12} \]

Finally, and using |\( \eta^* \)|, the equilibrium output per firm : \( \bar{y} = \frac{t(F + F_e)}{E} \).

At equilibrium, a higher individual income generates a more than proportional decrease in the domestic cutoff, a more than proportional increase of the mass of available varieties and a proportional decrease in average consumption per-variety:

\( \varepsilon_{E}^{\varphi^*} = - \left[ 1 + \frac{\bar{\varepsilon}(E)}{\log \left( \frac{F + F_e}{F_e} \right) - 1} \right] \); \( \varepsilon_{E}^{M} = 1 + |\bar{\varepsilon}(E)| \); and \( \varepsilon_{E}^{\bar{y}} = -1 \). Therefore, higher individual income

\[ \varepsilon_{E}^{\varphi^*} = - \left[ 1 + \frac{\bar{\varepsilon}(E)}{\log \left( \frac{F + F_e}{F_e} \right) - 1} \right] \]
makes the consumer less price sensitive: less reactive to the variation of the price of each variety, firms then react by increasing less proportionally their prices (only the responds positively to an increase in income) and expect higher demand (for given $|\eta|$), this increase in expect profits triggers a more than proportional entry of new varieties in response to the stronger love for variety displayed by the richer consumer. This later chooses to consume more varieties and on average less of each as long as he cares more about the width of the bundle of varieties he consumes than about quantity he consumes of each variety. Importantly, notice the market adjustment to an increase in individual income, not only, restores the Free entry condition (the per-unit variable profit $(E/t)$ increases proportionally to income and the equilibrium output per firm decreases accordingly) but also mimics a purely love for variety-driven reaction of the consumer who uses his additional income to consume much more varieties and less of each. His total consumption in terms of varieties increases then since the more than proportional increase in the mass of consumed varieties overcompensates the proportional decrease of the average per-variety consumption, which is synonym of a welfare improvement.

4 Open Economy

In their recent work, Disdier et al. (2015) has revealed that North-South standards harmonization fosters North-South trade, yet at the expense of South-South trade. This section aims to provide a theoretical explanation for this empirically observed conjecture and to prove the existence of a welfare loss for the excluded Southern trade partner. In order to focus on North-South and South-South trade, i Consider a trade bloc composed of 3 countries: 1 high-income country (N) and 2 symmetric low-income countries $S_1$ and $S_2$. Per-capita income $E$ arises then as the unique feature of asymmetry between developed and developing countries ($E_N > E_S$).

4.1 Pricing to Markets in the presence of Technical Barriers to Trade:

Recall that in Autarky, each $\varphi$ productivity firm established in a country $i$ produces its variety according to local standards $s_i$ at a marginal cost $(\frac{1}{\varphi}) \forall s_i$, meaning that there is cost hierarchy to standards: producing a variety in a developed country (N) according to regional standards (more stringent) or in a developing country according to international ones (less stringent) is always firm specific and completely determined by the level of efficiency of the firm ($\varphi$). However, what is really costly is to adapt a variety initially produced according to local standards to ensure that it conforms foreign standards. Any firm intending to export to a given country has to follow these
steps: produces its variety according to local standards (to be eligible to sell on the domestic market), adapts the fraction of its output that is destined to be exported to a foreign country to its specific requirements (which include conformity assessment, packaging, and labeling), and then export with no risk of rejection at the border. This compulsory step preceding export involves an additional cost, a question arises then: is it an additional variable or fixed cost? Intuitively, if a firm incurs a fixed cost of compliance $F_c$, it is to adapt its entire production process to foreign standards, which means that it produces each unit of its variety according to these foreign requirements. This, in turn, implies that the larger share of its output, which is destined to the domestic market is henceforth rejected since it no longer conforms to local standards. There is mounting evidence that exporting firms operate principally on the domestic market and export only a small fraction of their output, no exporter find it then reasonable and profitable to pay this fixed cost of compliance $F_c$ as long as it induces a loss of large domestic market shares and a gain of a small market shares on the export market. Accordingly, any $\varphi$-productivity firm established in a given country $i$ produces always its variety according to local requirements (which ensures that its production can be sold on the domestic market) at a marginal cost ($1\varphi$) and adapts only the fraction of its output destined to the export market $j$ at an additional per-unit cost of compliance with foreign standards: $z^i_j$.

Define $s_i$ as: the stringency of standards adopted by country $i$ on a $[0;1]$ scale and let $|s_i - s_j|$ be the distance between countries’ respective standards, $z^i_j$ is then given by: $z^i_j = 1 + |s_i - s_j|$ and can be interpreted as a coefficient of the distance between stringency of different standards. Since the two developing countries $S_1$ and $S_2$ share the same standards (international ones), while the developed country (N) aligns on different and more stringent standards (regional ones), $z^i_j$ differs across country pairs: $z^S_{S_1} = z^S_{S_2} = 1$ as long as $s_{S_1} = s_{S_2}$, while $z^S_N > 1$ as long as $s_S \neq s_N$. To avoid an abuse of notation, notice that $z^S_S = z^N_N = z > 1$. The profit-maximizing pricing rule for exporters still obeys to the same principle (as it was the case in autarky): the firm passes on its marginal cost and charges a marginal cost that is adapted to the level of wealth of the consumer (E).

Denote by $p(\varphi)_{x^i_j}$: the price a $\varphi$-productivity exporter established in country $i$ charges to the consumer in country $j$: $p(\varphi)_{x^i_j} = p_{x^S_{S_1}} = \frac{\tau}{\varphi} + \frac{E_S}{t}$ since $z^S_S = 1$; $p(\varphi)_{x^i_j} = p_{x^S_{S_2}} = \frac{\tau}{\varphi} + \frac{E_N}{t}$, and $p(\varphi)_{x^N_j} = p_{x^S_{S_2}} = \frac{\tau}{\varphi} + \frac{E_S}{t}$, where $\tau$ is the iceberg-transport cost. These pricing rules clearly show that Southern exporters charge a higher markup to Northern consumers as long as they are richer, less price sensitive and display a stronger love for variety. Similarly, Northern exporters set a lower markup to Southern consumers as long as they are poorer, more price sensitive and display a weaker love for variety. This provides then an intuitive explanation for Simonovska(2010)’s empirical finding: we observe higher Aggregate prices of tradable goods in rich countries because
foreign exporters pass on higher marginal cost of adapting their products to Northern Standards and charge higher markups to their rich consumers due to their lower price sensitivity and stronger love for variety. Pricing to markets emerges then as a translation of Non-tariff measures and also as a rational reaction of exporting firms to the degree of price sensitivity and love for variety of their foreign customers.

4.2 Self-selection into exporting:

In order to serve a foreign market , firms have to incur a fixed exporting cost . This sunk cost generally captures the advertising and distribution costs associated with entry into a foreign market: in order to attract foreign consumers, a firm must inform them about the characteristics of its product. It must also set up a distribution channel in the foreign country to ensure that its product is available for consumption for its foreign customers. It is important to mention that the fixed cost of serving a foreign market also includes costs of collecting information about foreign standards in order to adapt its product accordingly so that it conforms to the requirements specified by the foreign customs agency. Denote by the cutoff productivity level for exporting from country to country . By definition, this cutoff level must satisfy and is then given by:

\[ v \pi_{xj}(\varphi^*) = F_x \Rightarrow v \pi_{xj}^* (\varphi) = \frac{E_j L}{\eta_j} \exp \left( - \frac{t \tau z_j}{E_j} \right) \Rightarrow \varphi^*_{xj} = \frac{t \tau z_j}{E_j \left[ \log \left( - \frac{E_j L}{\eta_j F_x} \right) - 1 \right]}. \]

such that firms with productivity levels between and do not export and produce exclusively for their domestic market. Only firms whose productivity level exceeds can successfully enter the export market and earn positive profits from both their domestic and export sales. This endogenous export cutoff is increasing in the transport cost , the non-tariff barrier , the fixed exporting cost , yet decreasing in per-capita income in country as shown by the following partial derivatives:

\[ \frac{\partial \varphi^*_{xj}}{\partial \tau} = \frac{t \tau z_j}{E_j \left[ \log \left( - \frac{E_j L}{\eta_j F_x} \right) - 1 \right]} > 0 ; \quad \frac{\partial \varphi^*_{xj}}{\partial F_x} = \frac{t \tau z_j}{F_j E_j \left[ \log \left( - \frac{E_j L}{\eta_j F_x} \right) - 1 \right]^2} > 0 ; \]
\[ \frac{\partial \varphi^*_{xj}}{\partial E_j} = - \frac{t \tau z_j \log \left( - \frac{E_j L}{\eta_j F_x} \right)}{\left[ E_j \left[ \log \left( - \frac{E_j L}{\eta_j F_x} \right) - 1 \right] \right]^2} < 0 ; \quad \frac{\partial \varphi^*_{xj}}{\partial z_j} = \frac{t \tau}{E_j \left[ \log \left( - \frac{E_j L}{\eta_j F_x} \right) - 1 \right]} > 0 . \]

Recall that for any South-based exporter, there are two asymmetric destinations: a high-income country (N) that erects a non-tariff barrier to trade and a low-income country (S) whose standards are identical to local ones. The first question to arise is then: which country is easier to serve?
which determinant affects more the export cutoff: the individual income $E_j$ or the technical barrier to trade $z_j$? To address this question, I compute and compare the elasticities of the export cutoff with respect to individual income and the non-tariff barrier:

$$\varepsilon^{\phi^*_{x_j}}_{E_j} = -\frac{\log(-\frac{E_j E_j \not{z_j}}{\not{E_j} \not{z_j} - 1})}{\log(-\frac{E_j E_j \not{z_j}}{\not{E_j} \not{z_j} - 1} - 1)} \Rightarrow \varepsilon^{\phi^*_{x_j}}_{E_j} > 1; \ varepsilon^{\phi^*_{x_j}}_{z_j} = 1.$$  

This clearly shows that the income effect dominates the TBT effect: $|\varepsilon^{\phi^*_{x_j}}_{E_j}| > \varepsilon^{\phi^*_{x_j}}_{z_j}$. Therefore, despite the stringency of its standards and the additional cost of compliance $z$ it implies, the Northern market is easier to penetrate due its higher individual income $E_N$. For any Southern firm, the Northern destination is then more accessible than the symmetric Southern destination: $\phi^*_{x_1^S} < \phi^*_{x_2^S}$. In other words, $\phi^*_{x_1^S} < \phi^*_{x_2^S}$ and $\phi^*_{x_1^S} < \phi^*_{x_2^S}$.

Using (17), the productivity cutoff to export from the South to the North and to a symmetric Southern destination are respectively given by:

$$\phi^*_{x_1^S} = \phi^*_{x_2^S} = \frac{\frac{1}{1-G(\phi^*_{x_1^S})} \not{E_N} \not{E_N} \not{z_1} \not{z_1}}{E_N \not{E_N} \not{E_N} \not{E_N} \not{z_1} \not{z_1}}, \ z_1^S = 1, z_1^N = z > 1$$

Moreover, notice that any Southern market ($S_1$; or $S_2$) is harder to serve from the North than from a symmetric Southern country. In fact, while Southern firms (e.g. based in $S_1$) find it hard to export to the symmetric Southern destination ($S_2$) only because it is less profitable (due to the low level of per-capita income), the access to this less profitable market is even harder for Northern firms as long as they face an additional obstacle: the non-tariff barrier to trade ($z > 1$) the developing country erects to North-produced varieties:

$$\phi^*_{x_1^N} = \phi^*_{x_2^N} = \frac{\frac{1}{1-G(\phi^*_{x_1^N})} \not{E_S} \not{E_S} \not{E_S} \not{E_S} \not{z_1} \not{z_1}}{E_S \not{E_S} \not{E_S} \not{E_S} \not{z_1} \not{z_1}}, \ z_1^S = 1 \text{ and } z_1^N = z > 1$$

Summing up, the easiest is to export from the South to the North, harder is to export from the South to the symmetric Southern country, and the hardest is to export from the North to the South.

### 4.3 Probability of exporting and Mass of exporters:

As in Melitz (2003), the probability of exporting from country $i$ to country $j$ is defined by:

$$P_{x_j}^i = \frac{[1-G(\phi^*_{x_j})]}{[1-G(\phi^*_{x_j})]}.$$  

Applying this formula, I obtain the following probabilities of export:

$$P_{x_1^N} = P_{x_2^N} = \frac{[1-G(\phi^*_{x_1^N})]}{[1-G(\phi^*_{x_1^N})]}; \ P_{x_1^S} = P_{x_2^S} = \frac{[1-G(\phi^*_{x_1^S})]}{[1-G(\phi^*_{x_1^S})]}, \text{ and finally, } P_{x_1^N} = P_{x_2^N} = \frac{[1-G(\phi^*_{x_1^N})]}{[1-G(\phi^*_{x_1^N})]}.$$  

The
mass of varieties exported from country \( i \) to country \( j \) is then given by \( M_{x_{ij}} = P_{x_{ij}} M_i \); that is, \( M_{x_{Ni}} = P_{x_{Ni}} M_S \); \( M_{x_{Si}} = P_{x_{Si}} M_S \); and \( M_{x_{Ni}} = P_{x_{Ni}} M_N \).  

### 4.4 Combined revenues and profits of Northern firms:

The combined revenues are given by:

\[
r(\varphi) = \begin{cases} 
  r_N(\varphi) & \text{if } \varphi \in [\varphi_N^*, \varphi_{xS}^*] \\
  r_N(\varphi) + 2r_{xS}(\varphi) & \text{if } \varphi \in [\varphi_{xS}^*, +\infty[ 
\end{cases} 
\]

Their combined profits can be written as:

\[
\pi(\varphi) = \begin{cases} 
  \pi_N(\varphi) & \text{if } \varphi \in [\varphi_N^*, \varphi_{xS}^*] \\
  \pi_N(\varphi) + 2\pi_{xS}(\varphi) & \text{if } \varphi \in [\varphi_{xS}^*, +\infty[ 
\end{cases} 
\]

### 4.5 Combined revenues and profits of Southern firms:

The combined revenues are given by:

\[
r(\varphi) = \begin{cases} 
  r_S(\varphi) & \text{if } \varphi \in [\varphi_S^*, \varphi_{xN}^*] \\
  r_S(\varphi) + r_{xN}(\varphi) & \text{if } \varphi \in [\varphi_{xN}^*, \varphi_{xS}^*] \\
  r_S(\varphi) + r_{xN}(\varphi) + r_{xS}(\varphi) & \text{if } \varphi \in [\varphi_{xS}^*, +\infty[ 
\end{cases} 
\]

Their combined profits can be written as:

\[
\pi(\varphi) = \begin{cases} 
  \pi_S(\varphi) & \text{if } \varphi \in [\varphi_S^*, \varphi_{xN}^*] \\
  \pi_S(\varphi) + \pi_{xN}(\varphi) & \text{if } \varphi \in [\varphi_{xN}^*, \varphi_{xS}^*] \\
  \pi_S(\varphi) + \pi_{xN}(\varphi) + \pi_{xS}(\varphi) & \text{if } \varphi \in [\varphi_{xS}^*, +\infty[ 
\end{cases} 
\]

### 4.6 Open Economy Equilibrium:

#### 4.6.1 Determination of the new domestic cutoff:

There are two equilibrium conditions: the zero cutoff profit (ZCP) and the Free entry condition (FE) respectively given by:

\[
\text{ZCP} : \pi(\varphi_o^*) = 0 \Rightarrow v\pi(\varphi_o^*) = F
\]

---

\(^{13}\)By symmetry, \( P_{x_{Ni}} = P_{x_{Ni}} = P_{x_{Ni}} \); \( P_{x_{Si}} = P_{x_{Si}} = P_{x_{Si}} \), and \( P_{x_{Ni}} = P_{x_{Ni}} = P_{x_{Ni}} \).

\(^{14}\)For any country, subscript \( o \) refers to open economy and \( a \) to Autarky.
FE : $\pi = F_e \Rightarrow \int_{\varphi}^{+\infty} \pi(\varphi) \frac{g(\varphi)}{|1-G(\varphi)|} d\varphi + \sum_{j=N,S} \int_{\varphi_t^*}^{+\infty} \pi_{x_j}(\varphi) \frac{g(\varphi)}{|1-G(\varphi)|} d\varphi = F_e.$

The ZCP delivers the following expression of the domestic cutoff: $\varphi^* = \frac{1}{E[\log(\eta_N)])^{1/2}}$, showing that it is strictly increasing in $|\eta|$: $\frac{\partial \varphi^*}{\partial |\eta|} = \frac{1}{E[\log(\eta_N)])^{1/2}} > 0$. Importantly, $|\eta|$ captures the pro-competitive effect of trade, which is channelled through an increase in the mass of firms competing on the domestic market. It is important to mention that under this class of preferences, the mass of available varieties doesn’t affect neither the price elasticity of demand nor the degree of substitutability between varieties since they both depend mainly on individual income $E$ and also on prices (firm specific). As a result, the increase in the mass of firms present on the domestic market forces the least efficient domestic firm to exit only because it lowers the individual demand they attract (and thus the market demand), making then their variable profit too low to cover the fixed cost of production $F$:

$|\eta_a| = |\eta_a| + \sum_{j=N,S} |\eta_j^i| > |\eta_a|$, such that $|\eta_a| = M_a \int_{\varphi_a}^{+\infty} \left| v'(\frac{\varphi(\varphi)}{E}) \left( \frac{\varphi(\varphi)}{E} \right) - \frac{\alpha}{1-\alpha} v'(\frac{\varphi(\varphi)}{E}) \right| \frac{g(\varphi)}{|1-G(\varphi)|} d\varphi$ and $|\eta_j^i| = M_j \int_{\varphi_j^i}^{+\infty} \left| v'(\frac{\varphi(\varphi_j^i)}{E}) \left( \frac{\varphi(\varphi_j^i)}{E} \right) - \frac{\alpha}{1-\alpha} v'(\frac{\varphi(\varphi_j^i)}{E}) \right| \frac{g(\varphi)}{|1-G(\varphi)|} d\varphi$, where $M_j^i$ : Mass of varieties imported from country $j=N,S$. Since $\varphi^* = f^+(|\eta|)$, then, $\varphi^*_a = f(|\eta_a|) > \varphi^*_a = f(|\eta_a|)$.

4.6.2 Mass of Exiting and Surviving firms :

Denote by $M_{Ex}$ : The Mass of domestic firms who are forced to exit the market after openness to trade : $M_{Ex} = \left[ \frac{1-G(\varphi^*_a)}{1-G(\varphi^*_a)} \right] M_a = \left[ \frac{G(\varphi^*_a)-G(\varphi^*_a)}{1-G(\varphi^*_a)} \right] M_a$. The Mass of domestic firms who survive after openness to trade is then given by $M_o = M_a - M_{Ex} = \left[ \frac{1-G(\varphi^*_a)}{1-G(\varphi^*_a)} \right] M_a$. This implies a loss of ”domestic” varieties ($M_o < M_a$ ). In line with Melitz(2003), in any country, only the more efficient firms survive to foreign competition ($\varphi > \varphi^*_o$).

4.6.3 Total Mass of available varieties in Open Economy :

The Total Mass of firms operating on the domestic market of country $i$ in open economy is defined by: $M_i^T = M_o^T + \sum_{j=N,S} P x_i^j M_j^i$. The mass of varieties available for consumption for the Southern and the Northern consumer are respectively written as follows: $M_i^S = M_o^S + P x_S^i M_o^S + P x_S^N M_o^N$ and $M_i^N = M_o^N + P x_N^i M_o^S + P x_N^N M_o^S$. 15 This clearly shows that in every country, the consumer enjoys a variety gain since the mass of imported varieties overcompensates the loss of domestic varieties( which used to be produced by the least efficient domestic firms).

15 By symmetry, $M_i^S = M_i^S = M_i^S$; $M_o^N = M_o^S = M_o^S$, and $P x_N^i = P x_N^S = P x_N^S$.
4.6.4 Weighted Average Productivity of present firms

Denote by $\tilde{\varphi}_i^T$: The Weighted Average Productivity of firms competing in country $i$ in open economy. Following Melitz(2003), $\tilde{\varphi}_i^T$ for each country (N,S) can be written as:

$$\tilde{\varphi}_S^T = \frac{1}{M_S^T} [M_o^S \varphi^S + P x_S^S M_o^S \tau^{-1} \varphi^S_{x_S^S} + P x_S^N M_o^N \tau^{-1} \varphi^S_{x_S^N}]$$

$$\tilde{\varphi}_N^T = \frac{1}{M_N^T} [M_o^N \varphi^N + 2 P x_S^N M_o^N \tau^{-1} \varphi^N_{x_N^S}]$$  

5 North-S$_1$ Standards Harmonization

As it was previously shown, the Northern market is more profitable since its representative consumer is richer, less price sensitive and eager to consume more varieties at a higher per-unit price. This market is then very attractive for S$_1$-based firms who operate on a smaller and less profitable domestic market. This clearly indicates the asymmetry between North and South in terms of per-capita income generates a strong attractiveness of the Northern market for Southern firms and a negligible interest for Northern firms in serving the Southern market. This, in turn, shapes a vertical negotiation between the two countries, where the North is decision-maker and the South decision-taker. The North imposes then its more stringent standards to S$_1$ whose active firms have to start producing their varieties according to Northern standards. They must then incur and additional fixed cost of adapting their entire production process to Northern regulations ($F_c$). Put differently, they have to pay this fixed cost to set up a new production system allowing them to respect Northern requirements throughout all the steps of production. Since S$_1$ has aligned on Northern standards and the entire output of its active firms conforms hereafter to Northern regulations, the distance between their standards vanishes and $z_N^S$ collapses to 1. Similarly, since S$_1$ has adopted Northern standards, S$_1$ and S$_2$ do not share any longer the same standards, an additional per-unit cost of compliance with their respective different requirements is then needed to avoid rejection at border: $z_N^S$ jumps from 1 to $z > 1$. Summing up, after standards harmonization, S$_1$ exporter charge a higher marginal cost (z times higher) to S$_2$ consumers (and vice versa) and a z times lower marginal cost to Northern consumer:

$$p_{x_{S_1}^S}^{'S_1} (\varphi) = p_{x_{S_2}^S}^{'S_2} (\varphi) = \frac{z}{\varphi} + \frac{E_S}{t} > p_{x_{S_2}^S}^{'S_1} (\varphi) = p_{x_{S_1}^S}^{'S_2} (\varphi) = \frac{z}{\varphi} + \frac{E_S}{t}$$

$^{16}$where $\varphi^S = \int_{\varphi^S_{x_N^S}}^{+\infty} \varphi \frac{q(\varphi)}{[1-G(\varphi^S_N)]} d\varphi$; $\varphi^N = \int_{\varphi^N_{x_S^S}}^{+\infty} \varphi \frac{q(\varphi)}{[1-G(\varphi^N_S)]} d\varphi$; $\varphi^S_{x_N^S} = \int_{\varphi^S_{x_N^S}}^{+\infty} \varphi \frac{q(\varphi)}{[1-G(\varphi^S_N)]} d\varphi$; $\varphi^N_{x_S^S} = \int_{\varphi^N_{x_S^S}}^{+\infty} \varphi \frac{q(\varphi)}{[1-G(\varphi^N_S)]} d\varphi$
\[ p'_{x_S} (\varphi) = \frac{z}{\varphi} + \frac{E_S}{t}; \quad \text{and} \quad p'_{x_N} (\varphi) = \frac{z}{\varphi} + \frac{E_N}{t}. \]

5.1 Impact of Standards harmonization on export cutoff and probabilities of exporting:

Intuitively, this change in the above pricing rules suggest that it is henceforth easier to export to from \( S_1 \) to \( N \) (and vice versa) and harder to export to from \( S_1 \) to \( S_2 \) (and vice versa). The adjustment of the export cutoff and probabilities makes this conjecture even more visible. Using (42) and (43), the new export cutoffs can be expressed in a multiplicative form as follows:

\[ \varphi'_{x_{S_1} S_2} = z \varphi'_{x_{S_1} S_2}; \quad \varphi'_{x_{S_2} S_1} = z \varphi'_{x_{S_2} S_1}; \quad \varphi'_{x_{S_1} N} = z^{-1} \varphi'_{x_{S_1} N} \quad \text{and} \quad \varphi'_{x_{S_2} N} = z^{-1} \varphi'_{x_{S_2} N}. \]

Country \( S_1 \) faces then a simultaneous decrease in the probability of exporting to (and importing from) \( S_2 \) \( \left( P'_{x_{S_1} S_2} < P_{x_{S_1} S_2} \right) \) and increase in the probability of exporting to (and importing from) \( N \) since \( P'_{x_{S_1} N} > P_{x_{S_1} N} \) and \( P'_{x_{S_2} N} > P_{x_{S_2} N} \).

5.2 Silent intensive margin of trade:

As in Melitz(2003), the intensive margin is silent in this model since the trade cost-adjusted average productivity is always constant. For instance, the export cutoff varies proportionally with the non-tariff barrier \( z \), which means that the average productivity of exporters does the same. For example, after North-South standards harmonization, firms exporting from \( S_1 \) to \( N \) are on average \( z \) times less productive (since the export cutoff is \( z \) times lower), this decrease of the average productivity of exporters absorbs the collapse of \( z \) to 1, keeping then the average marginal cost charged to Northern consumer constant and thus the average volume exported per firm unchanged. Similarly, after Standards harmonization, fewer firms engage in South-South trade are on average \( (z \) times) more productive, yet they face a per-unit cost of compliance which is \( z \) times higher \( (z_S^S \) increases from 1 to \( z \)), they charge then the same marginal cost and export on average the same volume as before. As in Melitz(2003), the intensive margin is not operational in this model.

5.3 Only the extensive margin of trade matters:

As mentioned above, the variation of the probability of exporting clearly indicates that more firms export from \( S_1 \) (\( N \)) to \( N \) (\( S_1 \)) and from \( N \) to \( S_1 \) and less firms engage in South-South trade:

\[ M'_{x_{S_1} N} = P'_{x_{S_1} N} M_o^S > M_{x_{S_1} N} = P_{x_{S_1} N} M_o^S; \quad M'_{x_{S_1} S_1} = P'_{x_{S_1} S_1} M_o^S > M_{x_{S_1} S_1} = P_{x_{S_1} S_1} M_o^S \quad \text{and} \quad M'_{x_{S_2} S_1} = M'_{x_{S_2} S_1} = P'_{x_{S_2} S_1} M_o^S < M_{x_{S_2} S_1} = M_{x_{S_2} S_1} = P_{x_{S_2} S_1} M_o^S. \]

Standards harmonization fosters then
the number of varieties traded between $S_1$ and $N$ at the expense of a decline of in the number of South-South traded varieties.

5.4 Welfare Implications:

Recall that the pro-competitive effect of trade liberalization (decrease of the non-tariff barrier $z$ in our case) is channeled through $|\eta|$, which increases proportionally with the mass of imported varieties, but induces a less than proportional increase in the domestic cutoff:

$$\phi^N_{|\eta|} = \frac{1}{|\log(\frac{1}{z^N})-1|} < 1.$$ 

This means that an increase in the mass of foreign competitors on a given market induces a less than proportional exit of least efficient domestic firms, yielding then (as in Melitz(2003), not only, a net variety gain: the increase of imported varieties overcompensates the loss of domestic varieties, but also, an increase in the weighted average productivity of present firms (driven by a tougher selection of domestic firms). Therefore, after N-$S_1$ Standards harmonization, Northern consumers consume more varieties ($M'x_{N}^{S_1} > Mx_{N}^{S_1}$) increase in the mass of varieties imported from $S_1$) and on average, more of each as long as they are, on average, less expensive (increase in $\tilde{\phi}^N$). By contrast, the excluded Southern country $S_2$ faces an anti-competitive effect: the decrease in the mass of varieties imported from $S_1$ triggers a less than proportional entry of less efficient domestic firms. This synonym of a net variety loss: the entry of new domestic varieties does not compensates the loss of varieties that used to be imported from $S_1$ and implies a decrease in average productivity. Consumers in $S_2$ experience then a welfare loss since they consume less varieties ($M'x_{N}^{S_2} < Mx_{N}^{S_2}$) and on average, less of each since their average price has increased (due to entry of less efficient firms).

Conclusion

Indirect additivity provides preferences with much more flexibility: the elasticity of demand and the elasticity of substitution are, not only, firm specific, but also, country specific (both of them vary with price and per-capita income). This allows more productive firms to face a less elastic demand and enjoy higher markup rates, revealing then a new demand-based rationale for heterogeneity. Moreover, under this class of preferences, per-capita income appears arises as the key determinant of the demand system as long as it determines the extent of the consumer’s price sensitivity and shapes the degree of his love for variety. Taking into account the asymmetry between rich and developing countries in terms of per-capita income and the importance of the technical barriers to
trades they erect, this model aims to improve our understanding of two recent and major empirical find-
ingings in international trade such as higher aggregate prices of tradables in rich countries and the simultaneous increase in North-South trade and decrease in South-South trade after North-South standards harmonization. In deed, this model provides a common theoretical explanation for these two facts: as long as consumers in rich countries are less price sensitive and display a stronger love for variety, Southern exporters, not only, charge them higher markups, but also, tend to redirect their exports to Northern countries since they are more profitable than symmetric Southern ones.
References


