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MARKET POTENTIAL AND INCOME INEQUALITY

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Abstract

This study assumes that non-homothetic preferences determine the flow of international trade. Empirical studies of international trade have commonly only considered demand from a representative consumer. This would not provide a complete picture of the aggregate market demand. Because of the prevalence of non-homothetic preferences in demand, firms that contemplate exports should consider the distribution of income within a country as an attribute of the corresponding market. This study evaluates the effect that income inequality may exert on a firm's probability of selecting a particular export market. The theoretical framework is supported by discrete choice theory, and the empirical analysis uses export statistics for the OECD countries. The results indicate that uneven income distribution is perceived as an attractive feature of destinations for exports.

Keywords: market potential, income inequality, discrete choice theory

JEL classification: F10, D31

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1 Introduction

It is not likely that the famous pop singer Madonna has the same preferences as a coal miner in Britain. Preferences differ depending on the level of income, which is referred to as non-homothetic preferences. If preferences are assumed to be non-homothetic, an uneven distribution of income within a country also indicates a wider distribution of preferences. In studies of consumption patterns the connection between income level and differences in preferences is a well-established reality. However, in studies of international trade flows, demand has generally been modelled by assuming a representative consumer.[1]

Developing countries often struggle with an uneven distribution of income within the country. The average income levels in these countries are generally also fairly low. Firms in industrialised countries that are looking for potential export markets may be discouraged to export to these countries if they only consider the average income level. If, however, firms take into account the distribution of income in a potential export market they may find sufficient demand to motivate the effort to export.

The purpose of this study is to evaluate the effect of income inequality on the probability of exporters selecting a particular export market. The study also considers the effect of income distribution on demand for product diversity. The empirical analysis focuses on exports from the OECD countries.

The theoretical framework relies on discrete choice theory with a random utility approach. Trade flow models based on discrete choice framework have previously been derived by Johansson and Westin (1994). Discrete choice theory may be used to outline the decision process of firms that are searching for potential export markets. The discrete choice framework applied in this paper uses attributes of destinations in the set of alternatives to determine which market will provide the firm with the highest profit. The export supply behaviour of firms hinges on each market's potential demand, and this study also takes into account the diversity in preferences in that demand. In the empirical work the diversity in preferences is represented by the distribution of income. The most frequently employed measure of income distribution is the Gini coefficient. This measure is compared with the Theil index and the Rich/Poor income ratio to check the robustness of results with respect to the alternative measures.

Previous studies have shown that income inequality is a determinant of trade flows (Bohman and Nilsson, 2006, Dalgin et al., 2004, Hunter, 1991, Hunter and Markusen, 1988, Markusen, 1986). This study focuses on how firms may incorporate income inequality as an additional determinant of market selection. Lambert and Pfähler (1997) actually argue that it is crucial to include income distribution within a country to obtain the proper representation of market demand.

[1] See the classic literature on the theoretical framework of gravity models, Anderson (1979), Bergstrand (1985 and 1989) and Helpman and Krugman (1985).

Studies of income inequality have shown a positive relation between product diversity, in production and consumption, and the extent of inequality within a country (Falkinger and Zweimüller, 1996 and Jackson, 1984). Matsuyama (2000), Föllmi and Zweimüller (2002) and Krugman (1979) argue that there is a latent demand for new goods among consumers. Consumers can increase their utility not only by consuming more of a good but also by diversifying their consumption. In a developing country, where the distribution of income is uneven, part of the population has the higher income associated with greater demand for innovative products. In early stages of development, imports of technologically more advanced products are an important part of the development process.

This study shows that an uneven income distribution has a positive effect on the likelihood of firms selecting a particular destination for their exports. This means that diversity in demand may generate demand beyond what can be matched by the representative consumer. This is valid for all three measures of income inequality in a country. The effect of uneven income distribution on export diversity is positive and significant. Industrialised countries, like the OECD countries, generally increase the value of their exports by introducing new product groups through existing links. The positive relation between average log export shares and the average log number of product groups that are exported indicates that a country with a more diverse industry structure tends to have a more even distribution of its exports over the various destinations for those products.

The following section outlines the discrete choice framework, which is the basis for the model formulation in the subsequent section. The model formulation in section three presents the equations to be estimated and includes a description of the three distribution measures used in the empirical section (section four). Finally, section five provides conclusions and suggestions for further research.

2 Theoretical framework

The model estimated in the empirical analysis may be derived from discrete choice theory. The basic setting is shown in subsection 2.1. The second subsection, 2.2, presents the intuition why income inequality may be regarded as a relevant attribute of markets.

2.1 Evaluation of markets

The theoretical framework starts with a representative firm contemplating exporting its products to a foreign market. Discrete choice theory may be used to outline the decision process of a firm as it evaluates market potentials. For this endeavour it has to figure out which market will produce the best outcome given the cost of entering a foreign market and the resources available to the firm. In the discrete choice framework alternatives are evaluated by their attributes.

Let us first concentrate on the individual transaction. Generally, generated profits contain a systematic variation and a random part. Thus for a typical transaction between countries *i* and *j*, profits (Π_{ij}) take the following appearance (which is in line with McFadden, 1981, Ben-Akiva and Lerman, 1985, Ben-Akiva and Bierlaire, 2003, Johansson, Klaesson and Olsson, 2003 and Johansson and Westin, 1994):

$$\Pi_{ij} = \theta_{ij} + \varepsilon_{ij} \tag{1}$$

Where θ_{ij} represents the systematic variation and ε_{ij} represents the error term, which is assumed to be extreme value distributed. Components of the systematic variation are summarised in equation 2:

$$\theta_{ij} = p_i - v_i - \tau_{ij} \tag{2}$$

where p_i is the price of the product to be sold, v_i represents the cost of producing the product and τ_{ij} is the transfer cost. The transfer cost varies with where the product is sold, but that is not true for price and production costs. Transfer costs between markets may vary significantly. Besides the cost of transporting the products, firms face transaction costs. North and Thomas (1973) divide transaction costs into three categories: (i) search costs, (ii) negotiation costs and (iii) enforcement and monitoring costs. Affinity between markets reduces transaction costs (Johansson, 1993). More specifically, Andersson (2007) shows that familiarity with the export market reduces fixed entry costs. The frequency of contacts through different links contributes to a reduction in transaction costs. If firms try to sell products in markets in which there is already substantial trade with the home country, transfer costs are likely to be lower than if they look for new markets. The set of alternative country markets (S_i) considered by the representative firm is therefore more likely to be directed towards destinations where some trade with the home country already exist.

The objective of the producer's evaluation process is to attain the highest profit. The final choice of market will be optimal given the alternatives in the choice set, S_i. Revealed preferences imply that if the producer decides to choose market *j*, it follows that $\Pi_{ij} > \Pi_{il}$, for all *j* and *l* for which $j \neq l \quad j \in S_i$ and $l \in S_i$.

The probability of choosing market *j* is conditional on its characteristics and on the characteristics of the other alternatives. Equation 3 displays the representative firm's probability of choosing market *j*:

$$P_j = \frac{Y_j \times \exp\{p_i - v_i - \tau_{ij}\}}{\sum_l Y_l \times \exp\{p_i - v_i - \tau_{il}\}} \tag{3}$$

in which the frequency of transactions in market *j*, (Y_j), has been included. The choice probability only accounts for the observed characteristics in markets and allows the analyst to calculate the likelihood of selecting a particular market. The setup follows the general format for expressing choice probability when the error term is extreme value distributed (McFadden, 1981). The frequency of transactions is determined by the purchasing power of a market:

$$Y_j = I_j^{\phi_1} M_j^{\phi_2} \exp\{\phi_3 \sigma_j + \phi_4 \mathrm{MRes_j}\} \tag{4}$$

where I_j is the average individual income in country *j* and M_j is the market size of country *j*, which is commonly proxied by the population or GDP. The variable σ_j signifies the distribution of income in country *j*, which will be discussed further in the following subsection. There may be factors outside the bilateral relation that influence the purchasing capacity of a country. The multilateral resistance, $MRes_j$, is included to account for such influences.

The choice probability in equation 3 is derived for the representative firm. It is possible to assume that the same likelihood of selecting market *j* is applicable to any firm in country *i*. This assumption is necessary in order to shift from the micro to the macro perspective, which is important since the empirical analysis in section 4 uses aggregate data. The representative firm's probability of choosing a particular export destinations *j*, P_j, may be multiplied by the total value of exports from country *i* to calculate the total value of exports between country *i* and *j*, X_{ij}:

$$X_{ij} = P_j \times X_i$$

$$P_j = \frac{X_{ij}}{X_i} = x_{ij} \tag{5}$$

Rearranging the terms, equation 5 displays the connection between the choice probability of the representative firm and the export shares, (x_{ij}), of country *i*'s total exports. The choice probability of

selecting market *j* is equal to the revealed preferences indicated by the value share of exports from country *i* to country *j*. Thus, the value share can easily be used in the empirical analysis as representing the choice probability in equation 3.

2.2 The role of income distribution in the evaluation of markets

Non-homothetic preferences imply that budget shares are not constant over income. A rich person does not spend the same share of his or her budget on food as someone that is poor. The relation between preferences and income levels is generally known as Engel's law. Engel's law has a strong empirical foundation (Houthakker, 1957), in which consumption patterns consistently vary with income levels. Recent research contributions to the literature on non-homothetic preferences originate from Bertola et al. (2006).

Bertola et al. (2006) argues that there exists an infinite number of potentially producible goods which can be said to satisfy a corresponding need. Each need can be ranked according to priority by an index *z*. The index gives a low value to high priority goods, such as food, and a high value to low priority goods, which are typically luxury goods. By consuming good *z* the analogous need *z* is matched. A non-homothetic utility function can be formulated in which products are weighted according to the degree of necessity:

$$u(\{c(z)\}) = \int_0^{\infty} \xi(z) v(c(z)) dz \qquad (6)$$

where $\xi(z)$ represents the hierarchy function which is multiplied with the "baseline" utility of consuming good *z*, $v(c(z))$.[2] The $\xi(z)$ is monotonically decreasing in *z*, which means that consumption of food obtains a higher weight than consumption of luxury goods. The utility function in equation 6 is assumed to be additively separable and the utility of goods only differs by the hierarchy function. Bertola et al. (2006) further makes the assumption that preferences are the same for all consumers. This means that the distribution of income within a country corresponds to differences in preferences. The formulation in equation 6 displays non-homothetic characteristics provided that the elasticity of substitution, $-\frac{v'(c(z))}{v''(c(z)) \times c(z)}$, varies with the consumption of good *z*, $c(z)$ (assumed to be negative in the model).[3] This suggests that, since consumption of a particular good reaches a relative satiation, consumers are better off by spending additional income on other goods (low-priority goods). The individual demand for good *z* is derived from maximising utility subject to the individual budget constraint.

[2] The utility of consuming good *z* follows the usual assumptions of $v' > 0$ and $v'' < 0$

[3] In their model, the income elasticity of a good is proportional to the elasticity of substitution.

The aggregate demand for good *z* is calculated by summing the individual demand curves. The assumption of equal preferences across consumers asserts a systematic variation in the marginal utility of expenditure that can be said to follow the distribution of income, $G(e_i)$, where e_i represents the income level of consumer *i*. The aggregate demand for good *z* can schematically be denoted by $C(z) = \int_{e^*}^{\infty} c_i(z) dG(e_i)$, in which the individual demands, $c_i(z)$, are summed up and weighted by the income distribution $G(e_i)$ and where e^* denotes the minimum level of income required to consume good *z*.

Thus, two countries with the same average income level but with different distributions of income will display different aggregate demands for a good. If producers in search for new markets for their products only consider the average income level, they will not obtain the proper representation of market demand.

3 Method and measures of distribution

This section outlines the model estimated in the empirical section and the econometric circumstances accounted for when specifying the model. Subsection 3.2 presents the distribution measures used to display the income distributions.

This study focuses on exports from the OECD countries to various countries in the world. The members of the OECD are to the greater part made up of European countries. The European countries are placed in geographic proximity to one another, while the non-European member countries are scattered around the world. The members of the OECD have generally a fairly even distribution of income, while countries in the rest of the world may present rather skewed distributions of income. This applies especially to the Latin American countries.

3.1 Model formulation

The choice probability that was formulated in equation 3 may be logarithmically transformed and described in equation 7:

$$\begin{aligned} \ln x_{ij} &= \gamma_0 + w_i + \gamma_1 \ln(GDP/POP)_j + \gamma_2 \ln POP_j \\ &+ \gamma_3 INCDISTR_j - \gamma_4 D_{ij} + \gamma_5 D_{ij} \times NonEuropean_i \\ &+ \gamma_6 \mathrm{MRes}_j + \upsilon_{ij} \end{aligned} \tag{7}$$

where the various variables and parameters are defined as discussed below.

$x_{ij} = \dfrac{X_{ij}}{X_i}$ is the value of exports from country *i* to country *j*, X_{ij} as a share of the total value of products exported from country *i*, X_i. The value shares represent the revealed preferences.

γ_0 represents the intercept

w_i is the exporting country *i* fixed effects, which together with the intercept corresponds to the denominator in equation 3.

$(GDP/POP)_j$ is the average individual income level in country *j*, corresponding to I_j in equation 4.

POP_j is population size in country *j*, corresponding to M_j in equation 4.

$INCDISTR_j$ is the income distribution in country *j*, corresponding to σ_j, which will be measured in three ways:

- $GINI_j$ measures the distribution of disposable income in country *j* in per cent of perfect unequal distribution,
- $THEIL_j$ measures the distribution of disposable income in country *j* in per cent of perfect unequal distribution,
- $(RICH/POOR)_j$ measures the ratio of average income between the richest 20 per cent and the poorest 20 per cent of the population in country *j*.

D_{ij} is the geographical distance between capital cities (or major trading cities) in countries *i* and *j*.

$D_{ij} \times NonEuropean_i$ is an interaction dummy between distance and a dummy variable on whether the exporting country is a non-European country. A non-European member country is indicated by 1 and by 0 if the country is European and member of the OECD. The non-European countries are the USA, Mexico, Canada, New Zealand, Australia, Japan and South Korea.

$MRes_j$ accounts for the multilateral resistance using the method developed by Mundlak (1978). The motivation and development of this measure will be discussed below.

3.2 Measures of income distributions

There exist several methods of how to measure income distribution within a country, each with its pros and cons. This study applies three measures: the Gini coefficient, the Theil index and the Rich-to-poor ratio. This subsection defines and discusses the properties of the three measures.

Gini coefficient

The Gini coefficient is the most widely applied measure of income distribution. It is derived from the Lorenz curve. It measures the area between the Lorenz curve and the equality line as a share of the entire area below the equality line. Drawbacks of the Gini coefficient are that it is not decomposable and two Lorenz curves that cross one another may generate the same Gini coefficient.

Theil index

The Theil index is an entropy measure, deduced from information theory, and will in this setting measure the divergence from the average income level. The Theil index is calculated as follows:

$$T = \frac{1}{H}\sum_h \left(\frac{W_h}{\mu}\right)\ln\left(\frac{W_h}{\mu}\right) \tag{9}$$

where H is the sample size, W_h represent the income level of group *h* in the sample[4] and μ is the mean of W_h. The perfect equalitarian distribution of income would in equation 9 be indicated by a zero. The index number is always positive, and the more unequally dispersed the income is, the higher will be the index. Maximum inequality is reached when T equals $\ln(1/\Psi)$, where Ψ is the proportion of the population having the highest income level. One of the major advantages of the Theil index is the property of decomposability.[5]

The Theil index is, in this study, calculated from an approximated income distribution using deciles. The approximating technique applied is a non-parametric kernel density function with Gaussian kernel weights.[6] This methodology does not constrain the approximation to a particular distribution. For comparability with the other distribution measures, the calculated Theil index is related to maximum inequality and displayed in per cent.

Rich/Poor

Nelson (1984) suggested an alternative proxy of inequality by measuring the distance between the two tails of the income distribution. The Rich/Poor variable applied in this study measures the difference between the wealthiest 20 per cent and the poorest 20 per cent of the population in a country.

Table 3.2 presents the correlation between the three measures of income inequality applied in the empirical section. The strong correlation between the Gini coefficient and the Theil index is not surprising since they are both derived from the Lorenz curve. The Rich/Poor measure appears to have a stronger correlation with the Gini coefficient than with the Theil index.

[4] All groups are equal in size.
[5] Other properties of the Theil index are: symmetry, replication invariance, mean independence, compliance with the Pigou-Dalton property and consistency with Lorenz curves (Conceicão and Galbraith, 2000).
[6] This technique was also used in Sala-i-Martin (2006).

Table 3.1 Correlation matrix of income distribution indices

	$THEIL_j$ (per cent of max)	$GINI_j$ (per cent of max)	$(RICH/POOR)_j$ (per cent)
$THEIL_j$	1.0000		
$GINI_j$	0.9375***	1.0000	
$(RICH/POOR)_j$	0.5939***	0.7807***	1.0000

*** significant at 1 %

3.3 Econometric considerations

In recent empirical research of trade flow models, multilateral resistance has been put forward as an important control variable (Anderson and van Wincoop, 2003). It is not only the bilateral trade cost that affects the flow between two trading partners. The average friction with other trade partners also influences the bilateral relation. If resistance to other trading partners increases, this will have a positive effect on the trade between two trading partners. The multilateral resistance may be accounted for by including fixed effects for the export country and average import distance for the receiving country. Fixed effects for the import country, which would be in line with Anderson and van Wincoop (2003), are not applicable since non-homothetic preferences is assumed to exist in consumption. The approach of using averages of the bilateral variables is in line with the writings of Mundlak (1978).

The average import distance, $\overline{D_j}$[7], is highly collinear with the income distribution measures, which results in multicollinearity problems. To resolve this issue, orthogonalization with respect to the relevant distribution measures is done, so that $MRes_j$ is the residual from the OLS regression of $\overline{D_j}$ on $INCDISTR_j$ with an intercept included. This method has implications for the interpretation of the constant and the income distribution parameter in the main equations. It is important to recognise that the income distribution coefficient, γ_3, comprises the indirect effect, i.e. the effect of income distribution on multilateral resistance[8], as well as the direct effect of income distribution on the probability of selecting a particular market.

The non-European member states in the OECD have on average longer transport distances for their products to export destinations. Exports from these countries often have to be transported a substantial distance to reach various trading partner so additional transport costs may not then be crucial[9]. The

[7] $\overline{D}_j = \frac{1}{B}\sum_j D_{ij}$ where B is the number of import links to country *j*.

[8] This indirect effect is generally not captured by $MRes_j$, as that measure is constructed to be orthogonal to income distribution.

[9] See Andersson (2007) and Martinez-Zarzoso and Nowak-Lehmann (2006) for the relation between transport charges per distance unit and distance and the influence of transport modes on international trade flows.

European countries, on the other hand, are more integrated and closer to their trading partners, and consequently trade flows may be more sensitive to distance. To account for differences in distance sensitivity an interaction term, $D_{ij} \times NonEuropean_i$, is included, so the distance coefficient is allowed to differ for the non-European member states.

The assumption, made in the theoretical framework, that producers only include alternatives in the choice set where there already exists some trade could raise questions of censoring. Prevalence of censoring would speak for other estimation techniques. However, visual inspection of partial-regression leverage plots gave no indications of censoring problems.

3.4 Product diversity

Considering that many countries increase the value of their exports by introducing new products it is also important to examine the effect of greater income inequality on product diversity. Links may be more or less susceptible to diversity in trade flows. Product diversity may be captured by simply counting the number of product groups exported between countries *i* and *j*, N_{ij}. Equation 8 presents the model estimated for the analysis of product diversity:

$$\begin{aligned} \ln N_{ij} = {} & \beta_0 + \nu_i + \beta_1 \ln(GDP/POP)_j + \beta_2 \ln POP_j \\ & + \beta_3 INCDISTR_j + \beta_4 D_{ij} + \beta_5 D_{ij} \times NonEuropean_i \\ & + \beta_6 \mathrm{MRes}_j + \varepsilon_{ij} \end{aligned} \qquad (8)$$

where ν_i represents exporting country *i* fixed effects and the remaining independent variables used to explain the variation in the number of product groups exported are the same as in equation 7. Unlike equation 7, equation 8 is not grounded in discrete choice theory.

3.5 Statistical sources

For this study, export data have been collected for the OECD countries from the UN Comtrade database. To obtain a measure of product differentiation, the number of product groups on the six-digit level of the Harmonized System 1996 has been calculated for each trade link. Statistics for the independent variables were attained from the World Bank and Centre d'Études Prospectives et d'Informations Internationales (CEPII). The income distribution measures have all been collected from or calculated with the World Income Inequality Database (WIID) as the starting point. This database gathers country income statistics from various sources and provides quality assessment of the data. Quality and consistency of sources have been the guiding principles in the selection of partner countries for the export demand function. A detailed overview of the selection process is available in Appendix B. For the Theil and Rich/Poor ratio, Gross

Domestic Product (PPP-adjusted) from the World Development Indicators has supplemented the calculations. Table 3.2 presents the definitions of each variable and the statistical sources that have been used for each.

Table 3.2 Statistical sources

	Definition	**Source**
Exp, (X)	Export value in US Dollars	Comtrade, UN
Number, (N)	Counting product groups on the six-digit level of the Harmonized System 1996	Comtrade, UN
GDP/CAP	Per capita GDP measured in PPP-adjusted international dollar, current value of year 2000.	World Development Indicators, World Bank
POP	Total population, year 2000	World Development Indicators, World Bank
GINI	The Gini index based on household per capita disposable income, in per cent 0<Gini<100.	World Income Inequality Database, WIID2a
Theil	In per cent as a share of perfect unequal distribution, 0<Theil<100	World Income Inequality Database, WIID2a, and World Development Indicators, World Bank
Rich/Poor	In per cent, the difference in average income between the richest 20 per cent and the poorest 20 per cent.	World Income Inequality Database, WIID2a, and World Development Indicators, World Bank
D_{ij}	Distance between the capital cities, in 1000 kilometres.	Centre d'Ètudes Prospectives et d'Informations Internationales, CEPII
$\overline{D_j}$	Average import distance to country j, in 1000 kilometres	Centre d'Ètudes Prospectives et d'Informations Internationales, CEPII

4 Empirical results

Subsection 4.1 discusses the effect of income distribution within a country on the probability of selecting the country as an export market. Subsection 4.2 presents the effect of income distribution on the demand for product diversity and the relation between product diversity and the distribution of exports through various trade links.

4.1 Income inequality as a determinant of market selection

This study aims to evaluate income inequality as an attractor of exports. In view of the theoretical arguments, income inequality is expected to have a positive effect for market demand. Table 4.1 presents regression estimates for equation 7, varying which income inequality measure to include as explanatory variable: the Gini coefficient, the Theil index and the Rich to Poor ratio.

The standard variables for market size and average income level display the usual significant positive results. Distance has a negative effect on the selection of markets, and the non-European countries are significantly less sensitive to distance than the European OECD countries. The constant in Table 4.1 represents the average logged export share of the OECD countries, which also indicates the average distribution of exports to associated nodes.[10] The multilateral resistance parameters are significantly positive, which suggests that increased resistance to other trading partners has a positive effect on the bilateral trade relation. The selected independent variables are able to explain 83 per cent of the variation in the probability distribution.

The results in Table 4.2 confirm expectations of income inequality in a country as being positively associated with foreign exports into that country. The inequality measures are all displayed in per cent. The Gini coefficient is naturally set between zero and one hundred. The Theil index is set as per cent of maximum inequality. This implies that the index is interpreted in the same way as the Gini coefficient. The Rich/Poor variable simply captures the percentage difference in average income between rich and poor people in a country. All three measures display positive and significant results. The Rich/Poor variable is less comprehensive which is also indicated by the lower parameter value. The Theil parameter has higher t-value than the other two. Even if it is not possible to strictly separate between the direct and indirect effects of income distribution on the probability of selecting a particular market, the results are notably positive and significant.

[10] The country fixed effects provide the differences between the OECD countries in the distribution of exports to destinations.

Table 4.1 The effect of income distribution on the likelihood of selecting a market.

	Dependent variable: $\ln x_{ij}$ (eq 7)		
	(i)	**(ii)**	**(iii)**
$\ln POP_j$	0.872	0.881	0.868
	(32.46)***	(32.55)***	(32.23)***
$\ln(GDP/POP)_j$	1.787	1.803	1.745
	(30.51)***	(36.94)***	(34.78)***
$GINI_j$	0.067		
	(10.16)***		
$THEIL_j$		0.065	
		(11.83)***	
$(RICH/POOR)_j$			0.323E-3
			(8.37)***
D_{ij}	-0.443	-0.442	-0.443
	(21.61)***	(21.62)***	(21.56)***
$D_{ij} \times NonEuropean$	0.308	0.306	0.307
	(9.66)***	(9.63)***	(9.64)***
$MRes_j$	0.281	0.251	0.304
	(8.62)***	(7.66)***	(11.20)***
c (constant)	-38.167	-37.389	-35.388
	(52.08)***	(63.24)***	(59.39)***
Observations	1426	1426	1426
R-squared	0.8251	0.8259	0.8250

Robust t-statistics in parentheses, *significant at 10 %; ** significant at 5 %; *** significant at 1 %, fixed effects are not presented to save space.

Developing countries commonly struggle with both a low average income level and a much skewed income distribution. The result that an unequal distribution of income functions as an attractor of exports from the OECD countries to the developing economies may or may not be beneficial for future developments. It depends on the nature of these products and if and how they are being implemented into the economy

The robustness of the income distribution measures is solid when it comes to the Gini coefficient and the Theil index. The Rich/Poor variable is sensitive to model specification. Appendix B presents the same table as 4.1 but without the inclusion of multilateral resistance. All three measures generate larger

parameter estimates when the multilateral resistance is included; the Rich/Poor variable also becomes significant.

4.2 Product diversity and export flows

Industrialised economies, like the OECD countries, are generally able to increase exports by providing new products to their trading partners. It is reasonable to consider that total export value is related to the growth of the number of product groups in export flows. Figure 4.1 shows a positive nonlinear relation between the value of exports and the number of product groups exported from the OECD countries.

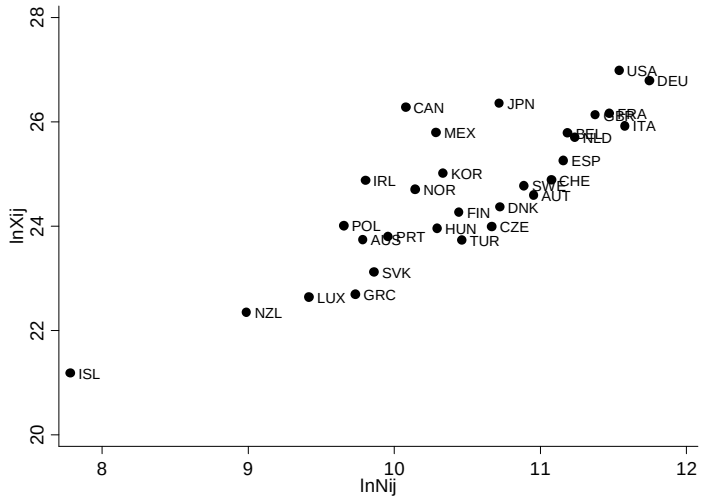


Figure 4.1 The relation between number of products (N_{ij}) exported and the value of export (X_{ij}), in natural logs.

Countries with greater diversity in production also tend to export more in value terms. The core countries of the OECD are placed in the far upper right of the figure while several of the new member states display lower product diversity accompanied by lower export values.

Table 4.2 shows the results of estimating equation 8, where the dependent variable is the number of different product groups that the individual OECD country exports to each destination. The estimated parameters show the same pattern as when the export share is used as the dependent variable.

Table 4.2 The effect of income distribution on the demand for differents products.

	Dependent variable: $\ln N_{ij}$ (eq 8)		
	(i)	**(ii)**	**(iii)**
$\ln POP_j$	0.388	0.397	0.387
	(21.07)***	(21.08)***	(20.65)***
$\ln(GDP/POP)_j$	0.841	0.915	0.864
	(21.73)***	(27.48)***	(26.24)***
$GINI_j$	0.036		
	(9.43)***		
$THEIL_j$		0.04068143	
		(12.66)***	
$(RICH/POOR)_j$			0.176E-3
			(7.32)***
D_{ij}	-0.287	-0.287	-0.287
	(23.39)***	(23.46)***	(23.42)***
$D_{ij} \times NonEuropean$	0.211	0.211	0.211
	(11.62)***	(11.66)***	(11.66)***
$MRes_j$	0.227	0.175	0.205
	(11.53)***	(9.48)***	(13.19)***
c (constant)	-8.527	-8.900	-7.449
	(16.93)***	(20.94)***	(17.91)***
Observations	1426	1426	1426
R-squared	0.8317	0.8312	0.8317

Robust t-statistics in parentheses, * significant at 10 %; ** significant at 5 %; *** significant at 1 %, fixed effects are not presented to save space.

Income distribution in the receiving country has a positive effect on the number of different product groups exported from the exporting country. The effect of income distribution is stronger when using the Theil index than when using the Gini coefficient, which is contrary to the results in Table 4.1. The t-value is greater for the coefficient for the Theil index in Table 4.2 than in Table 4.1, whereas the reverse applies to the other variable coefficients. Generally the t-values are higher in Table 4.1.

The similarity in results between Tables 4.1 and 4.2, suggests a relation between the dependent variables. Figure 4.2 shows the relation between average natural logarithms of export share and the average natural logarithms of the number of product groups exported and clearly the relation is positive. This suggests that a country with a more diverse industry structure tends to have a more even distribution of its exports over the various destinations for those products.

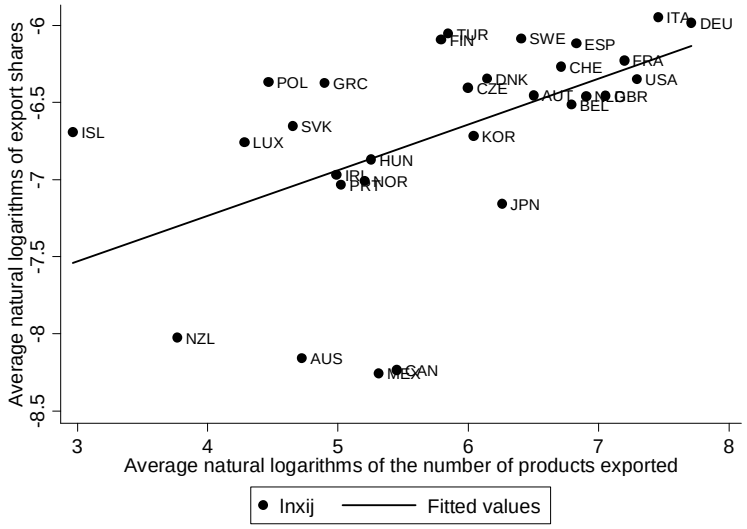


Figure 4.2 Scatter plot and fitted values of the average lnx_{ij} on the average lnN_{ij} exported from each of the OECD countries.

In Figure 4.2 there are four countries that diverge from the general pattern, New Zealand, Australia, Mexico and Canada. After controlling for a number of effects such as income and distance, only Canada and Mexico remain as extreme outliers[11].

[11] This refers to a comparison of the fixed effect of equations 7 and 8. The result is not displayed since it generally shows the pattern of Figure 4.2.

5 Conclusions

The purpose of this study has been to evaluate the effect of income inequality on the probability of selecting a particular export market. The effect of income inequality on demand for product diversity was also estimated. Discrete choice theory provided a framework for predicting firms' behaviour when searching for potential export markets. In addition to the usual attributes of destinations, average income, market size and distance, income inequality was found to act as an attractor of foreign-country exports. The inclusion of income distribution provides a better representation of market demand in countries.

The effect of income inequality on demand for product diversity is also positive. The empirical analysis also shows that countries with a more diversified industry structure are also able to have a more even distribution of its exports to destinations.

Future studies should consider the effect of income distribution on different types of product groups. The results in this study are encouraging for developing countries, where uneven distribution of income is often encountered, to be able to progress and improve the economic situation in the country. If a skewed income distribution can attract foreign-country exports of innovative product groups, development may proceed more smoothly.

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Appendix A Regression results

Table A4.2 Results of equations 7, accounting for exporting country fixed effects only.

	Dependent variable: $\ln x_{ij}$ (eq 7)		
	(i)	**(ii)**	**(iii)**
$\ln POP_j$	0.915	0.928	0.927
	(32.20)***	(33.51)***	(33.14)***
$\ln GDPCAP_j$	1.919	1.850	1.678
	(32.46)***	(37.10)***	(32.30)***
$GINI_j$	0.051		
	(8.42)***		
$Theil_j$		0.047	
		(10.68)***	
$(RICH/POOR)_j$			8.604e-5
			(2.57)**
D_{ij}	-0.337	-0.344	-0.253
	(23.37)***	(25.52)***	(23.48)***
$D_{ij} \times NonEuropean$	0.190	0.194	0.095
	(5.79)***	(5.88)***	(2.68)***
c_i (constant)	-40.597	-39.258	-36.446
	(45.19)***	(49.89)***	(44.02)***
Observations	1426	1426	1426
R-squared	0.81	0.82	0.80

Robust t-statistics in parentheses, * significant at 10 %; ** significant at 5 %; *** significant at 1 %

Appendix B Income inequality data

Income inequality statistics are still difficult to obtain. The objective of the data collection has been to

- select the best quality available. 60 per cent of the selected partner countries have income distribution data classified as 1, which is the best. Twenty-seven per cent of the countries have income data from the second best quality
- be consistent in estimation methodology and use the same source
- as far as possible choose data from 2000. If this was not possible, data were chosen from the closest previous year
- let collection units be household per capita disposable income, and income corrected for household size. When selecting the type of income measured, we have accepted disposable income as well as monetary disposable income. For an exact definition of these concepts and for more information on the collection methods, see the WIID web page, http://www.wider.unu.edu/wiid/wiid.htm.

Table D1 Quality of income distribution data

Quality ratings	Partner countries
1 Survey and income concept known and acceptable	30
2 Survey or income concept acceptable	13
3 Neither survey nor income concept known or acceptable	6
Total	49

Table D2 Source of income distribution data

Source	Partner countries
Deininger & Squire	18
Luxembourg Income Study	22
Other sources	9
Total	49