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International trade in services and inequalities: empirical evaluation and role of tourism services

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This study investigates the impact of the international openness in tourism services trade on wage inequality between highly skilled, semi-skilled and unskilled workers in the tourism industry. The sample covers 10 developed countries and expands over 15 years. A cointegrated panel data model and an Error Correction Model were used to distinguish between the short- and long-run effects. The results are compared to those of openness of business services and manufactured goods. The findings point out that tourism increases wage inequality at the expense of the least skilled workers in the long and the short-run. The results differ amongst countries.

Keywords: inequality, openness trade, trade of tourism services, tourism and poverty, Error Correction Model (ECM), cointegrated panel model

JEL classification: C23, D31, F10, Z30

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1. Introduction

Following pioneering empirical studies by Katz and Murphy (1992) and Lawrence and Slaughter (1993), several articles tried to provide empirical estimations of the impact of international trade on inequality. The results are inconclusive, however, especially in work studying the effect of the international trade of one country with the rest of the world on wage inequality in that country (see, among others, Higgins and Williamson, 1992; Figini and Görg, 2006 ; Gourdon et al., 2008). However, these studies estimate the impact of international trade in manufactured goods on inequality and only a very small number of empirical study has included the specific case of international trade in services. This can be explained by the fact that most trade between the north and south was in manufactured goods but also by the lack of available data on trade in services which has undergone a sharp increase in its share in total trade, particularly in the 1990s. Finally, from a theoretical point of view, only the models of Askenazy (2005) and Markusen and Strand (2008) take account of services in explaining, evaluating and trying to understand the impact of international trade in services on inequality. Unlike existing studies of the impact of international trade on inequality, this present study is not restricted to examination of the impact of goods on inequality but also considers the impacts of business services and tourism services.

This article seeks to contribute to this debate by studying the direct link between international trade in tourism services and wage inequality. This will require study of the impact of trade liberalization in tourism on skill premiums in the tourism sector, between highly skilled and semi-skilled workers, semi-skilled and unskilled workers, and between highly skilled and unskilled workers. The advantage of using skill premiums in the tourism sector (and not a general inequality index as Gini index) is that it is certain that the estimated effect is due to the characteristics of the tourism sector rather than to an uncontrolled or misleading correlation

effect. This approach assumes that the liberalization of tourism may have an effect on wage distributions in the tourism sector. Conversely, it is assumed that it has no impact on wage distributions in countries in all activity sectors combined¹.

First, the long-term relationship between tourism and inequalities is estimated using a cointegrated panel. This approach was followed for international trade in goods and services, so it is possible to compare the outcomes. This analysis shows that the international tourism trade creates major wage inequalities between highly skilled and unskilled workers. Also, our results indicate that the international tourism trade appears to result in a long-term reduction on wage differences between highly skilled and semi-skilled workers.

The second econometric strategy involves estimating an error correction model (ECM) to study this short-term link and the potential correction rate. It appears very difficult to use these models to demonstrate any effect of international trade in goods and services on inequality, except in the case of the international tourism trade. Indeed, our results indicate that liberalization of the tourism trade increases inequality in the short-term, between highly skilled workers and unskilled workers, but also between semi-skilled and unskilled workers.

This article is organized as follows. The section 2 addresses the lack of consensus in the literature regarding the relationship between international trade and inequality. The section 3 presents the data and variables used in this article. The section 4 explains the econometric strategies and methods used. The sections 5 and 6 address the econometric results based on the method used: the cointegrated panel model and the error correction model (ECM). The section 7 is devoted to the conclusion.

2. Theoretical and empirical literature

2.1 International trade and inequalities: the role of services

Traditional mechanisms used to explain the link between international trade and inequality are based on trade in manufactured and agricultural goods between the countries of the north and the south. Using a model with two countries, the Heckscher-Ohlin-Samuelson (HOS) model provides a theoretical explanation for the increase in these inequalities. A country will export the items for which it makes intensive use of an abundant production factor, which will increase the price of the exported item. This entails an increase in the price of the abundant factor (and a decrease in the remuneration of the less abundant factor); for the northern countries, this model then predicts an increase in the skill premium (*via* the Stolper-Samuelson theorem).

Some extensions have been produced using this theoretical framework, including services in the theoretical modelling. Askenazy's model (2005) is an extension of the HOS model. In this model, the country of the south only produces manufactured goods, while the country of the north also produces non-tradable services and Research and Development (R & D), which, respectively, require unskilled and skilled labour. Unskilled workers producing non-tradable services are, in this model, partly protected by from international competition and their salaries are not, therefore, at risk of being pushed downwards. Askenazy's model shows that if R&D production is at decreasing economies of scale and households consume a large share of non-tradable services then international trade will reduce inequalities. Blum (2008) and Anwar (2010) had purposed different theoretical approaches but they suppose also a non-tradable services sector. The model of Blum has an opposite conclusion to the Askenazy's model whereas the model of Anwar conclude that international trade decreases wage inequality in the short and long run.

According to Markusen and Strand (2008), trade in services is not merely a special case of an HOS-type situation with two factors and two assets. Indeed, this general model cannot predict that services with intensive skilled labour are produced by countries with an abundance of highly skilled workers. The authors propose a new extension of the HOS model by introducing an item whose production is geographically segmented into two separate production activities. Each part of the production requires workers with different skill levels. One part requires very intensive skilled labour and the other requires moderately intensive skilled labour. This model therefore introduces two categories of workers in addition to poorly qualified workers: semi-skilled workers performing routine tasks who can work remotely from company headquarters; highly skilled workers who perform essential tasks at high levels of responsibility for the firm. This model predicts that activities requiring semi-skilled work, which may be seen as codified and routine, will tend to relocate to the less rich country while activities requiring highly skilled labour will remain or expand in the richest countries. The consequence of this is that international trade in services not only increases income inequality between highly skilled and unskilled workers but also between highly skilled and semi-skilled workers. To date, this mechanism between international trade in services and inequalities has not been tested empirically.

Some new explanations of the link between international trade and inequalities have been developed, but without taking services into account, as emphasized by Chusseau et al. (2008). These explanations can be grouped into three arguments: (1) International *outsourcing*; (2) complementarity of capital and skills; (3) increasing international competition due to international trade liberalization. The last argument is of particular relevance to the case of north-north trade. More recently, the framework of Helpman et al. (2010) indicates that there is a non-monotonic relationship between industry level within-group wage inequality and

degree of openness. When the fraction of exporting firms is small and if this fraction increase, then the wage inequality will increase. At the opposite, if the number of exporting firms is large, an increase of this fraction will reduce the wage inequality. The empirical results from Liu (2013) support these conclusions.

2.2 Empirical links between international trade and inequalities

The first empirical studies carried out in the early 90s estimated that international trade only had a marginal impact on inequality levels (see Katz and Murphy, 1992; or Laurence and Slaughter, 1993). However, other studies showed that this impact was more significant than had been estimated (Wood, 1994, 1995; Goux and Maurin, 1997, Slaughter and Swagel, 1997; Burda and Dluhosch, 1998). More precisely, in these works, international trade seems to have a significant impact on inequality in the case of developed countries, particularly through an increase in the wages of skilled workers relative to the wages of unskilled workers.

More recent studies have continued to raise these questions about the impact of international trade on inequality. However, the methods and samples of countries are not usually the same. Some work involves samples of developed countries or of developing countries, while others use samples of both. Using the case of European countries between 1980 and 2000, Harjes (2007) emphasizes that the development of wage and income inequalities varies widely across different countries and concludes that international trade cannot, therefore, be the main explanation of inequality. Roine et al. (2009) confirmed this difference between countries by using *top income shares*² data. They noted that the increase in international trade increases inequality in Anglo-Saxon countries but not in the countries of continental Europe. Similar

results had been found by Meschi and Vivarelli (2007), Bahmami-Oskoe et al. (2008) and Bensidoum et al. (2011).

Engelmann (2014) uses data from EU KLEMS, to assess the effect of trade for 11 UK manufacturing sectors on inequality. The results shows a structural change in the U.K. economy by the declined share of low-skilled workers and the increased share of medium-skilled and high-skilled workers over the years. These results should to incite us to take into account the different specificities of each industrial sector when we estimate the effect of international trade on inequalities. This fact is supported by the Cassette et al. (2012), who had estimated the specific impact of international trade in services on inequalities by using three interdeciles ratio (D9/D1; D5/D1 and D9/D5). Their results, based on two models (DOLS and ECM) to distinguish between long- and short run effects, show that the relationship between international trade and inequalities differs between goods and services. More precisely, international trade in commercial services increases, only in the long-run, inequalities between top incomes and low incomes but also between top incomes and median incomes. Even tough, they do not have the same fineness of in inequality data than Engelmann (2013), their results supports the need to distinguish between trade in services and goods.

It appears, through this selective review of the empirical literature, that the effect of international trade on inequality differs between developed and developing countries and sometimes even between countries with similar levels of development. The existing empirical literature, however, generally addresses short-term effects.

2.3 The literature concerning the tourism trade and inequalities

The link between openness of tourism trade and inequality has not really studied. Most of the time, this question is indirectly approached as by Chao et al. (2012) for example. In this article, the authors build a theoretical framework (verified by simulations) for a small economy which indicates that if the inbound of tourist increases without a strict environmental control, then the pollution emissions and inequality between unskilled and skilled workers increase.

The other indirect contribution is the works which focus on the link between tourism and poverty. For example, Wattanakuljarus and Coxhead (2008) analysed the link between tourism and poverty in Thailand for 2004. They performed an empirical application of a general equilibrium model using social accounting matrices. Their analysis shows that the increase in national wealth, caused by the increasing of the tourism arrivals, will benefit domestic and foreign investors, which will lead to an increase in income inequality in Thailand. These results are not unique to Thailand. Blake (2008) has found similar patterns for East African countries.

3. Presentation of the database and variables

Table A.1 in the annex summarizes the descriptive statistics and sources of the variables used for this article. Because there is limited data for the variables, we used a sample of 10 developed countries (Australia, Austria, Denmark, Finland, Italy, Japan, Netherlands, Spain, United Kingdom and United States) for the period 1980 -2005. Some are highly specialized in tourism (Spain, Italy, United States) while others are not (Japan, Finland). The advantage of this sample is that it comprises of countries of comparable technological levels and factor endowments, as recommended by Gourdon et al. (2008) for the study of inequalities.

3.1 The dependent variable: sectoral skill premiums

The EU KLEMS database is used in this econometric analysis. This database provides the number of hours worked and wage bill, for each sector, for three categories of people: unskilled, semi-skilled and highly skilled. Three indicators of skill premiums were developed: highly skilled and unskilled, semi-skilled and unskilled, and highly skilled and semi-skilled. As it is possible to obtain the skill premiums by sector, these three indicators were calculated for the four aggregates of interest to us: total trade, trade in goods, trade in business services and the tourism trade³. In total, twelve dependent variables were derived, three for each of the four aggregates.

The advantage of this variable is it can be used to study the direct effect of the tourism trade on wage inequalities in the tourism sector. Using a traditional inequality indicator, such as the Gini coefficient or decile ratios, makes it impossible to discount the effect of the tourism trade on inequalities being due to a correlation effect with an omitted variable.

3.2 Trade liberalization indicators as the main independent variable

In this article, because several sets of sectors are being studied (goods, business services and tourism services), we chose to use the traditional indicator of trade openness (total trade volume of a country for the set of specific sectors divided by the income of the country).

As the study focuses on developed countries, a positive impact on inequality can be expected for international trade in goods and business services. If the share of north-south trade is significant, the traditional HOS model of the mechanism should apply. Indeed, unskilled-labour-intensive products will be imported by rich countries as they will reduce the production of such products. Demand for unskilled labour being a derived demand will be reduced and causing the wages for the unskilled to decline relative to those of highly skilled workers.

In the case of business services, semi-skilled workers are also affected. According to Markusen and Strand (2008), international trade in services can be expected to have a positive impact on wage differences between highly skilled and semi-skilled workers.

CEPII'S CHELEM database distinguishes three categories of services: Transport services (air, sea and others, freight and passenger); Travel services; and "Other business services". The second aggregate includes catering, accommodation, entertainment and tour operators. The statements for this category relate to a very large part of tourism revenues and spending. The last category covers communications, construction, insurance, financial services, computers and information, licences and patents, other business services, cultural services and government.

We test the link between 4 categories of international trade (total, goods, business services and tourism services) and inequality. These categories are summarized in Table 1, where j and t are, respectively, the country and the date.

Table 1: Trade openness variables

Trade category	Variable name	Content
Total trade	$OP_{TOT,j,t}$	Goods and services
Goods	$OP_{G,j,t}$	Goods (manufactured and agricultural)
Business services	$OP_{S,j,t}$	Other business services
Tourism services	$OP_{T,j,t}$	Travel services

3.3 Control variables

Education: a variable for the supply of skills is used, $EDU_{j,t}$, representing the average number of years in education for the total population aged over 24. The data is taken from Barro and Lee (1993, 2001). The level of education is assumed to reduce inequalities and a negative sign can therefore be expected.

Gross domestic product per capita: GDP per capita, $GDP_{j,t}$, may have an impact on inequalities, according to the mechanism originally explained by Kuznets (1955). The relationship between inequality and economic development should follow an inverted U-shaped curve, meaning that inequality increases in the first period of development, then decreases. However, there is no real consensus on this result, especially since Piketty (2001) and the recent literature on inequality. The data are from the CHELEM database (CEPII).

Inflation: An inflation rate variable, $INFL_{j,t}$, is included to control for the macroeconomic environment, which generally affects income distribution. Inflation erodes real wages and disproportionately affects low incomes thus increasing inequality (e.g. Romer and Romer, 1999). The data for this variable are from the International Monetary Fund (IMF).

Labour market - institutional context: Several variables were used to reflect the characteristics of the labour market and the influence of trade unions on wage formation. These variables are based on indicators calculated by Golden and Wallerstein (2006). $NETDEN_{j,t}$ is union density in a country. This calculation represents the number of union members divided by total labour force. It can be assumed that a country with a significant share of people involved in unions will have lower wage inequalities.

An indicator of government involvement in wage formation, $GOVIN_{j,t}$, is also used. It can be assumed that governments seek to reduce inequalities⁴. Finally the Herfindhal index ($HERF_{j,t}$) is used to measure trade union concentration. The greater the concentration, i.e. the more united the trade unions, the greater their room for manoeuvre and ability to limit inequality.

Finally, note that because the focus here is on inequalities in the tourism sector, the effects of foreign direct investment cannot be included. This variable could have been used to complement the effect of trade openness on inequalities. However, this type of data is not currently available for the tourism sector for the study period and for a significant sample of countries.

3.4 Decomposition of variance and unit root tests in the panel

Table A.2 in the annex shows the decomposition of the variance of the variable in relation to their two dimensions: *within* and *between* variances; *between* variance relates to differences in averages between the countries and does not take account of the evolution of individual countries over time. Conversely, with the *within* transformation, the differences in averages between the countries no longer appear and only evolution over time is considered.

The estimation methods used (cointegrated panel with ECM) require a non-negligible *within* variance. Table A.2 shows that the *within* variance in total variance is never too small, above all for dependent variables.

Because the time dimension is more important than the individual dimension (the country) it is also important to verify the stationarity of the variables. Several procedures have been

recommended to test for unit root presence using panel data techniques. The key difference between them relates to assumptions about the heterogeneity of the model.

According to the Im-Pesaran-Shin test (table A.3, in annex), all the variables are stationary at difference, except the education and inflation variables that are also stationary at level.⁵ In this case, these two variables are short-term determinants of inequality and have no long-term effect.

4. Empirical specification

Given the presence of unit roots in the main variables of this article, Pedroni's (1999) panel cointegration tests were conducted to determine whether or not there is a long-term equilibrium between the variables. If certain variables are cointegrated, there is a risk of fallacious regression when using standard estimation techniques. This section consists of three parts: First the cointegration tests are presented. The following parts present the cointegrated panel estimation method and the econometric specification of the ECM to estimate short-term relationships.

Testing the cointegration of a panel data model proceeds in two stages: first, a check to determine whether the dependent variable is cointegrated with each independent variable, then a test of cointegration between each independent variable, taken in pairs as it is not possible to use two independent cointegrated variables in a single regression with cointegrated panel methods. The test results are given in Table A.4 in the annex. They show that we cannot accept the null hypothesis of non-cointegration between each openness variable and the inequality variables except in two cases: between total trade openness and inequality between unskilled and highly skilled workers; between the openness of the tourism trade and inequality between

unskilled and semi-skilled workers. For these two relationships, because cointegration tests indicate non-cointegration there is no long-term relationship between the variables.

Then, because only the GDP per capita variable, among the control variables, is $I(1)$, there is no long-term equilibrium between inequality variables and other control variables (inflation, education and labour market structures). Moreover, the cointegration tests indicate that the GDP per capita variable is cointegrated with trade openness variables. In this case, this variable cannot be integrated into cointegrated panel regressions.

Since we are only interested in the effect of trade openness on inequalities we do not take account of the control variables in the cointegrated panel regressions. However, these variables are present in the ECM models.

4.2 Estimation of the cointegrated vector

To obtain an unbiased estimator of long-term parameters, the DOLS method uses parametric adjustment of errors, by increasing the initial static regression based on the past, future and present of values of the regressors at first difference, which allows for control of the endogenous reactions (Saikkonen, 1991). It is possible to include the differences between past and present values to reflect serial autocorrelation (see Stock and Watson, 1993). The standard deviations of the coefficients are obtained using the long-term variance of the residuals from the cointegration.

4.3 The error correction model (ECM)

The second estimation step in this article involves estimating the long- and short-term relationships using a panel data model based on an error correction model. This is used to establish the way in which the short-term varies from the long-term relationship and, more specifically, how the economy adjusts itself following disturbances over time.

The specification of the corrected error model is as follows:

$$\Delta INEG_{i,k,j,t} = \alpha \Delta INEG_{i,k,j,t-1} + \theta \Delta OP_{k,j,t} + \delta \Delta OP_{k,j,t-1} + \eta TCE_{k,j,t-1} + \varphi X_{k,j,t-1} + \psi_t \quad (3)$$

where $INEG_{i,k,j,t}$, dependent variable for i type inequalities, $i = \{UH, SH, US\}$ ⁶ the trade aggregate k with $k = \{TOT, G, S, T\}$ ⁷, the country j and the date t . OP is the trade openness variable and X is the control variables vector. The specific time effect, ψ_t is used to capture the aggregated shocks that may occur in any given year. The error correction term (TCE) comes from the residuals of the estimated long-term relationship by using the DOLS method. The corrected error term coefficient, η , provides the adjustment rate at which the short-term dynamics of the dependent variable converge towards the long-term relationship. Following a short-term shock on the trade openness variable, inequality temporarily deviates from the long-term equilibrium relationship. Consequently, if η is negative and significantly different from 0, then the wage inequality/trade openness relationship is long-term and the error correction mechanism leads to inequalities to be adjusted to reduce the deviation from the long-term relationship, thus validating the specification of the ECM model.

The cointegration tests indicated that in some cases, the openness variable was not cointegrated with an inequality variable. For this type of situation, there is not, therefore, a long-term relationship between these variables. For the short-term relationship, the error correction term

was therefore removed in both of these regressions. Accordingly, this was not an ECM model but a simple panel model used to test short-term relationships.

To estimate the model in general, the recommendations of Beck and Katz (1995) were followed. First, to address heteroscedasticity problems, a procedure based on a robust White (1980) standard deviations matrix was used. Second, because the OLS method is known to be biased in the presence of autocorrelation of the residual, this autocorrelation needs to be removed. The autocorrelation of the residual is assumed to be AR (1) type and the Prais-Winsten method is used as, like the Cochrane-Orcutt method, it involves estimation of the model through successive iterations. The Prais-Winsten method is particularly suitable to first difference models.

This econometric strategy is particularly recommended in the econometric literature when the time dimension is more important than the individual dimension, which is the case with 10 countries and 26 years of observation.

Finally, since this a model in first differences, there is no risk of correlation between the residuals and the fixed effects. In this case, the OLS method with corrected standard deviations is relevant and other dynamic panel methods cannot be used.

5. The long-term equilibrium relationship between the international tourist trade and inequality

This section studies the long-term equilibrium relationship between the international trade in the 4 aggregates studied (total, goods, business services, tourism services) and wage inequalities in the sectoral aggregates. Tables 2 and 3 show the panel estimates by using the DOLS estimator for the entire country sample during the period 1980-2005.

Table 2: Results of DOLS estimates with fixed time effects for total trade and trade in goods

Independent variable	$INEG_{SH,TOT,j,t}$	$INEG_{US,TOT,j,t}$	$INEG_{UH,G,j,t}$	$INEG_{SH,G,j,t}$	$INEG_{US,G,j,t}$
Dependent variable	$OP_{TOT,j,t}$		$OP_{G,j,t}$		
TOTAL	0.7518*** (4.72)	0.7069*** (9.31)	0.1897 (0.84)	-0.1972 (1.20)	0.2709** (2.04)

, ** and *** are coefficients with Student statistics rejecting the null hypothesis at the 10% , 5% and 1% confidence intervals.

Table 3: Results of DOLS estimates with fixed time effects for trade in business services and the tourism services trade

Independent variable	$INEG_{UH,S,j,t}$	$INEG_{SH,S,j,t}$	$INEG_{US,S,j,t}$	$INEG_{UH,V,j,t}$	$INEG_{SH,V,j,t}$
Dependent variable	$OP_{S,j,t}$			$OP_{T,j,t}$	
TOTAL	10.2840*** (8.25)	2.4919*** (3.26)	6.0589*** (14.13)	8.8514*** (3.71)	-2.1035* (1.92)

, ** and *** are coefficients with Student statistics rejecting the null hypothesis at the 10% , 5% and 1% confidence intervals.

To begin, we see that total international trade significantly increases wage inequality between highly skilled and semi-skilled workers and between semi-skilled and unskilled workers. This first result goes together with that of the traditional mechanism of the HOS model. The countries in our sample have more abundant highly skilled and semi-skilled work than other countries, particularly those in the South. However, this result is not confirmed for international trade in goods. Indeed, the coefficient is not significant for inequalities between highly skilled and unskilled workers. Furthermore, for wage inequality between semi-skilled and unskilled

workers, this coefficient is positive and significant but of much lower magnitude than that of total trade. Finally, note that the relationship between international trade in goods and wage inequality between highly skilled and semi-skilled workers is not significant for this sample.

Conversely, the results for international trade in services are much more settled as in Cassette et al. (2012). In fact, this entails higher wage inequality between each category of worker skills. Moreover, the coefficients are of much greater magnitude than for total trade and trade in goods: between 2% and 10%, depending on category, for services, compared to less than 1% for total trade. Note also that, unlike trade in goods, the coefficient is positive and significant for wage inequality between highly skilled and semi-skilled workers in business services sectors. This result might be consistent with the theoretical mechanism proposed by Markusen and Strand (2008) that activities requiring average skill levels tend to be relocated while activities requiring high skill levels remain in the domestic country. These types of services (financial services, licences and patents, insurance, information and business services) are generally traded between countries of the north and involve semi-skilled workers. In this case, we can return to the argument of Manasse and Turrini (2001): international differentiation of varieties and competition in quality lead to an increase in the skill premium. Our results are compatible with another argument - that the liberalization of services has led to outsourcing (Jones and Kierzkowski, 1999, 2001 and 2005) for activities requiring relatively unskilled and semi-skilled work and that this has led to an increase in inequality.

In the light of these results, it appears that the impact of international trade on wage inequality is mainly due, in this sample, to the liberalization of trade in business services. While the impact of international trade in goods seems marginal, it is the reverse for business services. These

increase wage inequalities between all categories of worker skills. And this impact is so significant that we identify it in total trade (goods + services)

With regard to tourism, the development of trade in this sector has a clear impact on wage inequality between highly skilled and unskilled workers. The coefficient is actually positive and significant at the 1 % confidence level. Note also that this coefficient (8.85%) is slightly lower than trade in services but significantly higher than trade in goods or total trade. However, note that at the 10% acceptance threshold, the international tourist trade reduces wage inequality between semi-skilled and highly skilled workers. This can be partly explained by the fact that tourism production is unskilled labour intensive. So the wage differences between semi-skilled and highly skilled workers in this sector are low. Although it is not possible to test the effect of the tourist trade on wage inequality between semi-skilled and unskilled workers, it can be recognized that tourism does not lead to improvements in the lowest wages but only those that are already relatively high. In this case, it can be concluded that tourism exacerbates wage inequalities in relation to the poorest individuals.

Table 4 shows DOLS estimates by country⁸. It shows that the international tourist trade leads to increased inequalities between highly skilled and unskilled workers in the following countries: Italy, United Kingdom, United States and to a lesser extent Austria. Note also that the tourist trade reduces wage inequality between these two skill categories for two countries: Spain and Finland. This table also indicates that the tourist trade increases wage inequality between semi-skilled and highly skilled workers in the United Kingdom and Austria, while it reduces them in Denmark, Finland and Italy. For other countries, the coefficient of the openness variable is not significant.

Table 4: Detail of DOLS estimates for tourism by country

	(1)	(2)
Dependent variables	$INEG_{UH,V,j,t}$	$INEG_{SH,V,j,t}$
Independent variable	$OP_{T,j,t}$	
Australia	-4.5117	-5.6878
Austria	9.6725***	1.2615***
Denmark	-39.3620	-40.3962*
Spain	-24.9941***	-3.9602
Finland	-43.7601**	-34.4440***
Italy	248.1925***	-22.3125**
Japan	-46.3025	-29.6951
Netherlands	-19.7240	-47.8834
United Kingdom	120.8259***	30.7825**
United States	95.4237***	10.3205
TOTAL	8.8514***	-2.1035*

*, ** and *** are coefficients with Student statistics rejecting the null

hypothesis at the 10%, 5% and 1% confidence intervals.

Although caution is required in relation to these estimates by country, since they are based only on 26 data items, this picture mainly shows that the effect of the tourist trade on wage inequality may differ according to country. However, it seems that these effects do not differ based on whether or not the country is specialized in the tourism sector - the result is very different between Italy and Spain, which both have strong comparative advantages in this sector⁹. Accordingly, if the effects vary between countries, this may be due to certain specificities of these countries, such as the labour market situation or education level. It is not possible to test

these variables over the long-term, but the ECM model, whose estimate is presented in the following section, enables testing for the short-term.

6. Results of ECM models

First, it was verified that there is no multicollinearity problem between the independent variables resulting from using the variance inflation factors (VIF) of each variable. A variance inflation factor for a variable j is one such as $VIF(j) = \frac{1}{1 - R^2(j)}$ with $R(j)$, the multiple correlation coefficient between the variable j and the other independent variables. This indicator shows how the variance of an estimator is inflated in the presence of multicollinearity. The greater the value of VIF the more the variables correlate. The traditional rule is to consider that a VIF value exceeding 10 is a plausible indicator of multicollinearity. This method led us not to include the square of GDP per capita as an independent variable, which meant that we could not test Kuznets's mechanism (1955). For the models whose results are presented in this section, the VIF is always under 3 regardless of the variable, which indicates that the results of the models in this section do not suffer from a problem of multicollinearity.

Table 5 presents the results of estimates of the ECM models for the tourism sector while tables A.7, A.8 and A.9, in the annex, address estimates, respectively, of total trade, trade in goods and trade in business services.

Table 5: Results of estimates of ECM models of the tourism sector

Dependent variables	$INEG_{UH,V,j,t}$		$INEG_{SH,V,j,t}$		$INEG_{US,V,j,t}$	
	No	Yes	No	Yes	No	Yes
$INEG_{UH,V,j,t-1}$	-0.03287 (0.24)	-0.0251 (0.20)	-	-	-	-
$INEG_{SH,V,j,t-1}$	-	-	-0.1714** (2.62)	-0.1539*** (2.89)	-	-
$INEG_{US,V,j,t-1}$	-	-	-	-	0.5487*** (4.07)	0.5856*** (4.29)
$OP_{T,j,t}$	10.9660* (1.77)	11.7282* (1.78)	-0.7111 (0.19)	-1.1528 (0.28)	5.8748* (1.74)	6.3261* (1.77)
$OP_{T,j,t-1}$	-2.2804 (0.38)	-2.9696 (0.46)	3.0415 (0.82)	3.0071 (0.75)	-3.8587 (1.17)	-4.6376 (1.35)
$TCE_{T,j,t-1}$	-0.0461*** (2.64)	-0.0485*** (2.97)	-0.2247*** (4.64)	-0.2350*** (4.53)	-	-
$GDP_{j,t}$	0.0018 (1.10)	-0.0026 (0.46)	0.0006 (0.38)	0.0021 (0.33)	0.0023*** (2.58)	0.0040 (1.36)
$EDU_{j,t}$	0.0060 (0.94)	0.0100 (1.22)	0.0176 (0.99)	0.0258 (1.04)	-0.0073** (1.97)	-0.0091* (1.78)
$INFL_{j,t}$	-0.0025 (0.68)	-0.0050 (0.98)	0.0025 (1.05)	0.0041 (1.20)	0.0010 (0.46)	-0.0012 (0.49)
$NETDEN_{j,t}$	-0.0545 (1.37)	-0.0544 (1.38)	0.0391 (0.28)	0.0218 (0.14)	0.0009 (0.31)	-0.0006 (0.04)
$GOVIN_{j,t}$	0.0028 (0.79)	0.0028 (0.74)	0.0008 (0.31)	3.7e-7 (0,01)	-0.0005 (0.29)	0.0003 (0.22)
$HERF_{j,t}$	-0.0794 (1.51)	-0.0728 (1.41)	0.0733 (0.81)	0.0796 (0.82)	-0.0302* (1.84)	-0.0186 (1.25)
Observations	280	280	280	280	280	280
R ²	13.06%	19.12%	17.98%	24.34%	39.81%	44.09%

*, ** and *** are coefficients with Student statistics rejecting the null hypothesis at the 10%, 5% and 1% confidence intervals.

First, these results indicate that the lagged inequality variable is a significant factor in two out of three cases, which confirms the autoregressive form of the equation (3). For inequality between semi-skilled and highly skilled workers, the lagged variable coefficient is negative. Conversely, the lagged variable coefficient of inequality between semi-skilled and unskilled workers is positive. This means that wage differentials for unskilled workers, relative to semi-skilled workers working in tourism, are increasing while wage differentials between high-skilled and semi-skilled workers reduce over time. This result can essentially be explained by the fact that tourist production is unskilled labour intensive. Accordingly, relative to unskilled workers, there are very few highly and semi-skilled workers. Wages therefore tend to reduce between these categories of workers, who differ less and less in terms of skill levels.

Table 5 also helps to show that the coefficient of the error correction term is negative and significant¹⁰, which validates the ECM models. The statistical significance of the error correction term implies that if there is deviation from long-term equilibrium then short-term adjustments will be made to the dependent variable in order to restore the long-term equilibrium. It can be observed that the range of the coefficients is not the same, depending on the inequalities studied: less than 4.5% for inequality between unskilled and highly skilled workers compared to over 22% for inequality between semi-skilled and highly skilled workers. However, they both indicate a convergence towards long-term equilibrium.

The most significant result is for the tourist trade openness variable. Although the coefficient of the lagged variable is not significant and the coefficient of the openness variable at date t is only significant at the 10% threshold. It is the only openness variable that has an influence on inequality variables. Tables A.7, A.8 and A.9, in the annex, indicate that the coefficients of openness variables, for the other aggregates (total, goods, business services), are not significant

at any time. This result implies that the explanations provided by the HOS framework and the Markusen and Strand model (2008) of the effect of international trade on rising inequalities are not consistent with our short-term results. The effect on inequality of total international trade and trade in business services is only verified in the long-term. Thus, the impact on rising inequality is not immediate for these types of international trade. By contrast, the effect of the tourism trade on wage inequalities in the tourism sector is immediate. If this effect is repeated in each period, that would explain the significant long-term effect observed in the previous section. Note also that the effect of tourist trade openness on inequality particularly affects unskilled workers.

Indeed, the coefficient of the openness variable is not significant for inequality between semi-skilled and highly skilled workers. This result therefore confirms the result of the previous section. The development of trade in tourism between countries leads to a relative deterioration in the wages of the poorest individuals. This finding casts doubt on some of the PPT literature: tourism may enrich some countries but it does not appear to be an effective tool for relative improvements in the wages of the poorest individuals.

Regarding the control variables, the coefficients have the expected sign when they are significant. The level of development of a country (GDP) seems to increase inequalities while the level of education (EDU) and salary negotiations (*HERF*) reduce wage inequality in the tourism sector between semi-skilled and unskilled workers. For other inequality indicators (*SH* and *UH*), none of the coefficients of the control variables is significant.

In light of these results it appears that the main factors behind wage inequality in the tourism sector are a form of inequality inertia and the immediate and long-term effect of tourism trade openness. This result is very important because for wage inequality in goods and business

services, trade openness only has a long-term effect. Moreover, the long-term effect on inequality appears to be greater in the case of the tourist trade than in other sectors (particularly goods). The main explanation of the short-term effect on inequalities in goods and business services is the inertia of these inequalities, although the level of government involvement in wage formation (*GOVIN*) also reduces wage inequality between semi-skilled and unskilled workers in the area of business services, as shown in table A.9 in the annex.

7. Conclusion

Recent studies have reported that the development of tourism seemed to increase wage inequality and that this was at the expense of the poorest individuals. The econometric results of this article point in this direction.

In this article, two econometric analyses were performed. The first was an estimate of the long-term relationship between international trade in tourism and inequality. The results indicate that tourism greatly increases wage inequality between highly skilled and unskilled workers. Moreover, my analysis does not provide the same result for inequalities between highly skilled and semi-skilled workers. The second econometric analysis was based on estimates of error correction models that are used to estimate the short-term link between tourism and inequalities. In the same way as for long-term estimates, it is showed that tourism increases wage inequality for the least skilled workers in the short-term.

However, this article also showed that the results may differ between countries. If economic policies based on tourism are to be developed in order to combat poverty, it should be understood that the development of tourism can have unintended consequences. However, a better understanding of these effects requires an estimate of this relationship for developing countries where tourism is an important part of national wealth. Accordingly, it is important to

have access to more data on wage gaps between different skill levels in tourism, but also to take full account of the specificities of the different countries.

Although the purpose of this article was to study the link between tourism and inequality, it is also possible to draw conclusions from other results. This econometric investigation highlighted the fact that international trade in services, in the long-term, results in rising wage inequalities, notably between highly-skilled and semi-skilled workers. Moreover, it seems that international trade in goods has no impact on inequality. That is why it seems important, in light of these results, to take account of the specific and decisive impact of services in order to study the role of international trade in inequality. The impact of international trade in services on inequalities, as highlighted in this article, may suggest that the developed countries need to develop high-tech sectors (requiring highly skilled labour). Otherwise, wage inequalities may continue to grow in the coming years.

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Endnotes

¹ This assumption can be supported in particular by the fact that the sample used does not include countries where tourism represents a major share of national income.

² *Top income shares* refers to the percentage of total national income held by the 10% (or 1%) of households with the highest incomes. For more detail, see Piketty (2001) or Leigh (2007).

³ This aggregate includes catering, accommodation, tourist attractions and tour operators. This is the same aggregate as in the CHELEM database for trade openness, see next sub-section.

⁴ Particularly for the countries in the sample.

⁵ Since the construction of variables of market structures is not time-dependent, it is not useful to study stationarity and the part of the *within* variances of these variables

⁶ I.e. between unskilled and highly skilled, between semi-skilled and highly skilled and between unskilled and semi-skilled.

⁷ I.e. total trade, trade in goods, trade in services and the tourism trade.

⁸ Tables A.5 and A.6 in the annex show the same data for the other aggregates.

⁹ See for example Nowak *et al.* (2010).

¹⁰ Recall that there is no error correction term in the regression for inequalities between semi-skilled and unskilled workers as there is no cointegration between these inequalities and tourist trade openness.