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An Empirical Analysis of the Influence of Macroeconomic Determinants on World Tourism Demand[*]

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Abstract

This paper considers three econometric models to determine the relationship between macroeconomic variables and tourism demand. Tourism demand is measured by the inbound visitor's population and also by on-the-ground expenditures. Macroeconomic determinants include the exchange rate, the relative domestic prices, and the World GDP *per capita*. The database is an unbalanced panel of 218 countries over the period 1995-2012. There is evidence that an increase in the World's GDP *per capita*, a depreciation of the national currency, and a decline of relative domestic prices do help boosting the number of arrivals and the correspondent expenditure level. The World's GDP *per capita* is more relevant when explaining arrivals, but relative prices become more important when we use expenditures as the proxy for tourism demand. In particular, we cannot reject the hypothesis of a relative prices unitary elasticity of expenditures. Additionally, we have also partitioned our data by income level and by continent. Results are robust in the first partition, but less robust in the second, although the main conclusions still hold.

JEL Classification: C23, L83.
Keywords: Tourism demand, exchange rate, relative domestic prices, world income, panel data model, Poisson panel data model.

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1 Introduction

As one of the important industries of the tertiary sector, the tourism industry has been developing rapidly in the last decades and contributing significantly for economic growth, especially in tourism-intensive countries. And the demand for tourism continues to rise, since the transports sector has also been significantly developing. Consumers have more means of transportation at their disposal, which are faster and cheaper, allowing them to choose over more destinations. With this growing trend in the travel and tourism industries, firms can take the chance to increase their income, by attracting more customers, if they effectively forecast their demand and allocate resources in a reasonable way. The macroeconomic determinants of tourism demand, at the world level, are the focus of our work. We will focus on three macroeconomic determinants of tourism demand - the nominal exchange rate, relative prices and world income *per capita*. We based our choices on the results draw from previous literature, which we present in the next section.

The choice to include the nominal exchange rate as a determinant is obvious, since a depreciation of a given currency relative to others, can increase the demand for tourism, hence domestic prices become relatively cheaper than import prices. A substantial amount of previous research focused on analyzing the relationship between this variable and tourism demand and found a somewhat robust and positive relationship between the two. We have also chosen to include relative prices, i.e., the ratio of domestic prices over foreign prices (in our case, the consumer price index of the USA is the proxy chosen for foreign prices) as an important explanatory variable. This variable measures the cost of living in the country in comparison with the USA, so it measures the purchasing power in the visited country. The expected sign of this variable is negative, since the higher the purchasing power of the visited country *vis-à-vis* the USA, the lower the probability of having many tourists. The literature has focused its attention mostly on the consumer price level (CPI) of the country and not much on the comparison between the CPI of the country and that of the rest of the World. We think a comparison of purchasing power is more important for consumer (tourist) decision than a mere introduction of the price level of the country itself. Additionally, in the tourism literature, income or economic growth has been playing an important role, either as a source or as consequence of tourism demand. Since in our work we are dealing with a panel of 218 countries, we consider the World GDP *per capita*, i.e., the average of World income, as one of our determinants for tourism demand, because it reflects

the global economic environment and wealth. The expected sign for this variable is positive, since we expect that an increase in average World income increases tourism demand.

We model tourism demand, our variable of interest, from two perspectives - value and quantity. From the value perspective we use on-the-ground expenditures. From the quantity perspective we use arrivals to the destination country as our variable. Besides distinguishing the determinants for tourism value and quantity, we use a log-log model specification so that the measurement units of the macroeconomic variables will not matter in ranking the importance of these in explaining tourism demand. Based on panel methods for count (Poisson regression) and real-valued data, we conclude that the World's GDP *per capita* is more significant when explaining arrivals and relative prices is more relevant when we use expenditures as the proxy for tourism demand.

Additionally, many of the studies so far applied the data for a specific country, region, or small group of countries, which may ignore the heterogeneity among destinations and also World-wide effects. Hence, these studies lack universality, making it difficult to apply their results and conclusions to a larger extent. To increase the scope of the literature, our work is going to analyze a panel of 218 economies, spread throughout all continents, thus covering the entire world. Our micro panel covers the period between 1995 and 2012 and it is found that the number of arrivals grew 1.2% *per* year whereas relative expenditures declined at a rate of about 2% *per* year.

Finally, we have also partitioned our data by income level and by continent to check whether the relative importance of each macroeconomic variable is indifferent to these two world aspects. Results are robust in the first partition, but less robust in the second, although the main conclusions still hold. Quite interesting, the results suggest that the world income is relevant to high income countries and the relative prices to low and middle income countries and that the relative prices have a much lower impact in Europe, when compared to other continents.

This work is structured as follows. In Section 2 we perform a literature review of the works closely related to our topic of study and that motivates the choice we make for the macroeconomic variables. Section 3 describes the empirical approach, i.e., data and methodology, Section 4 discusses the results and Section 5 analyses two extensions: income levels and continents. Finally, Section 6 concludes.

2   Literature Review

In this section we analyze the most relevant literature related with the macroeconomic determinants, which we use in our study as explanatory variables for tourism demand.

One of the macroeconomic variables that we use as a possible determinant of tourism demand is (World) income *per capita*. Previous literature has mainly used economic growth, i.e., the growth rate of GDP, as the variable of interest, and not the level or average income. This previous literature was mainly concerned about the direction of causality between tourism and growth. Additionally, most of the literature explores the influence of tourism on economic growth and few explore the reverse causality. Some of the studies presented below also use the nominal exchange rate and some proxy for prices as explanatory variables, but not in the same context as we do.

Sequeira and Campos (2007) investigated the causality between international travelling and economic development. The authors used variables such as the degree of openness, the investment-output ratio, tourist arrivals *per* head of population, tourism receipts in % of exports, the black market premium, real GDP, secondary male enrolment, and the government consumption-output ratio, from 1980 to 1999, obtained from the Penn World Tables and the World Bank. Using panel data regression (with fixed or random effects), they reached the following conclusions: the chosen tourism variables are not closely correlated with the economic boom, regardless of tourism-specialized countries or a wider range of other countries. In latter research, Sequeira and Nunes (2008a) introduced three additional variables: secondary years of schooling above 25 years, life expectancy, and international country risk guide, using the corrected Least Square Dummy Variables (LSDVC) or the fixed Effects (FE) approach and the Generalized Method of Moments (GMM) estimator. Results show that poor countries can profit from specializing in tourism, not only in tourist receipts, but also in consumption, which contributes to the development of the economy. On the other hand, small countries are benefiting less from the specialization in the tourism industry.

According to Odhiambo (2011), with data for 1980-2008, using the Autoregressive Distributed Lag (ARDL) bounds testing approach, unlike most of the previous research, in Tanzania, tourism development leads to more economic growth in the short term, however, in the long run, growth-led tourism plays the important role. Meanwhile, statistical analysis also indicates that in the short run, there are bidirectional relationships between exchange rate and tourism

development, and between exchange rate and economic growth. Research for Mediterranean countries shows similar results. Dritsakis (2012), using the method of cointegration analysis and data for real GDP *per capita*, real tourism receipts *per capita* and real effective exchange rate, in the period 1980-2007, reveals that tourism development is closely related to GDP in seven Mediterranean countries: Greece, Turkey, Cyprus, Spain, France, Italy, and Tunisia. Furthermore, the author suggests that governments should assist the tourism industry to grow as much as possible.

Harvey *et al.* (2013) applied the bounds testing approach to cointegration and an error-correction model to a linear-log equation, with data from the World Bank and the International Financial Statistics (IFS) of the International Monetary Fund (IMF) (1995-2010), using variables like the real GDP, annual international tourist arrivals, the nominal exchange rate, and real exchange rate. The empirical evidence from the Philippines indicated that not only short run but long run growth will benefit from tourism development. As a member of the Brunei-Indonesia-Malaysia-Philippines - East ASEAN Growth Area (BIMP-EAGA), Philippines implemented some measurements to boost economic cooperation, including tourism relations, which contributed to economic development. The same thing happened in Jamaica. By examining the causal relationship between financial development and tourism industry, Ghartey (2013) confirmed that tourism arrivals and expenditure lead to economic growth, by introducing the consumer price index (CPI), the GDP and tourism arrivals between 1963 and 2008, into a Vector Autoregressive (VAR) model, both in the long and in the short term. In 1986, due to the depreciation of the domestic currency, tourism expenditure ascended, being conducive to more economic growth in the country.

The exchange rate and prices are also considered as vital variables of explanation for tourism demand, and a strand of research is committed to clarify the relationship among them.

Cheng *et al.* (2013a, b) introduced the Structural Vector Autoregressive model (SVAR) to study the relationship between tourism revenues (exports) and tourism spending (imports). This paper illustrates the exchange rate effects on US tourism trade balance, using the SVAR model, using data from 1973 to 2007, for the exchange rate, tourism exports and imports. There is no evidence of a J-curve behavior (The J-curve behavior means that in the short run, currency depreciation leads to a trade balance deficit, instead of a surplus, like it is expected) of the US tourism trade balance with the US dollar depreciation, and a unit elastic effect hypothesis of US tourism trade balance was raised. Export revenue is finitely sensitive to the exchange rate

only. In these two works the nominal exchange rate was the only variable of interest that was related to tourism.

The following work only considers the impact of prices on tourism. The impact of prices on the number of tourists is different depending on the departing countries. The demand variation in tourism demand of New Zealand was estimated by Schiff and Becken (2011). The log-log specification was chosen, which gives a direct elasticity estimate. Elasticities for not only international visitor arrivals but on-the-ground expenditure *per* arrival are estimated for each segment. Analyzing the annual data for arrivals and the consumption from 16 countries (1997-2007), the authors concluded that the traditional segments, like the USA and Australia, were less price sensitive, while the Asian markets are relatively more sensitive to prices. Since the price is one of the critical components for tourists' decision, the inspection of price competitiveness relatively to the exchange rate and internal inflation should be consider.

The following works relate both exchange rates and prices with tourism, and in some of these works income or growth is also used as an explanatory variable. Lee *et al.* (1996) estimated the demand from inbound tourism expenditures for South Korea from eight tourists-originating countries. The annual time series data is used in this study for the period between 1970 and 1989. The income of tourists, prices and other special factors such as political unrest, economic recessions and mega events (e.g., World Expo) are considered as major determinants. The log-log specification is applied, estimated by Ordinary Least Squares (OLS). Income has positive and significant influence, while prices have negative and significant impact, and the exchange rates have positive signs for all the countries except for the UK. But dummy variables like mega events are generally insignificant.

Dwyer and Forsyth (2002) made a comparison of price competitiveness among Australia and 13 chosen destination countries. The article discusses the tourism price competitiveness relative to the exchange rate and domestic inflation of the destinations, using Australia as the base case. The appreciation of the exchange rate and the inflation rate jointly determine the price competitiveness. With the devaluation of the Australia dollar from 1985 to 1997, all 13 countries raised the price competitiveness compared with Australia. And the countries which kept relatively lower inflation rates greater enlarged their competitive advantage. In the case of Taiwan, while the effects of relative prices and exchange rate volatility tend to be different, the exchange rate typically has the expected negative impact on tourist arrivals to Taiwan. Whereas exchange rate volatility can have positive or negative effects on tourist arrivals to

Taiwan, depending on the source of the international tourists (Chang and Mcaleer, 2012). The authors use daily data on exchange rates and its volatility; arrivals of tourism to Taiwan from Japan, the USA, and the Rest of the World from 1 January 1990 to 31 December 2008. To capture the approximate long-memory properties in the tourist arrivals series, the heterogeneous autoregressive model is applied.

Saayman and Saayman (2013) studied the impact of exchange rate volatility on tourism in South Africa. It is assumed that the volatility of the South African Rand, the local currency (the ZAR) has an important impact on both visitors' spending and arrivals only from 2000 onwards, when the South African currency was permitted to free float. Volatility is modeled using a GARCH model, while the influence thereof on tourism is modeled using an autoregressive distributed lag model (ADL) and a bounds test approach. Using quarterly data for the period between 2003 and 2010 for average spending, tourism arrivals, real GDP, CPI, nominal exchange rate, and the main sources (countries) of intercontinental arrivals, respectively Australia, Germany, the UK, the USA, France, Brazil, and China. The authors found that increased currency volatility is associated with an increase in on-the-ground expenditure in most of the countries, respectively China, Germany, the USA, and Brazil, while Australian tourists tend to take smaller risks, spending less when volatility increases. In terms of arrivals, most of the countries showed risk aversion behavior, at the exception of China. Due to increased currency volatility, arrivals declined. Last but not least, in the long term, spending would be influenced more than arrivals.

Chao *et al.* (2013) examined how currency depreciation affects the prices of inbound tourism, illustrating that the exchange rate has a dominant effect in the amount of tourists that a country receives. Also, the effect of rising domestic price inflation can be passed through to foreigners, via consumption, while tourists are staying in the country. Consequently, the depreciation of the domestic currency may harm the revenue of inbound tourism. Currency volatility affects not only the visitor's expenditure but also arrivals, and in the long run, revenues will be influenced even more. Another example using German tourists who travel to Turkey, also showed that exchange rates are significant determinants of tourism demand (De Vita and Kyaw, 2013). The authors collected observations on Turkey's tourist arrivals from Germany from 1996 to 2009, at quarterly frequency, to analyze its relationship with exchange rates (the authors tested alternative exchange rates volatility measures), using Generalized Autoregressive Conditional Heteroscedasticity (GARCH) specification and a variance volatility measure. To sum up, ex-

change rates are significant determinants of tourism demand. Secondly, the exchange rate and a relative price proxy should not enter the tourism demand model separately, but rather be combined as an exchange rate adjusted effective price variable.

See also De Vita (2014) on the impact of exchange rate regimes on international tourism flows using a panel of 27 countries over the period 1980 to 2011, Kiliç and Bayar (2014) for an empirical study for the Turkish tourism industry, Chen *et al.* (2015) for the impact of some macroeconomic variables (the growth rate of GDP, the inflation rate) on Taiwan's tourism market cycle, and Salman *et al.* (2011) for the impact of the exchange rate, the CPI, and income on Sweden's inbound tourism demand.

This work will also focus on the relationship between exchange rates, prices, income, and the number and volume of expenditures of inbound tourists, but taking into account a panel of 218 countries between 1995 and 2012, allowing to reach robust conclusions, about the relevance of these macroeconomic variables as determinants for tourism demand. These three macroeconomic variables will be jointly combined in econometric specifications.

3   Empirical Approach

In this section we describe the data, as well as the econometric methodology that we use in our estimations.

3.1   Data

The sample of the variables used in the models was taken from several data sources.

To measure tourism demand we use the countries' number of arrivals (inbound visitors) and the on-the-ground expenditure level, between 1995 and 2012, collected from the World Tourism Organization. There are four approaches to compile the tourism arrivals, namely the arrivals of non-resident tourists at national borders (TF), arrivals of non-resident visitors at national borders (VF), arrivals of non-resident tourists in hotels and similar establishments (THS) and arrivals of non-resident tourists in all types of accommodation establishments (TCE). In this paper, we have used the criteria TF and VF, which give us a more precise figure for the number of tourists' arrivals, so countries for which these criteria are not observed were eliminated from our database. For the volume of expenditures, the data compiled by the WTO comes from the International Monetary Fund (IMF). We end up with a database of 218 countries.

The nominal exchange rate (XR) is defined with respect to the US dollar, the dominant vehicle currency in the international monetary system. For the Gross Domestic Product (GDP) we use the expenditure-side real GDP at chained Purchasing Power Parity (PPP), to allow for inter-country comparisons (RGDPE). We have also obtained data for the population (POP), so we can transform the variables in *per capita* terms, if necessary. These three variables were obtained from the Penn World Tables versions 7.1 and 8.0.

The consumer price index (CPI) measures the price level of a consumer basket of goods and services purchased by households. The collected data for CPI is from 1995 to 2012, and its source is the World Bank. Instead of directly using the domestic CPI as a covariate in the models, we use the *relative* domestic prices, as it is more appropriate for the tourist's perspective, and it is with respect to the US price level (RP), this last one used as a proxy for the "World CPI".

The World Gross Domestic Product (World GDP), at current prices, is also introduced as one of the key determinants of tourism demand. The statistics from 1995-2012 were gathered from the IMF, World Economic Outlook Database.

The measurement units of each variable are listed in Table 1 below.

[TABLE 1 ABOUT HERE]

As a whole, the dataset we use is a significant micro unbalanced panel. It covers essentially all countries in the world, although for some of them a few variables of the models are not observed for the entire time period. Nevertheless, the total number of observations used to estimate the tourism demand models is clearly meaningful: it ranges from a total of 1606 to 2190 data points.

3.2   Methodology

We specify three different econometric models for tourism demand as a function of the macro-economic variables exchange rate (XR), relative prices (RP), and the World GDP (WGDP). We measure *tourism demand* either in terms of quantity (tourism arrivals) or in terms of price (tourism expenditures). For the latter, tourism demand is proxied by Real Expenditures *per* Arrivals or Real Expenditures *per* Domestic GDP.[1] That is, instead of the total level of expenditures, we model how much a tourist spends on average in a journey or the weight tourism's expenditures have relatively to the GDP of each economy.

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[1] Nominal expenditures were deflated by the CPI.

Besides modeling the number of arrivals, we also have estimations for the number of arrivals relatively to the domestic populations (Arrivals/Pop). In this paper, we do not present the results for Arrivals/Pop because the estimated coefficients associated to the covariates XR and RP have the wrong expected signs (negative for XR and positive for RP). Nevertheless, it is worth mentioning that Arrivals/Pop has experienced an estimated increase of 3% a year, something that confirms that tourism has grown as an industry in the past years.

These three models were estimated taking log-log specifications, so that the coefficients are interpreted as elasticities and thus independent of the measurement units chosen for the variables. Additionally, we can also rank the three explanatory macroeconomic variables to see which has the highest importance for tourism demand, in terms of elasticity.

The models contain two more features in order to best capture the main drivers of tourism demand. To account for time-effects, we add a deterministic linear time trend to the models. We have 18 years of observations in the sample and, therefore, it is plausible that tourism demand in the world has been following a deterministic path over time. Since we have a micro-type of panel (the number of years, $T = 18$, is "small" relatively to the number of countries, $n = 218$) with unbalanced data, we do not consider dynamic panel models where the lagged dependent variable is included in the list of regressors of the model.

The second feature of the models is the existence of a component that captures all unobservable country-specific characteristics that also helps determining the tourism demand and which is assumed to be time-invariant such as the risk of the country (see Sequeira and Nunes, 2008b, for example). Note that, by assuming that these individual effects are unobserved, we do not have problems of mismeasurement of variables and the associated bias that it introduces in the estimation stage. Following the standard approach in panel data regression models, we test for the existence of country-specific effects and, in the case of its presence, we further test for random effects against fixed effects.

The number of arrivals is modeled by means of a panel Poisson regression for count dependent variable because Arrivals takes nonnegative integer values for all countries and years:

$$\mu_{it} = E\left(Arrivals_{it}|x_{it}, \alpha_i\right) = \alpha_i \exp\left(x'_{it}\beta\right) \equiv \exp\left(\delta_i + x'_{it}\beta\right), \qquad i = 1, ..., n; t = 1, ..., T, \quad (1)$$

where $E\left(\cdot|\cdot\right)$ is the conditional expectation, x_{it} includes $XR_{it}, RP_{it}, WGDP_{it}$ (all in logs) and the time trend, t, (the intercept is merged into α_i), β is the vector of coefficients, and $\delta_i = \log\left(\alpha_i\right)$

controls for individual country-effects. Taking logs,

$$\log \mu_{it} = \log E\left(Arrivals_{it}|x_{it}, \alpha_i\right) = \delta_i + \beta_1 \log XR_{it} + \beta_2 \log RP_{it} + \beta_3 \log WGDP_{it} + \beta_4 t. \quad (2)$$

The values of $\beta_j, j = 1, 2, 3$ shall be interpreted as point elasticities whereas β_4 is the percentage change of $E\left(Arrivals_{it}|x_{it}, \alpha_i\right)$ *per* year.

In model 2, real Expenditures *per* Arrivals is the dependent variable, measuring average real spending that a tourist does in a country. Now, the standard methods for panel data with real-valued dependent data are applied,

$$\mu_{it} = E\left(y_{it}|x_{it}, \alpha_i\right) = x'_{it}\beta + \alpha_i. \quad (3)$$

The model is given by:

$$\log\left(Expenditures/Arrivals\right)_{it} = \beta_0 + \beta_1 \log XR_{it} + \beta_2 \log RP_{it} + \beta_3 \log WGDP_{it} + \beta_4 t + u_{it}, \quad (4)$$

$i = 1, ..., n; t = 1, ..., T$, where $u_{it} = \delta_i + \varepsilon_{it}$ is the composite error term, and the $\beta's$ are the elasticities of demand for tourism expenditures. Considering the usual assumption of u_{it} with zero conditional expectation,

$$E\left[\log\left(Expenditures/Arrivals\right)_{it}|x_{it}\right] = \beta_0 + \beta_1 \log XR_{it} + \beta_2 \log RP_{it} + \beta_3 \log WGDP_{it} + \beta_4 t.$$
$$(5)$$

Likewise, in the third model, Expenditures *per* GDP is the dependent variable, measuring the relevance of the receipts of tourism for the wealth of an economy for each year:

$$E\left[\log\left(Expenditures/RGDPE\right)_{it}|x_{it}\right] = \beta_0 + \beta_1 \log XR_{it} + \beta_2 \log RP_{it} + \beta_3 \log WGDP_{it} + \beta_4 t.$$
$$(6)$$

The choice for having the macroeconomic variables XR and RP is also motivated by the data itself. We tested for $\beta_2 = -\beta_1$ which would mean that $\beta_1 \log XR + \beta_2 \log RP$ equals $\beta_{RXR} \log(RXR)$, the log of the real exchange rate. This restriction is clearly rejected by the data in all models, i.e., the effects of XR and RP on tourism demand are not symmetric, one dominating over the other (more details in the next section).[2]

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[2]Note that in models 2 and 3 (expenditures) we have $E\left(\log y_{it}|\log x_{it}, \alpha_i\right)$ whereas in the Poisson model (arrivals) it corresponds to $\log E\left(y_{it}|\log x_{it}, \alpha_i\right)$. Because $\log E\left(y_{it}|\log x_{it}, \alpha_i\right) > E\left(\log y_{it}|\log x_{it}, \alpha_i\right)$, by the Jensen's inequality, the elasticities in the arrivals model is up warded measured when compared to the expenditures

For the panel data Poisson regression model, the vector of coefficients β is consistently estimated and inference is done by maximum likelihood methods given that the probability density function equals $f\left(Arrivals_{it}|x_{it}\right) = \frac{\exp(-\mu_{it})\mu_{it}^{Arrivals_{it}}}{Arrivals_{it}!}$, where $Arrivals_{it} = 0, 1, 2, ...$ Testing for the existence of country-specific individual effects δ_i is also straightforward, based on the usual likelihood statistics. The problem arises when testing for random (RE) against fixed-type (FE) of individual effects since the Hausman (1978) assumptions are not valid. Therefore, we present results for both RE and FE which, apparently, are not distinguishable (see the results in the following section).

The estimation and inference procedures for the two Expenditures real-valued panel data models are the standard ones in the literature. Again, we test for individual effects and, if necessary, of which type (RE or FE, using the Hausman, 1978, test statistic) and, for the most suitable error specification, we consider the consistent and most efficient estimator and the correspondent standard errors.

For details about modeling, estimation and inference in panel data models, see, for example, Cameron and Trivedi (2005), Wooldridge (2010) and Baltagi (2013).

4 Results

In the next subsections we analyze the results drawn from our three econometric models for tourism demand, using different proxies. Results are in Table 2 below. The last subsection will make a comparison between the three estimations for tourism demand.

[TABLE 2 ABOUT HERE]

4.1 Arrivals

The second and third columns of Table 2 show us the results for the estimations when Arrivals is the explanatory variable, using random and fixed effects estimators. According to what was expected in theory, all the estimates associated to the macroeconomic variables have the correct signs and are statistically significant. The determinant which has the biggest impact, in absolute value, is the World GDP *per capita*, followed by the nominal exchange rate. The WGDP elasticity of demand is equal to 0.57 whereas the other one equals 0.33. The impact of relative prices (-0.08) is small. The trend has a positive slope, meaning that there is a growing

models.

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trend (1.2% *per* year) in the number of tourists (arrivals), which is what we actually observe looking at the empirical data.

4.2 Real Expenditures *per* Arrivals

The fourth and fifth columns of Table 2 present results using Real Expenditures *per* Arrivals as a proxy for tourism demand, with the random effects estimator according to usual specification tests. Again, we have the expected signs, although the nominal exchange rate is not statistically significant. In this case the most relevant variable is the relative prices, followed by the World GDP *per capita* (estimate of 0.43). In fact, the hypothesis of a relative prices (negative) unitary elasticity of real expenditure level *per* visitor cannot be statistically excluded from this model. Hence, the price of goods and services at the destination *vis-à-vis* the Rest of the World (i.e., the US) is a very important element when potential tourists make their travel decisions. Off course, it depends on the social economic status of the tourist, but in a global World, in which is ever more common to travel, more people of lower social economic status travel abroad, and these are the ones more sensible to price differences. The estimated value associated with the trend is this time negative, which means, that we can observe a declining trend in the expenditures *per* tourist of about 2.2% a year. This can arise due to several factors. First, due to competition between firms involved in the tourism industry, which is clearly growing, prices can go down. Second, since more young people are travelling and their budgets are tighter, expenditures *per* tourist can also decrease.

4.3 Real Expenditures *per* GDP

The last column of Table 2 exhibits results for the estimations when we use Real Expenditures *per* GDP as the explanatory variable. The specification tests were computed and the fixed effects estimator is the chosen one. All coefficients are statistically significant and have the expected signs. Confirming the results of the previous model, the elasticity of the relative prices is essentially unitary (negative), i.e., it implies that consumers do care about price comparison when they purchase goods or services at the destination. The World GDP *per capita* has also a quite high elasticity (0.81). The nominal exchange rate elasticity is the smallest one in absolute value (0.08), yet positive and significant, contrary to what happen in the previous model. Moreover, Real Expenditures *per* GDP have been decreasing at an average rate of 1.3% *per* year. The explanations provided in the previous subsection, apply to this one.

From the FE estimation procedure, we can obtain and rank the various individual country effects. The 20 countries with the highest and the lowest values are listed in Table 3 below.

[TABLE 3 ABOUT HERE]

The maximum amount is for Macao (3.4197) while the minimum is -4.9875 (Guinea). This means that, for example, Macao's country-specific characteristics are such that enable tourists to spend a ratio Expenditures/RGDPE of 30 *per* year ($= \exp(3.4)$) above the average country, after controlling for all covariates in the model. Obviously, this is a significant value because Macao is a small open economy that benefits a lot from the tourism industry.

4.4   Comparing Results

In this subsection we discuss the results of the previous three subsections. There is clearly a difference on the results of the elasticities of the macroeconomic determinants when we use a proxy for tourism demand based on quantity (Arrivals) or based on value (Real Expenditures *per* Arrivals and Real Expenditures *per* GDP).

When we use Arrivals as a proxy for tourism demand the World GDP *per capita* is the most important determinant, with the highest elasticity in absolute value, followed by the nominal exchange rate, and the effect of relative prices which, although significant, is almost negligible. But in the two estimations based on expenditure proxies, the relative prices become the most important determinant of tourism demand with a negative unitary elasticity. These last two estimations emphasize the relevance of the international comparison of prices, restricted on their own budget, before people make their decision where to travel and visit. The World GDP *per capita* is an important determinant, either when we use Arrivals or Real Expenditures (*per* Arrivals or *per* GDP) as proxies for tourism demand, although is specially relevant when Real Expenditures *per* GDP is used. In these last two estimations the effect of the nominal exchange rate is either non-significant or small. We observe a negative trend in the expenditures estimations, pointing to a decrease in expenditure *per* tourist and *per* GDP, possibly resulting from the increase in competition, which can decrease prices. When we use Arrivals, the trend is positive, pointing to an increase in the number of people travelling. These two trends seem to represent a typical demand function, based on prices and competition.

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5 Extensions

The estimates of the country-specific fixed effects in determining the level of expenditures *per* GDP highlight the fact that the wealth and the size of the economy might influence the tourism demand functions (c.f. Table 3 above). Thus, in this section we analyze the results of two extensions: we have partitioned the data by income level and also by Continent. These two extensions allow us to check the robustness of the macroeconomic determinants obtained before to explain the tourism demand.

5.1 Analysis by Income Level

We first break our data by income level using an adapted measure of the partition by income level of the World Bank. The World Bank uses the Gross National Income (GNI) *per capita* to breakdown countries by income level whereas in our sample we have data for nominal GDP *per capita.* Despite the obvious differences between GNI and GDP, we rank the countries according to their GDP in our dataset and apply the intervals of the World Bank.[3]

Overall, there are 17.85% of low income data points (Low), 24.32% lower middle income (LowMid), 24.96% upper middle income (UpperMid) and 32.80% of high income observations (High). In order to distinguish the elasticities of the macroeconomic variables according to the income level, we aggregate the lower middle income and upper middle income groups and build two dummy variables $dl_{it} = \begin{cases} 1 \text{ if } GDP_{it} \in \text{low income} \\ 0 \text{ if otherwise} \end{cases}$ and $dh_{it} = \begin{cases} 1 \text{ if } GDP_{it} \in \text{high income} \\ 0 \text{ if otherwise} \end{cases}$, both of which are time-varying. Almost all countries experienced a change in income level at some point of time, the majority an upgrade in its development level.

We extend the models (1), (5), and (6) by also including the covariates interacted with dl_{it} and dh_{it} so that the tourism demand functions for these two groups are compared to the reference group of middle income. More specifically, what was defined before as $x'_{it}\beta$ is now

$$x'_{it}\beta + dl_{it}x'_{it}\gamma + dh_{it}x'_{it}\eta. \tag{7}$$

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[3]The World Bank revises the classification of the world's economies yearly, based on estimates of the current gross national income (GNI) *per capita* for the previous year. As of 1 July 2012, the World Bank income classifications by GNI *per capita* are as follows:
- Low income: $1,025 or less;
- Lower middle income: $1,026 to $4,035;
- Upper middle income: $4,036 to $12,475;
- High income: $12,476 or more.

The estimation results are in Table 4. In the second column (LOW) we have $\widehat{\beta} + \widehat{\gamma}$; then (MIDDLE) $\widehat{\beta}$; and in the last (HIGH) $\widehat{\beta} + \widehat{\eta}$. We removed the parameters that were not statistically significant and that is the reason why some elasticities are the same across two or more groups.

[TABLE 4 ABOUT HERE]

The results are quite robust to the partition made to the data and the ranking of the elasticities still prevails in the partition between income levels, in all three estimations.

When Arrivals is the explanatory variable, the low and middle income countries' results are quite similar to the original estimations, even though the coefficients for relative prices and the trend are larger. The coefficient for World GDP *per capita* is smaller. For high income countries, the sign for the relative price and the trend changes, but the coefficients are small, and the coefficient of the World GDP *per capita* is larger. The results for Arrivals as the dependent variable seem to emphasize the higher relevance of the evolution of world income to high income countries and the higher relevance of relative prices to low and middle income countries (but still smaller in absolute value than the other two elasticities). Finally, arrivals have stagnated in high income countries (drop of 0.08% a year) compensated by an enormous growth in low and middle income countries (5.7% and 4%, respectively).

When the explanatory variable is Real Expenditures *per* Arrivals, the results for the coefficients of relative prices for middle and high income countries, for the World GDP *per capita* for low income countries, and for the trend for low and middle income countries are those that change the most, relative to the original estimations. Results stress the importance of relative prices to low income countries in comparison to middle and high income countries and also the relevance of the World GDP *per capita* to middle and high income countries in comparison to low income countries. Nevertheless, the elasticity of relative prices is always the largest and only for low income group the (negative) unitary hypothesis cannot be empirically rejected. The drop of spending *per* tourist is more significant in low and middle income countries (3.7%) than in high income countries (1.7%).

When we change the analysis to the Real Expenditure *per* GDP, the values for the coefficients of the nominal exchange rate all decrease slightly for all income levels, in terms of the relative prices the opposite happens, and for the World GDP *per capita* the results change for high income countries only. Again, elasticity of RP is the largest, with all groups having unitary elasticity, but now the elasticity of WGDP is closer to one. In fact, for the high income group,

unitary elasticities exist for RP and WGDP, meaning that both effects are equally important and very elastic. The Real Expenditure *per* GDP stabilized for low and middle income countries but dropped 4.3% *per* year in high income countries.

5.2 Analysis by Continent

Additionally, we also separate our data by Continent. There are 21.55% of countries in Asia, 21.10% in Europe, 24.31% in Africa, 9.17% in Oceania and 23.85% in America. We aggregate Africa and Oceania. Thus, and similarly to the income level partition, we now extend the original list of covariates to include the interactions with dummies for Europe, America and Asia so that the tourism demand models for these three groups are compared to the reference group of Africa and Oceania. Obviously, all dummies are time-invariant. The results are in Table 5, distinguishing the estimated elasticities in Europe (EUR), America (AME), Asia (ASIA) and Africa and Oceania (AF&OC), after eliminating the parameters that were not statistically significant in the models.

[TABLE 5 ABOUT HERE]

As we can see, the results are not quite as robust as in the previous section, although the ranking of the elasticities only change in the case of Real Expenditures *per* GDP, for Europe, where the ordering changes substantially. More importantly, the nominal exchange rate happens to be statistically significant now for the second model and in several situations the sign of the elasticity is not the expected one.

In the specification for Arrivals, the sign of the estimated coefficient of RP for America and Asia is not according to theory (is positive instead of negative) and contradicts all previous estimations. The relative positions of the coefficients (elasticities) for the World GDP *per capita* and the nominal exchange rate are quite robust across groups. Only for Europe, the elasticity of XR gets close enough from the one of WGDP, the largest. It is in Africa and Oceania that the elasticities of XR and WGDP are the largest compared to any other group. This means that, for Arrivals, AF&OC are the most sensitive continents to the macroeconomic drivers. For the period under analysis, the number of arrivals slightly dropped in America (0.4% a year) but rose elsewhere (from 1.2% in Europe to 4.8% in Asia).

When Real Expenditures *per* Arrivals is the explanatory variable, relative prices and the World GDP *per capita* maintain their relative position for all continents, although relative

prices have a much lower impact in Europe than in the other continents. It is in fact the only continent for which the elasticity of RP is smaller than one, in absolute value. The elasticity of WGDP is the same across groups (0.44). The exchange rate only has the correct sign in Asia. The Real Expenditures *per* Arrivals have fallen over the years (from 0.8% in Europe to 3.2% in Asia, Africa and Oceania).

For the estimations in which we use Real Expenditures *per* GDP as the dependent variable, relative prices have again a much lower impact in Europe, and a slightly lower impact in Asia, compared to the remaining continents (these with unitary elasticity). The World GDP *per capita* has a much lower impact in America and Asia, relatively to the other continents. By contrasting the two elasticities, only in Europe the coefficient of WGDP is larger than RP. That is, only in Europe the tourist's expenditures is less sensitive to changes in prices than in wealth. All continents have experienced a constant level of Real Expenditures *per* GDP except in Europe where it dropped 2.5% *per* year. The wrong expected sign for the nominal exchange rate in Europe and America, in the last two regressions, can be explained by business travelling to these two continents that is not influenced by the depreciation of the nominal exchange rate.

6 Conclusion

This work analyzes the influence of some key macroeconomic determinants, such as, the nominal exchange rate, relative prices, and the World GDP *per capita*, on the World tourism demand, namely on the inbound number of visitors and tourism expenditures, for a panel of 218 countries observed between 1995 and 2012.

We have estimated three models, using three different proxies for tourism demand - Arrivals, as a measure of tourism *quantity*, and Real Expenditures *per* Arrivals, and Real Expenditures *per* GDP, measuring tourism *value*. There is evidence that an increase in the World's GDP *per capita*, a depreciation of the national currency, and a decline of relative domestic prices do help boosting the number of arrivals and the correspondent expenditure level. The World GDP *per capita* is more relevant when we use arrivals as our dependent variable, but relative prices become the most important when we use expenditures as the proxy for tourism demand. In particular, we cannot reject the hypothesis of a relative prices (negative) unitary elasticity of real expenditures, i.e., consumers do care about price comparison when they choose destination and purchase goods or services at the destination.

On average, the number of tourists (arrivals) grew 1.2% *per* year whereas relative expenditures declined about 2% *per* year. In a global World, it becomes more common to travel abroad, including more people of lower social economic status, and fierce competition between firms involved in the tourism industry may be pushing prices down.

Additionally, we have also partitioned our data by income level and by continent. Results are robust in the first partition, but less robust in the second, although the main conclusions still hold. The results seem to emphasize the relevance of the world income to high income countries and of the relative prices to low and middle income countries, in determining tourism demand. For the period under analysis, arrivals have stagnated in high income countries and the drop in the expenditure levels *per* tourist is more significant in low and middle income economies.

The relative prices have a much lower impact in Europe, when compared to other continents. Arrivals in Europe do change with nominal exchange rates almost as with the World GDP and in Africa and Oceania both elasticities are the largest compared to any other group. That is, Africa and Oceania are the most influenced by the macroeconomic drivers. The expenditure level *per* tourist elasticity of the World GDP is the same for all continents. Also, the World GDP *per capita* has a much lower impact in America and Asia, relatively to the other continents, in determining the expenditures *per* GDP. Finally, Asia experienced the highest increase in arrivals (4.8% a year) but it was also the continent (*ex-aequo* with Africa and Oceania) whose expenditures *per* arrivals have fallen the most (3.2% *per* year).

The panel we use in this paper is very complete at the micro level since it covers essentially all countries in the world. Nevertheless, the time series information is somehow limited because the number of years it covers is not that significant and some variables of the models are not observed for some countries over the entire period. In the future, it shall be important to study the macroeconomic determinants in tourism demand once more time observations become available to practitioners.

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Figures and Tables

Table 1: Variables

POP	Population – in millions
XR	Exchange Rate, National Currency/U.S. Dollars
RGDPE	Expenditure-side real GDP at chained PPPs – U.S. dollars in millions, 2005=100
CPI	Consumer Price Index (2005=100)
Expenditure	Tourism real expenditure in the country– U.S. dollars in millions, 2005=100
Arrivals (TF) or (VF)	Arrivals of non-resident tourists (visitors) at national borders- in thousands
WGDP	World Gross Domestic Product, Current prices– U.S. dollars in billions

Table 2: Results for the Three Specifications

	Arrivals		Expenditure/Arrivals		Expenditure/RGDPE
XR	0.3257* (0.0007)	0.3257* (0.0007)	0.0065 (0.0234)	–	0.0849* (0.0333)
RP	−0.0848* (0.0006)	−0.0848* (0.0006)	−0.9572* (0.0280)	−0.9647* (0.0213)	−0.9684* (0.0281)
WGDP	0.5711* (0.0014)	0.5712* (0.0014)	0.4363* (0.1283)	0.4333* (0.1253)	0.8070* (0.1104)
Trend	0.0119* (0.0007)	0.0119 * (0.00007)	−0.0218* (0.0065)	−0.0224* (0.0064)	−0.0134* (0.0056)
Effects	Random	Fixed	Random	Random	Fixed
Hausman	-	-	0.2694	0.1179	0.0000
Rsquared	0.0236	0.0236	0.5870	0.5852	0.9295

Note: * stands for statistically significant; All log-log specifications;
Intercept not included in the table; Hausman test p-value

Table 3: Estimated Country Specific Effects

Expenditures *per* RGDPE Model

Highest		Smallest	
MACAO, CHINA	3.4197	GUINEA	−4.9875
MALDIVES	3.1873	BANGLADESH	−3.8436
BAHAMAS	3.0571	BURUNDI	−3.6901
CYPRUS	2.4474	TAJIKISTAN	−2.7431
BARBADOS	2.4446	NIGERIA	−2.3139
FIJI	2.3228	CENTRAL AFRICAN REPUBLIC	−2.1740
MALTA	2.2996	BELARUS	−2.0851
LUXEMBOURG	2.2955	PAKISTAN	−2.0642
JAMAICA	2.0122	JAPAN	−2.0336
BELIZE	2.0044	INDIA	−1.9715

Table 4: Results for the Partition by Income Level

	LOW	MIDDLE	HIGH
		Arrivals	
XR	0.24783	0.3272	0.27667
RP	−0.14133	−0.23092	0.05137
WGDP	0.42007	0.44444	0.67701
Trend	0.057712	0.04034	−0.000848
Effects		Fixed	
Hausman		-	
Rsquared		0.184917	
		Expenditures/Arrivals	
XR	0	0	0
RP	−0.99353[a]	−0.813431	−0.813431
WGDP	0.21437	0.400371	0.400371
Trend	−0.036664	−0.036664	−0.016792
Effects		Random	
Hausman		0.2761	
Rsquared		0.643024	
		Expenditures/RGDPE	
XR	0.046095	0.069595	0.069595
RP	−0.997506[a]	−0.997506[a]	−0.997506[a]
WGDP	0.792991	0.792991	0.98075[a]
Trend	0	0	−0.043454
Effects		Fixed	
Hausman		0.0000	
Rsquared		0.933139	

Note: all coefficients are statistically significant at 5% level;
All log-log specifications; Hausman test p-value
a : cannot reject unitary elasticity

Table 5: Results for the Partition by Continent

	EUR	AME	ASIA	AF&OC
		Arrivals		
XR	0.23341	0.18666	0.090219	0.33244
RP	−0.033165	0.096767	0.041979	−0.017753
WGDP	0.26671	0.41843	0.52867	0.643226
Trend	0.011832	−0.003894	0.048358	0.026771
Effects		Fixed		
Hausman		-		
Rsquared		0.171714		
		Expenditure/Arrivals		
XR	−0.053393	−0.053393	0.045235	−0.053393
RP	−0.44335	−1.2374	$−1.035590^a$	$−1.035590^a$
WGDP	0.442948	0.442948	0.442948	0.442948
Trend	−0.00781	−0.012191	−0.031968	−0.031968
Effects		Random		
Hausman		0.0558		
Rsquared		0.645840		
		Expenditure/RGDPE		
XR	−0.42409	−0.11301	0.069752	0.069752
RP	−0.23698	$−1.023838^a$	−0.83671	$−1.023838^a$
WGDP	0.723732	0.43687	0.44879	0.723732
Trend	−0.024528	0	0	0
Effects		Fixed		
Hausman		0.0000		
Rsquared		0.933076		

Note: all coefficients are statistically significant at 5% level;

All log-log specifications; Hausman test p-value

a : cannot reject unitary elasticity