

Article

The Effects of Real Exchange Rates and Income on International Tourism Demand for the USA from Some European Union Countries

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Abstract: This paper investigates the effects of real exchange rates and income on inbound tourism demand (tourist arrivals) from Germany, France, the UK, the Netherlands, Italy, Spain, and Sweden to the USA over the period 1996Q3–2015Q1. To achieve this aim, the Harmonized Index of Consumer Prices (HICP) for Restaurants and Hotels was used for the first time—instead of using the general Consumer Price Index (CPI)—to transform the nominal exchange rate into the real exchange rate as an independent variable in tourism demand analysis models. Panel co-integration analysis under the cross-sectional dependence (CD) test and common correlated effects (CCE) approach was applied. Empirical results show that tourists visiting the USA are more sensitive to changes in the real exchange rate than changes in GDP. While French tourists respond highly to the GDP, British tourists respond highly to the real exchange rate. It should also be noted that the UK, having the highest responsiveness to the real exchange rate, is a country outside the Eurozone and also intends to leave the European Union.

Keywords: real exchange rate; Harmonized Index of Consumer Prices for Restaurants and Hotels (HICP); GDP; tourism demand

JEL Classification: F00; F24; F14; Z3

1. Introduction

The United States is one of the most visited countries in the world and international tourism is one of the most important contributors to the country's economy. According to the National Travel and Tourism Office (NTTO), the arrival of international tourists in the USA grew by 97%, from 39.2 million in 1996Q3 to 77.5 million in 2015Q1 ([NTTO National Travel & Tourism Office](#)). These statistics are expected to grow with the World Travel and Tourism Council (WTTC) estimating that by 2025 the arrival of international tourists in the USA will reach 128.8 million and will generate USD279.4 billion ([WTTC World Travel & Tourism Council](#)). International travelers have a major impact on the US economy; international tourists visiting the USA in 2015 spent a total of USD216.9 billion. This level of spending yielded a USD61 billion trade surplus and generated one job for every 68 international visitors ([NTTO National Travel & Tourism Office](#)).

Although international tourists arrive in the USA from countries all across the world, the European tourist market makes an essential contribution to the US economy. In 2015, nearly 43.2% of all overseas arrivals in the USA came from Western Europe (mainly the UK, Germany, France, and the Netherlands). This statistic surpassed all other evaluated regions including Asia (31%), South America (16.4%),

Oceania (5.1%), and the Caribbean (4.3%) (NTTO National Travel & Tourism Office). While the UK was the largest European tourist market for the USA, Germany and France were the second and third largest European tourist markets, respectively, in 2015 (NTTO National Travel & Tourism Office). Tourists from the UK spent 82% more than tourists from Germany and 121% more than tourists from France. Whereas Mexican tourists spent an average of USD1027, this amount was USD2571 for British tourists in 2015 (NTTO National Travel & Tourism Office). Additionally, it is important to note the positive role that bilateral and unilateral *visa-free entry* agreements have in increasing inbound–outbound tourism arrivals–departures between the USA and Europe (Lee et al. 2010; Whyte 2008; Goh and Law 2002; Balaz 1995). Consequently, it can be said that the *Visa Waiver Program*¹ that allows most Western Europeans to enter the USA without having to obtain a visa for a specific number of days played an important role in growing the European tourist market for the USA (Belenkiy 2014; Hu 2013; GAO United States General Accounting Office).

This study investigates the effects that the *real exchange rates* and *incomes* have on inbound tourism demand (tourist arrivals) from Germany, France, the UK, the Netherlands, Italy, Spain, and Sweden to the USA over the period 1996Q3–2015Q1. To the best of our knowledge, this will be the first paper to use the Harmonized Index of Consumer Prices (HICP) for Restaurants and Hotels instead of the Consumer Price Index (CPI). We believe that it is a big opportunity to have these data collected from the price changes in only the accommodation and catering services, which are especially related to tourist expenditures. Unfortunately, many countries do not have these data. Besides their size in the US tourist market, there are other advantages of using these countries as the sample countries of the study. First, they provide regular and continuous data for analyses. Second, they enable the researchers to eliminate the effects of “visa restrictions” as one of the most important independent variables in demand tourism models.

The remainder of the paper is organized as follows. Section 2 provides a short literature review. Section 3 provides the empirical model, methodology, datasets, and empirical results. Section 4 offers conclusions and recommendations for application and additional research.

2. Literature Review

The empirical literature concerning tourism demand analysis shows that the majority of previous studies has focused on the analysis of international tourism demand (Crouch 1994a, 1994b, 1995; Witt and Witt 1995; Lim 1997, 1999; Li et al. 2005; Isik Cem and Sirakaya 2017a). In most of these analyses, the number of tourist arrivals was used as the dependent variable (Lin et al. 2011, Song and Li 2008; Downward and Lumsdon 2003; Song and Witt 2000). In some studies (Li et al. 2004, 2006, 2006; Seo et al. 2009; Halicioglu 2010; Ahmed 2013; Isik 2012; Isik and Radulescu 2017; Isik et al. 2017b), tourist expenditures in the tourist destinations were used. In others, particular tourist products such as meals (Au and Law 2000) and shopping expenditures (Au and Law 2000) were used. However, tourist expenditure data are difficult to measure since tourism consists of many related subsectors (Sheldon 1993). Therefore, according to Frechtling (1994), biases and inaccuracies exist when using tourist expenditures as a dependent variable.

As far as the independent variables are concerned, most of the previous empirical analyses show that *incomes* and the *real exchange rates* are the most used and most important determinant variables in tourism demand models as revealed by both Li et al. (2005) and Lim (1999). For instance, Seetaram (2010) applied a dynamic panel data co-integration technique for tourists arriving in Australia from ten main markets and found that tourism demand is elastic to changes in income, real exchange rates, and airfares in the long run. Seo et al. (2009) applied multivariate generalized autoregressive conditional heteroskedasticity (MGARCH) and vector error correction (VEC) models for small Asian islands. They found that the industrial production index and real exchange rates have a positive or

¹ Visit <https://travel.state.gov/content/visas/en/visit/visa-waiver-program.html> for details.

negative impact on conditional correlations of tourism demand for these destinations. Falk (2015) applied a panel error correction model for Swiss overnight stays in western Austrian ski resorts and found that the exchange rates between two countries' currencies are a significantly important factor in the tourism demand for Austria. Similarly, Karimi et al. (2015) applied the generalized Poisson regression model for ASEAN countries and found that inflation and real exchange rates have negative relationships with international tourism demand. Kamel et al. (2015) applied a vector autoregression error correction model for Tunisia and found that the real exchange rate is an important factor explaining long-term overnight stays in the country. Adeola et al. (2017) applied the Poisson regression model for 44 African countries and found that real exchange rates, per capita income, political stability, and the absence of violence are significant drivers of international tourism into Africa. Lim and Zhu (2017) applied dynamic heterogeneous panel data analysis for Singapore and found that long-run income (price) elasticity is positively (negatively) significant. On the other hand, Seetaram et al. (2016) introduced the price competitiveness index (PCI) as a new index outperforming the real exchange rate in their model. Yazdi and Khanalizadeh (2017) applied a gravity framework for the USA with 14 countries including our sample countries. They found that the real GDP and real exchange rates adjusted by CPI have significant impacts on the international tourism demand of a country. Ekanayake et al. (2012) applied a panel data analysis for the USA with different countries including Western European countries and found that tourism demand is elastic with respect to income but inelastic with respect to real exchange rates adjusted by CPI.

Tourists' incomes are used in different forms such as gross national product (GNP) (Garín-Muñoz and Amaral 2000; Qui and Zhang 1995), gross domestic product (GDP) (Kulendran and Wilson 2000; Lathiras and Siriopoulos 1998), GDP per capita (Dritsakis 2004; Hor 2015; Pivčević et al. 2016), and the industrial production index (IPI) (Espinoza et al. 2012; González and Moral 1995; Seo et al. 2009; Chang et al. 2017). The exchange rate is often used as a proxy for the relative price of tourism in tourism demand models. However, it alone is not an acceptable proxy (Martin and Witt 1987). Therefore, the majority of tourism demand analysis models apply the real exchange rate (which is adjusted for inflation with the general Consumer Price Index (CPI)) in both the tourist generator and destination countries (Thompson and Thompson 2010; Dritsakis 2004; Dritsakis and Gialelaki 2004; Cheng et al. 2013; Vogt 2008; Ganchev 2014). The general CPIs of both tourist generator and destination countries can be used to reflect the relative prices of tourist products and services. However, the general CPI may not show the price level of products and services that tourists often and directly encounter (Divisekera 2003; Dwyer et al. 2000; Lim 1997; Pérez 2002). This is because price indices created for only tourist expenditures are not available in many countries. For this reason, this study uses, for the first time, the Harmonized Index of Consumer Prices for Restaurants and Hotels (HICP)² instead of the general CPI to transform the nominal exchange rate into the real exchange rate as an independent variable of tourist demand models.

The HICP is a classification of services that contains the prices for accommodation and catering services, including all categories and subcategories therein. The reason for choosing and using the HICP is that tourists today are more able to search and compare hotel and restaurant prices as well as book their accommodation units online. According to the report prepared for the US Securities and Exchange Commission (SEC) in December 2015, 320 million people used the travel website company TripAdvisor to review and compare the prices of hotels and restaurants, as well as book 995,000 hotels and accommodations, 770,000 vacation rentals, and 3.8 million restaurant reservations in 125,000 destinations worldwide (SEC 2016).

² Visit <http://ec.europa.eu/eurostat/web/products-datasets/-/teicp110> for details.

3. Data, Empirical Model, Econometric Methodology, and Empirical Results

3.1. Data

Data used in this paper are quarterly figures covering the period 1996Q3–2015Q1. The independent variables of this study are *income* as the GDP at the constant 2010 prices in the local currency and the *real exchange rate* (RER) based on the HICP. The dependent variable is the *number of tourist arrivals* (ARTOU) from Germany, France, the UK, the Netherlands, Italy, Spain, and Sweden to the USA. These are the only European countries providing data for the number of monthly tourist arrivals in the USA. Additionally, in 2015, nearly 43.2% of all overseas arrivals in the USA came from these countries. The GDP data from the [World Bank \(2016\)](#), the HICP (2005=100), and the nominal exchange rate from the database of the Federal Reserve Bank of St. Louis ([FED Federal Reserve Bank of St. Louis](#)) were obtained. The data for the number of tourist arrivals were obtained from US monthly tourism statistics from the National Travel and Tourism Office ([NTTO National Travel & Tourism Office](#)). All data have been seasonally adjusted and within the logarithmic form. Gaussian 9, the latest version of the Gaussian®series of electronic structure programs, was used for the analyses.

3.2. Empirical Model

In tourism demand models, a wide range of different factors can be used as independent variables, such as political and social factors due to the increasing trend in globalization. All these factors can considerably affect the tourism demands of not only the destination country but also the tourist generator country. However, the majority of the empirical studies have tested the impact of economic factors on the tourism demand models. These are mostly income and the real exchange rates as surveyed by both [Li et al. \(2005\)](#) and [Lim \(1999\)](#). Similarly, different econometric approaches mentioned in previous sections have been applied.

This study applies the panel co-integration analysis under the cross-sectional dependence (CD) test and common correlated effects (CCE) approach. In the panel data analysis, it is important to test the independence test for the panels forming the panel and whether the variables are homogeneous. The cross-sectional units that are dependent on each other should be examined for whether they are equally affected by shocks. Cross-sectional dependency and homogeneity tests change the orientation and shape of unit roots and the co-integration tests to be applied. In the study, the dependencies of the variables were determined first by the CD tests and the homogeneity test by delta tests. The series covered include both heterogeneous and cross-sectional dependence. The ECM (Error Correction Model) panel co-integration test was applied in the study by [Westerlund \(2007\)](#). This test, developed by [Westerlund \(2007\)](#), is based on the assumption that the series are at the same level and are stationary at the first difference. The panel co-integration test developed by [Westerlund \(2007\)](#) is independent of the horizontal sections forming the hypothesis panel when compared to the standard normal distribution critical value. [Westerlund \(2007\)](#) suggested that the test statistics calculated to take the horizontal section dependence into account are compared with the “bootstrap” distribution critical values proposed by [Chang \(2004\)](#). The reason for this is that the variable with the bootstrap tests and produces critical values with Monte Carlo simulation on average at least 1000 times. Horizontal section dependency and heterogeneity must be interpreted in consideration of the panel bootstrap values. The heterogeneity, horizontal section dependence, and the existence of a co-integration relationship were estimated by the common correlated effects (CCE) model of the long-run co-integration vector of the model with numerical expressions. The CCE model is a predictor that can be used for $N > T$ and $N < T$. Horizontal section dependency is taken into account. The slope is allowed to change the horizontal section from the horizontal section ([Pesaran 2006](#)). An advantage of the CCE method is that long-run regression coefficients can be calculated for each horizontal section unit. It is also possible to make individual interpretations of the countries with calculated long-run regression coefficients for each horizontal section unit.

In this study, for the inbound tourism demand (tourist arrivals) from Germany, France, the UK, the Netherlands, Italy, Spain, and Sweden to the USA, the following function is used:

$$ARTOU_{it} = \alpha_{it} + \beta_1 GDP_{it} + \beta_2 RER_{it} + \varepsilon_{it} \quad (1)$$

The empirical model in Equation (1) can be expressed in logarithmic form as follows:

$$\ln ARTOU_{it} = \alpha_{it} + \beta_1 \ln GDP_{it} + \beta_2 \ln RER_{it} + \varepsilon_{it} \quad (2)$$

where $ARTOU_{it}$ is the number of tourist arrivals from every tourist generator country to the USA, GDP_{it} is the gross domestic product at the constant local currency of every tourist generator country, RER_{it} is the real exchange rate between every tourist generator and destination country, ε_{it} is the individual error term, and α_i is the constant, RER_{it} is calculated as follows:

$$RER_{it} = \frac{(NER_{it} * HICPG_{it})}{HICPD_{it}} \quad (3)$$

where NER_{it} is the nominal exchange rate between every tourist generator and destination country, $HICPG_{it}$ is the Harmonized Index of Consumer Prices for Restaurants and Hotels of the tourist generator country and $HICPD_{it}$ is the Harmonized Index of Consumer Prices for Restaurants and Hotels of the tourist destination country. A double-log (log–log) functional form is especially useful and is the most popular functional form since it allows the analyst to estimate price elasticities and income elasticities (Alston et al. 2002; Lewis 2011).

3.3. Econometric Methodology and Empirical Results

The cross-sectional dependence has implications for the unit root and co-integration tests as well as for the choice of estimation techniques and, hence, should be considered prior to empirical analyses. The existence of cross-sectional dependence was tested with the methods of the Lagrange multiplier (LM) and the adjusted cross-sectional dependence Lagrange multiplier (LM_{adj}) developed by Breusch and Pagan (1980), Pesaran (2004), and Pesaran et al. (2008). The test results are reported in Table 1 with ‘constant’ and ‘constant and trend’ options.

Table 1. Cross-Sectional Dependence Tests for Variables.

CD Tests	lnARTOU		lnGDP		lnRER	
	Constant	Constant and trend	Constant	Constant and trend	Constant	Constant and trend
LM	102.887 (0.000)	107.909 (0.000)	74.032 (0.000)	86.717 (0.000)	241.163 (0.000)	241.895 (0.000)
CD _{LM}	12.635 (0.000)	13.410 (0.000)	8.183 (0.000)	10.140 (0.000)	33.972 (0.000)	34.085 (0.000)
LM _{adj}	12.510 (0.000)	12.445 (0.000)	25.426 (0.000)	25.144 (0.000)	3.861 (0.000)	3.739 (0.000)

(Parentheses): *p*-values.

According to the test results shown in Table 1, the null hypothesis can be rejected, providing evidence for the existence of cross-sectional dependence across the countries analyzed. In other words, these findings imply that a shock affecting one of the countries can be transmitted to the others and, hence, cross-sectional dependence should be taken into account in the estimation process. The LM test is valid for N relatively small and T sufficiently large. Under the null hypothesis with $T \rightarrow \infty$ and $N \rightarrow \infty$ in any order, the CD test has an asymptotic normal standard distribution. Pesaran et al. (2008) recommended a bias-adjusted test that is a modified version of the LM by using the exact mean and variance of the LM statistic. The cross-sectional dependence and homogeneity tests were applied for the regression model and the test results are also reported in Table 2.

Table 2. Cross-Sectional Dependence Tests for Model and Homogeneity Tests.

Regression Model		Statistic	p-Value
$\ln ARTOU_{it} = \alpha_{it} + \beta_1 \ln GDP_{it} + \beta_2 \ln RER_{it} + \epsilon_{it}$			
Cross-section dependency tests:			
	LM	854.159	0.000
	CD_{lm}	128.559	0.000
	LM_{adj}	116.039	0.000
Homogeneity tests:			
	$\tilde{\Delta}$	4.510	0.000
	$\tilde{\Delta}_{adj}$	4.633	0.000

According to the test results shown in Table 2, the statistics of the three tests (LM , CD_{lm} , and LM_{adj}) given in the first part of the table suggest cross-sectional dependence in all model specifications. As far as the delta tests are concerned, the null hypothesis of homogeneity cannot be rejected for the model at 1%. After cross-sectional dependence and homogeneity tests, the unit root test was applied for whether the series is stationary. The test results from Table 2 are reported in Table 3.

Table 3. Unit Root Tests: Covariate-Augmented Dickey–Fuller (CADF).

Variable	Constant		Constant and Trend	
	CIPS Statistic	Critical Values	CIPS Statistic	Critical Values
$\ln ARTOU$	−1.890		−2.779	
$\ln GDP$	−0.846	%1 −2.54	−1.915	%1 −3.04
$\ln RER$	−2.191	%5 −2.33	−2.179	%5 −2.83
$\Delta \ln ARTOU$	−4.909	%10 −2.21	−4.989	%10 −2.72
$\Delta \ln GDP$	−4.704		−4.970	
$\Delta \ln RER$	−5.218		−5.934	

The covariate-augmented Dickey–Fuller (CADF)³ test results from Table 3 suggest that all variables are difference-stationary. Thus, the co-integration analysis can be applied. The ECM panel co-integration test results developed by Westerlund (2007) are reported in Table 4.

Table 4. Westerlund (2007) ECM Panel Co-integration Test.

Variables	Statistic	Bootstrap p-Value
g_tau	−19.36	0.000
g_alpha	−4.818	0.037
p_tau	−15.776	0.000
p_alpha	−6.154	0.033

According to the test results in Table 4, there is no co-integration hypothesis and the null hypothesis (H_0) is rejected. The variables are co-integrated in the long run. For the estimation phase of the panel, the common correlated effects (CCE) developed by Pesaran (2006) were applied to account for the cross-sectional dependence as well as heterogeneity in the data. The CCE estimator asymptotically eliminates strong as well as weak forms of cross-sectional dependence in large panels (Pesaran 2006). It can be used regardless of whether or not T is greater than N . In other words, CCE $T > N$ and $N > T$ denotes consistent and asymptotically normal distribution results and long-term

³ CADF (covariate-augmented Dickey–Fuller) test was developed by Hansen (1995).

stability coefficients can be calculated separately for every horizontal section (Pesaran 2006). The CCE test results for the panel and countries in the model are reported in Tables 5 and 6.

Table 5. Common Correlated Effects (CCE) Estimates for the Panel.

Variables	Dependent Variables: lnARTOU		
	coefficient	se	t
<i>LnRER</i>	0.902	0.253	3.565
<i>lnGDP</i>	1.028	0.960	1.070

Table 6. CCE Estimates for the Countries.

Countries	<i>lnGDP</i>	<i>lnRER</i>
Italy	−0.191 (−0.687)	0.680 * (1.416)
Germany	0.494 ** (2.129)	0.165 (0.450)
France	5.382 *** (5.653)	1.482 *** (2.806)
Spain	0.288 (0.829)	1.242 *** (3.642)
The United Kingdom	−1.991 *** (−2.422)	1.596 *** (7.636)
The Netherlands	−0.351 (−0.322)	−0.118 (−0.358)
Sweden	3.569 ** (2.041)	1.264 ** (1.947)

t statistics are given in parentheses. Critical values for t ratios are 2.32, 1.64, and 1.28 for 1%, 5%, and 10%, respectively. ***, **, * indicate significance levels at 1%, 5% and 10%.

According to the test results of the panel model in Table 5, the effects of income as a measure of GDP on the number of tourists arriving in the USA is positive (1.028). This was expected but it is non-significant since its *t*-values should have been 1.64 and 1.28 at the 5% and 10% levels, respectively. The effects of RER are positive (0.902) and significant at the 1% level ($p < 0.01$) since its *t*-value is 3.56. The increases in the RER of the tourist generator countries positively respond to the number of tourists from these countries traveling to the USA. In other words, a 1% increase in the RER increases the number of tourists from these countries traveling to the USA by 0.902%.

In Table 6, as far as the countries and variables are concerned, the GDP has been found to be positive, as expected, and significant for Germany, France, and Sweden at different levels but negative and significant for the UK and non-significant for Italy, Spain, and the Netherlands. While France has the highest elasticity coefficient of 5.38, the elasticity coefficients for Sweden and the UK are 3.56 and −1.99, respectively. The lowest elasticity coefficient of 0.49 belongs to Germany. On the other hand, the RER has been found to be positive, as expected, and significant for the number of tourists arriving in the USA from Italy, France, Spain, the UK, and Sweden at different levels but positive and non-significant from Germany and negative non-significant from the Netherlands. While the UK has the highest elasticity coefficient of 1.59, France and Sweden have elasticity coefficients of 1.48 and 1.26, respectively. The lowest elasticity coefficient of 0.68 belongs to Italy.

According to the comparative elasticities of the variables, the French and Swedish tourists traveling to the USA respond positively to GDP changes and much more than the German tourists. Conversely, while the tourists from the UK respond negatively to GDP changes, tourists from Italy, Spain, and the Netherlands do not respond to GDP changes since their coefficients are non-significant. For instance, a 1% increase in the GDPs of France and Sweden increase the number of tourists from these two countries to the USA by levels of 5.38% and 3.56%, respectively. The same amount of change in the GDP of Germany increases the number of tourists from Germany to the USA by only a 0.49% level. Interestingly, a 1% increase in the GDP of the UK decreases the number of tourists traveling from the UK to the USA at a −1.99% level. As far as the RER is concerned, tourists traveling from the UK, Sweden, Spain, France, and Italy to the USA respond positively to changes in their local currencies against the US dollar. For instance, when the value of the British pound against the US dollar increases by 1%, the number of tourists from this country to the USA increases by 1.59%. Additionally, when the value of the euro against the US dollar increases by 1%, the number of tourists from Italy to the USA

increases by only 0.68%. While the UK has the highest elasticity coefficient of 1.59, France and Sweden have elasticity coefficients of 1.48 and 1.26, respectively. Tourists from Germany and the Netherlands do not respond to changes in their local currencies against the US dollar since their coefficients are non-significant. However, according to the empirical results of the study by Ekanayake et al. (2012), the real exchange rates adjusted by CPIs between Western European countries' currencies and the US dollar have no effect on the number of tourists from these countries to the USA. On the other hand, Yazdi and Khanalizadeh (2017) found that the same variable has a significant impact on international tourism demand to the USA. Therefore, these comparative results reveal the need for more empirical studies focusing on the variable of the real exchange rate adjusted by the CPI and HICP.

4. Concluding Remarks

This paper investigated the effects of real exchange rates and income on inbound tourism demand (tourist arrivals) from Germany, France, the UK, the Netherlands, Italy, Spain and Sweden to the USA over the period 1996Q3–2015Q1. To achieve this aim, panel co-integration analysis under a cross-sectional dependence (CD) test and common correlated effects (CCE) approach was applied. In this study, to the best of our knowledge, the Harmonized Index of Consumer Prices (HICP) for Restaurants and Hotels was used for the first time—instead of the most used general Consumer Price Index (CPI)—to transform the nominal exchange rate to the real exchange rate as an independent variable in tourism demand analysis models. Hence, apart from the empirical results of the study reported in the previous section, the usage of this index should be considered as the main contribution of this study to the related literature. In this respect, future research directions in tourism demand analyses could include the further use of HICP. Because many scholars⁴ are inquiring about the use of general CPI for international tourism demand models, future research should compare HICP with the general CPI in order to calculate the real exchange rate and compare which index responds more effectively to the needs of scholars. These potential future studies using the HICP and CPI simultaneously in the same studies may provide researchers with the opportunity to compare the results of these two indexes technically and economically. In other words, all these future studies may be able to reveal the advantages and disadvantages of using both indexes. It is hoped that the results of this study will enable researchers to compare their results derived from using the CPI.

Author Contributions: Serdar Ongan, Cem Işık and Dilek Özdemir presents the basic ideas, introduction, literature, methodology and obtains the main results of the whole paper.

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⁴ Divisekera (2003); Dwyer et al. (2000); Lim (1997); Pérez (2002).

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