

## THE CHAOTIC GROWTH MODEL OF THE INTERNATIONAL TOURISM RECEIPTS: EURO AREA

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**Abstract** *This paper examines the international tourism receipts dynamics in the euro area. The basic aims of this paper are: firstly, to create a relatively simple chaotic growth model of the international tourism receipts that is capable of generating stable equilibria, cycles, or chaos, and secondly, to analyze the international tourism receipts growth stability in the period 1995-2015 in the euro area. This paper confirms the existence of the stable growth of the international tourism receipts in the euro area in the observed period.*

**Keywords:** *International tourism receipts, Growth, Stability, Chaos.*

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### INTRODUCTION

The euro was first introduced in 1999. The Eurozone consists of the following EU Member States (19) which have adopted the euro as their single currency: Austria, Belgium, Cyprus (2008), Estonia (2011), Finland, France, Germany, Greece (2001), Ireland, Italy, Latvia (2014), Lithuania (2015), Luxemburg, Malta (2008) Netherlands, Portugal, Slovakia (2009), Slovenia (2007), and Spain. The euro has a special impact on the tourism sector.

The euro area economy continued its gradual recovery in 2015. While private consumption continued to expand, investment growth faltered. Real GDP is forecast to rise by 2.145 per cent in 2017. In the euro area domestic demand is expected to be the main generator with robust private consumption supported by rising real incomes. Investment should continue to expand. Unemployment should continue to gradually decline, and the unemployment rate fall to 9.173 per cent in 2017. For 2016 as a whole, GDP growth is 1.793 percent (see Fig. 1).

The situation in the labour market continued to improve; the unemployment rate decreased by 1 percentage point in the course of the year to 10.008 percent. Annual average inflation rate is forecast at 1.482 per cent in 2017 (see Fig. 2) (Economic Assessment of the Euro Area Winter 2015/2016, 2016). The European Central Bank (ECB) loosened its policy by lowering the interest rate on excess reserves. The expansive monetary policy has effect. It is assumed that the interest rate will remain close to zero in 2017. Fiscal policy has been less restrictive in 2016 than in the previous two years. The reduction of the consolidated euro area budget deficit in relation to GDP has been supported by improved growth ( see Fig.3).

According to the UNWTO Tourism Highlights (2016 , pg.6), as a worldwide export category, tourism ranks third after fuels and chemicals, and ahead of food and automotive products. In many developing countries, tourism ranks as the first export sector. Tourism is increasingly an essential component of export diversification, both for emerging and advanced economies.

Tourism plays an important role in the euro area. In 2014, 2.3 million enterprises in industries with tourism related activities employed an estimated 12.3 million persons in EU. The EU-28's

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population aged 15 or over from within the EU-28 made an estimated 1.2 billion tourism trips in 2015. The important destinations in 2015 were concentrated in France, Italy, the United Kingdom, Spain and Germany. The top four most popular destinations for non-residents were Spain, Italy, France and the United Kingdom. ([http://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism_statistics)).

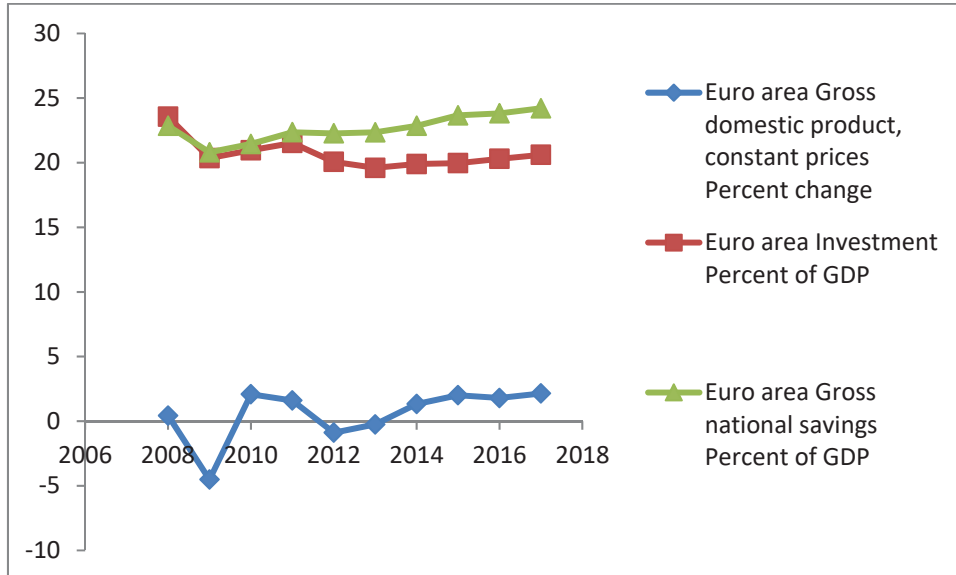


Figure 1. GDP (% change, constant prices), Investment (% of GDP), Gross national savings (% of GDP) :Euro area ([www.imf.org](http://www.imf.org))

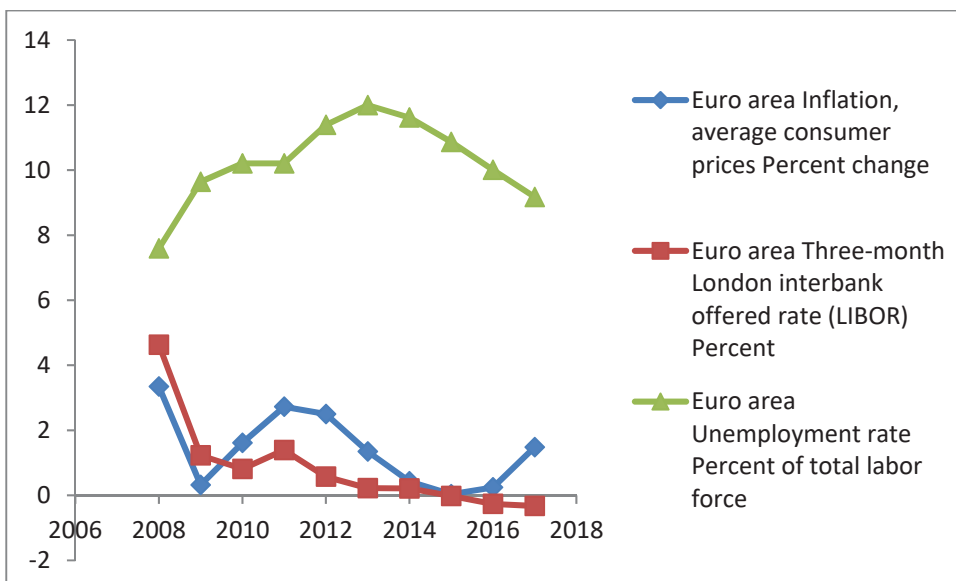


Figure 2. Inflation, Labor and Unemployment rate: Euro area ([www.imf.org](http://www.imf.org))

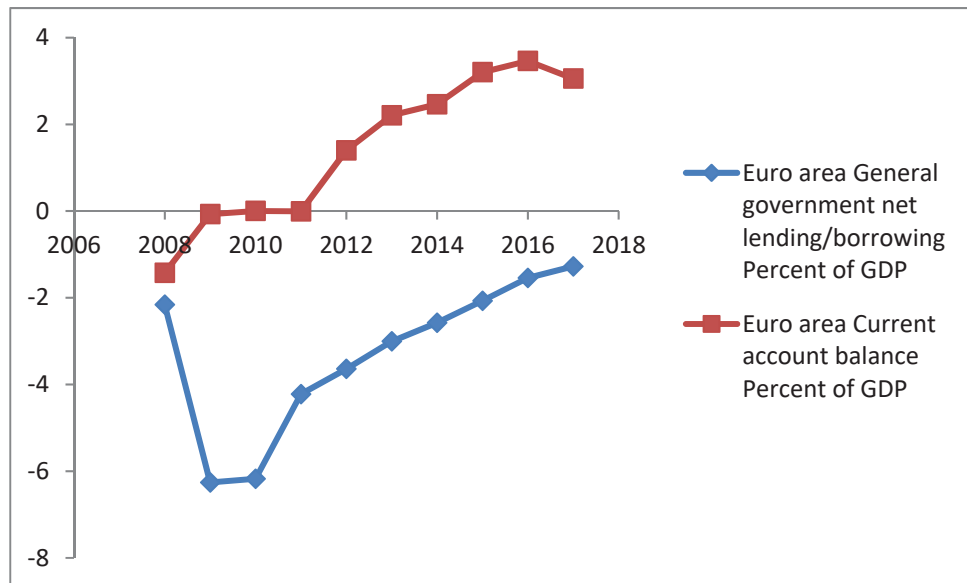


Figure 3. General government net lending /borrowing (% of GDP) and Current account balance (% of GDP): Euro area ([www.imf.org](http://www.imf.org))

The economic importance of international tourism can be measured by looking at the ratio of international travel receipts relative to GDP; these data are from balance of payments statistics. In 2015, the ratio of travel receipts to GDP was highest, among the EU Member States, in Croatia (18.1 %), Malta (13.4 %) and Cyprus (12.7 %). In absolute terms, the highest international travel receipts in 2015 were recorded in Spain (EUR 50.9 billion), France (EUR 41.4 billion) and the United Kingdom (41.1 billion), followed by Italy (35.6 billion) and Germany (33.3 billion). ([http://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism_statistics)).

Germany recorded the highest level of expenditure on international travel, totaling EUR 69.9 billion in 2015, followed by the United Kingdom (EUR 57.2 billion) and France (EUR 34.6 billion). Spain was the EU Member State with the highest level of net receipts from travel in 2015 (EUR 35.2 billion), while Germany recorded the biggest deficit (EUR -36.6 billion) ([http://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism_statistics))

International Tourism Receipts grew 3% in 2016. International tourism receipts are the earnings generated in destination countries from expenditure by international visitors. For the receiving country, receipts from international visitors count as exports. For some 110 countries and territories, receipts from international tourism exceeded euro 1 billion in 2016. Most EU-28 destinations show growth in receipts. The group of the 28 countries of the European Union (EU-28) recorded a total of euro 340 billion (US\$ 377 billion) in international tourism receipts, a 3% increase in real terms over 2015. This growth is above the increase for Europe overall (+1%). In absolute terms receipts in the EU-28 increased by euro 5 billion. Tourism receipts in EU-28 account for 31% of receipts worldwide (European Union Short-Term Tourism Trends , 2017 ).

Receipts earned by the eight EU-28 destinations in Southern and Mediterranean Europe, the most visited group of countries within the union, grew 5% in real terms, to euro 132 billion, accounting for 39% of EU-28's total receipts. Within this group, growth was led by Portugal (+11%), Croatia (+8%) and Spain (+7%), EU-28's top earner. Receipts earned by Slovenia grew by 4% and receipts by Italy, the second top earner in this group, by 2%. Enhanced air

connectivity along with a strong perception of safety played in favour of island destinations Cyprus (+11%) and Malta (+5%). In Greece, despite a 5% growth in arrivals, tourism receipts fell by 7%. This can be partly explained by shorter stays and a decrease in long-haul arrivals.

The nine EU28 destinations in Central and Eastern Europe recorded a 8% increase in receipts to euro 31 billion. Growth was led by Slovakia (+17%) and Bulgaria (+16%). Poland (+10%), Estonia (+8%) and Hungary (+7%) also reported good results. Growth was more moderate in the Czech Republic (+4%), Lithuania (+3%) and Romania (+1%). By contrast, Latvia recorded a 3% decline in tourism earnings (European Union Short-Term Tourism Trends, 2017).

Generally strong results in the five EU-28 destinations in Northern Europe (+2%) were weighed down by a decline in the sub region's largest destination, the United Kingdom, despite the more affordable British pound. The United Kingdom, Northern Europe's major destination, reported a 1% decrease in international tourism receipts, following the depreciation of the British pound after the vote to leave the European Union (Brexit) in the referendum on membership in June 2016. By contrast, Sweden (+13%), led growth in the subregion. Ireland (+8%) and Finland (+6%) also recorded solid growth in receipts, driven by stronger demand from EU-28 source markets. Denmark, earnings grew 3%, in line with growth in arrivals (European Union Short-Term Tourism Trends , 2017 ).

The group of the six EU-28 destinations in Western Europe recorded growth (0%) in receipts due to mixed results at the destination level. Higher earnings in Netherlands and Austria were offset by the weaker results in Belgium and France. Growth in this group was led by the Netherlands (+7%) and Austria (+6%), while Germany (+2%) reported more modest results as did Luxembourg (0%). By contrast, receipts earned by France (-5%), Europe's top destination, were impacted by security concerns, as were, to a lesser extent, receipts earned by Belgium (-1%) (European Union Short-Term Tourism Trends, 2017 ).

According to the UNWTO Tourism Highlights (2016 ,pg. 5), international tourism represents 7% of worldwide exports. Expenditure by international visitors reached US\$ 1260 billion (euro 1136 billion) in 2015. In real terms, this represents an increase of 4.4% over 2014. In real terms, receipts grew by 8% in the Americas, by 4% in both Asia and the Pacific and the Middle East, by 3% in Europe, and by 2% in Africa. Expenditure by international visitors counts as exports for the destination country and as imports for the country of residence of the visitor. International tourism also generated US\$ 211 billion in exports through international passenger transport services rendered to non-residents in 2015. Adding these together, the value of tourism exports amounted to US\$ 1.5 trillion, or US\$ 4 billion a day on average

According to the UNWTO Tourism Highlights (2017, pg. 7) Europe welcomed 616 million international tourists in 2016. This corresponds to 2% growth. International tourism receipts in Europe grew 1% in real terms to US\$ 447 billion (euro 404 billion), which represents 37% of receipts worldwide. Northern Europe led growth in the region, with a 6% increase in international arrivals. In Central and Eastern Europe, arrivals increased by 4% in 2016. Many destinations enjoyed strong results (Georgia , Slovakia , Bulgaria , Romania and Lithuania ). Growth in Southern and Mediterranean Europe was modest. Balkan destinations Serbia (+13%), Slovenia (+12%) and Albania (+8%) also enjoyed robust growth, as did island destinations Cyprus (+20%) and Malta (+10%). Greece reported a 5% increase in arrivals and Italy 3%. The world's top tourism destination, France (-2%), faced the aftermath of security incidents, as did Belgium (-10%).

According to the UNWTO World Tourism Barometer (2017, pg 17), expenditure by international visitors counts as exports for the destination country and as imports for the country of residence of the visitor. For many countries tourism is an important source of foreign currency earnings (see Fig. 4-7).

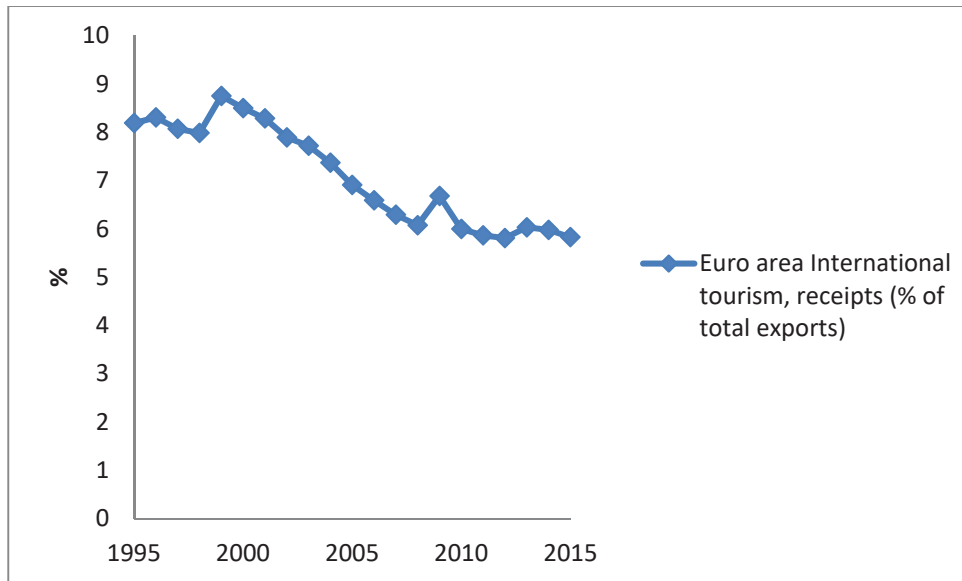


Figure 4. The international tourism receipts (% of total exports): Euro area  
[https://data.worldbank.org/indicator/ST.INT.RCPT.XP.ZS?view=chart&year\\_low\\_desc=false](https://data.worldbank.org/indicator/ST.INT.RCPT.XP.ZS?view=chart&year_low_desc=false)

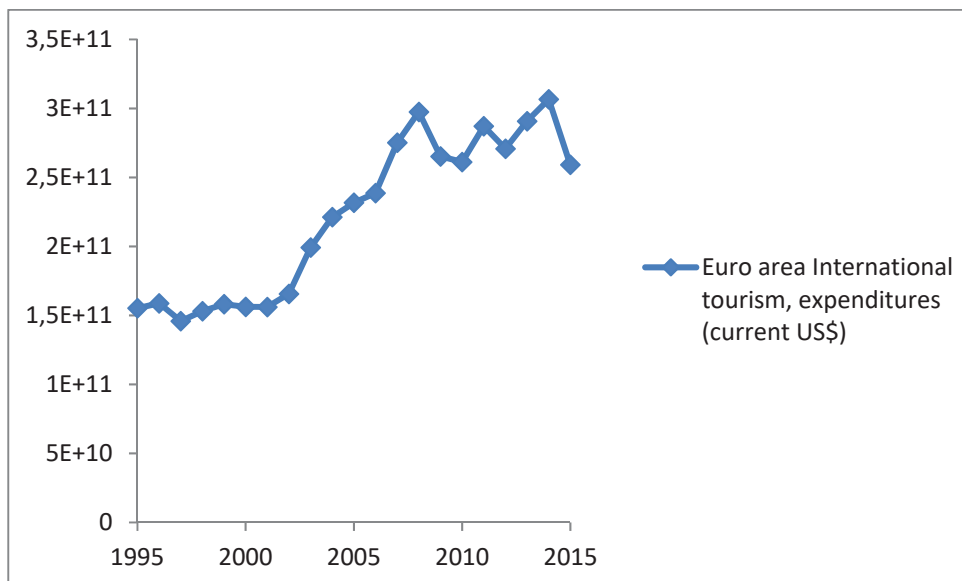


Figure .5. Expenditures, international tourism : Euro area  
[https://data.worldbank.org/indicator/ST.INT.XPND.CD?end=2015&start=1995&view=chart&year\\_low\\_desc=false](https://data.worldbank.org/indicator/ST.INT.XPND.CD?end=2015&start=1995&view=chart&year_low_desc=false)



Figure .6. Receipts for travel items (current US\$), international tourism : Euro area  
[https://data.worldbank.org/indicator/ST.INT.TVLR.CD?end=2015&start=1995&view=chart&year\\_low\\_desc=false](https://data.worldbank.org/indicator/ST.INT.TVLR.CD?end=2015&start=1995&view=chart&year_low_desc=false)

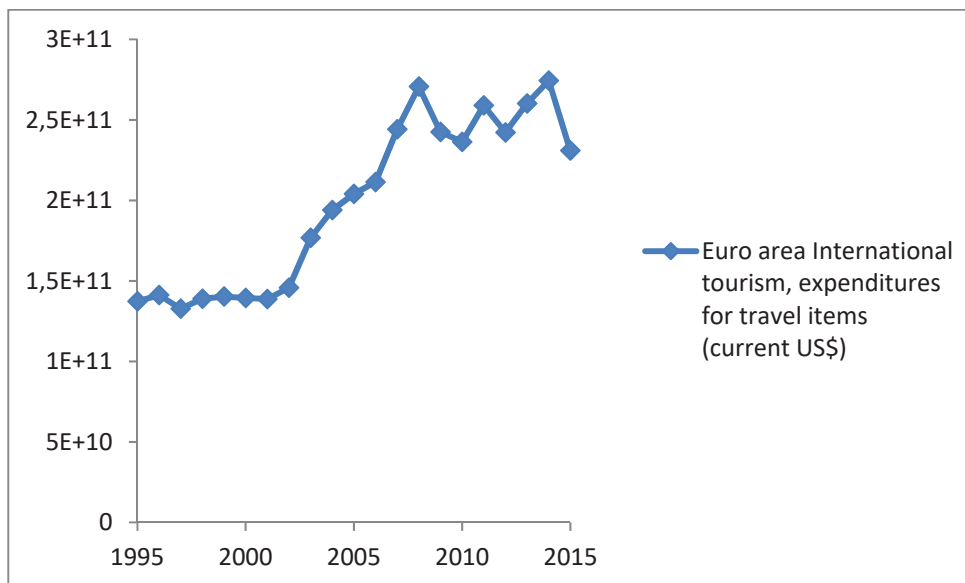


Figure 7. Expenditures for travel items, international tourism: Euro area  
[https://data.worldbank.org/indicator/ST.INT.TVLX.CD?end=2015&start=1995&view=chart&year\\_low\\_desc=false](https://data.worldbank.org/indicator/ST.INT.TVLX.CD?end=2015&start=1995&view=chart&year_low_desc=false)

According to the UNWTO Tourism Highlights (2016 , pg.4 ), the number of international tourist arrivals (overnight visitors) in 2015 reached a total of 1186 million, an increase of 52 million over the previous year. Three major factors influenced tourism flows in 2015: (a) the unusually strong exchange rate fluctuations, (b) the decline in the price of oil and other commodities which increased disposable income in importing countries but weakened tourism demand in exporting countries, as well as (c) increased global concern about safety and security. By UNWTO region, the Americas and Asia and the Pacific both recorded close to 6% growth in international tourist arrivals, with Europe recording 5%. (see Fig. 8-9). According to the UNWTO Tourism Highlights ( 2016 , pg.14), the number of international tourist arrivals worldwide is expected to increase by an average of 3.3% a year over the period 2010 to 2030.

In absolute numbers, international tourist arrivals will increase by some 43 million a year, compared with an average increase of 28 million a year during the period 1995 to 2010.

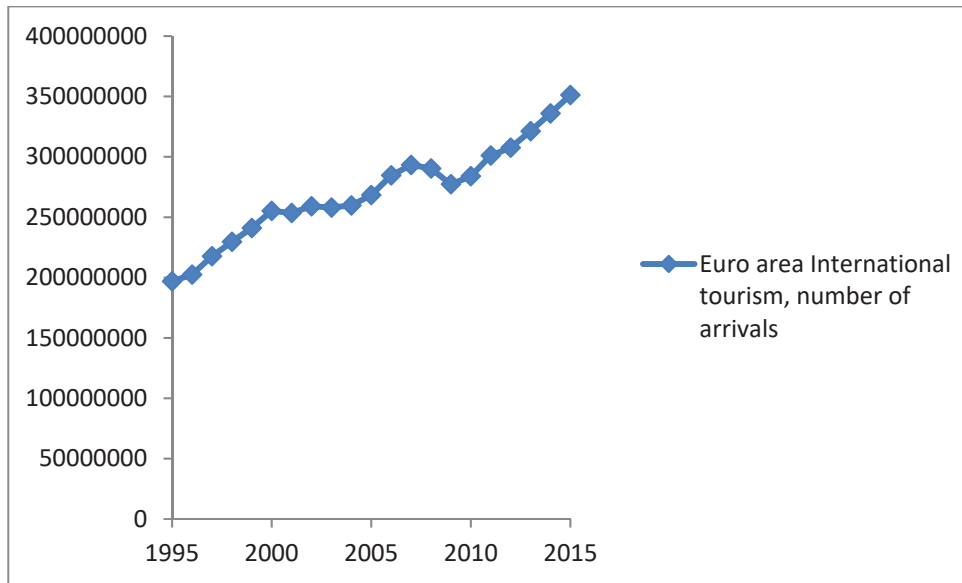


Figure .8. Number of arrivals, international tourism :Euro area

[https://data.worldbank.org/indicator/ST.INT.ARVL?end=2015&start=1995&view=chart&year\\_low\\_desc=false](https://data.worldbank.org/indicator/ST.INT.ARVL?end=2015&start=1995&view=chart&year_low_desc=false)

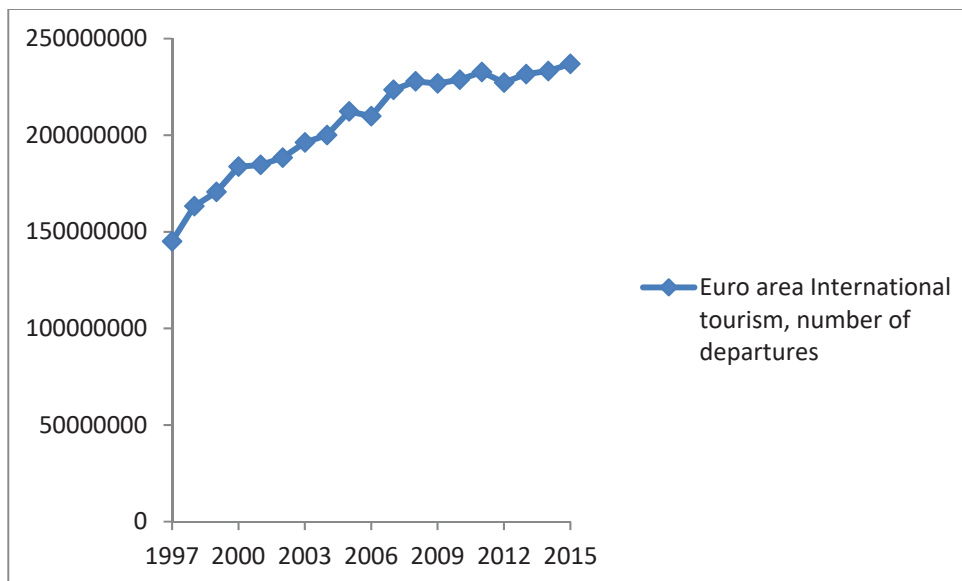


Figure 9. Number of departures, international tourism: Euro area

[https://data.worldbank.org/indicator/ST.INT.DPRT?end=2015&start=1995&view=chart&year\\_low\\_desc=false](https://data.worldbank.org/indicator/ST.INT.DPRT?end=2015&start=1995&view=chart&year_low_desc=false)

Chaos theory states that small changes can result in large differences. Chaotic system is unpredictable. Namely, a slight difference, in the decimal place, resulted in prediction failure. Chaotic systems exhibit a sensitive dependence on initial conditions: seemingly insignificant changes in the initial conditions produce large differences in outcomes. This is very different from stable dynamic systems in which a small change in one variable produces a small and easily quantifiable systematic change. Chaos theory started with Lorenz's (1963) discovery of complex dynamics arising from three nonlinear differential equations leading to turbulence in

the weather system. Li and Yorke (1975) discovered that the simple logistic curve can exhibit very complex behaviour. Further, May (1976) described chaos in population biology. Chaos theory has been applied in economics by Benhabib and Day (1981,1982), Day (1982, 1983,1992 , 1997.), Grandmont (1985), Goodwin (1990), Medio (1993,1996), Lorenz (1993), Jablanovic (2011 ,2013, 2016), among many others.

The basic aims of this paper are: firstly, to create a relatively simple chaotic growth model of the international tourism receipts that is capable of generating stable equilibria, cycles, or chaos, and secondly, to analyze the international tourism receipts growth stability in the period 1995-2015 in the euro area. This paper confirms the existence of the stable growth of the international tourism receipts in the euro area in the observed period.

## THE MODEL

The chaotic international tourism receipts growth model is presented by the following equations:

$$Y_t = C_t + I_t + G_t + Ex_t - Im_t \quad (1)$$

$$C_t = \alpha Y_{t-1}^2 \quad 0 < \alpha < 1 \quad (2)$$

$$I_t = \beta Y_{t-1} \quad 0 < \beta < 1 \quad (3)$$

$$G_t = g Y_t \quad 0 < g < 1 \quad (4)$$

$$Ex_t = \gamma Y_{t-1} \quad 0 < \gamma < 1 \quad (5)$$

$$Im_t = \delta Y_{t-1} \quad 0 < \delta < 1 \quad (6)$$

$$R_t = \rho Ex_t \quad \rho > 0 \quad (7)$$

with  $Y$  – the gross domestic product (GDP),  $I$  – investment,  $C$  – consumption,  $Ex$  – exports,  $Im$  – imports,  $G$  – government spending,  $R$  – the international tourism receipts,  $\alpha$  – the marginal propensity to consume,  $\beta$  – the investment rate,  $g$  – the government expenditure rate,  $\gamma$  – the exports rate,  $\delta$  – the imports rate,  $\rho$  – the international tourism receipts coefficient.

(1) shows GDP ( $Y$ ) as the sum of consumption ( $C$ ), investment ( $I$ ), government spending ( $G$ ), exports ( $Ex$ ) and imports ( $Im$ ). (2) In this model, the consumption function displays the quadratic relationship between consumption ( $C_t$ ) and real output of the previous period ( $Y_{t-1}$ ). Real output is multiplied by the coefficient  $\alpha$ , „the marginal propensity to consume“ (MPC). The MPC coefficient can be between zero and one. (3) shows the investment function. (4) shows the relation between government spending ( $G$ ) and the gross domestic product ( $Y$ ). (5) shows the relation between exports ( $Ex$ ) and the gross domestic product ( $Y$ ). (6) shows the relation between imports ( $Im$ ) and the gross domestic product ( $Y$ ). Finally, (7) explains the relation between the international tourism receipts ( $R$ ) and the gross domestic product ( $Y$ ).

Now, putting (1), (2), (3), (4), (5), (6), and (7) together we immediately get:

$$R_{t+1} = \left( \frac{\delta - \gamma - \beta}{g - 1} \right) R_t - \left( \frac{\alpha}{\rho \gamma} \right) R_t^2 \quad (8)$$



Further, it is assumed that the current value of the international tourism receipts is restricted by its maximal value in its time series. This premise requires a modification of the growth law. Now, the international tourism receipts growth rate depends on the actual value of the international tourism receipts,  $R$ , relative to its maximal size in its time series  $R^m$ . We introduce  $r$  as  $r = R/R^m$ . Thus  $r$  range between 0 and 1. Again we index  $r$  by  $t$ , i.e., write  $r_t$  to refer to the size at time steps  $t = 0, 1, 2, 3, \dots$ . Now the international tourism receipts growth rate is measured as

$$r_{t+1} = \left( \frac{\delta - \gamma - \beta}{g - 1} \right) r_t - \left( \frac{\alpha}{\rho \gamma} \right) r_t^2 \quad (9)$$

This model given by equation (9) is called the logistic model. For most choices of  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\rho$  and  $g$  there is no explicit solution for (9). Namely, knowing  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\rho$  and  $g$  and measuring  $r_0$  would not suffice to predict  $r_t$  for any point in time, as was previously possible. This is at the heart of the presence of chaos in deterministic feedback processes. Lorenz (1963) discovered this effect - the lack of predictability in deterministic systems. Sensitive dependence on initial conditions is one of the central ingredients of what is called deterministic chaos.

This kind of difference equation (9) can lead to very interesting dynamic behavior, such as cycles that repeat themselves every two or more periods, and even chaos, in which there is no apparent regularity in the behavior of  $r_t$ . This difference equation (9) will possess a chaotic region. Two properties of the chaotic solution are important: firstly, given a starting point  $r_0$  the solution is highly sensitive to variations of the parameters  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\rho$  and  $g$ ; secondly, given the parameters  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\rho$  and  $g$ , the solution is highly sensitive to variations of the initial point  $r_0$ . In both cases the two solutions are for the first few periods rather close to each other, but later on they behave in a chaotic manner.

### THE LOGISTIC EQUATION

It is possible to show that iteration process for the logistic equation (see Fig. 10.)

$$z_{t+1} = \eta z_t (1 - z_t), \quad \eta \in [0, 4], \quad z_t \in [0, 1] \quad (10)$$

is equivalent to the iteration of growth model (9) when we use the identification

$$z_t = \left[ \frac{\alpha (g - 1)}{\rho \gamma (\delta - \gamma - \beta)} \right] r_t \quad \text{and} \quad \eta = \left( \frac{\delta - \gamma - \beta}{g - 1} \right) \quad (11)$$

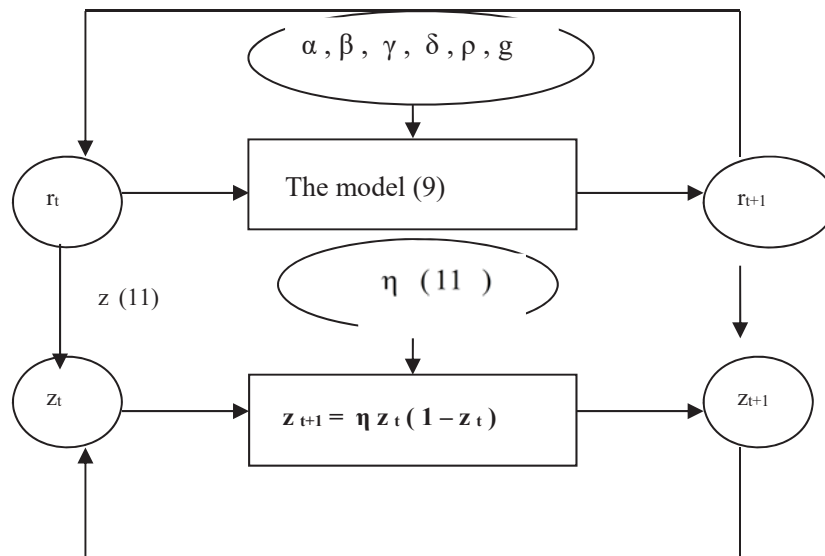


Figure 10. Two quadratic iterators running in phase are tightly coupled by the transformations indicated

Using (11) and (9) we obtain:

$$z_{t+1} = \left[ \frac{\alpha (g-1)}{\rho \gamma (\delta - \gamma - \beta)} \right] r_{t+1} = \left[ \frac{\alpha (g-1)}{\rho \gamma (\delta - \gamma - \beta)} \right] \left[ \left( \frac{\delta - \gamma - \beta}{g-1} \right) r_t - \left( \frac{\alpha}{\rho \gamma} \right) r_t^2 \right] =$$

$$= \left( \frac{\alpha}{\rho \gamma} \right) r_t - \left[ \frac{\alpha^2 (g-1)}{\rho^2 \gamma^2 (\delta - \gamma - \beta)} \right] r_t^2.$$

On the other hand, using (10) and (11) we obtain:

$$z_{t+1} = \eta z_t (1 - z_t) =$$

$$= \left( \frac{\delta - \gamma - \beta}{g-1} \right) \left[ \frac{\alpha (g-1)}{\rho \gamma (\delta - \gamma - \beta)} \right] r_t \left\{ 1 - \left[ \frac{\alpha (g-1)}{\rho \gamma (\delta - \gamma - \beta)} \right] r_t \right\} =$$

$$= \left( \frac{\alpha}{\rho \gamma} \right) r_t - \left[ \frac{\alpha^2 (g-1)}{\rho^2 \gamma^2 (\delta - \gamma - \beta)} \right] r_t^2.$$

Thus we have that iterating (9) is really the same as iterating (10) using (11). It is important because the dynamic properties of the logistic equation (10) have been widely analyzed (Li and Yorke (1975), May (1976)).

It is obtained that :

- (i) For parameter values  $0 < \eta < 1$  all solutions will converge to  $z = 0$ ;
- (ii) For  $1 < \eta < 3,57$  there exist fixed points the number of which depends on  $\eta$ ;

- (iii) For  $1 < \eta < 2$  all solutions monotonically increase to  $z = (\eta - 1) / \eta$ ;
- (iv) For  $2 < \eta < 3$  fluctuations will converge to  $z = (\eta - 1) / \eta$ ;
- (v) For  $3 < \eta < 4$  all solutions will continuously fluctuate;
- (vi) For  $3,57 < \eta < 4$  the solution become "chaotic" which means that there exist totally aperiodic solution or periodic solutions with a very large, complicated period. This means that the path of  $z_t$  fluctuates in an apparently random fashion over time, not settling down into any regular pattern whatsoever.

Important parameter  $\eta$  values "0, 1, 1, 2, 3" are part of the Fibonacci sequence. The Fibonacci Sequence is the series of numbers: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ... There is an interesting pattern: The Fibonacci Sequence is found by adding the two numbers before it together. The 1 is found by adding the two numbers before it (0+1). The 2 is found by adding the two numbers before it (1+1). The 3 is found by adding the two numbers before it (1+2). Namely, each number is the sum of the two numbers before it. If we make squares with those widths, we get a nice spiral. Also, if we take any two successive, important values of parameter  $\pi$ , ("2, 3"), their ratio is very close to the Golden ratio which is approximately 1.618034... The adjacent numbers divided yield the Golden Ratio (e.g.  $55/34=1.618$ ). For example  $3/2$  is 1.5. The golden ratio that has approximate value of 1.618. The golden ratio and the golden rectangle are connected. This is because the ratio of the longer side of a golden rectangle to the shorter side is equal to the golden ratio ( $1^2 + 1^2 + 2^2 + 3^2 + 5^2 + 8^2 + \dots$ ) (Jablanovic, 2016., pg. 30)

## EMPIRICAL EVIDENCE

According to the UNWTO World Tourism Barometer (2017, pg 19), for many countries international tourism contributes substantially to the improvement of their Balance of Payments, offsetting a deficit on the trade balance due to imports of other categories of goods and services, or adding to an existing surplus. International tourism receipts are a services export in the Balance of Payments

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of the destination country, while expenditure on international tourism is a services import for the source country. As such, international tourism can generate a tourism trade surplus for individual countries, or a deficit in the travel item. Some countries have important surpluses in their tourism trade balance (the United States, Mediterranean destinations Spain, Italy, Turkey, Greece, Portugal and Croatia, and Asian destinations Thailand, Macao (China) and Hong Kong (China)).

According to the UNWTO World Tourism Barometer (2017, pg 6), international tourism receipts increased 2.6% in real terms in 2016, according to visitor expenditure data reported by destinations so far. Earnings at destinations are estimated to total US\$ 1,220 billion globally (euro 1,102billion). Growth in tourism receipts followed the growth trend in international tourist arrivals. International tourism receipts are the earnings generated in destination countries from expenditure by international visitors. For the receiving country, receipts from international visitors count as exports. Tourism receipts give opportunities for development. For some 100 countries and territories, receipts from international tourism exceeded US\$ 1 billion in 2016.

The main aim of this paper is to analyze the international tourism receipts growth stability in the period 1995-2015 in the euro area (see Fig. 11).

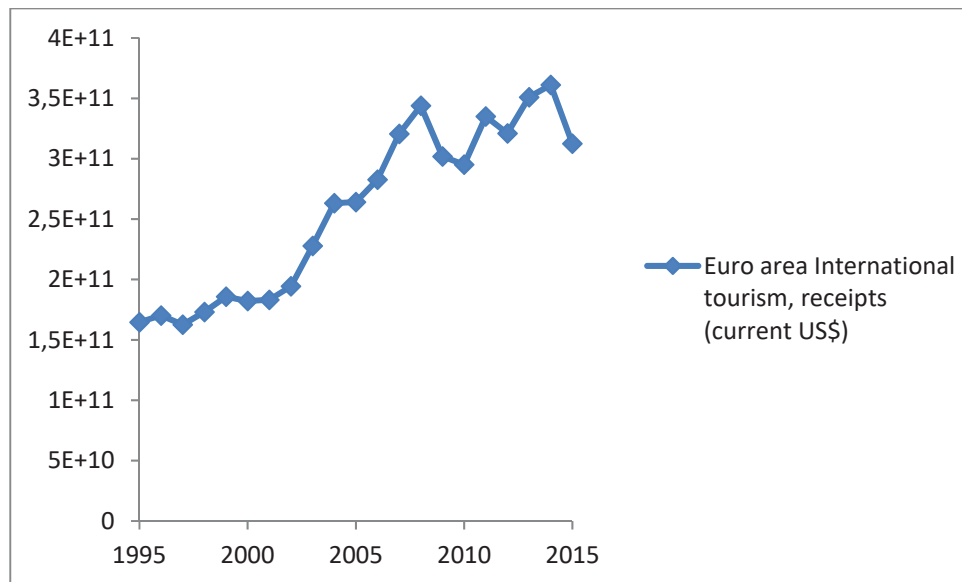


Figure 11. international tourism receipts ( current US\$) : Euro area

[https://data.worldbank.org/indicator/ST.INT.RCPT.CD?view=chart&year\\_low\\_desc=false](https://data.worldbank.org/indicator/ST.INT.RCPT.CD?view=chart&year_low_desc=false)

In this sense, it is important to use the logistic model (12):

$$r_{t+1} = \eta r_t - \vartheta r_t^2 \tag{12}$$

where  $r_t$  – the international tourism receipts ,  $\eta = \eta(1 \ 1)$ ,  $\vartheta = \left( \frac{\alpha}{\rho \ \gamma} \right)$ .

Now, the model (12) is estimated (see Table 1.)

Table 1. The estimated model (12): The euro area, 1995-2015.

([https://data.worldbank.org/indicator/ST.INT.RCPT.CD?view=chart&year\\_low\\_desc=false](https://data.worldbank.org/indicator/ST.INT.RCPT.CD?view=chart&year_low_desc=false))

The euro area	R=0.89423 Variance explained: 79.966%	
		$\eta$ $\upsilon$
	<b>Estimate</b>	1.21685                      .246941
	<b>Std.Err.</b>	.09691                      .117862
	<b>t(18)</b>	12.55651                      2.095173
<b>p-level</b>	.00000                      .050566	

## CONCLUSION

This paper creates the international tourism receipts growth model. For most choices of  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\rho$  and  $g$  there is no explicit solution for (12). Namely, knowing  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\rho$  and  $g$  and measuring  $r_0$  would not suffice to predict  $r_t$  for any point in time, as was previously possible.

A key hypothesis of this work is based on the idea that the coefficient  $\eta = \eta(1)$

plays a crucial role in explaining the local growth stability of the international tourism receipts, where  $\beta$  - the investment rate,  $g$  - the government expenditure rate,  $\gamma$  - the exports rate,  $\delta$  - the imports rate.

An estimated value of the coefficient  $\eta$  (1.21685) confirms stable growth of the international tourism receipts in the euro area in the observed period. In this sense, tourism has the potential to contribute towards employment and economic growth in the euro.

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