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Article

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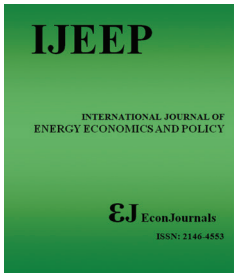
International Journal of Energy Economics and Policy

Provided in Cooperation with:
International Journal of Energy Economics and Policy (IJEEP)

Reference: Jambor, Attila/Leitão, Nuno Carlos (2017). Economic growth and sustainable development : evidence from Central and Eastern Europe. In: International Journal of Energy Economics and Policy 7 (5), S. 171 - 177.



International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2017, 7(5), 171-177.

Economic Growth and Sustainable Development: Evidence from Central and Eastern Europe

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ABSTRACT

There has been a large amount of literature dedicated to the determinants of economic growth recently. However, the majority of the literature so far has been concentrating on single factors and countries as examples. This research considers the effects of carbon dioxide emissions, tourism arrivals, foreign direct investments (FDIs), trade and domestic support on economic growth in Central and Eastern Europe. The paper uses panel data econometrics between 1995 and 2014 to perform its calculations. Results suggest a positive relationship between tourism arrivals, FDI, trade, domestic support and economic growth, while CO_2 emissions were found to be negatively related to economic growth in the region. Policy and decision makers in the region might find our results useful when thinking about drivers of economic growth.

Keywords: Tourism Demand, Foreign Direct Investment, Carbon Dioxide Emissions, Economic Growth, Panel Data
JEL Classifications: O13, F64, Z32

1. INTRODUCTION

There has been a large amount of literature dedicated to the determinants of economic growth recently. Especially after the economic crisis of 2008, economists have been intensively searching for factors contributing to economic growth worldwide. Given the special problems of developing countries in this regard, this issue has largely been attracting scientists from many different fields.

The endogenous theory of growth (Romer, 1986; Lucas, 1988; Grossman and Helpman, 1991; Rebelo, 1991; Aghion and Howitt, 1992) introduces the assumptions of monopolistic competition to explain economic growth. In this context, it should be noted that in the 1980s and 1990s, some studies have emerged that introduce other concepts to growth theory. Rodrik (1998), Alesina et al. (1994), Dollar (1992), Frankel and Romer (1996) explain new explanatory factors of growth.

However, the literature seems to have only concentrated on single factors and countries as examples. This paper aims to establish the link between carbon dioxide emissions, tourism arrivals, foreign direct investment (FDI), trade openness, domestic credits and economic growth for Central Eastern European countries. Consequently, the paper aims to contribute to the existing empirical literature in two ways. First, the impacts of a set of different variables is investigated to economic growth instead of single indicators. Second, a region is analysed instead of single countries.

The paper is structured as follows. A literature review section is presented after the introduction, followed by hypotheses and econometric specifications. The fourth section demonstrates changes in the indices analyzed in the CEE region, followed by the presentation of empirical results. The last section concludes.

2. LITERATURE REVIEW

A vast amount of literature is dedicated to the analysis of the determinants of economic growth. One strand of the literature analyses the impacts of carbon dioxide emissions on economic

growth. The investigation of Anderson and Karpestam (2013), for instance, show that economic growth is not responsible for environmental pollution. In this context, the Turkish experience was investigated by Bozkurt and Akan (2014), demonstrating that CO_2 had a negative relationship with economic growth. Tiwari (2011) also found a negative relationship between CO_2 and economic growth by using the impulse response function and the variance decomposition indicator. Oil consumption, carbon dioxide emissions and growth was investigated by Lim et al. (2014). Considering the Philippines experience, the study demonstrates a negative correlation between CO_2 and economic growth in long rung for 1965-2012. Results presented by Ghosh et al. (2014) also showed a negative correlation between CO_2 and economic growth to Bangladesh. The empirical study of Saidi and Hammami (2014) considered the relationship between energy consumption, carbon dioxide emissions and economic growth. The authors used a panel data for the period 1990-2012. By applying a GMM model, their econometric results demonstrated that carbon dioxide emissions were negatively correlated to economic growth. The research of Kais and Mbarek (2017) also showed a negative effect of CO_2 on economic growth in Algeria and Tunisia.

Another strand of the literature analyses tourism demand on economic growth, mainly showing a positive relationship between the two variables. The empirical studies of Sequeira and Nunes (2008) and Leitão (2011) utilized fixed effects and GMM-system models to evaluate the relationship between tourism demand and economic growth to Portugal. These studies show that tourism arrivals promote economic growth, also underpinned by Proença and Soukiazis (2008). The empirical study of Ozturk and Acaravci (2009) also considered the relationship between tourism and economic growth for Turkey and found that there was no correlation. The link between tourism arrivals and economic growth in Spain and Italy were also analyzed by Cortes-Jimenez (2008), suggesting that tourism arrivals highly contributed to economic growth.

The relationship between economic growth and tourism demand in Croatia was examined by Svilokos et al. (2014). Considering a time series analysis for 1972-2013, the authors demonstrate that economic crises affect the behavior of international tourists, and the decrease of tourism demand affect economic growth. The empirical study of Nonthapot (2016) also considers the relationship between tourism and economic growth for Cambodia, Laos, Myanmar, Thailand and Vietnam by applying panel co-integration. The study shows that the variables of tourism arrivals and per capita income are co-integrated. Panahi et al. (2015) also investigates the impact of tourism on economic growth in Turkey in 1970-2011, showing that gross fixed capital formation, human capital and tourism arrivals have a positive and significant effect on economic growth.

Another significant part of the economic growth literature is dedicated to the relationship between FDI and economic growth. The research of Kai and Hamori (2009), Damijan and Rojec (2007), Campos and Kinoshita (2002), Badinger and Tondl (2002), Mileva (2008) and Onaran (2007) show that FDI positively influences economic growth.

Leitão and Rasekhi (2013) considered the impact of FDI on economic growth for Portugal in 1995-2008. Their fixed effects estimator model demonstrates that FDI and trade openness have a positive, while inflation and the taxes have a negative effect on economic growth. Belloumi (2014) analysed the relationship between trade, FDI and economic growth in Tunisia by using a cointegration model from 1970 to 2008 and found no significant causality among the variables. Popescu (2014) analysed FDI and economic growth in Central and Eastern European countries and found strongly positive relationship between the two notions. Mehic et al. (2013) also investigated the impact of FDI on economic growth in Southeast Europe and concluded that investments significantly fostered economic growth in the region between 1998 and 2007.

The relationship between trade openness and economic growth literature is also investigated by a large amount of economic literature. The association between trade and economic growth is one of the most important issues of economic development that has been widely debated between developed and developing countries. The empirical works of Grossman and Helpman (1991), Rebelo (1991), Dollar (1992), Frankel and Romer (1996), Sequeira and Nunes (2008) found a positive relationship with statistical significance between international trade (degree of openness) and growth. In this context, economic growth in Australia was investigated by Thorpe and Leitão (2014) in 1986-2007. Their econometric results suggest that government spending, change of trade, economic and political globalization have a positive effect on Australian economic growth. Chaido et al. (2004) analysed the correlation between exports, investments and economic growth in Estonia, Latvia and Lithuania for the period 1992-2000. The authors applied the unit root test, co-integration methodology and VEC model. The vector of economic growth was proved to be statistically significant to Estonia and Latvia, while the lagged variable of exports presented a positive effect on a long run. Dritsakis and Stamatiou (2016) also analysed the impact of trade on economic growth in Central and Eastern Europe and by applying panel cointegration and causality analysis for the period of 1995-2013, they found positive relationship between the two variables both in the short and in the long run.

Last but not least, the impact of domestic credit on economic growth also has a considerable amount of literature. In fact, bank credit may encourage growth in an economy as argued by Hassan et al. (2011). Bank credit and economic growth was investigated by Leitão (2012) for the European Union in 1990-2010, showing that private credit and inflation discourage, while public savings promote economic growth. The effect of the banking sector on economic growth for Central and South Eastern European countries was investigated by Petkovski and Kjosevski (2014) for the period 1991-2011, showing that private credit and interest margin had a negative impact on economic growth. However, empirical studies of La Porta et al. (1998), Levine et al. (2000), Hassan et al. (2011) and Leitão (2010) supported the idea that domestic credit had a positive relationship with economic growth. Law and Singh (2014) was also in search for new evidence on the relationship between finance and economic growth by using a sample of 87 developed and developing countries and concluded that a threshold effect existed in this context.

3. HYPOTHESES AND ECONOMETRIC SPECIFICATIONS

Based on the literature above, the following hypotheses are tested for our sample.

Hypothesis 1: Sustainable development fosters economic growth. This hypothesis is directly coming from the vast amount of research, partly presented above, on the effects of CO_2 emissions on economic growth. A negative relationship is expected here (Anderson and Karpestam, 2013; Bozkurt and Akan, 2014, Tiwari, 2011, Lim et al., 2014). CO_2 emissions is measured in kilotonnes and data is coming from the World Bank Development Indicators (WDI) database.

Hypothesis 2: Tourism encourages economic growth. Based on the findings of Leitão and Shahbaz (2016), Tang and Tan (2015), Nonthapot (2016), Panahi et al. (2015) and Svilokos et al. (2014), tourism is expected to be positively related to economic growth. Tourism is proxied by the number of inbound tourists (number of arrivals), also downloaded from the WDI database.

Hypothesis 3: FDI has a positive effect on economic growth. Based on the studies of Belloumi (2014), Popescu (2014), Mehic et al. (2013), Yazdi et al. (2017), Anwar and Nguyen (2010), Sakyi et al. (2015) and Leitão and Rasekhi (2013), FDI is expected to be positively related to economic growth. FDI is measured as net inflows in billions of current USD, accessible from the WDI database.

Hypothesis 4: Trade encourages the economic growth. On the basis of a vast amount of seminal works on the topic as well as studies presented above like Thorpe and Leitão (2014), Chaido et al. (2004), Dollar (1992), Frankel and Romer (1996) and Sequeira and Nunes (2008), a positive relationship is expected here. Trade is measured as the sum of exports and imports of goods and services as a share of gross domestic product. Data is coming from the WDI database.

Hypothesis 5: Domestic credit drives the economic growth. La Porta et al. (1998), Levine et al. (2000), Hassan et al. (2011), Leitão (2010), Ryan et al. (2011), Cavenaile and Sougne (2012), Petkovski and Kjosevski (2014) and Law and Singh (2014) consider that there is a positive relationship between domestic credit and economic growth. Domestic credit provided by the financial sector is measured as the share of gross domestic product (GDP), coming from WDI database.

Based on the literature, the following equation is estimated to our sample:

$$LnGrowth=\beta_0+\beta_1 LnCO_2+\beta_2 LnTOURISM+\beta_3 LnFDI+\beta_4 LnTRADE+\beta_5 LnCREDIT+u_{it}$$

All variables are expressed in logarithm forms. The constant term is β_0. The coefficients for each variable take β_x. The error term is expressed by u_{it}. The sample covers the period 1995-2014 for ten CEE countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia). The dependent variable is growth (real GDP per capita). The data for the dependent variable is collected from World Bank WDI database. The explanatory variables introduced in the equation are carbon dioxide emissions (CO_2), TOURISM (tourism demand), FDI, trade openness (TRADE) and domestic credit (CREDIT) (Table 1).

4. DESCRIPTIVE STATISTCS

This section provides an overview on the general distribution of the variables used in the paper. First of all, Central and Eastern European countries show a high diversity in their annual GDP per capita growth rates from 1995 to 2014 (Table 2). The highest GDP per capita growth can be observed for the Baltic countries (Lithuania, Latvia and Estonia, respectively), while the lowest can be seen for Slovenia, Hungary and the Czech Republic. Without going very much into details, these trends can be partly explained by wise (fire brigade) policy making and initially different income levels. This was exactly verified by Jambor and Babu (2016) in their recent study analysing the impacts of EU accession on CEE agriculture.

As to CO_2 emissions in the region, Poland seems to have been the highest polluter in quantities in the period analysed, while Latvia has turned out to be the lowest (Figure 1). The extremely large values of CO_2 emissions of Poland (more than 5-6 times exceeding others) is probably due to the size as well as the economic structure of the country.

International tourism arrivals were the biggest in Poland and Hungary in 1995-2014, exceeding more the 15 million and 10 million tourists, respectively (Table 3). Interestingly, however, there has been a significant 25% and 15% decrease, respectively, from 1995-1999 to 2010-2014 in the tourism arrivals in these countries, while the highest increase in the same index can be seen in Estonia, Latvia and Slovenia.

Table 1: Description of independent variables

Variables	Definition	Source	Expected signs
CO_2	Carbon dioxide emissions	World Bank	-
TOURISM	Number of inbounds tourists	World Bank	+
FDI	Net inflows of foreign direct investment in billions of current USD	World Bank	+
TRADE	Sum of exports and imports of goods and services	World Bank	+
CREDIT	Domestic credit provided by the financial sector is measured as the share of GDP	World Bank	+

GDP: Gross domestic product

Table 2: The annual growth of GDP per capita in Central and Eastern Europe, 1995-2014, percentage

Country	1995-1999	2000-2004	2005-2009	2010-2014
Bulgaria	0.81	6.52	5.56	1.45
Czech Republic	2.29	3.68	2.86	0.99
Estonia	6.16	7.61	1.89	3.99
Hungary	2.66	4.53	0.77	1.71
Latvia	6.14	8.33	4.03	3.75
Lithuania	5.72	7.76	4.17	5.20
Poland	5.68	3.57	4.77	3.06
Romania	0.97	6.40	5.19	1.96
Slovakia	4.30	4.04	5.19	2.59
Slovenia	4.39	3.48	2.00	0.03

Source: Own composition based on WDI (2017) data. WDI: World Bank Development Indicators, GDP: Gross domestic product

Table 3: International tourism in Central and Eastern Europe, 1995-2014, number of arrivals

Country	1995-1999	2000-2004	2005-2009	2010-2014
Bulgaria	2876000	3616400	5333000	6625000
Czech		8344000	9306800	9737600
Estonia	740000	1422800	1979000	2714400
Hungary		12212000	9149600	10575400
Latvia	571800	799600	1462200	1536000
Lithuania	1066400	1414600	1723600	1851400
Poland	18975000	14878000	14139000	14492000
Romania	5170800	5438200	7207000	7901400
Slovakia		5689500	6394600	5870333
Slovenia	879800	1296600	1741000	2146400

Source: Own composition based on WDI (2017) data. WDI: World Bank Development Indicators

As to FDIs, Hungary, Poland and Romania experienced the biggest outflows, suggesting that residents of these countries have been pretty active in investing to external economies, mainly in the period of the economic crisis. At the other end, Slovenia, Latvia and Lithuania were the least active in this regard (Figure 2).

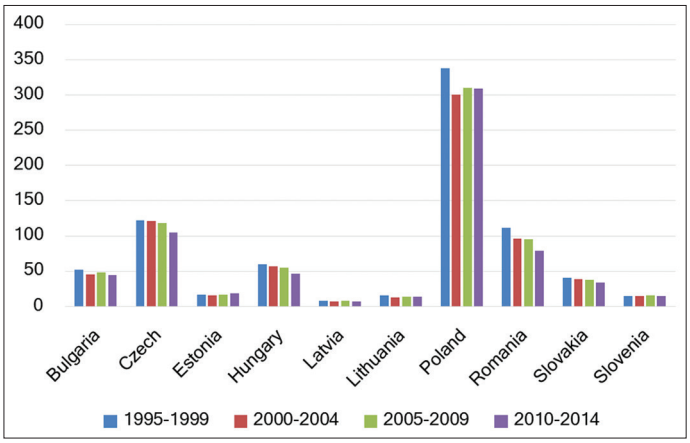
The total trade of Central and Eastern European countries also shows a diverse picture (Table 4). On the one hand, some countries like the Czech Republic, Hungary, Lithuania and Poland could significantly increase the share of trade in GDP, implying increasing international trade activities. On the other hand, other countries like Estonia, Romania or Bulgaria could hardly increase the share of trade in GDP.

Last but not least, domestic credit provided by the financial sector in the region has generally been increasing during the previous 20 years, though to a different extent (Figure 3). Latvia, Lithuania and Estonia could increase the share of domestic credit provided by the financial sector by five, four and three times, respectively, from 1995-1999 to 2010-2014. However, Hungary and Slovakia lacked behind in this regard, suggesting stable trends of domestic credit provision in the period analysed.

5. EMPIRICAL RESULTS

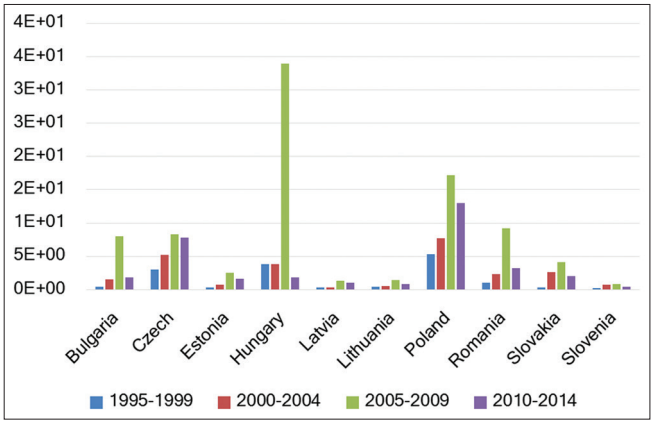
Before running the model, descriptive statistics and correlations are given for the variables (Tables 5 and 6). Results suggest relatively low standard deviations.

Figure 1: CO_2 emissions in Central and Eastern Europe, 1995-2014, thousand kt



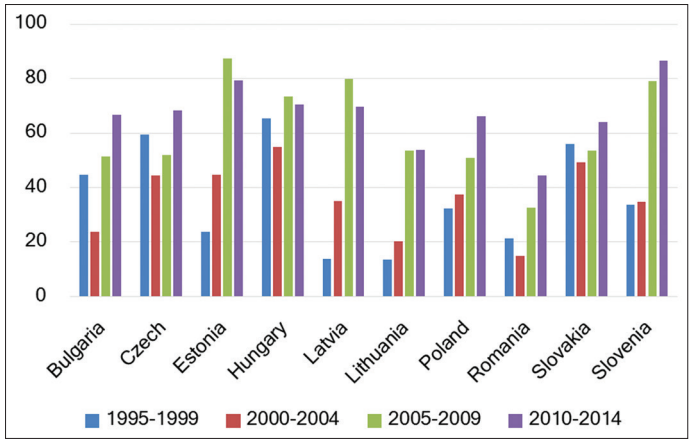
Source: Own composition based on WDI (2017) data

Figure 2: Foreign direct investment, net inflows in current billion US$ in Central and Eastern Europe, 1995-2014



Source: Own composition based on WDI (2017) data

Figure 3: Domestic credit provided by financial sector in Central and Eastern Europe, 1995-2014, % of gross domestic product



Source: Own composition based on WDI (2017) data

Table 6 displays the correlation between the variables used in the model. Carbon dioxide emissions ($LnCO_2$) is negatively correlated to economic growth, while trade openness (LnTrade) is also negatively related to FDI (LnFDI). The credit bank (LnCredit) has a positive relationship with carbon dioxide emissions.

The fixed effects estimator is presented in Table 7. The performance of the model is very satisfactory (adjusted $R^2 = 0.83$). The coefficients obtained are generally supported by the literature. The variable of CO_2 has a negative impact on economic growth, such as the empirical studies of Ghoshi et al. (2014), Saidi and Hamman (2015), and Kais and Mbarek (2017). This result suggests sustainable development.

The variable of tourism demand (LnTOURISM) presents a positive effect on economic growth. The empirical studies of Sequeira and Nunes (2008), Leitão (2011), Tang and Tan (2015), Nonthapot (2016), Leitão and Shahbaz (2016) also found a positive correlation between tourism arrivals and economic growth. According to this result, we can conclude that tourism demand promotes economic growth in Central and Eastern Europe. The variable of FDI (LnFDI) is positively related to economic growth in line with the empirical studies of Yazdi et al. (2017), Anwar and Nguyen (2010), Sakyi et al. (2015) and Leitão and Rasekhi (2013).

According to the empirical works of Helpman and Krugman (1985), Krugman, (1997), Romer (1986), Leitão (2012), and Thorpe and Leitão (2014), trade openness (LnTRADE) induces economic growth. La Porta et al. (1998), Levine et al. (2000), Hassan et al. (2011), Leitão (2010) found a positive correlation between domestic credit and growth. In line with their results, we also found the coefficient of credit bank (LnCREDIT) to be positively related to economic growth.

Table 4: Trade of goods and services measured as a share of gross domestic product in Central and Eastern Europe, 1995-2014

Country	1995-1999	2000-2004	2005-2009	2010-2014
Bulgaria	93	81	110	95
Czech Republic	85	100	124	113
Estonia	147	126	133	130
Hungary	96	125	148	133
Latvia	85	86	95	97
Lithuania	89	95	116	124
Poland	50	64	77	71
Romania	58	75	71	63
Slovakia	110	125	156	138
Slovenia	95	105	126	111

Source: Own composition based on WDI (2017) data. WDI: World Bank Development Indicators

Table 5: Descriptive statistics of the variables

Variable	Observations	Mean±SD	Min	Max
LnGrowth	200	8.93±0.75	7.10	10.22
$LnCO_2$	190	10.59±1.09	8.76	12.78
LnTourism	173	15.05±1.00	13.14	16.79
LnFdi	194	21.24±1.46	16.71	25.04
LnTrade	200	4.65±0.31	3.78	5.21
LnCredit	198	3.76±0.67	−1.47	4.67

Source: Own composition based on WDI (2017) data. WDI: World Bank Development Indicators, SD: Standard deviation

6. CONCLUSIONS

This paper analysed the impact of carbon dioxide emissions, tourism, FDI, trade openness and domestic credit on economic growth in Central and Eastern Europe. Our results confirm that economic growth in the region can significantly be explained by these variables. The econometric regression confirms these countries developed capacities to specialize in certain regional clusters, and these are associated with the economies of scale (Fujita, 1988; Henderson, 1974). Descriptive statistics suggest a huge diversity and differently changing patterns of the determinants of economics growth in the region. As to our model runs, results suggest a positive relationship between tourism arrivals, FDI, trade, domestic support and economic growth, while CO_2 emissions were found to be negatively related to economic growth in the region in line with previous findings.

Policy and decision makers in the region might find our results useful when thinking about drivers of economic growth. Research

Table 6: Correlations among the model variables

Variable	LnGrowth	$LnCO_2$	LnTourism	LnFDI	LnTrade	LnCredit
LnGrowth	1.00					
$LnCO_2$	−0.08	1.00				
LnTourism	0.17	0.91	1.00			
LnFDI	0.34	0.65	0.79	1.00		
LnTrade	0.60	−0.46	−0.23	−0.01	1.00	
LnCredit	0.60	0.03	0.25	0.29	0.42	1.00

Source: Own composition based on WDI (2017) data

Table 7: Determinants of economic growth in Central and Eastern Europe with fixed effects estimator

Variables	Coefficient	Standard error	T	P>t	95% confidence interval	
$LnCO_2$	−0.8466***	0.2190	−3.8700	0.0000	−1.2795	−0.4136
LnTourism	0.6818***	0.0865	7.8800	0.0000	0.5108	0.8529
LnFDI	0.1650***	0.0248	6.6500	0.0000	0.1160	0.2140
LnTrade	1.1543***	0.1427	8.0900	0.0000	0.8722	1.4363
LnCredit	0.1623***	0.0380	4.2700	0.0000	0.0871	0.2374
Constant	−1.8671	2.6406	−0.7100	0.4810	−7.0868	3.3526
Adjusted R^2	0.83					
Observations	158					

***Statistically significant at 1%. Source: Own composition based on WDI (2017) data

might want to include more variables or focus on different regions in the future to obtain a better picture on the global level. In this context, future research might also assess economic growth by taking into account other ecological variables such as renewable energies, energy consumption and the assumptions of Kuznets environmental curve in order to evaluate the status of sustainable development in the CEE region.

7. ACKNOWLEDGEMENTS

This paper was supported by the National Research, Development and Innovation Office Grant No. 112394 titled 10 years of accession: Lessons from the agri-food sector of the new member states as well as the UNKP-17-4-III-BCE-7 New National Excellence Program of the Ministry of Human Capacities of Hungary.

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