Coffee Index as Quick and Simple Indicator of Purchasing Power Parity

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Abstract

Purchasing Power Parity is the corner stone of all international comparisons. Various approaches to Purchasing Power Parity, such as the Big Mac Index, KFC Index, iPad Index, Tall Latte Index or Ikea Index were popularized to the broader audience besides the OECD Purchasing Power Parity indices. The aim of this paper is to develop a new ready-to-use quick and simple index based on the prices of Nespresso coffee's capsules and show the main challenges of such indices as well as of the PPP concept. For the purpose of our research the data on the Nespresso capsules prices were collected. Taking into account also the popularity (demand side) of the capsules types, the Espresso line was chosen as the basis for which all further calculations are made. The Nespresso Index provides us with clear evidence that the Law of One Price cannot work in recent world because of three key features. Firstly, differences in taxes make the perfect parity impossible. Secondly, the price discrimination prevents the rational subjects from arbitrage. Finally, the changes in the exchange rate make such indices highly volatile. Despite these weaknesses, the Nespresso Index could be used as the useful supplement of the OECD PPP as it is low cost, easy and fast to compute and digestible for the lay public.

Keywords

Price index, purchasing power parity, Big Mac Index, Nespresso Index

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INTRODUCTION

Macroeconomic aggregates are subjects of two contradicting pressures. The first one is based on the competition between countries and regions. Its main aim is to compare and contrast the economic level, economic power, wages or productivity among different economies. Question "Which state will catch up and overtake the USA?" has been a permanent subject of economic discussion since the post-war period. The second pressure, rooted especially in the European Union, seeks to close the gap between member states as well as between individual regions to reach the convergence and achieve homogenous economic area.

For performing such comparisons as well as for responsible decision making on the cohesion and regional policy the comparable macroeconomic data are needed. If the European Commission

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distinguishes i. Less Developed regions, ii. Transition regions and iii. More Developed regions (McCann, 2015) it should be able to compare the Gross Domestic Product (GDP) in all 276 NUTS 2 regions precisely.

Similarly, there is an extensive discussion on the wage differences between EU member states (e.g. Pereira and Galego, 2016), especially between former Western and Eastern Europe. The easiest way – using the nominal exchange rate – is, however, widely seen as inappropriate. As Rojíček et al. (2016) mentions, the exchange rate can convert the indicators to the same currency, but not to the same pricing level. Less developed countries tend to have lower price level due to the lower prices in non-tradable goods (Balassa-Samuelson effect, compare Balassa, 1964; and Samuelson, 1964). According to Lombardo and Ravenna (2012) the non-tradable sector ranges from 21.4% of consumption in Slovakia and 29.75% of investments in Sweden to 78.53% of consumption in the U.S.A. and 69.6% of investments in the Japan. Such part of economy cannot be neglected easily. As Berend noticed "Lower wages have greater purchasing power because of lower general price levels in less-developed countries (Berend, 2009:122)."

The simultaneous problem of currency *and* price level conversion has been, at least since 1918, solved by using the purchasing power parity as introduced by the prominent Swedish economist Gustav Cassel. Cassel developed the original contribution of the 16th century Salamanca School (Rogoff, 1996) and included it into the concept that he summarized as follows: "At every moment the real parity between two countries is represented by this quotient between the purchasing power of money in the one country and the other. I propose to call this parity '*the purchasing power parity.*' As long as anything like free movement of merchandise and a somewhat comprehensive trade between the two countries take place; the actual rate of exchange cannot deviate very much from this purchasing power parity." (Casel, 1918:413).

Purchasing Power Parity (PPP) promptly influenced modern macroeconomics. The Purchasing Power Parity theory became part of the Czechoslovak statistics already in 1929 when it was used as one of the pricing indices principle (see Kohn, 1929). The Czechoslovak government referred to the Cassel's theory as soon as in the middle of the Great Depression (Lidové Noviny, 1936). It lost its importance during the Central Planning as its main condition – the free trade and unbounded flow of goods and service, were not met. Nowadays, the Purchasing Power Parity is the corner stone of all international comparisons. There are numerous conversion rate used by the different institutions, e.g. PPP calculated by the World Bank as local currency unit (LCU) per international US dollar or PPP calculated by OECD for GDP and related indicators.

Various approaches to Purchasing Power Parity were popularized to the broader public by The Economist suggesting trivial Big Mac Index (BMI). The Big Mac Index follows the Law of One Price, examining if the currencies are overvalued or undervalued to the US dollar.

The aim of this paper is to develop a new ready-to-use index based on the prices of *Nespresso* coffee's capsules and show some of the challenges of such indices as well as of the PPP concept. It could be used as a useful supplement of the OECD PPP as it is low cost, easy and fast to compute and digestible for the lay public. Nespresso capsules were chosen because of their absolute homogeneity and tradability. Furthermore, they are fully standardized, being identical in all countries. Coffee market is also in the current decade highly competitive and growing. Nespresso brand was preferred as its data are easily available on-line via national e-shops for 116 territories in all five continents. Nespresso is also the oldest seller of coffee capsules. Together with other large capsules-seller *Dolce Gusto* is brand of *Nestlé*. In comparison to cheaper *Dolce Gusto* Nespresso represents a premium brand with a flavor of luxury. Apart from coffee capsules the Nestle market has been competing also on the market of instant coffee (Nescafé, since 1938) or Coffee Machines. Nestlé therefore stays for 22.3% of the world coffee retail market ahead of the second Jacobs Dough Egberts (16%), and with a huge lead ahead Tchibo (2.3%) or Starbucks (1.4%, compare Statista, 2017).

The rest of the paper is organized as follows. Firstly the Law of One Price, Absolute Purchasing Power Parity as well as its relative version are briefly introduced. In the second chapter OECD PPP and five commercial indices are discussed. Then, data and methodology are described and, finally, the results are presented.

1 PURCHASING POWER PARITY THEORY

The corner stone of the Purchasing Power Parity Theory is the Law of One Price. In this chapter the Law of One Price is defined and its weaknesses are shown. Then the Purchasing Power Parity is introduced.

1.1 Law of One Price

Law of one price assumes, that identical goods must be sold in different countries for the same price (Krugman, Obstfeld and Melitz, 2011).

To apply the Law of One Price, following assumptions must be held:

- goods must be transportable;
- there must not be any barriers of trade such as tariffs and quotas, or they must be included in the price.

The Law of One Price is than formalized as follows:

$$p_i = e \times p_i^*, \tag{1}$$

where p_i is price of i-th goods in the country, e is the exchange rate in direct quotation and p_i^* is the price of i-th goods in the foreign country.

However, Law of One Price does not apply perfectly in the real economy. Miljkovic (1999:126) states that "Although called a law, it has probably been violated more than any other economic law (on the basis of the results of numerous empirical studies)."

As Choi, Laibson and Madrian showed, even prices of highly homogenous products such as index mutual funds are often subject to white noise. It is caused by non-transparent system of management fees (Choi, Laibson and Madrian, 2006). Other obstacle of Law of one price might be information frictions connected to the insufficient technical level (Steinwender, 2014) or differences in language and religion (Fielding, Hajzler and Macgee, 2015). Yet Debreu (1959:29) showed that locations (country borders) as well as dates matter. Furthermore, there is pricing-to-market (Miljkovic, 1999:134), which is based on different elasticities among various countries.

1.2 Purchasing Power Parity

Law of One Price is strong version of Purchasing Power Parity theory (Pakko and Pollard, 2003). According to the Absolute Purchasing Power Parity (APPP) theory the nominal exchange rate is determined by the ratio of the overall price levels between local economy and foreign country (MacDonald, 2007:42). It is based on the bundle of goods and services which makes APPP possible to hold even if Law of One Price had not held for some of the products.

Let's P be the vector of domestic price index, P^* vector of foreign price index and e the direct exchange rate. The APPP then holds, if:

$$e = \frac{P}{P^*}, \tag{2}$$

(compare Dornbusch, 1985:3).

Softer version of APPP, the Relative Purchasing Power Parity (RPPP) assumes that currency in countries with higher inflation tend to depreciate while currency in countries with lower inflation tend to appreciate (Mac Donald, 2007:43).

2 PURCHASING POWER PARITY INDICATORS

Purchasing Power Parity is calculated by the international organizations for the aim of serious statistical comparison as well as by the commercial subjects wishing to present problem of undervaluation and overvaluation in the comprehensible form. In this chapter six various attitudes to the Purchasing Power Parity are introduced.

2.1 OECD PPP

Widely used Purchasing Power Parities are calculated by the Organization for Economic Co-operation and Development (OECD) in line with the EUROSTAT-OECD Methodological manual on Purchasing Power Parities (OECD/Eurostat, 2012). OECD PPPs are constructed in three years cycles and are based on market basket of goods and services. Such basket contains

- 3 000 consumer goods and services – e.g. long-grain rice, Ladies' haircut and coloring;
- 30 occupations in government – e.g. Statistician, Police officer;
- 200 types of equipment goods – e.g. Mercedes Benz;
- about 15 construction projects – e.g. Masonry, ground floor double-skin external wall (OECD/Eurostat, 2012).

Collecting data, their processing and evaluation is naturally lengthy and costly. Moreover, it is not manageable to collect data on prices throughout the whole territory. For example, the Regional Office of the Czech Statistical Office in Brno collects data on the consumer prices just in two South Moravian towns, Brno and Znojmo. It is therefore attractive to have simple, even imperfect, indicator which is always at hand, cheap and easy to use. According to the OECD/Eurostat PPP Manual, purchasing prices for consumer products are being collected in the capital city. If there is data also from other cities and towns, the national prices are calculated as an average. Complex Purchasing Power Parity is therefore challenged by numerous simple commodity indices.

Besides the Big Mac Index there are further indices used for various regions and purposes. In this chapter we briefly introduce the KFC Index, iPad Index, Starbuck's Tall Latte Index and Ikea Index. At the end of the chapter there is a brief comparison of their strengths and weaknesses.

2.2 Big Mac Index

Since 1980' difficulty of PPP estimating had led to numerous attempts to simplify the whole process. The most remarkable indicator, the Big Mac Index, was introduced by magazine *The Economist* in 1986 (Reinert, 2011:235). The Big Mac Index is Exchange Rate Deviation Index (ERDI) in kind, which calculates overvaluation or undervaluation of currency C to the basic currency C^* (often the US dollar). Firstly the Big Mac PPP is calculated as:

$$PPP = \frac{P}{P*}, \tag{3}$$

and then the Big Mac Index is calculated as:

$$BMI = \frac{PPP}{E} \times 100\% \cdot \tag{4}$$

The Big Mac Index is therefore based on the Law of One Price as introduced in section 1.1. Advantage of the Big Mac Index is that it can be easily computed even for the regions within one country. E. g. Fischer and Lipovská (2015) constructed regional Big Mac Index estimating inter-area price levels in the Czech Republic. On the other hand, its price is heavily influenced by the location of McDonald Restaurants, which are usually situated on the busy tourist crossroads (airports, main streets, large department stores). Those locations are characterized by high rent which is translated into the price of final product

and service. Moreover, Big Mac is no more a homogenous commodity. For example, in Hindu India the beef is replaced by chicken, in Islamic countries it is halal, while in Israel it is prepared as kosher (Pakko and Pollard, 2003). Finally, just a small count of Big Macs is sold at the menu board price, that is at the price listed on the "menu-board" screens in every McDonald restaurant. Fischer and Lipovská (2015) remind, that most of the Big Macs create part of special bundles together with other goods (such as fizzy drinks or chips) or are subject to special discounts (for example discount for students, quantity discounts or discounts coupons).

2.3 KFC Index

The KFC Index is calculated by pan-African research and market intelligence company *Sagaci*. It is based on the prices of Chicken Buckets which are being sold in KFC (Faramawy, 2016). The KFC Index is inspired by the Big Mac Index, however, McDonald is present just in two African countries, while KFC operated in 18 states. The KFC Index shows how many KFC Original 15 pc. buckets can be purchased in individual African states at 100 USD. If there could have been bought 4 buckets in the USA ($P_{\$} = 25$ USD apiece) and 9 buckets in Lesotho (P = 11.33 USD apiece), the Lesotho Loti is undervalued by 55%:

$$\frac{P - P_{\$}}{P_{\$}} = \frac{11.33 - 25}{25} \times 100\% = 55\% \,. \tag{5}$$

KFC Chicken Buckets also differ across the countries. For example, in Israel they must respect the Jewish kosher rule forbidding combination of meat and dairy (Brady, 2014).

2.4 iPad Index

The iPad Index has been calculated annually since 2007 by Australian broker company *CommSec*. It was designed as a new way of looking at the Purchasing Power Parity theory (Craig, 2016). The main weakness of iPad Index includes shipping costs, taxes as well as fact that iPad is luxury goods in some countries (Thao and Tsanthaiwo, 2017). Moreover, the iPad Index cannot be easily comparable during longer time period, as the new models are launched regularly which makes iPad heterogeneous in time.

2.5 Starbuck's Tall Latte Index

Thanks to the popularity and digestibility of the Big Mac Index *The Economist* started to compute Starbuck's Tall Latte Index in 2004. Then the Starbucks operated in 32 countries, while in 2017 it can be found in 72 countries. At the beginning there were significant differences between the Big Mac Index and Starbuck's Tall Latte Index in the Asian countries. For example yen was undervalued to dollar by 12% according to BMI while it was overvalued by 13% according to STLI (The Economist, 2004). This difference is caused by different composition of both goods.

Similarly to Big Mac or KFC, Starbucks is not the goods, but rather the service. For example between October 2014 and July 2015 the coffee bean prices decreased by 44% while Starbucks prices increased (Sommer, 2015).

Somewhat surprisingly, Starbucks coffee is not homogeneous, but heterogeneous goods, as different amount of caffeine is used for its production in individual countries. For example in USA or Australia the Tall Latte contains 75mg caffeine while in United Kingdom 150mg (Caffeine Informer, 2017).

2.6 Ikea Index

Ikea is the biggest multinational retailer of furniture (Baxter and Landry, 2017). Ikea Index constructed by the Swedish statistician Gabriel Thulin (2004) is the only index presented in this paper, which consists of more than one goods and represents not the law of one price, but also the Absolute Purchasing Power

Parity. It was constructed in 2003 for the basket consisting of 26 Ikea goods in 22 countries (20 European and 2 North-American). Nowadays, Ikea sells its furniture in 38 territories largely in the OECD countries and rest of Europe.

2.7 Comparison of Indices

All indices mentioned in subchapters 2.2–2.6 have several common features: they are based on highly standardized goods being sold by global brand. Theoretically, there should not be any difference between KFC Chicken Buckets sold in Cape Town and Prague or between Starbuck's Tall Latte in Kazakh Almaty and Czech Ostrava. Nevertheless, neither the chicken nor coffee make arbitrage possible. Even if there was free shipping from Almaty to Ostrava, hardly anybody would order his cup of coffee from Kazakh just to save a few pennies. On the contrary, Ikea furniture as well as iPods should be transportable all over the world despite the difficulties with shipping, transport costs, tariffs and quotas of warranty.

Moreover, Starbuck's, McDonald's of KFC's goods would be demanded quiet often by tourists. For example in the Czech Republic the higher prices (and higher turnover) are in the McDonald restaurant placed in the Prague International Airport (see Fischer and Lipovská, 2015). Big Mac Prices therefore mirror the purchasing power not of the local citizens, but of the foreigners.

Table 1 Comparison of indices

	Big Mac	KFC	iPod	Starbucks	IKEA
Data availability	✓	✓	✓	✓	✓
Homogeneity	×	×	✓	×	✓
Transportability	×	×	✓	×	✓
Countries	120	125	worldwide	72	38
Product/Service	Service	Service	Product	Service	Product
Luxury	✓	✓	✓	✓	×

Note: Number of countries, in which the goods is sold, is valid for August 2017 and be subject to continuous changes.
Source: Own elaboration

3 DATA AND METHODOLOGY

In this chapter data and methodology for our Nespresso index calculation are introduced. The first part is devoted to the capsules prices. Further, other data sources are briefly introduced. Finally, the construction of Nespresso Index is explained.

3.1 Nespresso capsules prices

For the aim of our research data on the Nespresso capsules prices were collected. Nespresso produces six basic types of capsules (Nespresso, 2017): Espresso, Pure Origin, Lungo, Intenso, Decaffeinato capsules and Variation. Those capsules differ in intensity, serving size, origin as well as the key flavors and, primarily, in price. In all 30 countries for which we have data available, Espresso is the cheapest line of capsules, together with three brands of Intenso. On the other hand, the most expensive in most of the OECD countries are capsules of Variation line (with caramel, chocolate or vanilla flavor). Figure 1 shows the price categories among the capsules line in most of the OECD countries.

Figure 1 Price classes of Nespresso capsules types

Espresso				Intenso					Pure Origin				Decaffeinato				Lungo				Variations		
I	I	I	I	I	I	I	II	II	II	II	II	II	II	III	III	III	III	III	III	III	IV	IV	IV

Source: Own construction

This structure, however, differs in Canada, USA, Chile, Mexico, New Zealand, Greece, Turkey and Japan (where are only three price classes), Sweden (with five price classes) and Finland and Switzerland where capsules from the typical price class II are being sold in price class IV.

Relations between price classes in individual countries are not same. For example, in Canada class II and I as well as III and II differ identically by 16 US cents, while in Mexico class II differs from I by 12 US cents and class III from II by 23 US cents. Taking into the account also the popularity (demand side) of the capsules types, the Espresso line was chosen as the basic one for which all the further calculations are done.

Nespresso capsules are produced in three Nespresso factories in Switzerland. Romont factory was built up for the need of the North American market in 2015 (Duperret, 2015), older factories were founded in Avenches and Orbe. Those capsules are then exported to the local branches in individual countries. However, capsules are not delivered across the borders, which rules out the possibility of arbitrage. This enables Nespresso to apply the price discrimination among countries depending on local demand. In this point Nespresso Index suffers from the same pain as the Big Mac Index. While Big Mac cannot be transportable as it is rather service than goods, Nespresso is not transportable because of the artificial barriers of trade.

3.2 Exchange rates and VAT

Data on the Value Added Tax (VAT) for the coffee capsules were collected from the websites of the individual responsible ministries.

3.3 Index construction

The Nespresso Index is calculated in the same way as the Big Mac Index. Firstly, the price P of capsules in the i-th country is compared to the price P^* in the basic country (usually USA) converted to the local currency ($P^* \times E$). The direct quotation is used. Secondly, the rate of overvaluation or undervaluation is calculated relatively to the price $P^* \times E$:

$$NI = \frac{P_i - P^* \times E}{P_i^* \times E} \times 100\% \,. \tag{6}$$

Let's the price of Nespresso capsule in the Czech Republic be $P = 9.9\ CZK$, price in the USA $P^* = 0.70\ USD$ and the exchange rate $E = 22.86\ CZK/USD$. According to the Law of one price the real exchange rate between the Czech crown and the US dollar should be 9.9/0.7 CZK/USD = 14.14 CZK/USD. However, the nominal exchange rate is 22.86 CZK/USD, which means that the Czech crown is undervalued by:

$$\left(\frac{14.14}{22.86} - 1\right) \times 100\% = -38.13\%. \tag{7}$$

In other words, the Czech crown should, according to the Nespresso Index, appreciate by 61.67% towards the exchange rate for which was the US dollar sold in July 2017.

In the same way also the Nespresso index which takes into account the Value Added Tax was calculated:

$$NI_{VAT} = \frac{(P_i - VAT)_i - (P^* - VAT^*) \times E}{(P_i^* - VAT^*) \times E} \times 100\% \,. \tag{8}$$

The Value Added Tax is considered to verify the validity of the Law of one price. It is valid just for the basic prices, the purchaser prices should be therefore calculated in term of the basic prices as well. For the aim of our paper the results for the Big Mac Index published on the 13th July 2017 were chosen (The Economist, 2017). Full data set published by The Economist contains also the exchange rates to US dollar which we used for the calculation of the Nespresso Index.

4 RESULTS

In this section the results are presented. Firstly, we will compare and contrast the Nespresso Index with the Big Mac Index. Then, we will focus on the role of the Value Added Tax. In the third section the high variability of the Nespresso Index in time is shown. Finally, the cross-country comparison in Eurozone is discussed.

4.1 Nespresso Index vs. Big Mac Index

Nespresso Index for OECD countries is closely correlated to the Big Mac Index as well as to the Purchasing Power Parity calculated by OECD (see Table 2). Nevertheless, for most of the countries Nespresso Index shows greater undervaluation of the domestic currency toward US dollar than the Big Mac Index. There is significant exception of Chile, Turkey and New Zealand. Currencies in these countries are undervalued according to the Big Mac Index but overvalued according to the Nespresso Index.

Differences between the Big Mac Index and the Nespresso Index in Japan and Mexico are remarkable. Both indices consistently suggest that Japanese yen as well as Mexican peso are undervalued. This undervaluation is, however, somewhat deeper according to the Big Mac Index.

On the other hand, the Swiss franc is being undervalued according to the Nespresso Index and overvalued according to the Big Mac Index. It might be explained by the historic development of the Nespresso brand. Nespresso was founded in Switzerland. To date, it has its headquarter in Swiss Lausanne. Switzerland also traditionally belongs (together with France, Spain and Germany) to the most important Nespresso's markets (Daneshkhu, 2013).

Table 2 Correlation matrix

NI	BMI	PPP OECD	
1.00	0.98	0.96	**NI**
	1.00	**0.99**	**BMI**
		1.00	**PPP OECD**

Source: Own calculation

4.2 Nespresso Index regarding Value Added Tax

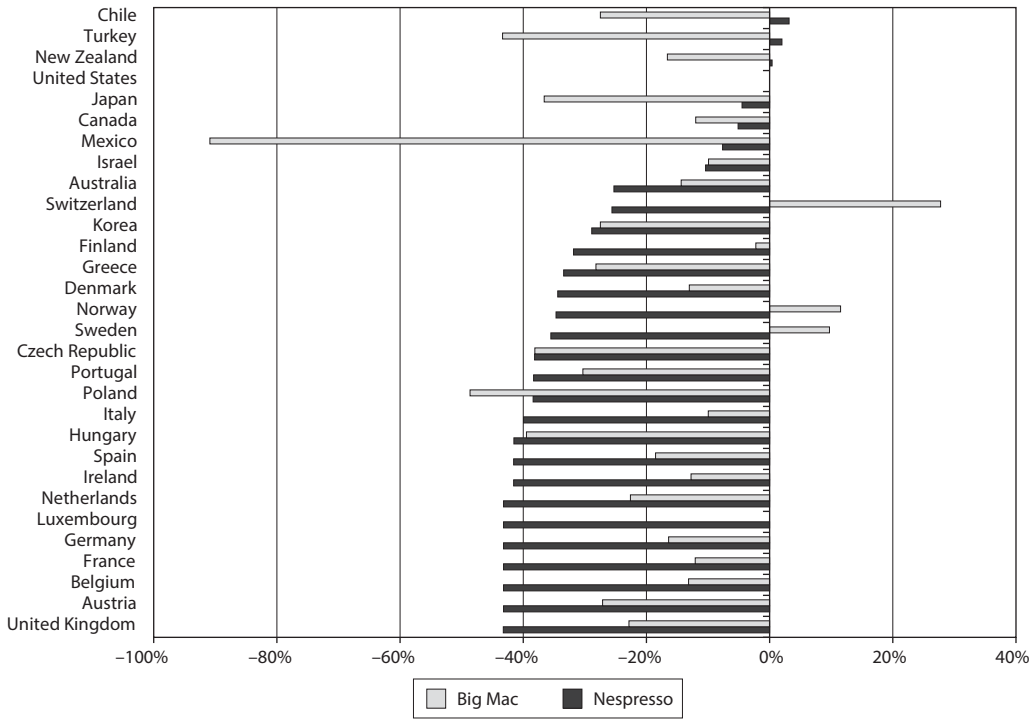
Value Added Tax (VAT) represents other obstacle of perfect Law of One Price. Even if the capsules were sold from factory in Switzerland to two countries at the very same price, higher VAT in one country would result in lowering the purchasing power and therefore to the greater undervaluation of the currency (compare Baxter and Landry, 2017).

Let's take Austria, Luxembourg and Germany as an example. All those countries use euro currency and the price, at which the capsules are sold on their market, is the same. However, the VAT on the Nespresso

capsules in Austria is 20% while in Luxembourg it is only 3% and in Germany 7%. Therefore, while the Law of One Price holds perfectly taking VAT into account, the situation largely differs if we disregard VAT: Austrian euro is according to the Nespresso Index without VAT undervalued towards German euro by 11% while Luxembourgian euro is overvalued towards German euro by 4%.

With the Value Added Tax taken into account, the Nespresso Index suggests even deeper undevaluation of individual currencies towards US dollar. This is therefore the Value Added Tax what narrows the gap in the purchasing power between certain countries (compare Figure 3).

Figure 2 The Big Mac Index and the Nespresso Index comparison (currency undervaluation/overvaluation in %)



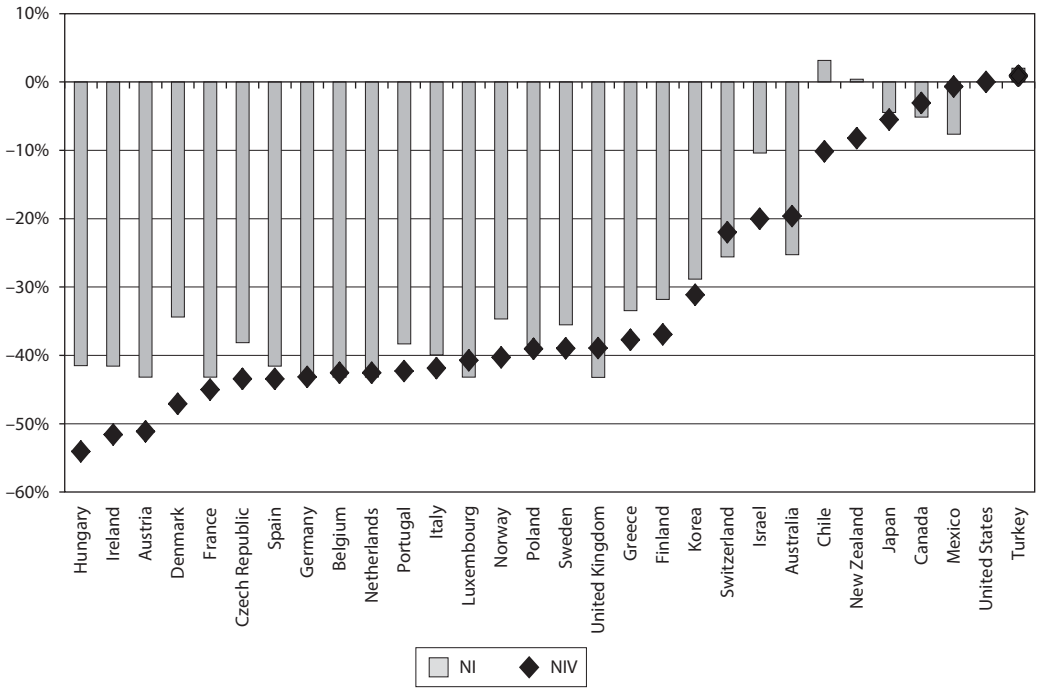
Source: Own construction

Table 3 The Nespresso Index in respect to the Value Added Tax

	P [€]	PPP	NI [%]	VAT [%]	P´ [€]	PPP´	NI´ [%]
Austria	0.35	1	0	20	0.29	0.89	–11
France	0.35	1	0	6	0.32	0.97	–3
Germany	0.35	1	0	10	0.33	1.00	0
Belgium	0.35	1	0	7	0.33	1.01	1
Netherlands	0.35	1	0	3	0.33	1.01	1
Luxembourg	0.35	1	0	6	0.34	1.04	4

Source: Own construction

Figure 3 The Nespresso Index and the Nespresso Index with VAT



Source: Own construction

4.3 Nespresso Index in the flow of time

Prices of goods as Big Mac or Nespresso tend not to be a subject of frequent changes. In the Czech Republic the price of Nespresso capsules (line Espresso) was fixed for the whole reporting period (from January 2017 to July 2017). However, the exchange rate towards euro changed significantly because of the exchange regime change. The Czech central bank intervened on the currency market till 6th April 2017 as it aimed at the exchange rate 27 CZK/EUR. After the end of interventions, the Czech crown started to fluctuate relatively to the euro. At a fixed price the Nespresso Index fluctuated in the opposite direction than the exchange rate. If the Czech crown appreciated, the Nespresso Index decreased as the crown shrunk its pace of undervaluation towards euro. Literally overnight the Czech crown changed according to the Nespresso Index from the undervaluated to the slightly overvaluated currency without the change of real prices between Czech Republic and Eurozone (represented by Germany) in terms of Nespresso capsules.

4.4 Cross-country comparison in Eurozone

Comparison of the cross-country Nespresso Index for Eurozone countries (Table 3) reveals that the member states are clustered into two different groups. For the first one, represented by Austria, Belgium, France, Germany, Luxembourg and Netherlands, the common currency is too weak. On the contrary, for the second group, represented by PIIGS countries (Portugal, Italy, Ireland, Greece, Spain) and Finland is the euro too strong which slows down their international trade and makes worse the balance of trade. All of them except for the Ireland had deficit of the balance of trade. On the other hand, the Irish Republic is a specific small open economy with Gross Domestic Product being 31% higher in comparison to the Gross National Product.

Nespresso capsules are totally standardized as produced on the same place for the whole world. Moreover, the demand is not influenced by the tourism. Nespresso prices does not depend on the "bundling". While Big Mac prices relatively differs according to the type of McDonald's menu or system of individual discounts (e.g. for students), the Nespresso prices tend to be fix. Finally, the capsules can be ordered via e-shop which prevents the price differentiation within one country (there are also Nespresso Boutiques, however, they are situated just in a few big cities. For example in the Czech Republic there are just three boutiques – in Prague and Brno).

Table 4 Eurozone cross-country Nespresso Index [€]

		Austria 0.35	Belgium 0.35	Finland 0.42	France 0.35	Germany 0.35	Greece 0.41	Ireland 0.36	Italy 0.37	Luxembourg 0.35	Netherlands 0.35	Portugal 0.38	Spain 0.36
Austria	0.35		0	+20	0	0	+17	+3	+6	0	0	+9	+3
Belgium	0.35	0		+20	0	0	+17	+3	+6	0	0	+9	+3
Finland	0.42	–17	–17		–17	–17	–2	–14	–12	–17	–17	–10	–14
France	0.35	0	0	+20		0	+17	+3	+6	0	0	+9	+3
Germany	0.35	0	0	+20	0		+17	+3	+6	0	0	+9	+3
Greece	0.41	–15	–15	+2	–15	–15		–12	–10	–15	–15	–7	–12
Ireland	0.36	–3	–3	+17	–3	–3	+14		+3	–3	–3	+6	0
Italy	0.37	–5	–5	+14	–5	–5	+11	–3		–5	–5	+3	–3
Luxembourg	0.35	0	0	+20	0	0	+17	+3	+6		0	+9	+3
Netherlands	0.35	0	0	+20	0	0	+17	+3	+6	0		+9	+3
Portugal	0.38	–8	–8	+11	–8	–8	+8	–5	–3	–8	–8		–5
Spain	0.36	–3	–3	+17	–3	–3	+14	0	+3	–3	–3	+6	

Source: Own construction

CONCLUSION

The Nespresso Index provides us with a clear evidence, that the Law of one Price cannot work in recent world and that the theory of the Parity of Purchasing Power is connected to serious weaknesses. First of all, the differences in taxes make the perfect parity impossible. In this paper only the Value Added Tax was taken in account, however, the total bundle of all taxes might just confirm this tendency.

Furthermore, even if the goods is perfectly tradable in theory (and even if there were no tariffs and quotas) the multinational producers might create their own barriers of trade to nobble customers ordering goods from different localities. Such strategy enable companies performing price discrimination, however, it prevents the rational subjects from arbitrage.

Thirdly, there is great disproportion between individual price changes among as well as within the markets. While the goods prices are quite stable, changing just in the jumps, the price of currency – exchange rates – is a subject of the monetary policy as well as of the demand and supply on the currency markets. Therefore, the same price index might indicate both the overvaluation as well as undervaluation of currency in the very short time period.

If the Law of One Price holds for every commodity, even the absolute Purchasing Power Parity holds. However, we have seen that Law of One Price does not hold for Nespresso capsules. From the similar reasons as listed above, it would be very difficult to ensure, that Purchasing Power Parity holds for

the basket of goods and services. The lower level of prices might be caused not only by the lower purchasing power, but also by the pricing strategies of the multinational corporations which maximize profit due to the price discrimination.

All weaknesses of the one-commodity price indices apply also on the composite indices (e.g. OECD PPP). However, the large bundle of goods and services diminishes the amount of errors and may produce more precious results. However, despite the problems connected to the Nespresso Index, it is sufficiently precious to uncover structural problems of the Finnish economy and to highlight other special features. As it is low cost, easy to compute and digestible for the lay public, and as it is not burdened by the Big Mac's weaknesses, it could be used as the useful supplement of the OECD PPP.

Our ambition was not to create new, ideal, competitive Purchasing Power Parity Index which would replace formal OECD PPP. Instead, we wished to perform a kind of mental experiment which would help to reveal further weaknesses of the standard approach to PPP estimates. Purchasing Power Parity is of vital importance for the international comparison; however, our ability to achieve accurate estimates is still seriously limited. Our Coffee Index is therefore not the solution of the problem, but rather a challenge for further methodological work.

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