Comparison of Living Costs in the USA and the Czech Republic  
Using Monetary-Minute Currency  

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The evaluation study deals with the function of money in the management of economic and business processes. The author has postulated a yearly time potential 525,600 minutes as a commodity for its time-based money system. The author has defined a new currency—a Monetary-Minute Currency (in abbreviation MonMin Currency, \( \text{ṁ} \))—as a value of the GDP per capita of a specific state divided by the number of minutes per year (525,600). The author has calculated the MonMin values for the U.S. and Czech economies in the 2010-2018 years. The author has found out, that the MonMin Currency is a usable tool for comparison of living costs and economic performances of the individual states, as well as for evaluating a quality of monetary policy of states. The author has identified distortion of the real Czech economy outcomes expressed in US$, in comparison with outcomes in the MonMin Currency in CZK. In author’s opinion, the Czech Crown’s exchange rate against the US dollar was determined on the money market rather than based on the real economy in 2010-2018.  

Keywords: Monetary-Minute Currency, Gross Domestic Product per Capita, the U.S.A., the Czech Republic  

Introduction  

Money is an important tool for economic and business processes in various human activities. Money represents, expresses, and measures a value of economic entities (i.e. goods, services, resources, labor, debts, etc.), serves as a medium of exchange of valuable entities, serves for storage of values, as a standard of value (or standard of deferred payment), as a unit of account, and it has many further important functions (Samuelson & Nordhaus, 2010; Kala, 2019b). It’s the fiat money, which is prevalingly used in the economy, business, and everyday life nowadays. The amount of money in each state, and consequently the value of its currency, is regulated by individual governments and central banks, and/or by other monetary authorities based on a declared monetary policy (Samuelson & Nordhaus, 2010).  

It is a matter of fact, that there is not generally accepted any standard value, which could measure the value setting of individual currencies, and consequently the value of economic entities, processes, and market transactions in specific states (Kala, 2019b).  

The author has designed and tested an idea of using Time as a commodity for a value standard setting (and evaluation) of money, respectively for the currency. Namely, the author has defined a new currency, called a Monetary-Minute Currency (in abbreviation MonMin Currency or \( \text{ṁ} \)), as a value of the GDP per capita of a
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specific state divided by the number of minutes per year (525,600) (Kala, 2014; 2015; 2017; 2018; 2019a; 2019b).

In this contribution, there are given MonMin values related to the U.S. and China’s economies in the 2011-2018 years to illustrate the use of the MonMin for comparison of living costs in the United States and the Czech Republic, and consequently also of the economic productivity and quality of currency ratio setting in the U.S.A. and the Czech Republic.

**Methodology**

The author has postulated 525,600 minutes, which is a value of 360 days x 24 hours x 60 minutes as a total time capacity of the year as a standard for the Monetary Minute Currency.

Consequently, the author has defined the Monetary Minute (in abbreviation MonMin or ṁ) as domestic product per person created in a 1/525,600 part of the total time capacity of the year, i.e..

\[ \text{ṁ} = \frac{\text{GDP}}{\text{NP}/\text{TC}} \]  

where:
- \( \text{ṁ} \) denotes the value of the Monetary Minute Currency unit,
- GDP is the Gross Domestic Product (in \( \text{ṁ} \)),
- NP is for number of population,
- TC is a total time capacity of a year 525,600 minutes.

It is obvious, that the values of the \( \text{ṁ} \) can be expressed in various currencies, in which the GDP values are used. In this article the author has calculated the following values:

\[ \$\text{ṁ} = \frac{\text{GDP( in $ )}}{\text{NP}/525,600} \]  

and

\[ \text{CZK}\text{ṁ} = \frac{\text{GDP( in CZK )}}{\text{NP}/525,600} \]  

The CZK\( \text{ṁ} \) values were recalculated into the \$\( \text{ṁ} \) in this paper (see Table 2) according to the equation:

\[ \$\text{ṁ} = \frac{\text{CZK}\text{ṁ}}{\text{CR}} \]

where:
- \( \text{CZK}\text{ṁ} \) denotes the Value of a Monetary Minute \( \text{ṁ} \) expressed in the Czech currency CZK,
- \( \$\text{ṁ} \) denotes the value of a Monetary Minute \( \text{ṁ} \) in the U.S. currency,
- CR is for currency rate (i.e. CZK per 1 U.S. Dollar).

Using the Monetary Minute Values, one can calculate prices of products and services or values of incomes, salaries, costs, and other quantities in Monetary Minutes as:

\[ \text{P}\text{ṁ} = \frac{\text{PC}}{\text{C} \text{ṁ}} \]

where:
- \( \text{P}\text{ṁ} \) denotes a price of a product, a service, or other quantities in Monetary Minutes \( \text{ṁ} \),
- PC denotes a price of a product, a service, or other quantities in a specific Currency C, in which the GDP (or the GDP, p.c.)—and consequently—the Monetary Minutes \( \text{ṁ} \) are given,
- \( \text{C} \text{ṁ} \) denotes the value of a MonMin in a specific Currency C.

The values of the GDP and the Number of Population of the U.S. were taken from the U.S. Bureau of Economic (2019), U.S. Census Bureau (2019), Czech Statistical Office (2019), and Czech National Bank (n.d.).

Further details are given in the work (Kala, 2019b).
Results

In Table 1, there are given numbers of the population, values of the Nominal GDP and the $\$/ in current US$ for the United States of America and the Nominal GDP and the $\$/ in CZK in the Czech Republic in 2010-2018 years. It can be seen from Table 1, that the number of population and the value of GDP in USD created yearly in the U.S.A. were considerably greater (nearly 30 times in population, and more than 80 times in GDP) than in the Czech Republic.

Table 1
Population, Values of the Nominal GDP, and the MonMin in Current US$ and CZK for the United States of America and the Czech Republic in 2010-2018

| Year | The U.S.A. | The Czech Republic |
|------|------------|-------------------|
|      | Nominal GDP, in billions$ | Population | $\$/ | Nominal GDP, in millions CZK | Population | CZK$/\$ |
| 2010 | 14,992 | 310,781,705 | 0.091780 | 3,962,464 | 10,517,247 | 0.716816 |
| 2011 | 15,543 | 313,009,712 | 0.094476 | 4,033,755 | 10,496,672 | 0.731143 |
| 2012 | 16,197 | 315,232,752 | 0.097757 | 4,059,912 | 10,509,286 | 0.735001 |
| 2013 | 16,785 | 317,411,551 | 0.100610 | 4,098,128 | 10,510,179 | 0.741819 |
| 2014 | 17,527 | 319,746,157 | 0.104291 | 4,313,783 | 10,524,783 | 0.779813 |
| 2015 | 18,225 | 322,043,071 | 0.107671 | 4,595,783 | 10,542,942 | 0.829359 |
| 2016 | 18,715 | 324,274,912 | 0.109805 | 4,767,990 | 10,565,284 | 0.858616 |
| 2017 | 19,519 | 326,301,399 | 0.113811 | 5,047,267 | 10,589,526 | 0.906827 |
| 2018 | 20,580 | 328,318,861 | 0.119260 | 5,323,556 | 10,626,430 | 0.953145 |

Source: Data of U.S. Bureau of Economic (2019), U.S. Census Bureau (2019), and Czech Statistical Office (2019).

It is also obvious from Table 1, that $\$/ 0.091780, i.e. 9.1780 cents per $\$/ were added to the GDP of the U.S.A. during every minute of the life of each of the American inhabitants in 2010 and that the value increased systematically to 11.9260 cents per $\$/ in 2018. In the Czech Republic, the value added to the GDP of the Czech Republic budget during every minute of the life of every Czech inhabitant was CZK$/\$/ 0.716816 per $\$/ in 2010 and CZK$/\$/ 0.953145 per $\$/ in 2018.

In Table 2, there are given values of the nominal GDP of the Czech Republic in CZK and in USD, currency ratios CZK/USD and corresponding MonMin Values expressed in US$ in 2010-2018. The GDP, as well as MonMin values, shows decreases in their values, which appears in the same years (namely in 2011 and 2013-2016) as the decreases in the Czech Crown value to the USD in 2010-2018.

In Table 3, there are given costs of several products (goods and services) and average monthly net salaries (after income tax) expressed in USD, in Monetary Minutes ($\$/), and in percentages of salaries in Prague and New York City in January 2020 (based on the data of NUMBEO, n.d.) using the current currency ratio of 22.496 CZK per 1 USD). That means for example, the price of the meal in an inexpensive restaurant in Prague is 3.1 times lower in comparison with the one in New York City (further NYC, only), and average monthly net salaries in NYC are 3.9 times higher than those in Prague. This relation is awful to Czech citizens coming to NYC and very plausible for U.S. residents coming to Prague. However, it also means, that the productivity of most of the living products and services would be several times higher in the Czech Republic than that in the United States. The other view offer figures for the costs expressed in percent of the average monthly net salaries (after income tax) in both cities. They differ in relatively low amounts, not just in the case of the meal in inexpensive restaurants in the cities, but also in other items. It means, that the costs of living related to the incomes were the same in both cities.
### Table 2
**Values of the Nominal GDP of the Czech Republic in CZK and USD and Corresponding MonMin Values Expressed in US$ in 2010-2018**

| Year   | The Czech Republic                      | CZK/USD currency ratio | Nominal GDP, in millions USD | $\text{\textdollar}$ |
|--------|----------------------------------------|------------------------|------------------------------|-----------------------|
| 2010   | 3,962,464                              | 18.751                 | 211,320                      | 0.038228              |
| 2011   | 4,033,755                              | 19.940                 | 202,295                      | 0.036667              |
| 2012   | 4,059,912                              | 19.055                 | 213,063                      | 0.038573              |
| 2013   | 4,098,128                              | 19.894                 | 205,998                      | 0.037289              |
| 2014   | 4,313,789                              | 22.834                 | 188,920                      | 0.034151              |
| 2015   | 4,595,783                              | 24.824                 | 185,135                      | 0.033410              |
| 2016   | 4,767,990                              | 25.639                 | 185,966                      | 0.033489              |
| 2017   | 5,047,267                              | 21.291                 | 237,061                      | 0.042592              |
| 2018   | 5,323,556                              | 22.466                 | 236,961                      | 0.042426              |

Source: Data of Czech National Bank (n.d.), Czech Statistical Bureau (2019), and Kimberley Amadeo (n.d.).

### Table 3
**Costs of Several Products and Average Monthly Net Salaries (After Income Tax) Expressed in USD, Monetary Minutes ($\text{\textdollar}$), and in Percentages of Salaries in Prague and New York City in January 2020**

| Products and Salaries | Price in $ | $\text{\textdollar}$ | Ratio of Prices | Price in % of Salary | Ratio of Prices |
|-----------------------|------------|-----------------------|-----------------|----------------------|-----------------|
|                       | Prague     | NYC                   | Prague          | NYC                  | Prague          | NYC             |
| **Restaurants**       |            |                       |                 |                      |                 |
| Meal, inexpensive restaurant | 6.67 | 21.00 | 0.79 | 2.49 | 3.1 | 0.50 | 0.40 | 0.8 |
| Meal for 2 people, mid-range rest. three-course | 33.34 | 87.50 | 3.96 | 10.40 | 2.6 | 2.51 | 1.69 | 0.7 |
| McMeal at McDonalds (or equivalent meal) | 6.22 | 9.00 | 0.74 | 1.07 | 1.4 | 0.47 | 0.17 | 0.4 |
| Domestic Beer (0.5 liter draught) | 1.78 | 7.00 | 0.21 | 0.83 | 3.9 | 0.13 | 0.13 | 1.0 |
| Imported Beer (0.33 liter bottle) | 2.22 | 8.00 | 0.26 | 0.95 | 3.6 | 0.17 | 0.15 | 0.9 |
| Coke/Pepsi (0.33 liter bottle) | 1.40 | 2.11 | 0.17 | 0.25 | 1.5 | 0.11 | 0.04 | 0.4 |
| Water (0.33 liter bottle) | 1.04 | 1.77 | 0.12 | 0.21 | 1.7 | 0.08 | 0.03 | 0.4 |
| **Markets**           |            |                       |                 |                      |                 |
| Milk (regular) (1 liter) | 0.87 | 1.16 | 0.10 | 0.14 | 1.3 | 0.07 | 0.02 | 0.3 |
| Loaf of Fresh White Bread (500g) | 1.09 | 3.74 | 0.13 | 0.44 | 3.4 | 0.08 | 0.07 | 0.9 |
| Rice (white) (1kg) | 1.59 | 6.34 | 0.19 | 0.75 | 4.0 | 0.12 | 0.12 | 1.0 |
| Eggs (regular) (12) | 1.90 | 3.70 | 0.23 | 0.44 | 1.9 | 0.14 | 0.07 | 0.5 |
| Local Cheese (1kg) | 9.02 | 15.80 | 1.07 | 1.88 | 1.8 | 0.68 | 0.30 | 0.4 |
| Chicken breasts (boneless, skinless) (1kg) | 6.80 | 14.17 | 0.81 | 1.68 | 2.1 | 0.51 | 0.27 | 0.5 |
| Beef round (1kg) (or equiv. back leg meat) | 10.36 | 15.11 | 1.23 | 1.79 | 1.5 | 0.78 | 0.29 | 0.4 |
| **Rent per month**    |            |                       |                 |                      |                 |
| Apartment (1 bedroom) in city centre | 902.99 | 3,195.40 | 107.28 | 379.62 | 3.5 | 68.08 | 61.54 | 0.9 |
| Apartment (3 bedrooms) in city centre | 1,450.86 | 6,218.75 | 172.37 | 738.81 | 4.3 | 109.38 | 119.76 | 1.1 |
| Buy apartment price | Price per square meter to buy apartment in centre | 5,571.79 | 14,668.68 | 661.95 | 1,742.69 | 2.6 | 420.06 | 282.49 | 0.7 |
| **Salaries**          |            |                       |                 |                      |                 |
| Average monthly net salary (after tax) | 1,326.43 | 5,192.60 | 157.58 | 616.90 | 3.9 | 100.00 | 100.00 | 1.0 |

Source: Data of NUMBEO (n.d.).
According to the NUMBEO’s (n.d.) calculation, using their costs of living and rent indexes to compare (this assumes net earnings after income tax), one would need around 177,734.38 CZK (7,900.68$) in NYC to maintain the same standard of life that one can have with 68,000.00 CZK in Prague (assuming you rent in both cities) in January 2020. That means, that the related currency ration, in this case, corresponds to 8.6068 CZK per 1 USD.

**Discussion**

This work has put a light on the essentiality of the Monetary Minute Currency, and on how to use it in evaluating some entities and processes of real economics.

Data gathered in Tables 1 and 2 indicate that meanwhile, the development of the GDP of the Czech Republic expressed in Czech Crowns and CZK $\text{=}\text{m}$ was smooth and positive in 2010-2018, the ones expressed in U.S. dollars and $\text{=}\text{m}$ (recalculated based on corresponding currency ratios) show negative declines in the rate indexes. The declines correspond to occurrences of anomalies in the development of the currency ratio CZK/USD in the same period. In the author’s opinion, the currency ratio CZK/USD does not correspond to real economic development in the Czech Republic.

The decline of the CZK/USD currency ratio from the economic reality in the Czech Republic was revealed in the comparison of the costs of several products and average monthly net salaries in Prague and New York City in January 2020 (see Table 3), too. The author has found, the costs expressed in percent of the average monthly net salaries in both cities differed in relatively low amounts (that means, that the costs of living related to the incomes in both cities were the same). However, the market costs in CZK or USD were several times lower in Prague than in New York City, and the average monthly net salaries in NYC were 3.9 times higher than in Prague. It would evoke an unrealistic conclusion that the productivity of most of the living products and services would be several times higher in the Czech Republic than in the United States.

The results indicate that the real state of the Czech economy, and the Czech central bank authorities influence the currency ratio CZK/USD which are lower than factors like the economic robustness and strength of states and/or the mood of traders on the financial market.

**Conclusions**

The gist of the MonMin Currency dwells in the fact that the Total Economic Time Capacity of a Year expressed in Monetary Minutes is 525,600 $\text{=}\text{m}$ all over the world and history. It can serve as a commodity, for a steady monetary value standard. One can recalculate the value of the $\text{=}\text{m}$ into different currencies (see Equation 3). The values of the $\text{=}\text{m}$ can be joint to the real socioeconomic situation in specific states via their GDP, a number of residents, and currency via Equation (1). The Monetary Minute Currency can fulfill the role of comparative currency, which enables an evaluation of the differences among real economies, their efficiencies, productivity, currencies, monetary, economic, political, and other entities in the unitary time units $\text{=}\text{m}$. Their unit values are commensurate with the values of smallest items in everyday expenditures of households.

The use of Monetary Minute Currency revealed also the fact that the Czech Crown’s exchange rate against the US dollar was determined on the money market rather than based on the real economy in 2010-2018.

**References**

Czech National Bank. (n.d.). Kurzy historie, kurzovní lístek ČNB 31.12.2018. Retrieved January 28, 2020, from https://www.kurzy.cz/kurzy-men/kurzy.asp?A=H&M=6&D=31.12.2018
Czech Statistical Bureau. (2019). *M000101a GDP identity from the production side (current prices).* http://apl.czso.cz/plc/rocenka/rocenka.presmsocas?jmeno_tabulka=M0%25201aa&rokov=2008&roko=2018&mylang=EN&ceny=bc&vystup=obrazovka&priznak=M00010%25&type=2&jak=1&dejarchiv=0

Kala, T. (2014). Management & financial and economic crisis 2007-2008. In P. Jedlica (Ed.), *Hradec Economic Days ISBN 978-80-7433-366-6 ISSN 2464-6032 (Print)* (pp. 415-421). University of Hradec Kralove. https://uni.uhk.cz/hed/site/assets/files/1049/proceedings_2014_1.pdf

Kala, T. (2015). Money in modern economy. In J. Pavel (Ed.), *Hradec Economic Days 2015* (pp. 277-283). University of Hradec Kralove.

Kala, T. (2017). Time-based money in V4 economies. In P. Jedlicka (Ed.), *Hradec Economic Days (HED) 2017* (pp. 73-78). Gaudeamus Hradec Kralove ISSN 2464-6032 (Print), ISSN 2464-6040 (Online). https://uni.uhk.cz/hed/site/assets/files/1046/proceedings_2017_2.pdf

Kala, T. (2018). Monetary minute currency—An economic value setting tool. In I. Jedlička, P. Marešová, & P. Soukal (Eds.), *Hradec Economic Days* (pp. 377-387). University of Hradec Kralove. https://uni.uhk.cz/hed/site/assets/files/1072/proceedings_2018_1.pdf

Kala, T. (2019a). Currency based on time standard. *ArXiv:1910.07859 [Econ.GN].* https://arxiv.org/abs/1910.07859

Kala, T. (2019b). Comparison of living costs in monetary minute currency. In I. Jedlička, P. Marešová, & P. Soukal (Eds.), *Hradec Economic Days* (pp. 386-396). University of Hradec Kralove. https://uni.uhk.cz/hed/site/assets/files/1073/proceedings_2019_1.pdf

Kimberley Amadeo. (n.d.). *U.S. GDP by year since 1929 compared to major events.* Retrieved January 28, 2020, from https://www.thebalance.com/us-gdp-by-year-3305543

NUMBE. (n.d.). *Cost of living comparison between Prague and New York, NY.* Retrieved January 16, 2020, from https://www.numbeo.com/cost-of-living/compare_cities.jsp?country1=Czech+Republic&country2=United+States&city1=Prague&city2=New+York%2C+NY&tracking=getDispatchComparison

Samuelson, P. A., & Nordhaus, W. D. (2010). *Macroeconomics 19e* (H. Karren, L. Fisger, & N. Fox (Eds., 19th ed.). McGraw-Hill/Irwin, Douglas Reiner.