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## **Euro and Corporate Management in Czech Republic**

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**Abstract:**

*The paper aims to evaluate the attitude of corporate management (not the public opinion) regarding the introduction of the euro in the Czech Republic and to identify the main factors which influence this attitude.*

*We also work on the hypothesis that the attitude to the euro depends on the stability of the CZK/EUR exchange rate and on developments in the Czech foreign trade with the euro area.*

*We collected companies' opinions on the introduction of the euro from corporate management opinion polls in 2011-2017. The data analysis has concluded that increased fluctuations of the CZK/EUR exchange rate (towards appreciation as well as depreciation) are accompanied with increased interest in the introduction of the euro.*

*It is also the growing volume and share of trading with the euro area which is directly proportional to the growth in companies' interest in the introduction of the euro.*

**Keywords:** *Corporate management, euro area enlargement, exchange rate stability, foreign trade.*

**JEL Code:** *F 15, F 45, M 10.*

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## **1. Introduction**

Our research aims to find out what affects attitudes of companies in the Czech Republic to replacement of the Czech koruna by the euro. The key benefits of the introduction of the euro are elimination of exchange rate fluctuations and reduction of transaction costs in trade with the euro area. Therefore, our working hypothesis is: corporate managers adopt their attitude to the euro depending on two factors:

- a) stability of the CZK/EUR exchange rate;
- b) a share of the Czech foreign trade with euro area countries in the total foreign trade.

At first, our research provides an overview of the Czech Republic's readiness to adopt the euro and an overview of expected benefits and costs for companies, in relation to the introduction of the euro in the Czech Republic. Furthermore, we analyse the development of the CZK/EUR exchange rate, the development of the foreign trade with the euro area and Czech companies' opinions on the introduction of the euro. It is followed by evaluation of relations among exchange rate development, regional structure of foreign trade and companies' interest in the introduction of the euro.

## **2. Literature review**

The literature which we have used as a source will be divided into two categories. First, it is the literature that deals with the currency integration at the general level. When evaluating benefits and costs of the introduction of the single EU currency, we proceed from key "classic" works by De Grauwe (2016) and Baldwin and Wyplosz (2015). General conditions for the introduction of the euro in the Central and Eastern Europe are dealt with the work by Palankai (2015) and Thalassinos *et al.* (2015) and Thalassinos and Dafnos (2015). We supplement this literature with our own specifications. For the purpose of quantification of benefits and costs related to the introduction of the euro, three studies in particular have been used, namely the Czech study by Lacina (2007), Slovak studies by the National Bank of Slovakia (Národná banka Slovenska, 2006) and by Lalinský (2010). When evaluating the Czech Republic's readiness for the introduction of the euro, we proceed from the study of the Ministry of Finance and the Czech National Bank on nominal convergence (2017) and complement it with our own calculations about real convergence.

Second, it is the literature that explores attitudes of Czech companies to the introduction of the euro. We use several opinion polls. One of them is a study by the Czech Chamber of Commerce (Hospodářská komora České republiky, 2011), Confederation of Industry of the Czech Republic (Svaz průmyslu a dopravy České republiky, 2014) and CEEC Research (2016; 2017). Although these opinion polls do not form a continuous timeline, we consider them sufficiently representative for our

research. Until now, no paper has been published that would provide a global evaluation of the reasons which have an impact on Czech companies' opinions on the introduction of the euro.

### 3. Methods and data

To evaluate the Czech Republic's readiness for joining the euro area, on one hand, we took the data about nominal convergence from the analysis by the Ministry of Finance and the Czech National Bank and, on the other hand, we calculated real convergence indicators (economic level, price level) from the Eurostat database.

To achieve the main objective of our research, we analysed three data files (i.e. collected empirical data and sorted them), specifically on:

- development of the CZK/EUR exchange rate;
- opinions of Czech companies (i.e. managers of these companies) on the introduction of the euro;
- development of the Czech foreign trade (export and import of goods and services) with the euro area.

Subsequently, we made a comparison of developments in these indicators expressed by graphs and numbers and made conclusions based on this comparison. Statistical sources come from databases of the European Central Bank and the Czech National Bank (CZK/EUR exchange rate, balance of payments statistics). The companies' opinions come from the above-mentioned opinion polls.

## 4. Motivation – the introduction of the euro in the Czech Republic

### 4.1 Institutional and economic readiness

Once, the introduction of the euro was already planned and later cancelled in the Czech Republic *The Czech Republic's Euro Area Accession Strategy* (of September 2003) mentions "the term of 2009–2010" which was later made more accurate in the *Institutional safeguarding of the introduction of the euro* (2005) to a "working deadline" of 1 January 2010. In October 2006, the government decided not to seek to join the exchange rate system ERM II in 2007, which meant cancellation of the initial plan to join the eurozone in 2010. A new date has not been set. *The Czech Republic's Updated Euro Area Accession Strategy* (of August 2007) confirmed both cancellation of the initial deadline in 2010 and absence of any new particular date for the planned joining of the euro area. On an annual basis, the Ministry of Finance and the Czech National Bank work out *Assessment of the Fulfilment of the Maastricht Convergence Criteria*. Since 2006 until now, this Assessment contains the same recommendation to the government as to not to set a date for joining the exchange rate mechanism (ERM II) and consequently the euro area.

The Czech Republic has made a number of preparatory steps for the introduction of the euro (especially it adopted the *National Euro Changeover Plan for the Czech Republic*, April 2007, updated three times in 2008–2010); however, the introduction of the euro has been postponed in the long run. In April 2011 starts a period of “*reduced preparations*”, when next preparatory steps consist only in e.g. foreign experience monitoring, informing the public via websites, etc. Still existing is the *National Coordination Group for Euro Changeover in the Czech Republic* (as part of the Ministry of Finance), whose activity is mentioned in annual *Reports* (the most recent one of January 2017).

We will evaluate economic conditions for the introduction of the euro in the Czech Republic from the viewpoint of nominal and real convergence to the euro area. We will express nominal convergence by evaluation of fulfilment of Maastricht convergence criteria (Table 1).

**Table 1:** Maastricht convergence criteria (2016, in %)

Criterion	Reference value	Actuals Czech Republic
Price stability (inflation rate)	0.7	0.6
Sustainability of public finance: - public finance balance (in % to the GDP) - public debt (in % to the GDP)	max. -3.0 max. 60.0	0.7 36.8
Exchange rate	No participation in ERM II	
Long-term interest rate convergence	4.1	0.4

**Source:** Ministry of Finance of the Czech Republic and the Czech National Bank (2017).

Nominal convergence is fulfilled except for participation in ERM II. The ERM II participation has to be at least two years long. However, to simulate this participation we cannot use the development of the CZK/EUR exchange rate in 2016–2017, because massive interventions were running in the foreign currency market which could be regarded as “severe tensions”. Nevertheless, using two alternative simulations (Helísek and Mentlík, 2017) shows fulfilment of this Maastricht criterion as well. We will express real convergence by comparison of the economic level (GDP per capita) and price levels (Table 2). We will compare the Czech Republic both with the euro area average and with major trade partners (Germany, Slovakia).

**Table 2:** Comparison of the economic and price level (2016, in %).

Czech Republic compared with	Economic level	Price level
euro area (19)	83.0	64.7
Germany	71.5	63.6
Slovakia	114.3	96.6

**Source:**

<http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tec00114&plugin=1>

<http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tec00120>. Our own calculations.

*Note:* GDP per capita in PPS. Comparative price levels of final consumption by private households including indirect taxes.

No arbitrary criteria are defined to evaluate real convergence (in contrast to nominal convergence). For the sake of comparison, let us add convergence of Slovakia to the euro area in 2008, i.e. one year before they adopted the euro. The economic level was 65.1 %, whereas the price level was 68.1 %. The Czech Republic thus shows a sufficient real convergence to the euro area as a whole as well as to the main trade partners.

#### 4.2 Benefits and costs of the introduction of the euro for the industry

We proceed from the standard concept of benefits and costs of a single currency. At the general level, we use De Grauwe (2016) and Baldwin and Wyplosz (2012) as the basis. We also utilise experience from the introduction of the euro in Slovakia (Lalinský, 2010), in Romania (Zaman and Meunier, 2017) and in Greece (Thalassinos *et al.*, 2012). The main benefits for companies include:

- 1) Elimination of some transaction costs related to foreign currency management, such as costs of foreign currency conversion, increased costs of payments using foreign currencies, costs related to keeping other accounts opened (i.e. foreign currency accounts). These costs in the Czech Republic are estimated to be 0.28% GDP (Lacina, 2007).<sup>3</sup>
- 2) Transparency of prices makes their comparison easier, which simplifies mutual trading and reduces related costs.
- 3) The exchange rate risk and costs related to mitigating this risk (insurance against exchange rate risk) cease to exist at foreign trading.
- 4) A consequence of the previous benefits is an increase in the mutual trade within the monetary union (“trade effect”).

What is the quantification of the overall benefit of the single currency for the development of the mutual trade among euro area members? According to the study by the European Commission *EMU@10* (European Commission, 2008, p. 4), the mutual trade of euro area members increased from one quarter to one third of GDP over the last decade. A half of this increase in the trade is attributed to the effect of elimination of the exchange rate risk and reduced costs.<sup>4</sup>

<sup>3</sup>According to the study by the Office of the Government of the Czech Republic *Economic evaluation of the Czech Republic’s membership in the EU after ten years (Ekonomické vyhodnocení členství České republiky v EU po deseti letech, 2014, p. 44)*, the transaction costs savings are 0.22 %.

<sup>4</sup>According to the above-mentioned study from 2014 (p. 45), the trade of the Czech Republic and the euro area would grow by 30–50% in the long term.

Companies' costs related to the introduction of the euro (Lacina, 2007; Helisek, 2016):

- 1) Costs of modification of information systems (conversion of IT systems to the euro, SW updates, user training).
- 2) Information and awareness-building campaign (employee training, increased capacity of call centre – customer inquiries).
- 3) Preparation of new price lists, informational materials and catalogues, costs related to dual price labelling.
- 4) Dual cash handling and costs of new cash replacement (cash collection and transport between the bank and the company).

To quantify these costs, we will use findings from the Slovak economy. A research carried out by the National Bank of Slovakia has concluded that Slovak small and medium-sized companies expected, on average, costs of 0.27 % of the company annual turnover, whereas big companies 0.09 % (Národná banka Slovenska, 2006, p. 15).<sup>5</sup>

## **5. Data analysis: exchange rate, foreign trade and opinions of companies**

### **5.1 Development of the CZK/EUR exchange rate**

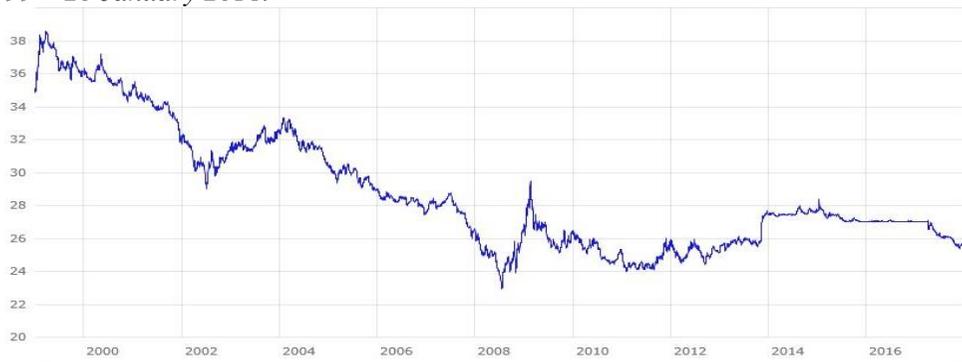
Companies' motivation to the introduction of the euro is connected with the development of the CZK/EUR exchange rate. This development has been showing an appreciation trend in the long run. In 1999-2017 we can notice the following interim stages in the development of the CZK/EUR exchange rate:

- The starting average value in 1999 was CZK 37/EUR.
- In 2009, a marked depreciation occurred as a consequence of investors distrust due to the economic recession, which was followed by a moderate appreciation again.
- From 7 November 2013 till 6 April 2017 the Czech National Bank (ČNB) was keeping an “exchange rate commitment”. The CZK/EUR exchange rate did not fall down the lower (appreciation) limit of CZK 27 per EUR, while the upper (depreciation) limit was unrestricted. This exchange rate obligation was implemented by means of massive interventions in the foreign currency market. During these interventions, the ČNB purchased assets in the equivalent of CZK 2 050 bn as foreign currency reserves, after the end of the interventions, the development of the CZK/EUR exchange rate continued in its appreciation trend.

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<sup>5</sup>A more recent research confirmed these estimates at 0.2%, see the study by the National Bank of Slovakia *Introduction of the euro in Slovakia. Information for entrepreneurs (Národná banka Slovenska, Zavedenie eura na Slovensku. Informácia pre podnikateľov, 2007).*

**Figure 1.** Development of CZK/EUR exchange rate (daily exchange rates) 1 April 1999 – 20 January 2018.



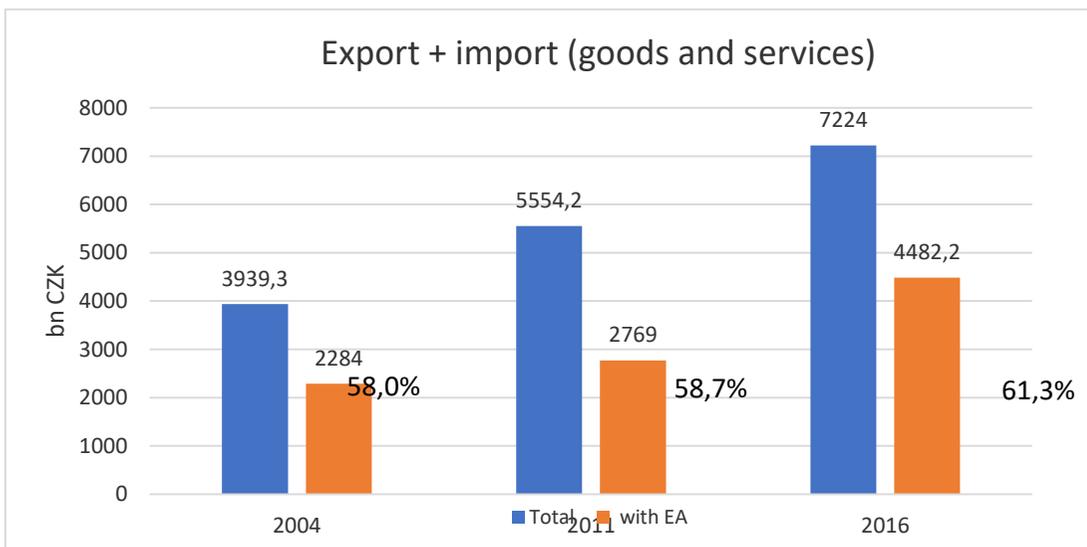
**Source:**

[https://www.ecb.europa.eu/stats/policy\\_and\\_exchange\\_rates/euro\\_reference\\_exchange\\_rates/html/eurofxref-graph-czk.en.html#](https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/eurofxref-graph-czk.en.html#)

## 5.2 Development of the foreign trade with the euro area

In order to identify companies' motivation to the introduction of the euro, we must also find out the development of the foreign trade with euro area countries. For that purpose, we will use the data about total foreign trade turnover (i.e. a sum of exports and imports of goods and services) with the whole world and the data about this turnover in relation to the euro area (Figure 2).

**Figure 2:** Foreign trade of the Czech Republic in total and with the euro area (in bn CZK, %)



**Source:**

[http://www.cnb.cz/cs/statistika/platbni\\_bilance\\_stat/publikace\\_pb/bezny\\_ucet\\_pb\\_tc/index.html](http://www.cnb.cz/cs/statistika/platbni_bilance_stat/publikace_pb/bezny_ucet_pb_tc/index.html), Our own calculations.

**Note:** EA = euro area in the composition according to the current status in the above-mentioned years (i.e. 12 members, 17 members and 19 members).

The euro area's share in the Czech foreign trade has been increasing, specifically from 58.0 % in 2004 to 61.3 % in 2016 (in 2016 the share of export to the euro area countries was 62.7 %, while the import accounted for 59.6 %; the main trading partners were Germany and Slovakia). We opted for the initial year 2004 because of the homogenous character of the period of time under review. In that year the Czech Republic joined the European Union, which led to a boost of trade and to a surplus of the trade balance (since 2015).

### 5.3 Companies' opinions on the adoption of the euro

There is a systematic, long-term public opinion survey in the Czech Republic regarding the introduction of the euro which has been carried out by the Centre for Public Opinion Research (Centrum pro výzkum veřejného mínění). However, there is no similar opinion survey concerning companies' attitudes. For our analysis, we will, therefore, use available results of opinion polls conducted by various organisations. Although the timeline of the survey was discontinuous, we regard it as sufficiently representative for our research.

**Table 3.** Development in Czech companies' opinions on the adoption of the euro.

<b>Opinion poll in October 2011</b>	<b>Comments</b>
For the euro: 31 % Against the euro: 55 % Without express opinion: 14 %	Czech Chamber of Commerce (Hospodářská komora České republiky), 906 companies. For the euro: big companies 48 %, small companies 26 %.
<b>Opinion poll in April 2014</b>	<b>Comments</b>
Adopt the euro quickly: 55 % Adopt the euro later or never: 45 %	Czech Confederation of the Industry (Svaz průmyslu a dopravy České republiky), 267 companies. For the euro: "Yesterday was already too late." 25.1 %; Adopt it by 2020: 29.6 %
<b>Opinion poll in November 2016</b>	<b>Comments</b>
Adopt the euro: 44 % Not to adopt the euro: 56 %	CEEC Research, 101 respondents – managers of engineering companies. For the euro: big companies 49 %, small and medium-sized companies 40 %.
<b>Opinion poll in November 2017</b>	<b>Comments</b>
Adopt the euro: 73 % Not to adopt the euro: 27 %	CEEC Research, 101 respondents – managers of engineering companies. For the euro: big companies 78 %, small and medium-sized companies 66 %.

**Source:**

2011: *Hospodářská komora České republiky, 2011.*

2014: *Svaz průmyslu a dopravy České republiky, 2014.*

2016, 2017: *CEEC Research, pp. 22, 38.*

The development of Czech companies' opinions on the adoption of the euro does not show a steady trend (upward or downward); substantial variations occur in these opinions. The following part of our paper (Part 6) seeks to find an explanation of these variations.

## 6. Results

1) We consider the key factor influencing Czech companies' opinions on the introduction of the euro to be the development of the CZK/EUR exchange rate, or more precisely the stability of this exchange rate. We work on the proven fact that a reduction in the risk of exchange rate fluctuations results in an increase in the trade with the monetary union countries (empirical study by the European Commission, see Helísek, 2013; Bartram and Karolyi, 2006). Although it is possible to take out an insurance policy against the risk of exchange rate fluctuations, the insurance policy is expensive.<sup>6</sup>

We will assess the exchange rate stability as a year-on-year percentage change in the average annual CZK/EUR exchange rate (Table 4).

**Table 4:** *Change in the CZK/EUR exchange rate (average annual exchange rate, year-on-year change, in %).*

2011	2012	2013	2014	2015	2016	2017
-2.8	+2.3	+3.3	+6.0	-0.9	-0.9	-2.6

*Notice:* “-“ means appreciation, “+“ means depreciation of the CZK/EUR exchange rate.

**Source:**

[https://www.cnb.cz/cs/financni\\_trhy/devizovy\\_trh/kurzy\\_devizoveho\\_trhu/prumerne\\_mena.js?p?mena=EUR](https://www.cnb.cz/cs/financni_trhy/devizovy_trh/kurzy_devizoveho_trhu/prumerne_mena.js?p?mena=EUR) Our own calculations.

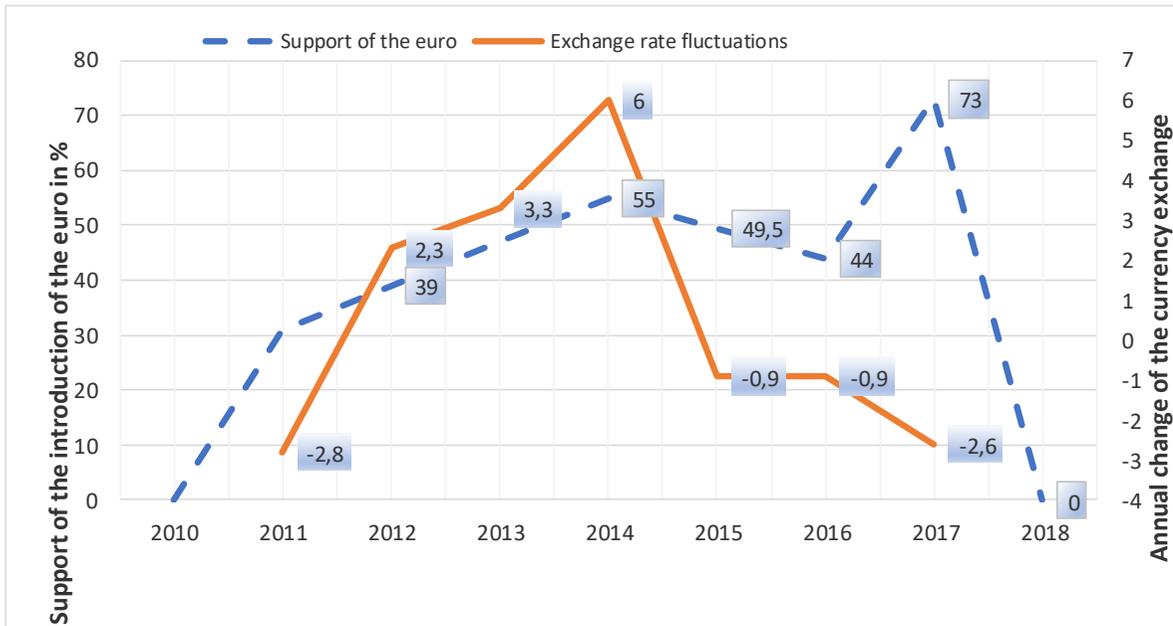
Further, we will compare the stability of the CZK/EUR exchange rate with the development of companies' opinions on the introduction of the euro (Figure 3). The left axis shows the companies' opinions on the introduction of the euro being “for the euro” (in %), whereas the right axis shows a change in the CZK/EUR exchange rate (in %).

The analysis of the indicators under review shows these conclusions:

- The weak interest in the euro at the beginning of this period of time in 2011 was caused, according to the companies, by fears for the development of the euro area.

<sup>6</sup>According to the survey by Association of Small and Medium-Sized Companies of the Czech Republic *Perception of currency interventions among exporters (Asociace malých a středních podniků České republiky, Vnímání měnových intervencí mezi exportery, 2017)*, only 40% of exporters takes out such an insurance policy.

**Figure 3.** Comparison of CZK/EUR exchange rate fluctuations and opinions on the introduction of the euro



*Source:* The authors' own calculations – Table 3 and Table 4.

- From 2011 till November 2013 (foreign currency interventions started in November 2013) the CZK/EUR exchange rate was considerably variable (from -2.8 % up to 3.3 %), simultaneously, the companies' interest in the introduction of the euro grew from 31 % to 55 % (in April 2014).
- At the time of the foreign currency interventions between 2014 and 2016, the CZK/EUR exchange rate was relatively stable, while the companies' interest in the euro fell to 44 % (in November 2016).
- After the end of the foreign currency interventions in April 2017, the CZK/EUR exchange rate was appreciated, while the interest in the euro grew significantly (six months before the end of the interventions it was 73 %).

Figure 3 shows a clear relation; a higher instability of the CZK/EUR exchange rate (both towards depreciation and appreciation) is accompanied by companies' interest in the introduction of the euro.

2) Another factor which is connected with companies' interest in the introduction of the euro is the development in the share of foreign trade with the euro area. The development between 2011 and 2016 was as follows:

- Czech companies' interest in the introduction of the euro grew from 31 % to 44 % over that period of time.

- The share of Czech companies' trade with the euro area grew both absolutely (from CZK 2 789.0 bn to CZK 4 428.2 bn) and relatively (from 58.7 % to 61.3 %).

The growth in Czech companies' interest in the introduction of the euro corresponds to the growing share of the Czech foreign trade with the euro area.

## 7. Conclusion

The Czech Republic is economically and institutionally ready for the introduction of the euro. The industrial sector can expect those benefits from the introduction of the euro that result from the exchange rate stability (the CZK/EUR exchange rate will cease to exist) and from a reduction of transaction costs in foreign trade with the euro area. The companies' interest in the introduction of the euro shows:

- a direct proportion with instability of the exchange rate, in both directions (appreciation, depreciation) – an increased instability of the exchange rate is accompanied with growing interest of companies in the introduction of the euro;
- as well as a direct proportion with a growth of the trade with the euro area – the growing trade with the euro area is accompanied with growing interest of companies in the introduction of the euro.

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## References:

- Baldwin, R. and Wyplosz, Ch. 2015. *The Economics of European Integration*. Fourth ed. McGraw-Hill Education. ISBN 9780077169657.
- Bartram, S.M. and Karolyi, G.A. 2016. The impact of the introduction of the Euro on foreign exchange rate risk exposures. *Journal of Empirical Finance*, 13(4-5).
- CEEC Research. 2016, 2017. Study on Czech Engineering Industry H2/2016, H2/2017. November 2016, November 2017, <http://www.ceec.eu/media/>
- Chamber of Commerce of the Czech Republic 2011. Survey by the Chamber of Commerce: Companies are against the adoption of the euro, <https://www.iprosperita.cz/lobby-info/1010-pruzkum-hospodarske-komory-cr-firmy-jsou-proti-prijeti-eura>
- Confederation of Industry of the Czech Republic. 2014. Czech companies appreciate the accession to the European Union, <https://archiv.ihned.cz/c1-62109400-ceske-firmy-si-vstup-do-evropske-unie-pochvaluji>
- De Grauwe, P. 2016. *Economics of Monetary Union*. 11th ed. Oxford: Oxford University Press, ISBN 978-0199605576.

- European Commission 2008. EMU@10: Successes and challenges after 10 years of Economic and Monetary Union. May 7, 2008, [http://ec.europa.eu/economy\\_finance/emu10/emu10report\\_en.pdf](http://ec.europa.eu/economy_finance/emu10/emu10report_en.pdf).
- Helisek, M. 2013. Export Potential of SMEs and Euro Adoption in the Czech Republic. *European Research Studies Journal*, 16(4), 71-78.
- Helisek, M. 2016. Supporting Small and Medium-sized Enterprises in Preparing for the Euro Adoption in the Czech Republic. *European Research Studies Journal*, 19(4), 27-41.
- Helisek, M. and Mentlik, R. 2017. Simulation of the Czech Koruna's Participation in ERM II – Alternative Approaches. *Journal of International Studies*, 10(2).
- Lacina, L. 2007. Study on impact of the introduction of the euro on Czech economy. Ministry of Finance of the Czech Republic, [http://www.mfcr.cz/cps/rde/xbcr/mfcr/Studie\\_NKS\\_final\\_upravena\\_po\\_opnerture\\_31\\_08\\_20081.pdf](http://www.mfcr.cz/cps/rde/xbcr/mfcr/Studie_NKS_final_upravena_po_opnerture_31_08_20081.pdf)
- Lalinský, T. 2010. Companies' competitiveness after the introduction of the euro in Slovakia. National Bank of Slovakia, [https://www.nbs.sk/\\_img/Documents/PUBLIK/OP\\_03\\_2010\\_Lalinsky-Konkurencieschopnost\\_podnikov\\_po\\_zavedeni\\_eura.pdf](https://www.nbs.sk/_img/Documents/PUBLIK/OP_03_2010_Lalinsky-Konkurencieschopnost_podnikov_po_zavedeni_eura.pdf)
- Ministry of Finance of the Czech Republic and the Czech National Bank. 2017. Assessment of the Fulfilment of the Maastricht Convergence Criteria and the Degree of Economic Alignment of the Czech Republic with the Euro Area, <https://www.zavedenieura.cz/en/documents/fulfilment-of-maastricht-criteria>
- National Bank of Slovakia. 2006. Estimate of possible impacts of the introduction of the euro on the company sector in the Slovak Republic. June 2006, [http://www.nbs.sk/\\_img/Documents/PUBLIK/06\\_kol3.pdf](http://www.nbs.sk/_img/Documents/PUBLIK/06_kol3.pdf)
- Palankai, T. 2015. The introduction of the Euro and Central Europe. *Economics and Sociology*, 8(2).
- Thalassinos, I.E., Stamatopoulos, D.T. and Thalassinos, E.P. 2015. The European Sovereign Debt Crisis and the Role of Credit Swaps. Chapter book in *The WSPC Handbook of Futures Markets* (eds) W. T. Ziemba and A.G. Malliaris, in memory of Late Milton Miller (Nobel 1990) *World Scientific Handbook in Financial Economic Series Vol. 5*, Chapter 20, pp. 605-639, ISBN: 978-981-4566-91-9, (doi: 10.1142/9789814566926\_0020).
- Thalassinos, I.E. and Dafnos, G. 2015. EMU and the process of European integration: Southern Europe's economic challenges and the need for revisiting EMU's institutional framework. Chapter book in *Societies in Transition: Economic, Political and Security Transformations in Contemporary Europe*, 15-37, Springer International Publishing, DOI: 10.1007/978-3-319-13814-5\_2.
- Thalassinos, I.E., Haniias, P.M. and Curtis, G.P. 2012. Time series prediction with neural networks for the Athens Stock Exchange indicator. *European Research Studies Journal*, 15(2), 23-31.
- Zaman, C., Meunier, B. 2017. A Decade of EU Membership: Evolution of Competitiveness in Romania. *European Research Studies Journal*, 20(2A), 224-236.